City of Plymouth

# 2040 COMPREHENSIVE PLAN



CHAPTER 1

# Introduction

# Chapter 1

# INTRODUCTION

## AUTHORITY AND PROCESS

The City of Plymouth has prepared this update of its comprehensive plan to guide community development and improvements over the next 20 years. State law authorizes a municipality to prepare a comprehensive plan. State law also requires that a municipality within the seven-county metropolitan area review, and if necessary revise, its comprehensive plan every ten years.

State law requires that a municipality undertake a public process to gain citizen input as part of the preparation of a comprehensive plan. The City of Plymouth began the public process in May of 2015. Unlike earlier processes, input gathered through workshops and open houses was augmented with input received through social media.

The overall comprehensive plan replaces the last major plan update, which the City adopted in April 2009, and all amendments to that plan. Since 2009, Plymouth has moved closer to becoming a fully developed community with an increasingly limited supply of undeveloped land and an emerging need for redevelopment in commercial and industrial areas.

The Comprehensive Plan begins with community background information and the vision statements that guided all elements of the plan. Chapters on land use, housing, surface water management, transportation, parks, trails, recreation and open space, water supply and distribution, sanitary sewer and public facilities follow. Each of these chapters includes goals and policies, plans that reflect the policy direction, and an implementation plan. Most of the chapters also contain technical appendices.

## IMPLEMENTATION

The purpose of addressing implementation in the comprehensive plan is to set forth the actions that the City will take to ensure that the plans, programs and policies set forth in the plan will be carried out by the decisions that the City makes on a daily basis. The implementation section in each chapter provides guidance to policy-makers and staff for the timing and priority of a wide range of strategies recommended to carry out the plan. Some implementation strategies are on-going city activities that will be continued and others are new initiatives.

Implementation activities fall into the following general categories:

- Future studies and planning activities, including plan amendments – additional planning or research that must occur before a specific course of action may be recommended. For example, the land use plan identifies several areas for future study to address appropriate land use options.
- Ordinance/city code amendments – amendments to the "official controls," including the zoning and subdivision regulations that the City uses to regulate land use and establish standards for development. Amendments to official controls may include amendments to the text of the zoning ordinance that affect the city as a whole, or may affect specific areas of the community; for example, a zoning map amendment to ensure consistency with the land use guide plan.
- Intergovernmental cooperation – working with another community or agency to address mutual needs or issues. Examples of intergovernmental cooperation would include sharing park facilities with a school district, or connecting to a sewer line in an adjacent community.
- Capital improvements – financing and building the physical facilities (roads, buildings, utilities, etc.) needed to meet the needs of new development and to maintain the city's infrastructure. The City updates its five-year capital improvements program (CIP) on an annual basis. The CIP is part of this plan. Only projects expected to be needed in the next five years are included in the CIP.
- Other strategies – actions to be carried out through other policies, programs or initiatives of the City. These strategies may include policy directives or statements of positions that will be taken when the City is confronted with a particular issue or request.

The general time frame within which the City intends to carry out each activity is indicated for each implementation strategy. Some strategies represent programs or activities already in place that the City plans to continue – those are listed as "ongoing." The timing and priority of the strategies will regularly be re-evaluated as part of the City Council's priority-setting and work planning process. For capital improvements, project timing is based on when the project will be included in the City's CIP. The City re-evaluates the timing, cost and funding source for each project and updates the CIP every year. Timing is indicated as follows:

### Implementation Strategy Timing:

| | |
|---|---|
| Ongoing | Continuous or existing effort |
| Short | 1 to 5 years; included in 5-year capital improvements program (CIP) |
| Medium | 5 to 10 years |
| Long | May not be needed until next time the City updates its plan |

The implementation plan is not intended to be all-inclusive of the planning and policy efforts that the City will undertake to fulfill the goals of the comprehensive plan. It is intended to identify the major initiatives and those that represent significant new direction or require significant efforts by the City Council, staff and the City's advisory boards and commissions. The City is continually reviewing its operations (such as services, facilities and personnel requirements) for improvements to meet the changing needs of the city. These types of efforts are not included in the implementation sections of the individual chapters.

The entire comprehensive plan will be re-evaluated, at a minimum, every ten years as required by law. The implementation activities identified as "long term" will be re-evaluated at such time as the City undertakes its next comprehensive plan update.

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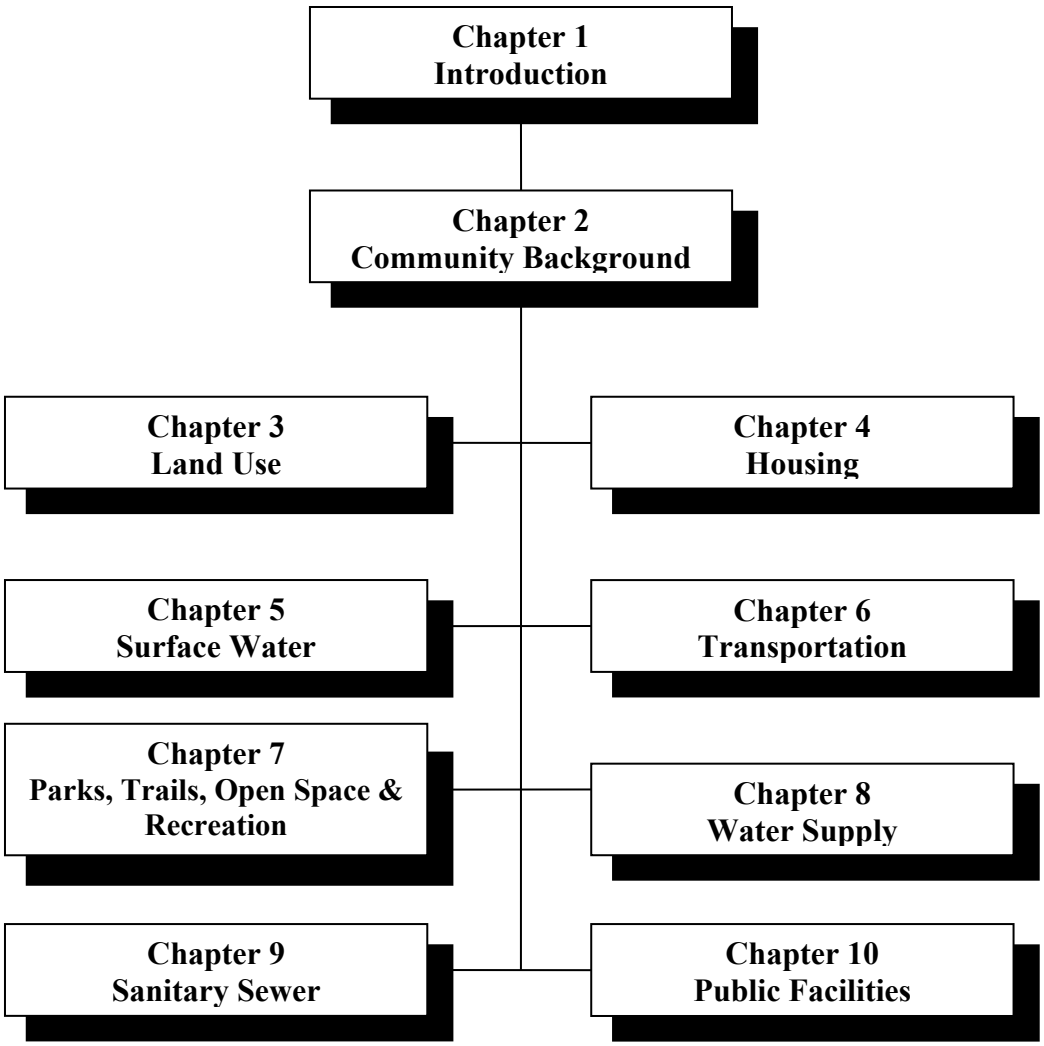
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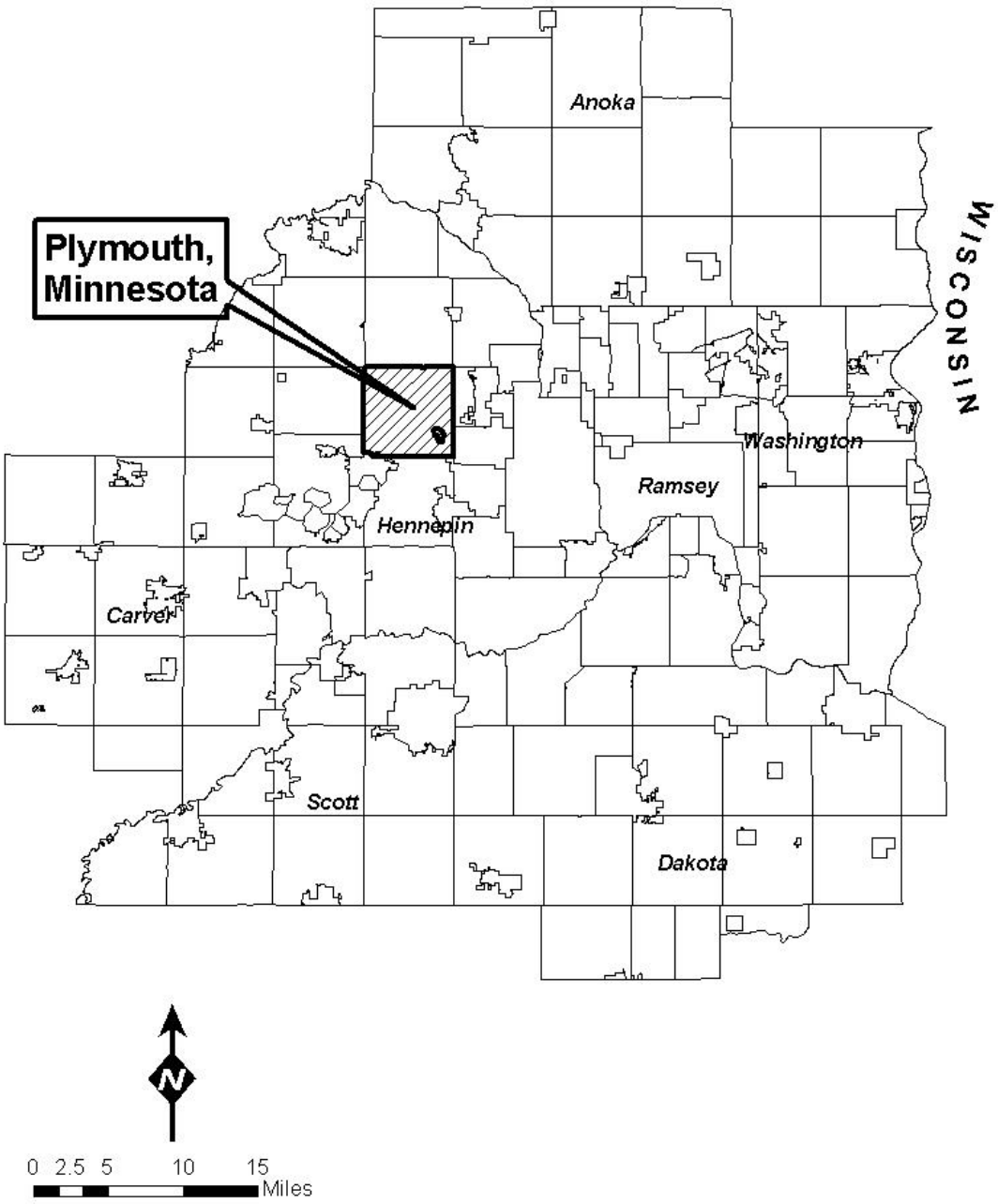
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# PLYMOUTH COMPREHENSIVE PLAN






The Metropolitan Council classifies Plymouth as a "suburban edge" community with an accompanying overall average net density of at least 3-5 dwelling units per acre.

CHAPTER 2

# Community Background

# TABLE OF CONTENTS

CHAPTER PURPOSE....1
PLANNING AREA DESIGNATION....1
PHYSICAL SETTING....1
*TABLE 2-1: Existing Land Use*....1
*Figure 2-1: Existing Land Use*....2
HISTORIC POPULATION GROWTH....3
*TABLE 2-2: Population Data*....3
GROWTH FORECASTS AND TRENDS....3
*TABLE 2-3: Household, Population and Employment Forecasts*....3
*TABLE 2-4: Population Characteristics*....4
*TABLE 2-5: Household Trends*....5
*TABLE 2-6: Husband-Wife Households and Presence of Children (Under 18 Years)*....5
VISION STATEMENTS....5

Chapter 2

# COMMUNITY BACKGROUND

## CHAPTER PURPOSE

The Community Background chapter sets the stage for the rest of the comprehensive plan. It: 1) identifies the City's planning area designation within the larger region; 2) provides an overview of the physical setting; 3) includes growth forecasts and major demographic trends; and 4) presents the City's vision statements.

## PLANNING AREA DESIGNATION

The Metropolitan Council classifies Plymouth as a "suburban edge" community (as depicted on the map on page 6 in Chapter 1), based on the amount of undeveloped land in northwest Plymouth. Nevertheless, the city is approaching full development. Consequently, the City will increasingly face issues of maintenance and redevelopment rather than those associated with new development.

## PHYSICAL SETTING

Plymouth has little remaining undeveloped land. Existing land use as of January 2016 is illustrated in Figure 2-1 and summarized in Table 2-1.

TABLE 2-1
EXISTING LAND USE

| Existing Land Use Classification | Total Gross Acres | Cumulative % of Total |
|---|---|---|
| Attached Non-Apartment | 1,147 | 5.1% |
| Apartment | 620 | 2.7% |
| Single Family Development | 8,747 | 38.7% |
| Commercial/Office | 1,066 | 4.7% |
| Industrial | 1,571 | 7.0% |
| Public | 347 | 1.5% |
| Church | 191 | 0.8% |
| School | 581 | 2.6% |
| Parks & Open Space | 2,570 | 11.4% |
| Railroad | 122 | 0.5% |
| Utilities | 27 | 0.1% |
| Vacant | 460 | 2.0% |
| Agriculture | 283 | 1.3% |
| Roads | 3,153 | 14.0% |
| Lakes | 1,710 | 7.6% |
| TOTAL | **22,595** | **100%** |

Source: City of Plymouth

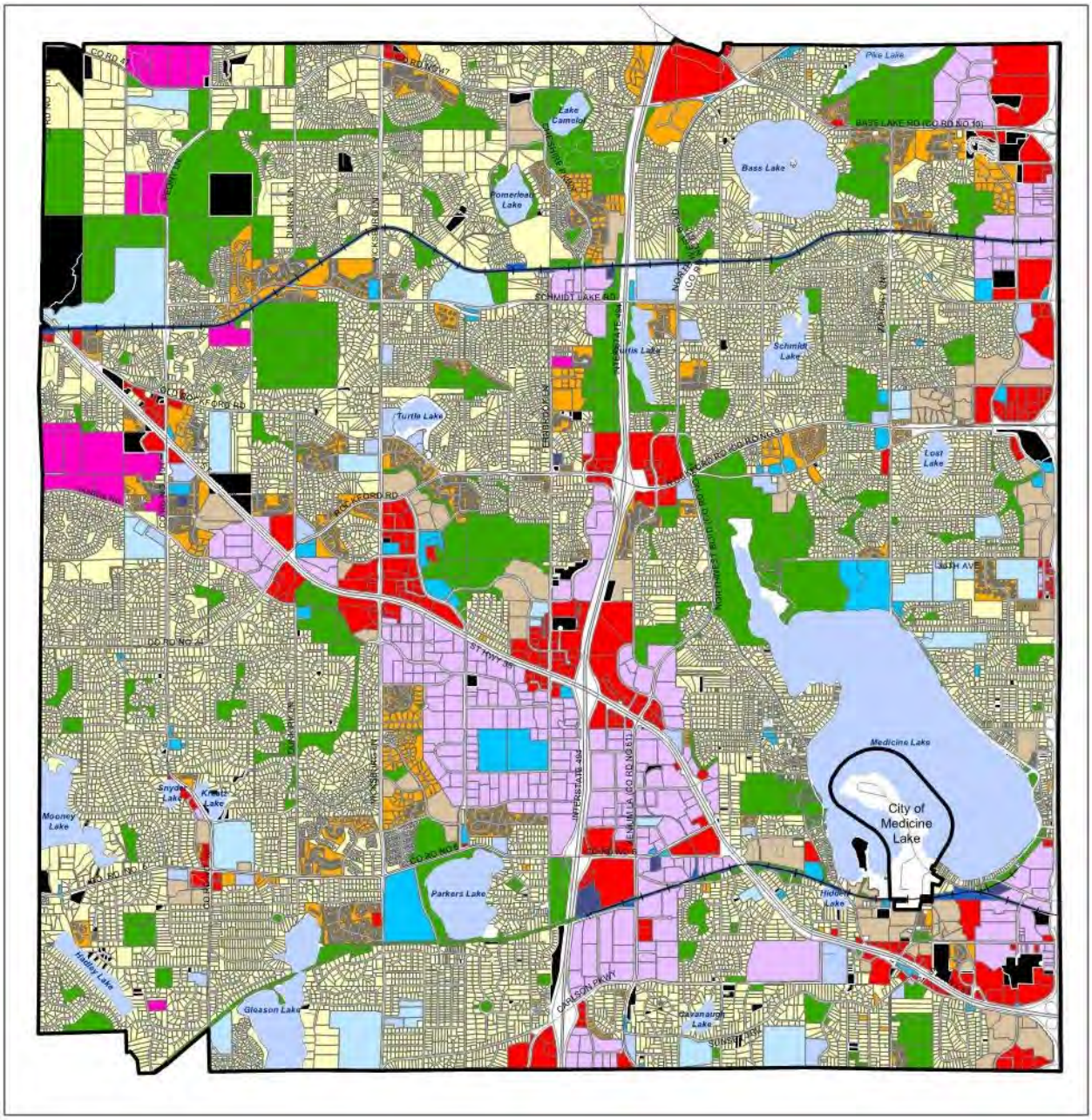



Figure 2-1

## Existing Land Use

As of 3/1/2016

## HISTORIC POPULATION GROWTH

Plymouth experienced its greatest population growth in the 1980's, far outpacing growth in Hennepin County and the region. This growth rate has slowed considerably as the supply of vacant land diminished.

### TABLE 2-2
### POPULATION DATA

| Year | Plymouth | Hennepin County | 7-County Metro |
|---|---|---|---|
| Population Growth 1980-2016 Estimate | | | |
| 1980 | 31,615 | 941,411 | 1,985,873 |
| 1990 | 50,889 | 1,032,431 | 2,288,729 |
| 2000 | 65.894 | 1,116,200 | 2,642,056 |
| 2010 | 70,576 | 1,152,425 | 2,849,567 |
| 2016 Estimate | 75,452 | 1,237,604 | 3,041,526 |
| Percentage Growth | | | |
| 1980-1990 | 61.0 | 9.7 | 15.2 |
| 1990-2000 | 29.5 | 8.1 | 15.4 |
| 2000-2010 | 7.1 | 3.2 | 7.9 |
| 2010-2016 Estimate | 6.9 | 7.4 | 6.7 |

Source: U.S. Census, Metropolitan Council

## GROWTH FORECASTS AND TRENDS

The anticipated change in population, households and employment affects all parts of the comprehensive plan. For example, the number of households and workers in the city drives the need for services and infrastructure. The number of anticipated new households relates to the need for new housing and additional parks, open space and other City services. Table 2-3 summarizes the City's 2040 forecasts.

### TABLE 2-3
### HOUSEHOLD, POPULATION AND EMPLOYMENT FORECASTS

| | City 2040 Forecast | Regional 2040 Forecast | % Difference |
|---|---|---|---|
| Population | 82,085 | 85,100 | 3.7% |
| Households | 35,192 | 34,700 | 1.4% |
| Employment | 59,986 | 61,500 | 2.5% |

Source: City of Plymouth, Metropolitan Council

The city and regional household forecasts are within a margin of error. Given the small differences between the two sets of forecasts, the City will use the 2040 regional forecasts in this plan update.

Plymouth's population is anticipated to increase 10.8 percent between 2016 and 2040. During this same period, the region's population is expected to increase 22.9 percent.

Although population growth is slowing, the City can still expect to see healthy household and employment growth in coming years. However, Table 2-4 indicates that the make-up of the population will be different than in decades past. In the future, the City can expect that the population will be older and more diverse. Table 2-5 illustrates that along with the slowing growth rate in new households, household size is decreasing, reflecting a combination of lower birth rates, an increasing number of empty nester households and an increasing number of single person households. This will affect the type of housing and services that residents' demand.

TABLE 2-4
POPULATION CHARACTERISTICS

| | 2000 | % of Total Population | 2010 | % of Total Population |
|---|---|---|---|---|
| Population 60+ years | 7,331 | 11.1% | 12,602 | 17.9% |
| Median age (in years) | 36.1 | -- | 39.5 | -- |
| | | | | |
| Non-white population | 5,694 | 8.6% | 11,116 | 15.8% |
| Black/African American | 1,783 | 2.7% | 3,704 | 5.3% |
| Asian | 2,495 | 3.8% | 4,888 | 6.9% |
| Other races | 1,416 | 2.1% | 2,524 | 3.6% |

Source: U.S. Census

TABLE 2-5
HOUSEHOLD TRENDS

| Year | Population | Households | Households % Change | Household Size | Average Annual Household Growth |
|---|---|---|---|---|---|
| 1980 | 31,615 | 10,491 | -- | 3.0 | -- |
| 1990 | 50,889 | 18,361 | 75.0% | 2.8 | 787/year – 1980s |
| 2000 | 65,894 | 24,820 | 35.2% | 2.7 | 646/year – 1990s |
| 2010 | 70,576 | 28,663 | 15.5% | 2.4 | 384/year – 2000s |
| 2040 | 85,100* | 34,700* | 19.3% | 2.4* | -- |

Source: U.S. Census, *Metropolitan Council estimate

Table 2-6 illustrates that while more than half of Plymouth households are husband/wife households, the percentage has decreased nearly 10 percent since 1990. The percentage of husband/wife households with children has likewise declined.

TABLE 2-6
HUSBAND-WIFE HOUSEHOLDS AND PRESENCE OF CHILDREN (Under 18 years)

| | Households | | With Children | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| 1990 | 11,964 | 65.2% | 6,412 | 34.9% |
| 2000 | 15,188 | 61.2% | 7,844 | 31.6% |
| 2010 | 15,926 | 55.6% | 6,955 | 24.3% |

Source: U.S. Census

## VISION STATEMENTS

The community vision statements were first developed in a community forum held during the preparation of the City's 2000 Comprehensive Plan. The vision statements were updated in a City Council/Planning Commission workshop in 2005. In 2016, the City Council and Planning Commission reviewed and updated the statements again. At the same time, the City facilitated community input on the vision statements through social media.

### Maintain a safe and secure community.

Plymouth values the safe and secure environment currently found in the community. Safety and security are reflected in the low crime rate and superior police protection, quality fire protection and response time

and the availability of health and community services. Residents value the involvement of individuals, households and neighborhoods in creating a safe environment.

### Protect and enhance the natural environment.

Plymouth values the natural resources in the community, including lakes, ponds, streams, wetlands and the rolling and wooded terrain and consequently, the preservation and maintenance of these resources. A healthy environment is important to people, and the existing natural resources contribute to the livability of the community.

### Support high quality education.

Plymouth values education, supports the public and private schools in the community and places an emphasis on educating the youth of the community. Plymouth values the quality of school facilities, the safety of school buildings and grounds and the quality of school programs.

### Maintain and enhance housing quality and diversity.

Plymouth values housing that is attractive, well constructed and maintained to ensure quality of life for all residents. Plymouth also values diverse housing opportunities in neighborhoods throughout the community, including affordable housing, renter and owner-occupied housing, senior housing and life-cycle housing.

### Protect and enhance convenience and mobility.

Plymouth values the convenience and mobility provided by the community's strategic geographic location in the metropolitan area. Three regional highways run through the community, providing direct access to the rest of the region. The layout of the city affords convenient access to goods and services within the community. The trail system and public transportation provide valuable alternative modes of transportation. The mix of housing and business within the community allows residents to live near their place of employment. Moving forward, investment in all modes of transportation is essential to realizing the City's vision.

### Promote and strengthen economic vitality.

Plymouth values the strong economy and diverse tax base within the community, which includes high quality commercial and industrial development to complement the residential development. The diversity of development within the community results in a balanced tax base and a wide variety of employment opportunities. Plymouth recognizes, however, that as the community ages, maintenance of its assets as well as redevelopment will be necessary components of the community's economic vitality. Therefore,

Plymouth supports both maintenance programs (e.g. code enforcement) and redevelopment as tools to sustain economic health.

### Provide high quality city services and facilities.

Plymouth values both the facilities and services the City provides. The park and trail systems as well as special programs contribute to the quality of life within the community. Other City facilities and services, such as public safety, public works, recycling and long-term planning also contribute to a high quality of life. The many resident volunteers that supplement the work of City staff represent an important contribution for which the City is rightfully proud. The city is well-governed and well-managed, and both residents and businesses look forward to a continued high level of City-based services. The City will continue to be responsive to the emerging trends and changing needs of its residents and businesses.

### Meet the needs of all age groups within the city, with a particular focus on young people and the aging population.

Plymouth recognizes that the nation is aging. And the city is no exception. Plymouth will pay increased attention to the special needs of its aging population in all aspects of community life – housing, all forms of transportation, services and facilities and especially, sense of community. Young people likewise have special needs with respect to the same aspects of community life, most notably housing options and all forms of transportation.

### Enhance and strengthen the sense of community.

Plymouth is a welcoming community that appreciates differences and fosters diversity. Plymouth values its sense of community. People are connected to the community, want to continue to strengthen this sense of place, are involved in community life (government, religious institutions, schools, libraries, recreation, arts and volunteer efforts) and are able to bridge physical barriers to come together. There is a pride in the community that will be made stronger as the community matures.

CHAPTER 3

# Land Use Plan

# TABLE OF CONTENTS


CHAPTER PURPOSE ..... 1
LAND USE GOALS AND POLICIES ..... 1
DEVELOPMENT APPROACH ..... 3
ELIMINATION OF OVERLAY DISTRICT ..... 3
POTENTIAL CHANGE AREAS ..... 4
Southwest Quadrant of Highway 169 and County Road 10 ..... 4
Southwest Quadrant of Highway 169 and 36th Avenue ..... 4
Industrial Area Southeast of Medicine Lake ..... 4
Northwest, Southwest and Southeast Quadrants of I-494 and Highway 55 ..... 5
HISTORIC PRESERVATION ..... 5
SOLAR ACCESS PROTECTION ..... 5
*TABLE 3-1: Gross Solar and Rooftop Solar Calculations* ..... 5
*Figure 3-1: Solar Potential* ..... 6
AGGREGATE RESOURCES ..... 7
LAND USE CLASSIFICATIONS ..... 7
*TABLE 3-2: Future Land Use* ..... 7
RESIDENTIAL LAND USES ..... 8
COMMERCIAL LAND USES ..... 8
*Figure 3-2: 2040 Land Use Plan* ..... 9
INDUSTRIAL LAND USES ..... 10
PUBLIC/SEMI-PUBLIC/INSTITUTIONAL LAND USES ..... 10
MIXED USE ..... 11
2040 CITYWIDE DEVELOPMENT ..... 11
*TABLE 3-3: Land Use in 10-Year Stages* ..... 12
CONSISTENCY WITH OFFICIAL CONTROLS ..... 12
*Figure 3-3: Forecasted Residential Growth* ..... 13
IMPLEMENTATION ..... 14


# LIST OF APPENDICES


3A ENVIRONMENTAL PROTECTION/TRANSITIONS
3B LAND USE PLAN CLASSIFICATIONS
3C COMPREHENSIVE PLAN AMENDMENT PROCEDURES
3D CITY CENTER
3E EMPLOYMENT-BEARING INTENSITY
3F IMPLEMENTATION

Chapter 3

# LAND USE PLAN

## CHAPTER PURPOSE

The land use plan is the basic building block in a community's comprehensive plan. The plan identifies where people will live, shop, work and play. Development and redevelopment anticipated in the plan drives the need for all types of infrastructure – sewer, water, roads, parks and more. In addition, the land use plan helps the Planning Commission and City Council make decisions on individual development requests.

The purpose of the land use plan is to identify appropriate locations for all types of land use, including where different land use types can be located in proximity to one another. It also provides critical background data for infrastructure planning. The land use plan appendix specifies criteria for determining the appropriate location for a specific land use and identifies strategies to ensure that different types of uses exist together harmoniously.

## LAND USE GOALS AND POLICIES

**Establish and maintain a land use pattern that reflects the community's** desire to provide for a variety of land uses, including residential neighborhoods of varying densities and housing types, retail commercial and office areas, industrial developments, civic uses and parks and open space.

- Encourage the mixing of complementary uses to enhance convenience, livability and accessibility and decrease traffic.
- Facilitate clustering of new development to preserve natural communities identified in the 2006 *Natural Resources Inventory.*
- Support the needs of an aging population for shopping, passive and active recreation, including walking and biking trails, and other support services within easy access.
- Support further subdivision within existing low density neighborhoods only when it is consistent with the density and intensity of the neighborhood and meets the standards and intent of the subdivision regulations.
- Encourage preservation of outlots that were created for open space in return for smaller lot sizes in the adjacent neighborhoods.

- Require vegetative screening and other types of buffers to provide transitions between land uses of different intensities, e.g. low density neighborhoods and retail commercial developments.
- Promote sustainable building practices in all new developments and redevelopments.
- Support redevelopment of obsolete, underutilized and deteriorated uses.
- As northwest Plymouth continues to develop, respect the many natural features that reflect the character of the area.

### Achieve a balance among: 1) efficient delivery of public services; 2) preservation of natural and cultural resources; and 3) respect for individual property rights.

- Provide public services and facilities in a cost-effective manner.
- Support an orderly and efficient staging of infrastructure and utilities.
- Apply development standards that protect the environment and advance community values while allowing sound use of private property.
- Encourage resource preservation in areas where parks and open spaces are planned and in areas of high erosion potential (steep slopes and bluffs).
- Promote solar access protection, particularly in areas with the highest potential – commercial and industrial areas.
- Where feasible, support preservation of resources (sites and structures) that are historically significant to Plymouth.

### Encourage that all areas of Plymouth be visually appealing, vital and continually maintained.

- Apply development standards that produce quality design, aesthetic appeal and compatibility in building height and mass between existing properties and adjacent new development.
- Establish regulations that ensure all types of residential, commercial and industrial structures and properties are maintained.
- Construct and maintain high quality, attractive public facilities.

### Pursue complementary economic growth and redevelopment opportunities that serve to further enhance the comm**unity's economic and social vitality and in turn help sustain Plymouth's high quality of life.**

- Promote development of well-designed commercial and industrial uses to maintain the community's diversified tax base and provide varied employment opportunities.
- Support existing Plymouth businesses.
- Recruit diverse businesses that are complementary to Plymouth's existing businesses.
- Support redevelopment of obsolete and deteriorated commercial and industrial development.
- Encourage development and infrastructure improvements that support the daytime worker population.

### Support efforts that strengthen community identity, contribute to a high quality of life and enhance Plymouth as a desirable place to live, work and play.

- Strengthen City Center as a community-wide focal point.
- Provide non-motorized connections across major physical barriers at key locations where feasible.
- Encourage new development to integrate pedestrian and bicycle facilities – both within and connecting to adjacent development – and transit facilities.
- Encourage development or redevelopment, where needed or appropriate, of high profile buildings with high quality finishes at major entrances to the community.

## DEVELOPMENT APPROACH

### ELIMINATION OF OVERLAY DISTRICT

The 2030 plan divided the city into two areas: northwest Plymouth and the existing urban area. As noted in the following paragraphs, there is no longer a need to look at these areas differently.

In the 2030 plan, the City established an overlay district that covered a majority of the northwest area of the city and a Rural-to-Urban Transition within the overlay district. In conjunction with the overlay district and transition area, the City incorporated new land use guide plan classifications (LA-R) and performance standards for the development in the northwest area.

Since the adoption of the 2030 plan in 2009, Plymouth has experienced substantial residential development, primarily in the northwest area of the city. Consequently, now that the area is largely developed, there is no longer a need to differentiate the northwest area from the rest of the city. This plan

therefore eliminates the overlay district and its associated guide plan classifications and performance standards. The City will also amend the zoning ordinance to eliminate the district and development standards that correspond to the LA-R land use classifications.

## POTENTIAL CHANGE AREAS

There are areas throughout the city, including the northwest area, where land use change may occur over the course of the next 20 years.

Following input and review, the City changed the land use classification for several linear parcels west and east of Vicksburg Lane that will become part of the Northwest Greenway trail corridor. The City did not formally change the land use classification for the following potential change areas, but they are specially noted on the land use plan map. The areas include: 1) the southwest quadrant of Highway 169 and County Road 10; 2) the southwest quadrant of Highway 169 and 36th Avenue; 3) the industrial area southeast of Medicine Lake; and 4) the northwest, southwest and southeast quadrants of I-494 and Highway 55. The City anticipates further detailed study of the future land uses in these four areas. Typically, the City does not initiate study of an area until there is developer interest. If needed, once a study is complete, the City will amend the comprehensive plan. Since the four potential change areas currently have active businesses, as a policy the City waits for the market to change before re-guiding any affected properties.

### Southwest Quadrant of Highway 169 and County Road 10

This area is a mix of commercial uses, including car dealerships, vacant land and older industrial uses. It is likely that parts of the area will develop or redevelop over the next 20 years. The need for further study is driven by the number of different property owners, variety of uses, adjacent residential development and existing traffic concerns in the area.

### Southwest Quadrant of Highway 169 and 36th Avenue

The commercial area between 34th and 36th Avenues has been of interest during the past two comprehensive planning efforts. However, the City has never initiated any detailed study of the area. Given recent interest in redevelopment of the northernmost parcels and the likelihood of additional redevelopment in the area, it became a candidate for further study.

### Industrial Area Southeast of Medicine Lake

Many older industrial buildings in this area cannot satisfy the demands of the existing industrial market. During the planning period, some of the industrial buildings in the area will become less competitive in

the market. At the same time, this area is located adjacent to one of the City's greatest natural assets, Medicine Lake, as well as an extensive park and trail system. In addition, the area has good highway access, plus many of the properties are located such that they are not negatively impacted by highway noise. Consequently, the City supports a transition to commercial office uses for much of the area and a change to higher density residential use for the area adjacent to Medicine Lake. The ultimate density, which would be a minimum of 12 units per acre, would be determined by the type of design – use of low impact environmental design, including open space preservation and high quality architectural design are elements that could increase the density that the City would allow.

### Northwest, Southwest and Southeast Quadrants of I-494 and Highway 55

These areas may be considered gateways into Plymouth. Existing uses include a combination of commercial and light industrial, plus restaurants, hotels, storage facilities and a bank. The need for further study is based on the prominence of these areas. As part of this plan, the area in the southeast quadrant is being guided Mixed Use-Residential (MXD-R).

## HISTORIC PRESERVATION

Plymouth presently has no sites listed on the National Register of Historic Places.

## SOLAR ACCESS PROTECTION

Protecting solar access means protecting solar collectors (or the location of future collectors) from shading by adjacent structures or vegetation. The City recognizes the importance of protecting solar access. Figure 3-1 illustrates the City's solar potential. The map shows that the highest potential is found in Plymouth's commercial and industrial areas and in parts of northwest Plymouth. Potential in the northwest area is less than when the map was created, based on the development that has occurred in that area since January 2017. The City's gross solar and rooftop solar calculations are included in Table 3-1 below.

### TABLE 3-1
### GROSS SOLAR AND ROOFTOP SOLAR CALCULATIONS

| Gross Potential (Mwh/yr*) | Rooftop Potential (Mwh/yr) | Gross Generation Potential (Mwh/yr) | Rooftop Gen. Potential (Mwh/yr) |
|---|---|---|---|
| 42,591,155 | 4,900,271 | 4,259,115 | 490,027 |

*Megawatt hours per year

Sources: Metropolitan Council, Minnesota Department of Commerce and Great Plains Institute

In addition to allowing solar energy systems as a permitted use in all zoning districts, the zoning ordinance provides standards for establishing and protecting solar energy systems. The ordinance limits

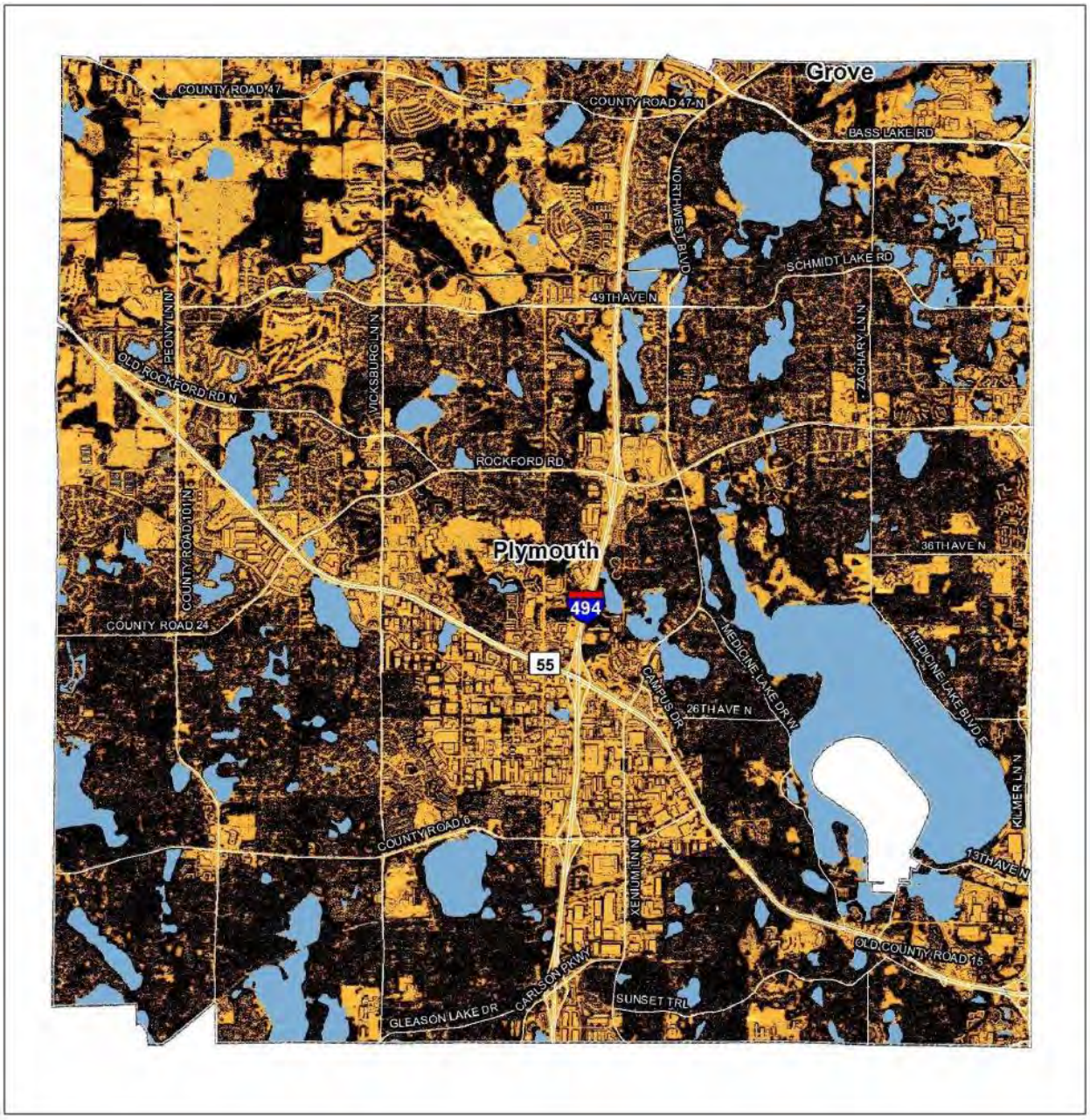



Figure 3-1

## Solar Potential

As of 1/5/2017

Source: University of Minnesota
U-Spatial Statewide Solar Raster

July, 2018
City of Plymouth

Gross Solar Potential
(Watt-hours per Year)
High : 1276772
Low : 900001

Solar Potential under 900,000 watt-hours per year
County Boundaries
City and Township Boundaries
Wetlands and Open Water Features

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

building height in all zoning districts and requires a conditional use permit to exceed the height limits. In approving a conditional use permit to exceed the height standard, the City Council must find that the building would not limit solar access to abutting or neighboring properties. While these standards go a long way to protect solar access, mature trees, topography and the location of structures make it difficult to obtain unobstructed access on every lot.

### AGGREGATE RESOURCES

The city has no remaining areas with aggregate resources. The several areas, primarily in the southwestern part of the city, where aggregate resources were once found have been developed with suburban land uses.

## LAND USE CLASSIFICATIONS

Table 3-2 provides a breakdown of future land uses within the city, calculated for each distinct land use classification.

### TABLE 3-2
### FUTURE LAND USE

| Land Use Plan Classification | Total Gross Acres | Cumulative % of Total |
|---|---|---|
| LA-1, Living Area 1 | 7,246 | 32.1% |
| LA-2, Living Area 2 | 3,256 | 14.4% |
| LA-3, Living Area 3 | 572 | 2.5% |
| LA-4, Living Area 4 | 564 | 2.5% |
| LA-5, Living Area 5 | 4 | 0.02% |
| Sub-Total Living Areas | **11,642** | **51.52%** |
| C, Commercial | 444 | 2.0% |
| CC, City Center | 137 | 0.6% |
| CO, Commercial Office | 610 | 2.7% |
| IND, Industrial | 1,740 | 7.7% |
| P-I, Public/Semi-Public/Institutional | 3,052 | 13.5% |
| MXD, Mixed Use | 16 | 0.07% |
| MXD-R, Mixed Use Residential | 34 | 0.2% |
| Roads, Railroad, Etc. | 3,210 | 14.21% |
| Lakes | 1,710 | 7.5% |
| Sub-Total Non-Living Areas | **10,953** | **48.48%** |
| TOTAL | **22,595** | **100%** |

Source: City of Plymouth

When interpreting the land use plan as found in Figure 3-2, the City will use the following guidelines:

- Where applicable, the boundary between two land use classifications will be considered to extend to the center of an adjacent street.

- In undeveloped areas, the classifications on the plan assume that the boundary between classifications will follow major roads. Consequently, if the final alignment of a road changes from that shown on the map, the line on the land use plan will also move to reflect the adjusted road alignment.

For residential, commercial and industrial classifications, there is more than one corresponding zoning district. More than one district may be applicable to a particular site depending on: 1) the type and density/intensity of uses; 2) compatibility with the comprehensive plan, including public facilities (e.g. transportation and sanitary sewer); and 3) the purposes of the individual zoning district.

Based on historical data found in Table 3E-1 in Appendix E, the employment-bearing intensity in Plymouth (measured as floor area ratio) ranges from roughly 0.02 to 3.1.

## RESIDENTIAL LAND USES

Residential use is predominant in Plymouth, comprising just over half of the city's total acreage. The land use plan provides for a broad range of housing opportunities in five different "Living Areas." Each specifies a range of acceptable densities.

The City will continue to provide opportunities for a broad range of housing styles for people in all stages of the life cycle. While the plan recognizes that detached homes are the most dominant housing option in Plymouth, this plan strives to provide opportunities for a variety of housing styles developed in a range of densities.

The City has established minimum and maximum densities for each living area as illustrated in Figure 3-2. All new development will be required to meet the minimum density guidelines unless the developer can demonstrate that site characteristics make it infeasible to reach this goal. Density is based on the net acreage of the site (which excludes wetlands and areas below the 100-year ordinary high water level for lakes and streams, arterial right of ways, parks and buffers) divided by the number of dwelling units.

## COMMERCIAL LAND USES

Commercial land uses occupy a relatively small amount of the city's land area (just over five percent). However, their location and accessibility are critical to providing residents with necessary goods and services. The location of and access to a specific commercial site is directly related to the type and intensity of commercial use that the site can support.

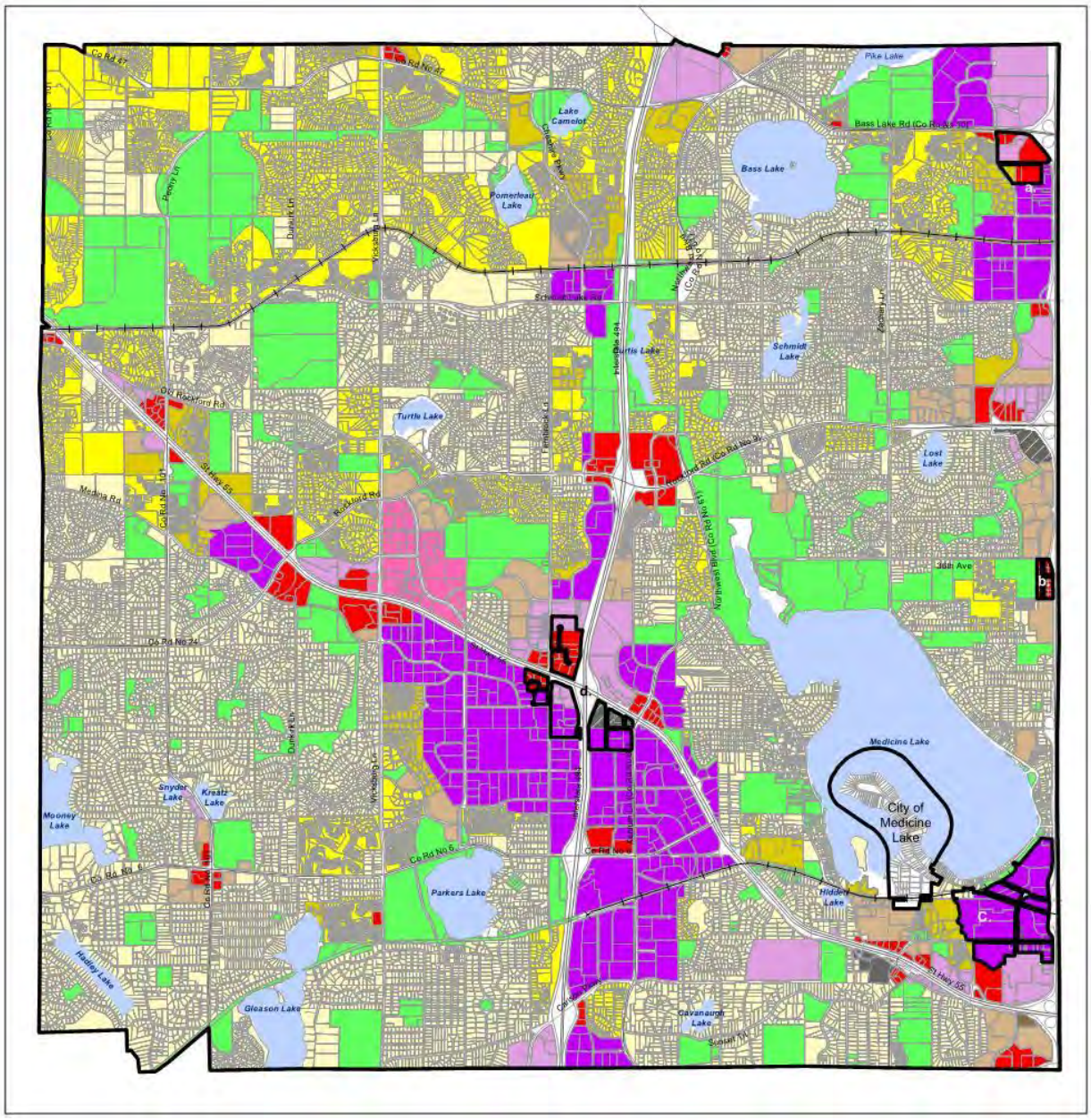



Figure 3-2

## 2040 Land Use Plan

As of 7/23/2019

City of Plymouth

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N

- Study Areas
- Living Area 1, LA-1 (2-3)
- Living Area 2, LA-2 (3-6)
- Living Area 3, LA-3 (6-12)
- Living Area 4, LA-4 (12-20)
- Living Area 5, LA-5 (20-60)
- Mixed Use, MXD
- Mixed Use Residential, MXD-R
- Industrial, IND
- Commercial, C
- Commercial Office, CO
- City Center, CC
- Public/Semi-Public/Institutional, P-I

**Areas with Potential Land Use Change**

a. Potential Mixed Use Site
b. Potential Commercial Office / Light Industrial Site
c. Potential Commercial Office south of 10th Avenue and west of Nathan Lane; potential higher density residential north of 10th Avenue
d. Potential Mixed Use site

The land use guide plan includes three commercial guiding designations, consisting of "CO" (commercial office), "C" (commercial) and "CC" (city center). While areas guided CO or CC could be developed with a mix of uses, based on changing market trends and the overall health of the economy at any point in time, the City cannot reasonably identify what that mix of uses might look like.

To protect the health, safety and general welfare of the surrounding uses and the community as a whole, proposed commercial developments must be carefully evaluated in terms of their access, location, size, intensity, traffic generation, context, site plan and building orientation, structural aesthetics and transition to non-commercial uses. Access and how much traffic a proposed development will generate will be major considerations in determining the zoning for a commercially-guided site.

## INDUSTRIAL LAND USES

Although residential use is the predominant land use in Plymouth, industrial land (less than eight percent of the city's land area) provides opportunities for much of Plymouth's employment base. Convenient locations with access to regional highway and railway routes and other services needed for business development have made Plymouth an important industrial employment center for the western part of the region. The jobs and tax base that industrial uses provide are important contributors to the economic vitality of the community.

With the continued evolution of the information age, Plymouth has seen a shift in the nature of its industrial users. Current trends show a greater amount of area devoted to office uses and the associated higher demand for parking. The City will need to balance the demand for parking with other objectives, including limiting impervious surfaces and promoting travel demand management.

To protect the health, safety and general welfare of the surrounding uses and the community as a whole, the City must carefully evaluate industrial developments in terms of their access, location, size, intensity, traffic generation, context, site plan and building orientation, structural aesthetics and transition to non-industrial uses. Access and how much traffic a proposed development will generate will be major considerations in determining the zoning for an industrially-guided site.

## PUBLIC/SEMI-PUBLIC/INSTITUTIONAL LAND USES

The objective of public, semi-public and institutional uses is to provide services, frequently on a non-profit basis, rather than the sale of goods and services. In Plymouth, public/semi-public uses make up 13.5 percent of the city's land area. Many of these uses, such as schools, churches and parks are essential

to the creation of a healthy, well-balanced community. Others, such as public utility structures are essential to providing municipal sewer and water, which residents and businesses rely upon on a daily basis. Where these services are located is an important community consideration.

Some institutional facilities such as places of worship, schools, parks and recreation facilities can be suitably located in residential neighborhoods. Schools and parks in particular often become the focus of the neighborhood in which they are located. Public service facilities such as post offices and libraries are more appropriately located in or near neighborhood centers.

The development of other uses such as correctional treatment and detention facilities need to be carefully planned and regulated consistent with state law.

### MIXED USE

Mixed use development allows the mixing of higher intensity land uses in one building or the physical integration of different uses on the same lot or within close proximity. Typically, mixed use includes a combination of retail, office, cultural or entertainment uses with higher density residential use. However, these uses can occur in combination without housing and still be considered mixed use.

In the MXD classification, Plymouth will allow mixed use to occur with or without housing as a component. In the MXD-R classification, high density housing is a required component. Mixed use developments will be processed as planned unit developments (PUDs), with the location of specific uses and development criteria determined through that process.

## 2040 CITYWIDE DEVELOPMENT

The City foresees development occurring at the levels illustrated in Table 3-3. Based on the current pace of development, the City expects to be built out by 2040. The table illustrates that Plymouth's residential density in currently undeveloped areas will range from approximately 3.5 units per acre to 6.4 units per acre.

TABLE 3-3
LAND USE IN 10-YEAR STAGES

| Classification | Allowed Density Range | | Undeveloped | 2018-2020 | 2021-2030 | 2031-2040 | Total Min. Units | Total Max. Units |
|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | | | | | | |
| Residential | | | Net Acres | | Net Acres | | | |
| LA-1 | 2 | 3 | 259.8 | 35.5 | 112.8 | 111.5 | 519.6 | 779.4 |
| LA-2 | 3 | 6 | 199.4 | 20.0 | 97.4 | 82 | 598.2 | 1,196.4 |
| LA-3 | 6 | 12 | 20.1 | | 20.1 | | 120.6 | 241.2 |
| LA-4 | 12 | 20 | 13.5 | | 13.5 | | 162.0 | 270.0 |
| MXD-R | 12 | 25 | 34.3 | | 34.3 | | 411.6 | 857.5 |
| Residential Subtotal | | | **527.1** | **55.5** | **278.1** | **193.5** | **1,812** | **3,344.5** |
| Underutilized Opportunities | | | | | | | | |
| Underutilized LA-4 | | | 3.6 | | 3.6 | | 43 | 72 |
| Future MXD and CC opportunities | | | | | | 4.25 | 51 | 85 |
| TOTAL | | | | | | | Min. U/A* | Max. U/A* |
| | | | 530.7 | 55.5 | 281.7 | 197.75 | **3.44** | **6.35** |

Net acres equals gross acres minus wetland, floodplain, ROW (arterials), public parks and buffers
Acres identified in the 10-year periods are estimates only; actual development activity will be affected by local trends and the overall economy.
* Min. and Max. U/A does not included Underutilized Opportunities.
Source: City of Plymouth

## CONSISTENCY WITH OFFICIAL CONTROLS

State law requires consistency between a community's comprehensive plan and official controls. Whenever the City makes a change to its comprehensive plan, the City will review its official controls, including the zoning ordinance, to identify possible inconsistencies between the adopted plan and official controls. An inconsistency would be any official control that is in direct conflict with the goals and policies of the comprehensive plan.

To maintain consistency between the land use plan and zoning map, the City will only rezone property consistent with the land use plan. Appendix 3B identifies which zoning districts are generally consistent with each of the land use classifications. Zoning districts not specifically identified under each land use classification may also be allowed if the resulting density and type of development are consistent with the comprehensive plan.

The City has established a uniform process and criteria for amending the land use plan. The outline of the process and review criteria are found in Appendix 3C.

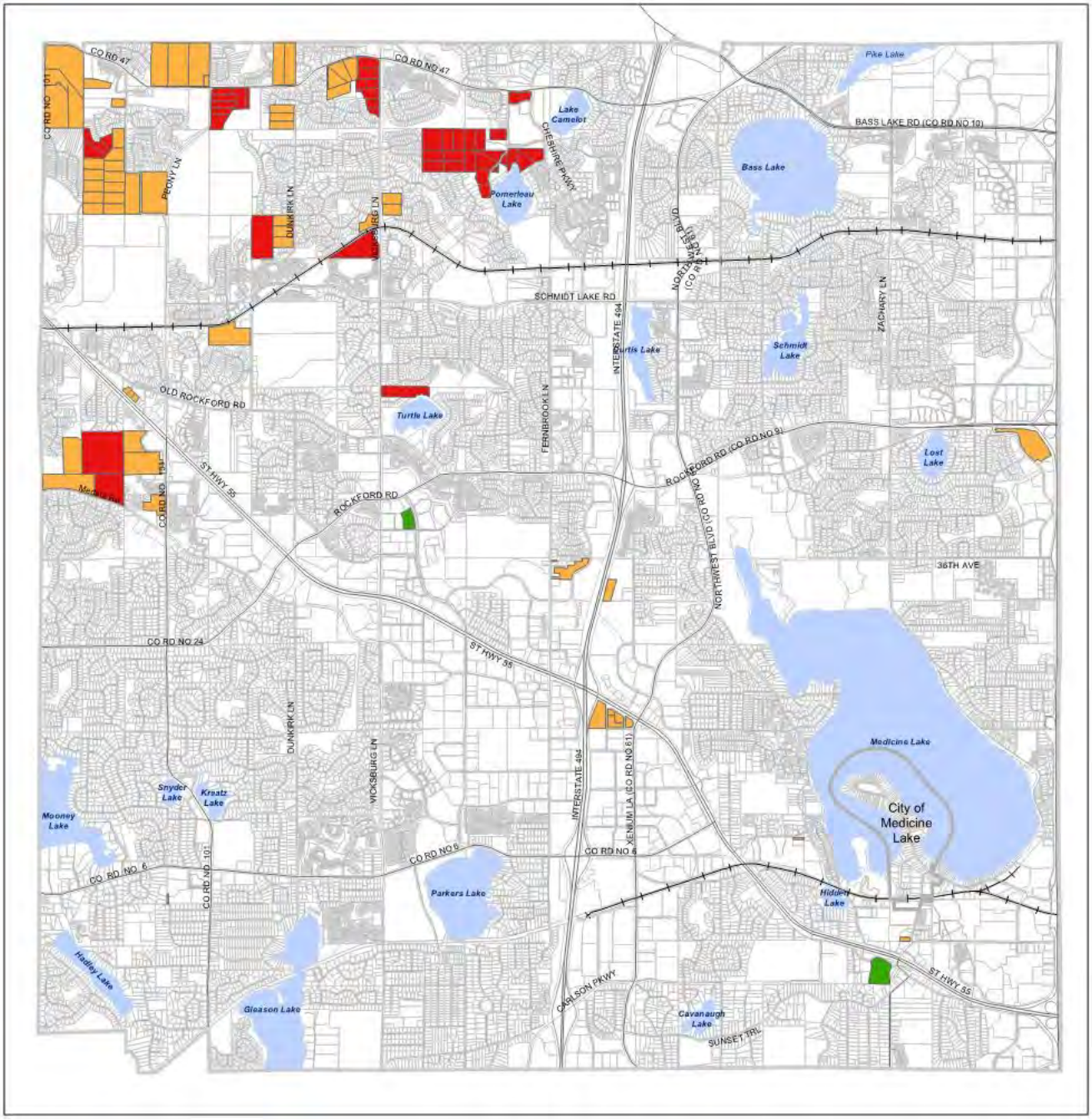



Figure 3-3

# Forecasted Residential Growth

As of 2/15/2019

2020 - 2030
2030 - 2040
2030 - 2040 Future MXD and CC Opportunities

City of Plymouth

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## IMPLEMENTATION

The following specific implementation strategies are planned to carry out the land use plan. These strategies are in addition to the enforcement of the City's existing official controls (zoning, subdivision and other regulations that are part of the city code), which are some of the most important tools for implementation of the City's land use policies. Supporting documents not included in the body or appendices of this plan include the zoning ordinance and the most current capital improvements program. The zoning map and district descriptions are included in Appendix 3F.

| *Description* | *Timing* |
|---|---|
| **Zoning Map Amendments–** Continue to use the FRD (Future Restricted Development) zoning district as a holding zone until property is rezoned concurrent with review of development plans. Consider amendments to rezone property consistent with the 2040 Land Use Plan, provided that the development does not result in the premature extension of public utilities, facilities or services. | Short |
| **Zoning Ordinance** (Chapter 21, Plymouth City Code) – Eliminate the RSF-R district (single family detached rural-to-urban transition), which is no longer needed with the elimination of the rural-to-urban land use classifications. | Short |
| **Zoning Ordinance** (Chapter 21, Plymouth City Code) – Review the ordinance text and map to identify any inconsistencies with the comprehensive plan and propose amendments as necessary to ensure consistency as required in state law. | Short |
| **Economic Development –** Work with new businesses and existing businesses when they are updating or expanding to consider use of solar panels to meet at minimum a part of their energy needs, which in turn will reduce operational costs. | Ongoing |
| **Solar Program** – Hosted an educational event run by Midwest Renewable Energy Association (MREA) to promote MREA programs to city residents. | September 20, 2018 |
| **City Center –** Re-evaluate the existing plan and update as needed. | Short |
| **Historic Preservation –** Identify historic landmarks in the city and work with the Plymouth Historical Society to preserve and promote them. | Ongoing |

Appendix Chapter 3A

# ENVIRONMENTAL PROTECTION/TRANSITIONS

## ENVIRONMENTAL PROTECTION

Plymouth's environmental resources, including lakes, streams, wetlands and rolling and wooded terrain, all contribute to the quality of life in the community. Protecting these resources occurs on a community land use planning level and through individual site planning techniques.

### LAND USE PLANNING TECHNIQUES TO PROTECT THE NATURAL ENVIRONMENT

The City considers its environmental resources and individual land use needs when designating each type of land use throughout the community.

In addition to considering its natural resources when planning at the community level, the City uses regulation and acquisition as techniques for protecting unique elements of the natural environment.

The City has used regulation to protect water resources and trees. The City inventoried and evaluated all wetland basins as a prelude to establishing an ordinance requiring wetland buffers that vary in size, based on wetland quality. In addition, the City has ordinances controlling erosion during construction. It also banned use of phosphorus fertilizers – an initiative that ultimately went state-wide. The City has a tree preservation ordinance that sets maximum tree removal thresholds for new development and requires reforestation and/or monetary restitution if removal exceeds the thresholds.

Where regulation cannot adequately preserve a key natural environmental resource, the City has turned to preservation through acquisition. Because acquisition is normally very costly, the City has used it only after careful study of the attributes of existing resources and ruling out all other options. A key example is the Northwest Greenway, where the City purchased several parcels that could not be acquired through park dedication.

### SITE PLANNING TECHNIQUES TO PROTECT THE NATURAL ENVIRONMENT

Site planning techniques to address protection of the environment start with an inventory of the natural resources on an individual site. With every development application, the City requires an inventory of trees over a specified size as well as any lakes, wetlands and water courses. The City then requires that the developer meet all the requirements of its environmental regulations. For example, when a site is platted, the City requires the developer to prepare a tree preservation plan that conforms to City regulations. When a wetland is present, the City also requires that the developer establish a wetland buffer consistent with the quality of the wetland.

## TRANSITIONS

Developing and sustaining a well-balanced community – one that includes a variety of land uses that are conveniently located to one another – often requires that different types of land uses are located in proximity to one another. It also frequently requires the use of transitions from one land use to another. However, a mixing of land uses and the accompanying transitions help create a more exciting and stimulating environment than one dominated by a single land use.

The compatibility of one land use with another depends on what the uses are and the quality of site design. Compatibility may be judged broadly, based on general land use, or narrowly, based on the design features of a specific project. What uses are compatible is often a matter of the particular circumstances of a proposed development and its location. Therefore, there are no hard and fast rules that apply in every case.

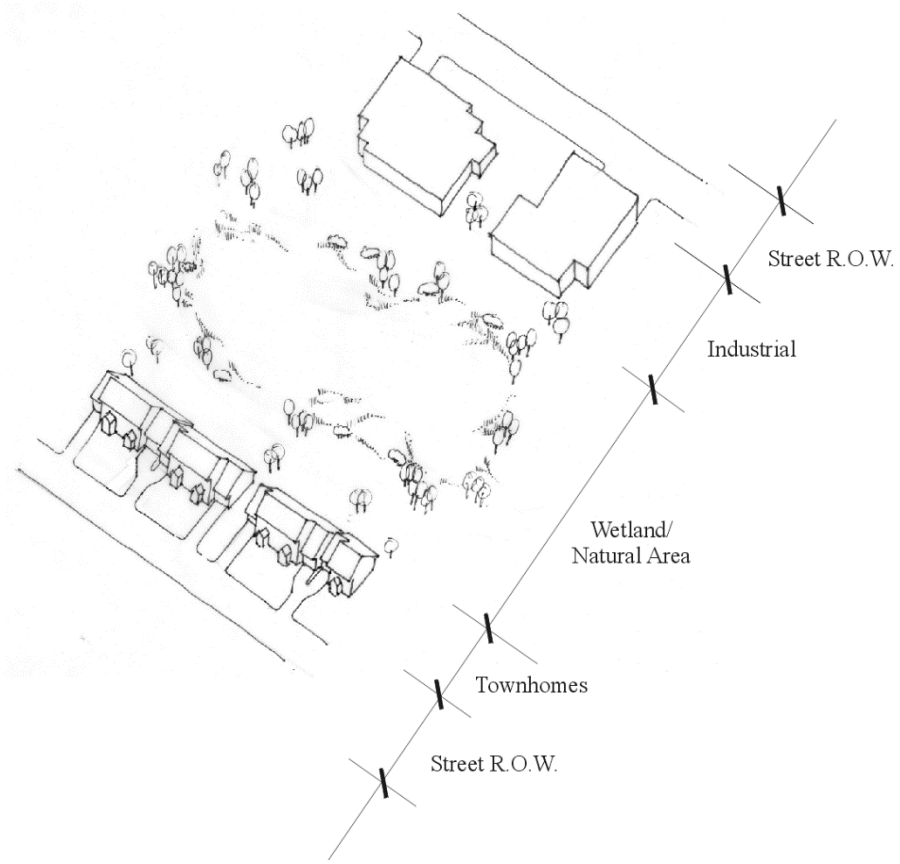
Good transitions can be promoted by both land use planning and by development regulations and site planning techniques. Opportunities for good transitions can be enhanced or lost when the overall land use pattern is set. For example, a land use plan should anticipate the need for transitions by using natural or man-made features, such as a wetland or a major roadway, as separation between potentially incompatible uses. If incompatible uses are placed next to each other without physical separation, it is possible that no amount of site planning can mitigate the potential problem.

Traditionally, it is the responsibility of the more intense land use to provide an appropriate transition to an adjacent less intense land use. However, sometimes, making an appropriate transition is the responsibility of the last property owner to develop. Consequently, it is important to consider existing and future land use when planning for transitions.

## LAND USE PLANNING TECHNIQUES FOR TRANSITIONS

Land use planning techniques for transitions include:

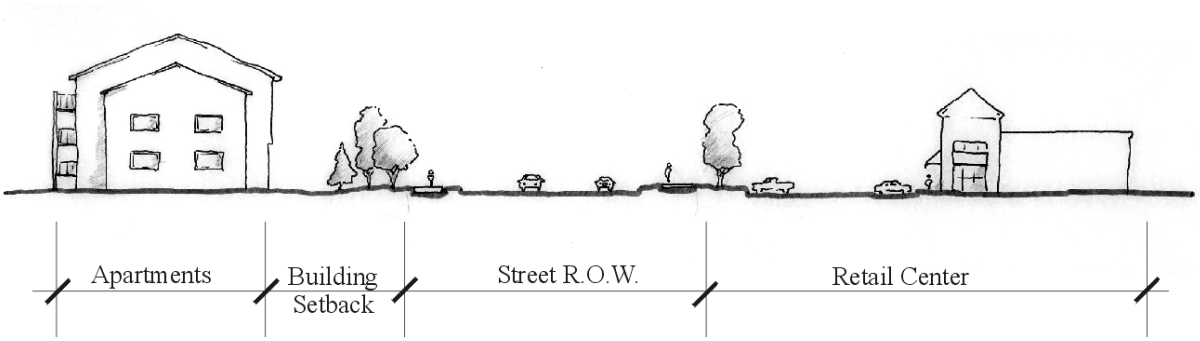
- *Using natural features (such as water bodies, wetlands, trees, ravines and other topographic features) to separate uses.* The sketch at the right illustrates how a wetland can be used to separate residential and light industrial uses. The wetland provides a natural barrier between the two uses and also provides a greater separation in distance than standard zoning setback requirements.




***Using natural features to separate uses***

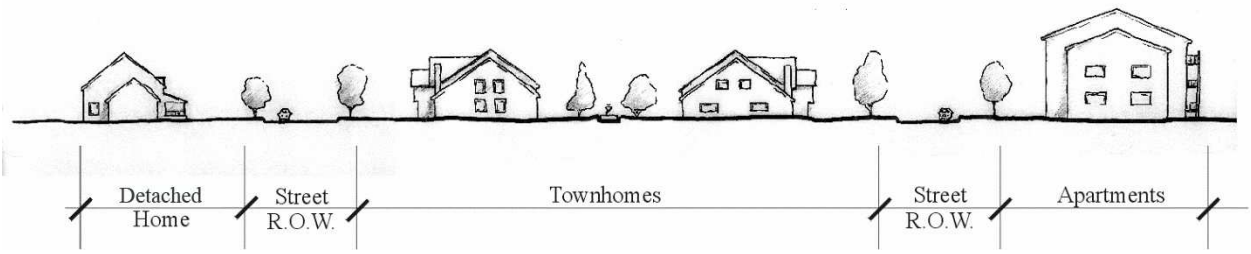
- *Using man-made features to separate uses.* Just as natural features can be used to separate uses, so may man-made features such as major roadways, parks or storm water detention ponds.

- *Placing uses next to different uses of similar intensity.* The following sketch illustrates an apartment building, which is an intense/dense residential use, located across a major street from a retail center, also a relatively intense use. Another example would be placing an office use next to an apartment building or similar types of lesser-intensity uses.




***Relating different uses of similar intensity***

- *Graduating land use intensity* (such as placing low density residential next to medium density residential next to high density residential, etc.). The sketch below illustrates a progression from detached homes to townhomes to apartments. In this example, the density and scale of each of the developments relates to the neighboring use.



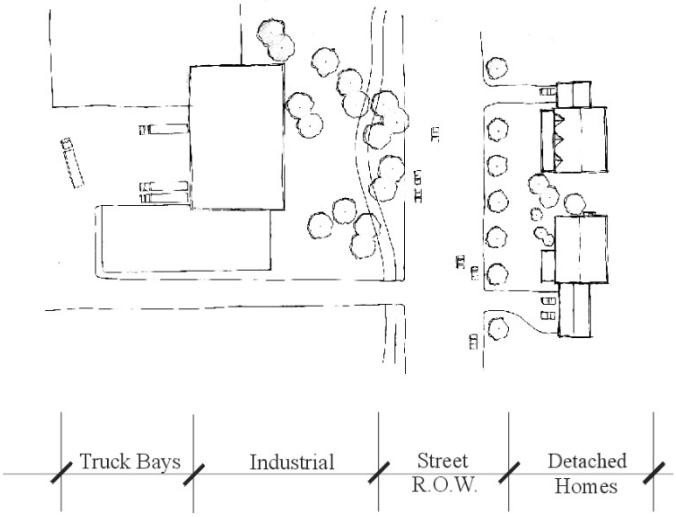

***Graduating land use intensity***

- *Establishing land use patterns that avoid mixing traffic* from high intensity uses with low intensity uses on local streets (no sketch). For example, streets should be laid out so that commercial traffic takes access from collector or higher-level streets, not local streets that directly serve driveways for residential properties.

Land use planning techniques for transitions are reflected in the land use plan map and may be used as development location criteria when considering amendments to the land use plan. However, the separation of uses resulting from the use of these techniques must be balanced with the benefits of having different land uses located in close proximity for the sake of convenience and livability.

## SITE PLANNING TECHNIQUES FOR TRANSITIONS

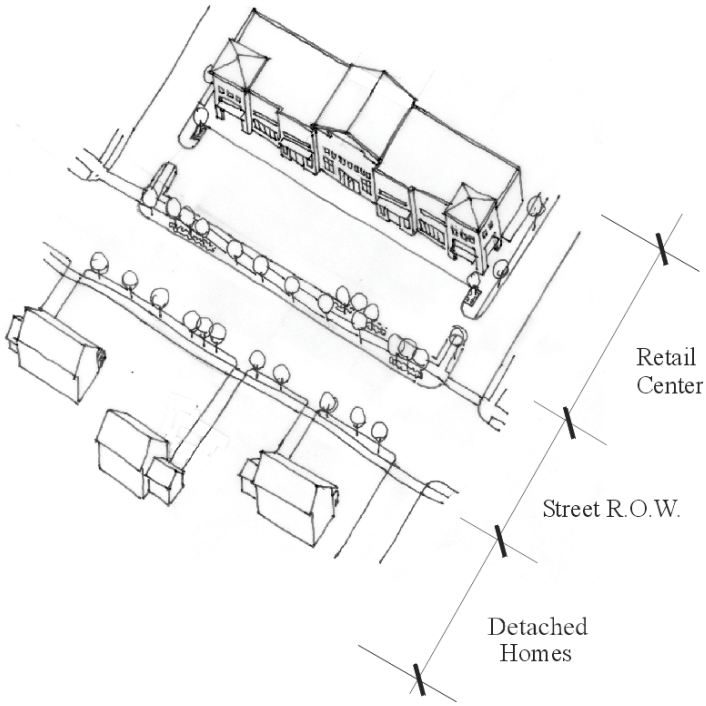
There is also a need for transitions between land uses on a site planning level. Site planning techniques for transitions usually take the form of fences, vegetative screening and landscaped buffer yards. While these techniques can provide a smooth transition between uses, they are often used by communities to create a wall that completely separates adjacent land uses. This is not the objective of a good site level transition. Rather, a site level transition should be just that, a passage from one land use to another. Site planning techniques for transitions include:




***Site layout: separating active areas from sensitive uses***

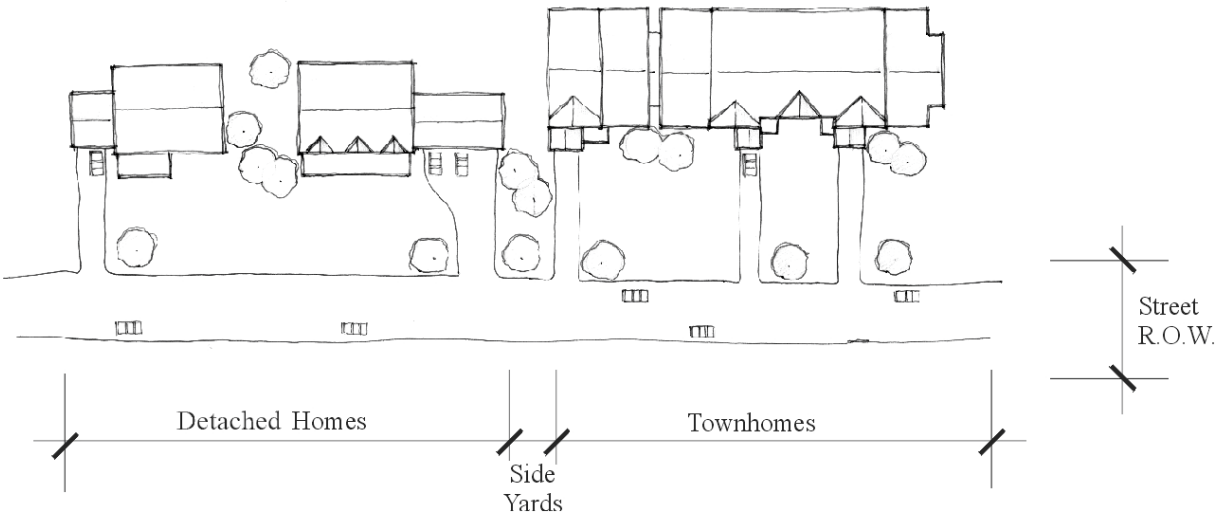
- *Site layout* – requiring separation of active areas from sensitive uses. In the example above, the active area is a truck loading area, but it could also include parking lots or major site entrances. These types of uses should be placed away from areas such as private, residential yards.

- *Architectural design* – requiring design that is complementary in height, scale, massing, materials, roof lines, door and window placement and overall appearance to adjacent buildings. The sketch at the right illustrates a retail center adjacent to a low density neighborhood. The center is similar in height to the adjacent homes, has pitched roofs which are typically associated with residential construction and has a staggered building line to break up the mass of the building to give the appearance of less bulk.

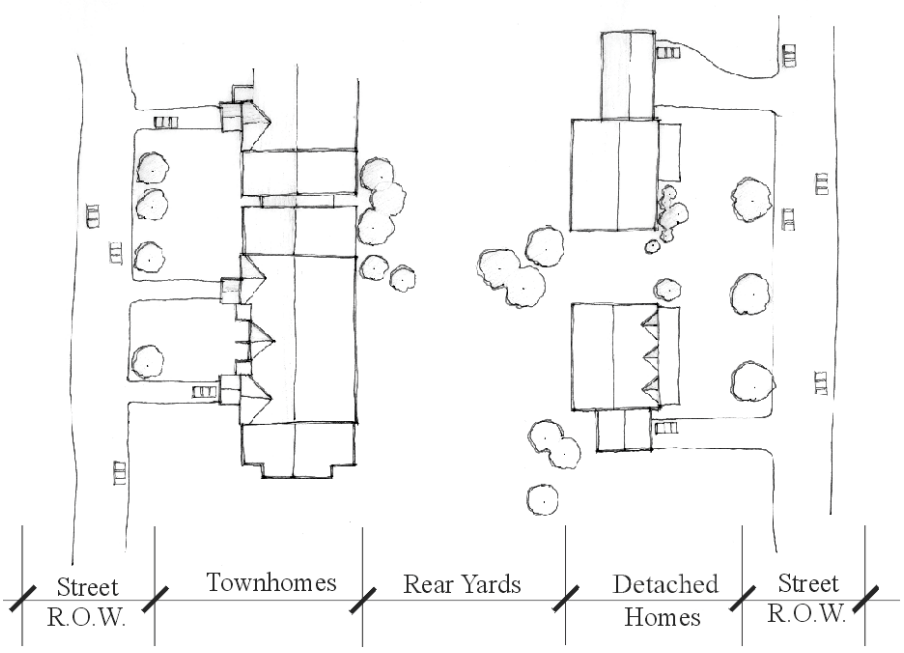



***Complementary architectural design***

- *Building orientation* – requiring that different uses abut at side or rear yards rather than facing each other across front yards. The next two sketches illustrate how this could work with detached homes and townhomes. The first sketch also illustrates how garage placement can act as a further buffer.

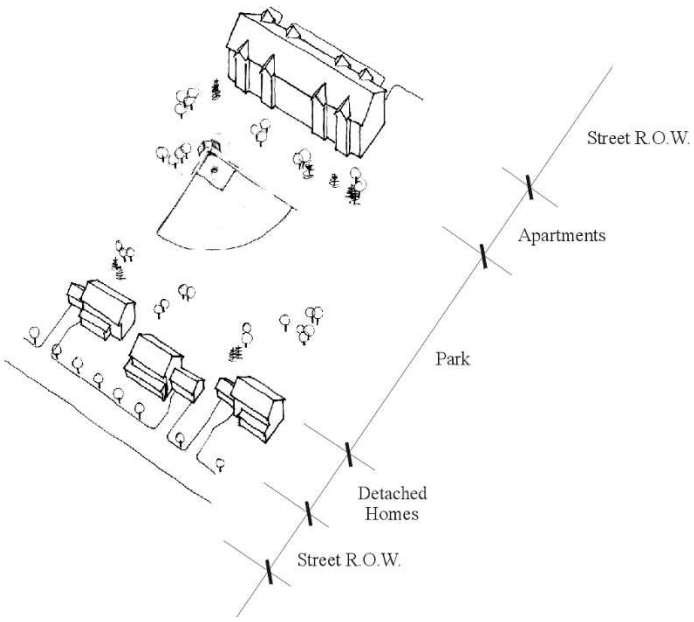



***Building orientation – side yard transition***




***Building orientation – rear yard transition***

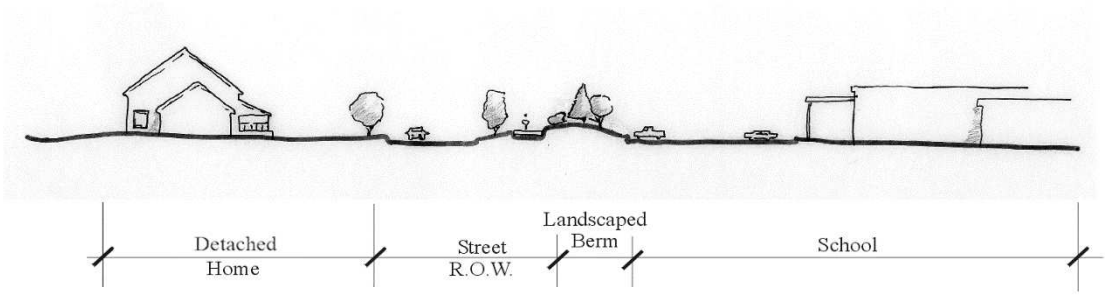
- *Distance* – increasing setbacks between a more intensive land use located adjacent to a less intensive land use. The sketch at the right shows how open space separating detached homes and apartments lessens the difference in scale between the two uses.



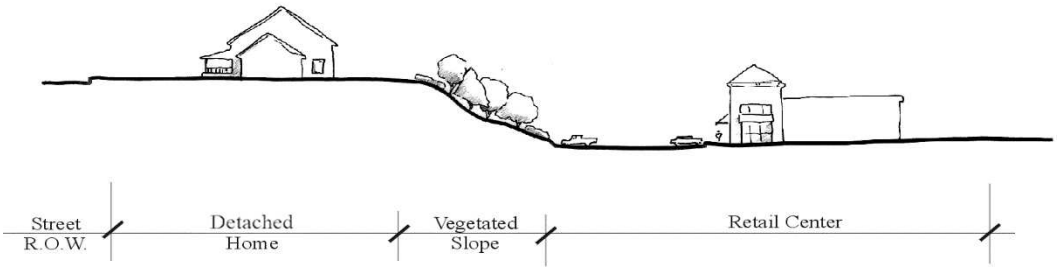

***Increasing distance between uses of different intensity***

- *Buffering and screening* – using berms, landscaping and vegetation and/or elevation changes to separate uses.

Fences and walls can also be used to provide screening when there is no change in elevation, or when there is insufficient space to construct a berm. The two sketches that follow show how a landscaped berm and a vegetated slope can provide a transition between detached homes and higher intensity uses of various types. The examples illustrate that these transitions soften the change in use, but do not and are not intended to completely screen the more intense use. It is important that the buffers are consistent in scale and mass to the adjacent land uses and still allow convenient pedestrian access from one use to another.




***Screening with a landscaped berm***




***Screening with a change in elevation***

- *General performance standards* – including standards for lighting/glare, dust, air pollution, noise, exterior storage/display, radiation/electric emission, etc.

- *Performance standards for specific uses* – including outdoor storage, drive-through businesses, gas stations, etc. that may relate to site planning as well as operational issues, such as business hours.

Site planning techniques for transitions will be reviewed and evaluated as the City considers applications for development approvals. The transitions to nearby existing and planned uses are important factors in determining whether or not a development will be compatible with its surroundings. Specific requirements and standards for particularly sensitive uses will be included in the City's zoning regulations and other relevant sections of the city code.

Appendix Chapter 3B

# LAND USE PLAN CLASSIFICATIONS

## LIVING AREA 1 (LA-1)

Living Area 1 (LA-1) identifies low density neighborhoods and directly related complementary uses such as churches, schools and recreational facilities.

Lot sizes in areas guided LA-1 will reflect the City's goal to develop new homes at a minimum of two units per acre as well as make reasonable use of the City's investment in public utilities and the limited supply of available land. This means that lots in future LA-1 developments may be smaller than is the case in some LA-1 guided neighborhoods today.

Because LA-1 guiding is characterized by large, individual lots that typically offer less opportunity to preserve significant natural resources on individual sites, the City may allow townhomes up to three units per acre on a case by case basis. The City may allow townhomes if a developer can demonstrate that townhomes could preserve a significant natural resource that would be lost through conventional development of detached homes.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Density:<br>Maximum Density: | 2 units per acre<br>3 units per acre |
| City Utilities: | Required for all areas |
| Corresponding Zoning Districts: | RSF-1 (Single Family Detached 1)<br>RSF-2 (Single Family Detached 2)<br>RSF-3 (Single Family Detached 3)<br>RSF-4 (Single and Two Family)<br>Other zoning districts may be appropriate if the proposed development would meet the density criteria of 2 to 3 units per acre. |
| Types of Development: | • Single-unit detached dwellings<br>• Two-unit dwellings<br>• Townhomes if resource preservation criteria met<br>• Churches, schools, and private recreational facilities |
| Development Location Criteria: | Not appropriate adjacent to principal arterial interchanges |

| | |
|---|---|
| Desirable Facilities: | • Neighborhood parks, school parks or mini parks within ½ mile walking distance<br>• Defined trail system that connects the neighborhood to other services and facilities, including parks, schools, churches, and/or neighborhood shopping areas<br>• Neighborhood shopping facilities within five minutes driving time from the neighborhood |

## LIVING AREA 2 (LA-2)

Living Area 2 (LA-2) identifies areas for detached and attached homes and townhomes, and directly related complementary uses such as churches, schools and recreational facilities.

The primary intent behind the LA-2 designation is to respond to a need for smaller homes on smaller lots. The City needs to offer the opportunity for this type of housing alternative to expand opportunities for people seeking more affordable detached home living and to respond to changing demographics. As the population ages, there will be a growing need for smaller homes for empty nesters and for smaller households.

LA-2 also offers the opportunity for townhomes, which provide additional life cycle housing opportunities. Townhomes in LA-2 neighborhoods offer residents a housing option with less maintenance than a typical detached home, while still being located in a familiar residential setting.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Density:<br>Maximum Density: | 3 units per acre<br>6 units per acre |
| City Utilities: | Required for all areas |
| Corresponding Zoning Districts: | RSF-3 (Single Family Detached 3)<br>RSF-4 (Single and Two Family)<br>RMF-1 (Multiple Family 1)<br>RMF-2 (Multiple Family 2)<br>Other zoning districts may be appropriate if the proposed development would meet the density criteria of 3 to 6 units per acre. |
| Types of Development: | • Single unit detached dwellings<br>• Two-unit dwellings<br>• Townhomes<br>• Churches, schools, and private recreational facilities |

| | |
|---|---|
| Development Location Criteria: | • Not appropriate adjacent to principal arterial interchanges |
| Desirable Facilities: | • Neighborhood parks, school parks or mini parks within ½ mile walking distance of the neighborhood<br>• Defined trail system that connects the neighborhood to other services and facilities, including parks, schools, churches and neighborhood shopping areas<br>• Neighborhood shopping facilities within five minutes driving time from the neighborhood |

## LIVING AREA 3 (LA-3)

Living Area 3 (LA-3) identifies areas where the City will promote a variety of housing types, including detached homes on small lots, townhomes and apartments. This district will also provide opportunities for directly related complementary uses such as churches, schools and recreational facilities.

The broad selection of housing types in this area is designed to provide opportunities for people in all stages of the life cycle. LA-3 neighborhoods should be located near commercial centers and transportation facilities to provide convenient access to jobs, shopping, medical and recreation opportunities.

To allow greater flexibility to preserve natural resources, the City may allow apartments with more than 12 units in a single building in areas guided LA-3 as long as the density is consistent with the comprehensive plan. The City will evaluate requests on a case by case basis where a developer can demonstrate that apartments could preserve a significant natural resource that would be lost through development of individual homes or townhomes.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Density: | 6 units per acre |
| Maximum Density: | 12 units per acre |
| City Utilities: | Required for all areas |
| Corresponding Zoning Districts: | RMF-1 (Multiple Family 1)<br>RMF-2 (Multiple Family 2)<br>RMF-3 (Multiple Family 3)<br>Other zoning districts may be appropriate if the proposed development would meet the density criteria of 6 to 12 units per acre. |

| | |
|---|---|
| Types of Development: | • Single unit detached dwellings<br>• Two-unit dwellings<br>• Townhomes and apartments with up to 12 units in a building<br>• Apartments with more than 12 units in a building if resource preservation criteria met<br>• Churches, schools, and private recreational facilities |
| Development Location Criteria: | • Abuts or has reasonably direct access to major collectors or minor arterials<br>• Near large parks or permanent open space (city park, community playfield, special use park, school recreation facility, conservation area, etc.)<br>• Near neighborhood shopping and service facilities<br>• Proximity to jobs |
| Desirable Facilities: | • Neighborhood parks, school parks or mini parks within ½ mile walking distance of the neighborhood<br>• Trail system connecting the area to other services and facilities, including parks, schools, churches and neighborhood shopping areas<br>• Transit within ½ mile walking distance of the neighborhood |

## LIVING AREA 4 (LA-4)

Living Area 4 (LA-4) identifies areas with high density housing, primarily apartments, condominiums and townhomes, as well as directly related complementary uses such as churches, schools and recreational facilities.

LA-4 areas will have great potential for transit service. These areas should also have good pedestrian access to complement the transit services. LA-4 neighborhoods should have easy access to jobs, shopping opportunities and open spaces, such as major parks or natural areas.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Density: | 12 units per acre |
| Maximum Density: | 20 units per acre |
| City Utilities: | Required for all areas |
| Corresponding Zoning Districts: | RMF-3 (Multiple Family 3)<br>RMF-4 (Multiple Family 4)<br>Other zoning districts may be appropriate if the proposed development would meet the density criteria of 12 to 20 units per acre. |

| | |
|---|---|
| Types of Development: | • Two-unit dwellings<br>• Townhomes and apartments<br>• Churches, schools and private recreational facilities |
| Development Location Criteria: | • Abuts or has reasonably direct access to arterials<br>• Near large parks or permanent open space (city park, community playfield, special use park, school recreation facility, conservation area, etc.)<br>• Near neighborhood shopping facilities<br>• Close proximity to jobs |
| Desirable Facilities: | • Neighborhood parks, school parks or mini parks within ½ mile walking distance of the neighborhood<br>• Trail system connecting the area to other services and facilities, including parks, schools, churches and shopping areas<br>• Transit within ½ mile walking distance of the neighborhood |

## LIVING AREA 5 (LA-5)

Living Area 5 (LA-5) identifies those areas with the maximum density housing, including apartments, condominiums and townhomes necessary to encourage redevelopment or development of challenging infill properties.

LA-5 areas will have the greatest potential for transit service. These areas also have good pedestrian access to complement the transit services. LA-5 areas have easy access to jobs, shopping opportunities and open spaces, such as major parks or natural areas.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Density: | 20 units per acre |
| Maximum Density: | 60 units per acre |
| Maximum Area: | Five acres |
| City Utilities: | Required for all areas |
| Corresponding Zoning Districts: | RMF-5 (Multiple Family 5)<br>Other zoning districts may be appropriate if the proposed development would meet the density criteria of 20 to 60 units per acre. |
| Types of Development: | • Apartments<br>• Nursing homes, assisted living and other senior citizen housing |

| | |
|---|---|
| Development Location Criteria: | • Abuts a principal arterial (Highways 55 or 169 or I-494) on two or more sides and abuts LA-4 on all other sides<br>• Has reasonably direct access to arterials<br>• Near neighborhood shopping facilities<br>• Close proximity to jobs<br>• Located in areas not abutting or adjacent to LA-1, LA-2 or LA-3 guided properties |
| Desirable Facilities: | • Trail system connecting the area to other services and facilities, including parks, transit and shopping areas<br>• Near large parks or permanent open space (city park, community playfield, special use park, school recreation facility, conservation area, etc.) or provides on-site private recreational facilities such as pools, walking paths, etc. |

## COMMERCIAL OFFICE (CO)

The commercial office (CO) guiding designation allows a variety of uses, including professional offices, administrative offices, research and laboratory facilities, wholesale showrooms, service facilities (e.g., conference centers, lodging and reception halls), residential care facilities (e.g., nursing homes and assisted living), senior citizen housing, and business uses having limited contact with the general public. Based on the specialized nature of potential residential uses, the City does not project the level of residential use on any of its CO sites.

CO sites may provide for limited retail sale of convenience-type products and services for the immediately surrounding area. Commercial uses in this classification are expected to develop with the highest standards of design and performance. Consequently, they should have a higher level of amenities such as landscaping, preservation of natural features, architectural controls, pedestrian trails and other features. Office parks and campus-style developments are encouraged in these areas. Commercial offices, residential facilities, and senior citizen housing can also serve as, and provide for, an orderly and progressive transition between higher and lower intensity land uses.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | • Ten acres for office parks and business campus developments<br>• One acre for smaller projects that serve as a transition between business and residential areas |

| | |
|---|---|
| Density Range: | 6 to 20 dwelling units per acre if residential use included |
| City Utilities: | Required in all areas |
| Corresponding Zoning Districts: | • B-C (Business Campus District)<br>• O (Office District)<br>• Other zoning districts as may be appropriate |
| Types of Development: | • High amenity office facilities (e.g., administrative, executive, medical, research, professional and government offices, financial institutions and research and development laboratories<br>• Residential facilities (e.g., nursing homes and assisted living) and senior citizen housing |
| Development Location Criteria: | • Abuts or has reasonably direct access to arterials<br>• In conjunction with major commercial centers<br>• The high amenity development expected renders the CO areas very suitable as "gateways" to the city<br>• Residential care facilities and senior citizen housing should be near parks or permanent open space (city park, community playfield, special use park, school recreation facility, conservation area, etc.)<br>• Residential facilities and senior citizen housing should be near neighborhood shopping facilities |
| Desirable Facilities: | • Park within ½ mile for residential facilities and senior citizen housing developments<br>• Sidewalks or trails connecting residential care facilities and senior citizen housing developments to other services and facilities, such as parks, churches and shopping centers<br>• Transit facilities on residential facility sites and senior citizen housing sites or within ½ mile walking distance of such developments |

## COMMERCIAL (C)

The commercial (C) guiding designation allows a wide variety of uses including those for convenience-oriented, neighborhood-oriented, highway-oriented, community-oriented and bulk retail-oriented markets and consumers as well as limited senior housing (no more than 150 units). These areas provide a wide range of goods and services to serve many of the shopping needs of people who live or work in the city. Where neighborhood/community commercial centers 15 acres or larger lie adjacent to a principal and minor arterial, a commercial office area and a high density residential area (LA-4), uses may also include senior housing to serve as a transition from the other residential uses. The City does not expect a regional shopping center to be built in

Plymouth. Plymouth has a limited supply of suitable land, and the city is within the trade area of existing regional centers in other communities.

Certain commercial uses, such as those devoted to motor vehicle-oriented retail or service activities (e.g., vehicle service and fuel sales, drive-through businesses and sales of motor vehicles), depend on access to major transportation routes and often have characteristics that are incompatible with residential areas. Other commercial uses, such as those involving wholesale and retail trade of large volume or bulk commercial items, storage and warehousing, may have both commercial and industrial characteristics.

## Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | • One acre for convenience retail and highway commercial<br>• Five acres for neighborhood and community shopping centers and for commercial warehouse uses<br>• 15 acres or larger adjacent to properties guided LA-4 and CO if senior housing is provided |
| Density Range | 6-12 units per overall site area |
| City Utilities: | Required in all areas |
| Corresponding Zoning Districts: | • C-1 (Convenience Commercial District)<br>• C-2 (Neighborhood Commercial District)<br>• C-3 (Highway Commercial District)<br>• C-4 (Community Commercial District)<br>• C-5 (Commercial/Industrial District)<br>• Other zoning districts as may be appropriate |

### Limited Scale Commercial

| | |
|---|---|
| Types of Development: | • Limited-scale neighborhood centers that offer basic convenience-type goods and services to the immediately surrounding areas in which they are located |
| Development Location Criteria: | • May be adjacent to low density residential areas<br>• At intersection of streets classified as at least collectors |

### Neighborhood Commercial

| | |
|---|---|
| Types of Development: | • Neighborhood-scale shopping centers providing low to moderate intensity retail goods and/or services, including senior housing when integrated with a neighborhood shopping center |

| | |
|---|---|
| Development Location Criteria: | • Intersections of arterials and at least minor collectors<br>• Locations that provide appropriate transitions between the commercial uses and residential neighborhoods |

### Community Commercial

| | |
|---|---|
| Types of Development: | • Community-scale shopping centers providing high intensity retail goods and/or services, including senior housing when integrated with a community shopping center |
| Development Location Criteria: | • Intersections of arterials and major collectors<br>• Locations that provide appropriate transitions between the commercial uses and residential neighborhoods |

### Commercial/Industrial

| | |
|---|---|
| Types of Development: | • Wholesale and retail trade establishments for large volume or bulk commercial items (such as lumber yards or motor vehicles), office showrooms and small businesses that have both commercial and industrial characteristics |
| Development Location Criteria: | • Near arterial access points<br>• In transition areas between commercial and industrial areas |

## CITY CENTER (CC)

The intent of the city center (CC) classification is to provide a framework for development of a vital center aimed at: serving the entire community; attracting residents for a variety of civic, cultural, entertainment, retail and recreation activities; and providing a strong sense of identity for Plymouth. This is a unique classification intended to provide for planned, unified development in the City Center area. Guiding principles, design guidelines, streetscape elements and public space design guidelines (which can be found in Appendix 3D) will be used to implement, reinforce and strengthen the identity of this area.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | None |
| City Utilities: | Required in all areas |
| Corresponding Zoning Districts: | CC-P (City Center-Public)<br>CC-R&E (City Center-Retail and Entertainment)<br>CC-OT&R (City Center-Office/Technical and Retail) |

| | |
|---|---|
| Types of Development: | • Integrated retail, office, entertainment, recreation and housing (12-20 units per acre; market-driven) |
| Development Location Criteria: | • Unique location in the community as shown on the Land Use Plan |

## INDUSTRIAL (IND)

The industrial (IND) guiding designation allows a variety of uses, including manufacturing, production, processing and storage of materials, goods and products. In addition, compatible and supportive office and business uses may be allowed in IND areas to provide an integrated and attractive employment center.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | 5 acres |
| City Utilities: | Required in all areas |
| Corresponding Zoning Districts: | • I-1 (Light Industrial District)<br>• I-2 (General Industrial District)<br>• I-3 (Heavy Industrial District)<br>• Other zoning districts as may be appropriate |
| Types of Development: | • Manufacturing, production, processing, cleaning, storage, servicing, repair or testing of materials, goods or products<br>• Warehousing, wholesale showrooms and distribution centers<br>• Offices related to the above uses and limited retail, rental or service activities |
| Development Location Criteria: | • Areas with access to principal arterials, related service drives or minor arterials<br>• Sites that are appropriate and reasonably adaptable to industrial site development without substantial earthwork or removal of natural stands of trees<br>• Near other intensive land uses (high density residential development, service business and limited business)<br>• Uses generating large amounts of truck traffic, such as distribution centers and truck terminals, located away from residential areas<br>• Heavy manufacturing uses in areas isolated from commercial or residential uses to minimize adverse external impacts |
| Related Facilities: | • Areas served by railroad<br>• Near transit |

- Near supportive facilities (e.g., restaurants) that will provide convenience to employees

## PUBLIC/SEMI-PUBLIC/INSTITUTIONAL (P-I)

The Public/Semi-Public/Institutional (P-I) guiding designation allows a variety of uses including public parks and open space, private recreation facilities and public buildings.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | • Two acres<br>• Varies by specific use |
| City Utilities: | • Required for all buildings except park buildings without sanitary facilities |
| Corresponding Zoning Districts: | • P-I (Public/Institutional District)<br>• Other zoning districts as may be appropriate |

### Parks and Open Spaces

| | |
|---|---|
| Facilities Include: | • Mini-parks, neighborhood parks, community playfields, city parks, special use parks and regional parks |
| Size and Location Criteria: | • Specifications for public parks and open spaces are found in the Parks chapter and Appendix 7A |

### Private Recreation Uses

| | |
|---|---|
| Facilities Include: | • Large facilities that affect the overall land use pattern could include such things as golf courses, riding stables, snowmobile courses, ski hills, etc. |
| Size and Location Criteria: | • The variety of potential private recreation facilities makes size or location criteria a function of specific proposed developments<br>• Location on collectors or arterials that can adequately handle the peak traffic expected, rather than local streets |

### Institutional Uses

| | |
|---|---|
| Facilities Include: | • Schools, libraries, fire stations, community centers, public administrative offices and maintenance shops, places of worship, correctional facilities, nursing care and hospital facilities, and the like |
| Size and Location Criteria: | • Most of the uses are special facilities where generalized criteria would not apply. State law |

and rules often set the size and design requirements for facilities. Appropriate criteria should be specified in the zoning ordinance for both permitted and conditional uses.
- Public utilities sites should be located so that water, sewer, electricity, gas and other utilities can be readily provided.
- Maintenance and outside storage of an industrial character should not be located adjacent to residential areas unless fully screened.

## MIXED USE (MXD)

Development within the Mixed Use (MXD) classification is expected to demonstrate a higher standard of site and building design. Evaluation of building design will be based on the building's relationship to its surroundings and the following architectural characteristics: materials; texture; colors; massing; building components and details; articulation of roof lines and exterior walls; height; and setbacks. In meeting a higher standard of site design, mixed use developments should include such things as: well-defined pedestrian walkways; transit improvements; decorative paving materials; street furniture; public plazas; decorative pedestrian-scale lighting; the screening of parking and loading areas; and a quality landscape design that ties together all of the individual elements of the development. To encourage pedestrian movement and reduce impervious surfaces, parking for either residential or non-residential uses should not dominate the site. Reducing the amount of surface parking should be accomplished through structured parking, shared parking or by locating a portion of the parking beneath the building.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | Five acres |
| Residential Density Range: | 12 to 20 units per acre (residential density is calculated using the total land area for the development) |
| City Utilities: | Required in all areas |
| Corresponding Zoning District: | PUD (Planned Unit Development) |
| Types of Development: | • Multiple dwellings (apartments, townhouses and similar attached housing – all market-driven)<br>• Commercial uses that offer basic convenience type goods and services<br>• Community scale commercial uses that are not oriented toward the motorist<br>• Office facilities (professional, medical, dental and similar uses)<br>• No single use shall dominate the site |

| | |
|---|---|
| | • Both vertical and horizontal mixing of uses is permitted |
| Development Location Criteria: | • Abuts or has reasonably direct access to major collectors or minor arterials<br>• Mixed use developments may provide a transition between low density residential and more intense land uses |
| Desirable Facilities: | • Adequate recreation facilities available to the site<br>• Sidewalks and trails connecting the development to other services and facilities, including parks, schools, churches and shopping centers<br>• Transit facilities on the site or within ½ mile walking distance |

## MIXED USE RESIDENTIAL (MXD-R)

Development within the Mixed Use Residential (MXD-R) classification must include a residential component. As is the case with the MXD classification, development is also expected to demonstrate a higher standard of site and building design. Likewise, evaluation of building design will be based on the building's relationship to its surroundings and the following architectural characteristics: materials; texture; colors; massing; building components and details; articulation of roof lines and exterior walls; height; and setbacks. In meeting a higher standard of site design, mixed use residential developments should include such things as: well-defined pedestrian walkways; transit improvements; decorative paving materials; street furniture; public plazas; decorative pedestrian-scale lighting; the screening of parking and loading areas; and a quality landscape design that ties together all of the individual elements of the development. To encourage pedestrian movement and reduce impervious surfaces, parking for either residential or non-residential uses should not dominate the site. Reducing the amount of surface parking should be accomplished through structured parking, shared parking or by locating a portion of the parking beneath a building.

### Guidelines and Criteria

| | |
|---|---|
| Minimum Area: | Ten acres |
| Residential Density Range: | 12 to 25 units per acre (residential density is calculated using the total acreage for the area guided MXD-R). The minimum number of residential units cannot be reduced once an area is guided MXD-R without a comprehensive plan amendment. No more than 50 percent of a district land area shall be residential. |

| | |
|---|---|
| City Utilities: | Required in all areas |
| Corresponding Zoning District: | PUD (Planned Unit Development) – with a redevelopment proposal<br>Existing Districts as of adoption of this plan if:<br>• No more than 25% of an existing use is altered or changed<br>• A principle structure is vacant less than one year. |
| Types of Development: | • Multiple dwellings (apartments, townhouses and similar attached housing)<br>• Commercial uses that offer basic convenience type goods and services<br>• Community scale commercial uses<br>• Office facilities (professional, medical, dental and similar uses)<br>• Hospitality (hotels)<br>• Restaurants<br>• No single use shall dominate the site<br>• Both vertical and horizontal mixing of uses is permitted |
| Development Location Criteria: | • Abuts or has reasonably direct access to major collectors or minor arterials<br>• Mixed use residential developments may provide a transition between low density residential and more intense land uses |
| Desirable Facilities: | • Adequate recreation facilities available to the site<br>• Sidewalks and trails connecting the development to other services and facilities, including parks, schools, churches and shopping centers<br>• Transit facilities on the site or within ½ mile walking distance |

Appendix Chapter 3C

# COMPREHENSIVE PLAN AMENDMENT PROCEDURES

## AMENDMENTS INITIATED BY APPLICANTS OTHER THAN THE CITY OF PLYMOUTH

- Anyone requesting an amendment to the comprehensive plan (text or maps) needs to submit an application and associated fee to the Community Development Department. The application form and fee schedule can be found on the City's website (www.plymouthmn.gov). The application needs to include detailed written and graphic materials, the number and size as indicated on the City's guide plan amendment checklist (also found on the website), explaining the proposed change to the plan. The application is considered complete when the applicant has provided all the information specified.

- Within 15 days of receipt of a complete application for a change to the land use plan map, Community Development Department staff mails a notice to all property owners within 750 feet of the boundary of the subject property, informing them of the receipt of the application and the anticipated schedule for its consideration. A public notice sign is placed on the property.

- Following analysis of the request, Community Development Department staff sets a public hearing date, following established hearing notification procedures. The Planning Commission conducts the hearing and following the hearing, makes its recommendation(s) to the City Council. Notice of the hearing is published in the official newspaper at least ten days prior to the hearing and when the amendment affects a particular property, written notification of the hearing is mailed at least ten days prior to all property owners within 750 feet of the boundary of the subject property. Failure of a property owner to receive the notice does not invalidate the proceedings.

- The Planning Commission reviews the impact of the proposed amendment. Its judgment is based on, but not limited to, the following factors:

    - The extent to which the location criteria of applicable existing or proposed land use plan classifications are satisfied.

- Evidence submitted by the applicant demonstrating the reason(s) that the plan should be changed, including, but not limited to, whether new information has become available since the comprehensive plan was adopted that supports re-examination of the plan, or that existing or proposed development offers new opportunities or constraints that were not previously considered by the plan.

- If the amendment affects a particular site, whether or not the change is needed to allow reasonable development of the site.

- The relationship of the proposed amendment to the supply and demand for particular land uses within the city and the immediate vicinity of the site.

- The applicant's demonstration that the proposed amendment has merit beyond the interests of the proponent.

- The possible impacts of the amendment on all specific elements of the comprehensive plan as may be applicable, including, but not limited to:

    - Transportation, as demonstrated by a traffic study conducted by the City at the applicant's expense;
    - Sanitary sewer, including existing and proposed sanitary sewer flows compared to the adopted plan;
    - Housing, including the extent to which the proposal contributes to the City's adopted housing goals;
    - Surface water, including compliance with the City's goals for water quality and water quantity management;
    - Water supply;
    - Parks and open space; and
    - Capital improvements program (CIP).

- Consideration of the impact of the proposed amendment upon current and future special assessments and utility area charges, future property tax assessments or other fiscal impacts on the City of Plymouth.

- The City may request additional information from the applicant concerning the requested amendment or retain expert testimony with the consent and at the expense of the applicant, when the information is necessary to establish the possible effects or benefits of the proposed amendment.

- The applicant or their representative may appear before the Planning Commission to present information and answer questions concerning the proposed request.

- Following the applicant's presentation and the close of the public hearing, the Planning Commission makes a recommendation on the request. Their recommendation is accompanied by the report and recommendation of City staff.

- The City Council will not act on an amendment until it has received a report and recommendation from the Planning Commission and City staff or until 60 days after the first regular Planning Commission meeting at which the request was considered.

- Upon receiving the report and recommendation of the Planning Commission, the City Manager schedules the application for City Council consideration. Planning Commission reports and recommendations are made part of the permanent written record of the City Council meeting.

- The City Council considers an amendment and then takes action by resolution to authorize the amendment to be submitted to the Metropolitan Council for review.

- Following action by the Metropolitan Council, the City Council formally approves the amendment. Approval of a proposed amendment requires passage by a two-thirds vote of the entire City Council.

- Whenever an application for an amendment has been considered and denied by the City Council, a similar application for an amendment affecting substantially the same property will not be considered again by the Planning Commission or City Council for at least six months from the date of its denial; and a subsequent application affecting substantially the same property will likewise not be considered again by the Planning Commission or City Council for an additional six months from the date of the second denial unless a decision to reconsider such matter is made by a majority of the full City Council.

- According to state law, amendment applications must be approved or denied within 120 days from the date of a complete submission unless extended by a mutual agreement between the applicant and the City.

## AMENDMENTS INITIATED BY THE CITY COUNCIL OR PLANNING COMMISSION

The City Council or Planning Commission may initiate amendments to the text or maps of the comprehensive plan. The procedural requirements outlined above apply to these amendments to the extent required by state statute and as follows:

- The Planning Commission or City Council, upon initiating the amendment, will specify the notification procedure to be followed to ensure that all affected citizens and landowners have adequate notice of the initiation and consideration of the amendment.

- The Planning Commission or City Council, upon initiating the amendment, will specify the anticipated schedule for its consideration.

Appendix Chapter 3D

# CITY CENTER

Plymouth's City Center is located one mile west of I-494 on Highway 55. The district contains roughly 140 acres and is located near the geographic center of the city. Wooded areas are located to the east and west, wetlands are located east of and within City Center. These features create a commercial center surrounded by natural environment. Land ownership is divided among many individuals, with no single owner controlling a majority of the City Center area.

The 2007 review of City Center and its guidelines confirmed that the vision of Plymouth's City Center is for the area to be a blend of cultural, recreational, civic and entertainment uses that encourage interaction of the entire community. It will be built around an infrastructure that provides goods and services for residents and that allows for casual meetings and organized community-wide events. In all facets, City Center will orient to people.

## CITY CENTER VISION AND GUIDING PRINCIPLES

Plymouth's City Center will not be a "downtown" in the traditional sense, but it will not be merely a "shopping center" either.

In developing City Center, it will be considered as a whole. Even as individual parcels are considered, it is their fit as a part of City Center that is paramount – the role of the parcel in the City Center landscape and the affect of the parcel on its neighbors. City Center will be pedestrian friendly and auto convenient, with an emphasis on striking a balance between people and cars.

The City will use design guidelines to maintain consistency with the vision and concept plan and coherency in the patterns of development that result.

*Structure and Organization* – The pattern of streets in City Center serve as a foundation for the structure of City Center. Uses along Vicksburg Lane and Plymouth Boulevard define the west and east edges, while cross streets break City Center into discrete blocks.

A pedestrian "spine," when completed, will connect the north and south ends of City Center through the middle of the blocks. Within the spine, spaces can be developed for joint uses in the center (storm water ponds and pedestrian connections and activities). The spine will become one of the center's key elements.

Another key element of City Center is the way development relates to the street. Buildings in City Center will be set close to the street, resulting in buildings becoming the focus rather than parking lots. Buildings close to the street will also shield neighboring residential areas from parking areas and lights and create a sense of density for City Center.

It is important that corners not be relegated to parking. Corner sites have a critical role to play in lending identity to City Center. Parking, therefore should not occur on corners, and should not be located between a building and the street.

*Identity Related to Place* – An identity will be established that is meaningful to the community, symbolizing the area as the heart of the community. This identity must be recognizable from the edges of City Center and from within.

The best opportunities for creating a distinct City Center will be in its public components. Buildings like City Hall, the post office, the ice center and the library are strong civic elements. However, streetscape elements such as pedestrian features, lighting, landscaping, signage and street furniture will play a significant role in unifying the City Center area through consistent design. This consistency will create a unique and identifiable image for City Center and emphasize pedestrian-friendly streets that encourage walking through the area.

*A Mix of Uses* – City Center will contain a blend of activities, including commercial, office and public uses, with no single use dominating. The public elements include: City Hall; Hilde Performance Center; Plymouth Ice Center; and the Hennepin County Library. Additional public elements include parks, plazas and community-oriented open space. Mixing may occur vertically within a building. Mixing may also occur horizontally. This will provide a range of uses along the length of a street. However, as mixing occurs, it needs to respect the specific character of the land and resources and take into account the character of areas bordering City Center.

Higher density residential uses, which would be market-driven, could occur on several sites within City Center. The density of this housing would range from 12-20 units per acre.

*Streets as Spaces* – Streets are the public spaces and the common ground of City Center. To serve as public spaces, they cannot be used for cars alone. Pedestrians must be an integral part of the street environment. Areas between buildings and the street will not be so much a part of the private realm, but instead will feel like an extension of the public space of the street. All uses will front on streets and buildings will orient to streets instead of parking lots.

Circulation patterns throughout City Center will be planned to allow for people to move about without cars and to allow people to park once and shop twice. Streets will be planned to create comfort and interest for pedestrians.

*Parking for* People – To provide focus on the architecture and activities of City Center, parking will be moved out of the "front yard" and shared among a variety of uses. To enliven the street, on-street parking will be encouraged on Plymouth Boulevard and on cross streets (34th, 35th, 36th and 37th Avenues).

*Design of* Buildings – Development of City Center needs to generate intensity and permanence and set a hierarchy of building types. Consistently high standards will be set for building materials and construction to achieve an architecture that is meant to last.

*Connection to, from and within City Center* – City Center must be walkable. Strong connections in the form of continuous and convenient trails are needed between City Center and the neighborhoods that surround it. To facilitate north-south pedestrian movement through City Center, developers need to establish the mid-block spine through City Center. Transit is also a method of connecting. Transit needs will be considered as development proposals are reviewed.

*Day to Night Orientation* – Activities will be encouraged that add life to City Center during both day and night, for civic and entertainment reasons as well as for shopping or work.

## CITY CENTER DESIGN GUIDELINES

The following design guidelines provide specific direction to Plymouth property owners for the development of City Center.

*Accommodating Pedestrians and the Pedestrian Environment* – Pedestrian activity is an important component of City Center. Every person that comes to City Center will experience some part of it as a

pedestrian. City Center should be a place that is as comfortable for pedestrians as it is for cars. Pedestrians should be able to move easily from one destination to another without resorting to driving.

Recognize first that most people will arrive by car, but once they park they become pedestrians. The pedestrian and vehicle environments should be balanced, creating a City Center that is comfortable, safe, convenient and accessible for pedestrians. Access from the street to a building in City Center should be clearly visible, convenient and safe and should be oriented to vehicles and pedestrians. This level of connection between buildings and the street will complete the pedestrian network through City Center.

- Complete a pedestrian network of sidewalks and trails, including the pedestrian spine.
- Connect the sidewalks and trails of City Center to trails reaching to the rest of Plymouth.
- Facilitate parking and pedestrian connections that allow people to park once and shop twice.
- Develop the shortest possible street crossing distance by using "bump-outs," medians, or other devices.
- Plan for traffic signals at intersections along Vicksburg Lane and stop signs at other City Center intersections to allow for safe pedestrian crossings.
- Provide access to sites from 35th Avenue, 36th Avenue and 37th Avenue to the greatest degree possible.
- Provide for interesting, comfortable and safe routes for pedestrians in parking areas.
- Require sidewalks connecting the public sidewalk and the front door of every building in City Center.
- Encourage other pedestrian features, such as benches, small plazas and landscape amenities. Especially focus these features at building entries and areas near the pedestrian spine.

*Identity and Definition* – One should know when he/she enters City Center, and what it is that sets this place apart from other downtowns or commercial areas. In City Center, features of the natural and man-made environment can be used to create a sense of identity, and to define the boundaries of City Center. When considering landmarks, recognize that focal points do not have to be buildings – special sites and well-developed streets can become key elements of City Center.

- Establish "markers" at significant points of entry (key intersections) to highlight the streets of City Center. Extend the character of those markers throughout the City Center streetscape.
- Treat the woodlands that lie at the edges of City Center as a crucial identity element.

- Use markers to reinforce the woods at the edges of City Center as the boundary to City Center.
- Promote the inclusion of unique elements such as landscaping and flower beds in key locations.

*Mixing Uses* – City Center should be a mix of commercial, office, public, entertainment, recreation and residential uses.

- Allow for a range of uses that occur on the various blocks of City Center, within individual parcels, and within a single building.
- Permit uses that promote an active and vital City Center, but do not compromise compatibility.

*Landscape* – A consistent landscape character should be developed. It should relate City Center to the larger environment. City Center should promote a seamless landscape between public spaces (streets) and private spaces (sites).

- Emphasize the spine by establishing a landscape character that is different from streets and developed areas.
- Blend the boundary area of sites adjacent to the spine with "wetland" landscape materials.
- Plant shade trees in parking areas.
- Plant trees close to the street to calm traffic and to develop streets with distinct character.
- Establish common landscape themes for the public/street side of each development in City Center. These may include hedges and street trees.
- Screen parking and service areas from street views with landscape and architectural treatments. Berms should not be used.
- Emphasize the pedestrian environment with street trees, plantings, pedestrian-scale street lights and other amenities.
- Provide pedestrian scale light fixtures (no higher than 15 feet) at walkways, gathering spaces, building fronts and entries. Provide lighting in parking areas no higher than 25 feet.
- Provide planters and seasonal plantings in public and private locations.

*Streets of City Center* – To encourage people to explore City Center, streets should encourage pedestrian activity and provide for visually interesting views from vehicles. The streets set an order to City Center, and there should be a hierarchy of streets relating to their importance in the structure of City Center. By controlling traffic speed, City Center can be made more pedestrian friendly and safer for vehicles as well as walkers.

- Develop Plymouth Boulevard as the main street, strengthening the relationship between City Center to its west and the park to its east.
- Develop 36th Avenue with a character that links Vicksburg Lane and the park and connects the public/civic functions at its ends.
- Provide traffic signals at all intersections on Vicksburg Lane to control speed and to allow for pedestrian crossing.
- Balance traffic flow and convenience with scale, pedestrian movement and aesthetics.

*Parking* – City Center streets need to do more than move vehicles. Streets should be used, where practical, for parking. On-street parking will: result in activity on the street; ease the need for parking on sites; create a buffer between traffic and pedestrians; and reduce traffic speed. On-street parking is important to the success of buildings that are oriented to the street.

- Encourage joint use parking to avoid over-building of parking.
- Locate parking behind or beside buildings – limit parking between buildings and streets and do not allow parking at corners/intersections.
- Implement parking to meet the expected demand of proposed development.
- Provide opportunities for on-street parking.
- Do not provide parking in front of areas where the pedestrian spine touches the street.

*Useable Spaces* – The entire City Center should be considered a gathering space for the community. Every building should offer opportunities for some degree of gathering. Spaces should be developed to encourage interaction and gathering and to accommodate special events. These spaces should vary in size and be multi-purpose.

- Create a pedestrian-oriented spine to connect the north and south ends of the City Center area.
- Add functions of private development to the spine (e.g., storm water ponds and rain gardens).
- Include amenities such as benches and arbors as a part of the spine for comfort, convenience and interest.
- Develop waiting spaces at transit stops.
- Create useable, inviting outdoor spaces (plazas) at front doors of buildings over 30,000 square feet or developments with an aggregate building size of over 30,000 square feet, especially where the front door lies at a connection to the pedestrian spine.

- Incorporate special pavement, seating, more detailed landscaping, and other special features at each plaza space.

*Storm Water as a Feature* – Development is required to accommodate systems for treatment of runoff. These spaces, if designed properly, can become an amenity, and allow for some increase in the intensity of development.

- Develop storm water ponds to be shared by a number of parcels in City Center. Locate ponds so they are part of the pedestrian spine.
- Recognize ponds as an amenity and encourage ponds to be developed in a more park-like fashion. Wherever possible, prohibit fences around ponds.

*A Community Gathering Space* – A facility should be incorporated into City Center that draws people to the area and serves as a hub of activity. It should be the one place in Plymouth that welcomes all residents for functions that are oriented to community rather than commerce. The community gathering space should act as a bridge between important aspects of City Center and the community.

- Make people and their activity the focus of the community gathering space, allowing the activity of the community gathering space to be seen.
- Develop strong pedestrian connections between the community gathering space and other uses in City Center.
- Provide spaces for large and small gatherings, formal and informal events, and paid and free activities.
- Develop the community gathering space and its site in ways that do not dominate the natural resources of the site.
- Make the community gathering space structure the transition between the more urban development to the west and the natural area to the east.

*Buildings* – For City Center to gain an identity as a distinct district and a commercial area with a different look than a shopping center, it must be made to feel like one has entered something. City Center should be different than other commercial areas in the city. City Center should be one of the most intensely developed parts of the community, and the density will foster pedestrian activity. Larger buildings should be expected, but they should not be so large as to prevent them from relating strongly to the street or from becoming attractive components of City Center. Buildings should be commercial, not residential in

character; more permanent than transitional; and more expressive than "formulized." Every building in City Center does not have to be the same. The way buildings relate to the street is one of the key aspects of creating a distinct district. By addressing the space between buildings, a feeling of a continuous wall might be developed, lending a stronger sense of a district. This continuous wall effect can create a sense that the street is a sort of room or public space.

- Form an edge to the street with buildings, leading to a sense that the street is like a "room" within City Center.
- Establish a "build to" line at 20 feet from the right-of-way. Require that 50 percent of the largest building on the site occupy the street frontage at the "build-to" line.
- Minimize the side yard area of buildings.
- Coordinate development of buildings to create active spaces in side yards rather than only parking or service functions.
- Allow parking between buildings to the extent that parking in the side yard accounts for a maximum of 50 percent of parking on the site.
- Encourage the creation of spaces for people in areas between buildings.
- Place buildings near the streets to provide a sense of development beyond parking – define an edge and create something to pass by.
- Share land resources wherever possible to increase the intensity of development (shared ponding, joint use parking).
- Prohibit uses that rely on drive-through sales and those that are solely automobile-oriented.
- Encourage multiple story buildings where appropriate.
- Articulate large buildings to reduce their apparent size; modulate their facades to provide for additional interest to long buildings.
- Encourage individual expression, but develop continuity with elements that result in a unified, compatible City Center.
- Require that buildings and entryways be oriented to the street.
- Avoid designs that rely on fashion. Instead, encourage designs that are timeless and will not become obsolete and outdated with age.
- Discourage large blank exterior surfaces; articulate facades, especially with windows, to create visual interest from the street.
- Establish a strong base and top for multi-story buildings, with middle layers that are simpler.
- Articulate the tops of buildings to avoid box-like images. Encourage building tops that reinforce the building's commercial nature (prohibit sloped roofs).

- Integrate mechanical systems and service areas into the architecture of the building.
- Base building design on unique characteristics, not on a franchise formula (roof patterns, corporate colors or similar elements).
- Create detail that is an integral part of the architecture, not a series of applied elements.
- Require signs to be incorporated into the facades of buildings, not extending past the roof line and not projecting more then 12 inches beyond the plane of the façade on which they are located; allow pylon signs only along the Highway 55 frontage. Signs should be located on buildings in a manner that allows them to be read by pedestrians on the sidewalks in front of the buildings.
- Buildings with facades along Vicksburg Lane must address Vicksburg Lane through architecture and setbacks and have easily accessible entrances to the Vicksburg Lane sidewalk. However, the front entrance does not have to face Vicksburg Lane.

*Materials* – In City Center, creativity should be promoted. Buildings should be constructed of materials that are enduring, timeless and well-detailed.

- The following is a list of desired and undesired materials for buildings in City Center. Allow developers to deviate from the list only when they demonstrate that the proposed design incorporates materials in ways that are compatible with the proposed use and City Center as a whole.

    - Desired Materials:
        - Materials that are easily maintained, durable and attractive at close distances (e.g. from the view of a pedestrian on a sidewalk)
        - Materials that have an attractive pattern, texture, and quality detailing
        - Brick, stone or high quality pre-cast concrete (colored and textured)
        - Metals that are matt finish and neutral or earth tone in color; metals that are used for exterior walls should have visible corner moldings and trim
        - Transparent glass
        - Canvas awnings

- Undesired Materials:
    - Non-durable siding materials such as plywood, corrugated metal or fiberglass or other materials that decay rapidly when exposed to the elements
    - Materials that have no pattern or relief, especially when those materials are applied to large wall surfaces
    - Simulated brick or stone
    - Wood, except as accent materials or in elements that are integrated with other desired materials
    - Mirrored glass, especially mirrored glass that faces an active pedestrian street
    - Materials that represent corporate colors, patterns or trademarks
    - Brightly colored metal roofing or canopies
    - Concrete that is not enhanced as indicated under "Desired Materials," especially pre-cast, tilt-up walls
    - Synthetic awnings, especially awnings meant to be illuminated from within

## Streetscape Elements

*Streetscape Hierarchy* – The streets within City Center should have differing characteristics due to their differing functions, adjacent land uses and traffic volumes. The five streetscape zones include: 1) the main street parkway zone (Plymouth Boulevard), which emphasizes the natural setting, slower speeds and softer lighting; 2) the primary gateway (South Vicksburg Lane), which serves as the "front door" to City Center; 3) the secondary gateway (North Vicksburg Lane and County Road 9), which serves as the lower-intensity edge of City Center; 4) the pedestrian focus zone (internal streets), where the design should encourage walkability; and 5) Highway 55, which offers significant views and the opportunity to create an identity for City Center. Each of these zones has differing design characteristics, elements and edges.

*Lighting* – A common street light should be incorporated throughout City Center. This street light should be used along public streets, the pedestrian spine and other high pedestrian areas, and, where appropriate, incorporated into private streets.

*Landscaping* – Landscaping consists predominantly of oak and maple variety street trees planted at regular 40-foot intervals. Maple trees should be planted along 35th and 37th Avenues and oak trees should be planted along 36th Avenue. Smaller flowering trees should be used in medians and pedestrian areas for added interest and human scale. Hedge and informal shrub groupings should alternate with low fencing to provide dense screening of parking lots. Boulevards planted with flowers and flowering planters are suggested along east/streets, in front of buildings and along the pedestrian spine to soften the appearance of the buildings and enhance the pedestrian environment.

*Irrigation* – Limited use of automatic irrigation is recommended for higher-maintenance plantings and in high-traffic pedestrian areas that include flower and shrub plantings, where regular, predictable water schedules are required. Supplemental watering of street trees will be provided by City water trucks when required due to insufficient rainfall.

*On-Street Parking* – The number of on-street parking spaces will be increased in City Center to supplement existing parking supply and to help reduce traffic speeds. Providing for on-street parking will require that Plymouth Boulevard be reduced from two-lane to one-lane of travel in each direction, north of 34th Avenue.

*Sidewalks* – Many of the necessary sidewalks have been installed in City Center as development has proceeded. Continued efforts are necessary to complete sidewalks throughout City Center. In addition to sidewalks along public streets, sidewalks are necessary throughout the private sites to provide for defined and safe pedestrian movements. In both the private and public sidewalk system a distinctive crosswalk design or designs are necessary to increase pedestrian safety.

*Furnishings* – Furnishings are important to the streetscape image because they provide life, identity and pedestrian amenity. Public seating areas, which include benches, trash receptacles and flower planters, should be provided where high pedestrian traffic is expected. This includes points along Plymouth Boulevard, 36th Avenue and the pedestrian spine.

*Banners and Street Signs* – Banners and street signs help to create a sense of arrival. Banners should be considered along Plymouth Boulevard, Vicksburg Lane, and 35th, 36th and 37th Avenues. They will help to emphasize the special nature of City Center. Street signs specially designed for City Center should be considered. These signs will identify City Center as a unique place in the city.

*Gateways* – Another important group of streetscape elements that add life and identity to the streetscape are gateway monuments and intersection landscaping treatments. They are used to mark important locations within City Center. Primary gateways are larger structures that will identify City Center to drivers on Highway 55 and other major routes. Secondary gateways are smaller structures that will be located at key pedestrian crossings to alert both walkers and drivers to the crossing. Intersection landscaping should be incorporated with gateways as well as at intersections where no gateways are constructed.

Appendix Chapter 3E

# EMPLOYMENT-BEARING INTENSITY

The following table details the City's employment-bearing intensity expressed as commercial/industrial floor area ratios (FARs). The intensity in Plymouth ranges from 0.02 to 3.1.

## TABLE 3E-1
## COMMERCIAL/INDUSTRIAL FAR

| PID | Address | PT | S/R | Use Code | Use Code Description | Property Title | Owner Name | Actual Land | Actual Acres | Usable Land | Zoning | FFA | GBA | FAR (GBA/Usable) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01-118-22-11-0004 | 6150 TRENTON LA N | C | 1 | 344 | Office Building | UNITED HEALTHCARE | JC PLYMOUTH PROP LLC ET AL | 1,624,734 | 37.30 | 740,302 | B-C | 30,225.00 | 185,870 | 0.251073211 |
| 01-118-22-11-0005 | 6000 NATHAN LA N | C | 1 | 344 | Office Building | SMITH MEDICAL | 6000 NATHAN (MN) LLC | 1,144,166 | 26.27 | 605,852 | B-C | 0.00 | 190,403 | 0.314273123 |
| 01-118-22-12-0003 | 6055 NATHAN LA N | I | 1 | 407 | Distribution Warehouse | BASS CREEK BUSINESS | LIBERTY PROPERTY L P | 375,052 | 8.61 | 375,052 | I-2 | 99,378.00 | 99,378 | 0.264971257 |
| 01-118-22-12-0004 | 6050 NATHAN LA N | I | 1 | 494 | Industrial Light Manufacturing | ACRYLIC DESIGNS | EXOTIC PROP LTD PTNRSHP | 320,790 | 7.36 | 320,790 | I-2 | 101,565.00 | 101,565 | 0.316608997 |
| 01-118-22-13-0005 | 5905 NATHAN LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | BOSTON SCIENTIFIC | SCHNEIDER (USA) INC | 994,935 | 22.84 | 994,935 | I-2 | 153,442.00 | 219,514 | 0.220631499 |
| 01-118-22-13-0009 | 9955 59TH AVE N | C | 1 | 344 | Office Building | POLARIS | POLARIS INDUSTRIES INC | 383,052 | 8.79 | 383,052 | B-C | 40,482.00 | 162,478 | 0.424166954 |
| 01-118-22-13-0010 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | SELECT COMFORT CORPORATION | 285,172 | 6.55 | 147,250 | B-C | 0.00 | 0 | 0 |
| 01-118-22-14-0004 | 9800 59TH AVE N | C | 1 | 344 | Office Building | SELECT COMFORT HEADQ | INVESTORS WARANTY OF AMERICA | 694,498 | 15.94 | 694,498 | B-C | 0.00 | 167,486 | 0.241161242 |
| 01-118-22-21-0002 | 6075 TRENTON LA N | I | 1 | 494 | Industrial Light Manufacturing | ACRYLIC DESIGNS | EXOTIC PROPERTIES LTD PTNRSH | 478,198 | 10.98 | 380,646 | I-2 | 119,216.00 | 131,074 | 0.34434619 |
| 01-118-22-21-0005 | 6105 TRENTON LA N | I | 1 | 494 | Industrial Light Manufacturing | SELECT COMFORT | ICON OWNR POOL 3 MIDWST/SE | 531,144 | 12.19 | 531,144 | I-2 | 99,388.00 | 125,690 | 0.236640158 |
| 01-118-22-24-0006 | 5905 NATHAN LA N | LI | 1 | 102 | Vacant Industrial Land | BOSTON SCIENTIFIC | SCHNEIDER (USA) INC | 105,626 | 2.42 | 105,626 | I-2 | 0.00 | 0 | 0 |
| 01-118-22-24-0007 | 5905 TRENTON LA N | I | 1 | 494 | Industrial Light Manufacturing | TRENTON COMMERCE CEN | LIBERTY PROPERTY LTD PTSP | 451,687 | 10.37 | 451,687 | I-2 | 100,384.00 | 99,502 | 0.220289714 |
| 01-118-22-24-0008 | 5959 TRENTON LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | TWIN CITY FAN | LOMAR DEVELOPMENT CO | 603,326 | 13.85 | 290,000 | I-2 | 67,869.00 | 78,509 | 0.27072069 |
| 01-118-22-41-0008 | 5615 STATE HWY NO 169 | I | 1 | 406 | Storage Warehouse | | CFGM LLC | 44,818 | 1.03 | 44,818 | I-2 | 3,000.00 | 3,000 | 0.066937391 |
| 01-118-22-41-0010 | 9700 56TH AVE N | C | 1 | 455 | Auto Dealership, New (Complete) | SUPERIOR FORD | TG FAMILY LTD PARTNERSHIP | 512,816 | 11.77 | 512,816 | C-5 | 61,099.00 | 64,310 | 0.125405604 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01-118-22-42-0009 | 5750 NATHAN LA N | C | 1 | 419 | Convenience Market (With Fuel) | SUPER AMERICA | ASTLEFORD FAMILY LTD PTNSP | 94,398 | 2.17 | 50,700 | C-2 | 2,952.00 | 2,952 | 0.058224852 |
| 01-118-22-42-0049 | 40 ADDRESS PENDING | LC | 1 | 100 | Vacant Commercial Land | | ASTLEFORD FAMILY LTD PTNSP | 113,571 | 2.61 | 113,571 | | | | 0 |
| 01-118-22-43-0120 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | BASS LAKE REALTY CORP | 0 | 0.00 | | I-1 | 0.00 | 0 | 0 |
| 01-118-22-44-0002 | 5505 STATE HWY NO 169 | I | 1 | 494 | Industrial Light Manufacturing | TOP NOTCH TREE SERVI | TOP NOTCH INVESTMENTS LLC | 27,169 | 0.62 | 27,169 | I-2 | 6,000.00 | 6,000 | 0.220839928 |
| 01-118-22-44-0003 | 5475 STATE HWY NO 169 | I | 1 | 406 | Storage Warehouse | | 5475 HWY 169 LLC | 84,000 | 1.93 | 84,000 | I-2 | 15,600.00 | 15,600 | 0.185714286 |
| 01-118-22-44-0004 | 5465 STATE HWY NO 169 | I | 1 | 494 | Industrial Light Manufacturing | ACE ELECTRICAL | ACE PROPERTIES L L C | 55,823 | 1.28 | 55,823 | I-2 | 10,664.00 | 10,664 | 0.19103237 |
| 01-118-22-44-0005 | 5461 STATE HWY NO 169 | LI | 1 | 102 | Vacant Industrial Land | ACE PROPERTIES LAND | ACE PROPERTIES L L C | 55,823 | 1.28 | 55,823 | I-2 | 0.00 | 0 | 0 |
| 01-118-22-44-0016 | 9825 56TH AVE N | C | 1 | 455 | Auto Dealership, New (Complete) | LUTHER COLLISION & G | 9825 56TH AVENUE NORTH LLC | 353,386 | 8.11 | 353,386 | C-5 | 38,897.00 | 48,284 | 0.136632464 |
| 01-118-22-44-0026 | 5480 NATHAN LA N | I | 1 | 453 | Industrial Flex Building | BASS LAKE BUSINESS C | BASS LAKE REALTY CORP | 224,250 | 5.15 | 224,250 | I-1 | 63,000.00 | 63,000 | 0.280936455 |
| 01-118-22-44-0027 | 5400 NATHAN LA N | I | 1 | 453 | Industrial Flex Building | FIRST INDUSTRIAL | FR MASSACHUSETTS 7 LLC | 248,282 | 5.70 | 248,282 | I-1 | 72,339.00 | 72,339 | 0.291358214 |
| 01-118-22-44-0028 | 5525 STATE HWY NO 169 | I | 1 | 386 | Mini Warehouse | ACE MINI STORAGE | ACE MINI STORAGE LLC | 165,419 | 3.80 | 165,419 | I-2 | 52,860.00 | 119,370 | 0.721622063 |
| 01-118-22-44-0029 | 5575 STATE HWY NO 169 | C | 1 | 410 | Automotive Center | WALSER COLLISION & G | WALSER REAL ESTATE III LLC | 74,682 | 1.71 | 74,682 | I-2 | 0.00 | 16,151 | 0.216263624 |
| 01-118-22-44-0030 | 5455 STATE HWY NO 169 | I | 1 | 453 | Industrial Flex Building | ZEEPLEX | NORTH STATES INDUSTRIES INC | 59,704 | 1.37 | 59,704 | I-2 | 10,500.00 | 10,500 | 0.175867614 |
| 01-118-22-44-0031 | 9600 54TH AVE N | I | 1 | 453 | Industrial Flex Building | EV3 | LSOP 3C II LLC | 218,160 | 5.01 | 218,160 | I-2 | 0.00 | 50,000 | 0.229189586 |
| 02-118-22-13-0049 | 11540 CO RD NO 10 | C | 1 | 353 | Small Box Retail Store | RETAIL | JAY KAY BUSINESS PROPS LLC | 73,048 | 1.68 | 30,960 | PUD | 6,192.00 | 6,192 | 0.2 |
| 02-118-22-22-0005 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | THE PRUDENTIAL INS CO | 292,240 | 6.71 | 15,000 | B-C | 0.00 | 0 | 0 |
| 02-118-22-22-0009 | 6175 QUINWOOD LA N | C | 1 | 349 | Fast Food Restaurant | CULVER'S | AMB HOPE LLC | 46,498 | 1.07 | 46,498 | C-4 | 4,538.00 | 4,538 | 0.097595596 |
| 02-118-22-22-0010 | 12650 CO RD NO 10 | C | 1 | 419 | Convenience Market (With Fuel) | FREEDOM GAS STATION | ERICKSON OIL PRODUCTS INC | 44,126 | 1.01 | 44,126 | C-4 | 0.00 | 2,608 | 0.059103476 |
| 03-118-22-11-0007 | 13001 CO RD NO 10 | C | 1 | 344 | Office Building | PRUDENTIAL INSURANCE | THE PRUDENTIAL INS CO | 1,905,765 | 43.75 | 1,905,765 | B-C | 103,188.00 | 472,693 | 0.248033205 |
| 03-118-22-12-0002 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | PRUDENTIAL INS CO OF AMER | 1,019,753 | 23.41 | 953,528 | B-C | 0.00 | 0 | 0 |
| 04-118-22-14-0218 | 5855 CHESHIRE PKWY N | K | 1 | | | Trillium Woods | LCS-WESTMINSTER PRTSHP V LLP | | 0.00 | | | | | 0 |
| 04-118-22-22-0007 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | NON-USABLE LAND | RYAN COMPANIES US INC | 15,500 | 0.36 | 1,550 | C-2 | 0.00 | 0 | 0 |
| 04-118-22-22-0132 | 6025 SHENANDOAH LA N | C | 1 | 511 | Drugstore | WALGREEN'S | DR PROPERTIES I LLC | 91,012 | 2.09 | 91,012 | C-2 | 0.00 | 14,490 | 0.159209775 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04-118-22-22-0164 | 15855 61ST AVE N | C | 1 | 426 | Day Care Center | FOUNDATION HILL MONT | GRIFFEN PLYMOUTH LLC | 49,607 | 1.14 | 49,607 | C-2 | 10,098.00 | 10,098 | 0.203559981 |
| 04-118-22-22-0215 | 15805 61ST AVE N | C | 1 | 419 | Convenience Market (With Fuel) | | RAPTOR FIVE LLC | 73,000 | 1.68 | 73,000 | | | 4,284 | 0.058684932 |
| 04-118-22-22-0216 | 15755 61ST AVE N | C | 1 | 353 | Small Box Retail Store | Kadai Foods | PAL ASSOCIATES LLC | 43,210 | 0.99 | 43,210 | | | 5,066 | 0.117241379 |
| 04-118-22-34-0061 | 40 ADDRESS UNASSIGNED | LR | 1 | 1330 | Res Vac Pot Bldg Site | | TRADITION DEVELOPMENT CORP | 0 | 0.00 | | RSF | 0.00 | 0 | 0 |
| 07-118-22-32-0004 | 18710 STATE HWY NO 55 | C | 1 | 127 | Lumberyard | HAMEL LUMBER | HAMEL LUMBER & SUPPY INC | 133,847 | 3.07 | 133,847 | FRD | 16,000.00 | 16,589 | 0.123940021 |
| 07-118-22-32-0009 | 19020 HAMEL RD | LC | 1 | 100 | Vacant Commercial Land | HAMEL VFW | V F W POST NO 5903 | 50,034 | 1.15 | 26,800 | FRD | 0.00 | 0 | 0 |
| 07-118-22-32-0010 | 19020 HAMEL RD | C | 1 | 442 | Bar/Tavern | HAMEL VFW POST 5903 | H DITTER POST 5903 | 44,874 | 1.03 | 37,862 | FRD | 6,703.00 | 8,828 | 0.233162538 |
| 07-118-22-32-0011 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | HEINZEN-DITTER POST NO 5903 | 15,365 | 0.35 | 3,500 | FRD | 0.00 | 0 | 0 |
| 07-118-22-33-0001 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | HAMEL LUMBER | HAMEL LUMBER & SUPPLY INC | 14,637 | 0.34 | 14,637 | FRD | 0.00 | 0 | 0 |
| 07-118-22-43-0075 | 18200 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | RIVERCREST FINANCIAL GRP LLC | 2,768 | 0.06 | 2,768 | B-C | 0.00 | 3,613 | 1.305274566 |
| 07-118-22-43-0076 | 18200 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | ASGS REAL ESTATE HOLDING LLC | 2,742 | 0.06 | 2,768 | B-C | 0.00 | 2,743 | 0.990968208 |
| 07-118-22-43-0077 | 18200 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | DEROMA ASSOCIATES LLC | 2,768 | 0.06 | 2,768 | B-C | 0.00 | 3,613 | 1.305274566 |
| 08-118-22-21-0002 | 5400 HOLLY LA N | C | 1 | 142 | Outdoor Recreational | PLYMOUTH GUN CLUB | PLYMOUTH GUN CLUB | 890,010 | 20.43 | 1 | FRD | 0.00 | 1,200 | 1200 |
| 10-118-22-23-0008 | 5005 CHESHIRE PKWY N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECHNOLOLY | ALIDADE PLYMOUTH TECH I LLC | 122,962 | 2.82 | 122,962 | PUD | 26,186.00 | 26,186 | 0.212960101 |
| 10-118-22-23-0009 | 5025 CHESHIRE PKWY N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECHNOLOGY | ALIDADE PLYMOUTH TECH II LLC | 82,221 | 1.89 | 82,221 | PUD | 26,186.00 | 26,186 | 0.318483113 |
| 10-118-22-23-0010 | 5015 CHESHIRE PKWY N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECHNOLOGY | ALIDADE PLYMTH TECH III LLC | 167,690 | 3.85 | 95,000 | PUD | 26,186.00 | 26,186 | 0.275642105 |
| 10-118-22-24-0008 | 13700 SCHMIDT LAKE RD | U | 1 | 471 | Utility Building | PERSONAL PROPERTY - | UNITED POWER ASSOC | 91,648 | 2.10 | 91,648 | I-1 | 0.00 | 0 | 0 |
| 10-118-22-24-0011 | 5000 CHESHIRE PKWY N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECHNOLOGY | ALIDADE PLYMOUTH TECH IV LLC | 213,485 | 4.90 | 213,485 | PUD | 53,309.00 | 53,309 | 0.24970841 |
| 10-118-22-24-0012 | 5010 CHESHIRE PKWY N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECHNOLOGY | ALIDADE PLYMOUTH TECH V LLC | 496,642 | 11.40 | 281,413 | PUD | 73,500.00 | 73,500 | 0.261181964 |
| 10-118-22-31-0003 | 13825 SCHMIDT LAKE RD | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | AERO SYSTEMS ENGINEE | AERO SYSTEMS ENGINEERING INC | 641,273 | 14.72 | 348,480 | I-1 | 0.00 | 22,955 | 0.065871786 |
| 12-118-22-11-0005 | 9605 54TH AVE N | I | 1 | 407 | Distribution Warehouse | US FOODSERVICE | USF PROPCO I LLC | 813,570 | 18.68 | 813,570 | I-2 | 296,095.00 | 311,849 | 0.383309365 |
| 12-118-22-11-0006 | 5205 STATE HWY NO 169 | I | 1 | 494 | Industrial Light Manufacturing | MIDWEST BUSINESS CEN | MIDWEST BUSINESS PROP LLC | 355,999 | 8.17 | 355,999 | I-2 | 97,770.00 | 100,858 | 0.283309785 |
| 12-118-22-11-0007 | 9850 51ST AVE N | I | 1 | 453 | Industrial Flex Building | BASS LAKE BUSSINESS | BASS LAKE REALTY CORP | 112,678 | 2.59 | 112,678 | I-2 | 29,000.00 | 29,000 | 0.25737056 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12-118-22-12-0003 | 10200 51ST AVE N | I | 1 | 406 | Storage Warehouse | JH LARSON ELECTRICAL | LJG PROPERTIES LLC | 330,620 | 7.59 | 330,620 | I-1 | 104,560.00 | 106,660 | 0.322606013 |
| 12-118-22-12-0008 | 5353 NATHAN LA N | I | 1 | 406 | Storage Warehouse | NEXT DAY GOURMET | USF PROPCO I LLC | 830,689 | 19.07 | 191,849 | I-1 | 82,208.00 | 82,208 | 0.428503667 |
| 12-118-22-13-0004 | 10205 51ST AVE N | I | 1 | 406 | Storage Warehouse | TAHER BUSINESS DININ | TAHER REAL ESTATE LLC | 353,707 | 8.12 | 100,000 | I-1 | 30,476.00 | 30,476 | 0.30476 |
| 12-118-22-13-0007 | 5005 NATHAN LA N | C | 1 | 344 | Office Building | UNITED HARDWARE BLDG | UNITED HARDWARE DIST CO | 261,300 | 6.00 | 261,300 | I-1 | 20,164.00 | 40,328 | 0.154336012 |
| 12-118-22-13-0008 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | NORTHERN STATES POWER CO | 390,925 | 8.97 | 295,000 | I-2 | 0.00 | 0 | 0 |
| 12-118-22-13-0011 | 10055 51ST AVE N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | OSTBYE & ANDERSON MF | JOHN D & LYNNE K MACBEAN | 87,148 | 2.00 | 87,148 | I-2 | 18,404.00 | 18,404 | 0.211180979 |
| 12-118-22-13-0013 | 5095 NATHAN LA N | I | 1 | 453 | Industrial Flex Building | OFFICE/SHOW/WHSE | WILLOW PROPERTIES #7 LLC | 95,450 | 2.19 | 95,450 | I-2 | 20,500.00 | 20,500 | 0.214772132 |
| 12-118-22-13-0014 | 10005 51ST AVE N | I | 1 | 494 | Industrial Light Manufacturing | Knight Machining | KNI LLC | 50,964 | 1.17 | 50,964 | I-2 | 16,104.00 | 16,104 | 0.315987756 |
| 12-118-22-14-0001 | 5050 NATHAN LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | Abbott Medical | AGA MEDICAL CORPORATION | 1,157,350 | 26.57 | 1,157,350 | I-2 | 159,273.00 | 470,615 | 0.406631529 |
| 12-118-22-14-0002 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | VACANT LAND - ST. JU | AGA MEDICAL CORPORATION | 39,378 | 0.90 | 4,000 | I-2 | 0.00 | 0 | 0 |
| 12-118-22-41-0007 | 4700 NATHAN LA N | C | 1 | 344 | Office Building | ALLIANT TECHSYSTEMS | BOOM (MN) LLC | 892,308 | 20.48 | 892,308 | B-C | 58,203.00 | 205,955 | 0.230811558 |
| 12-118-22-41-0015 | 9605 SCHMIDT LAKE RD | C | 1 | 344 | Office Building | Edina Realty | CLEVELAND HOLDINGS LLC | 44,841 | 1.03 | 44,841 | C-3 | 10,040.00 | 10,040 | 0.223902232 |
| 12-118-22-41-0016 | 9705 SCHMIDT LAKE RD | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 131,000 | 3.01 | 43,560 | C-3 | 0.00 | 5,200 | 0.119375574 |
| 12-118-22-41-0017 | 9655 SCHMIDT LAKE RD | C | 1 | 344 | Office Building | | MSC PROPERTIES LLC | 74,792 | 1.72 | 74,792 | C-3 | 10,000.00 | 15,000 | 0.200556209 |
| 12-118-22-44-0003 | 4600 NATHAN LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | Medtronic | LSOP 3C II LLC | 528,001 | 12.12 | 220,000 | B-C | 86,936.00 | 86,936 | 0.395163636 |
| 13-118-22-11-0005 | 9800 ROCKFORD RD | C | 1 | 344 | Office Building | CAMDEN PHYSICIANS BL | 918 PLYMOUTH PARTNERS LLC | 44,429 | 1.02 | 44,429 | O | 7,700.00 | 7,700 | 0.173310225 |
| 13-118-22-11-0008 | 4475 STATE HWY NO 169 | C | 1 | 426 | Day Care Center | KINDERCARE DAYCARE | KC RE LLC | 44,467 | 1.02 | 44,467 | O | 5,879.00 | 5,879 | 0.132210403 |
| 13-118-22-11-0013 | 9750 ROCKFORD RD | C | 1 | 344 | Office Building | PLYMOUTH PROFESSIONA | 918 PLYMOUTH PARTNERS LLC | 62,407 | 1.43 | 62,407 | O | 15,000.00 | 15,000 | 0.240357652 |
| 13-118-22-11-0014 | 9850 ROCKFORD RD | C | 1 | 349 | Fast Food Restaurant | WENDY'S | NEARCO IV LLC | 74,710 | 1.72 | 50,000 | C-3 | 2,780.00 | 2,780 | 0.0556 |
| 13-118-22-11-0015 | 9655 45TH AVE N | C | 1 | 344 | Office Building | NATIONAL BANKCARD SE | LEONARD / HAVIR LLC | 44,361 | 1.02 | 44,361 | O | 6,051.00 | 18,846 | 0.424832623 |
| 13-118-22-11-0018 | 4455 STATE HWY NO 169 | C | 1 | 344 | Office Building | | BGTC PROPERTIES LLC | 52,140 | 1.20 | 52,140 | O | 6,440.00 | 12,610 | 0.241848868 |
| 13-118-22-11-0019 | 4425 STATE HWY NO 169 | C | 1 | 344 | Office Building | EDINA REALTY | PLATINUM INVESTMENTS L L C | 82,652 | 1.90 | 82,652 | O | 6,670.00 | 13,177 | 0.159427479 |
| 13-118-22-11-0020 | 9805 45TH AVE N | C | 1 | 344 | Office Building | EMPLOYERS ASSOCIATIO | MRA THE MGMT ASSOCIATION INC | 192,620 | 4.42 | 192,620 | O | 30,107.00 | 30,107 | 0.156302565 |
| 13-118-22-11-0022 | 4355 STATE HWY NO 169 | C | 1 | 426 | Day Care Center | STEP BY STEP MONTESS | ES SBS PROPCO LLC | 119,958 | 2.75 | 119,958 | O | 13,265.00 | 13,265 | 0.11058037 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13-118-22-12-0003 | 4445 NATHAN LA N | C | 1 | 412 | Neighborhood Shopping Center | CUB FOODS & RETAIL | COLUMBIA II ROCKRIDGE CENTER | 588,229 | 13.50 | 588,229 | C-4 | 128,685.00 | 133,101 | 0.2262 74121 |
| 13-118-22-12-0005 | 9950 ROCKFORD RD | C | 1 | 419 | Convenience Market (With Fuel) | FOUR SEASONS AUTOMOT | ROBBINS PROPERTIES II LLC | 89,300 | 2.05 | 53,000 | C-3 | 10,003.00 | 11,203 | 0.2113 77358 |
| 13-118-22-12-0006 | 9900 ROCKFORD RD | C | 1 | 349 | Fast Food Restaurant | TACO BELL | WAVE CAR WASHES INC | 105,824 | 2.43 | 65,000 | C-3 | 3,294.00 | 3,294 | 0.0506 76923 |
| 13-118-22-12-0007 | 9905 45TH AVE N | C | 1 | 344 | Office Building | P.O.S. BUSINESS SYST | NORTH COUNTRY BUS PRODUCTS | 146,797 | 3.37 | 79,457 | O | 15,450.00 | 29,813 | 0.3752 09233 |
| 13-118-22-12-0008 | 10000 ROCKFORD RD | C | 1 | 349 | Fast Food Restaurant | BURGER KING | THE RESTAURANT UNITS CORP | 67,356 | 1.55 | 58,770 | C-3 | 3,313.00 | 3,313 | 0.0563 72299 |
| 13-118-22-12-0009 | 10100 ROCKFORD RD | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 78,400 | 1.80 | 52,214 | C-3 | 4,680.00 | 4,680 | 0.0896 31133 |
| 13-118-22-12-0010 | 4400 NATHAN LA N | C | 1 | 412 | Neighborhood Shopping Center | GREAT CLIPS/QUIZNO'S | ELEFTERIA FAMILY TRUST ET AL | 68,704 | 1.58 | 56,880 | C-2 | 6,921.00 | 10,691 | 0.1879 57103 |
| 13-118-22-13-0088 | 4205 LANCASTER LA N | C | 1 | 344 | Office | FOUR SEASONS PROFESS | MINTZ FAMILY L P | 101,385 | 2.33 | 101,385 | O | 19,066.00 | 20,154 | 0.1987 86803 |
| 13-118-22-14-0012 | 4105 LANCASTER LA N | C | 1 | 304 | Bank | U. S. BANK | FIRST BUILDING CORP | 61,767 | 1.42 | 50,580 | O | 4,157.00 | 4,157 | 0.0821 86635 |
| 13-118-22-14-0013 | 4200 LANCASTER LA N | C | 1 | 413 | Community Shopping Center | FOUR SEASONS MALL | WAL-MART REAL ESTATE BUS TR | 709,519 | 16.29 | 709,519 | C-2 | 115,790.00 | 115,790 | 0.1631 95066 |
| 14-118-22-14-0006 | 4155 ZACHARY LA N | C | 1 | 426 | Day Care Center | LITTLE FLOWERS MONTE | L & P GOONETILLEKE | 192,283 | 4.41 | 57,000 | P-I | 3,000.00 | 6,000 | 0.1052 63158 |
| 15-118-22-13-0004 | 4075 VINEWOOD LA N | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | BETTGER INC | 50,155 | 1.15 | 50,155 | C-4 | 6,177.00 | 6,534 | 0.1302 76144 |
| 15-118-22-13-0006 | 4100 VINEWOOD LA N | C | 1 | 350 | Restaurant | SUNSHINE FACTORY | FW MN-ROCKFORD ROAD LLC | 43,950 | 1.01 | 43,950 | C-4 | 7,399.00 | 7,399 | 0.1683 50398 |
| 15-118-22-13-0009 | 4190 VINEWOOD LA N | C | 1 | 413 | Community Shopping Center | ROCKFORD PLAZA SHOPP | FW MN-ROCKFORD ROAD LLC | 967,185 | 22.20 | 967,185 | C-4 | 207,454.00 | 201,858 | 0.2087 06711 |
| 15-118-22-13-0010 | 4105 VINEWOOD LA N | C | 1 | 412 | Neighborhood Shopping Center | RETAIL STRIP - Five Guys (Anchor) | ROCKFORD POINTE LLC | 37,577 | 0.86 | 37,577 | C-4 | 7,019.00 | 7,019 | 0.1867 89792 |
| 15-118-22-13-0011 | 4175 VINEWOOD LA N | C | 1 | 458 | Warehouse Discount Store | TARGET | DAYTON HUDSON CORP | 716,432 | 16.45 | 716,432 | C-4 | 165,786.00 | 170,564 | 0.2380 74235 |
| 15-118-22-23-0013 | 4115 BERKSHIRE LA N | C | 1 | 426 | Day Care Center | NEW HORIZON DAY CARE | ST PAUL PROPERTIES INC | 54,886 | 1.26 | 54,886 | I-1 | 5,880.00 | 5,880 | 0.1071 31145 |
| 15-118-22-23-0014 | 4155 BERKSHIRE LA N | I | 1 | 406 | Storage Warehouse | HOLMBERG | ST PAUL PROPERTIES INC | 205,690 | 4.72 | 205,690 | I-1 | 71,900.00 | 71,900 | 0.3495 55156 |
| 15-118-22-23-0043 | 4120 FERNBROOK LA N | I | 1 | 497 | Computer (Data) Center | US WEST - TELEPHONE | U S WEST INC | 90,728 | 2.08 | 90,728 | RSF | 15,587.00 | 16,811 | 0.1852 90098 |
| 15-118-22-24-0023 | 4150 BERKSHIRE LA N | C | 1 | 458 | Warehouse Discount Store | HOM FURNITURE | CRW PLYMOUTH LLC | 641,794 | 14.73 | 499,898 | PUD | 135,912.00 | 207,934 | 0.4159 52854 |
| 15-118-22-24-0025 | 4100 BERKSHIRE LA N | C | 1 | 344 | Office Building | BURNET REALTY | 1501 PARTNERSHIP | 69,336 | 1.59 | 69,336 | PUD | 7,921.00 | 23,764 | 0.3427 36818 |
| 15-118-22-24-0026 | 4130 BERKSHIRE LA N | C | 1 | 412 | Neighborhood Shopping Center | PLYMOUTH COLLECTION | IRC PLYMOUTH COLLECTION LLC | 194,985 | 4.48 | 156,000 | PUD | 40,815.00 | 40,815 | 0.2616 34615 |
| 15-118-22-24-0027 | 4140 BERKSHIRE LA N | C | 1 | 419 | Convenience Market (With Fuel) | FREDOM GAS/CONVENIEN | ERICKSON OIL PRODUCTS INC | 35,826 | 0.82 | 35,826 | PUD | 5,107.00 | 5,107 | 0.1425 50103 |
| 15-118-22-24-0028 | 4120 BERKSHIRE LA N | C | 1 | 350 | Restaurant | COWBOY JACK'S | IRC PLYMOUTH | 48,582 | 1.12 | 30,000 | PUD | 4,607.00 | 4,607 | 0.1535 66667 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | COLLECTION LLC | | | | | | | |
| 15-118-22-31-0007 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | TRAMMELL CROW CO MINN | 0 | 0.00 | 0 | CHE | 0.00 | 0 | 0 |
| 15-118-22-31-0008 | 3905 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH BUSINESS CE | ST PAUL PROPERTIES INC | 263,201 | 6.04 | 263,201 | I-1 | 81,885.00 | 81,885 | 0.3111 1204 |
| 15-118-22-31-0009 | 4000 ANNAPOLIS LA N | C | 1 | 412 | Neighborhood Shopping Center | ROCKFORD SQUARE SHOP | MARTINEZ PROPERTIES LLC | 129,800 | 2.98 | 129,800 | C-3 | 16,025.00 | 16,025 | 0.1234 59168 |
| 15-118-22-32-0074 | 4090 ANNAPOLIS LA N | C | 1 | 419 | Convenience Market (With Fuel) | BP CONVENIENCE STORE | 4090 ANNAPOLIS LLC | 43,560 | 1.00 | 43,560 | C-3 | 2,604.00 | 2,604 | 0.0597 79614 |
| 15-118-22-34-0003 | 3850 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH BUSINESS CE | ST PAUL PROPERTIES INC | 322,000 | 7.39 | 322,000 | I-1 | 106,070.00 | 106,070 | 0.3294 09938 |
| 15-118-22-34-0005 | 3750 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH BUSINESS CE | ST PAUL PROPERTIES INC | 474,800 | 10.90 | 474,800 | I-1 | 139,510.00 | 139,510 | 0.2938 28981 |
| 15-118-22-34-0006 | 3650 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH BUSINESS CE | ST PAUL PROPERTIES INC | 405,800 | 9.32 | 405,800 | I-1 | 115,058.00 | 115,058 | 0.2835 3376 |
| 15-118-22-42-0008 | 3950 VINEWOOD LA N | C | 1 | 304 | Bank | ANCHOR BANK | FIRST NATIONAL BK OF WAYZATA | 43,680 | 1.00 | 43,680 | C-4 | 2,700.00 | 2,700 | 0.0618 13187 |
| 15-118-22-42-0009 | 3900 VINEWOOD LA N | C | 1 | 412 | Neighborhood Shopping Center | COTTONWOOD PLAZA | COTTONWOOD PLAZA LLLP | 279,700 | 6.42 | 279,700 | C-4 | 39,800.00 | 39,800 | 0.1422 95316 |
| 15-118-22-42-0012 | 4005 VINEWOOD LA N | C | 1 | 511 | Drugstore | WALGREENS | KEMPF PROP.-VINEWOOD LLC | 77,510 | 1.78 | 77,510 | C-4 | 12,544.00 | 12,544 | 0.1618 37182 |
| 15-118-22-42-0014 | 4000 VINEWOOD LA N | C | 1 | 350 | Restaurant | CHILI'S | BLGL PLYMOUTH LLC | 60,670 | 1.39 | 60,670 | C-4 | 5,550.00 | 5,550 | 0.0914 7849 |
| 15-118-22-42-0058 | 3901 VINEWOOD LA N | C | 1 | 455 | Auto Dealership, New (Complete) | CORNERSTONE AUTO | LYNN E BROKKE TRUSTEE | 246,557 | 5.66 | 246,557 | PUD | 16,711.00 | 23,703 | 0.0961 35985 |
| 16-118-22-32-0006 | 3855 PLYMOUTH BLVD | C | 1 | 408 | Service Station (With Fuel) | BP GAS STATION | TAY-LAN PROPERTIES LLC | 60,977 | 1.40 | 60,977 | CC- | 2,383.00 | 2,383 | 0.0390 80309 |
| 16-118-22-32-0021 | 18590 37TH AVE N | C | 1 | 344 | Office Building | CABLE TV STUDIO | KING VIDEOCABLE COMPANY MINN | 87,651 | 2.01 | 87,651 | CC- | 3,060.00 | 3,060 | 0.0349 11182 |
| 16-118-22-32-0025 | 15755 ROCKFORD RD | C | 1 | 426 | Day Care Center | KINDERCARE DAYCARE | EMPIRE FOUR LLC ET AL | 166,483 | 3.82 | 100,000 | CC- | 10,313.00 | 10,313 | 0.1031 3 |
| 16-118-22-33-0006 | 15800 37TH AVE N | C | 1 | 342 | Funeral Home | DELMORE FUNERAL HOME | DELMORE REALTY LLC | 174,799 | 4.01 | 130,000 | CC- | 11,900.00 | 11,900 | 0.0915 38462 |
| 16-118-22-33-0007 | 15700 37TH AVE N | C | 1 | 341 | Medical Office | CITY CENTER PROFESSI | SIDAL PLYMOUTH LLC | 121,532 | 2.79 | 121,532 | CC- | 16,980.00 | 52,019 | 0.4280 27186 |
| 16-118-22-33-0011 | 15600 37TH AVE N | C | 1 | 344 | Office Building | FORMER STATE FARM CL | 15600 37TH STREET LLC | 189,071 | 4.34 | 189,071 | CC- | 17,000.00 | 17,000 | 0.0899 13313 |
| 16-118-22-33-0012 | 15600 36TH AVE N | C | 1 | 344 | Office Building | PLYMOUTH CITY CENTER | PLYMOUTH CITY CENTER II LLC | 84,402 | 1.94 | 76,233 | CC- | 15,173.00 | 44,763 | 0.5871 86651 |
| 16-118-22-33-0013 | 15650 36TH AVE N | C | 1 | 344 | Office Building | PLYMOUTH CITY CENTER | PLYMOUTH PLAZA I LLC | 88,990 | 2.04 | 88,990 | CC- | 21,189.00 | 21,189 | 0.2381 05405 |
| 16-118-22-33-0014 | 3655 PLYMOUTH BLVD | C | 1 | 344 | Office Building | PLYMOUTH CREEK PROFE | BAKKEN PROP OF PLYMOUTH LLC | 86,899 | 1.99 | 86,899 | CC- | 23,138.00 | 23,138 | 0.2662 63133 |
| 16-118-22-33-0016 | 15705 37TH AVE N | C | 1 | 304 | Bank | CENTER NATIONAL BANK | CENTER NATIONAL BANK | 46,800 | 1.07 | 46,800 | CC- | 0.00 | 6,970 | 0.1489 31624 |
| 16-118-22-33-0018 | 15655 37TH AVE N | C | 1 | 341 | Medical Office | | US HSAPC PLYMOUTH I LLC | 171,446 | 3.94 | 171,446 | | 24,675.00 | 49,350 | 0.2878 45736 |
| 16-118-22-33-0019 | 40 ADDRESS PENDING | LC | 1 | 100 | Vacant Commercial Land | | GLEN LINCOLN PARTNERS | 42,864 | 0.98 | 42,864 | | | | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16-118-22-34-0017 | 3600 PLYMOUTH BLVD | C | 1 | 483 | Fitness Center | LIFE TIME FITNESS CE | CITY OF PLYMOUTH | 137,784 | 3.16 | 166,824 | CC- | 0.00 | 112,216 | 0.672661008 |
| 17-118-22-33-0005 | 17100 MEDINA RD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS V | MU PLYMOUTH PONDS LLC | 279,999 | 6.43 | 279,999 | PUD | 98,048.00 | 98,048 | 0.350172679 |
| 17-118-22-33-0006 | 17200 MEDINA RD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS VI | MU PLYMOUTH PONDS LLC | 293,812 | 6.74 | 293,812 | PUD | 101,906.00 | 101,906 | 0.346840837 |
| 17-118-22-33-0007 | 17300 MEDINA RD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS VII | MU PLYMOUTH PONDS LLC | 319,154 | 7.33 | 280,000 | PUD | 100,818.00 | 100,818 | 0.360064286 |
| 17-118-22-33-0008 | 17400 MEDINA RD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS VIII | MU PLYMOUTH PONDS LLC | 394,964 | 9.07 | 280,000 | PUD | 83,513.00 | 83,513 | 0.298260714 |
| 17-118-22-34-0001 | 16940 STATE HWY NO 55 | I | 1 | 406 | Storage Warehouse | TRI-STATE WELL DRILL | TRI STATE DRILLING | 179,091 | 4.11 | 179,091 | PUD | 12,672.00 | 25,960 | 0.144954241 |
| 17-118-22-34-0007 | 3600 HOLLY LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS IV | MU PLYMOUTH PONDS LLC | 386,800 | 8.88 | 386,800 | I-1 | 110,180.00 | 110,180 | 0.284850052 |
| 18-118-22-11-0004 | 17730 OLD ROCKFORD RD | C | 1 | 528 | Service Repair Garage | Honest Auto | MARJORIE E SABOURIN | 27,693 | 0.64 | 27,693 | FRD | 1,643.00 | 1,643 | 0.059329072 |
| 18-118-22-11-0091 | 17805 OLD ROCKFORD RD | C | 1 | 426 | Day Care Center | PRIMROSE | NORUIK INVESTMENTS LLC | 104,882 | 2.41 | 86,000 | C-1 | 10,990.00 | 10,990 | 0.127790698 |
| 18-118-22-12-0008 | 17905 OLD ROCKFORD RD | LC | 1 | 100 | Vacant Commercial Land | | SUMIT DHAWAN & JUAN URIBE | 44,053 | 1.01 | 44,053 | C-1 | 0.00 | 0 | 0 |
| 18-118-22-12-0010 | 4435 PEONY LA N | LC | 1 | 100 | Vacant Commercial Land | | SUMIT DHAWAN & JUAN URIBE | 21,514 | 0.49 | 13,500 | C-3 | 0.00 | 0 | 0 |
| 18-118-22-12-0018 | 18240 STATE HWY NO 55 | LI | 1 | 102 | Vacant Industrial Land | | GRANITE INVESTMENTS LLC | 34,300 | 0.79 | 34,300 | B-C | 0.00 | 0 | 0 |
| 18-118-22-12-0020 | 4335 PEONY LA N | C | 1 | 349 | Fast Food Restaurant | CULVER'S | SDR REALTY LLC | 49,482 | 1.14 | 49,482 | C-3 | 0.00 | 4,538 | 0.091710117 |
| 18-118-22-12-0021 | 4345 PEONY LA N | C | 1 | 426 | Day Care Center | NEW HORIZON | HORIZON PLYMOUTH HLDGS LLC | 48,558 | 1.11 | 48,558 | C-3 | 0.00 | 10,202 | 0.2100 99263 |
| 18-118-22-12-0022 | 4325 PEONY LA N | C | 1 | 419 | Convenience Market (With Fuel) | SUPER AMERICA | PEONY 55 PARTNERS LLC | 41,728 | 0.96 | 41,728 | C-3 | 0.00 | 4,494 | 0.107697469 |
| 18-118-22-12-0023 | 4315 PEONY LA N | C | 1 | 384 | Salon/Barber Shop | PCI Academy | PEONY 55 PARTNERS LLC | 28,905 | 0.66 | 28,905 | C-3 | 5,824.00 | 5,824 | 0.201487632 |
| 18-118-22-12-0024 | 4305 PEONY LA N | C | 1 | 384 | Salon/Barber Shop | PCI Academy | PEONY 55 PARTNERS LLC | 33,582 | 0.77 | 33,582 | C-3 | 0.00 | 3,174 | 0.094514919 |
| 18-118-22-12-0025 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | SDR REALTY LLC | 202,959 | 4.66 | 202,959 | C-3 | 0.00 | 0 | 0 |
| 18-118-22-12-0026 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | SDR REALTY LLC | 12,722 | 0.29 | 12,722 | C-3 | 0.00 | 0 | 0 |
| 18-118-22-12-0027 | 18205 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | TRW PROPERTIES LLC | 2,765 | 0.06 | 2,768 | O | 0.00 | 2,765 | 0.998916185 |
| 18-118-22-12-0028 | 18205 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | SCHERER LTD PARTNERSHIP | 2,855 | 0.07 | 2,768 | O | 0.00 | 2,855 | 1.031430636 |
| 18-118-22-12-0029 | 18205 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | SCHERER LTD PARTNERSHIP | 2,780 | 0.06 | 2,768 | O | 0.00 | 2,780 | 1.00433526 |
| 18-118-22-12-0030 | 18205 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | EHL PROPERTIES LLC | 2,652 | 0.06 | 2,652 | O | 0.00 | 2,652 | 1 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18-118-22-12-0031 | 18215 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | FRAGOMENI ENTERPRISES L L C | 2,652 | 0.06 | 2,768 | O | 0.00 | 2,652 | 0.958092486 |
| 18-118-22-12-0032 | 18215 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | SCHERER LTD PARTNERSHIP | 2,780 | 0.06 | 2,768 | O | 0.00 | 2,780 | 1.004333526 |
| 18-118-22-12-0033 | 18215 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | SCHERER LTD PARTNERSHIP | 2,855 | 0.07 | 2,768 | O | 0.00 | 2,855 | 1.031430636 |
| 18-118-22-12-0034 | 18215 45TH AVE N | C | 1 | 110 | Office Condominium/ TH | PLYMOUTH OFFICE COND | NORTON HOMES LLC | 2,768 | 0.06 | 2,768 | O | 0.00 | 3,613 | 1.305274566 |
| 18-118-22-13-0004 | 4155 CO RD NO 101 | C | 1 | 341 | Medical Office | | PARK NICOLLET CLINIC | 171,446 | 3.94 | 171,446 | | 31,400.00 | 52,290 | 0.304993992 |
| 18-118-22-13-0006 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | PARK NICOLLET CLINIC | 23,604 | 0.54 | 23,604 | | | | 0 |
| 18-118-22-14-0125 | 4140 CO RD NO 101 | C | 1 | 511 | Drugstore | CVS PHARMACY | SCP 2004E-O56 LLC | 135,110 | 3.10 | 110,000 | C-2 | 13,013.00 | 15,217 | 0.138336364 |
| 18-118-22-41-0009 | 3940 CO RD NO 101 | U | 1 | 471 | Utility Building | NSP | NORTHERN STATES POWER CO | 135,225 | 3.10 | 135,225 | P-I | 0.00 | 0 | 0 |
| 20-118-22-11-0015 | 3505 VICKSBURG LA N | C | 1 | 413 | Community Shopping Center | PLYMOUTH MARKETPLACE | PLYMOUTH MARKETPLACE LLC | 412,411 | 9.47 | 246,000 | PUD | 41,419.00 | 41,419 | 0.168369919 |
| 20-118-22-11-0016 | 3425 VICKSBURG LA N | C | 1 | 412 | Neighborhood Shopping Center | CHIPOTLE/NOODLES & C | PLYMOUTH MARKETPLACE LLC | 44,805 | 1.03 | 44,805 | CC- | 5,551.00 | 5,551 | 0.123892423 |
| 20-118-22-11-0017 | 3415 VICKSBURG LA N | C | 1 | 304 | Bank | BREMER BANK | BREMER BANK NATIONAL ASSOC | 45,959 | 1.06 | 45,959 | CC- | 4,560.00 | 4,665 | 0.101503514 |
| 20-118-22-11-0018 | 3405 VICKSBURG LA N | C | 1 | 350 | Restaurant | Vacant Restaurant fka RUBY TUESDAY | RT MINNEAPOLIS FRANCHISE LLC | 94,898 | 2.18 | 50,000 | CC- | 5,014.00 | 5,014 | 0.100028 |
| 20-118-22-11-0019 | 3455 VICKSBURG LA N | C | 1 | 446 | Supermarket | PLYMOUTH MARKETPLACE | PLYMOUTH MARKETPLACE LLC | 315,040 | 7.23 | 197,373 | PUD | 41,731.00 | 46,231 | 0.234231632 |
| 20-118-22-12-0007 | 16305 36TH AVE N | I | 1 | 453 | Industrial Flex Building | WEST GLEN CORPORATE | WEST GLEN DEVELOPMENT I LLC | 444,748 | 10.21 | 222,000 | B-C | 83,121.00 | 83,121 | 0.374418919 |
| 20-118-22-12-0010 | 16605 CO RD NO 24 | C | 1 | 413 | Community Shopping Center | PLYMOUTH STATION | PLYMOUTH STATION LLC | 250,240 | 5.74 | 250,240 | PUD | 25,670.00 | 25,670 | 0.102581522 |
| 20-118-22-12-0011 | 16355 36TH AVE N | I | 1 | 453 | Industrial Flex Building | WEST GLEN CORPORATE | WEST GLEN CORP DEV I ET AL | 307,357 | 7.06 | 194,180 | B-C | 56,447.00 | 56,447 | 0.290694201 |
| 20-118-22-14-0005 | 3205 VICKSBURG LA N | C | 1 | 458 | Warehouse Discount Store | LOWE'S | SHOPS AT PLYMOUTH CREEK LLC | 561,127 | 12.88 | 561,127 | PUD | 134,563.00 | 134,563 | 0.239808457 |
| 20-118-22-14-0006 | 3215 VICKSBURG LA N | C | 1 | 413 | Community Shopping Center | RETAIL/MICHAELS | SHOPS AT PLYMOUTH CREEK LLC | 317,802 | 7.30 | 317,802 | PUD | 39,206.00 | 39,206 | 0.123366121 |
| 20-118-22-14-0007 | 3245 VICKSBURG LA N | C | 1 | 304 | Bank | M&I BANK | SHOPS AT PLYMOUTH CREEK LLC | 41,631 | 0.96 | 41,631 | PUD | 5,034.00 | 5,034 | 0.120919507 |
| 20-118-22-14-0008 | 3255 VICKSBURG LA N | C | 1 | 511 | Drugstore | WALGREENS | MILDRED GOLLOP FAMILY L P | 88,634 | 2.03 | 88,634 | PUD | 14,465.00 | 14,465 | 0.163199224 |
| 20-118-22-14-0009 | 3195 VICKSBURG LA N | C | 1 | 412 | Neighborhood Shopping Center | DUNN BROS/NAILS/ DICK | SHOPS AT PLYMOUTH CREEK LLC | 63,396 | 1.46 | 63,396 | PUD | 5,611.00 | 5,611 | 0.088507161 |
| 20-118-22-21-0018 | 3500 HOLLY LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS # 2 | MU PLYMOUTH PONDS LLC | 300,196 | 6.89 | 300,196 | I-1 | 75,707.00 | 75,707 | 0.252191901 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-118-22-21-0019 | 3580 HOLLY LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS # 3 | MU PLYMOUTH PONDS LLC | 237,402 | 5.45 | 237,402 | I-1 | 68,217.00 | 68,217 | 0.2873 48043 |
| 20-118-22-21-0021 | 16825 CO RD NO 24 | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | ROBBINS PROPERTIES III LLC | 114,044 | 2.62 | 114,044 | PUD | 8,817.00 | 8,817 | 0.0773 12265 |
| 20-118-22-21-0025 | 16755 CO RD NO 24 | C | 1 | 426 | Day Care Center | GODDARD SCHOOL | M P NORMAN LLC | 60,307 | 1.38 | 60,307 | PUD | 0.00 | 8,100 | 0.1343 12766 |
| 20-118-22-21-0026 | 16705 CO RD NO 24 | C | 1 | 413 | Community Shopping Center | PLYMOUTH STATION - 4 | PLYMOUTH STATION LLC | 428,214 | 9.83 | 428,214 | PUD | 88,891.00 | 88,891 | 0.2075 8546 |
| 20-118-22-21-0027 | 16855 CO RD NO 24 | C | 1 | 349 | Fast Food Restaurant | TACO BELL | MARVIN DEVELOPMENT III LLC | 43,029 | 0.99 | 43,029 | PUD | 0.00 | 3,183 | 0.0739 73367 |
| 20-118-22-22-0055 | 3555 HOLLY LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH PONDS | MU PLYMOUTH PONDS LLC | 263,940 | 6.06 | 263,940 | I-1 | 76,238.00 | 76,238 | 0.2888 4595 |
| 20-118-22-22-0056 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | MU PLYMOUTH PONDS LLC | 143,117 | 3.29 | 143,117 | I-1 | 0.00 | 0 | 0 |
| 21-118-22-14-0008 | 3131 FERNBROOK LA N | C | 1 | 344 | Office Building | FOX MEDOWS OFFICE (P | RSOC REAL ESTATE HLDNGS LLC | 109,771 | 2.52 | 109,771 | O | 16,000.00 | 32,000 | 0.2915 15974 |
| 21-118-22-14-0014 | 3140 HARBOR LA N | C | 1 | 344 | Office Building | FOX MEDOWS OFFICE (P | RSOC REAL ESTATE HLDNGS LLC | 77,183 | 1.77 | 77,183 | O | 16,000.00 | 32,000 | 0.4145 9907 |
| 21-118-22-14-0015 | 3030 HARBOR LA N | C | 1 | 344 | Office Building | FOX MEDOWS OFFICE (P | RSOC REAL ESTATE HLDNGS LLC | 54,512 | 1.25 | 54,512 | O | 16,000.00 | 32,000 | 0.5870 2671 |
| 21-118-22-14-0017 | 3200 HARBOR LA N | C | 1 | 426 | Day Care Center | RSC | LINDSAY CAN-AM LTD PTNRSHP | 64,096 | 1.47 | 64,096 | O | 12,347.00 | 12,289 | 0.1917 28033 |
| 21-118-22-14-0022 | 3141 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | NELSON PROPERTY HOLDINGS LLC | 3,358 | 0.08 | 3,358 | O | 1,344.00 | 2,688 | 0.8004 76474 |
| 21-118-22-14-0025 | 3161 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | YANGTZE HOME LLC | 2,984 | 0.07 | 2,984 | O | 1,344.00 | 2,688 | 0.9008 0429 |
| 21-118-22-14-0026 | 3165 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | ANGEL REAL EST HOLDINGS LLC | 2,184 | 0.05 | 2,184 | O | 1,232.00 | 2,464 | 1.1282 05128 |
| 21-118-22-14-0027 | 3169 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | KAL STAY LLC | 2,984 | 0.07 | 2,984 | O | 1,344.00 | 2,688 | 0.9008 0429 |
| 21-118-22-14-0028 | 3181 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | R L MINKEMA & T M MINKEMA | 2,984 | 0.07 | 2,984 | O | 1,344.00 | 2,688 | 0.9008 0429 |
| 21-118-22-14-0031 | 3211 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | R M JACOB & J M JACOB | 3,003 | 0.07 | 3,003 | O | 1,344.00 | 2,688 | 0.8951 04895 |
| 21-118-22-14-0032 | 3215 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | ESCO AGENCY LLC | 2,184 | 0.05 | 2,184 | O | 1,232.00 | 2,464 | 1.1282 05128 |
| 21-118-22-14-0033 | 3219 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | ESCO AGENCY LLC | 2,984 | 0.07 | 2,984 | O | 1,344.00 | 2,688 | 0.9008 0429 |
| 21-118-22-14-0034 | 3231 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | NORTHERN CON-AGG LLP | 3,003 | 0.07 | 3,003 | O | 1,344.00 | 2,688 | 0.8951 04895 |
| 21-118-22-14-0035 | 3235 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | FERNBROOK 14 LLC | 2,184 | 0.05 | 2,184 | O | 1,232.00 | 2,464 | 1.1282 05128 |

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| 21-118-22-14-0036 | 3239 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | BEMBOOM PROPERTIES LLC | 3,003 | 0.07 | 3,003 | O | 1,344.00 | 2,688 | 0.895104895 |
| 21-118-22-14-0037 | 3251 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | 3251 FERNBROOK LLC | 3,003 | 0.07 | 3,003 | O | 1,344.00 | 2,688 | 0.895104895 |
| 21-118-22-14-0038 | 3255 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | 3255 FERNBROOK LLC | 2,184 | 0.05 | 2,184 | O | 1,232.00 | 2,464 | 1.128205128 |
| 21-118-22-14-0039 | 3259 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | | 3255 FERNBROOK LLC | 3,358 | 0.08 | 3,358 | O | 1,344.00 | 2,688 | 0.800476474 |
| 21-118-22-14-0041 | 3189 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | OFFICE CONDO | KINGDOM HOLDINGS LLC | 5,168 | 0.12 | 5,168 | O | 2,576.00 | 5,152 | 0.996904025 |
| 21-118-22-14-0043 | 3145 FERNBROOK LA N | C | 1 | 110 | Office Condominium/ TH | OFFICE CONDO | SELECT FOOD PRODUCTS LLC | 5,168 | 0.12 | 5,168 | O | 2,576.00 | 5,152 | 0.996904025 |
| 21-118-22-21-0003 | 3300 PLYMOUTH BLVD | C | 1 | 344 | Office Building | USPS CURRENTLY LEASE | N W ISLAMIC COMMUNITY CENTER | 110,686 | 2.54 | 26,670 | CC- | 0.00 | 4,495 | 0.168541432 |
| 21-118-22-22-0003 | 15500 34TH AVE N | C | 1 | 344 | Office Building | COMMUNITY BANK BLDG | KLEINBANK | 65,796 | 1.51 | 65,796 | CC- | 7,126.00 | 14,252 | 0.216608912 |
| 21-118-22-22-0004 | 15705 35TH AVE N | C | 1 | 353 | Small Box Retail Store | COLONY LIQUOR STORE/ | DOWNTOWN PROPERTIES 2000 LLC | 55,829 | 1.28 | 55,829 | CC- | 5,300.00 | 5,300 | 0.094932741 |
| 21-118-22-22-0009 | 3400 VICKSBURG LA N | C | 1 | 380 | Theater, Cinema | MANN THEATRES | MOVIE CINEMA LIMITED PTNRSHP | 218,049 | 5.01 | 218,049 | CC- | 41,710.00 | 58,592 | 0.268710244 |
| 21-118-22-22-0011 | 3475 PLYMOUTH BLVD | C | 1 | 341 | Medical Office | PLYMOUTH HILLS PROFE | PLYMOUTH HILLS PROPERTY LLC | 47,637 | 1.09 | 47,637 | CC- | 11,499.00 | 15,217 | 0.319436572 |
| 21-118-22-22-0012 | 15600 34TH AVE N | C | 1 | 410 | Automotive Center | NAPA/PRECISION TUNE/ | GLEN LINCOLN PARTNERS | 65,255 | 1.50 | 65,255 | CC- | 13,000.00 | 13,000 | 0.199218451 |
| 21-118-22-22-0015 | 3550 VICKSBURG LA N | C | 1 | 413 | Community Shopping Center | CUB FOODS/RETAIL | IRC PLYMOUTH TOWN CENTER LLC | 360,770 | 8.28 | 360,770 | CC- | 84,759.00 | 91,912 | 0.254766195 |
| 21-118-22-22-0016 | 3500 VICKSBURG LA N | C | 1 | 413 | Community Shopping Center | PLYMOUTH TOWN CENTER | WEST PTC LLC ET AL | 172,572 | 3.96 | 172,572 | CC- | 28,212.00 | 28,212 | 0.163479591 |
| 21-118-22-22-0018 | 15535 34TH AVE N | C | 1 | 341 | Medical Office | MEDICAL OFFICE | VIOLET - C LLC | 65,452 | 1.50 | 65,452 | CC- | 0.00 | 18,525 | 0.2830 3184 |
| 21-118-22-22-0019 | 15525 34TH AVE N | C | 1 | 304 | Bank | TCF BANK | TCF NATIONAL BANK MINNESOTA | 61,999 | 1.42 | 61,999 | CC- | 4,444.00 | 4,444 | 0.071678575 |
| 21-118-22-22-0020 | 15555 34TH AVE N | C | 1 | 350 | Restaurant | KOBE JAPANESE RESTAU | NFQM LLC | 57,224 | 1.31 | 57,224 | CC- | 7,250.00 | 7,205 | 0.12590871 |
| 21-118-22-22-0021 | 15545 34TH AVE N | C | 1 | 353 | Small Box Retail Store | TURNSTYLE | WILLIAM CHARLES ASSOC LLC | 31,908 | 0.73 | 31,908 | CC- | 10,656.00 | 10,656 | 0.333960135 |
| 21-118-22-22-0022 | 15600 35TH AVE N | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PARKELLE PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0023 | 15600 35TH AVE N | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PARKELLE PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0024 | 15600 35TH AVE N | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PARKELLE PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0025 | 3515 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | BLACKSTONE BUSINESS GRP INC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |

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| 21-118-22-22-0026 | 3515 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | GENISYS TECHNOLOGIES INC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0027 | 3515 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | DC ENTERPRISES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0028 | 3525 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | BOYER REAL EST HOLDINGS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0029 | 3525 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | N W BUYERS & JOBBERS INC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0030 | 3525 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | R E VENTURES II LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0031 | 3535 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | MCCONE HOLDINGS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0032 | 3535 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | JPO HOLDINGS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0033 | 3535 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | I2E INC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0034 | 3545 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | LEE BUSINESS PRODUCTS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0035 | 3545 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | LEE BUSINESS PRODUCTS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0036 | 3545 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | GENISYS TECHNOLOGIES INC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0037 | 3555 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | TABOR PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0038 | 3555 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | TABOR PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0039 | 3555 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | LIFE IS GOOD! LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0040 | 15600 35TH AVE N | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PLYMOUTH TOWN CENTRE LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0041 | 15600 35TH AVE N | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | MCKEE & ANDREWS PROP LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0042 | 15600 35TH AVE N | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PAKLAND LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0043 | 3515 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PLYMOUTH PHOENIX LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0044 | 3515 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | FIRST VENTURES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0045 | 3515 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PLEXUS PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |

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| 21-118-22-22-0046 | 3525 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | BOYER REAL EST HOLDINGS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0047 | 3525 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | RRY 1 LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0048 | 3525 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | R E VENTURES II LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0049 | 3535 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | BEHM FAMILY LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0050 | 3535 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | KGK PROPERTIES LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0051 | 3535 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | ALLIED CONCERT SERVICES INC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0052 | 3545 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | CAVANAUGH FINANCIAL LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0053 | 3545 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | ALMARK INVESTMENTS LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0054 | 3545 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | PO JCR LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0055 | 3555 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | Town Center Office P | JAYSUE LLC | 1,560 | 0.04 | 1,560 | CC- | 1,560.00 | 1,560 | 1 |
| 21-118-22-22-0058 | 3555 PLYMOUTH BLVD | C | 1 | 110 | Office Condominium/ TH | TOWN CENTER OFFICE P | GFE INVESTMENT LLC | 3,120 | 0.07 | 3,120 | CC- | 3,120.00 | 3,120 | 1 |
| 21-118-22-23-0001 | 15515 STATE HWY NO 55 | I | 1 | 386 | Mini Warehouse | PUBLIC STORAGE | SUPERIOR STORAGE II LLC | 111,388 | 2.56 | 111,388 | I-1 | 45,427.00 | 90,854 | 0.8156 53392 |
| 21-118-22-23-0002 | 15600 32ND AVE N | I | 1 | 406 | Storage Warehouse | LINDFOR | PLYMOUTH BLDG LTD PART LLLP | 174,600 | 4.01 | 174,600 | C-2 | 32,000.00 | 32,000 | 0.1832 7606 |
| 21-118-22-23-0004 | 15625 32ND AVE N | I | 1 | 527 | Municipal Service Garage | HANUS/FIRST STUDENT | FRED E HANUS ETAL | 100,600 | 2.31 | 100,600 | I-2 | 15,640.00 | 15,640 | 0.1554 67197 |
| 21-118-22-23-0005 | 15605 32ND AVE N | I | 1 | 406 | Storage Warehouse | | MILLER 32ND AVENUE LLC | 70,009 | 1.61 | 70,009 | I-2 | 12,000.00 | 12,000 | 0.1714 06533 |
| 21-118-22-23-0006 | 15525 32ND AVE N | I | 1 | 406 | Storage Warehouse | DALCO ROOFING | DJD PROPERTIES GROUP LLC | 144,708 | 3.32 | 144,708 | I-2 | 29,446.00 | 31,327 | 0.2164 8423 |
| 21-118-22-23-0010 | 15755 32ND AVE N | I | 1 | 406 | Storage Warehouse | BANNER ENGINEERING | BANNER ENGINEERING CORP | 147,538 | 3.39 | 147,538 | I-2 | 48,227.00 | 72,564 | 0.4918 32613 |
| 21-118-22-23-0011 | 3131 VICKSBURG LA N | I | 1 | 494 | Industrial Light Manufacturing | AMP MANUFACTURING | A M P MANUFACTURING/SUPPLY | 133,994 | 3.08 | 133,994 | I-2 | 35,264.00 | 48,810 | 0.3642 70042 |
| 21-118-22-23-0013 | 15800 32ND AVE N | I | 1 | 453 | Industrial Flex Building | ALPHA BUSINESS CENTE | PLYMOUTH PROPERTIES RLTY COR | 89,405 | 2.05 | 89,405 | C-2 | 18,000.00 | 18,000 | 0.2013 31022 |
| 21-118-22-23-0014 | 15760 32ND AVE N | C | 1 | 446 | Supermarket | FRESHTYME GROCERY | VICKSBURG 55 LLC | 133,288 | 3.06 | 133,288 | PUD | | 29,303 | 0.2198 47248 |
| 21-118-22-23-0015 | 15750 32ND AVE N | C | 1 | 353 | Small Box Retail Store | GOODWILL | VICKSBURG 55 LLC | 103,983 | 2.39 | 103,983 | PUD | | 20,594 | 0.1980 51605 |
| 21-118-22-23-0016 | 15850 32ND AVE N | C | 1 | 349 | Fast Food Restaurant | Starbucks Coffee | VICKSBURG 55 LLC | 46,962 | 1.08 | 46,962 | PUD | | 2,000 | 0.0425 87624 |
| 21-118-22-24-0005 | 3305 PLYMOUTH BLVD | C | 1 | 304 | Bank | U. S. BANK | FIRST BUILDING CORP | 339,768 | 7.80 | 130,000 | CC- | 5,296.00 | 10,633 | 0.0817 92308 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21-118-22-24-0008 | 15301 STATE HWY NO 55 | I | 1 | 453 | Industrial Flex Building | JAGODZINSKI BUILDING | J M JAGODZINSKI TRUST ET AL | 255,307 | 5.86 | 182,000 | I-2 | 45,027.00 | 45,027 | 0.247401099 |
| 21-118-22-24-0009 | 3200 RANCHVIEW LA N | I | 1 | 406 | Storage Warehouse | HOLSUM | LAKELAND INVESTORS INC | 206,900 | 4.75 | 206,900 | I-2 | 59,912.00 | 59,912 | 0.289569841 |
| 21-118-22-24-0011 | 3355 PLYMOUTH BLVD | C | 1 | 412 | Neighborhood Shopping Center | PLYMOUTH HILLS SHOPP | PLYMOUTH HILLS SHOPPES LLC | 126,220 | 2.90 | 126,220 | CC- | 21,724.00 | 21,724 | 0.172112185 |
| 21-118-22-31-0004 | 15400 28TH AVE N | I | 1 | 406 | Storage Warehouse | | 15400 ASSOCIATES LLP | 128,131 | 2.94 | 128,131 | I-1 | 29,852.00 | 37,352 | 0.291514153 |
| 21-118-22-31-0005 | 15300 28TH AVE N | I | 1 | 406 | Storage Warehouse | | H & M LAND CO LLC | 121,000 | 2.78 | 121,000 | I-1 | 25,320.00 | 30,520 | 0.252231405 |
| 21-118-22-31-0008 | 3005 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | TOLL GAS & WELDING S | TOLL COMPANY INC | 179,000 | 4.11 | 134,000 | I-2 | 24,638.00 | 30,158 | 0.225059701 |
| 21-118-22-31-0009 | 15395 31ST AVE N | I | 1 | 406 | Storage Warehouse | GREENSTUFF | GREEN STUFF PROPERTIES LLC | 203,291 | 4.67 | 73,000 | I-2 | 13,064.00 | 13,064 | 0.178958904 |
| 21-118-22-31-0010 | 3050 RANCHVIEW LA N | I | 1 | 453 | Industrial Flex Building | MULTI-TENANT | ALMAGIL LLC | 87,755 | 2.01 | 87,755 | I-2 | 24,763.00 | 24,763 | 0.282183351 |
| 21-118-22-31-0013 | 15400 MEDINA RD | I | 1 | 494 | Industrial Light Manufacturing | CONTROL ASSEMBLIES | CACO PROPERTIES CO | 157,687 | 3.62 | 157,687 | I-2 | 24,750.00 | 24,750 | 0.156956502 |
| 21-118-22-31-0014 | 15405 MEDINA RD | I | 1 | 406 | Storage Warehouse | J. L. RUBIN BUILDING | CML HOLDINGS LLC | 137,957 | 3.17 | 137,957 | I-1 | 18,700.00 | 18,700 | 0.135549483 |
| 21-118-22-31-0015 | 2915 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | GORDON FERGUSON BLDG | NU AIRE INC | 413,683 | 9.50 | 372,000 | I-2 | 77,820.00 | 88,902 | 0.238983871 |
| 21-118-22-32-0005 | 15700 28TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | ALJON TOOL INC. | LUCKER FAMILY LTD PTNRSHP | 217,991 | 5.00 | 217,991 | I-1 | 43,050.00 | 62,843 | 0.288282544 |
| 21-118-22-32-0006 | 15605 MEDINA RD | I | 1 | 453 | Industrial Flex Building | | ACON MN LLC | 116,419 | 2.67 | 116,419 | I-1 | 30,300.00 | 30,300 | 0.260266795 |
| 21-118-22-32-0007 | 15505 MEDINA RD | I | 1 | 406 | Storage Warehouse | SABRE HEATING | SABRE PLUMBING HEATING & AIR | 97,258 | 2.23 | 97,258 | I-1 | 26,391.00 | 32,119 | 0.330245327 |
| 21-118-22-32-0008 | 15500 28TH AVE N | I | 1 | 406 | Storage Warehouse | AKZO NOBEL | DIAMOND PARTNERS LLC | 97,000 | 2.23 | 97,000 | I-1 | 25,974.00 | 30,234 | 0.311690722 |
| 21-118-22-32-0009 | 15600 28TH AVE N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | DAVE OSBORNE CONSTRU | B/D PROPERTY MANAGEMENT LLLP | 97,100 | 2.23 | 97,100 | I-1 | 20,155.00 | 20,085 | 0.20684861 |
| 21-118-22-32-0010 | 15600 MEDINA RD | I | 1 | 494 | Industrial Light Manufacturing | INDUSTRIAL MOLDED RU | GROS VENTRE INVESTMENTS LP | 188,583 | 4.33 | 188,583 | I-2 | 60,436.00 | 65,986 | 0.349904286 |
| 21-118-22-32-0011 | 3005 RANCHVIEW LA N | I | 1 | 406 | Storage Warehouse | ALLIED PLASTICS | RIC-WIC LIMITED PARTNERSHIP | 188,604 | 4.33 | 188,604 | I-2 | 35,200.00 | 41,011 | 0.217445017 |
| 21-118-22-32-0012 | 2800 VICKSBURG LA N | I | 1 | 453 | Industrial Flex Building | VICKSBURG BUSINESS C | SOUTHTECH RIDGE LLC | 477,083 | 10.95 | 477,083 | I-1 | 150,659.00 | 150,659 | 0.315792011 |
| 21-118-22-34-0002 | 2765 NIAGARA LA N | I | 1 | 494 | Industrial Light Manufacturing | AMERILAB | AP NIAGARA LLC | 326,525 | 7.50 | 326,525 | I-1 | 117,048.00 | 123,900 | 0.379450272 |
| 21-118-22-34-0003 | 2727 NIAGARA LA N | I | 1 | 494 | Industrial Light Manufacturing | WRICO PLANT | HAROLD F GRIFFITHS TRUSTEE | 283,100 | 6.50 | 283,100 | I-1 | 94,900.00 | 94,900 | 0.335217238 |
| 21-118-22-34-0006 | 2601 NIAGARA LA N | I | 1 | 495 | Industrial Heavy Manufacturing | GARLOCK EQUIPMENT | PLYMOUTH PROPERTY CO LLC | 307,005 | 7.05 | 307,005 | I-1 | 77,140.00 | 81,935 | 0.266884904 |
| 21-118-22-34-0007 | 2790 RANCHVIEW LA N | I | 1 | 406 | Storage Warehouse | J-MARK | GARY R HENRIKSEN TRUST | 210,940 | 4.84 | 210,940 | I-1 | 71,346.00 | 74,946 | 0.355295345 |
| 21-118-22-34-0008 | 2750 RANCHVIEW LA N | I | 1 | 494 | Industrial Light Manufacturing | THRALL DISTRIBUTION | NORFAB PROPERTY HOLDINGS LLC | 235,848 | 5.41 | 235,848 | I-1 | 57,803.00 | 57,803 | 0.245085818 |
| 21-118-22-34-0009 | 2700 RANCHVIEW LA N | I | 1 | 494 | Industrial Light Manufacturing | LUNDELL MANUFACTURIN | LUNDELL PROPERTIES | 380,013 | 8.72 | 380,013 | I-1 | 109,518.00 | 124,415 | 0.327396694 |
| 21-118-22-41-0001 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | LAND USED AS PARK. L | STORE MASTER FUNDING V LLC | 29,956 | 0.69 | 29,956 | C-3 | 0.00 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21-118-22-41-0002 | 40 ADDRESS UNASSIGNED | LI | 1 | 117 | Billboard Site | | NAEGELE OUTDOOR ADV CO | 5,553 | 0.13 | 5,553 | I-1 | 0.00 | 0 | 0 |
| 21-118-22-41-0004 | 3001 HARBOR LA N | C | 1 | 344 | Office Building | FERNBROOK OFFICE | FERNBROOK OFFICE LLP | 31,554 | 0.72 | 31,554 | C-3 | 8,210.00 | 8,210 | 0.260188883 |
| 21-118-22-41-0005 | 3005 HARBOR LA N | C | 1 | 350 | Restaurant | JAKE'S CITY GRILLE | STORE MASTER FUNDING V LLC | 68,460 | 1.57 | 68,460 | C-3 | 9,562.00 | 9,562 | 0.139672802 |
| 21-118-22-41-0010 | 14370 28TH PL N | C | 1 | 349 | Fast Food Restaurant | WENDY'S | PLYMOUTH WENDYS HOLDINGS LLC | 51,400 | 1.18 | 51,400 | C-3 | 3,089.00 | 3,089 | 0.060097276 |
| 21-118-22-41-0014 | 14630 28TH AVE N | I | 1 | 406 | Storage Warehouse | | LIBERTY PROPERTY LTD PTNSHP | 187,700 | 4.31 | 187,700 | I-1 | 56,100.00 | 56,100 | 0.298881193 |
| 21-118-22-41-0015 | 3007 HARBOR LA N | C | 1 | 341 | Medical Office | MULTI-TENANT MEDICAL | PLYMOUTH MEDICAL BLDG LLC | 135,578 | 3.11 | 135,578 | C-3 | 13,885.00 | 13,886 | 0.102420747 |
| 21-118-22-41-0018 | 14420 28TH PL N | C | 1 | 349 | Fast Food Restaurant | ARBY'S | RAMONA L DREHER REVOC TRUST | 52,100 | 1.20 | 52,100 | C-3 | 3,722.00 | 3,722 | 0.071439539 |
| 21-118-22-41-0020 | 3020 HARBOR LA N | C | 1 | 344 | Office Building | EAST VIEW INFORMATIO | RFUTURES LLC | 23,814 | 0.55 | 23,814 | O | 3,180.00 | 6,280 | 0.263710422 |
| 21-118-22-41-0022 | 3025 HARBOR LA N | C | 1 | 344 | Office Building | MULTI-TENANT OFFICE | RSOC REAL ESTATE HLDNGS LLC | 178,170 | 4.09 | 178,170 | O | 12,555.00 | 50,220 | 0.281865634 |
| 21-118-22-41-0024 | 14430 28TH PL N | C | 1 | 349 | Fast Food Restaurant | BURGER KING | ALLSTATE BK R/E HOLDINGS LTD | 56,427 | 1.30 | 56,427 | C-3 | 3,529.00 | 3,529 | 0.062540982 |
| 21-118-22-41-0027 | 14700 28TH AVE N | I | 1 | 453 | Industrial Flex Building | TECH EAST 55 | TECH EAST 55 LLP | 126,778 | 2.91 | 126,778 | I-1 | 37,542.00 | 37,542 | 0.296123933 |
| 21-118-22-41-0029 | 3015 HARBOR LA N | C | 1 | 350 | Restaurant | DAVANNI'S | HARBOR PLACE LLP | 69,196 | 1.59 | 43,560 | O | 4,650.00 | 4,650 | 0.106749311 |
| 21-118-22-41-0030 | 3021 HARBOR LA N | C | 1 | 344 | Office Building | GOLDRIDGE BUILDING | HARBOR LANE OF PLYMOUTH LLC | 99,087 | 2.27 | 99,087 | O | 22,904.00 | 39,056 | 0.394158669 |
| 21-118-22-42-0006 | 2950 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | | RCL MAMMOTH LLC | 277,000 | 6.36 | 277,000 | I-1 | 90,684.00 | 90,684 | 0.327379061 |
| 21-118-22-42-0010 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | VACANT LAND MEDIVATO | RENAL SYSTEMS INC | 114,900 | 2.64 | 114,900 | I-2 | 0.00 | 0 | 0 |
| 21-118-22-42-0012 | 14905 28TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | MEDIVATORS INC | MEDIVATORS INC | 267,722 | 6.15 | 267,722 | I-2 | 65,416.00 | 66,991 | 0.250225981 |
| 21-118-22-42-0013 | 2800 NIAGARA LA N | I | 1 | 494 | Industrial Light Manufacturing | SCHWAN'S | SAFEPARK COMMERCIAL LLC | 109,300 | 2.51 | 109,300 | I-1 | 27,947.00 | 27,947 | 0.255690759 |
| 21-118-22-42-0014 | 14910 28TH AVE N | I | 1 | 453 | Industrial Flex Building | CIRCLE STAR DISTRIBU | PARKWOOD INVESTMENTS LLC | 125,468 | 2.88 | 125,468 | I-1 | 31,770.00 | 31,770 | 0.253211974 |
| 21-118-22-42-0018 | 14800 28TH AVE N | I | 1 | 453 | Industrial Flex Building | TECH WEST 55 | AX TECH WEST LP | 392,990 | 9.02 | 392,990 | I-1 | 108,000.00 | 108,000 | 0.274816153 |
| 21-118-22-43-0008 | 14830 27TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | NORFAB | S P HAUGLAND ET AL TRUSTEES | 119,479 | 2.74 | 119,479 | I-2 | 39,280.00 | 42,010 | 0.351609906 |
| 21-118-22-43-0009 | 14920 27TH AVE N | I | 1 | 495 | Industrial Heavy Manufacturing | ENGINEERED AEROACOUS | AG GADBERRY 14920 LLC | 169,616 | 3.89 | 169,616 | PUD | 61,964.00 | 61,964 | 0.365319309 |
| 21-118-22-43-0011 | 15020 27TH AVE N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | INSURANCE ADVISORS | RICHMOND FAMILY LTD PTNRSHP | 95,988 | 2.20 | 95,988 | I-2 | 28,265.00 | 28,265 | 0.294463891 |
| 21-118-22-43-0012 | 2750 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | METRO SIDING | RJA LLC | 52,480 | 1.20 | 52,480 | I-2 | 11,984.00 | 11,984 | 0.228353659 |
| 21-118-22-43-0013 | 2740 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | HALES MACHINE TOOL | HALES FAMILY LTD PTNRSHP | 43,500 | 1.00 | 43,500 | I-2 | 12,000.00 | 13,195 | 0.303333333 |
| 21-118-22-43-0014 | 14605 28TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | MINNTECH | MEDIVATORS INC | 395,660 | 9.08 | 395,660 | I-2 | 105,053.00 | 134,778 | 0.340640954 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21-118-22-43-0015 | 14755 27TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | UNITRON | ARHC UHPTHMN01 LLC | 284,079 | 6.52 | 284,079 | I-2 | 81,927.00 | 81,927 | 0.28839513 |
| 21-118-22-43-0016 | 2600 NIAGARA LA N | I | 1 | 494 | Industrial Light Manufacturing | PROTO LABS | PROTO LABS INC | 509,288 | 11.69 | 509,288 | I-2 | 166,525.00 | 175,933 | 0.34544894 |
| 21-118-22-44-0002 | 14350 27TH AVE N | C | 1 | 453 | Industrial Flex Building | | D J & C R CAVANAUGH | 45,846 | 1.05 | 45,846 | I-2 | 6,400.00 | 6,400 | 0.139597784 |
| 21-118-22-44-0011 | 14550 28TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | MINNTECH | MEDIVATORS INC | 109,300 | 2.51 | 109,300 | I-2 | 36,571.00 | 43,307 | 0.396221409 |
| 21-118-22-44-0012 | 14530 27TH AVE N | I | 1 | 406 | Storage Warehouse | ROTO-ROOTER | ROTO-ROOTER SERVICES COMPANY | 84,000 | 1.93 | 84,000 | I-2 | 15,936.00 | 19,060 | 0.226904762 |
| 21-118-22-44-0013 | 14350 28TH PL N | C | 1 | 528 | Service Repair Garage | TIRE'S PLUS | KEATS PLYMOUTH LLC | 37,892 | 0.87 | 37,892 | C-3 | 6,803.00 | 6,803 | 0.179536578 |
| 21-118-22-44-0014 | 14600 28TH AVE N | I | 1 | 406 | Storage Warehouse | MINNEAPOLIS GLASS | RIC-WIC LTD PTNRSHP | 85,300 | 1.96 | 85,300 | I-2 | 34,320.00 | 35,696 | 0.418475967 |
| 21-118-22-44-0018 | 2855 GLACIER LA N | C | 1 | 412 | Neighborhood Shopping Center | SIMONSON'S | KYLEESTATES II LLC | 76,389 | 1.75 | 69,600 | C-3 | 12,200.00 | 12,200 | 0.175287356 |
| 21-118-22-44-0019 | 14307 28TH PL N | I | 1 | 453 | Industrial Flex Building | MIDWEST RUBBER | K B DEVELOPMENT CO II L L P | 137,200 | 3.15 | 137,200 | I-2 | 40,680.00 | 40,680 | 0.296501458 |
| 21-118-22-44-0021 | 2605 FERNBROOK LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH CORPORATE C | PLYMOUTH CORPORATE LLC | 279,257 | 6.41 | 279,257 | I-2 | 80,679.00 | 80,769 | 0.289228202 |
| 21-118-22-44-0023 | 14601 27TH AVE N | I | 1 | 453 | Industrial Flex Building | NORTH POINT CORPORAT | TEACHER FEDERAL CREDIT UNION | 240,686 | 5.53 | 240,686 | I-2 | 56,925.00 | 56,925 | 0.236511471 |
| 21-118-22-44-0024 | 14505 27TH AVE N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | SCOVILLE PRESS | THE ALVIN E MCQUINN REV TRST | 291,008 | 6.68 | 291,008 | I-2 | 109,175.00 | 109,175 | 0.375161508 |
| 22-118-22-21-0008 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | REGENCY MIDWEST VEN LTD PRTS | 169,937 | 3.90 | 169,937 | RMF | 0.00 | 0 | 0 |
| 22-118-22-22-0029 | 3500 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH BUSINESS CT | ST PAUL PROPERTIES INC | 759,482 | 17.44 | 435,600 | I-1 | 124,214.00 | 124,214 | 0.285156107 |
| 22-118-22-22-0031 | 3405 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | | ST PAUL PROPERTIES INC | 316,939 | 7.28 | 316,939 | I-1 | 71,082.00 | 71,082 | 0.224276596 |
| 22-118-22-23-0013 | 3155 EMPIRE LA N | C | 1 | 442 | Bar/Tavern | THE RESERVE | LIXIAO WANG I LLC | 84,070 | 1.93 | 84,070 | C-3 | 10,427.00 | 13,144 | 0.156345902 |
| 22-118-22-23-0016 | 3300 FERNBROOK LA N | C | 1 | 344 | Office Building | PLYMOUTH WOODS OFFIC | ST PAUL PROPERTIES INC | 334,511 | 7.68 | 334,511 | O | 30,228.00 | 107,935 | 0.322665024 |
| 22-118-22-23-0017 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | ST PAUL PROPERTIES INC | 311,776 | 7.16 | 311,776 | O | 0.00 | 0 | 0 |
| 22-118-22-23-0025 | 3390 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/ TH | ANNAPOLIS OFFICE PAR | SZ PROPERTIES LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0026 | 3390 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/ TH | ANNAPOLIS OFFICE PAR | MAYHEW DEVELOPMENT LLC | 1,536 | 0.04 | 1,536 | O | 1,536.00 | 3,072 | 2 |
| 22-118-22-23-0027 | 3390 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/ TH | ANNAPOLIS OFFICE PAR | MAYHEW DEVELOPMENT LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0028 | 3380 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/ TH | ANNAPOLIS OFFICE PAR | CPEC EXCHANGE 40807 LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0029 | 3380 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/ TH | ANNAPOLIS OFFICE PAR | CPEC EXCHANGE 40807 LLC | 1,536 | 0.04 | 1,536 | O | 1,536.00 | 3,072 | 2 |
| 22-118-22-23-0030 | 3370 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/ TH | ANNAPOLIS OFFICE PAR | STEVEN EARL PROPERTIES LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |

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| 22-118-22-23-0031 | 3370 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | S C HOLDINGS LLC | 1,536 | 0.04 | 1,536 | O | 1,536.00 | 3,072 | 2 |
| 22-118-22-23-0032 | 3370 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | ANCILLARY PROPERTIES LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0033 | 3360 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | DJL3 LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0034 | 3360 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | ONEDGE LLC | 1,536 | 0.04 | 1,536 | O | 1,536.00 | 3,072 | 2 |
| 22-118-22-23-0035 | 3350 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | DLO LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,575 | 1.828835227 |
| 22-118-22-23-0036 | 3350 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | DLO LLC | 1,536 | 0.04 | 1,536 | O | 1,536.00 | 3,072 | 2 |
| 22-118-22-23-0037 | 3350 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | DLO LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0038 | 3340 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | ORIOLE HOLDINGS LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0039 | 3340 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | GHLR LLC | 1,536 | 0.04 | 1,536 | O | 1,536.00 | 3,072 | 2 |
| 22-118-22-23-0040 | 3340 ANNAPOLIS LA N | C | 1 | 110 | Office Condominium/TH | ANNAPOLIS OFFICE PAR | GHLR LLC | 1,408 | 0.03 | 1,408 | O | 1,408.00 | 2,816 | 2 |
| 22-118-22-23-0041 | 3000 HARBOR LA N | C | 1 | 594 | Hotel, Full Service | COMFORT INN / LUCKY' | SANDMAN MOTELS LLC | 291,029 | 6.68 | 291,029 | C-3 | 49,488.00 | 75,362 | 0.258950139 |
| 22-118-22-24-0004 | 3131 CAMPUS DR | C | 1 | 594 | Hotel, Full Service | RADISSON CONFERENCE | REGENCY MIDWEST VEN LTD PRTS | 942,600 | 21.64 | 550,000 | PUD | 91,513.00 | 309,429 | 0.562598182 |
| 22-118-22-24-0005 | 3033 CAMPUS DR | C | 1 | 344 | Office Building | ATRIA CORPORATE CENT | TALCOTT III ATRIA LLC | 819,050 | 18.80 | 700,000 | PUD | 80,404.00 | 439,913 | 0.628447143 |
| 22-118-22-31-0017 | 2800 CAMPUS DR | I | 1 | 453 | Industrial Flex Building | | LSOP 3 MN 3 LLC | 250,900 | 5.76 | 250,900 | PUD | 65,450.00 | 65,450 | 0.260860901 |
| 22-118-22-31-0018 | 2955 XENIUM LA N | I | 1 | 453 | Industrial Flex Building | | LSOP 3 MN 3 LLC | 121,900 | 2.80 | 121,900 | PUD | 24,800.00 | 24,800 | 0.203445447 |
| 22-118-22-31-0019 | 3000 CAMPUS DR | I | 1 | 392 | Industrial Engineering/R&D/Laboratory | TURCK | TURCK INC | 200,300 | 4.60 | 175,000 | PUD | 25,035.00 | 50,070 | 0.286114286 |
| 22-118-22-31-0023 | 2855 CAMPUS DR | C | 1 | 341 | Medical Office | WEST HEALTH (PHASE I | HSRE-WH MOB LLC | 34,940 | 0.80 | 34,940 | PUD | 26,500.00 | 110,629 | 3.16625644 |
| 22-118-22-31-0025 | 2855 CAMPUS DR | C | 1 | 320 | Medical Clinic | WEST HEALTH PHASE II | HSRE-WH MOB LLC | 26,703 | 0.61 | 26,703 | PUD | 0.00 | 19,684 | 0.737145639 |
| 22-118-22-31-0027 | 3005 CAMPUS DR | LC | 1 | 100 | Vacant Commercial Land | | WESTHEALTH INC | 968,353 | 22.23 | 938,353 | | | | 0 |
| 22-118-22-32-0001 | 14225 STATE HWY NO 55 | C | 1 | 344 | Office Building | SINGLE TENANT OFFICE | DANCO R E HOLDINGS LLC | 31,300 | 0.72 | 31,300 | O | 3,718.00 | 3,718 | 0.118785942 |
| 22-118-22-32-0005 | 2945 EMPIRE LA N | C | 1 | 350 | Restaurant | PERKINS | DELREY PLYMOUTH ASSOCIATES | 87,555 | 2.01 | 86,731 | C-3 | 5,900.00 | 5,900 | 0.068026427 |
| 22-118-22-32-0010 | 2955 EMPIRE LA N | C | 1 | 595 | Hotel, Limited Service | DAYS INN | PLYMOUTH HOTELS LLC | 106,722 | 2.45 | 106,722 | C-3 | 11,630.00 | 46,520 | 0.435898877 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22-118-22-32-0014 | 3000 FERNBROOK LA N | C | 1 | 304 | Bank | WELLS FARGO BANK | NW NATL BANKWEST | 128,316 | 2.95 | 128,316 | C-3 | 5,762.00 | 8,887 | 0.069258705 |
| 22-118-22-32-0015 | 3050 FERNBROOK LA N | C | 1 | 426 | Day Care Center | KINDERCARE DAYCARE | R I C PROPERTIES LTD | 49,436 | 1.13 | 49,436 | C-3 | 7,280.00 | 7,280 | 0.147261105 |
| 22-118-22-32-0016 | 2960 EMPIRE LA N | I | 1 | 386 | Mini Warehouse | LOCK-UP STORAGE | EXTRA SPACE PROPS TWO LLC | 76,458 | 1.76 | 66,100 | C-5 | 26,261.00 | 100,000 | 1.512859304 |
| 22-118-22-32-0018 | 2995 HARBOR LA N | C | 1 | 410 | Automotive Center | GOOD YEAR | PAULY ENTERPRISES INC | 43,560 | 1.00 | 43,560 | C-3 | 6,200.00 | 8,184 | 0.187878788 |
| 22-118-22-32-0019 | 3020 FERNBROOK LA N | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 51,115 | 1.17 | 51,115 | C-3 | 3,749.00 | 3,749 | 0.073344419 |
| 22-118-22-32-0020 | 2980 EMPIRE LA N | C | 1 | 410 | Automotive Center | ROGERS BODY SHOP | 2980 EMPIRE LA LLC | 89,612 | 2.06 | 89,612 | C-5 | 29,680.00 | 31,556 | 0.352140338 |
| 22-118-22-32-0021 | 40 ADDRESS UNASSIGNED | LC | 1 | 117 | Billboard Site | BILLBOARD | WILLIAM O NAEGLE | 0 | 0.00 | 3,600 | C-5 | 0.00 | 0 | 0 |
| 22-118-22-32-0022 | 2990 Harbor Lane North | C | 1 | 595 | Hotel Limited Service | Home 2 Suites by Hilton | | 100,914 | 2.32 | 100,914 | | | 65,657 | 0.650623303 |
| 22-118-22-33-0001 | 2800 FERNBROOK LA N | C | 1 | 418 | Health Club | THE DANCE SHOPPE | JMJ PLUS LLC | 99,312 | 2.28 | 99,312 | PUD | 18,668.00 | 23,700 | 0.238641856 |
| 22-118-22-33-0002 | 2730 FERNBROOK LA N | I | 1 | 494 | Industrial Light Manufacturing | PAUL'S WOODCRAFT | 2730 FERNBROOK LLC | 71,473 | 1.64 | 71,473 | I-2 | 31,640.00 | 31,640 | 0.44268465 |
| 22-118-22-33-0003 | 2720 FERNBROOK LA N | I | 1 | 406 | Storage Warehouse | | PLYMOUTH PARTNERS LLC | 76,961 | 1.77 | 76,961 | I-2 | 16,613.00 | 18,041 | 0.234417432 |
| 22-118-22-33-0007 | 2705 CHESHIRE LA N | I | 1 | 495 | Industrial Heavy Manufacturing | AACRON INC. | AACRON INCORPORATED | 153,300 | 3.52 | 153,300 | I-2 | 58,545.00 | 68,332 | 0.445740378 |
| 22-118-22-33-0011 | 2735 CHESHIRE LA N | I | 1 | 494 | Industrial Light Manufacturing | | PLYMOUTH HOLDINGS LLC | 122,800 | 2.82 | 122,800 | O | 54,519.00 | 57,075 | 0.46478013 |
| 22-118-22-33-0014 | 2600 FERNBROOK LA N | I | 1 | 453 | Industrial Flex Building | CHESHIRE BUSINESS CE | CHESHIRE REALTY CORP | 189,020 | 4.34 | 189,020 | I-2 | 55,295.00 | 55,295 | 0.292535181 |
| 22-118-22-33-0016 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | AACRON INC | 76,915 | 1.77 | 76,915 | I-2 | 0.00 | 0 | 0 |
| 22-118-22-33-0018 | 2655 CHESHIRE LA N | I | 1 | 453 | Industrial Flex Building | JELDWEN WINDOWS & TC | BRINKER INVESTMENTS LLC | 89,793 | 2.06 | 79,793 | I-2 | 19,440.00 | 19,440 | 0.243630394 |
| 22-118-22-33-0019 | 40 ADDRESS UNASSIGNED | LI | 1 | 117 | Billboard Site | | FLAGSHIP OUTDOOR ADV INC | 0 | 0.00 | 3,700 | I-2 | 0.00 | 0 | 0 |
| 22-118-22-34-0005 | 2705 ANNAPOLIS LA N | C | 1 | 594 | Hotel, Full Service | KELLY INN/GREEN MILL | AMERICAN HOSPITALITY LLC | 333,331 | 7.65 | 333,331 | C-3 | 51,723.00 | 85,582 | 0.256747797 |
| 22-118-22-34-0006 | 13705 27TH AVE N | C | 1 | 350 | Restaurant | BROADWAY PIZZA | KINGFISH PROPERTIES LLP | 42,800 | 0.98 | 42,800 | C-3 | 4,912.00 | 4,912 | 0.114766355 |
| 22-118-22-34-0016 | 13605 27TH AVE N | C | 1 | 304 | Bank | FIRST NATIONAL BANK | FIRST NATIONAL BK FULDA MINN | 72,186 | 1.66 | 72,186 | C-3 | 5,616.00 | 11,232 | 0.155598038 |
| 22-118-22-34-0018 | 2705 ANNAPOLIS CIR N | C | 1 | 349 | Fast Food Restaurant | MC DONALD'S | MC DONALDS CORPORATION | 49,998 | 1.15 | 49,998 | PUD | 4,006.00 | 4,366 | 0.087323493 |
| 22-118-22-34-0020 | 2600 ANNAPOLIS LA N | C | 1 | 595 | Hotel, Limited Service | RED ROOF INN | MIDWEST HOSPITALITY LLC | 129,446 | 2.97 | 129,446 | C-3 | 12,157.00 | 36,471 | 0.281746829 |
| 22-118-22-34-0021 | 13500 26TH AVE N | C | 1 | 426 | Day Care Center | LEARNING TREE | 2269 FORD-FS PARTNERSHIP LLP | 31,148 | 0.72 | 31,148 | C-3 | 6,016.00 | 6,016 | 0.193142417 |
| 22-118-22-34-0022 | 13500 26TH AVE N | C | 1 | 344 | Office Building | | 2269 FORD-FS PARTNERSHIP LLP | 36,252 | 0.83 | 36,252 | C-3 | 7,040.00 | 7,040 | 0.194196182 |
| 22-118-22-34-0023 | 2805 CAMPUS DR | C | 1 | 341 | Medical Office | WEST HEALTH (PHASE I | HSRE-WH MOB LLC | 35,338 | 0.81 | 35,338 | PUD | 21,642.00 | 83,262 | 2.356160507 |
| 22-118-22-42-0010 | 2905 NORTHWEST BLVD | I | 1 | 453 | Industrial Flex Building | | LSOP 3 MN 3 LLC | 409,450 | 9.40 | 409,450 | PUD | 84,850.00 | 84,850 | 0.20722921 |
| 22-118-22-42-0012 | 2950 XENIUM LA N | I | 1 | 453 | Industrial Flex Building | NORTHWEST BUSINESS C | NORTHWEST PROP REALTY LLC | 377,229 | 8.66 | 242,630 | PUD | 70,000.00 | 70,000 | 0.288505131 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22-118-22-42-0013 | 2920 NORTHWEST BLVD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH CREEK COMMO | LIBERTY PROPERTY LTD PTNRSHP | 426,511 | 9.79 | 318,000 | PUD | 81,935.00 | 81,935 | 0.257657233 |
| 22-118-22-43-0006 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | REGENCY MIDWEST VEN LTD PRTS | 9,862 | 0.23 | 9,862 | I-2 | 0.00 | 0 | 0 |
| 22-118-22-43-0013 | 2600 CAMPUS DR | C | 1 | 483 | Fitness Center | Gymnastics | WILLOW PROPERTIES #6 LLC | 222,590 | 5.11 | 189,000 | PUD | 48,080.00 | 48,080 | 0.254391534 |
| 22-118-22-43-0015 | 2700 CAMPUS DR | I | 1 | 494 | Industrial Light Manufacturing | | PLYMOUTH R/E HOLDINGS LLC | 190,723 | 4.38 | 190,723 | PUD | 39,408.00 | 48,268 | 0.253079073 |
| 22-118-22-43-0017 | 2800 NORTHWEST BLVD | I | 1 | 494 | Industrial Light Manufacturing | DATA RECOGNITION COR | KEYSTONE PROPERTYS OF MN LLC | 612,049 | 14.05 | 612,049 | PUD | 106,533.00 | 165,466 | 0.270347636 |
| 22-118-22-43-0019 | 2725 CAMPUS DR | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 79,341 | 1.82 | 54,000 | PUD | 5,400.00 | 5,400 | 0.1 |
| 22-118-22-43-0020 | 2605 CAMPUS DR | C | 1 | 344 | Office Building | REMAX OFFICE | THE JAMTA GRP LTD PTNRSHP | 49,736 | 1.14 | 49,736 | PUD | 5,138.00 | 10,276 | 0.206610906 |
| 22-118-22-43-0021 | 2655 CAMPUS DR | C | 1 | 304 | Bank | ASSOCIATED BANK | ASSOCIATED BANK N A | 46,801 | 1.07 | 46,801 | PUD | 10,178.00 | 10,178 | 0.217473986 |
| 22-118-22-43-0022 | 2675 CAMPUS DR | C | 1 | 410 | Automotive Center | JIFFY LUBE | CAMPUS DRIVE LLC | 45,473 | 1.04 | 40,000 | PUD | 2,427.00 | 4,083 | 0.102075 |
| 22-118-22-43-0024 | 2669 CAMPUS DR | C | 1 | 350 | Restaurant | RED ROBIN RESTAURANT | 2020 INVESTMENTS LLC | 67,976 | 1.56 | 43,560 | PUD | 6,980.00 | 6,980 | 0.160238751 |
| 22-118-22-43-0025 | 2661 CAMPUS DR | C | 1 | 412 | Neighborhood Shopping Center | STARBUCK'S/ JIMMY JOH | BENTHILL PROPERTY LLC | 48,267 | 1.11 | 37,000 | PUD | 3,432.00 | 3,432 | 0.092756757 |
| 22-118-22-43-0026 | 2700 ANNAPOLIS CIR N | C | 1 | 412 | Neighborhood Shopping Center | WEST HEALTH RETAIL | PLYMOUTH POINTE PLAZA LLC | 99,054 | 2.27 | 99,054 | PUD | 0.00 | 21,334 | 0.215377471 |
| 22-118-22-43-0027 | 2750 ANNAPOLIS CIR N | C | 1 | 595 | Hotel, Limited Service | RESIDENCE INN HOTEL | CSM RI PLYMOUTH LLC | 115,466 | 2.65 | 115,466 | PUD | 0.00 | 89,501 | 0.775128609 |
| 24-118-22-11-0001 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | ENDURANCE TRANSMISSI | ENDURANCE MAHCINE INC | 12,746 | 0.29 | 1,640 | C-3 | 0.00 | 0 | 0 |
| 24-118-22-11-0004 | 3515 STATE HWY NO 169 | C | 1 | 528 | Service Repair Garage | ENDURANCE TRANSMISSI | ENDURANCE MACHINE INC | 15,120 | 0.35 | 8,335 | C-3 | 4,000.00 | 4,000 | 0.479904019 |
| 24-118-22-11-0009 | 3515 KILMER LAN | I | 1 | 494 | Industrial Light Manufacturing | MARKSMAN CONSTUCTION | D M WELD JR & C J WELD | 19,750 | 0.45 | 19,750 | C-5 | 2,400.00 | 2,400 | 0.121518987 |
| 24-118-22-11-0013 | 3415 KILMER LAN | I | 1 | 494 | Industrial Light Manufacturing | | KENNETH C STABECK | 20,000 | 0.46 | 20,000 | C-5 | 3,200.00 | 3,200 | 0.16 |
| 24-118-22-11-0017 | 3435 STATE HWY NO 169 | C | 1 | 412 | Neighborhood Shopping Center | MARKET, AUTO, LIQUOR | YEVGENY VAYNBERG | 17,004 | 0.39 | 17,004 | C-3 | 7,944.00 | 7,944 | 0.467184192 |
| 24-118-22-11-0018 | 3431 STATE HWY NO 169 | C | 1 | 412 | Neighborhood Shopping Center | 3 TENANT SPACE | MARK CEMENSKY | 17,895 | 0.41 | 17,895 | C-3 | 4,017.00 | 4,017 | 0.224476111 |
| 24-118-22-11-0019 | 3425 STATE HWY NO 169 | C | 1 | 353 | Small Box Retail Store | SPECIAL EVENTS CATER | SPEC EVENTS CATERING CO INC | 18,365 | 0.42 | 18,365 | C-3 | 2,580.00 | 3,948 | 0.214974136 |
| 24-118-22-11-0020 | 3405 STATE HWY NO 169 | C | 1 | 353 | Small Box Retail Store | DOLPHIN POOLS | CD NELSON PROPERTIES LLC | 18,798 | 0.43 | 18,798 | C-3 | 4,320.00 | 4,320 | 0.229811682 |
| 24-118-22-11-0021 | 3401 STATE HWY NO 169 | C | 1 | 444 | Dental Office/Clinic | DENTAL CLINIC | WEST SUBURBAN PROPERTIES LLC | 18,975 | 0.44 | 18,975 | C-3 | 2,880.00 | 5,760 | 0.303557312 |
| 24-118-22-11-0022 | 3400 KILMER LAN | LC | 1 | 100 | Vacant Commercial Land | VACANT LOT | WEST SUBURBAN PROPERTIES LLC | 19,140 | 0.44 | 19,140 | C-5 | 0.00 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24-118-22-11-0023 | 3410 KILMER LA N | I | 1 | 494 | Industrial Light Manufacturing | WELD & SONS PLUMBING | D M WELD JR & C WELD | 18,995 | 0.44 | 18,995 | C-5 | 4,406.00 | 4,406 | 0.231955778 |
| 24-118-22-11-0025 | 3430 KILMER LA N | I | 1 | 494 | Industrial Light Manufacturing | SAGE COMPANIES | W JANSSEN & D L T JANSSEN | 19,442 | 0.45 | 19,442 | C-5 | 1,496.00 | 1,496 | 0.076946816 |
| 24-118-22-11-0026 | 3440 KILMER LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | HARRISON ELECTRIC | HARRISON-ENGER LLC | 19,456 | 0.45 | 19,456 | C-5 | 4,356.00 | 4,356 | 0.223889803 |
| 24-118-22-11-0030 | 9605 36TH AVE N | C | 1 | 408 | Service Station (With Fuel) | SINCLAIR STATION | AVP ENERGY LLC | 38,900 | 0.89 | 38,900 | C-3 | 1,260.00 | 1,260 | 0.032390746 |
| 24-118-22-11-0032 | 40 ADDRESS UNASSIGNED | C | 1 | 528 | Service Repair Garage | ENDURANCE TRANSMISSI | ENDURANCE MACHINE INC | 10,283 | 0.24 | 10,283 | C-3 | 900.00 | 900 | 0.087523096 |
| 24-118-22-11-0034 | 3510 KILMER LA N | C | 1 | 528 | Service Repair Garage | UNITED TOWING AND AU | LIEW WAI LLC | 30,420 | 0.70 | 30,420 | C-3 | 4,052.00 | 4,052 | 0.133201841 |
| 24-118-22-11-0035 | 3435 KILMER LA N | I | 1 | 494 | Industrial Light Manufacturing | HARDWOOD MANUFACTURE | GREGG C NAFSTAD | 59,942 | 1.38 | 59,942 | C-5 | 20,912.00 | 22,544 | 0.376096894 |
| 24-118-22-11-0037 | 3401 KILMER LA N | C | 1 | 110 | Office Condominium/ TH | KILMER OFFICE BUILDI | KILMER OFFICE BLDG | 39,324 | 0.90 | 7,865 | C-5 | 1,824.00 | 1,824 | 0.231913541 |
| 24-118-22-11-0038 | 3403 KILMER LA N | C | 1 | 110 | Office Condominium/ TH | KILMER OFFICE BUILDI | KILMER OFFICE BLDG | 39,324 | 0.90 | 7,865 | C-5 | 1,824.00 | 1,824 | 0.231913541 |
| 24-118-22-11-0039 | 3407 KILMER LA N | C | 1 | 110 | Office Condominium/ TH | KILMER OFFICE BUILDI | KILMER OFFICE BLDG | 39,324 | 0.90 | 7,865 | C-5 | 1,824.00 | 1,824 | 0.231913541 |
| 24-118-22-11-0040 | 3409 KILMER LA N | C | 1 | 110 | Office Condominium/ TH | KILMER OFFICE BUILDI | KILMER OFFICE BLDG | 39,324 | 0.90 | 7,865 | C-5 | 1,824.00 | 1,824 | 0.231913541 |
| 24-118-22-11-0041 | 3411 KILMER LA N | C | 1 | 110 | Office Condominium/ TH | KILMER OFFICE BUILDI | KILMER OFFICE BLDG | 39,324 | 0.90 | 7,865 | C-5 | 1,824.00 | 1,824 | 0.231913541 |
| 24-118-22-11-0043 | 3525 KILMER LA N | C | 1 | 527 | Municipal Service Garage | APPLE AUTOMATIC FOOD | MSY PROPERTIES LLC | 39,645 | 0.91 | 39,645 | C-5 | 0.00 | 16,128 | 0.406810443 |
| 25-118-22-41-0031 | 1695 STATE HWY NO 169 | C | 1 | 344 | Office Building | Berger office | L A BERGER & L M BERGER | 65,400 | 1.50 | 65,400 | I-3 | 8,100.00 | 12,604 | 0.192721713 |
| 25-118-22-41-0032 | 1605 STATE HWY NO 169 | I | 1 | 495 | Industrial Heavy Manufacturing | RYERSON STEEL | JOSEPH T RYERSON & SON INC | 614,000 | 14.10 | 614,000 | I-3 | 274,176.00 | 274,176 | 0.446540717 |
| 25-118-22-43-0026 | 10005 13TH AVE N | U | 1 | 471 | Utility Building | NSP | NORTHERN STATES POWER CO | 157,852 | 3.62 | 157,852 | I-2 | 0.00 | 0 | 0 |
| 25-118-22-43-0028 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | CHICAGO & NORTHWESTERN RR | 91,361 | 2.10 | 32,000 | I-2 | 0.00 | 0 | 0 |
| 25-118-22-43-0039 | 9905 13TH AVE N | I | 1 | 406 | Storage Warehouse | | SOUTH SHORE LLC | 89,490 | 2.05 | 89,490 | I-2 | 28,800.00 | 35,711 | 0.399050173 |
| 25-118-22-43-0040 | 9835 13TH AVE N | I | 1 | 406 | Storage Warehouse | | SOUTH SHORE LLC | | 0.00 | | | | 45,387 | 0 |
| 25-118-22-44-0003 | 9700 13TH AVE N | I | 1 | 406 | Storage Warehouse | | CHARAL PROPERTIES PLY LLC | 141,570 | 3.25 | 141,570 | I-3 | 41,915.00 | 45,672 | 0.322610723 |
| 25-118-22-44-0008 | 9800 13TH AVE N | I | 1 | 406 | Storage Warehouse | UNITED PRODUCTS | CHARAL PROPERTIES LLC | 426,000 | 9.78 | 426,000 | I-3 | 120,025.00 | 124,181 | 0.291504695 |
| 25-118-22-44-0011 | 9900 13TH AVE N | I | 1 | 406 | Storage Warehouse | MEDICINE LAKE PROPER | MEDICINE LAKE PROP PLYMOUTH | 374,000 | 8.59 | 374,000 | I-2 | 118,369.00 | 154,000 | 0.411764706 |
| 26-118-22-33-0039 | 12615 16TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | CROWN PLASTICS INC. | PLASTIC PROPERTIES LLC | 130,000 | 2.98 | 130,000 | I-2 | 27,207.00 | 27,207 | 0.209284615 |
| 26-118-22-33-0040 | 12325 STATE HWY NO 55 | C | 1 | 426 | Day Care Center | BEACON HEIGHTS | STORE MASTER FUNDING VIII | 235,383 | 5.40 | 235,383 | RSF | 47,407.00 | 47,407 | 0.20140367 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26-118-22-42-0001 | 1705 FORESTVIEW LA N | C | 1 | 514 | Community Center | | W MED LK COMM CLUB | 236,853 | 5.44 | 73,100 | RSF | 6,441.00 | 6,441 | 0.088112175 |
| 27-118-22-11-0003 | 13011 STATE HWY NO 55 | I | 1 | 386 | Mini Warehouse | PUBLIC STORAGE OFFIC | SSCI MINNESOTA LLC | 34,500 | 0.79 | 34,500 | I-2 | 1,477.00 | 1,477 | 0.042811594 |
| 27-118-22-11-0050 | 12900 STATE HWY NO 55 | I | 1 | 453 | Industrial Flex Building | PLYMOUTH OAKS PARK ( | PLYMOUTH OAKS 12900 LLC | 112,948 | 2.59 | 92,948 | I-1 | 34,693.00 | 34,693 | 0.373251711 |
| 27-118-22-11-0056 | 13000 STATE HWY NO 55 | I | 1 | 453 | Industrial Flex Building | PLYMOUTH OAKS PARK ( | PLYMOUTH OAKS 13000 LLC | 107,741 | 2.47 | 73,396 | I-1 | 23,543.00 | 23,543 | 0.320766799 |
| 27-118-22-12-0004 | 2320 XENIUM LA N | I | 1 | 386 | Mini Warehouse | MINNESOTA MINI-STORA | TWO S PROPERTIES INC | 314,500 | 7.22 | 314,500 | I-2 | 103,184.00 | 103,184 | 0.328008903 |
| 27-118-22-12-0007 | 40 ADDRESS UNASSIGNED | I | 1 | 494 | Industrial Light Manufacturing | | WELLIK FAMILY LTD PTNRSHP | 85,063 | 1.95 | 85,063 | I-2 | 0.00 | 10,000 | 0.117559926 |
| 27-118-22-12-0008 | 2400 XENIUM LA N | I | 1 | 407 | Distribution Warehouse | CHRISTOPHER AND BANK | CHRISTOPHER & BANKS COMPANY | 524,427 | 12.04 | 524,427 | I-2 | 203,215.00 | 223,375 | 0.425941075 |
| 27-118-22-12-0010 | 2530 XENIUM LA N | I | 1 | 453 | Industrial Flex Building | SATELLITE INDUSTRIES | T L HILDE/T G HILDE TRUSTEES | 187,776 | 4.31 | 187,776 | I-2 | 48,062.00 | 55,342 | 0.2947235 |
| 27-118-22-13-0001 | 13005 STATE HWY NO 55 | I | 1 | 407 | Distribution Warehouse | | NATHAN-JEFFREY LLC ET AL | 429,000 | 9.85 | 429,000 | I-2 | 168,146.00 | 168,146 | 0.391948718 |
| 27-118-22-13-0002 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | SUSAN SANDELMAN TRUSTEE | 8,700 | 0.20 | 8,700 | I-2 | 0.00 | 0 | 0 |
| 27-118-22-13-0004 | 13310 INDUSTRIAL PARK BLVD | I | 1 | 406 | Storage Warehouse | | AX TC INDUSTRIAL III LP | 280,174 | 6.43 | 280,174 | I-2 | 113,054.00 | 113,054 | 0.403513531 |
| 27-118-22-13-0005 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | AX TC INDUSTRIAL III LP | 90,363 | 2.07 | 90,000 | I-2 | 0.00 | 0 | 0 |
| 27-118-22-13-0007 | 2003 EAST CENTER CIR N | I | 1 | 392 | Industrial Engineering/R&D/Laboratory | | GRI PROPERTIES LLC | 140,260 | 3.22 | 140,260 | I-2 | 37,800.00 | 37,800 | 0.269499501 |
| 27-118-22-13-0008 | 13435 INDUSTRIAL PARK BLVD | I | 1 | 494 | Industrial Light Manufacturing | WARNER MANUFACTURING | GUY R WARNER | 124,100 | 2.85 | 124,100 | I-2 | 20,080.00 | 20,080 | 0.161804996 |
| 27-118-22-13-0009 | 1920 XENIUM LA N | I | 1 | 494 | Industrial Light Manufacturing | SPECTRUM SCREEN PRIN | SPECTRUM SCREEN PRINTING INC | 121,900 | 2.80 | 121,900 | I-2 | 34,868.00 | 34,868 | 0.286037736 |
| 27-118-22-13-0010 | 2010 EAST CENTER CIR N | I | 1 | 453 | Industrial Flex Building | PARK INDUSTRIAL VILL | MSP PLYMOUTH PARK INDUST LLC | 673,400 | 15.46 | 673,400 | I-2 | 231,063.00 | 233,650 | 0.346970597 |
| 27-118-22-13-0011 | 2100 XENIUM LA N | I | 1 | 494 | Industrial Light Manufacturing | LSI CORP | WELLIK FAMILY LTD PTNRSHP | 117,329 | 2.69 | 117,329 | I-2 | 54,148.00 | 54,148 | 0.461505681 |
| 27-118-22-14-0002 | 12905 STATE HWY NO 55 | I | 1 | 406 | Storage Warehouse | INDUSTRIAL SUPPLY CO | KOCH HOLDINGS LLC | 92,200 | 2.12 | 95,000 | I-2 | 26,518.00 | 26,518 | 0.279136842 |
| 27-118-22-14-0003 | 12955 STATE HWY NO 55 | I | 1 | 494 | Industrial Light Manufacturing | MINGLE DESIGN CENTER | ESCUBED LLC | 115,433 | 2.65 | 115,433 | I-2 | 29,922.00 | 29,922 | 0.259215302 |
| 27-118-22-14-0004 | 12855 STATE HWY NO 55 | I | 1 | 406 | Storage Warehouse | ANCHOR PAPER EXPRESS | DL&E MANAGEMENT L L C | 184,000 | 4.22 | 184,000 | I-2 | 30,293.00 | 30,293 | 0.16463587 |
| 27-118-22-14-0005 | 12800 INDUSTRIAL PARK BLVD | C | 1 | 344 | Office Building | PLYMOUTH CREEKVIEW | CREEKVIEW ASSOCIATES LLC | 87,120 | 2.00 | 87,120 | I-1 | 11,160.00 | 28,468 | 0.326767677 |
| 27-118-22-14-0006 | 12700 INDUSTRIAL PARK BLVD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH OAKS PARK ( | PLYMOUTH OAKS PARK LLC | 143,844 | 3.30 | 103,844 | I-1 | 29,360.00 | 29,360 | 0.28273179 |
| 27-118-22-14-0011 | 12800 STATE HWY NO 55 | I | 1 | 453 | Industrial Flex Building | PLYMOUTH OAKS PARK ( | PLYMOUTH OAKS 12800 LLC | 217,664 | 5.00 | 172,742 | I-1 | 48,068.00 | 48,068 | 0.278264695 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27-118-22-14-0012 | 12805 INDUSTRIAL PARK BLVD | I | 1 | 453 | Industrial Flex Building | PLYMOUTH OAKS PARK ( | D A KRAHN TRUSTEE | 198,335 | 4.55 | 188,335 | I-1 | 58,911.00 | 58,911 | 0.312799002 |
| 27-118-22-21-0001 | 2415 XENIUM LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECH CENTER | TED GLASRUD ASSOCIATE MN LLC | 156,821 | 3.60 | 156,821 | I-2 | 52,935.00 | 52,934 | 0.337544079 |
| 27-118-22-21-0005 | 2405 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | WEST PARK PLAZA | WESTPARK PROPERTIES 494 LLC | 344,948 | 7.92 | 344,948 | I-2 | 95,720.00 | 95,720 | 0.2774911 |
| 27-118-22-21-0007 | 13600 INDUSTRIAL PARK BLVD | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | MC QUAY | MC QUAY INC | 544,063 | 12.49 | 544,063 | I-2 | 161,216.00 | 210,787 | 0.387431235 |
| 27-118-22-21-0010 | 13705 26TH AVE N | I | 1 | 453 | Industrial Flex Building | ANNAPOLIS BUSINESS C | PLYMOUTH PROPERTIES RLTY COR | 133,795 | 3.07 | 133,795 | I-2 | 35,434.00 | 35,434 | 0.264837998 |
| 27-118-22-21-0011 | 2450 ANNAPOLIS LA N | I | 1 | 406 | Storage Warehouse | GRAINGER INDUSTRIAL | W W GRAINGER INC | 180,308 | 4.14 | 180,308 | I-2 | 56,000.00 | 60,973 | 0.338160259 |
| 27-118-22-21-0012 | 2300 BERKSHIRE LA N | C | 1 | 344 | Office Building | | BERKSHIRE PROMENADE LLC ETAL | 812,611 | 18.65 | 812,611 | I-2 | 245,091.00 | 245,091 | 0.301609257 |
| 27-118-22-22-0002 | 2440 FERNBROOK LA N | I | 1 | 406 | Storage Warehouse | | 2440 HOLDINGS LLC | 122,409 | 2.81 | 122,409 | I-2 | 50,000.00 | 57,952 | 0.473429241 |
| 27-118-22-22-0004 | 14005 25TH AVE N | C | 1 | 410 | Automotive Center | ABRA AUTO BODY | FERNBROOK PROPERTIES LLC | 134,547 | 3.09 | 134,547 | I-2 | 0.00 | 17,950 | 0.13341063 |
| 27-118-22-22-0005 | 14100 23RD AVE N | I | 1 | 453 | Industrial Flex Building | NESLUND PROPERTY | STEPHEN B NESLUND | 193,230 | 4.44 | 193,230 | I-2 | 55,864.00 | 55,864 | 0.289106246 |
| 27-118-22-22-0007 | 2340 FERNBROOK LA N | I | 1 | 406 | Storage Warehouse | RSC RENTAL | HAYDEN FAMILY LTD PARTNRSHIP | 202,023 | 4.64 | 202,023 | I-2 | 14,546.00 | 18,406 | 0.091108438 |
| 27-118-22-22-0008 | 14200 23RD AVE N | I | 1 | 453 | Industrial Flex Building | FERNBROOK BUSINESS C | FERNBROOK LTD PARTNERSHIP | 184,100 | 4.23 | 184,100 | I-2 | 64,308.00 | 64,308 | 0.349310158 |
| 27-118-22-22-0009 | 2500 FERNBROOK LA N | I | 1 | 406 | Storage Warehouse | DAVEY TREE EXPERT | THE DAVEY TREE EXPERT CO | 116,514 | 2.67 | 116,514 | I-2 | 10,000.00 | 11,440 | 0.098185626 |
| 27-118-22-22-0010 | 14000 25TH AVE N | I | 1 | 453 | Industrial Flex Building | CHESHIRE EAST BUSINE | PLYMOUTH PROPERTIES RLTY COR | 138,905 | 3.19 | 138,905 | I-2 | 27,000.00 | 27,000 | 0.194377452 |
| 27-118-22-23-0004 | 1940 FERNBROOK LA N | I | 1 | 453 | Industrial Flex Building | FERNBROOK DISTRIBUTI | ICON 1940 FRNBK LA OWNR PO 2 | 289,679 | 6.65 | 289,679 | I-2 | 101,520.00 | 111,690 | 0.385564711 |
| 27-118-22-23-0010 | 2220 FERNBROOK LA N | I | 1 | 406 | Storage Warehouse | SEELYE CRAFTSMEN INC | SEELYE CRAFTSMEN CO | 116,995 | 2.69 | 116,995 | I-2 | 37,073.00 | 37,073 | 0.31687679 |
| 27-118-22-23-0011 | 14025 23RD AVE N | I | 1 | 406 | Storage Warehouse | CHENEY CARPET | STEVEN J CHENEY | 144,947 | 3.33 | 144,947 | I-2 | 50,804.00 | 50,804 | 0.350500528 |
| 27-118-22-23-0012 | 14000 21ST AVE N | I | 1 | 453 | Industrial Flex Building | | 494 BP LLC | 205,538 | 4.72 | 205,538 | I-2 | 54,505.00 | 54,505 | 0.265182107 |
| 27-118-22-23-0013 | 2100 FERNBROOK LA N | I | 1 | 494 | Industrial Light Manufacturing | NUARIE INC | NUAIRE INC | 313,880 | 7.21 | 313,880 | I-2 | 123,470.00 | 141,425 | 0.450570282 |
| 27-118-22-24-0003 | 1925 ANNAPOLIS LA N | I | 1 | 406 | Storage Warehouse | | LAKESIDE INVESTMENTS LLC | 95,681 | 2.20 | 95,681 | I-2 | 34,037.00 | 37,166 | 0.388436576 |
| 27-118-22-24-0004 | 13825 INDUSTRIAL PARK BLVD | I | 1 | 453 | Industrial Flex Building | WEST POINT BUSINESS | 62NDS2 WESTPOINT LLC | 547,118 | 12.56 | 547,118 | I-2 | 160,993.00 | 160,993 | 0.294256449 |
| 27-118-22-24-0005 | 13505 INDUSTRIAL PARK BLVD | I | 1 | 406 | Storage Warehouse | SEACOLE CORP. | ELLIOTT VENTURES LLC | 194,723 | 4.47 | 194,723 | I-2 | 62,800.00 | 83,000 | 0.426246514 |
| 27-118-22-24-0006 | 1900 ANNAPOLIS LA N | I | 1 | 453 | Industrial Flex Building | EDELMANN BUILDING | EDELMANN LLC | 60,000 | 1.38 | 60,000 | I-2 | 15,197.00 | 15,197 | 0.253283333 |
| 27-118-22-24-0007 | 1915 XENIUM LA N | C | 1 | 528 | Service Repair Garage | SEARS AUTO BODY | XENIUM BUILDING LLP | 140,000 | 3.21 | 140,000 | I-2 | 37,306.00 | 37,306 | 0.266471429 |
| 27-118-22-31-0001 | 1820 BERKSHIRE LA N | I | 1 | 406 | Storage Warehouse | RBC Tile & Stone | BSM REAL PROPERTY LLC | 135,091 | 3.10 | 135,091 | I-2 | 38,744.00 | 38,744 | 0.286799269 |
| 27-118-22-31-0002 | 13700 WATERTOWER CIR N | I | 1 | 406 | Storage Warehouse | | KOSMIDES PROPERTIES LLC | 111,900 | 2.57 | 111,900 | I-2 | 39,600.00 | 43,100 | 0.385165326 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27-118-22-31-0004 | 13600 WATERTOWER CIR N | I | 1 | 406 | Storage Warehouse | | PLYMOUTH TOWER LLC | 140,000 | 3.21 | 140,000 | I-2 | 56,000.00 | 56,000 | 0.4 |
| 27-118-22-31-0005 | 1600 ANNAPOLIS LA N | C | 1 | 458 | Warehouse Discount Store | SCHNEIDERMAN'S FURNI | SCHNEIDERMAN PLYMOUTH LLC | 242,664 | 5.57 | 242,664 | C-4 | 65,465.00 | 115,982 | 0.477953054 |
| 27-118-22-31-0006 | 1725 XENIUM LA N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH SERVICE CEN | AX TC RETAIL L P | 221,214 | 5.08 | 221,214 | I-2 | 84,480.00 | 84,480 | 0.381892647 |
| 27-118-22-31-0008 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | KOSMIDES PROPERTIES LLC | 1,027 | 0.02 | 1,027 | CHE | 0.00 | 0 | 0 |
| 27-118-22-31-0019 | 1605 ANNAPOLIS LA N | C | 1 | 419 | Convenience Market (With Fuel) | Kwik Trip | HD PLYMOUTH MN OUTLOTS LLC | 48,563 | 1.11 | 48,563 | C-4 | 4,790.00 | 4,790 | 0.098634763 |
| 27-118-22-31-0020 | 1655 ANNAPOLIS LA N | C | 1 | 410 | Automotive Center | DISCOUNT TIRE | HD PLYMOUTH MN OUTLOTS LLC | 54,362 | 1.25 | 54,362 | C-4 | 7,555.00 | 7,555 | 0.138975755 |
| 27-118-22-31-0021 | 1705 ANNAPOLIS LA N | C | 1 | 458 | Warehouse Discount Store | HOME DEPOT | HD PLYMOUTH MN LLC | 493,822 | 11.34 | 493,822 | C-4 | 115,071.00 | 115,071 | 0.233302121 |
| 27-118-22-32-0022 | 1770 FERNBROOK LA N | I | 1 | 494 | Industrial Light Manufacturing | WAGNER SPRAY TECH | WAGNER SPRAY TECH CORP | 795,945 | 18.27 | 795,945 | I-2 | 175,590.00 | 232,043 | 0.291533145 |
| 27-118-22-32-0023 | 40 ADDRESS UNASSIGNED | LC | 1 | 117 | Billboard Site | | CLEAR CHANNEL OUTDOOR INC | 3,600 | 0.08 | 3,600 | C-4 | 0.00 | 0 | 0 |
| 27-118-22-33-0006 | 1235 BERKSHIRE LA N | U | 1 | 471 | Utility Building | | NORTHERN STATES POWER CO | 582,013 | 13.36 | 582,013 | I-2 | 0.00 | 0 | 0 |
| 27-118-22-33-0008 | 13905 CO RD NO 6 | C | 1 | 426 | Day Care Center | NEW HORIZON DAYCARE | NEW HORIZON RE DEVLPMNT LLP | 73,800 | 1.69 | 73,800 | PUD | 0.00 | 13,045 | 0.176761518 |
| 27-118-22-34-0010 | 1405 XENIUM LA N | C | 1 | 344 | Office Building | CMG BUILDING | TFO REVA WILDAMERE PCC LLC | 1,752,219 | 40.23 | 1,640,563 | I-2 | 423,855.00 | 639,737 | 0.389994967 |
| 27-118-22-41-0003 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | JET 55 PROPERTY OWNER LLC | 32,484 | 0.75 | 32,484 | CHE | 0.00 | 0 | 0 |
| 27-118-22-41-0005 | 13010 CO RD NO 6 | I | 1 | 494 | Industrial Light Manufacturing | OIL AIR PRODUCTS | GILMORE LAKE PARTNERS LLC | 220,045 | 5.05 | 220,045 | I-2 | 61,132.00 | 68,510 | 0.311345407 |
| 27-118-22-41-0007 | 12755 STATE HWY NO 55 | C | 1 | 344 | Office Building | OCT BUILDING | JET 55 PROPERTY OWNER LLC | 564,453 | 12.96 | 563,228 | I-2 | 147,200.00 | 225,000 | 0.399488298 |
| 27-118-22-41-0009 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | JET 55 PROPERTY OWNER LLC | 266,470 | 6.12 | 266,470 | I-2 | 0.00 | 0 | 0 |
| 27-118-22-41-0060 | 12805 STATE HWY NO 55 | C | 1 | 344 | Office Building | PLYMOUTH COURT BUILD | PLYMOUTH COURT LLC | 111,949 | 2.57 | 111,949 | I-2 | 11,421.00 | 57,105 | 0.510098348 |
| 27-118-22-42-0001 | 13120 CO RD NO 6 | I | 1 | 407 | Distribution Warehouse | PLYMOUTH DISTRIBUTIO | WAYZATA VILLAGE SHOPPES LLP | 499,768 | 11.47 | 499,768 | I-2 | 185,511.00 | 194,005 | 0.388119012 |
| 27-118-22-42-0005 | 13305 WATERTOWER CIR N | I | 1 | 494 | Industrial Light Manufacturing | TONKA WATER TREATMEN | 13305 WATERTOWER CIR LP ETAL | 123,200 | 2.83 | 123,200 | I-2 | 25,600.00 | 25,600 | 0.207792208 |
| 27-118-22-42-0006 | 13220 CO RD NO 6 | I | 1 | 453 | Industrial Flex Building | | G & H HOLDING CO LLC | 94,379 | 2.17 | 94,379 | I-2 | 15,823.00 | 21,819 | 0.231184903 |
| 27-118-22-42-0012 | 13415 WATERTOWER CIR N | I | 1 | 406 | Storage Warehouse | | SLOS LLC | 123,492 | 2.83 | 123,492 | I-2 | 49,920.00 | 49,920 | 0.404236712 |
| 27-118-22-42-0015 | 1600 XENIUM LA N | I | 1 | 406 | Storage Warehouse | SILVER KING REFRIDGE | PRINCE CASTLE INC | 238,730 | 5.48 | 238,730 | I-2 | 90,995.00 | 97,235 | 0.407301135 |
| 27-118-22-43-0010 | 13405 15TH AVE N | I | 1 | 406 | Storage Warehouse | FORMER GUYER'S | AZTEC PROPERTY HOLDINGS LLC | 324,522 | 7.45 | 292,000 | I-2 | 107,356.00 | 113,844 | 0.389876712 |
| 27-118-22-43-0012 | 13400 15TH AVE N | I | 1 | 453 | Industrial Flex Building | PLYMOUTH TECH CENTER | DAKOTA UPREIT LTD PRTNERSHIP | 171,936 | 3.95 | 171,936 | I-2 | 35,135.00 | 45,000 | 0.261725293 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27-118-22-43-0015 | 13205 16TH AVE N | I | 1 | 406 | Storage Warehouse | GARTNER REFRIGERATIO | 13205 OFFICE WAREHOUSE LLC | 137,389 | 3.15 | 137,389 | I-2 | 28,009.00 | 28,009 | 0.203866394 |
| 27-118-22-43-0017 | 13100 15TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | OLYMPIC STEEL | OLYMPIC STEEL MPLS INC | 311,378 | 7.15 | 311,378 | I-3 | 112,600.00 | 112,600 | 0.361618355 |
| 27-118-22-43-0018 | 13320 15TH AVE N | I | 1 | 498 | Broadcast Facility | AT & T | AT&T COMMUNICATIONS INC | 135,034 | 3.10 | 135,034 | I-2 | 18,418.00 | 30,793 | 0.228038864 |
| 27-118-22-43-0019 | 13300 15TH AVE N | C | 1 | 528 | Service Repair Garage | QWEST | KEH&H PROPERTIES LLC | 187,308 | 4.30 | 176,500 | I-2 | 16,600.00 | 16,600 | 0.094050992 |
| 27-118-22-44-0002 | 12811 16TH AVE N | I | 1 | 406 | Storage Warehouse | HOUCK MACHINE | RAH L L C | 118,107 | 2.71 | 118,107 | I-2 | 32,866.00 | 41,880 | 0.354593716 |
| 27-118-22-44-0003 | 12901 16TH AVE N | I | 1 | 453 | Industrial Flex Building | SUNRISE BUILDING | ZOLTAR INVESTMENT GROUP LLC | 105,156 | 2.41 | 105,156 | I-2 | 24,130.00 | 24,130 | 0.229468599 |
| 27-118-22-44-0004 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | CHICAGO & NORTHWESTERN RR | 54,400 | 1.25 | 54,400 | I-2 | 0.00 | 0 | 0 |
| 27-118-22-44-0005 | 12975 16TH AVE N | I | 1 | 453 | Industrial Flex Building | SELECT BUSINESS CENT | SELECT PROP OF PLYMOUTH LLC | 82,024 | 1.88 | 82,024 | I-2 | 20,016.00 | 20,016 | 0.244026139 |
| 27-118-22-44-0006 | 13005 16TH AVE N | I | 1 | 453 | Industrial Flex Building | SPECK PROPERTIES | SJE RHOMBUS PROPERTY LLC | 111,870 | 2.57 | 96,870 | I-2 | 25,842.00 | 25,842 | 0.266769898 |
| 27-118-22-44-0007 | 13021 16TH AVE N | I | 1 | 406 | Storage Warehouse | | 13021 16TH AVE N PROPS LLC | 84,347 | 1.94 | 84,347 | I-2 | 15,000.00 | 15,000 | 0.177836793 |
| 27-118-22-44-0039 | 13055 15TH AVE N | I | 1 | 406 | Storage Warehouse | NUCOAT INC. | NUCOAT INC | 79,657 | 1.83 | 79,657 | I-1 | 19,700.00 | 21,903 | 0.274966419 |
| 27-118-22-44-0054 | 12725 16TH AVE N | I | 1 | 406 | Storage Warehouse | POTTEBAUM PROPERTIES | CITY OF MINNEAPOLIS | 130,147 | 2.99 | 130,147 | I-2 | 40,600.00 | 54,520 | 0.418910924 |
| 28-118-22-11-0004 | 2525 FERNBROOK LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | PRECISION GRAPHICS | FERNBROOK LLC | 113,600 | 2.61 | 113,600 | I-2 | 28,450.00 | 28,450 | 0.250440141 |
| 28-118-22-11-0005 | 2545 FERNBROOK LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | FRANKLIN PRESS | DIAMOND VENTURES INC | 89,800 | 2.06 | 89,800 | I-2 | 36,380.00 | 36,380 | 0.405122494 |
| 28-118-22-12-0002 | 2550 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | | CS PROPS OF PLYMOUTH LLC | 87,170 | 2.00 | 87,170 | I-2 | 19,440.00 | 19,440 | 0.223012504 |
| 28-118-22-12-0003 | 2500 NIAGARA LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | CUSTOM ACTUATOR PROD | CAP COMMERCIAL PROP LLC | 83,543 | 1.92 | 83,543 | I-2 | 22,606.00 | 22,606 | 0.270591193 |
| 28-118-22-12-0004 | 2410 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | | NIAGARA NORTH LLC | 85,351 | 1.96 | 85,351 | I-2 | 15,600.00 | 15,600 | 0.18277466 |
| 28-118-22-12-0005 | 2340 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | | NIAGARA SOUTH LLC | 81,000 | 1.86 | 81,000 | I-2 | 20,925.00 | 20,925 | 0.258333333 |
| 28-118-22-12-0007 | 15000 23RD AVE N | I | 1 | 453 | Industrial Flex Building | PARKERS LAKE BUSINES | CAMBRIDGE APARTMENTS INC | 142,120 | 3.26 | 142,120 | I-2 | 38,280.00 | 38,280 | 0.269349845 |
| 28-118-22-13-0003 | 14815 23RD AVE N | LI | 1 | 102 | Vacant Industrial Land | NILFISK-ADVANCE MACH | JPMCC 2006-LDP7 21ST AVE N | 140,821 | 3.23 | 140,821 | I-2 | 0.00 | 0 | 0 |
| 28-118-22-13-0004 | 14600 21ST AVE N | I | 1 | 494 | Industrial Light Manufacturing | NILFISK-ADVANCE MACH | JPMCC 2006-LDP7 21ST AVE N | 246,500 | 5.66 | 246,500 | I-2 | 175,538.00 | 223,063 | 0.904920892 |
| 28-118-22-13-0005 | 14810 21ST AVE N | LI | 1 | 102 | Vacant Industrial Land | NILFISK-ADVANCE MACH | JPMCC 2006-LDP7 21ST AVE N | 154,591 | 3.55 | 154,591 | I-2 | 0.00 | 0 | 0 |
| 28-118-22-13-0007 | 2100 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | SKARNES INC. | SKARNES INCORPORATED | 106,493 | 2.44 | 106,493 | I-1 | 24,639.00 | 24,639 | 0.23136732 |
| 28-118-22-13-0008 | 2150 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | AUTOMATE INC. | R & G BROWN FAMILY L L L P | 91,979 | 2.11 | 91,979 | I-1 | 29,400.00 | 29,400 | 0.319638178 |
| 28-118-22-13-0010 | 14900 21ST AVE N | I | 1 | 494 | Industrial Light Manufacturing | RED DEVIL | GESS CO | 216,380 | 4.97 | 216,380 | I-1 | 40,204.00 | 49,685 | 0.229619188 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28-118-22-13-0043 | 2200 NIAGARA LA N | I | 1 | 406 | Storage Warehouse | PACKAGING SYSTEMS AU | SUMMIT MS LLC | 98,915 | 2.27 | 98,915 | I-2 | 28,000.00 | 33,640 | 0.340089976 |
| 28-118-22-13-0044 | 14905 23RD AVE N | I | 1 | 494 | Industrial Light Manufacturing | UPSHER SMITH LAB | SUMMIT MS LLC | 218,768 | 5.02 | 218,768 | I-2 | 65,922.00 | 92,755 | 0.423987969 |
| 28-118-22-14-0002 | 14600 21ST AVE N | I | 1 | 494 | Industrial Light Manufacturing | NILFISK-ADVANCE MACH | JPMCC 2006-LDP7 21ST AVE N | 254,800 | 5.85 | 254,800 | I-2 | 108,558.00 | 124,398 | 0.48821821 |
| 28-118-22-14-0004 | 14320 21ST AVE N | I | 1 | 406 | Storage Warehouse | | NASH & CARLSON LLC | 139,605 | 3.20 | 139,605 | I-2 | 51,300.00 | 59,850 | 0.428709573 |
| 28-118-22-14-0005 | 14410 21ST AVE N | I | 1 | 406 | Storage Warehouse | | TCOS PROPERTY HOLDING LLC | 138,891 | 3.19 | 138,891 | I-2 | 48,416.00 | 52,946 | 0.381205406 |
| 28-118-22-14-0006 | 14600 21ST AVE N | I | 1 | 494 | Industrial Light Manufacturing | NILFISK-ADVANCE MACH | JPMCC 2006-LDP7 21ST AVE N | 254,800 | 5.85 | 254,800 | I-2 | 101,283.00 | 117,123 | 0.459666405 |
| 28-118-22-14-0009 | 14305 21ST AVE N | I | 1 | 453 | Industrial Flex Building | PARKERS LAKE POINTE | PLYMOUTH PROPERTIES RLTY COR | 155,411 | 3.57 | 155,411 | I-1 | 40,685.00 | 40,685 | 0.261789706 |
| 28-118-22-14-0011 | 14425 23RD AVE N | I | 1 | 453 | Industrial Flex Building | | FERNBROOK AB LLC | 130,321 | 2.99 | 130,321 | I-2 | 44,003.00 | 44,003 | 0.337650877 |
| 28-118-22-14-0012 | 14325 23RD AVE N | I | 1 | 453 | Industrial Flex Building | | FERNBROOK AB LLC | 87,523 | 2.01 | 87,523 | I-2 | 22,585.00 | 22,585 | 0.258046456 |
| 28-118-22-14-0013 | 14505 21ST AVE N | I | 1 | 453 | Industrial Flex Building | PARKERS LAKE POINTE | PARKERS LAKE II REALTY CORP | 184,165 | 4.23 | 184,165 | I-1 | 46,769.00 | 46,769 | 0.253951619 |
| 28-118-22-14-0014 | 14405 21ST AVE N | I | 1 | 453 | Industrial Flex Building | PARKERS LAKE I REALT | PARKERS LAKE I REALTY CORP | 138,058 | 3.17 | 138,058 | I-1 | 39,822.00 | 39,822 | 0.288443987 |
| 28-118-22-21-0027 | 15300 25TH AVE N | I | 1 | 407 | Distribution Warehouse | LAKE POINT DISTRIBUT | HRC LAKEPOINT LLC | 308,404 | 7.08 | 308,404 | PUD | 96,916.00 | 96,916 | 0.314250139 |
| 28-118-22-21-0029 | 2355 POLARIS LA N | I | 1 | 453 | Industrial Flex Building | POLARIS BUSINESS CEN | POLARIS REALTY CORP | 330,815 | 7.59 | 185,000 | PUD | 52,000.00 | 52,000 | 0.281081081 |
| 28-118-22-21-0030 | 15350 25TH AVE N | I | 1 | 453 | Industrial Flex Building | POLARIS BUSINESS CEN | POLARIS II REALTY CORP | 94,419 | 2.17 | 78,000 | PUD | 22,600.00 | 22,650 | 0.290384615 |
| 28-118-22-21-0031 | 15150 25TH AVE N | I | 1 | 453 | Industrial Flex Building | PRODUCTIVITY INC. | PARKERS PT REAL ESTATE LLC | 248,295 | 5.70 | 248,295 | PUD | 82,608.00 | 82,608 | 0.332701021 |
| 28-118-22-21-0032 | 15175 25TH AVE N | I | 1 | 406 | Storage Warehouse | Opus Building | URSF MN PLYMOUTH LLC | 283,925 | 6.52 | 283,925 | | 96,470.00 | 96,470 | 0.339772827 |
| 28-118-22-21-0033 | 2333 NIAGARA LA N | I | 1 | 494 | Industrial Light Manufacturing | | DAILY PRINTING INC | 292,643 | 6.72 | 292,643 | | | 68,000 | 0.232365032 |
| 28-118-22-24-0011 | 15155 23RD AVE N | I | 1 | 406 | Storage Warehouse | BILL HICKS COMPANY | M BINSTOCK/W HICKS TRUSTEES | 182,728 | 4.19 | 182,728 | PUD | 60,172.00 | 60,172 | 0.329298192 |
| 28-118-22-24-0116 | 2155 NIAGARA LA N | I | 1 | 453 | Industrial Flex Building | NORTHWEST POINT BUSI | NORTHWEST PROP REALTY LLC | 281,397 | 6.46 | 281,397 | PUD | 92,500.00 | 92,500 | 0.328717079 |
| 28-118-22-24-0117 | 15255 23RD AVE N | I | 1 | 406 | Storage Warehouse | INTERCLAD | ZEEPLEX LLC | 136,612 | 3.14 | 136,612 | PUD | 27,828.00 | 27,828 | 0.203700993 |
| 28-118-22-31-0012 | 1700 NIAGARA LA N | C | 1 | 344 | Office Building | PILLAR HOMES | OUR HOUSE LLC | 22,199 | 0.51 | 22,199 | P-I | 3,154.00 | 5,925 | 0.266903915 |
| 29-118-22-33-0039 | 17435 CO RD NO 6 | C | 1 | 419 | Convenience Market (With Fuel) | OAKWOOD SQUARE SHOPP | OAKWOOD SQUARE LLC | 47,900 | 1.10 | 47,900 | C-3 | 5,063.00 | 7,500 | 0.1565762 |
| 29-118-22-33-0040 | 17405 CO RD NO 6 | C | 1 | 412 | Neighborhood Shopping Center | OAKWOOD SQUARE SHOPP | OAKWOOD SQUARE LLC | 21,850 | 0.50 | 21,850 | C-2 | 5,200.00 | 5,200 | 0.23798627 |
| 29-118-22-33-0041 | 17415 CO RD NO 6 | LC | 1 | 100 | Vacant Commercial Land | OAKWOOD SQUARE SHOPP | OAKWOOD SQUARE LLC | 13,346 | 0.31 | 13,346 | C-2 | 0.00 | 0 | 0 |
| 29-118-22-33-0042 | 1400 CO RD NO 101 | C | 1 | 412 | Neighborhood Shopping Center | OAKWOOD SQUARE SHOPP | OAKWOOD SQUARE LLC | 82,274 | 1.89 | 82,274 | C-2 | 18,600.00 | 18,600 | 0.226073851 |
| 30-118-22-14-0021 | 2045 MERRIMAC LA N | C | 1 | 381 | Veterinary Clinic/Hospital | NORTHWEST ANIMAL HOS | MOUSEL WILLIAMS PROP LLC | 252,843 | 5.80 | 58,425 | O | 2,880.00 | 2,880 | 0.049293967 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-118-22-14-0025 | 17610 19TH AVE N | C | 1 | 344 | Office Building | | D L WEAVER & M J WEAVER TRS | 64,118 | 1.47 | 64,118 | O | 10,502.00 | 10,502 | 0.163791759 |
| 30-118-22-14-0026 | 2000 MERRIMAC LA N | C | 1 | 344 | Office Building | BETA TECHNOLOGIES | BETA TECHNOLOGY SALES INC | 57,934 | 1.33 | 57,934 | O | 5,016.00 | 10,032 | 0.173162564 |
| 30-118-22-44-0001 | 17805 CO RD NO 6 | LC | 1 | 118 | Cellular/Radio Site | PERSONAL PROPERTY - | PARKERS LAKE METH CH | 0 | 0.00 | 1 | RSF | 0.00 | 0 | 0 |
| 30-118-22-44-0011 | 1455 CO RD NO 101 | C | 1 | 412 | Neighborhood Shopping Center | PLYMOUTH PLAZA SHOPP | PLYMOUTH PLAZA LLC ET AL | 292,103 | 6.71 | 127,100 | C-2 | 72,560.00 | 74,174 | 0.583587726 |
| 30-118-22-44-0012 | 1525 CO RD NO 101 | C | 1 | 444 | Dental Office/Clinic | | ARNESEN PROPERTIES LLC | 40,908 | 0.94 | 40,908 | C-2 | 5,278.00 | 6,768 | 0.165444412 |
| 32-118-22-11-0001 | 1115 VICKSBURG LA N | C | 1 | 412 | Neighborhood Shopping Center | VICKSBURG PLAZA RETA | VICKSBURG LTD PARTNERSHIP | 121,132 | 2.78 | 121,132 | C-2 | 25,100.00 | 25,100 | 0.207211967 |
| 33-118-22-44-0031 | 1 CARLSON PKWY N | C | 1 | 344 | Office Building | 1 CARLSON PARKWAY OF | ONE TWO HOLDING LLC | 512,000 | 11.75 | 250,034 | B-C | 41,500.00 | 83,832 | 0.335282402 |
| 33-118-22-44-0032 | 220 CARLSON PKWY N | C | 1 | 350 | Restaurant | GRIZZLY'S | BRICKSTONE ENTERPRISES LLC | 175,485 | 4.03 | 43,560 | B-C | 6,898.00 | 6,898 | 0.15835629 |
| 33-118-22-44-0037 | 210 CARLSON PKWY N | C | 1 | 595 | Hotel Limited Service | COUNTRY INN & SUITES | LOF PLYMOUTH LLC | 140,107 | 3.22 | 140,107 | B-C | 27,917.00 | 76,029 | 0.542649546 |
| 33-118-22-44-0038 | 2 CARLSON PKWY N | C | 1 | 344 | Office Building | 2 CARLSON PARKWAY OF | ONE TWO HOLDING LLC | 537,872 | 12.35 | 322,000 | B-C | 33,864.00 | 156,892 | 0.487242236 |
| 34-118-22-12-0008 | 13100 12TH AVE N | I | 1 | 407 | Distribution Warehouse | 12TH AVE. DISTRIBUTI | AX TC INDUSTRIAL III LP | 429,900 | 9.87 | 386,000 | I-2 | 112,000.00 | 112,000 | 0.29015544 |
| 34-118-22-12-0009 | 13330 12TH AVE N | I | 1 | 495 | Industrial Heavy Manufacturing | DELTAK | HAMON ACQUISITIONS INC | 496,267 | 11.39 | 496,267 | I-2 | 80,150.00 | 80,150 | 0.161505802 |
| 34-118-22-12-0011 | 13305 12TH AVE N | C | 1 | 344 | Office Building | Solutran | SOLUTRAN PROPERTIES LLC | 116,484 | 2.67 | 116,484 | I-2 | 16,500.00 | 29,384 | 0.252257821 |
| 34-118-22-12-0012 | 1100 XENIUM LA N | C | 1 | 344 | Office Building | MINNESOTA RUBBER | QUADION LLC | 194,876 | 4.47 | 194,876 | I-2 | 19,501.00 | 56,082 | 0.287783 |
| 34-118-22-12-0013 | 13105 12TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | BUHLER INC | BUHLER INC | 541,389 | 12.43 | 541,389 | I-2 | 102,314.00 | 125,010 | 0.230906058 |
| 34-118-22-13-0002 | 1000 XENIUM LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | ELLISON MACHINERY | XENIUM LANE INVESTORS LLC | 168,950 | 3.88 | 42,200 | I-2 | 12,165.00 | 12,165 | 0.288270142 |
| 34-118-22-13-0012 | 13200 10TH AVE N | I | 1 | 406 | Storage Warehouse | | JAMES CAMPBELL CO LLC | 339,768 | 7.80 | 300,000 | I-2 | 112,029.00 | 112,029 | 0.37343 |
| 34-118-22-13-0013 | 13200 6TH AVE N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | ZERO MAX | MIKI HOLDING INC | 459,994 | 10.56 | 205,775 | I-2 | 73,748.00 | 73,748 | 0.358391447 |
| 34-118-22-13-0014 | 13355 10TH AVE N | I | 1 | 453 | Industrial Flex Building | PARKERS LAKE POINTE | PARKERS EAST REALTY CORP | 156,163 | 3.59 | 142,000 | I-2 | 44,000.00 | 44,000 | 0.309859155 |
| 34-118-22-13-0015 | 13300 6TH AVE N | I | 1 | 406 | Storage Warehouse | | SHAFFER FAMILY LTD PARTNERS | 308,689 | 7.09 | 214,000 | I-2 | 56,132.00 | 65,017 | 0.303817757 |
| 34-118-22-21-0007 | 800 BERKSHIRE LA N | I | 1 | 407 | Distribution Warehouse | BERKSHIRE DISTRIBUTI | AX TC INDUSTRIAL II LP | 616,072 | 14.14 | 616,072 | I-2 | 208,432.00 | 208,432 | 0.338324092 |
| 34-118-22-21-0008 | 1105 XENIUM LA N | I | 1 | 407 | Distribution Warehouse | | COLFIN 2016 4 IND OWNER LLC | 701,879 | 16.11 | 701,879 | I-2 | 320,019.00 | 335,063 | 0.477380004 |
| 34-118-22-22-0015 | 1005 BERKSHIRE LA N | I | 1 | 407 | Distribution Warehouse | | JAMES CAMPBELL CO LLC | 355,727 | 8.17 | 355,727 | I-2 | 125,280.00 | 125,280 | 0.352180183 |
| 34-118-22-23-0022 | 845 BERKSHIRE LA N | I | 1 | 406 | Storage Warehouse | FACILITY SYSTEMS | 27TH AVE N CORPORATE CTR LLC | 488,290 | 11.21 | 488,290 | I-2 | 136,331.00 | 136,331 | 0.279200885 |
| 34-118-22-23-0026 | 701 BERKSHIRE LA N | I | 1 | 406 | Storage Warehouse | KATE-LO TILE CO. | LEMER COMPANY LLC | 174,300 | 4.00 | 174,300 | I-1 | 46,880.00 | 46,880 | 0.268961561 |
| 34-118-22-23-0031 | 14100 CARLSON PKWY N | I | 1 | 453 | Industrial Flex Building | | DOMAIN 14100 CARLSON PKYLLC | 243,936 | 5.60 | 87,000 | I-1 | 28,738.00 | 28,738 | 0.330321839 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34-118-22-23-0034 | 14005 13TH AVE N | I | 1 | 407 | Distribution Warehouse | | JAMES CAMPBELL COMPANY LLC | 509,306 | 11.69 | 509,306 | I-2 | 168,912.00 | 168,912 | 0.331651306 |
| 34-118-22-24-0005 | 625 XENIUM LA N | I | 1 | 495 | Industrial Heavy Manufacturing | OLYMIPIC STEEL | OLYMPIC STEEL MPLS INC | 412,639 | 9.47 | 412,639 | I-3 | 196,800.00 | 200,290 | 0.485387954 |
| 34-118-22-24-0007 | 700 BERKSHIRE LA N | I | 1 | 406 | Storage Warehouse | | R & K REALTY COMPANY LLC | 184,654 | 4.24 | 184,654 | I-2 | 69,200.00 | 76,520 | 0.414396655 |
| 34-118-22-24-0008 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | COLFIN 2016 4 IND OWNER LLC | 41,964 | 0.96 | 41,964 | I-2 | 0.00 | 0 | 0 |
| 34-118-22-24-0009 | 865 XENIUM LA N | I | 1 | 407 | Distribution Warehouse | | JCC MINNESOTA PORTFOLIO LLC | 358,499 | 8.23 | 358,499 | I-2 | 110,502.00 | 110,502 | 0.308235169 |
| 34-118-22-32-0029 | 14000 CARLSON PKWY N | I | 1 | 453 | Industrial Flex Building | THE TILE SHOP | FALCON 14000 CARLSON LLC | 148,104 | 3.40 | 148,104 | I-1 | 30,597.00 | 33,299 | 0.224835251 |
| 34-118-22-32-0033 | 189 CHESHIRE LA N | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 54,934 | 1.26 | 54,934 | C-2 | 5,460.00 | 5,460 | 0.099391998 |
| 34-118-22-32-0035 | 187 CHESHIRE LA N | C | 1 | 412 | Neighborhood Shopping Center | CARLSON CENTER SHOPP | CARLSON SHOPPES LLC | 75,955 | 1.74 | 75,955 | C-2 | 14,200.00 | 14,200 | 0.186952801 |
| 34-118-22-32-0036 | 185 CHESHIRE LA N | C | 1 | 426 | Day Care Center | KINDERBERRY HILL DAY | JOHN C STIEHM ET AL | 65,150 | 1.50 | 65,150 | C-2 | 11,612.00 | 11,612 | 0.178234843 |
| 34-118-22-33-0009 | 181 CHESHIRE LA N | I | 1 | 453 | Industrial Flex Building | CARLSON BUSINESS CEN | WPT CHESHIRE LANE LP | 119,348 | 2.74 | 119,348 | I-2 | 37,106.00 | 37,106 | 0.310905922 |
| 34-118-22-33-0010 | 161 CHESHIRE LA N | I | 1 | 453 | Industrial Flex Building | CARLSON BUSINESS CEN | WPT CHESHIRE LANE LP | 205,324 | 4.71 | 205,324 | I-2 | 71,414.00 | 71,414 | 0.347811264 |
| 34-118-22-33-0011 | 141 CHESHIRE LA N | I | 1 | 453 | Industrial Flex Building | CARLSON BUSINESS CEN | WPT CHESHIRE LANE LP | 232,515 | 5.34 | 232,515 | I-2 | 79,691.00 | 79,691 | 0.342734877 |
| 34-118-22-33-0012 | 151 CHESHIRE LA N | I | 1 | 453 | Industrial Flex Building | CARLSON BUSINESS CEN | WPT CHESHIRE LANE LP | 193,768 | 4.45 | 193,768 | I-2 | 63,611.00 | 63,611 | 0.32828434 |
| 34-118-22-33-0013 | 171 CHESHIRE LA N | I | 1 | 453 | Industrial Flex Building | CARLSON BUSINESS CEN | WPT CHESHIRE LANE LP | 199,290 | 4.58 | 199,290 | I-2 | 69,699.00 | 69,699 | 0.349736565 |
| 34-118-22-34-0028 | 13805 1ST AVE N | I | 1 | 453 | Industrial Flex Building | | JAMES CAMPBELL COMPANY LLC | 131,880 | 3.03 | 131,880 | I-1 | 29,927.00 | 29,927 | 0.226925993 |
| 34-118-22-34-0031 | 13755 1ST AVE N | I | 1 | 453 | Industrial Flex Building | | JAMES CAMPBELL COMPANYLLC | 106,286 | 2.44 | 106,286 | I-1 | 29,927.00 | 29,927 | 0.28157048 |
| 34-118-22-34-0032 | 13705 1ST AVE N | I | 1 | 453 | Industrial Flex Building | | JAMES CAMPBELL COMPANY LLC | 106,286 | 2.44 | 106,286 | I-1 | 29,927.00 | 29,927 | 0.28157048 |
| 34-118-22-34-0046 | 13700 1ST AVE N | I | 1 | 453 | Industrial Flex Building | | JAMES CAMPBELL COMPANY LLC | 374,276 | 8.59 | 321,353 | I-1 | 96,406.00 | 96,406 | 0.300000311 |
| 34-118-22-34-0047 | 13605 1ST AVE N | C | 1 | 344 | Office Building | ANDERSON ENGINEERING | ANDERSON ENGINEERING -RAA LLC | 189,518 | 4.35 | 104,000 | I-1 | 24,304.00 | 24,304 | 0.233692308 |
| 34-119-22-44-0002 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | PRUDENTIAL INS CO OF AMERICA | 31,343 | 0.72 | 5,000 | B-C | 0.00 | 0 | 0 |
| 35-118-22-11-0038 | 11350 STATE HWY NO 55 | C | 1 | 528 | Service Repair Garage | PIRTEK HYDRAULICS | H & G MNGMNT SERVICES LLC | 41,182 | 0.95 | 41,182 | C-3 | 1,640.00 | 1,640 | 0.039823224 |
| 35-118-22-12-0036 | 1025 EVERGREEN LA N | C | 1 | 444 | Dental Office/Clinic | | HUNDER FAMILY LLLP | 48,922 | 1.12 | 48,922 | O | 5,016.00 | 9,302 | 0.190139406 |
| 35-118-22-14-0001 | 11140 STATE HWY NO 55 | C | 1 | 412 | Neighborhood Shopping Center | OFFICE/RETAIL STRIP | IMAGE WORKS PROPERTIES LLC | 47,506 | 1.09 | 47,506 | C-2 | 12,960.00 | 12,960 | 0.272807645 |
| 35-118-22-14-0004 | 11318 STATE HWY NO 55 | C | 1 | 435 | Car Wash, Drive Thru | PLYMOUTH CAR WASH | NATL RETAIL PROPERTIES LP | 21,492 | 0.49 | 21,492 | C-3 | 1,332.00 | 1,332 | 0.061976549 |
| 35-118-22-14-0005 | 11310 STATE | C | 1 | 434 | Car Wash, Self-Serve | PLYMOUTH CAR WASH | NATL RETAIL PROPERTIES LP | 26,724 | 0.61 | 26,724 | C-3 | 3,100.00 | 3,100 | 0.116000599 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HWY NO 55 | | | | | | | | | | | | | |
| 35-118-22-14-0007 | 11425 STATE HWY NO 55 | C | 1 | 344 | Office Building | | GARY C BENDICKSON | 10,097 | 0.23 | 10,097 | RSF | 1,358.00 | 2,276 | 0.225413489 |
| 35-118-22-14-0020 | 11308 STATE HWY NO 55 | C | 1 | 350 | Restaurant | FAMOUS DAVE'S | FAMOUS DAVE'S OF AMERICA INC | 40,874 | 0.94 | 40,670 | C-3 | 3,591.00 | 4,841 | 0.119031227 |
| 35-118-22-14-0030 | 11325 STATE HWY NO 55 | C | 1 | 349 | Fast Food Restaurant | McDONALD'S | MCDONALDS USA LLC | 63,195 | 1.45 | 63,195 | PUD | 0.00 | 5,300 | 0.083867395 |
| 35-118-22-14-0031 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | KTJ 198 LLC | 17,573 | 0.40 | 0 | PUD | 0.00 | 0 | 0 |
| 35-118-22-14-0032 | 40 ADDRESS PENDING | LC | 1 | 100 | Vacant Commercial Land | COMMERCIAL LAND WITH | MINNWEST BANK | 453,782 | 10.42 | 309,598 | PUD | 0.00 | 0 | 0 |
| 35-118-22-24-0005 | 12001 STATE HWY NO 55 | C | 1 | 344 | Office Building | HONEYWELL | HONEYWELL INC | 2,793,878 | 64.14 | 1,448,884 | B-C | 92,073.00 | 283,904 | 0.195946673 |
| 35-119-22-33-0133 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | AMB HOPE LLC | 11,251 | 0.26 | 11,251 | C-4 | 0.00 | 0 | 0 |
| 36-118-22-11-0006 | 1015 STATE HWY NO 169 | I | 1 | 386 | Mini Warehouse | MINNESOTA MINI-STORA | TWO S PROPERTIES INC | 123,200 | 2.83 | 123,200 | I-2 | 39,340.00 | 39,340 | 0.319318182 |
| 36-118-22-11-0007 | 1005 STATE HWY NO 169 | LI | 1 | 102 | Vacant Industrial Land | DRYWALL SUPPLY | BANNER ENGINEERING CORP | 62,276 | 1.43 | 62,276 | I-2 | | | 0 |
| 36-118-22-11-0027 | 40 ADDRESS UNASSIGNED | LI | 1 | 102 | Vacant Industrial Land | | BANNER ENGINEERING CORP | 186,451 | 4.28 | 43,560 | I-2 | 0.00 | 0 | 0 |
| 36-118-22-11-0029 | 1225 STATE HWY NO 169 | I | 1 | 386 | Mini Warehouse | | AMERCO REAL ESTATE COMPANY | 232,990 | 5.35 | 232,990 | I-2 | 76,840.00 | 93,464 | 0.401150264 |
| 36-118-22-11-0031 | 1200 NATHAN LA N | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | BANNER ENGINEERING | BANNER ENGINEERING CORP | 596,816 | 13.70 | 596,816 | I-2 | 74,124.00 | 187,255 | 0.313756669 |
| 36-118-22-12-0010 | 1205 NATHAN LA N | I | 1 | 406 | Storage Warehouse | HEDBERG AGGREGATES | SJH REAL ESTATE LLC | 357,192 | 8.20 | 290,400 | I-2 | 16,212.00 | 17,508 | 0.060289256 |
| 36-118-22-12-0012 | 1035 NATHAN LA N | I | 1 | 407 | Distribution Warehouse | MINTER WEISMAN BROTH | CM NATHAN MN LLC | 730,713 | 16.77 | 593,700 | I-2 | 198,045.00 | 238,208 | 0.401226209 |
| 36-118-22-12-0013 | 1125 NATHAN LA N | I | 1 | 406 | Storage Warehouse | HEDBERG | 1125, LLP | 364,814 | 8.37 | 313,500 | I-2 | 24,109.00 | 26,239 | 0.08369697 |
| 36-118-22-13-0008 | 9905 10TH AVE N | C | 1 | 344 | Office Building | FRUEN'S SALES | MICHAEL B FRUEN | 34,871 | 0.80 | 34,871 | I-2 | 1,767.00 | 3,104 | 0.089013794 |
| 36-118-22-13-0010 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | CCG REAL ESATE LLC | 70,168 | 1.61 | 50,000 | B-C | 0.00 | 0 | 0 |
| 36-118-22-13-0011 | 10100 6TH AVE N | C | 1 | 413 | Community Shopping Center | WATERFORD PARK PLAZA | WATERFORD PARK STATION LLC | 633,849 | 14.55 | 633,849 | C-4 | 129,871.00 | 129,871 | 0.204892648 |
| 36-118-22-13-0012 | 975 NATHAN LA N | I | 1 | 406 | Storage Warehouse | | COLFIN 2015-I IND OWNER | 734,065 | 16.85 | 515,000 | I-2 | 210,418.00 | 222,893 | 0.432801942 |
| 36-118-22-14-0009 | 725 STATE HWY NO 169 | I | 1 | 392 | Industrial Engineering/R &D/Laboratory | | DJK PARTNERSHIP LLP | 48,622 | 1.12 | 48,622 | B-C | 15,400.00 | 15,400 | 0.316729053 |
| 36-118-22-14-0024 | 815 STATE HWY NO 169 | I | 1 | 406 | Storage Warehouse | | NORCOSTCO INC | 48,619 | 1.12 | 48,619 | I-2 | 15,330.00 | 15,330 | 0.31530883 |
| 36-118-22-14-0025 | 825 STATE | I | 1 | 453 | Industrial Flex Building | | WAYFOUR II LLC | 72,815 | 1.67 | 72,815 | I-2 | 19,440.00 | 19,440 | 0.266977958 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HWY NO 169 | | | | | | | | | | | | | |
| 36-118-22-14-0026 | 945 STATE HWY NO 169 | I | 1 | 453 | Industrial Flex Building | | WAYFOUR II LLC | 61,972 | 1.42 | 61,972 | I-2 | 18,000.00 | 18,000 | 0.290453753 |
| 36-118-22-14-0027 | 9621 10TH AVE N | I | 1 | 494 | Industrial Light Manufacturing | LINDSTROM COMPANY | RICHARD L LINDSTROM | 50,011 | 1.15 | 50,011 | I-2 | 9,984.00 | 11,848 | 0.23690788 |
| 36-118-22-14-0028 | 9707 10TH AVE N | C | 1 | 344 | Office Building | | CHARAL PROPERTIES LLC | 38,602 | 0.89 | 38,602 | I-2 | 1,728.00 | 4,128 | 0.106937464 |
| 36-118-22-14-0029 | 9715 10TH AVE N | I | 1 | 406 | Storage Warehouse | | CHARAL PROPERTIES LLC | 63,553 | 1.46 | 63,553 | I-2 | 17,160.00 | 20,074 | 0.315862351 |
| 36-118-22-14-0030 | 9805 10TH AVE N | I | 1 | 406 | Storage Warehouse | TREK INC (PARCEL 1 | TREK INC | 21,483 | 0.49 | 21,483 | I-2 | 5,000.00 | 5,000 | 0.232742168 |
| 36-118-22-14-0031 | 9811 10TH AVE N | I | 1 | 406 | Storage Warehouse | TREK INC (PARCEL 2 | TREK INC | 32,732 | 0.75 | 32,732 | I-2 | 12,000.00 | 13,942 | 0.42594403 |
| 36-118-22-14-0032 | 9817 10TH AVE N | I | 1 | 406 | Storage Warehouse | TREK INC (PARCEL 3 | TREK INC | 32,727 | 0.75 | 32,727 | I-2 | 600.00 | 600 | 0.018333486 |
| 36-118-22-14-0035 | 605 STATE HWY NO 169 | C | 1 | 344 | Office Building | 605 WATERFORD OFFICE | G&I VIII 605 WATERFORD LLC | 271,492 | 6.23 | 271,492 | B-C | 0.00 | 233,398 | 0.859686473 |
| 36-118-22-14-0039 | 701 STATE HWY NO 169 | LI | 1 | 102 | Vacant Industrial Land | VACANT LAND WITH EAS | DRAM INVESTMENTS LTD PTNRSHP | 48,665 | 1.12 | 20,000 | B-C | 0.00 | 0 | 0 |
| 36-118-22-14-0041 | 9800 8TH AVE N | I | 1 | 406 | Storage Warehouse | Intereum Herman Miller | DUKE REALTY LTD PRTNSHP | 881,328 | 20.23 | 600,256 | | | 134,384 | 0.223877812 |
| 36-118-22-21-0068 | 10300 10TH AVE N | C | 1 | 344 | Office Building | | BASSETT CREEK PROPERTIES LLC | 690,218 | 15.85 | 37,200 | I-2 | 3,887.00 | 7,774 | 0.208978495 |
| 36-118-22-22-0022 | 10900 SOUTH SHORE DR | LR | 1 | 100 | Vacant Commercial Land | | SMART LIVING LLC | 40,607 | 0.93 | 40,607 | | | | 0 |
| 36-118-22-23-0005 | 11000 STATE HWY NO 55 | C | 1 | 353 | Small Box Retail Store | PLYMOUTH LIQUORS | COMB FAMILY LLC | 35,495 | 0.81 | 35,495 | C-3 | 5,120.00 | 5,120 | 0.144245668 |
| 36-118-22-23-0006 | 11021 STATE HWY NO 55 | LC | 1 | 100 | Vacant Commercial Land | | HOLIDAY STATIONSTORES INC | 13,325 | 0.31 | 13,325 | PUD | 0.00 | 0 | 0 |
| 36-118-22-23-0011 | 10913 STATE HWY NO 55 | C | 1 | 344 | Office Building | JENNIGES | JENNIGES PROPERTIES LLC | 56,600 | 1.30 | 56,600 | C-2 | 15,000.00 | 30,000 | 0.530035336 |
| 36-118-22-23-0014 | 11010 OLD COUNTY RD NO 15 | C | 1 | 344 | Office Building | OFFICE - FORMER RESI | DENNIS M PETERSON INTERESTS | 24,265 | 0.56 | 24,265 | C-2 | 0.00 | 1,091 | 0.044961879 |
| 36-118-22-23-0015 | 10905 OLD COUNTY RD NO 15 | C | 1 | 528 | Service Repair Garage | PLYMOUTH VILLAGE AUT | J F & D M PRUSAK | 31,022 | 0.71 | 31,022 | O | 4,002.00 | 4,002 | 0.129005222 |
| 36-118-22-23-0022 | 10730 STATE HWY NO 55 | C | 1 | 412 | Neighborhood Shopping Center | RETAIL CENTER | HASMUKH II LLC | 31,000 | 0.71 | 31,000 | C-3 | 7,577.00 | 7,577 | 0.244419355 |
| 36-118-22-23-0037 | 10800 OLD COUNTY RD NO 15 | C | 1 | 344 | Office Building | | ECM PROPERTIES LLC | 17,280 | 0.40 | 17,280 | O | 2,560.00 | 5,120 | 0.296296296 |
| 36-118-22-23-0038 | 10750 OLD COUNTY RD NO 15 | C | 1 | 344 | Office Building | | LARRY P LARSON | 20,880 | 0.48 | 20,880 | O | 2,560.00 | 3,840 | 0.183908046 |
| 36-118-22-23-0042 | 10910 SOUTH SHORE DR | C | 1 | 412 | Neighborhood Shopping Center | RETAIL CENTER | THE COLUMBUS HOME ASSOC | 52,986 | 1.22 | 52,986 | C-3 | 5,472.00 | 5,372 | 0.101385272 |
| 36-118-22-23-0046 | 10850 OLD COUNTY RD NO 15 | C | 1 | 344 | Office Building | | TITLE HOLDINGS II LLC | 30,700 | 0.70 | 30,700 | O | 4,003.00 | 8,006 | 0.260781759 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36-118-22-23-0049 | 10900 STATE HWY NO 55 | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 46,672 | 1.07 | 46,672 | C-3 | 4,265.00 | 4,265 | 0.091382413 |
| 36-118-22-23-0051 | 11040 STATE HWY NO 55 | C | 1 | 410 | Automotive Center | MINNETONKA COLLISION | 904 W 79TH STREET PARTNERS | 21,880 | 0.50 | 21,880 | C-3 | 6,156.00 | 6,156 | 0.281352834 |
| 36-118-22-23-0052 | 11050 STATE HWY NO 55 | C | 1 | 410 | Automotive Center | VALVOLINE RAPID OIL | VALVOLINE LLC | 33,903 | 0.78 | 33,903 | C-3 | 6,853.00 | 6,853 | 0.202135504 |
| 36-118-22-23-0053 | 11040 STATE HWY NO 55 | C | 1 | 410 | Automotive Center | VALVOLINE | 904 W 79TH STREET PARTNERS | 11,436 | 0.26 | 11,436 | C-3 | 1,469.00 | 1,469 | 0.128454005 |
| 36-118-22-23-0054 | 11050 STATE HWY NO 55 | LC | 1 | 100 | Vacant Commercial Land | | VALVOLINE LLC | 16,683 | 0.38 | 16,683 | C-3 | 0.00 | 0 | 0 |
| 36-118-22-23-0055 | 10820 STATE HWY NO 55 | C | 1 | 350 | Restaurant | LATUFF'S | K H NYSTROM & P K BAJARI TRS | 46,449 | 1.07 | 40,000 | C-3 | 3,902.00 | 3,902 | 0.097755 |
| 36-118-22-23-0056 | 10700 STATE HWY NO 55 | C | 1 | 344 | Office Building | 55 WEST OFFICE CENTE | AURORA TOWER LLC | 108,527 | 2.49 | 108,527 | C-3 | 15,062.00 | 61,768 | 0.569148691 |
| 36-118-22-23-0058 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | MINNWEST BANK | 46,107 | 1.06 | 39,137 | PUD | 0.00 | 0 | 0 |
| 36-118-22-23-0059 | 10810 OLD COUNTY RD NO 15 | C | 1 | 344 | Office Building | | TC GEN LLC | 33,763 | 0.78 | 33,763 | | | 9,485 | 0.280928827 |
| 36-118-22-24-0006 | 10300 6TH AVE N | C | 1 | 344 | Office Building | | ONVOY LLC | 119,434 | 2.74 | 119,434 | O | 22,786.00 | 22,786 | 0.190783194 |
| 36-118-22-24-0007 | 40 ADDRESS UNASSIGNED | LC | 1 | 100 | Vacant Commercial Land | | ONVOY LLC | 24,099 | 0.55 | 24,099 | O | 0.00 | 0 | 0 |
| 36-118-22-24-0010 | 10405 6TH AVE N | C | 1 | 344 | Office Building | 55 WEST FINANCIAL | DAKOTA UPREIT LTD PARTNERSHP | 203,961 | 4.68 | 203,961 | O | 18,130.00 | 53,544 | 0.262520776 |
| 36-118-22-24-0089 | 40 ADDRESS PENDING | LC | 1 | 100 | Vacant Commercial Land | | JNA 55 LLC | 560,887 | 12.88 | 394,671 | PUD | 0.00 | 0 | 0 |
| 36-118-22-31-0002 | 10700 OLD COUNTY RD NO 15 | C | 1 | 344 | Office Building | TIFFANY OFFICE BLDG | LGA TIFFANY BUILDING LLC | 45,477 | 1.04 | 45,477 | O | 7,162.00 | 35,810 | 0.787431009 |
| 36-118-22-31-0003 | 10600 OLD COUNTY RD NO 15 | C | 1 | 341 | Medical Office | 10600 BUILDING | 10600 PARTNERS LLC | 43,812 | 1.01 | 43,812 | O | 9,930.00 | 9,930 | 0.226650233 |
| 36-118-22-31-0049 | 10305 6TH AVE N | C | 1 | 426 | Day Care Center | NEW HORIZON DAY CARE | M CAMPBELL ET AL TRUSTEES | 43,543 | 1.00 | 43,543 | O | 8,171.00 | 8,171 | 0.187653584 |
| 36-118-22-32-0015 | 10700 OLD COUNTY RD NO 15 | LC | 1 | 100 | Vacant Commercial Land | | LGA TIFFANY BUILDING LLC | 20,232 | 0.46 | 20,232 | O | 0.00 | 0 | 0 |
| 36-118-22-41-0013 | 505 STATE HWY NO 169 | C | 1 | 344 | Office Building | 505 WATERFORD OFFICE | 505 WATERFORD LLC | 531,412 | 12.20 | 372,000 | B-C | 23,244.00 | 271,864 | 0.730817204 |
| 36-118-22-42-0018 | 10000 STATE HWY NO 55 | C | 1 | 344 | Office Building | GAGE BUILDING | CCG REAL ESATE LLC | 341,569 | 7.84 | 341,569 | B-C | 22,000.00 | 86,000 | 0.251779289 |
| 36-118-22-42-0024 | 10205 6TH AVE N | C | 1 | 349 | Fast Food Restaurant | ARBY'S | R HORK & M T HORK | 51,014 | 1.17 | 51,014 | C-4 | 3,490.00 | 3,490 | 0.068412593 |
| 36-118-22-42-0025 | 10130 STATE HWY NO 55 | C | 1 | 353 | Small Box Retail Store | BACHMAN'S | STARCO LLC | 208,712 | 4.79 | 208,712 | C-4 | 32,000.00 | 31,587 | 0.15134252 |
| 36-118-22-43-0020 | 30 NATHAN LA N | C | 1 | 412 | Neighborhood Shopping Center | WILLOW GROVE SHOPPIN | WILLOW GROVE INVESTORS LLC | 211,127 | 4.85 | 211,127 | C-4 | 32,964.00 | 32,964 | 0.156133512 |
| 36-118-22-44-0006 | 9800 SHELARD PKWY | C | 1 | 344 | Office Building | WILLOW CREEK PLAZA O | LSREF4 REBOUND LLC | 150,688 | 3.46 | 113,000 | C-4 | 15,000.00 | 58,186 | 0.514920354 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36-118-22-44-0009 | 9900 SHELARD PKWY | C | 1 | 380 | Theater, Cinema | SHELARD THEATRE | SPIRIT MASTER FUNDING X LLC | 309,595 | 7.11 | 309,595 | C-4 | 50,350.00 | 58,023 | 0.187415817 |
| 36-118-22-44-0011 | 9700 BETTY CROCKER DR | C | 1 | 419 | Convenience Market (With Fuel) | HOLIDAY CONVENIENCE | HOLIDAY STATIONSTORES INC | 131,225 | 3.01 | 52,500 | C-4 | 4,232.00 | 4,232 | 0.080609524 |

Source: Hennepin County 2-28-18

Appendix Chapter 3F

# IMPLEMENTATION

## ZONING

This appendix includes a current zoning map, which does not correspond to the 2040 land use plan. Following formal adoption the 2040 plan, the City will review the zoning ordinance text and map to identify any inconsistencies and propose amendments as necessary to ensure consistency between the two documents.

When the City amends the zoning map from time to time in the future, unlike changes to the land use plan, the City will not need to submit zoning map changes to the Metropolitan Council.

### ZONING CATEGORY DESCRIPTIONS

#### Future Restricted Development (FRD)

A holding zone until a landowner/developer makes application for development, at which time the City may rezone the affected property consistent with its designation in the comprehensive plan, provided that the development does not result in the premature extension of public utilities, facilities, or services.

#### Single Family Detached Dwelling District (RSF-1)

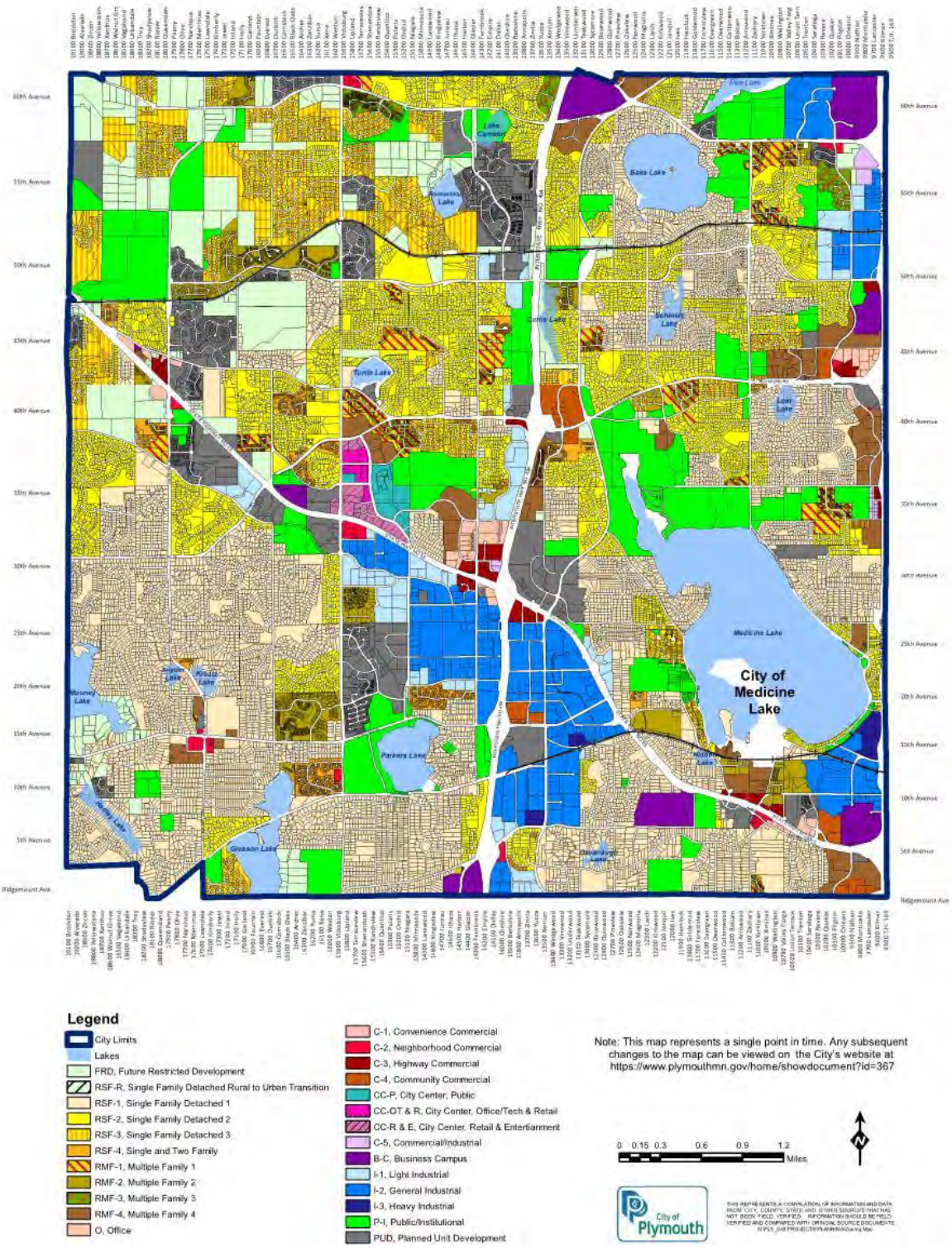
A district intended to preserve and maintain existing larger lot single family neighborhoods while also allowing for directly related, complementary uses. A full range of public services and facilities shall also be available to RSF-1 areas.

#### Single Family Detached Dwelling District 2 (RSF-2)

A district intended to allow for new single family neighborhoods with a lot size that is smaller than the City's traditional single family lot as well as directly related, complementary uses. The smaller lot size will make better use of the City's shrinking land supply and investment in public utilities and allow the City to better protect and preserve its natural resources such as wetlands and woodlands. A full range of public services and facilities shall be available to RSF-2 areas.

# Zoning Map

Adopted December 18, 1996
Dated February 27, 2018
Per Ordinance NO. 2018-03



### Single Family Detached Dwelling District 3 (RSF-3)

A district intended to provide opportunities for smaller single family homes on smaller lots and directly related, complementary uses. This in turn will provide opportunities for the development of more affordable single family homes and homes that address the needs of an aging population in a more compact development pattern that makes more efficient use of the City's land supply and investment in public utilities as well as help the City meet its density goal for new single family homes. A full range of public services and facilities shall be available to RSF-3 areas.

### Single Family Detached Dwelling District 4 (RSF-4)

A district intended to provide transitional areas that will allow a mixing of two family dwellings and/or single family dwellings on smaller lots where property is adjacent to arterial streets and/or where property is adjacent to higher intensity development. Directly related, complementary uses are also appropriate. A full range of public services and facilities shall be available to RSF-4 areas.

### Multiple Family Dwelling District 1 (RMF-1)

A district intended to expand life cycle housing options in Plymouth by allowing for a variety of attached dwelling unit types as well as directly related complementary uses. Lot sizes are intended to reflect the City's objective of promoting efficient use of land and public utilities. A full range of public services and facilities shall be available to RMF-1 areas.

### Multiple Family Dwelling District 2 (RMF-2)

A district intended to expand life cycle housing options in Plymouth by allowing for a variety of attached dwelling unit types as well as directly related complementary uses. Lot sizes are intended to reflect the City's objective of promoting efficient use of land and public utilities. A full range of public services and facilities shall be available to RMF-1 areas.

### Multiple Family Dwelling District 3 (RMF-3)

A district intended to promote the development of higher density, primarily attached housing and directed related, complementary uses. Densities will help increase the feasibility of transit and will help the City meet its multiple family density goal. A full range of public services and facilities shall be available to RMF-3 areas.

### Multiple Family Dwelling District 4 (RMF-4)

A district intended to provide for high density, primarily apartment style, rental and condominium housing and directly related complementary uses. Densities in this area will exceed the City's multiple family density goal and provide housing that can be more easily served by transit. A full range of public services and facilities shall be available to RMF-4 areas.

### Multiple Family Dwelling District 5 (RMF-5)

A district intended to provide for high-density, apartment-style, rental and condominium housing and directly related complementary uses. Densities in this area will exceed the City's multiple family density goal and provide housing that can be more easily served by transit. A full range of public services and facilities shall be available to RMF-5 areas.

### Office District (O)

A district intended to provide an area for commercial offices and uses that are compatible with commercial offices. A full range of public services and facilities shall be available in O areas.

### Convenience Commercial District (C-1)

A district intended to provide for the establishment of highly limited scale neighborhood centers that offer basic, convenience-type goods and services to the immediately surrounding areas in which they are located.

### Neighborhood Commercial District (C-2)

A district intended to provide for low to moderately intense retail or service outlets that deal directly with the customer for whom the goods or services are furnished. The uses allowed in this district are to provide goods and services on a limited community market scale, located in areas that are well served by collector or arterial streets at the edges of residential districts.

### Highway Commercial District (C-3)

A district intended to provide for the establishment of service and limited retail businesses primarily oriented toward motorists and requiring high volumes of traffic and visibility from major roads.

## Community Commercial District (C-4)

A district intended to provide for the establishment of areas devoted to high intensity retailing and service activities with a city-wide and multi-community consumer market.

## City Center District (CC)

A district intended to provide for the establishment of a community focal point that is a blend of cultural, recreational, civic, entertainment, commercial retail, and office uses as defined and guided by the Comprehensive Plan.

## Commercial/Industrial District (C-5)

A district intended to provide areas for businesses that have both commercial and industrial characteristics and for the establishment of wholesale and retail trade of large volume or bulk commercial items.

## Business Campus District (B-C)

A district intended to provide for multi-use buildings and/or the establishment of business offices, wholesale showrooms, and related uses in an environment that provides a high level of amenities, including landscaping, preservation of natural features, architectural controls, pedestrian trails, and other features.

## Light Industrial District (I-1)

A district intended to provide for the establishment of warehousing and light industrial development. The overall character of the I-1 District is intended to have low impact manufacturing/warehouse character. Industrial uses allowed in this district shall be limited to those which can compatibly exist adjacent to both lower intensity business uses and high intensity manufacturing uses and which have limited amounts of truck traffic in comparison to higher intensity industrial districts. Based on the fact that I-1 areas may abut residential neighborhoods, I-1 uses are regulated in height, lot coverage, setbacks, landscaping, loading and use type, so as to facilitate compatibility between these uses and residential development.

### General Industrial District (I-2)

A district intended to provide for the establishment of warehousing and light industrial development and large volume truck-oriented uses.

### Heavy Industrial District (I-3)

A district intended to provide areas suitable for the location of general industrial activities, including heavy manufacturing and other such activities which, because of the nature of the product or character of operation, require isolation from or special protections from non-industrial uses.

### Public/Institutional District (PI)

A district intended to provide a specific area for facilities devoted to serving the public and specialized government activities, and semi-public uses. The primary objective of uses within this district is the provision of services, frequently on a non-profit basis, rather than the sale of goods or services. It is intended that uses will be compatible with adjoining development, and they normally will be located on or in proximity to an arterial street.

### Planned Unit Development District (PUD)

A district intended to provide a comprehensive procedure to allow greater flexibility in the development of neighborhoods or non-residential areas than would be possible under a conventional zoning district. The decision to zone property to PUD is a public policy decision for the City Council to make in its legislative capacity.

CHAPTER 4

# Housing Plan

# TABLE OF CONTENTS

CHAPTER PURPOSE....1
GOALS AND POLICIES....1
HOUSING OPPORTUNITIES....3
LIFE-CYCLE HOUSING....3
Life Cycle Housing Indicators....4
Housing Programs....4
Fair Housing....5
AFFORDABLE HOUSING....5
Affordable Housing Indicators....5
Affordable Housing Programs....6
Community Housing Goals....6
HOUSING MAINTENANCE AND PRESERVATION....7
Housing Condition Indicators....7
*Figure 4-1: Affordable Housing Opportunity Areas: 2021-2030*....8
*Figure 4-2: Re-Investment in Homes*....9
Housing Maintenance Programs....10
IMPLEMENTATION....11

# LIST OF APPENDICES

4A HOUSING CHARACTERISTICS
4B HOUSING PROGRAMS

Chapter 4

# HOUSING PLAN

## CHAPTER PURPOSE

The Housing Plan establishes standards, plans and programs to meet existing and projected housing needs in Plymouth. It also identifies strategies to promote the development of low and moderate income housing as defined by state law. The Housing Plan will help Plymouth integrate housing into the City's overall development objectives and encourage the private sector to meet identified housing needs. The plan is intended to provide direction as the City responds to and creates opportunities for the development of affordable and life cycle housing, promotes efficient and well-integrated development and maintains the City's neighborhoods and housing stock.

This chapter, along with the associated appendices, provides information on present and future housing demand in Plymouth, present housing supply and housing mix, current and proposed housing programs and the trends associated with these elements of Plymouth's housing stock. The primary sources of data are the Metropolitan Council, Housing and Urban Development (HUD) Comprehensive Housing Affordability Strategy data, the American Community Survey, Housing Link Streams data, the U.S. Census, Hennepin County and the City of Plymouth. When the results of the 2020 U.S. Census are available, the City will analyze them to determine if the plan will require updating.

## GOALS AND POLICIES

### Promote the development and preservation of a supply of quality housing that is affordable at all income levels and at all stages of the life cycle.

- Provide opportunities for the development of quality housing that is diverse in terms of ownership, price, type and style.
- Ensure that Plymouth provides housing opportunities for households at all stages of the life cycle, including first time homebuyers and those wishing to move up to their second or third home and households wishing to down size as households age.
- Promote the use of sustainable design practices for proposed housing projects.

- Actively encourage residential developers to include housing that is affordable to low- and moderate-income persons and local employees as part of their proposals in order to provide a range of mixed-income housing throughout the community. Toward that end, the City will provide information about Plymouth's goals for affordable housing to anyone inquiring about possible development within the city.
- Work with owners of existing Naturally Occurring Affordable Housing (NOAH) properties to preserve and maintain quality, affordable housing throughout the city.
- Provide financial and technical assistance, when appropriate, to developers of housing that is affordable to low and moderate income persons.
- Promote the development of housing for persons with special needs, including accessible housing for persons with disabilities.
- Support efforts to assure equal access to housing in Plymouth regardless of race, color, creed, religion, sex, national origin, disability, marital status, status with regard to public assistance, sexual orientation, and familial status.
- Continue to pursue federal and state resources on behalf of developers for affordable housing that help meet Plymouth's need for low and moderate income life cycle housing.
- Review all development proposals for their potential to contribute toward meeting the City's goals for affordable housing.

### Encourage and ensure that all housing and neighborhoods in Plymouth are well maintained.

- Support programs and activities that promote the maintenance and enhancement of the Plymouth housing stock.
- Support local programs that provide low and moderate income households with financial assistance to maintain and rehabilitate their housing.
- Preserve the current affordable housing stock in the city through programs to assist with maintenance activities.

### Promote development patterns that link housing with services and employment centers by all forms of transportation, particularly public transit and non-motorized forms of transportation.

- Support residential development that makes efficient use of land and public infrastructure.

- Provide opportunities to develop new housing that is affordable to low and moderate income persons in areas that are accessible to employment centers and public amenities through public transit and non-motorized transportation.
- Work with Plymouth businesses to identify opportunities to promote affordable housing to meet the needs of the area workforce.
- Support efforts to maintain and rehabilitate existing affordable housing in areas that are near employment centers and public amenities.

## HOUSING OPPORTUNITIES

This Plan addresses the following key housing opportunities: 1) life cycle housing; 2) affordable housing; and 3) housing maintenance and preservation.

### LIFE-CYCLE HOUSING

Life-cycle housing is housing that meets the needs of all residents in various phases in life. It ranges from housing for young adults establishing new households to homes for growing households with children and housing for seniors in their retirement years. To accommodate this range, the City's housing supply needs to be diverse, consisting of a variety of prices and styles of housing. Furthermore, providing an adequate supply will require an adequate response from both the private and public sectors.

In 2016, Hennepin County indicated the City's mix of housing included 16,724 (53 percent) detached housing units and 14,727 (47 percent) attached housing units. Sixty-eight percent of Plymouth's housing units are owner-occupied; thirty-two percent are renter-occupied. The number of non-family households has remained constant since the previous plan in terms of percentage of population. This is most likely due to new development in northwest Plymouth oriented toward households with children (family households) balancing out the aging population in many other areas of the city. A non-family household consists of a person living alone or a householder who shares a home with nonrelatives only; for example, with roommates or an unmarried partner. Approximately 41 percent of Plymouth's housing units are affordable to low and moderate income households, which are households at or below 80 percent of the area median income. City officials will monitor this mix throughout the planning period so that imbalances may be identified.

## Life Cycle Housing Indicators

Indicators of the future need for additional life-cycle housing or greater housing diversity include: 1) changes in age of population; 2) changes in household structure; 3) changes in the availability of different types of housing; 4) supply of and demand for senior housing; and 5) supply of and demand for special needs housing.

Demographic trends indicate that Plymouth's population is aging, and the community is seeing an increase in non-family and non-traditional households. According to the Metropolitan Council's housing stock estimates, the City currently exceeds the metropolitan area's average for multi-family housing, which is 31 percent. Waiting lists for senior housing suggest that current demand exceeds supply (see Appendix 4A).

Plymouth will promote housing diversity, but recognizes that several factors may limit the City's ability to meet life-cycle housing needs in Plymouth between now and 2040.

- The supply and mix of housing, both rental and ownership, may not keep pace with the demand created by the increasing number of elderly and the lower number of family households. Such changes indicate that the demand for alternatives to the detached home will continue to be strong in the future.
- Sites suitable for additional higher-density housing types, such as apartments, are limited.
- The property tax system discourages investment in rental housing. In addition, the 1986 federal income tax reforms eliminated incentives that had encouraged significant investment in rental housing and continue to discourage this type of development.
- Public resources that help provide special needs housing for the elderly and disabled are limited.
- The demand for affordable family and senior housing exceeds the supply.

## Housing Programs

As people go through various stages and/or changes in their lives, their housing needs and desires change. The City provides the leadership, through its policies and programs, to meet the anticipated future housing needs of all residents.

In consultation with the City Council, the Plymouth Housing and Redevelopment Authority (HRA) is the primary municipal agency that administers housing assistance programs in Plymouth. The HRA and its staff work closely with staff from Hennepin County, Minnesota Housing Finance Agency, U.S. Department of Housing and Urban Development (HUD) and local lenders, realtors and landlords. The HRA administers programs that address the need for life-cycle and all other housing needs within the city.

## Fair Housing

Fair housing is the assurance that adequate housing opportunities are available to all residents. The City's role is to ensure that landlords and renters are aware of state and federal regulations prohibiting discrimination in housing for any member of society based on religion, sexual orientation, gender, physical disability or race.

The HRA participates in the Fair Housing Implementation Council, which is a consortium of 16 organizations that provide public education, complaint resolution and fair housing testing in Plymouth as well as the entire seven county metropolitan area. When issues or concerns are brought to the attention of the City, referrals are provided to outside organizations such as HOME Line.

## AFFORDABLE HOUSING

HUD defines affordable housing as housing for which a household pays no more than 30 percent of its income toward housing costs. As detailed on the following page, the Metropolitan Council has further refined this definition.

## Affordable Housing Indicators

Indicators of affordable housing need include: 1) household income; 2) housing cost as a percent of household income; 3) jobs and housing relationship; 4) availability of affordable housing units; and 5) supply of and demand for subsidized housing units.

Although Plymouth's median income exceeds the metropolitan area median, there are a number of households for which housing affordability is an issue. The 2015 American Community Survey five-year estimates show the number of renter households and homeowners paying more than 30 percent of their income for housing has increased in Plymouth over the past ten years by 310 households, which is about a

six percent increase. In addition, given the high cost of housing in the city and the wages earned by non-resident workers, housing costs are likely an obstacle for some non-resident workers.

Based on Metropolitan Council estimates, roughly 41 percent of Plymouth's housing units are affordable to households at or below 80 percent of the area median income. At the time of this report, there were nearly 779 units of subsidized rental housing and rental housing occupied by individuals holding 357 Housing Choice vouchers (Section 8) in the city. For a current list, visit www.plymouthmn.gov/housing. Looking at new construction, the cost of land in Plymouth will make it increasingly difficult to add affordable housing with single family homes. Based on regional figures, the demand for affordable housing still exceeds the supply. This is the case in almost all metropolitan area communities.

## Affordable Housing Programs

The City and the HRA support federal, state and local housing programs to assist low and moderate income persons. In addition to taking advantage of state and federal funds, from 2000 to 2015, the City used almost $8.6 million in local property tax dollars to promote and support affordable housing. The City has been proactive in providing affordable housing opportunities in the past and will continue efforts into the future. Housing costs in Plymouth are higher than the average for the metropolitan area and this makes it difficult for a homebuyer to be able to purchase a home in the city. According to the Metropolitan Council, 18 percent of Plymouth households earning 80 percent or less of the area median income are housing cost-burdened. In an effort to mitigate the high cost of housing, the City offers a first-time homebuyer program that provides up to $25,000 to assist with the down payment, closing costs and mortgage principal reduction. Through 2015, the City has assisted 184 buyers, providing over $3,000,000 in funding. Plymouth will continue to market this program to offer homeownership options to moderate income first-time homebuyers.

## Community Housing Goals

With assistance from other housing-oriented groups, in 2015 the Metropolitan Council developed new forecasts of affordable housing need in the metropolitan area from 2021-2030 and assigned a proportional share (goal) to each community. The new housing needs are separated into three groups that are based on the percentage of household income. The three groups or "bands" as the Metropolitan Council refers to them, include households at or below 30 percent of the area median income (AMI); households between 31 and 50 percent of the AMI; and households between 51 and 80 percent of AMI. Plymouth's overall share has been set at 679 units for the 10-year period. This goal serves as a benchmark for the City as it

promotes development that maintains the livability in the city and provides opportunities for affordable and life-cycle housing that is efficient, compact and well-integrated. There are sufficient acres available in higher density areas to allow for the potential development of 736 units of affordable housing (see Figure 4-1). Nevertheless, the City's affordable housing goal will be difficult to meet due to factors that include high land prices, inflationary pressure on building materials, dwindling financial resources, and limited availability of land for commercial purposes.

The implementation activities outlined later in this section serve as the Housing Action Plan for achieving the goal identified by the Metropolitan Council. Supporting demographic information can be found in Appendix 4A.

## HOUSING MAINTENANCE AND PRESERVATION

The current condition of Plymouth's housing stock is good. However, programs fostering housing maintenance will become increasingly important as the community ages. Good housing maintenance promotes stability and appreciation in housing values and helps create a sense of community. The City and HRA believe that NOAH properties are an asset to the community and will continue to work with property owners to retain these types of properties in the city.

### Housing Condition Indicators

Indicators of housing condition include: 1) age of housing; 2) housing values; and 3) exterior condition. Since a majority of the housing in Plymouth is less than 35 years old, the condition of most of the housing supply is good. Since 1990, the Plymouth HRA has provided approximately $2,389,450 for the rehabilitation of 188 homes in the city. Housing in need of rehabilitation is scattered throughout the city, with most scattered in the southern and eastern areas near Parkers Lake and Medicine Lake. However, at this time, Plymouth has no concentrated areas in need of rehabilitation.

The southern and eastern areas of the city also have the majority of Plymouth's oldest homes – over 50 years old. Based on building permit data, 19 percent of these homes had additions or alterations between 1991 and 2016. While investment is being made in the City's oldest housing, more may need to be done to ensure that older neighborhoods are maintained (Figure 4-2).

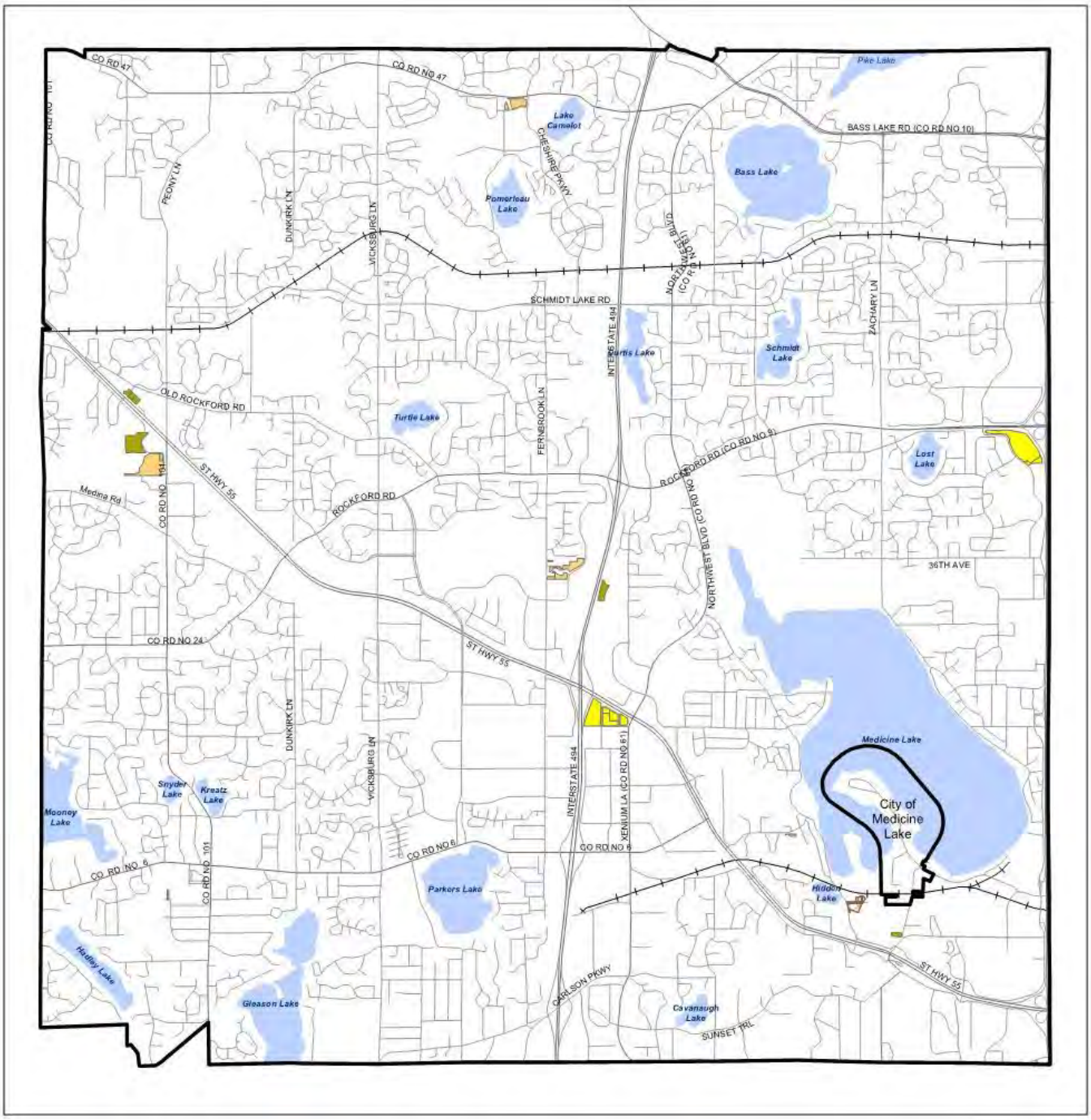



Figure 4-1

# Housing Opportunities

As of 5/15/2018

- LA-3 Vacant 20.1 Acres
- LA-4 Vacant 13.5 Acres
- Underdeveloped LA-4 3.6 Acres
- MXD-R 34.3 Acres

N

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

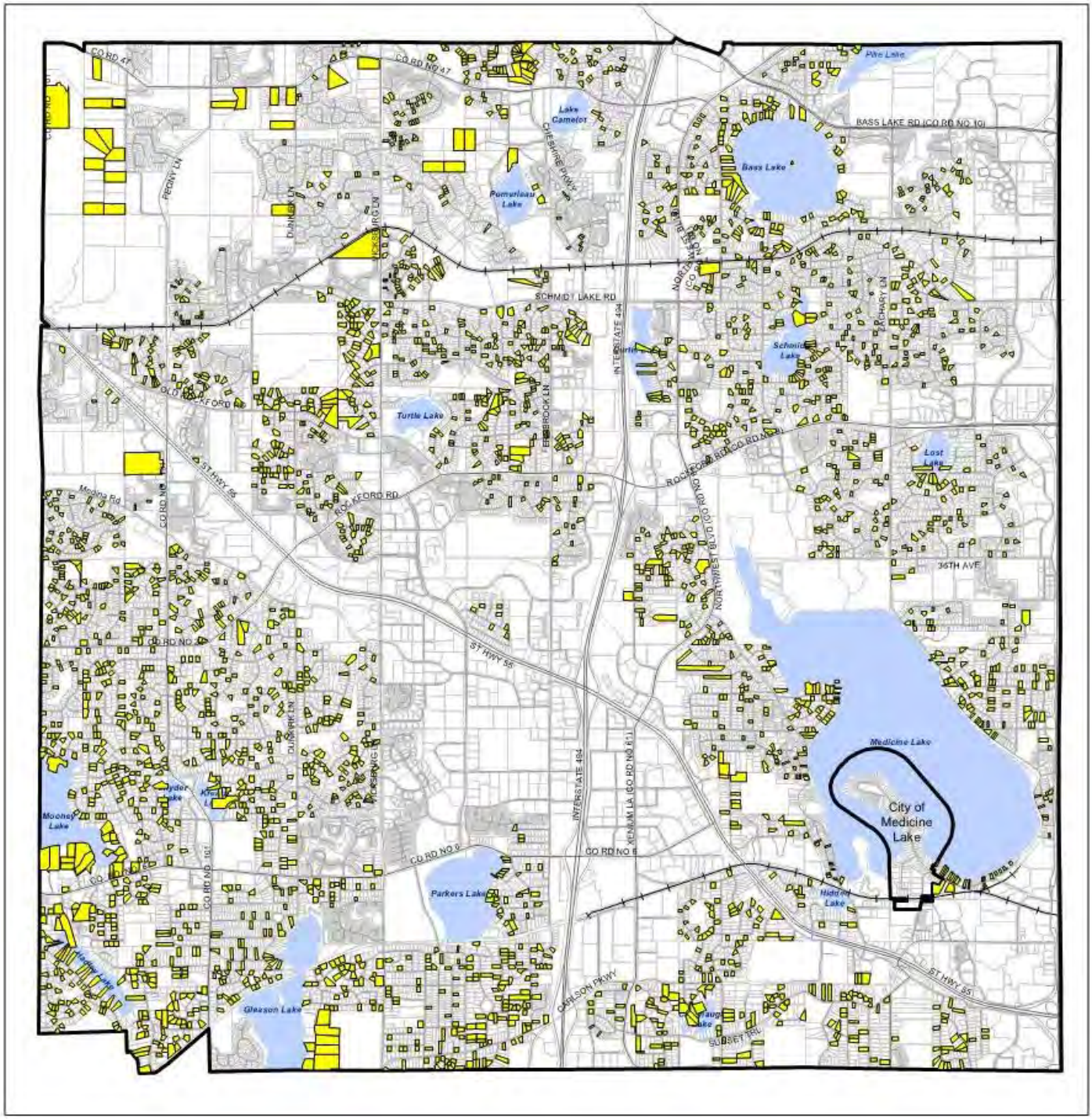



Figure 4-2

# Re-Investment in Homes

Building Permits with Estimated Cost over $25,000 between 1990 and 2015

* City of Plymouth Building Permit Data

N

August, 2017

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

Housing condition is also related to value. Median housing values in Plymouth exceed values in both Hennepin County and the metropolitan area.

The 2014 American Community Survey (ACS) identified one type of substandard housing condition in Plymouth. It indicated that there were 16 units that lacked complete kitchen facilities. In addition, the ACS identified less than one percent (180 units) as being overcrowded, which is defined as more than one person per room.

The City's Housing Maintenance Code and rental housing licensing programs have identified housing in need of continued maintenance and renovation. In 2015, the City licensed 8,896 units in 1,598 buildings. As part of the licensing program, the City inspects units for code compliance. The City identified 241 violations in 2015. The City may need to expand its efforts to provide housing assistance to owners of affordable rental and homesteaded units to ensure older units remain in good condition.

## Housing Maintenance Programs

Six City programs support well-maintained housing and neighborhoods. These include the Housing Maintenance Code, rental licensing, homeowner rehabilitation, multi-family fire suppression upgrade program, Crime-Free Multi-Housing and Neighborhood Watch. Through these programs, the City is able to continually monitor the condition of the City's housing stock and require owner compliance with the Housing Maintenance Code when applicable.

The City supports a number of local non-profit groups that help residents with housing-related issues. They include Interfaith Outreach, People Responding in Social Ministry (PRISM), Community Action Partnership of Hennepin County (CAPHC), HOME Line, Senior Community Services, Hammer Residences and Habitat for Humanity.

## IMPLEMENTATION

| *Description* | *Timing* |
|---|---|
| **Livability of Housing and Neighborhoods** – Continue to support programs that improve the livability of housing and neighborhoods such as Neighborhood Watch, Crime-Free Multi-Housing, Interfaith Outreach, PRISM, CAPCH, Senior Community Services and HOME Line. | Ongoing |
| **Financial Support and Technical Assistance for Maintenance and Development of Affordable Housing** – Any affordable housing development in Plymouth will be a fiscal challenge. Consequently, stipulating an implementation strategy based on an affordability band is not practical. Given the economics of development in Plymouth, multiple fiscal tools will be necessary for a successful project, many not controlled by the City. The City of Plymouth and Plymouth Housing and Redevelopment Authority (HRA) have previously used and will continue to consider using the following tools:<br>• Zoning and land use flexibility<br>• Project-based vouchers<br>• Legislative allowance of using excess tax increment<br>• Fee waivers<br>• Tax increment financing<br>• Tax abatement<br>• 4d tax incentives<br>• Effective referrals<br>• Excess tax increment from existing districts (when feasible)<br>• Land acquisition (when appropriate)<br>• Participation in regional collaborations<br>• Along with these City and HRA-administered financing tools, the City will support applications to other agencies such as:<br>o Metropolitan Council;<br>o Hennepin County;<br>o Minnesota Housing Finance Agency; and<br>o Federal Home Loan Bank. | Ongoing |

| *Description* | *Timing* |
|---|---|
| (continued from page 11) The City of Plymouth will engage all new developers as they submit applications for new housing and work with them to determine whether a portion or all of the units could be developed as affordable housing. Plymouth will strive to serve those in the lower bands of the affordability spectrum. However, the strategy is to provide affordable housing, no matter the specific band. The determination of which tools or programs the City and HRA will use to assist a particular development will be made on a case-by-case basis and will be customized to that development to provide the most effective use of all available resources. It is the intent of the City to give higher priority in funding decisions to projects that provide housing affordable to households at 30 percent of Area Median Income or below. | Ongoing |
| **Support for Existing Low and Moderate Income Rental Housing** – Continue, through the HRA, to operate the following programs:<br>• Plymouth Towne Square (a 99-unit apartment building for low and moderate income seniors);<br>• Vicksburg Crossing (a 96-unit apartment building for low and moderate income seniors); and<br>• Housing Choice Voucher Program. | Ongoing/ Short |
| **Preserve existing affordable housing and Naturally Occurring Affordable Housing (NOAH) whenever feasible.**<br>To that end, the City and HRA will carry out the following actions:<br>• Create and maintain a list of NOAH properties located in the city;<br>• Consider the establishment of a dedicated funding source to assist NOAH properties that are being considered for purchase in order to maintain their affordability;<br>• Create and maintain a list of all publically subsidized properties in the city along with relevant information about the property;<br>• Continue to have conversations with owners of publically subsidized and NOAH properties to stay abreast of their future plans;<br>• Consider amending the City's Rental Licensing Ordinance to provide for a 90 day notification to the City and residents of the pending sale of NOAH property; | Ongoing/ Short |

| *Description* | *Timing* |
|---|---|
| • Consider a policy that would allow tenants in "good standing" who reside at a NOAH property that has been sold to remain at the property for up to 12 months even if rental criteria for tenancy has changed that makes them no longer eligible to rent at the property; and<br>• Research potential programs that may provide a benefit to the Sun Valley mobile home park residents. | Ongoing/ Short |
| **Regulatory Barriers to Affordable Housing** – Study and make recommendations on changes to zoning, subdivision and other code requirements that may be impediments to developing and maintaining housing affordable to low and moderate income residents, particularly those in the lower spectrum of the affordability bands. The City will review the concept of a Mixed-Income/Inclusionary housing policy and monitor how such policies are working in neighboring cities. | Ongoing/ Short |
| **Housing and Employment Relationships** – Study the relationship between affordable housing and the ability of Plymouth businesses to recruit and retain employees. Through the Plymouth Economic Development Authority (EDA), the City will engage with local businesses to determine if they have identified staffing issues that are a result of the lack of lower cost housing and develop strategies to mitigate identified issues. | Short |
| **Impact of Assessments and Fees on Housing Affordability** – Study the impact of City assessments and fees on housing affordability and lower income residents. Consider the feasibility of waiving or reducing assessments and fees for new housing that is affordable to low and moderate income residents. | Short |
| **Housing Conditions** – Identify substandard, blighted or deficient housing in order to target housing maintenance code enforcement, housing rehabilitation assistance programs and possible redevelopment. The HRA's rehabilitation programs target households at the lower spectrum of the affordability bands when possible to assist those with the greatest needs. | Ongoing |

| *Description* | *Timing* |
|---|---|
| **Truth in Housing** – Study the feasibility of establishing a program to require a property inspection and disclosure report before residential property changes hands and determine if there is a greater impact on lower income households purchasing or renting in the city. | Medium |
| **Zoning Ordinance** –Continue to use the annual Zoning Ordinance update to address new housing trends. | Ongoing |
| **Section 8 Project-Based Properties** – Encourage owners of existing affordable properties to renew their contracts with HUD or encourage and facilitate the sale of such properties to new owners who will renew these contracts with an emphasis on providing housing to lower income populations. | Ongoing |
| **Long Term Affordability** – Use techniques, such as land trusts or property encumbrance, to maintain long term affordability of housing receiving assistance. | Ongoing |
| **Housing and Industrial Bond Policies** – Use policies to leverage affordable housing beyond minimums required by law and to generate revenue to support affordable housing efforts of the HRA. | Ongoing |
| **Transitional/Emergency Housing** – Encourage local social service agencies to develop a transitional housing facility in Plymouth that targets individuals and households at the lower end of the income spectrum. | Medium |
| **Housing Maintenance Education** – Develop a voluntary education and inspection program for existing housing, with rehabilitation assistance for income-qualified residents. | Medium |
| **Housing Maintenance** – Continue to provide technical assistance and, as a lender of last resort, financial assistance to townhome and condominium associations to maintain and renovate low and moderate cost older buildings. | Ongoing |

| *Description* | *Timing* |
|---|---|
| **Rental Housing License Program** – Continue to enforce life safety and other minimum housing standards for all rental units in the city. | Ongoing |
| **Legislative Initiatives** – Encourage and support legislative initiatives that provide incentives and eliminate disincentives and penalties for cities to assist affordable housing (e.g., tax increment financing and fiscal disparities). | Ongoing |
| **Property Taxes** – Support equity in property taxation for non-homestead residential (rental) properties. | Ongoing |
| **Fair Housing** – Continue to support and publicize fair housing programs and policies. The City will consider the adoption of a local Fair Housing Policy. | Ongoing/ Short |

Appendix Chapter 4A

# HOUSING CHARACTERISTICS

## AGE OF POPULATION

The population of Plymouth, as well as the metropolitan region, is aging. The Metropolitan Council's Thrive MSP 2040 plan predicts that one in five residents will be age 65 and older in 2040, compared to one in nine in 2010. While the population is aging, Plymouth still remains an attractive community to younger households desiring a convenient location in the Twin Cities with quality housing, natural amenities, highly rated schools, good public services and recreational opportunities.

The change in the age distribution of Plymouth residents between 2000 and 2010 illustrates how a city's population can change over time (Table 4A-1). In the ten-year period between 2000 and 2010, the largest percentage population increase occurred among older adults ages 55 and over, while the younger age groups of (0-4) and (5-14) declined for the first time. The decline in the younger population is not unique to Plymouth and is one that is being seen nation-wide. It is important to note that the younger age group decline from 2000 to 2010 is somewhat mitigated when viewing the 2014 American Community Survey five-year estimates. These combined numbers for the age groups 0-4 and 5-14, while still below 2000 figures, did rise somewhat. This indicates that in the period between 2010 and 2014, Plymouth's younger population was growing. This is most likely related to the desirability of single-family homes in the northwest section of the city and the high quality schools in the area.

From 1990 to 2000, the 35-44 age group saw a 28 percent increase, however, this age group experienced a decrease of 23 percent or just over 3000 persons from 2000 to 2014. This data will be important to monitor as Plymouth plans for future housing.

During the same time period, the greatest percentage increase was in persons over 65. During the period covered by this plan, the City expects to see continuing increases in the number of older residents. As the families that moved to Plymouth age, the parents will become empty nesters and begin to retire, and their children will become young, independent adults. Both groups will need housing that is affordable and appropriate to their needs, including supportive living arrangements.

TABLE 4A-1
CHANGE IN AGE DISTRIBUTION

| Age Range | 2000 Total | 2010 Total | Change | % Change | 2014 ACS 5-year |
|---|---|---|---|---|---|
| 0 to 4 | 4,595 | 4,202 | (393) | -8.5% | 4,436 |
| 5 to 14 | 10,334 | 9,462 | (872) | -8.4% | 9,276 |
| 15 to 24 | 7806 | 8,101 | 295 | 3.8% | 7,578 |
| 25 to 34 | 9,068 | 9,566 | 498 | -5.5% | 10,610 |
| 35 to 44 | 12,647 | 9,522 | (3,125) | -24.7% | 9,698 |
| 45 to 54 | 10,622 | 11,899 | 1,277 | 12% | 11,589 |
| 55 to 64 | 5,835 | 9,307 | 3,472 | 59.5% | 10,077 |
| 65 + | 4,987 | 8,517 | 3,530 | 70.8% | 9,604 |
| **Total** | **65,894** | **70,576** | **-** | **-** | **72,868** |

Source: 2000, 2010 U.S. Census and 2010-2014 ACS 5-Year Estimates

## HOUSEHOLD STRUCTURE

Over the past 30 years, the size and make-up of families has changed nationally as well as in Plymouth. From 2000 to 2010, family households overall grew by 1,576, however, married couple families grew by less than half that number at 738. Married couple families with children under 18 years of age saw the largest decline of all householder categories, losing 988 during the decade. As would be expected, non-family households saw one of the largest increases, growing by 2,267, of which the vast majority were one-person households.

In 2010, Plymouth had a higher percentage of its population in family households than in non-family households. As the population continues to age and as trends in the formation of more non-traditional families in Hennepin County continue, the City can expect more non-traditional families and non-family households.

TABLE 4A-2
CHANGES IN HOUSEHOLD TYPE

| Household Type | 2000 | 2010 | Change | % Change |
|---|---|---|---|---|
| Family Households | 17,555 | 19,230 | 1,675 | 9.5% |
| Married couples | 15,089 | 15,926 | 837 | 5.5% |
| - With related children under age 18 | 7,844 | 6,955 | (889) | -8.9% |
| - No related children under age 18 | 7,245 | 8,971 | 1,726 | 23.8% |
| Male householder, no wife present | 592 | 869 | 277 | 46.8% |
| - With related children under age 18 | 327 | 477 | 150 | 45.9% |
| - No related children under age 18 | 265 | 392 | 127 | 47.9% |
| Female householder, no husband present | 1,874 | 2,435 | 561 | 18.1% |
| - With related children under age 18 | 1,268 | 1,498 | 230 | 18.1% |
| - No related children under age 18 | 606 | 937 | 331 | 54.6% |
| Non-family households | 7,166 | 9,433 | 2,267 | 31.6% |
| 1-person | 5,402 | 7,569 | 2,167 | 40.1% |
| 2 or more persons | 1,764 | 1,864 | 100 | 5.7% |
| **Total** | **24,721** | **28,663** | **3,942** | **15.9%** |

Sources: 2000 and 2010 U.S. Census

Over the past 40 years, the average household size in Plymouth has decreased from 3.9 persons to 2.4 persons. It is expected to remain at or near 2.4 persons through 2040 (Table 4A-3). The decrease in average household size reflects a combination of lower birth rates, an increasing number of empty nester households and an increasing number of single person households. The Metropolitan Council projections suggest that household size will begin to stabilize through 2040. Both the changes in household structure and household size will have an effect on the type of housing needed in Plymouth in the future.

TABLE 4A-3
HOUSEHOLD SIZE TRENDS

| Year | Population | Households | Household Size |
|---|---|---|---|
| 1970 | 18,077 | 4,645 | 3.9 |
| 1980 | 31,615 | 10,491 | 3.0 |
| 1990 | 50,889 | 18,361 | 2.8 |
| 2000 | 65,894 | 24,820 | 2.6 |
| 2010 | 70,576 | 28,663 | 2.4 |
| 2020* | 77,200 | 31,800 | 2.4 |
| 2030* | 81,400 | 33,400 | 2.4 |
| 2040* | 85,100 | 34,700 | 2.5 |

Sources: U.S. Census; *Metropolitan Council

## OWNER-OCCUPIED AND RENTER HOUSING

Younger individuals or couples, who are still at the early stages of their earning potential, will likely begin as renters and move to home ownership at some point. Similarly, retired individuals or couples

may wish to sell their homes in favor of renting or owning in a complex where they will need to do little or no maintenance. As the city's population continues to age and as the city's children grow to young adults, rental housing will continue to be in demand.

According to Hennepin County, there were 31,451 housing units in Plymouth in 2016. Of these, 21,491 were owner-occupied homesteads (68 percent) and 9,960 units were rental units (32 percent). Plymouth's ratio of 68/32 percent is similar to many other metro communities and is almost identical to the previous ten-year period.

## HOUSING TYPES

As of December 2015, detached homes, including single family, mobile homes, farmhouses and seasonal homes, represented 53 percent of the housing stock. Multiple family housing, including duplexes, townhomes and apartments, represented 47 percent (Table 4A-4). At the present time, Plymouth has a balanced housing stock.

### TABLE 4A-4
### HOUSING STOCK

| Type of Housing | Number of Dwelling Units | Percent of Total |
|---|---|---|
| Single Family | 16,656 | 53% |
| Mobile Homes | 60 | 0.2% |
| Farm Houses | 3 | 0.0% |
| Seasonal Homes | 5 | 0.0% |
| **Total Detached Housing** | 16,724 | 53.2% |
| Apartments | 7,168 | 22.8% |
| Other Multiple Housing | 7,559 | 24.0% |
| **Total Multiple Housing** | 14,727 | 47.0% |
| **Total Housing Stock** | 31,451 | 100.0% |

Source: Hennepin County

## SENIOR HOUSING

Senior housing is one of the fastest growing segments in the housing industry, due to an aging population both nationally and locally. Over the past ten years, the City has added over 400 new units specifically designed toward an aging population. Plymouth Towne Square was the first apartment complex in the city specifically for seniors. The Plymouth Housing and Redevelopment Authority (HRA) opened Plymouth Towne Square in the Fall of 1994. The complex reached full occupancy in 1995. It provides affordable housing options for 130 residents. This complex continues to have a waiting list of over 100

applicants, which is an indication of the need for more housing of this type in Plymouth. The Plymouth HRA opened Vicksburg Crossing in 2006 to provide additional affordable, independent options. Vicksburg Crossing is a 96-unit independent senior facility that offers a mix of affordable and moderate rate units. One-third of the units are set aside for low-income seniors. The remaining two-thirds are offered at moderate rate levels. This property also maintains a waiting list.

Based on discussions with senior housing providers, projects in Plymouth have rented or sold in short timeframes. Examples include Gramercy Park Cooperatives, Bassett Creek Commons, Alterra Clare Bridge, Cornerstone Commons Cooperative, The Waters of Plymouth, Trillium Woods, Cherrywood Pointe and Summerwood assisted living.

## SPECIAL NEEDS HOUSING

Special needs housing encompasses a diverse set of populations: those who are older and frail; those with mental and/or physical disabilities; those with mental illness or chemical health issues; and those who are in need of temporary or transitional housing due to major changes or losses in their lives.

For many years, Hammer Residences has operated a successful housing and service program for mentally and physically challenged adults in small group homes and apartments scattered throughout the community. The organization houses 103 clients at 15 locations in Plymouth. Demand for this program is growing, and Hammer has indicated that it would like to develop more homes in the community.

Plymouth has a need for housing designed to be accessible for disabled persons. The City and the HRA have actively promoted and supported more accessible housing in the community. The HRA, in partnership with Habitat for Humanity, provided financial assistance for the construction of a four-unit townhome project with one accessible unit and currently owns one rental unit that is fully accessible.

## HOUSEHOLD INCOME

The federal and state governments have long used household income as a key measure for eligibility for housing programs. Eligibility is based upon extremely low-, very low-, and low-income categories defined as follows:

- An extremely low-income household has an income no greater than 30 percent of the median income of the county or metropolitan area, as adjusted for household size. In 2016, an extremely low-income four-person household was one with an income of $25,750 or less.
- A very low-income household has an income between 31 and 50 percent of the median income of the county or metropolitan area, as adjusted for household size. In 2016, a very low-income four-person household was one with an income between $25,751 and $42,900.
- A low-income household has an income between 51 and 80 percent of the median income of the county or metropolitan area, as adjusted for household size. In 2016, a low-income four-person household was one with an income between $42,901 and $65,700.

According to the 2015 American Community Survey, which is the most current available, the median family income for Plymouth was $85,418. This was higher than the comparable figures for Hennepin County and the metropolitan area of $65,834 and $75,172,000, respectively. Given the cost of housing built in the city over the past ten years, it is reasonable to assume that the median income in Plymouth still far exceeds the metropolitan area median income. While housing affordability is not an issue for the majority of Plymouth's households, the 2000 Census indicated there were 1,679 persons in Plymouth with incomes below the poverty line, which was 2.6 percent of the city's population. The 2015 American Community Survey indicated an increase in persons with incomes below the poverty line. The data indicate that this figure has increased to 4,219 or 5.8 percent of the city's population. Of those below the poverty line, four percent were age 65 and older, 10 percent were children under the age of 18, and 31 percent were female heads of household living with children under 18 years old.

## HOUSING COST AS PERCENT OF INCOME

Tables 4A-5 and 4A-6 show the relationship of housing cost and income for people living in Plymouth. Data from the 2009-2013 Comprehensive Housing Affordability survey indicate that there were 2,875 renter households in Plymouth with incomes less than 80 percent of the area median income that were paying more than 30 percent of household income for housing. These households would qualify as needing affordable rental housing based on Metropolitan Council guidelines. Data from this same survey indicate there were 2,310 homeowners with incomes less than 80 percent of the area median income in Plymouth who were paying more than 30 percent of household income for housing. These households would also be classified as needing affordable housing based on Metropolitan Council guidelines. Based on trends cited in this appendix, including an aging population and an increase in the number of non-

traditional families, it is reasonable to conclude that the number of households that would qualify as needing affordable housing has not declined in the past 10 years and more likely has increased.

TABLE 4A-5
RENTERS PAYING MORE THAN 30 PERCENT OF INCOME FOR HOUSING

| | Household Type | | | | |
|---|---|---|---|---|---|
| Income by % of Area Median Income | Elderly 1 & 2 persons (62 +) | Small Related (2-4 persons) | Large Related (5+ persons) | All Other | Total |
| 0 – 30% | 95 | 525 | 60 | 340 | 1,020 |
| 31 – 50% | 25 | 460 | 20 | 380 | 885 |
| **Total: 50% or less** | **120** | **985** | **80** | **720** | **1,905** |
| 51 – 80% | 180 | 350 | 30 | 410 | 970 |
| **Total: 80% or less** | **300** | **1,335** | **110** | **1,130** | **2,875** |
| Over 80% | 15 | 79 | 0 | 135 | 229 |
| All Households | 315 | 1,414 | 110 | 1,265 | 3,104 |
| Percent | 10% | 45% | 4% | 41% | 100% |

Source: Comprehensive housing affordability strategy data (CHAS), 2009-2013

TABLE 4A-6
HOMEOWNERS PAYING MORE THAN 30 PERCENT OF INCOME FOR HOUSING

| Income by Percent of Area Median Income | Household Type | | Total |
|---|---|---|---|
| | Elderly 1 & 2 (under 62) | All Other | |
| 0 - 30% | 510 | 330 | 840 |
| 31 - 50% | 165 | 285 | 450 |
| 51 - 80% | 405 | 615 | 1,020 |
| **80% or below** | **1,080** | **1,230** | **2,310** |
| Over 80% | 355 | 1,405 | 1,760 |
| All Households | 1,435 | 2,635 | 4,070 |
| Percent | 35% | 65% | 100% |

Source: CHAS data, 2009-2013

## HOUSING COSTS

According to the Minneapolis Area Association of Realtors, Plymouth's median residential market value for single family housing increased from $225,000 in 2001 to $294,000 in 2007. While the recession affected housing prices throughout the nation, the market value has been increasing and Plymouth's market value has also been rising. Over the past five years, the City has seen 6.8 percent growth in the price of single family homes and a significantly larger 54.4 percent growth in apartment values.

Plymouth's median value for single family homes in 2016 was $325,000. In comparison, the median value during the same period for Hennepin County was $246,500 (see Map 4A-1 and 4A-2).

Annually, the Plymouth HRA conducts a survey of rental properties in the city. The 2016 survey indicated that the average monthly rents, including utilities, for one-, two- and three-bedroom unit apartments were $1,079, $1,308, and $1,533, respectively. This represents an increase in the one-bedroom units of 38.5 percent and increases in the two- and three-bedroom units of 21.5 percent and 7.2 percent, respectively, over a ten-year period. The survey also analyzed the average rent for townhomes and condominiums and found that the average rents for one-, two-, and three-bedroom units were $1,010, $1,470, and $1,762, respectively. This represents an increase of 44 percent for the one-bedroom units, 31.4 percent for the two-bedroom units, and 23 percent for the three-bedroom units.

In 2006, the average rental vacancy rate was just under five percent. The industry considers five percent an acceptable vacancy rate in a balanced market. In the City's 2016 rent survey, the vacancy rate was about two percent, which is far below the industry standard and indicates that there may still be a need to build additional attached rental products in Plymouth.

## HOUSING AND EMPLOYMENT RELATIONSHIP

Plymouth has always been an attractive community for business due to its proximity to downtown Minneapolis and major highway access. In 2010, the Minnesota Department of Employment and Economic Development (DEED) indicated there were 45,881 jobs in the city. This figure has grown over the past six years and at the end of 2016 there were 51,484 jobs, which is an increase of 12 percent. Plymouth is also a net importer of jobs with more than 10,000 more people commuting into the city than there are Plymouth residents in the labor force. Due to the high number of jobs in the city, it will be important for employers to be assured there is a broad mix of housing options in the community to provide options for their employees.

## AVAILABILITY OF AFFORDABLE HOUSING UNITS

Table 4A-7 shows the number of affordable housing units in Plymouth based on information gathered by the Metropolitan Council and broken down into three bands of affordability. Plymouth had a total of 12,818 affordable units, which is about 41 percent of the city's housing stock.

From 2010 through 2015, 67 rental units and 15 ownership units were constructed that were affordable to households within the Metropolitan Council's affordability limits.

Between 2021 and 2030, the Metropolitan Council estimates that there will be a need for 37,900 new affordable housing units in the sewer-serviced portion of the metropolitan area. Plymouth's share of this figure is 679 units (Table 4A-8). In vacant areas guided LA-3, LA-4 and MXD-R, the City is providing the opportunity for the construction of 736 affordable units (Table 4A-9). Because of the greater availability of subsidies from federal and state sources for rental housing as compared to ownership housing, Plymouth has a better chance of increasing its supply of affordable rental housing. The high cost of land in Plymouth presents a significant challenge for the development of affordable owner-occupied housing.

TABLE 4A-7
AFFORDABLE HOUSING UNITS IN PLYMOUTH

| Units affordable to households with income at or below 30% of AMI | Units affordable to households with income 31% to 50% of AMI | Units affordable to households with income 51% to 80% of AMI |
|---|---|---|
| **878** | **2,607** | **9,333** |

Source: Metropolitan Council

TABLE 4A-8
AFFORDABLE HOUSING NEED ALLOCATION

| Income Range | Number of Units |
|---|---|
| At or Below 30% AMI | 369 |
| From 31 to 50% AMI | 219 |
| From 51 to 80% AMI | 91 |
| Total Units | 679 |

Source: Metropolitan Council
AMI = Area Median Income

Table 4A-9
LAND GUIDED TO MEET AFFORDABLE HOUSING NEED

| Land Use | 2021-2030 Acreage | Number of Affordable Units |
|---|---|---|
| Medium Density Residential (6-12 du/ac) | 20.1 | 120 |
| High Density Residential (12-20 du/ac) | 13.5 | 162 |
| MXD-R (12-25 du/ac) | 34.3 | 411 |
| | | |
| Underutilized LA-4 guided property | 3.6 | 43 |
| | 71.5 | 736 |

Source: City of Plymouth

## SUBSIDIZED HOUSING UNITS

At the end of 2015, there were 779 units of rental housing in Plymouth that were publicly subsidized or had income/rent restrictions due to their specific type of financing.

While the actual number of units has increased, the HRA's HUD Housing Choice Voucher Program (Section 8) has experienced a decline in the pool of rental units accessible to low-income clients with Section 8. This is a result of higher rents in the community and fewer landlords willing to accept vouchers. As of January 2016, there were 357 households in private rental housing in Plymouth receiving Section 8 assistance. The HRA opened its Section 8 waiting list in the fall of 2017 for new applicants. There are currently 500 names on the list. The waiting list is a good indicator that there is strong unmet need for subsidized housing in the community. Table 4A-10 breaks out the publicly subsidized units by category type.

### Table 4A-10
### PUBLICLY SUBSIDIZED HOUSING UNITS BY CATEGORIES

| Category | Number of Affordable Units |
|---|---|
| Senior housing units | 133 |
| Housing for people w/disabilities | 15 |
| Other units | 631 |
| Total | 779 |

## BARRIERS TO DEVELOPMENT OF AFFORDABLE HOUSING

The private market on its own has not provided the number of affordable units, either owner-occupied or rental, needed in Plymouth or within the metropolitan region. There are barriers to the development of affordable housing, some of which are within the City's control and some are not. Many of these barriers increase the cost of development and dissuade developers from undertaking affordable housing development projects.

Barriers to affordable housing beyond the City's control include:

- Steady increase in land prices. The 1995 average residential lot with public improvements sold for $50,000 to $60,000. Since then, prices have increased and the average new (improved) lot is selling between $160,000 and $250,000.

- Construction costs have been rising steadily over the past 10 years. These increases make it more difficult to provide affordable units through new construction.
- Much of the city's remaining vacant land is encumbered by wetlands, poor configuration, poor access and/or poor soil conditions, requiring construction that is more expensive and often spreading the development costs over fewer housing units.
- Most of the remaining vacant land is in the northwest area of the city where there are no major roads and limited opportunity for commercial development that would lead to job creation. Consequently, there are few areas that would meet location criteria for higher density housing.
- There is limited transit funding available to assist in the expansion of public transportation to accommodate potential users in the city's developing areas.
- The 1986 federal income tax reforms, which eliminated a number of tax incentives that encouraged investment in rental housing, continue to have a lasting effect on the creation of new rental housing, particularly for low and moderate income households.

There are barriers to the development of affordable housing the City could potentially influence that impact the cost of development. Included among these barriers are the amount of land guided and zoned for various types and densities of residential use, development fees, public improvement standards such as required street width and utility construction specifications, and development regulations such as park dedication fees, tree preservation and wetland buffers.

While all of these items affect development costs, they are also important tools to ensure that Plymouth is well planned and provides sound infrastructure and equitable amenities throughout the community. Reducing certain standards and/or reducing or waiving fees would produce trade-offs that could result in higher long-term infrastructure and maintenance costs as well as negatively affect quality of life amenities such as parks. For example, not charging adequate fees to build parks and trails initially could put the City in the position of having to raise property taxes over the long-term to provide them. Similarly, the City may have to assess property owners prematurely to repair or replace infrastructure that was not initially built to public improvement standards.

## AGE OF HOUSING STOCK

The number of housing units built in Plymouth began rising in the 1970s and increased dramatically in the 1980s. The 1990s saw a slight downward trend that has continued through the present time as the city becomes more developed and less land is available. As of 2016, approximately 67 percent of Plymouth's housing stock was less than 35 years old, and 41 percent was less than 25 years old (see Table 4A-11). As the figures in the table indicate, growth in residential housing stock in Plymouth is declining, and the City will soon be fully developed. Consequently, the age of housing will become more of a factor in maintaining and providing affordable housing (see Map 4A-3).

### TABLE 4A-11
### AGE OF HOUSING STOCK

| Year Built | Number of Dwelling Units | Percent of Total |
|---|---|---|
| 1939 or earlier | 311 | 0.99% |
| 1940 to 1959 | 1,158 | 3.68% |
| 1960 to 1969 | 2,993 | 9.52% |
| 1970 to 1979 | 5,901 | 18.76% |
| 1980 to 1989 | 8,318 | 26.45% |
| 1990 to 1999 | 6,671 | 21.21% |
| 2000 to 2009 | 4,264 | 13.56% |
| 2010 to 2016 | 1,835 | 5.83% |
| Total | 31,451 | 100.00% |

Source: Hennepin County

## HOUSING AGE AND AFFORDABILITY

The Plymouth housing market has seen a rapid increase in values since the last comprehensive plan. In 1999, 33 percent of the housing built prior to 1970 was considered affordable. Comparatively, only 12 percent of the housing built prior to 1970 was considered affordable in 2006 (Table 4A-12). As the housing stock ages, the need for maintenance and renovation of older homes may need to increase to increase their lifespan, which in turn will provide for a balance between more moderately priced existing homes and the more expensive newly built homes. The City may need to consider providing more housing assistance to owners of affordable rental and homesteaded units to ensure older units remain in good condition.

## TABLE 4A-12
## HOMESTEADED UNITS BY AFFORDABILITY AND YEAR BUILT

| Year Built | Affordable Units | | Other Units | | All Homesteaded Units | |
|---|---|---|---|---|---|---|
| | Value $0 to $211,500 | Percent | Value Over $211,500 | Percent | Total | Percent |
| Pre-1960 | 396 | 32% | 839 | 68% | 1,235 | 100% |
| 1960-1969 | 107 | 6% | 1,800 | 94% | 1,907 | 100% |
| 1970-1979 | 987 | 25% | 3,037 | 75% | 4,024 | 100% |
| 1980-1989 | 925 | 16% | 4,820 | 84% | 5,745 | 100% |
| 1990-1999 | 1,134 | 23% | 3,868 | 77% | 5,002 | 100% |
| 2000-2009 | 623 | 29% | 1,670 | 71% | 2,293 | 100% |
| 2010-2015 | 162 | 2% | 1,123 | 98% | 1,285 | 100% |
| Total | 4,334 | 20% | 17,157 | 80% | 21,491 | 100% |

Source: Hennepin County Assessor's Data, October 2016

Table 4A-13 identifies homesteaded affordable units by unit type and age. The data in this table illustrate that most of the newer affordable units are multiple family units. The cost of land in Plymouth will make it increasingly difficult to meet affordable housing needs with single family homes.

## TABLE 4A-13
## HOMESTEADED AFFORDABLE HOUSING UNITS BY UNIT TYPE AND YEAR BUILT

| Year Built | Multi-Family Units | | Single Family Units | | All Affordable Units | |
|---|---|---|---|---|---|---|
| | Number | Percent | Number | Percent | Total | Percent |
| Pre-1960 | 0 | 0% | 396 | 100% | 396 | 100% |
| 1960-1969 | 0 | 0% | 107 | 100% | 107 | 100% |
| 1970-1979 | 909 | 92% | 78 | 8% | 987 | 100% |
| 1980-1989 | 732 | 79% | 193 | 21% | 925 | 100% |
| 1990-1999 | 1,100 | 97% | 34 | 3% | 1,134 | 100% |
| 2000-2009 | 605 | 97% | 18 | 3% | 623 | 100% |
| 2010-2015 | 7 | 4% | 155 | 96% | 162 | 100% |
| Total | 3,353 | 77% | 981 | 23% | 4,334 | 100% |

Source: Hennepin County Assessor's Data, October 2016

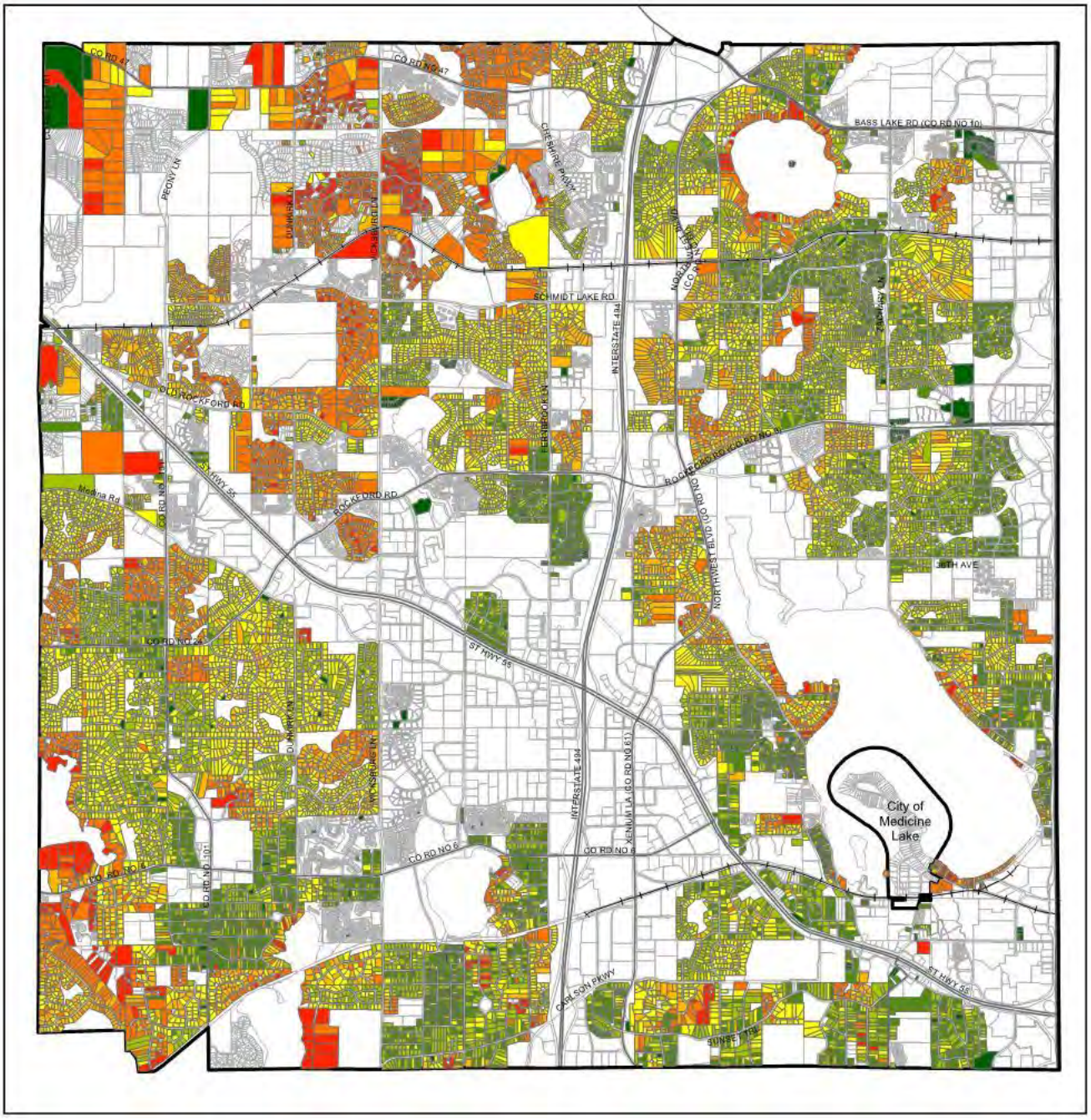



Figure 4A-1

# Residential Property Values

As of 9/27/2016

Source: Hennepin County Assessing Department

City of Plymouth

**Total Market Value**

- $0 - $150,000 (205)
- $150,001 - $243,500 (2684)
- $243,501 - $300,000 (3843)
- $300,001 - $400,000 (4816)
- $400,001 - $500,000 (2646)
- $500,001 - $700,000 (1799)
- $700,001 - $10,000,000 (386)
- Non Residential or No Value

N

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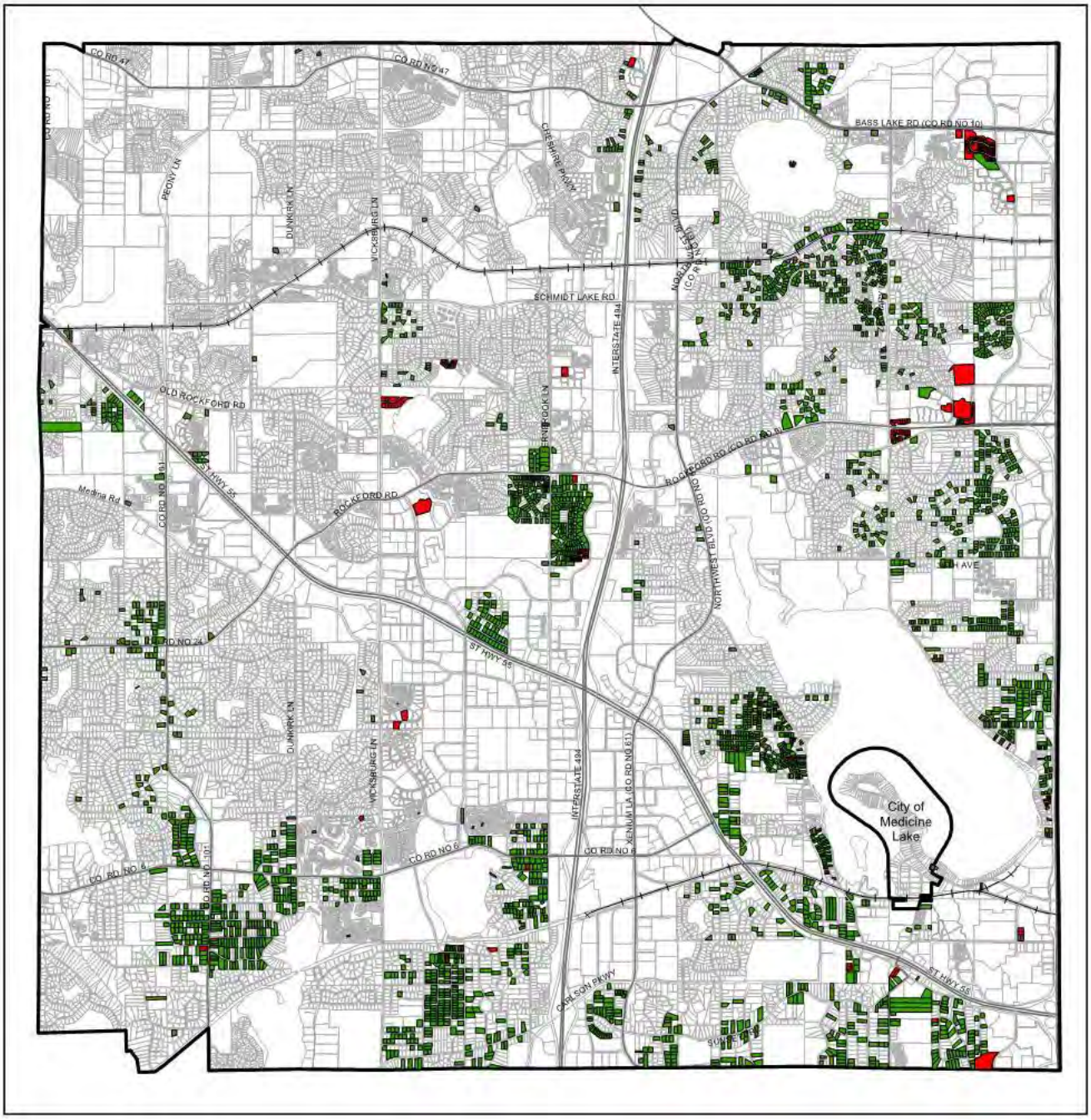



Figure 4A-2

## Residential Property Values

As of 9/27/2016

Source: Hennepin County Assessing Department

$150,000 and Under (205)

$150,001 - $243,500 (2684)

N

City of Plymouth

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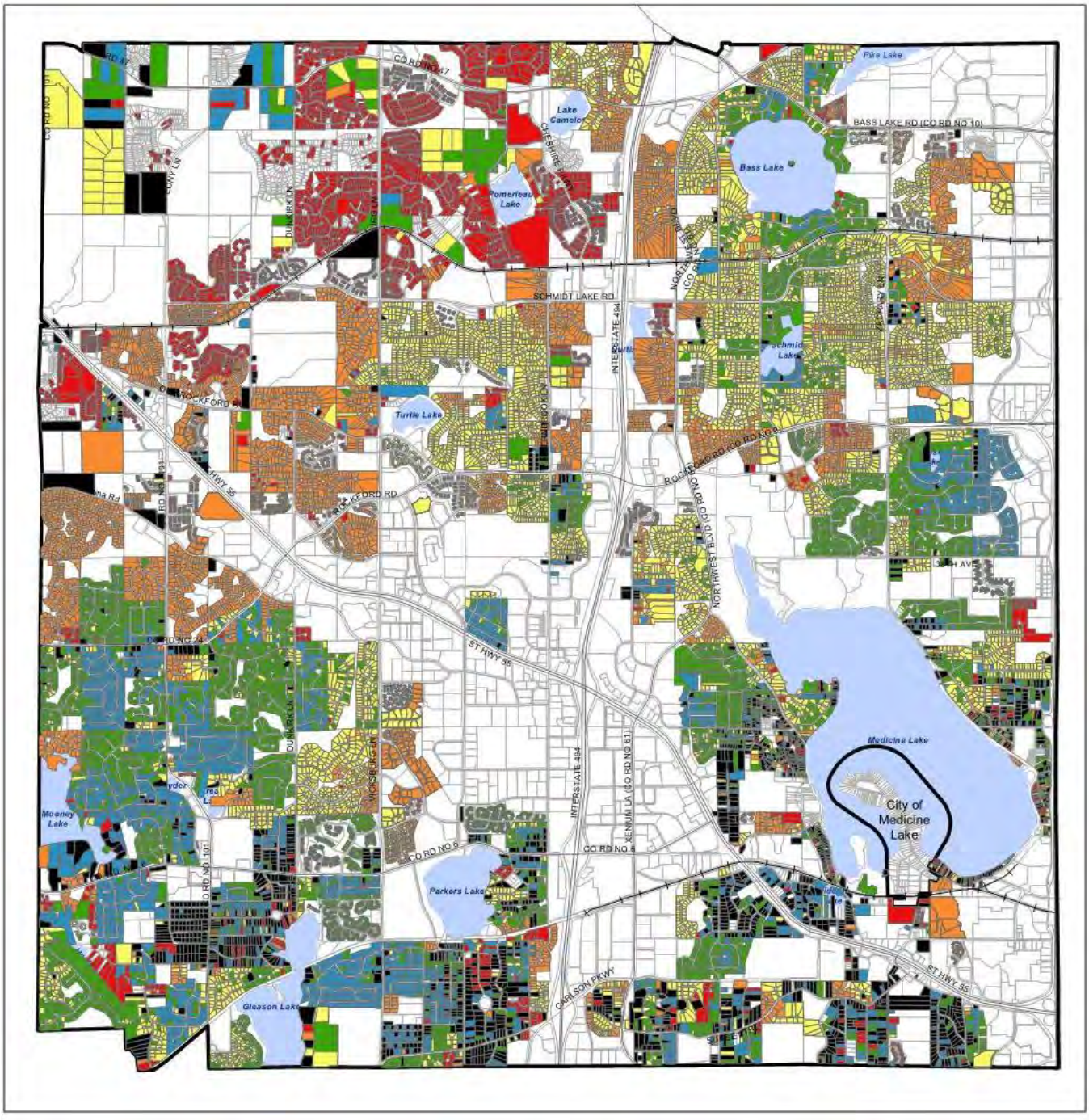



Figure 4A-3

# Year Built Residential Property

August, 2017
City of Plymouth

| | |
|---|---|
| Pre 1960 (1542) | 1981 - 1990 (6293) |
| 1961 - 1970 (2206) | 1991 - 2000 (5308) |
| 1971 - 1980 (4653) | 2001 - Present (4138) |
| | Non Residential or No Value |

*Year built according to Hennepin County Assessor records as of August 2016.

N

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Appendix Chapter 4B

# HOUSING PROGRAMS

## FINANCIAL ASSISTANCE FOR HOUSING CONSTRUCTION

Since 1990, the Plymouth Housing and Redevelopment Authority (HRA) has used local, state and federal funds to help develop about 923 units of housing for low- and moderate-income persons. The HRA has also used federal Community Development Block Grant (CDBG) funds to provide a variety of affordable housing and home rehabilitation programs aimed at homeowners, renters and people with special needs. In doing so, the HRA worked with homeowners and for-profit and non-profit developers. In addition, the HRA has worked with local lenders and the Minnesota Housing Finance Agency (MHFA) to make MHFA low- and moderate-income housing programs available in Plymouth.

The City has used housing revenue bonds to finance the development and renovation of rental housing in the community. The City has required developers using these bonds to provide a portion of their housing at affordable rents. This requirement goes beyond federal provisions that do not require affordable rents in all developments using this financing. When it is not feasible to provide units at affordable rents, developers have been required to make annual bond fee payments to the HRA to support affordable housing activities elsewhere in Plymouth.

Plymouth has also created tax increment finance (TIF) districts to assist with the development of workforce and senior housing. Over the past several years, the City and HRA have created TIF districts and financial assistance totaling more than $6.5 million that have resulted in the creation of 194 affordable units.

## SECTION 8 HOUSING CHOICE VOUCHER (HCV) PROGRAM

The Section 8 program provides housing subsidies for about 357 low-income households in Plymouth. The HRA has successfully increased the pool of rental units accessible to clients with Section 8 vouchers over the years. The HRA continually sets the payment standards above fair market rents. The rents for 2016, excluding utilities, are $769 for one-bedroom units, $935 for two-bedroom units and $1,239 for three-bedroom units.

At the present time there are 500 people on the waiting list for vouchers. The HRA last opened this waiting list for new applicants in the fall of 2017. The HRA generally opens the Section 8 waiting list every three to four years and typically receives about 2,000 inquires and subsequently places 300 new applicants on the waiting list. The HRA currently administers 30 mainstream vouchers as part of its allocation. The HRA also has 20 project-based vouchers and 22 Minnesota housing opportunities program (MHOP) units.

## FIRST TIME HOMEBUYER'S PROGRAM

The first time homebuyer's program has been instrumental in assisting low- and moderate-income persons to become new homeowners. From 1991 to 2006, about $3 million of Community Development Block Grant funds were spent in this program to assist 182 clients at 80 percent or less of area median income. The average assistance per homebuyer was $16,650. Since 2000, the Minnesota Housing Finance Agency has provided $29 million in first-time homebuyer program funds to assist 326 eligible homebuyers in Plymouth with below market rate financing and down payment assistance.

## SENIOR HOUSING

The City of Plymouth, through the HRA, has been active in providing senior housing options. The City uses its HRA property tax levy to subsidize rents for nearly all of the tenants at Plymouth Towne Square, a locally financed senior housing complex. In 2016, the total subsidy was $230,000. Of those people subsidized, 58 percent qualify as extremely low-income individuals (i.e. their income is at or below 30 percent of the area median income) and 37 percent as very low-income individuals (i.e. their income is between 31 percent and 50 percent of the area median income).

In 2006, the City opened its second senior building, Vicksburg Crossing. Vicksburg Crossing is a 96-unit independent living senior community. The property has 34 units that offer rents that are affordable to low-income households. The remaining 62 units are offered at a moderate income rate.

## HOUSING MAINTENANCE CODE

The City has a housing maintenance code that is enforced on a complaint basis for single family residences. City staff addresses an average of 46 maintenance code inspections annually and while most of the issues are addressed by the property owner, the HRA does offer assistance through home improvement loan and grant programs.

## RENTAL HOUSING MAINTENANCE CODE AND LICENSING PROGRAM

To address the condition of the rental housing stock, the City has adopted a rental housing maintenance code and rental housing licensing program. Through these programs, the City conducts periodic inspection of all rental housing to identify any building or code deficiencies that require building maintenance or renovation. These programs allow the City to continually monitor the condition of the City's rental housing stock and order owner compliance with the housing maintenance code.

## REHABILITATION FINANCING PROGRAMS

The HRA operates the CDBG-funded home rehabilitation program that provides no interest deferred loans that after 30 years become grants to low- and moderate-income homeowners. As of 2016, the home rehabilitation program had served a total of 176 city households since 1990. The average assistance to each household is $12,500 and the total dollar amount loaned is about $2.2 million.

The HRA has increased the use of home rehabilitation loan and grant programs operated by the Minnesota Housing Finance Agency and Hennepin County. Homeowners in Plymouth have received more than $1.7 million from these programs since 2000. This has increased the rehabilitation funding available to low- and moderate-income homeowners in Plymouth.

In addition, the City has assisted owners of private rental properties in need of renovation and repairs with tax-exempt federal housing revenue bond financing. As noted above, the City has used this program to require a portion of the units to have affordable rents or annual bond fee payments that go to the HRA to be used to assist in the development of affordable housing.

## HOUSING IMPROVEMENT AREAS

The City used the state housing improvement area statute to provide financing for a local homeowners association for needed building improvements to their affordable townhome development. The program included the replacement of siding and windows for more than 200 units spread throughout 57 separate buildings.

Under this program, property owners are levied the cost of the improvements on their property tax statements. These improvements can be paid off over time. The HRA also used housing assistance program funds from the Federal Home Loan Bank to pay a portion of the cost of the improvements for low-income homeowners in the development.

The City is open to using the housing improvement area statute in the future if and when a homeowners association makes a request and the City finds it appropriate to assist in the maintenance of the neighborhood.

CHAPTER 5

# Surface Water Management Plan

# TABLE OF CONTENTS


CHAPTER PURPOSE....1
WATER RESOURCE MANAGEMENT RELATED AGREEMENTS....2
*TABLE 5-1: Watershed Plan Status*....2
SURFACE WATER GOALS AND POLICIES....2
*Figure 5-1: Watershed Districts*....3
WATER BODY GOALS (STREAMS AND LAKES)....9
*TABLE 5-2: Shallow Lakes With Approved TMDLS*....9
*TABLE 5-3: Deep Lakes With Approved TMDLS*....10
*TABLE 5-4: Streams With Approved TMDLS*....11
EXISTING AND PROPOSED PHYSICAL ENVIRONMENT AND LAND USE....11
TOPOGRAPHY....11
LAKES, WETLANDS, AND PONDS....12
*TABLE 5-5: Lake Data Summary*....12
SOILS....12
WATERSHEDS....12
*TABLE 5-6: Watersheds*....13
*Figure 5-2: Wetlands & Water Quality Ponds*....14
*Figure 5-3: Soil Classifications*....15
CLIMATE....16
ASSESSMENT OF EXISTING OR POTENTIAL WATER RESOURCE RELATED PROBLEMS....16
*Figure 5-4: Subwatershed Boundaries*....17
*TABLE 5-7: Plymouth Impaired Waters*....18
IMPLEMENTATION PLAN....19
*TABLE 5-8: Official Controls*....20


# LIST OF APPENDICES


5A SURFACE WATER PLAN AMENDMENT PROCEDURES
5B PLYMOUTH SURFACE WATER MANAGEMENT PLAN

# Chapter 5

# SURFACE WATER

## CHAPTER PURPOSE

Federal and state law, including the federal Clean Water Act (1972) and its subsequent updates, as well as the Metropolitan Surface Water Management Act (1982) set the foundation for surface water and non-point source pollution treatment.

As Plymouth continues to grow, develop, and redevelop, urbanization will continue to impact the quality of ponds, wetlands, streams and lakes. The City Council, with assistance from the Environmental Quality Committee (EQC) has revised the City's 2008 surface water management plan to comply with the rules and requirements of the 3rd generation plans (Minnesota Statute 103B.235) of each watershed management organization (WMO) within the city (Bassett, Elm, Minnehaha, Shingle) and the Board of Soil and Water Resources (Minnesota Rule 8410). The Metropolitan Council also has a role in water resources management at the local level. Current Metropolitan Council goals and policies pertaining to water management are addressed in their 2040 water resources management policy plan. This plan includes a significant water quality goal – that the quality of water leaving the metropolitan area be as good as the quality of water entering the area and be in compliance with state and federal regulations. The City of Plymouth's strategy for improving water quality focuses on pollution prevention first and storm water treatment second. The plan goes beyond reacting to problems after they occur by implementing proactive programs and policies to protect surface water. The City annually assesses the condition of water resources and develops strategies for achieving realistic, attainable, implementable and affordable goals. This plan utilizes environmental and water resource inventories, monitoring data, citizen input, ordinances and other available information to work towards achieving the goals. The plan is the framework for implementation of best management practices (BMPs), programs and policies to manage surface water and to meet goals established for water resources in the future.

Over the next 10 years, the City anticipates a transition from a majority of development projects to a majority of redevelopment projects. The plan focus will continue to be on problems associated with increased runoff volumes, sedimentation and storm water discharge into city lakes and wetlands.

## WATER RESOURCE MANAGEMENT RELATED AGREEMENTS

The purpose of the Metropolitan Surface Water Management Act (1982) is to reduce, to the greatest practical extent, public expenditures related to quantity of storm water runoff. Responding to the state mandate, each watershed unit in the metropolitan area was charged with completing a watershed management plan. As a result, numerous watershed management organizations (WMOs) were formed, either as formal watershed districts or as Joint Powers Agreement WMOs. Each watershed in turn requires the preparation of local or community watershed plans to achieve consistency in water resources management.

Minnesota Rules Chapter 8410 (BWSR, 1992) were promulgated to provide additional direction to WMOs and to ensure the incorporation of water quality and wetland components into watershed plans. There are four WMO's affecting Plymouth (Table 5-1). Watershed boundaries are identified in Figure 5-1.

### TABLE 5-1
### WATERSHED PLAN STATUS

| Watershed Management Organization | Original Plan Approval | Current Plan Approval |
|---|---|---|
| Bassett Creek | July 26, 1989 | September 17, 2015 |
| Elm Creek | May 25, 1990 | October 14, 2015 |
| Minnehaha Creek | May 26, 1993 | July 5, 2007 |
| Shingle Creek | April 25, 1990 | April 11, 2013 |

## SURFACE WATER GOALS AND POLICIES

### CITY-WIDE GOALS

#### Water Quantity (i.e., Flood Control): Reduce the potential for flooding and minimize related public capital and maintenance expenditures necessary to control excessive volumes and rates of runoff.

- Constructed detention ponds should be relied on to limit runoff to pre-development flow rates and to control downstream flooding where feasible; natural basins and green corridors may also be used.

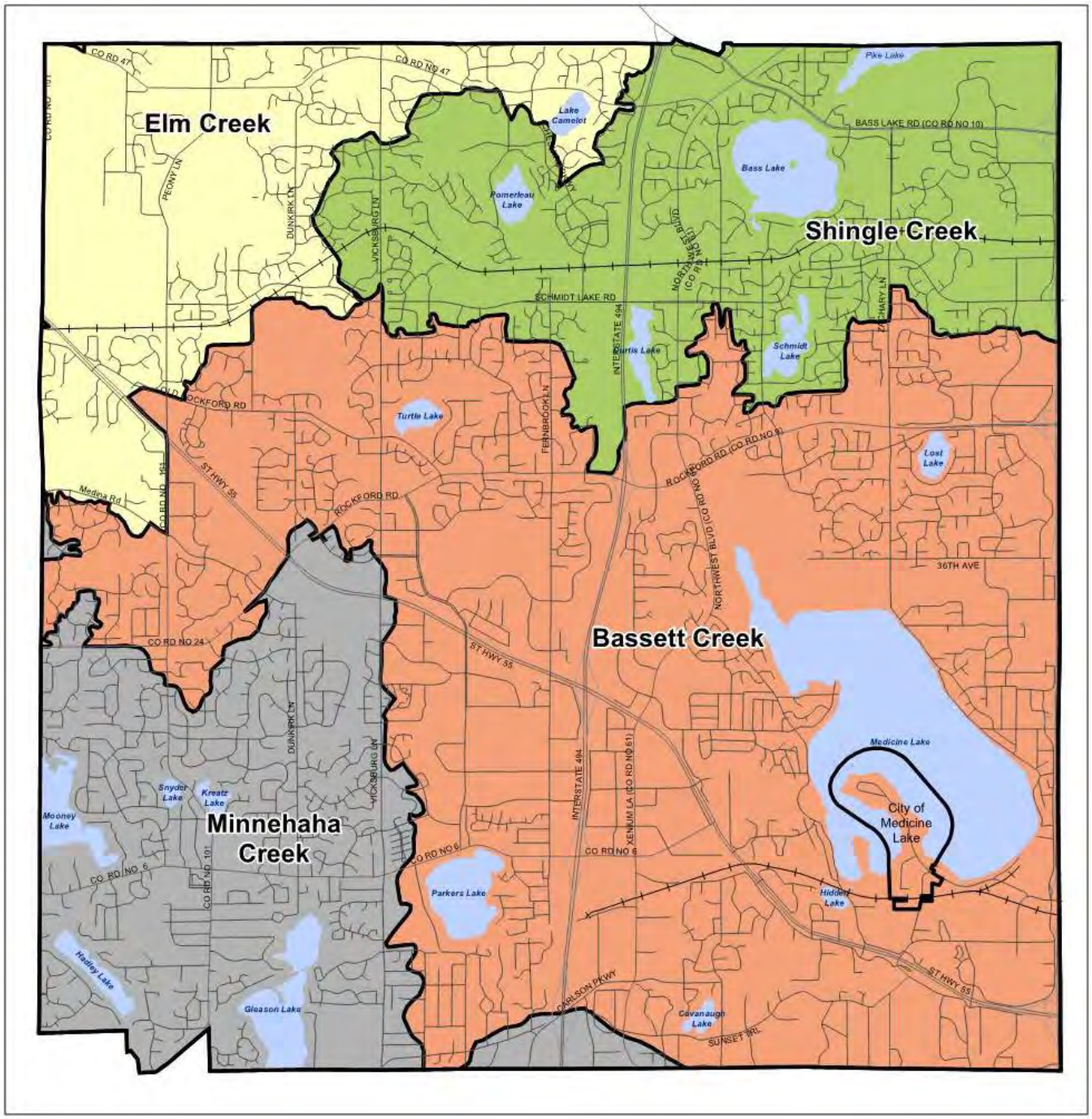



Figure 5-1

## Watershed Boundaries

As of 2/26/2016

- Bassett Creek Watershed Management Organization
- Elm Creek Watershed Management Organization
- Minnehaha Creek Watershed District
- Shingle Creek Watershed Management Organization

N

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October, 2017
City of Plymouth

- In northwest Plymouth, the Elm Creek stream flows will be limited to pre-development in-stream flow rates.
- The City encourages regional detention areas, whenever practical.
- Emergency overflows, outlets to drainage systems or other provisions shall be provided if the available storm water storage capacity is inadequate to prevent flooding of adjacent structures.
- Encroachment into the flood plain and flood way (volume) below 100-year flood levels shall be prohibited without mitigating action that will preserve the storage capacity, prevent a surcharge in the flood profile, and minimize excessive velocities.
- The minimum building elevation (lowest floor opening) for all structures must be two feet above the established 100-year water level in accordance with Plymouth engineering guidelines.
- Increased volumes of runoff due to development or redevelopment should be minimized by limiting impervious cover and encouraging infiltration of storm water where soil conditions are appropriate or modifiable.
- The City shall promote the use of alternative landscape techniques and materials to reduce rates and volumes of runoff and may require maintenance agreements for such features.
- The City shall acquire easements covering ponds, wetlands, flood plains, streams, and ditches as part of land development proposals.
- The City shall maintain the drainage system for flood prevention and water flow including excavation, facility management, stream and channel restoration, and removal of debris obstructing water conveyance facilities.
- The City shall promote disconnection of on-site impervious surfaces to the City's drainage system.

## Water Quality: Achieve water quality standards in lakes, streams, and wetlands, consistent with intended use and classification.

- The City accepts the Minnesota Pollution Control Agency's minimal impact design standards (MIDS), or an approved equal as the approved water quality design standard for new, redevelopment and linear projects within the City. Adopting MIDS will help to achieve water quality standards and meet total maximum daily load (TMDL) allocations for shallow and deep lakes, streams and creeks. The emphasis of

MIDS is on keeping the raindrop where it falls in order to minimize storm water runoff, pollution and preserving our natural resources. MIDS along with the Wetland Conservation Act (WCA) will help to keep wetlands consistent with their intended use and classification.

- All volume control practices and site design specifications shall conform to the current version of the Minnesota Stormwater Manual.
- Whenever possible, all development projects shall be designed using the better site design techniques of the current version of the Minnesota Stormwater Manual.
- The City shall maintain a response plan to minimize the impact of hazardous spills in accordance with the current version of the Minnesota Pollution Control Agency's MS4 Permit.
- The City shall supplement its regulatory approach with an education-based approach to achieve proper yard care measures that will reduce nutrient loadings to lakes, creeks and wetlands and to reduce the impacts of animal waste.
- The City shall promote the reduction or minimization of impervious areas.
- The City will balance protection of wetlands, use of wetlands to protect the water quality of other water resources (i.e. other wetlands, lakes, streams), and use of wetlands to provide flood control.
- The City shall promote the use of alternative landscape techniques and materials to reduce negative water quality impacts.
- The City will manage its properties in accordance with appropriate and innovative BMPs as an example for its citizens.
- The City requires that NOAA Atlas 14, Volume 8 be used to calculate precipitation amounts and storm water runoff rates.

### Erosion Control: The City will minimize the loss of soil into wetlands, lakes, streams and creeks through plan review, education, enforcement and management.

- All erosion and sediment control requirements shall conform to the current requirements of the Minnesota Pollution Control Agency's General Permit for Small Municipal Separate Storm Sewer Systems (Permit No. MNR040000), the Minnesota Pollution Control Agency's general permit for construction activity under the National Pollutant Discharge Elimination System/State Disposal System Program (Permit No. MNR10001) and the Minnesota Stormwater Manual.

- Erosion control plans shall be required for grading activities in excess of 50 cubic yards or 10 cubic yards in a shoreland district.
- The City shall continue implementing an erosion control enforcement program for all properties in Plymouth. New, redevelopment and linear projects will receive a higher priority than single family homes.
- The City shall use regulatory measures to control erosion and sediment to extend the effective life of water resource facilities and to reduce pollutant loadings.

### Wetlands: The City will administer the State Wetland Conservation Act, consistent with the rules of the Minnesota Board of Water and Soil Resources.

- Maintain the amount of wetland acreage and improve the wetland functions and values within the city, where feasible.
- The City shall administer wetland protection and mitigation in accordance with the Minnesota Wetland Conservation Act, as amended, and the City's wetland regulations.
- For development which creates more than 1.0 acre of impervious surface, water quality treatment must be provided prior to discharge to wetlands.
- The City requires treatment of storm water runoff prior to discharge to wetlands on sites where treatment of storm water is required.
- The City will encourage the use of wetland banking as the primary means to satisfying wetland mitigation requirements.

### Public Participation, Information and Education: The City will continue to increase public involvement and knowledge in management and protection of water resources through public participation and education.

- The City will use a public involvement process in resource management decision-making (the Environmental Quality Committee).
- The City will use a variety of media, including newsletters, brochures, local cable television and the City's web site, to inform the community about surface water issues.
- The City will work with existing government and non-government organizations to increase public participation and education in surface water management.
- The City will establish model interpretive sites for public education.

- The City will continue to manage public education grant and rebate programs, including but not limited to, programs for alternative landscapes and water efficiency.
- Highlight water quality issues at City sponsored and community events.
- Provide speakers and workshops for property owners on shoreline, landscaping and yard care BMPs to protect water quality.

Monitoring: The City will continue to support a comprehensive water resources monitoring program to help identify progress toward meeting water quality goals and allocations assigned by total maximum daily loads (TMDLs). Water quality parameters include total suspended solids (TSS), total phosphorous (TP), nitrogen (N), and chloride (Cl).

- The City will conduct in-lake and storm water flow monitoring programs to develop baseline and long-term water quality records for all city lakes, as well as Bassett, Elm, Plymouth, and Shingle Creeks.
- The City will cooperate with all public agencies to conduct monitoring projects.
- The City will assist with citizen monitoring programs as opportunities arise.

Maintenance and Inspection: The City will preserve the function, quantity, and quality of water resource facilities through routine inspections, regular maintenance activities and administration of the Minnesota Wetland Conservation Act.

- The City will inspect its drainage system to be in compliance with the most recent version of the Minnesota Pollution Control Agency's General Permit for Small Municipal Separate Storm Sewer Systems (Permit No. MNR040000) and the City's pond maintenance policy.
- The City shall require maintenance of privately owned and operated water quality treatment ponds and water quality best management practices as outlined in any applicable maintenance agreement(s).
- The City shall require adequate access to public and private surface water facilities (ponds, rain gardens, underground storage areas etc.) for inspection and maintenance purposes.

Recreation, Fish and Wildlife: The City may support water recreation activities and improve fish and wildlife habitat by implementation of programs which will improve water quality.

- Use appropriate BMPs during construction to protect natural areas and wildlife habitat intended for preservation.
- Preserve vegetative buffers around wetlands and riparian areas to provide habitat for wildlife.
- Support programs for controlling exotic and invasive species of plants and animals.
- Design and construct lake outlets to provide a barrier to upstream migration of rough fish whenever practical.
- Balance water recreational activity with water quality and habitat issues.
- Explore new opportunities to integrate surface water-based recreation activities and wildlife interests within wildlife corridors.

### Groundwater: The City shall strive to prevent contamination of the aquifers and promote groundwater recharge including water conservation practices to maintain base flows in streams.

- The City shall develop and implement controls to protect identified wellhead areas.
- The City shall promote proper well abandonment.
- The City will consider alternatives to conventional storm water detention to enhance groundwater recharge through infiltration.
- Design and installation of on-site wastewater systems shall be in accordance with the standards set forth in Minnesota Rules, Chapter 7080 and the Individual Sewage Treatment System (ISTS) Act.
- The City will implement and enforce the current water emergency and conservation plan.
- The City shall promote and demonstrate the use of alternative landscape techniques and materials to reduce dependency on groundwater supplies.

### Finance: The City may regularly evaluate and monitor funding sources used to finance water resources management activities.

- The City shall continue to help fund surface water management through the surface water utility fee.
- The City will actively pursue grants, donations, in-kind contributions, and watershed resources to help fund surface water management.

- The City shall assist citizens and businesses in their efforts to improve water quality, decrease water quantity and/or improve the functions and values of surface water resources.

## WATER BODY GOALS (STREAMS AND LAKES)

### Shallow Lakes: The goal for all shallow lakes within the city is to have an average total phosphorus concentration of 60 µg/l or less, secchi depths greater than one meter and to have chlorophyll-a concentrations below 20 µg/l.

- The watershed management organization (WMO) or watershed district may have different goals for each lake, however in general, 303d listed lakes will need to work toward meeting the specific goals set forth in the US EPA approved TMDL implementation plan. The goal for lakes not listed as 303d impaired waters is protection of the resources to prevent them from being listed as impaired in the future.

TABLE 5-2
SHALLOW LAKES* WITH APPROVED TMDLS

| Lake | Impairment |
|---|---|
| Bass | Excess Nutrients |
| Cavanaugh | |
| Camelot | |
| Gleason | Excess Nutrients |
| Kreatz | Excess Nutrients |
| Lost | |
| Mooney | Excess Nutrients |
| Pike | Excess Nutrients |
| Schmidt | Pending Delisting (2014) |
| Snyder | Excess Nutrients |
| Turtle | |

*Shallow lakes are defined as lakes with a maximum depth of 15 feet or less or with 80% or more of the lake area shallow enough to support emergent or submergent rooted aquatic plants (littoral zone). The water quality standards are based on the June 1 to September 30 mean values of water quality monitoring data obtained by MPCA, the City of Plymouth, the watershed management organization (WMO) or any combination of the three units of government.

Deep Lakes: The goal for all deep lakes within the city is to have an average total phosphorus concentration of 40 **µg/l** or less, secchi depths greater than 1.4 meters and to have chlorophyll-a concentrations below 14 **µg/l.**

- The watershed management organization (WMO) or watershed district may have different goals for each lake, however in general, 303d listed lakes will need to work toward meeting the specific goals set forth in the US EPA approved TMDL implementation plan. The goal for lakes not listed as 303d impaired waters is protection of the resources to prevent them from being listed as impaired in the future.

TABLE 5-3
DEEP LAKES* WITH APPROVED TMDLS

| Lake | Impairment |
|---|---|
| Hadley | Excess Nutrients |
| Medicine | Excess Nutrients |
| Parkers | Chloride |
| Pomerleau | Excess Nutrients |

*Deep lakes are defined as lakes with maximum depths over 15 feet and as having less than 80% of the lake area as shallow enough to support emergent or submergent rooted aquatic plants (littoral zone). The water quality standards are based on the June 1 to September 30 mean values of water quality monitoring data obtained by MPCA, the City of Plymouth, the watershed management organization (WMO) or any combination of the three units of government.

Streams: The City shall have water quality goals in streams for E. Coli, dissolved oxygen, chloride, and biotic integrity.

- E. coli concentrations should not exceed 126 colony forming units per 100 milliliters (cfu/100ml) as a geometric mean of not less than five samples representative of conditions within any given calendar month, nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 cfu/100ml. This standard applies only between April 1 and October 31.
- Dissolved oxygen should be 5.0 mg/l as a daily minimum. Chloride standards for the protection of aquatic life in class 2 waters are a chronic standard of 230 mg/L based on the 4-day average and an acute standard of 860mg/L for a one hour duration for class 2 waters. (Minnesota Rules, ch. 7050 and 7052).
- The biotic integrity standard uses an IBI which evaluates and integrates multiple attributes of the aquatic community, or “metrics”, to evaluate a complex biological system. Each metric is based on a structural (e.g. species composition) or functional

(e.g. feeding habitats) aspect of the aquatic community that changes in a predictable way in response to human disturbance. Fish and macroinvertebrate IBIs are expressed as a score that ranges from 0 to 100, with 100 reflecting the healthiest biotic community possible.

- The watershed management organization (WMO) or watershed district may have different goals for each stream, however in general, 303d listed streams will need to work toward meeting the specific goals set forth in the US EPA approved TMDL implementation plan. The goal for streams not listed as 303d impaired waters is protection of the resources to prevent them from being listed as impaired in the future.

TABLE 5-4
STREAMS* WITH APPROVED TMDLS

| Stream | Impairment |
|---|---|
| Bass Creek | Fish and Macroinvertebrate IBI<br>Chloride |
| Bassett Creek | Fish and Macroinvertebrate IBI<br>Fecal Coliform<br>Chloride |
| Elm Creek** | Fish and Macroinvertebrate IBI<br>E. Coli<br>Dissolved Oxygen<br>Chloride |
| Shingle Creek | Chloride |

*Streams are important conduits in the water cycle and are instruments in groundwater recharge, and habitat for many aquatic species. Increased rates and volumes of storm water runoff, resulting from urbanization and other activities, can degrade a stream's hydrology and physical condition.
** The US EPA approved the Elm Creek TMDL in 2017.

## EXISTING AND PROPOSED PHYSICAL ENVIRONMENT AND LAND USE

### TOPOGRAPHY

The topography of Plymouth can be described as rolling, with wetlands, lakes and some bluffs. The topographic relief is approximately 196 feet with elevations varying from 1,070 feet above sea level in the southwestern part of the city to about 874 feet above sea level at Pike Lake in the northeastern part of the city.

Water drains naturally through most of the city, however, for a few isolated spots, natural overland drainage has been replaced by storm sewer pipe. The pipe can be large if the land has minimal relief.

The high cost of large storm sewers has made it necessary to construct and maintain a large number of storm water holding ponds throughout the city in order to reduce the overall cost of the drainage system.

## LAKES, WETLANDS, AND PONDS

Approximately 20 percent of the city's area is covered with water. There are 2,785 acres of wetlands, 77 acres of wetland mitigation, 123 acres of water quality ponding, and 1,542 acres covered by eight major lakes (Figure 5-2). Table 5-5 summarizes data from the major lakes within Plymouth.

### TABLE 5-5
### LAKE DATA SUMMARY

| Lake | Watershed | Acreage |
|---|---|---|
| Pomerleau | Shingle Creek | 30 acres |
| Bass | Shingle Creek | 174 acres |
| Schmidt | Shingle Creek | 37 acres |
| Pike | Shingle Creek | 48 acres |
| Medicine | Bassett Creek | 898 acres |
| Parkers | Bassett Creek | 97 acres |
| Mooney | Minnehaha Creek | 118 acres |
| Gleason | Minnehaha Creek | 142 acres |

## SOILS

The soil in Plymouth can be generally described as dense clay with occasional lenses of mixed sand and gravel (Figure 5-3). The three basic soil types are sandy clay till from the Des Moines ice lobe of the Wisconsin glaciation, natural silty sand and topsoil and organic silt deposits. Bedrock (Prairie du Chien formation and the St. Peter formation) is found between elevations 700 and 800 feet above sea level. The water table is very close to the ground surface in certain areas.

## WATERSHEDS

Plymouth lies within the larger Mississippi River basin. The Mississippi River basin includes several smaller watershed units including Elm Creek, Shingle Creek, Bassett Creek and Minnehaha Creek (Table

5-6). Each of these smaller watershed units is further broken down in the City of Plymouth into sub-watershed areas (Figure 5-4).

TABLE 5-6
WATERSHEDS

| Watershed | Area (acres) | Percent of City | Headwater Location |
|---|---|---|---|
| Shingle Creek | 4,371 | 19.3 | Plymouth |
| Bassett Creek | 11,636 | 51.5 | Plymouth |
| Minnehaha Creek | 3,733 | 16.5 | Minnetonka |
| Elm Creek | 2,855 | 12.6 | Medina |
| **Total** | **22,595** | **99.9** | |

### Elm Creek

Elm Creek drains the northwestern corner of Plymouth which includes the majority of the remaining undeveloped property in Plymouth. This area is also the most active area for new single family home developments and the associated infrastructure. Approximately 4,000 acres in Medina drain to Elm Creek before it enters Plymouth. The watershed will coordinate drainage plans for the two cities.

### Shingle Creek

Shingle Creek drains the urbanized north central and northeastern part of Plymouth. Water from this watershed discharges to New Hope under Highway 169 and to Maple Grove through Pike and Eagle Lakes. The major lakes in the watershed include Bass, Pomerleau, Schmidt and Pike.

### Bassett Creek

The predominant water feature in the urbanized Bassett Creek watershed is Medicine Lake, in the southeastern portion of Plymouth. Medicine Lake's largest tributary is Plymouth Creek whose headwaters begin near the intersection of County Road 101 and State Highway 55 and travel 15,000 linier feet (2.8 miles) to discharge into Medicine Lake. Parkers Lake is also found in this watershed and is a popular swimming beach and park area. Bassett Creek discharges southeasterly into Golden Valley then through Minneapolis to the Mississippi River

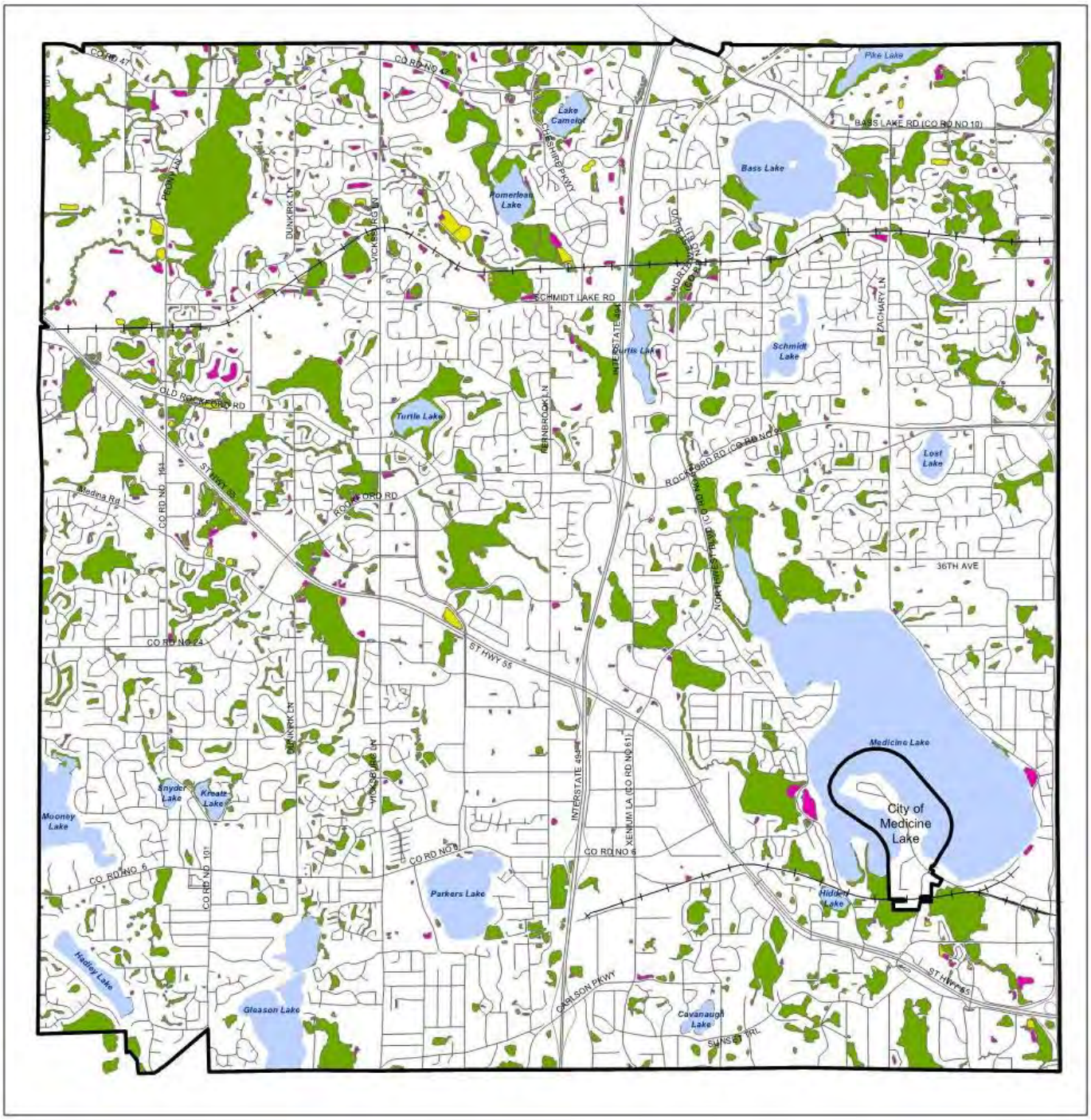



Figure 5-2

# Wetland & Water Quality Ponds

As of 2/26/2016

Wetland
Wetland Mitigation
Water Quality Pond

N

October, 2017
City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

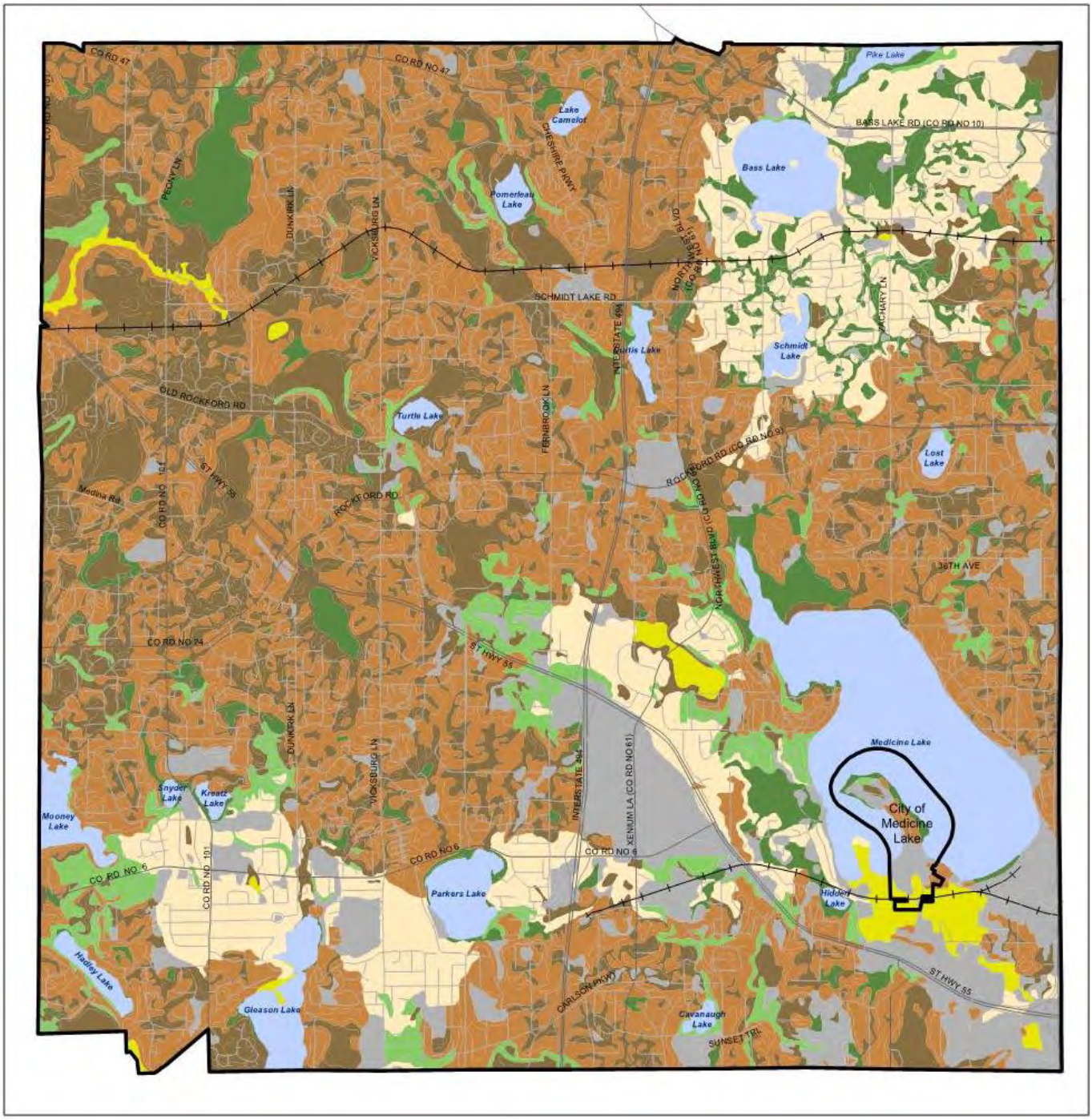



Figure 5-3

# Soil Hydrologic Group Information

As of 2/29/2016

| | |
|---|---|
| A | C |
| A/D | C/D |
| B | Not Available |
| B/D | |

N

October, 2017
City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

### Minnehaha Creek

The Minnehaha Creek basin is located in the southwestern portion of Plymouth. The major lakes in this basin are Gleason and Mooney.

## CLIMATE

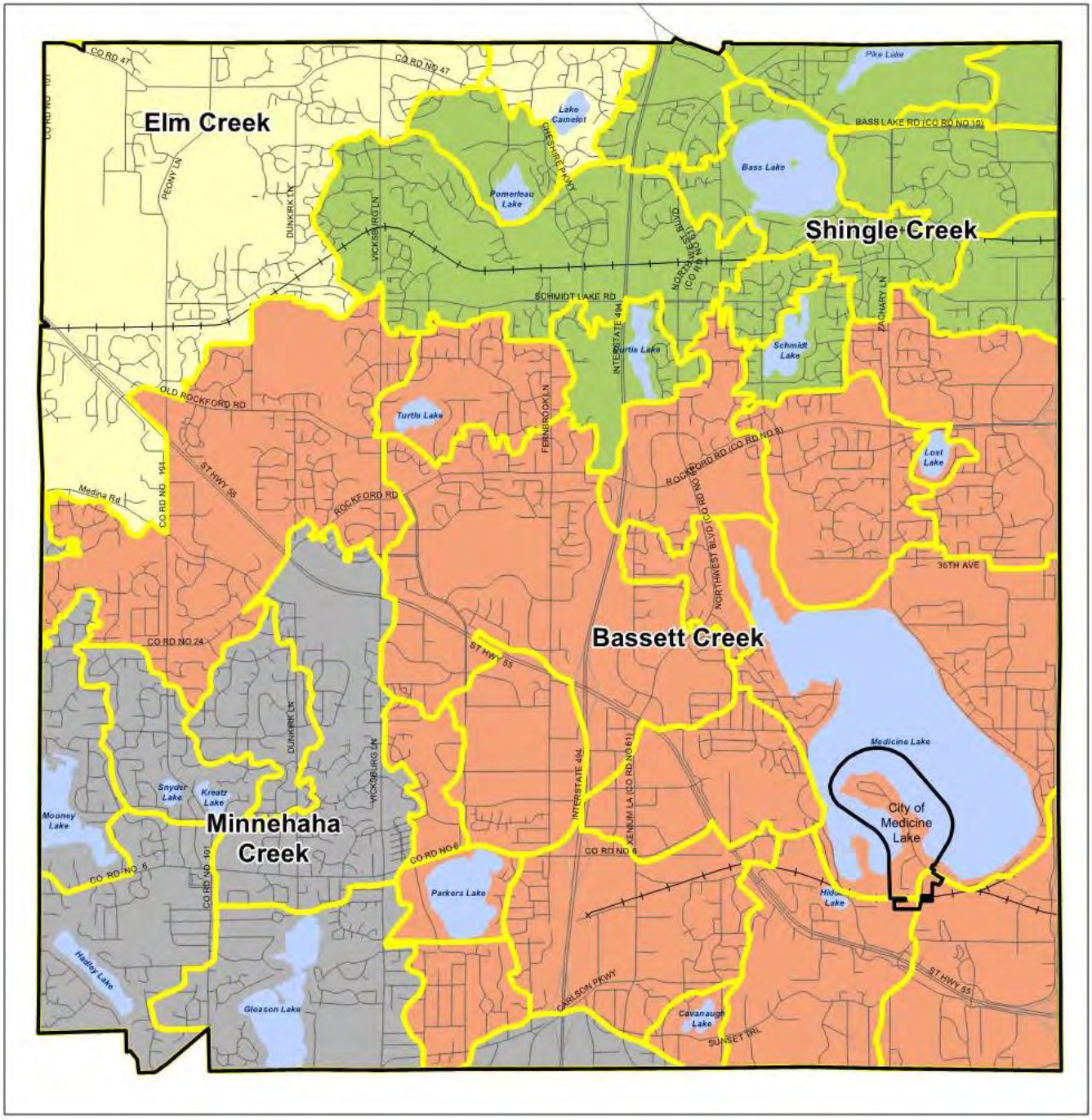
The climate of the area is moderate, characterized by large seasonal variations in temperature and rainfall and by moderate snowfall. The summers are warm and moderately humid and the winters are usually cold and moderately humid. The mean annual temperature is 44°F, and the mean monthly temperatures vary from 12°F in January to 73°F in July. The average annual precipitation is approximately 30 inches, with snowfall averaging approximately 44 inches annually and representing approximately 17 percent of the total precipitation.

# ASSESSMENT OF EXISTING OR POTENTIAL WATER RESOURCE RELATED PROBLEMS

The Federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The City of Plymouth, among other agencies, monitors water resources such as lakes, streams, wetlands, ponds and other features on regular intervals. Other monitoring agencies include watersheds, Three Rivers Park District, and citizens through the Metropolitan Council's citizen assisted monitoring program (CAMP).

The State of Minnesota sets standards to define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses such as fishing, swimming or drinking. When the assessment indicates a water resource is not meeting the established state standard, it is considered impaired (Table 5-7). A water body is impaired if it fails to meet one or more of the water quality standards. All of the water bodies that are impaired in the State of Minnesota are listed on the 303(d) impaired waters list.

Once a water body is listed on the impaired waters list, a total maximum daily load (TMDL) study must be completed in order to assess and set pollutant reduction goals that are needed in order to restore the water body and meet water quality requirements.


Elm Creek
Shingle Creek
Bassett Creek
Minnehaha Creek
City of Medicine Lake
CO RD 47
CO RD NO 47
Pike Lake
Lake Camelot
BASS LAKE RD (CO RD NO 10)
Bass Lake
Pomerleau Lake
CHESHIRE PKWY
PEONY LN
DUNKIRK LN
VICKSBURG LN
NORTHWEST BLVD (CO RD NO 81)
SCHMIDT LAKE RD
INTERSTATE 494
Curtis Lake
Schmidt Lake
ZACHARY LN
OLD ROCKFORD RD
Turtle Lake
FERNBROOK LN
ROCKFORD RD (CO RD NO 9)
Lost Lake
Medina Rd
CO RD ND 101
ST HWY 55
ROCKFORD RD
36TH AVE
CO RD NO 24
Medicine Lake
Snyder Lake
Kreatz Lake
Mooney Lake
CO RD NO 6
CO RD ND 101
Parkers Lake
XENIUM LA (CO RD NO 61)
Hidden Lake
Hadley Lake
Gleason Lake
CARLSON PKWY
Cavanaugh Lake
SUNSET TRL
Figure 5-4
Subwatershed Boundaries
As of 2/29/2016
Subwatershed Boundaries
Bassett Creek Watershed Management Organization
Elm Creek Watershed Management Organization
Minnehaha Creek Watershed District
Shingle Creek Watershed Management Organization
N
October, 2017
City of Plymouth
THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

The municipal separate storm sewer (MS4) permit though the Minnesota Pollution Control Agency also establishes baseline intervals for which water resources and other assets are to be assessed for treatment effectiveness and maintenance needs. The goal of these assessments and inspections is to identify any pollution to water resources and eliminate it through procedures established by the City.

## TABLE 5-7
## PLYMOUTH IMPAIRED WATERS

| Water | Affected use | Impairment |
|---|---|---|
| Bass Creek | Aquatic Life | Fish IBI[1] |
| Bassett Creek | Aquatic Life | Fish IBI |
| Elm Creek | Aquatic Life | Low Oxygen |
| Elm Creek | Aquatic Recreation | E. Coli |
| Shingle Creek | Aquatic Life | Chloride |
| Shingle Creek | Aquatic Life | Invertebrate IBI |
| Shingle Creek | Aquatic Life | Low Oxygen |
| Bass Lake | Aquatic Recreation | Excess Nutrients |
| Gleason Lake | Aquatic Recreation | Excess Nutrients |
| Medicine Lake | Aquatic Recreation | Excess Nutrients |
| Medicine Lake | Aquatic Consumption | Mercury FCA[2] |
| Mooney Lake | Aquatic Recreation | Excess Nutrients |
| Parkers Lake | Aquatic Consumption | Mercury FCA |
| Pike Lake | Aquatic Recreation | Excess Nutrients |
| Pike Lake | Aquatic Consumption | Mercury FCA |
| Pomerleau Lake | Aquatic Recreation | Excess Nutrients |
| Schmidt Lake | Aquatic Recreation | Excess Nutrients |
| Snyder Lake | Aquatic Recreation | Excess Nutrients |

Source: Minnesota Pollution Control Agency, 2016
[1]Index of biological integrity
[2]Fish consumption advisory

## IMPLEMENTATION PLAN

To protect water resources and to address impaired waters, the City will implement the goals stated in the first section. The goals and controls were established in accordance with the purposes of the water management programs required by State Statute Sections 103B.201 – 103B.251. Furthermore, they are in conformance with the goals of the watershed management organizations with some level of jurisdiction in Plymouth including the Bassett Creek, Elm Creek, and Shingle Creek WMOs and the Minnehaha Creek Watershed District.

Entities currently having some level of administration responsibility within the City of Plymouth include the City of Plymouth, Bassett Creek WMO, Elm Creek WMO, Minnehaha Creek WMO, Shingle Creek WMO, Hennepin County, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Board of Water and Soil Resources, United States Army Corps of Engineers, and the Metropolitan Council.

The City's responsibilities include, but are not limited to:

- Comprehensive plan updates;
- Surface water management plan updates;
- Ordinance review and amendment;
- Local plat review and amendments;
- Permits;
- Administration of the State Wetland Conservation Act;
- Groundwater – wells; and
- Financing Alternatives.

The Plymouth City Code contains the regulatory procedures and protections for surface water management. Several of the codes that relate to surface water management are incorporated by reference into this plan and are listed below (Table 5-8). Updates to the city code or changes to the surface water management plan may result in a plan amendment.

TABLE 5-8
OFFICIAL CONTROLS

| Official Control | City Code |
|---|---|
| Floodplain Overlay District | Chapter 21 – Section 21660 |
| Shoreland Management Overlay District | Chapter 21 – Section 21665 |
| Wetland District | Chapter 21 – Section 21670 |
| Erosion Control | Chapter 4 – Section 425<br>Chapter 5 – Section 526 |
| Storm Drainage Systems | Chapter 7 – Section 725 |
| Natural Preserves | Chapter 8 – Section 811 |

The four watershed management organizations (Bassett, Elm, Minnehaha, Shingle) are responsible for:

- Water quality, lake, and stream monitoring;
- Local plan review and approval;
- Projects of regional significance; and
- Education activities.

Appendix Chapter 5A

# SURFACE WATER PLAN AMENDMENT PROCEDURES

## AMENDMENTS TO THE SURFACE WATER MANAGEMENT PLAN

Request for an amendment to any portion of the surface water management plan (text or maps) shall be made in writing to the city engineer. Such request shall be accompanied by a fee as set forth in the city code. Such request shall also be accompanied by detailed written and graphic materials, the number and size as prescribed by the city engineer, fully explaining the proposed change to the plan, along with a list of property owners located within 750 feet of any subject property in a format prescribed by the City. The application shall be considered as being officially submitted and complete when the applicant has complied with all the specified information requirements.

Upon receipt of a complete application for any type of amendment and following staff analysis of the application and request, the city engineer shall set a public hearing. The Environmental Quality Committee shall conduct the hearing and report its findings and make recommendations to the City Council. Notice of said hearing shall be published in the official newspaper at least ten days prior to the hearing and when the amendment affects a particular property.

The Environmental Quality Committee shall review the impact of the proposed amendment. Its judgment shall be based upon, but not limited to, the following factors:

- Evidence submitted by the applicant demonstrating the reason(s) that the plan should be changed, including, but not limited to, whether new information has become available since the surface water management plan was adopted that supports re-examination of the plan, or that new legislation offers new opportunities or constraints that were not previously considered by the plan.

- A demonstration by the applicant that the proposed amendment has merit beyond the interests of the proponent.

- The possible impacts of the amendment on all specific elements of the surface water management plan as may be applicable, including, but not limited to:

    - The 10 City-wide goals
    - The 3 water-body goals
    - The watershed assessments; and
    - Capital improvement program (CIP).

- The impact of the amendment on city code and the city comprehensive plan.

- Consideration of the impact of the proposed amendment on current and future special assessments and utility area charges, future property tax assessments or other fiscal impacts on the City of Plymouth.

The City may request additional information from the applicant concerning the requested amendment or retain expert testimony with the consent and at the expense of the applicant, said information to be declared necessary to establish the possible effects or benefits of the proposed surface water plan amendment.

The applicant or a representative thereof may appear before the Environmental Quality Committee in order to present information and answer questions concerning the proposed request.

The Environmental Quality Committee shall make a recommendation on the request. Such recommendations shall be accompanied by the report and recommendation of the City staff.

The City Council shall not act upon an amendment until it has received a report and recommendation from the Environmental Quality Committee and City staff or until 60 days after the first regular Environmental Quality Committee meeting at which the request was considered.

Upon receiving the report and recommendation of the Environmental Quality Committee and City staff, the city manager shall schedule the application for consideration by the City Council. Such reports and recommendations shall be entered in and made part of the permanent written record of the City Council meeting.

Approval of a proposed amendment shall require passage by a two-thirds vote of the entire City Council.

The City Council may approve an amendment conditionally upon completion of any review by the Metropolitan Council pursuant to the Metropolitan Land Use Planning Act. Or, the City Council may direct staff to submit the amendment recommended by the Environmental Quality Committee to the Metropolitan Council for review prior to City Council consideration of the amendment and consider final passage of the amendment only after completion of the Metropolitan Council's review.

Whenever an application for an amendment has been considered and denied by the City Council, a similar application for an amendment shall not be considered again by the Environmental Quality Committee or City Council for at least six months from the date of its denial; and a subsequent application shall likewise not be considered again by the Environmental Quality Committee or City Council for an additional six months from the date of the second denial unless a decision to reconsider such matter is made by a majority of the full City Council.

Amendment applications shall be approved or denied within 120 days from the date of official and complete submission unless extended by a mutual agreement between the applicant and the City Council.

Appendix Chapter 5B

# SURFACE WATER MANAGEMENT PLAN

The Surface Water Management Plan is 268 pages long. It can be found on the City's website at the following link: https://www.plymouthmn.gov/home/showdocument?id=19499. A full paper copy is available on request.

City of Plymouth

# SURFACE WATER MANAGEMENT PLAN

DECEMBER 2018



# Table of Contents

Acknowledgements 2
List of Figures 3
List of Tables 5
Documents included by reference 8
Executive Summary 9

CITY OF PLYMOUTH SURFACE WATER MANAGEMENT PLAN

Introduction 11
Water Resources Related Agreements 12
Existing and Proposed Physical Environment and Land Use 14
Assessment of Existing or Potential Water Resource Related Problems 41
Implementation Plan 43
Amendments to the Surface Water Management Plan 53

Appendix A – Watershed Assessments 57
Bassett Creek Watershed 59
Elm Creek Watershed 136
Minnehaha Creek Watershed 150
Shingle Creek Watershed 193
Appendix B – Regulatory Program 248
Appendix C – Implementation Program 263
Appendix D – Acronyms, Abbreviations & Definitions 264

# Acknowledgements


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Jim Prom, Ward 4
Ned Carroll, At Large
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Clay Hoes, Ward 2
Kathleen Osborne, Ward 3
Marlene Williamson, At Large
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# List of Figures

## City Wide Maps

Figure 1. Watershed Management Organizations 13
Figure 19. Existing Land Use – City Wide 34
Figure 20. 2040 Land Use – City Wide 35
Figure 21. Wetlands and Water Quality Ponds – City Wide 36
Figure 22. Soil Classifications – City Wide 37
Figure 23. Sub-watershed Boundaries – City Wide 40
Figure 24. MN DNR Protected Waters – City Wide 49
Figure 25. Storm Sewer Map – City Wide 50

## Lake Information & Access Maps

Figure 2. Bass Lake Information & Access Map 17
Figure 3. Cavanaugh Lake Information & Access Map 18
Figure 4. Curtis Lake Information & Access Map 19
Figure 5. Gleason Lake Information & Access Map 20
Figure 6. Hadley Lake Information & Access Map 21
Figure 7. Hidden Lake Information & Access Map 22
Figure 8. Kreatz Lake Information & Access Map 23
Figure 9. Lake Camelot Information & Access Map 24
Figure 10. Lost Lake Information & Access Map 25
Figure 11. Medicine Lake Information & Access Map 26
Figure 12. Mooney Lake Information & Access Map 27
Figure 13. Parkers Lake Information & Access Map 28
Figure 14. Pike Lake Information & Access Map 29
Figure 15. Pomerleau Lake Information & Access Map 30
Figure 16. Schmidt Lake Information & Access Map 31
Figure 17. Snyder Lake Information & Access Map 32
Figure 18. Turtle Lake Information & Access Map 33

## Sub-watershed Assessment Maps

### Bassett Creek Watershed Management Commission

Figure 26. Upper Plymouth Creek Sub-watershed 66
Figure 27. Turtle Lake Sub-watershed 70
Figure 28. Middle Plymouth Creek Sub-watershed 74
Figure 29. Fernbrook Lane Sub-watershed 77
Figure 30. North Parkers Lake Sub-watershed 81
Figure 31. South Parkers Lake Sub-watershed 85
Figure 32. Parkers Lake Sub-watershed 89
Figure 33. Cavanaugh Lake Sub-watershed 93
Figure 34. Plymouth Creek Southwest Sub-watershed 97

Figure 35. Lower Plymouth Creek Sub-watershed 101
Figure 36. West Medicine Lake Sub-watershed 105
Figure 37. North Medicine Lake Sub-watershed 109
Figure 38. Northeast Medicine Lake Sub-watershed 113
Figure 39. South Medicine Lake Sub-watershed 117
Figure 40. Medicine Lake Sub-watershed 121
Figure 41. Bassett Creek Sub-watershed 126
Figure 42. Lost Lake Sub-watershed 130
Figure 43. North Branch of Bassett Creek Sub-watershed 134

## Elm Creek Watershed Management Commission

Figure 44. Elm Creek Sub-watershed 142
Figure 45. Lake Camelot Sub-watershed 147

## Minnehaha Creek Watershed District

Figure 46. 19th Avenue Sub-watershed 157
Figure 47. Dunkirk Lane Sub-watershed 162
Figure 48. Gleason Lake Sub-watershed 167
Figure 49. Hadley Lake Sub-watershed 172
Figure 50. Kreatz & Snyder Lakes Sub-watershed 177
Figure 51. Medina Sub-watershed 182
Figure 52. Minnetonka Outlet Sub-watershed 186
Figure 53. Mooney Lake Sub-watershed 190

## Shingle Creek Watershed Management Commission

Figure 54. Pomerleau Lake Sub-watershed 199
Figure 55. Upper Shingle Creek Sub-watershed 204
Figure 56. Curtis Lake Sub-watershed 209
Figure 57. Schmidt Lake Sub-watershed 214
Figure 58. Bass Lake South Sub-watershed 219
Figure 59. Bass Lake Northwest Sub-watershed 223
Figure 60. Bass Lake Sub-watershed 227
Figure 61. Pike Lake Sub-watershed 232
Figure 62. Lower Shingle Creek Sub-watershed 237
Figure 63. Shingle Creek Outlet Sub-watershed 242
Figure 64. New Hope Sub-watershed 246

# List of Tables

Table 1. Watershed Plan Status 12
Table 2. Lake Data Summary 14
Table 3. Watersheds 38
Table 4. Plymouth Impaired Waters 42
Table 5. Shallow Lakes with Approved TMDL's 46
Table 6. Deep Lakes with Approved TMDL's 47
Table 7. Streams with Approved TMDL's 48
Table 8. Official Controls 52

## Sub-watershed Assessment Tables

## Bassett Creek Watershed

Table 9. Bassett Creek Watershed Management Commission Capital Improvements in Plymouth 2018-2022 62
Table 10. Upper Plymouth Creek Sub-watershed Characteristics 64
Table 11. Upper Plymouth Creek Sub-watershed Impaired Waters 65
Table 12. Upper Plymouth Creek Sub-watershed Implementation Program 67
Table 13. Turtle Lake Sub-watershed Characteristics 68
Table 14. Turtle Lake Sub-watershed Implementation Program 71
Table 15. Middle Plymouth Creek Sub-watershed Characteristics 72
Table 16. Middle Plymouth Creek Sub-watershed Impaired Waters 73
Table 17. Middle Plymouth Creek Sub-watershed Implementation Program 75
Table 18. Fernbrook Lane Sub-watershed Characteristics 76
Table 19. Fernbrook Lane Sub-watershed Implementation Program 78
Table 20. North Parkers Lake Sub-watershed Characteristics 79
Table 21. North Parkers Lake Sub-watershed Implementation Program 82
Table 22. South Parkers Lake Sub-watershed Characteristics 83
Table 23. South Parkers Lake Sub-watershed Implementation Program 86
Table 24. Parkers Lake Sub-watershed Characteristics 87
Table 25. Parkers Lake Sub-watershed Impaired Waters 88
Table 26. Parkers Lake Sub-watershed Implementation Program 90
Table 27. Cavanaugh Lake Sub-watershed Characteristics 91
Table 28. Cavanaugh Lake Sub-watershed Implementation Program 94
Table 29. Plymouth Creek Southwest Characteristics 95
Table 30. Plymouth Creek Southwest Implementation Program 98
Table 31. Lower Plymouth Creek Sub-watershed Characteristics 99
Table 32. Lower Plymouth Creek Sub-watershed Impaired Waters 100
Table 33. Lower Plymouth Creek Sub-watershed Implementation Program 102
Table 34. West Medicine Lake Sub-watershed Characteristics 103
Table 35. West Medicine Lake Sub-watershed Impaired Waters 104
Table 36. West Medicine Lake Sub-watershed Implementation Program 106
Table 37. North Medicine Lake Sub-watershed Characteristics 107

Table 38. North Medicine Lake Sub-watershed Implementation, Program 110
Table 39. Northeast Medicine Lake Sub-watershed Characteristics 111
Table 40. Northeast Medicine Lake Sub-watershed Implementation Program 114
Table 41. South Medicine Lake Sub-watershed Characteristics 115
Table 42. South Medicine Lake Sub-watershed Implementation Program 118
Table 43. Medicine Lake Sub-watershed Characteristics 119
Table 44. Medicine Lake Sub-watershed Impaired Waters 120
Table 45. Medicine Lake Sub-watershed Implementation Program 122
Table 46. Bassett Creek Sub-watershed Characteristics 124
Table 47. Bassett Creek Sub-watershed Impaired Waters 125
Table 48. Bassett Creek Sub-watershed Implementation Program 127
Table 49. Lost Lake Sub-watershed Characteristics 128
Table 50. Lost Lake Sub-watershed Implementation Program 131
Table 51. North Branch Sub-watershed Characteristics 132
Table 52. North Branch Sub-watershed Implementation Program 135

## Elm Creek Watershed

Table 53. Elm Creek Watershed Capital Improvements in Plymouth 2018-2024 138
Table 54. Elm Creek Sub-watershed Characteristics 140
Table 55. Elm Creek Sub-watershed Impaired Waters 141
Table 56. Elm Creek Sub-watershed Implementation Program 143
Table 57. Camelot Lake Sub-watershed Characteristics 145
Table 58. Camelot Lake Sub-watershed Implementation Program 148

## Minnehaha Creek Watershed

Table 59. Municipalities within the Minnehaha Creek Watershed 151
Table 60. MCWD Capital Improvements in Plymouth 2018-2027 153
Table 61. 19th Avenue Sub-watershed Characteristics 155
Table 62. 19th Avenue Sub-watershed Implementation Program 158
Table 63. Dunkirk Lane Sub-watershed Characteristics 160
Table 64. Dunkirk Lane Sub-watershed Implementation Program 163
Table 65. Gleason Lake Sub-watershed Characteristics 165
Table 66. Gleason Lake Sub-watershed Impaired Waters 166
Table 67. Gleason Lake Sub-watershed Implementation Program 168
Table 68. Hadley Lake Sub-watershed Characteristics 170
Table 69. Hadley Lake Sub-watershed Impaired Waters 171
Table 70. Hadley Lake Sub-watershed Implementation Program 173
Table 71. Kreatz/Snyder Lakes Sub-watershed Characteristics 176
Table 72. Kreatz/Snyder Lakes Sub-watershed Impaired Waters 176
Table 73. Kreatz/Snyder Lakes Sub-watershed Implementation Program 178
Table 74. Medina Sub-watershed Characteristics 180
Table 75. Medina Sub-watershed Implementation Program 183
Table 76. Minnetonka Outlet Sub-watershed Characteristics 184
Table 77. Minnetonka Outlet Sub-watershed Implementation Plan 187

Table 78. Mooney Lake Sub-watershed Characteristics 188
Table 79. Mooney Lake Sub-watershed Impaired Waters 189
Table 80. Mooney Lake Sub-watershed Implementation Program 192

## Shingle Creek Watershed

Table 81. Shingle Creek Watershed Capital Improvements in Plymouth 2018-2024 195
Table 82. Pomerleau Lake Sub-watershed Characteristics 197
Table 83. Pomerleau Lake Sub-watershed Impaired Waters 198
Table 84. Pomerleau Lake Sub-watershed Implementation Program 201
Table 85. Upper Shingle Creek Sub-watershed Characteristics 202
Table 86. Upper Shingle Creek Sub-watershed Implementation Program 205
Table 87. Curtis Lake Sub-watershed Characteristics 207
Table 88. Curtis Lake Sub-watershed Implementation Program 210
Table 89. Schmidt Lake Sub-watershed Characteristics 212
Table 90. Schmidt Lake Sub-watershed Implementation Program 215
Table 91. Bass Lake South Sub-watershed Characteristics 217
Table 92. Bass Lake South Sub-watershed Implementation Program 220
Table 93. Bass Lake Northwest Sub-watershed Characteristics 221
Table 94. Bass Lake Northwest Sub-watershed Implementation Program 224
Table 95. Bass Lake Sub-watershed Characteristics 225
Table 96. Bass Lake Sub-watershed Impaired Waters 226
Table 97. Bass Lake Sub-watershed Implementation Program 229
Table 98. Pike Lake Sub-watershed Characteristics 230
Table 99. Pike Lake Sub-watershed Impaired Waters 231
Table 100. Pike Lake Sub-watershed Implementation Program 233
Table 101. Lower Shingle Creek Sub-watershed Characteristics 235
Table 102. Lower Shingle Creek Sub-watershed Impaired Waters 236
Table 103. Lower Shingle Creek Sub-watershed Implementation Program 238
Table 104. Shingle Creek Outlet Sub-watershed Characteristics 240
Table 105. Shingle Creek Outlet Sub-watershed Impaired Waters 241
Table 106. Shingle Creek Outlet Sub-watershed Implementation Program 243
Table 107. New Hope Sub-watershed Characteristics 244
Table 108. New Hope Sub-watershed Implementation Program 247

## Regulatory and Compliance Program

Table 109. Shallow Lakes with Approved TMDL's 256
Table 110. Deep Lakes with Approved TMDL's 258
Table 111. Streams with Approved TMDL's 259
Table 112. Official Controls 261

# Documents Included by Reference

The City of Plymouth includes, as may be amended, the following documents in the City of Plymouth Surface Water Plan:

- City of Plymouth Comprehensive Plan
- Storm Water Pollution Prevention Program
- Wellhead Protection Plan
- Capital Improvement Program
- Natural Resources Inventory and Minnesota Land Cover Classification System Mapping (2006)
- City of Plymouth Pond Maintenance Policy
- Plymouth City Code
- Plymouth Zoning Ordinance
- Plymouth Post-Construction Water Quality Management Guidance
- Plymouth Illicit Discharge Detection and Elimination Program
- Water Conservation Program
- FEMA Flood Hazard Maps
- Drainage Calculations
- City of Plymouth Open Space Management Plans
- Mooney Lake Operating Plan for Emergency Pumping
- Joint Powers Agreement – Bassett Creek Watershed
- Joint Powers Agreement – Elm Creek Watershed
- Joint Powers Agreement – Shingle Creek Watershed

## EXECUTIVE SUMMARY

Federal and state law, including the federal Clean Water Act (1972) and its subsequent updates, as well as the Metropolitan Surface Water Management Act (1982) set the foundation for surface water and non-point source pollution management in the City of Plymouth.

As Plymouth continues to grow, develop, and redevelop, urbanization will continue to impact the quality of ponds, wetlands, streams and lakes. The City Council, with assistance from our Environmental Quality Committee (EQC) has revised the City's 2008 Surface Water Management Plan to comply with the rules and requirements of the 3rd Generation Plans (Minnesota Statute 103B.235) of each watershed management organization (WMO) within the City (Bassett, Elm, Minnehaha, Shingle) and the Board of Soil and Water Resources (Minnesota Rule 8410). The Metropolitan Council also has a role in water resources management at the local level. Current Metropolitan Council goals and policies pertaining to water management are addressed in its 2040 Water Resources Management Policy Plan. This plan includes a significant water quality goal – that the quality of water leaving the metropolitan area be as good as the quality of water entering the area, and be in compliance with state and federal regulations.

The City of Plymouth's strategy for improving water quality focuses on pollution prevention first and storm water treatment second. The plan goes beyond reacting to problems after they occur by implementing proactive programs and policies to protect surface water. In addition to improving water quality, the City also works with citizens and regulatory agencies to address water quantity and invasive species issues identified throughout the community. The City annually assesses the condition of water resources and develops strategies for achieving realistic, attainable, implementable and affordable goals. This plan utilizes environmental and water resource inventories, monitoring data, citizen input, ordinances and other available information to work towards achieving the goals. The plan is the framework for

implementation of best management practices (BMPs), programs and policies to manage surface water and to meet goals established for water resources in the future.

Over the next 10 years, the City anticipates a transition from a majority of development projects to a majority of redevelopment projects. The Plan focus will continue to be on problems associated with increased runoff volumes, sedimentation and storm water discharge into city lakes and wetlands.

# CITY OF PLYMOUTH
# SURFACE WATER MANAGEMENT PLAN

## INTRODUCTION

The past 10 years has seen an enormous effort and investment by the City of Plymouth and its partners in improving water resources in Plymouth. These efforts were rewarded in 2016 when Schmidt Lake, previously placed on the State Impaired Waters List, was found to meet State standards and was removed from the Impaired Waters List.

The majority of funding for these efforts is Plymouth's Surface Water Fee which generated over 20 million dollars the past 10 years and was invested in over two dozen capital improvements and other projects to provide for improved flood protection, water quality, education, regulatory programming, and more. Partners with the City of Plymouth in improving water resources include the State of Minnesota, the Metropolitan Council, Hennepin County, Three Rivers Park District, the Bassett, Elm, Shingle Creek Watershed Management Organizations, the Minnehaha Creek Watershed District, the Association of Medicine Lake Area Citizens, the Schmidt Lake Association, the Gleason Lake Improvement Association, and the Bass Lake Improvement Association.

Over the next 10 years, two points of emphasis for the City will be to seek opportunities for water resource improvements within re-development projects and to seek cooperative and collaborative partnerships to address water quality, vegetation, and aquatic invasive species within our lakes.

## WATER RESOURCE MANAGEMENT RELATED AGREEMENTS

The purpose of the Metropolitan Surface Water Management Act (1982) is to reduce, to the greatest practical extent, public expenditures related to quantity of storm

water runoff. Responding to the state mandate, each watershed unit in the metropolitan area was charged with completing a watershed management plan. As a result, numerous watershed management organizations (WMOs) were formed, either as formal watershed districts or as Joint Powers Agreement WMOs. Each watershed in turn requires the preparation of local or community watershed plans to achieve consistency in water resources management.

Minnesota Rules Chapter 8410 apply to the general administration of watershed management activities within the metropolitan area. There are four WMO's with boundaries in Plymouth (Table 1). The City of Plymouth is party to a joint powers agreement with the Bassett, Elm, and Shingle Creek watersheds. Watershed boundaries are identified in Figure 1.

**TABLE 1**
**WATERSHED PLAN STATUS**

| Watershed Management Organization | Original Plan Approval | Current Plan Approval |
|---|---|---|
| Bassett Creek | July 26, 1989 | September 17, 2015 |
| Elm Creek | May 25, 1990 | October 14, 2015 |
| Minnehaha Creek | May 26, 1993 | January 11, 2018 |
| Shingle Creek | April 25, 1990 | April 11, 2013 |

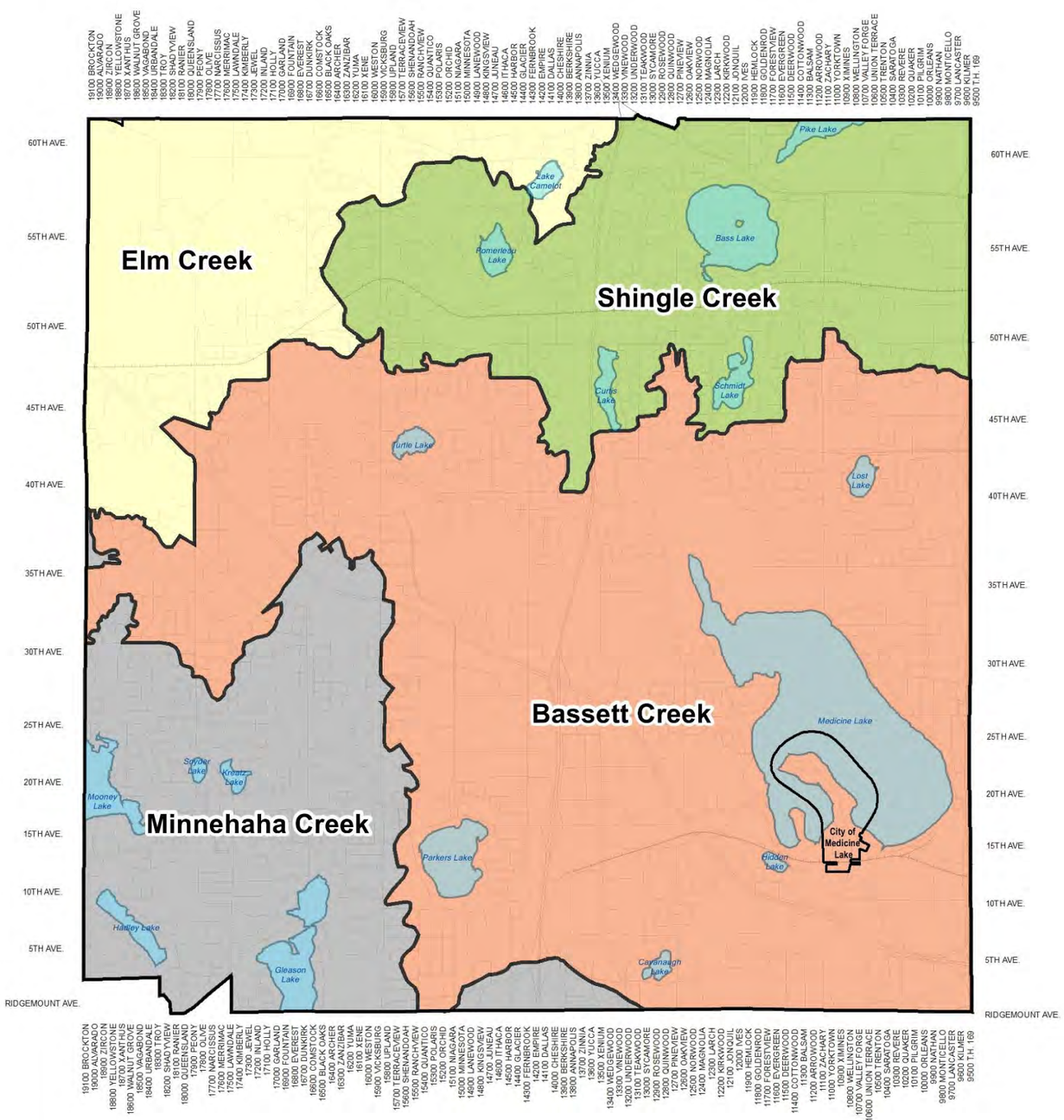



FIGURE 1

# Watershed Boundries

**Legend**

- Bassett Creek Watershed Management Organization
- Elm Creek Watershed Management Organization
- Minnehaha Creek Watershed District
- Shingle Creek Watershed Management Organization
- Roads
- Railroad
- City Limits
- Lakes

N

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City of Plymouth
Adding Quality to Life

**Information As of: February 26, 2016**

# EXISTING AND PROPOSED PHYSICAL ENVIRONMENT AND LAND USE

## TOPOGRAPHY

The topography of Plymouth can be described as rolling, with wetlands, lakes and some bluffs. The topographic relief is approximately 200 feet with elevations varying from 1,070 feet above sea level in the southwestern part of the city to about 874 feet above sea level at Pike Lake in the northeastern part of the city.

Water drains naturally through most of the city, however, for a few isolated spots, natural overland drainage has been replaced by storm sewer pipe. The pipe can be large if the land has minimal relief. The high cost of large storm sewers has made it necessary to construct and maintain a large number of storm water holding ponds throughout the city in order to reduce the overall cost of the drainage system.

## LAKES, WETLANDS, AND PONDS

Approximately 20 percent of the city's area is covered with water. There are 2,785 acres of wetlands, 77 acres of wetland mitigation, 123 acres of water quality ponding, and 1,542 acres covered by eight major lakes (Figure 21). Table 2 summarizes data from the major lakes within Plymouth.

**TABLE 2**
**LAKE DATA SUMMARY**

| Lake | Watershed | Acreage | Figure |
|---|---|---|---|
| Bass | Shingle Creek | 174 acres | Figure 2 |
| Cavanaugh | Bassett Creek | 14 acres | Figure 3 |
| Curtis | Shingle Creek | 32 acres | Figure 4 |
| Gleason | Minnehaha Creek | 142 acres | Figure 5 |
| Hadley | Minnehaha Creek | 38 acres | Figure 6 |
| Hidden | Bassett Creek | 9 acres | Figure 7 |

| | | | |
|---|---|---|---|
| Kreatz | Minnehaha Creek | 14 acres | Figure 8 |
| Lake Camelot | Elm Creek | 23 acres | Figure 9 |
| Lost | Bassett Creek | 23 acres | Figure 10 |
| Medicine | Bassett Creek | 898 acres | Figure 11 |
| Mooney | Minnehaha Creek | 118 acres | Figure 12 |
| Parkers | Bassett Creek | 97 acres | Figure 13 |
| Pike | Shingle Creek | 48 acres | Figure 14 |
| Pomerleau | Shingle Creek | 30 acres | Figure 15 |
| Schmidt | Shingle Creek | 37 acres | Figure 16 |
| Snyder | Minnehaha Creek | 9 acres | Figure 17 |
| Turtle | Bassett Creek | 24 acres | Figure 18 |

## SOILS

The soil in Plymouth can be generally described as dense clay with occasional lenses of mixed sand and gravel (Figure 22). The three basic soil types are sandy clay till from the Des Moines ice lobe of the Wisconsin glaciation, natural silty sand and topsoil and organic silt deposits. The majority of the soils within the City have moderate to slow infiltration rates which leads to higher volumes of runoff when compared to sandy soil. Bedrock (Prairie du Chien formation and the St. Peter formation) is found between elevations 700 and 800 feet above sea level. The water table is very close to the ground surface in certain areas.

## WATERSHEDS

Plymouth lies within the larger Mississippi River basin. The Mississippi River basin includes several smaller watershed units including Elm Creek, Shingle Creek, Bassett Creek and Minnehaha Creek (Table 3). The City identifies 17 lakes spread throughout these four watersheds (Table 2). These lakes are also Public Waters identified by the

Minnesota Department of Natural Resources. Additionally, each of these smaller watershed units is further broken down in the City of Plymouth into sub-watershed areas (Figure 23).

Figure 2 – Bass Lake Information and Access Map

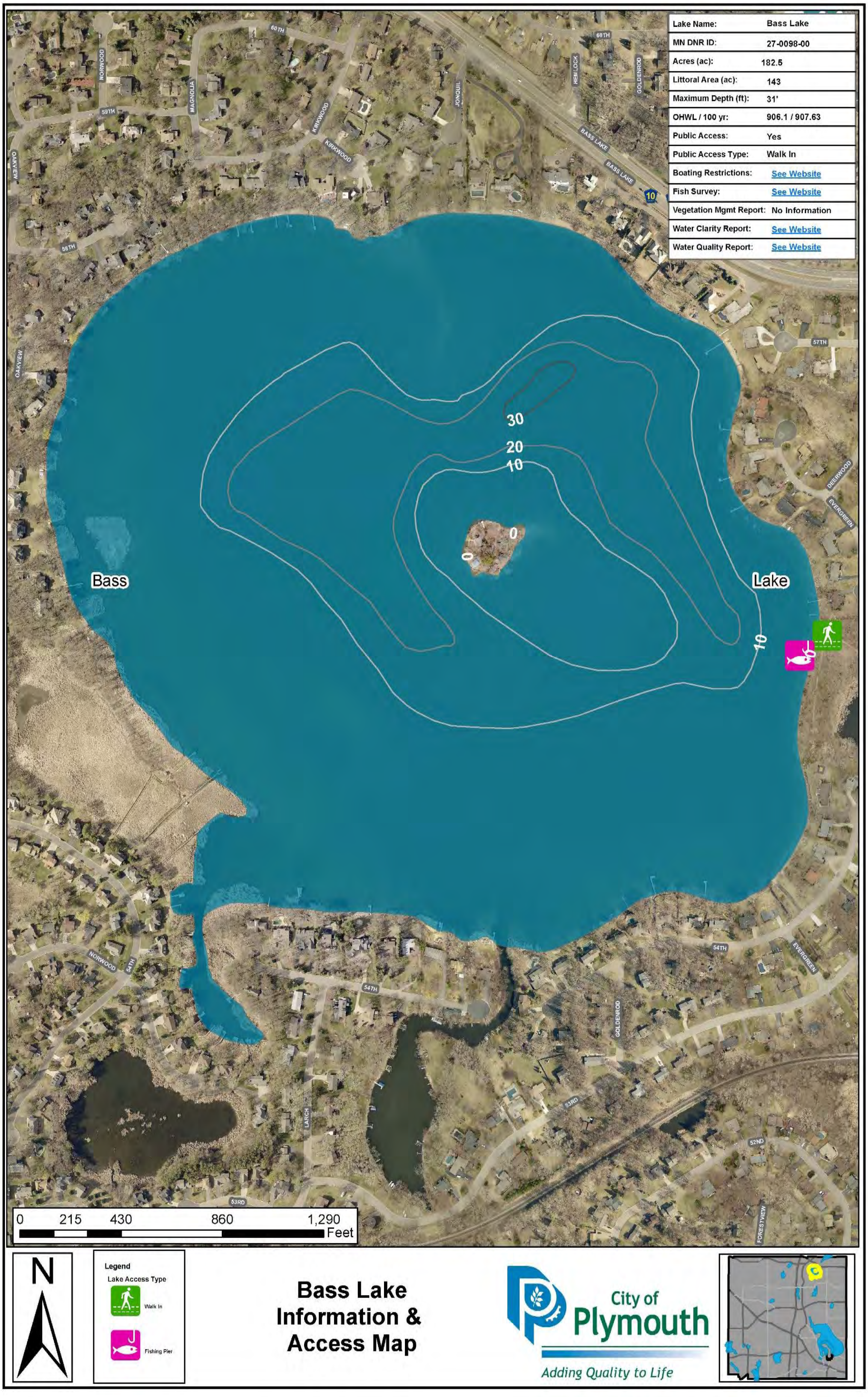


Figure 3 - Cavanaugh Lake Information and Access Map



Figure 4 – Curtis Lake Information and Access Map



Figure 5 – Gleason Lake Information and Access Map

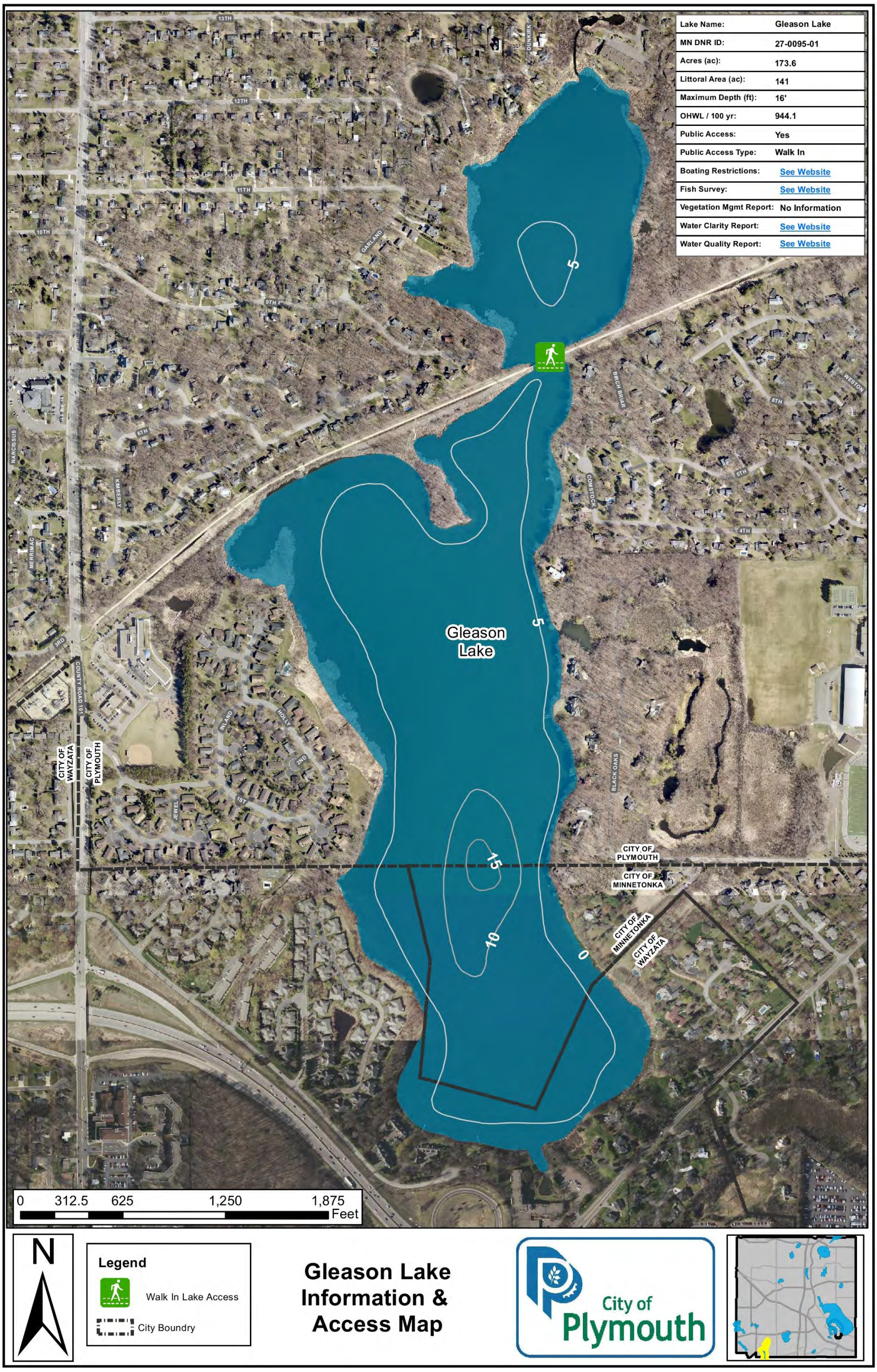


Figure 6 – Hadley Lake Information and Access Map



Figure 7 – Hidden Lake Information and Access Map

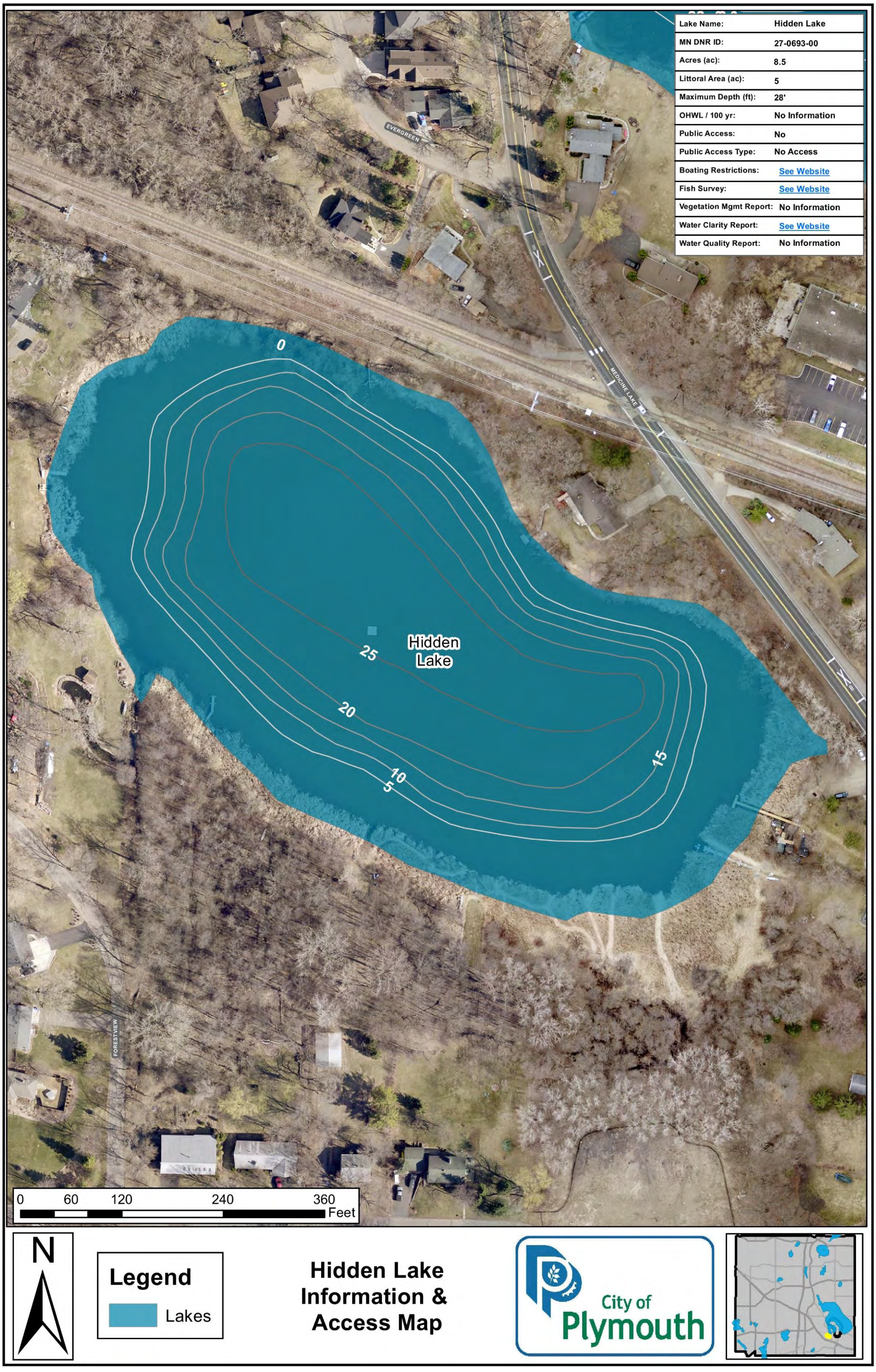


Figure 8 – Kreatz Lake Information and Access Map



Figure 9 – Lake Camelot Information and Access Map



Figure 10 – Lost Lake Information and Access Map



Figure 11 – Medicine Lake Information and Access Map



Figure 12 – Mooney Lake Information and Access Map



Figure 13 – Parkers Lake Information and Access Map



Figure 14 – Pike Lake Information and Access Map



Figure 15 – Pomerleau Lake Information and Access Map

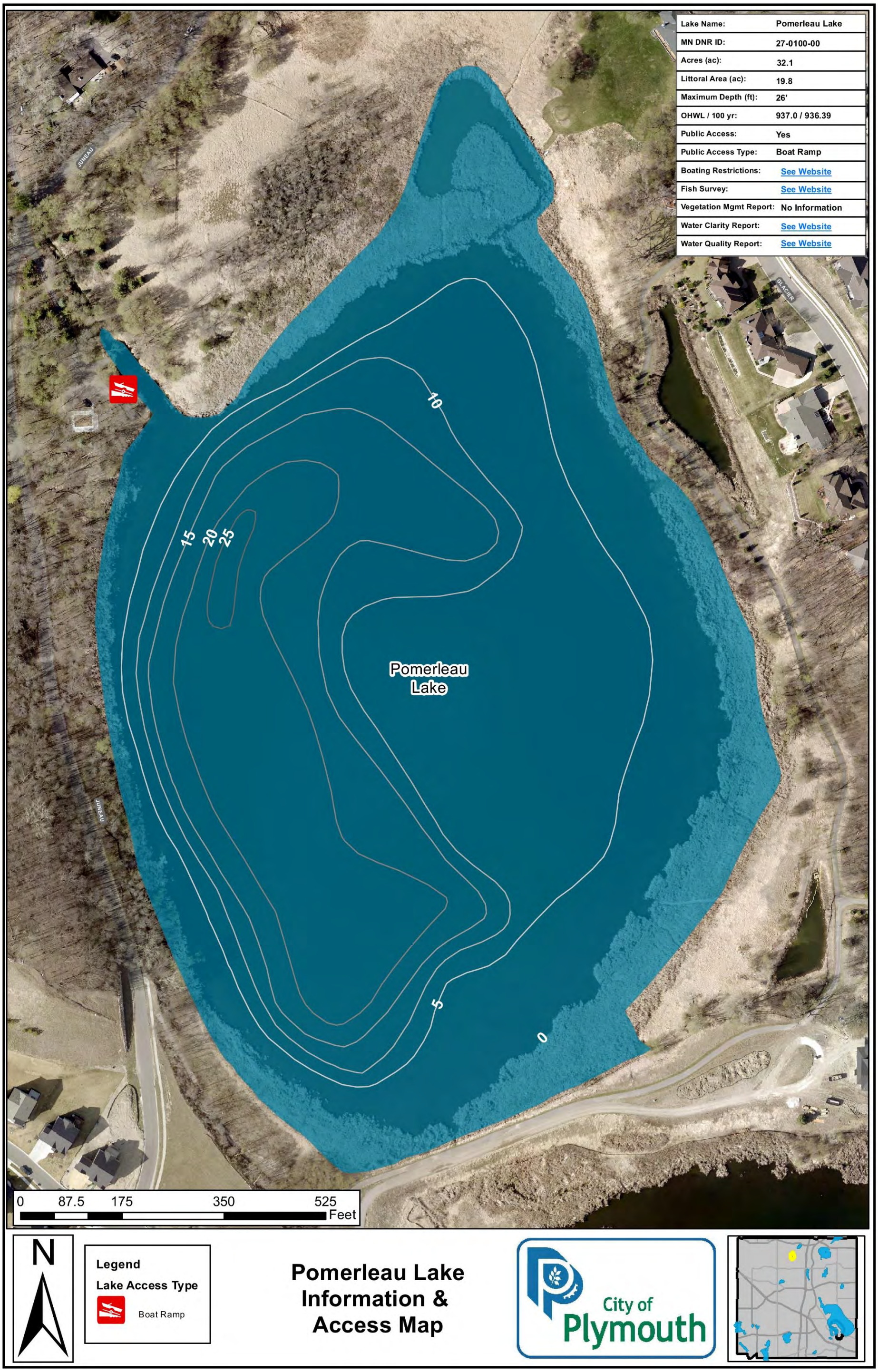


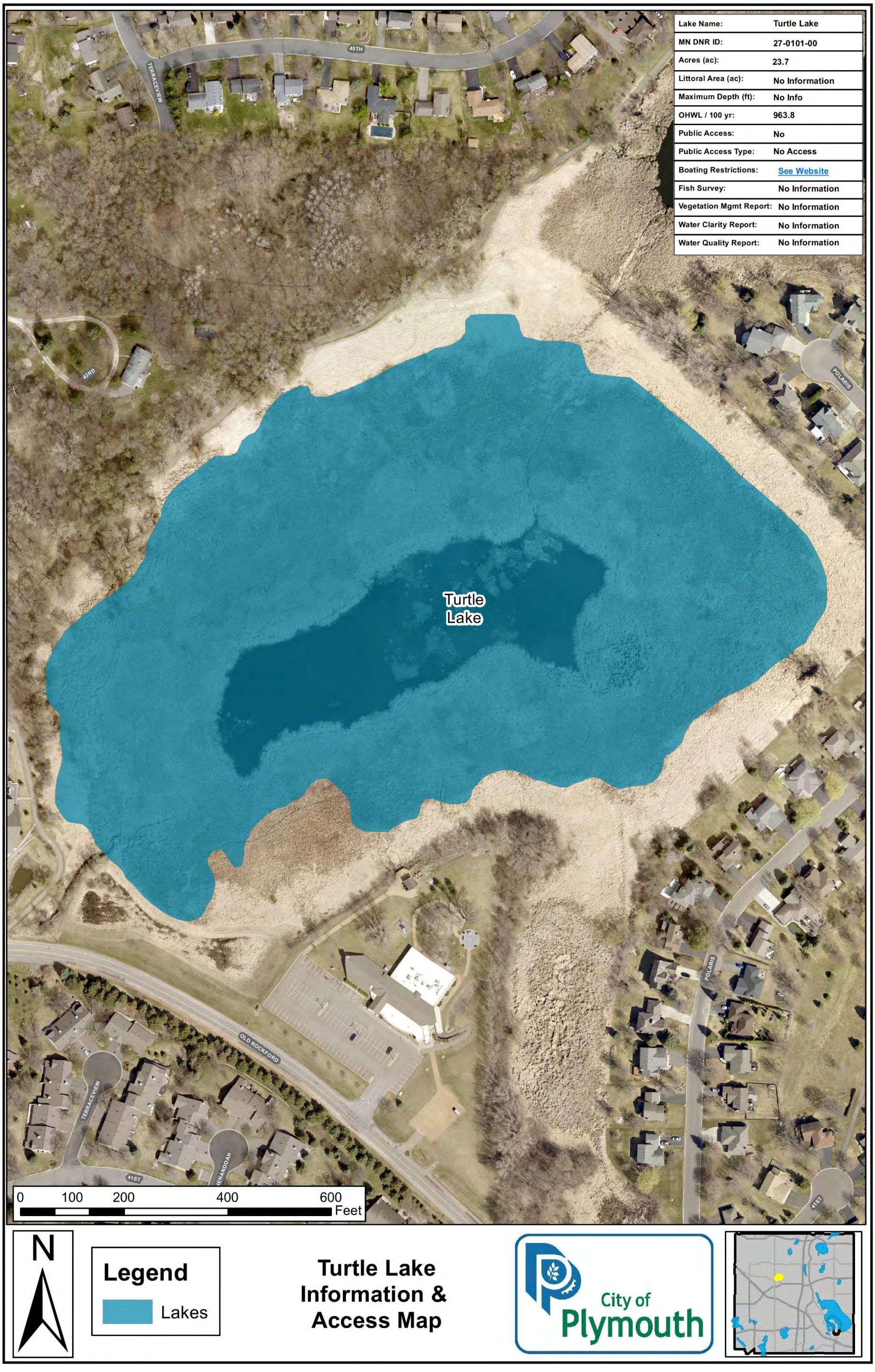
Figure 16 – Schmidt Lake Information and Access Map



Figure 17 – Snyder Lake Information and Access Map



Figure 18 – Turtle Lake Information and Access Map



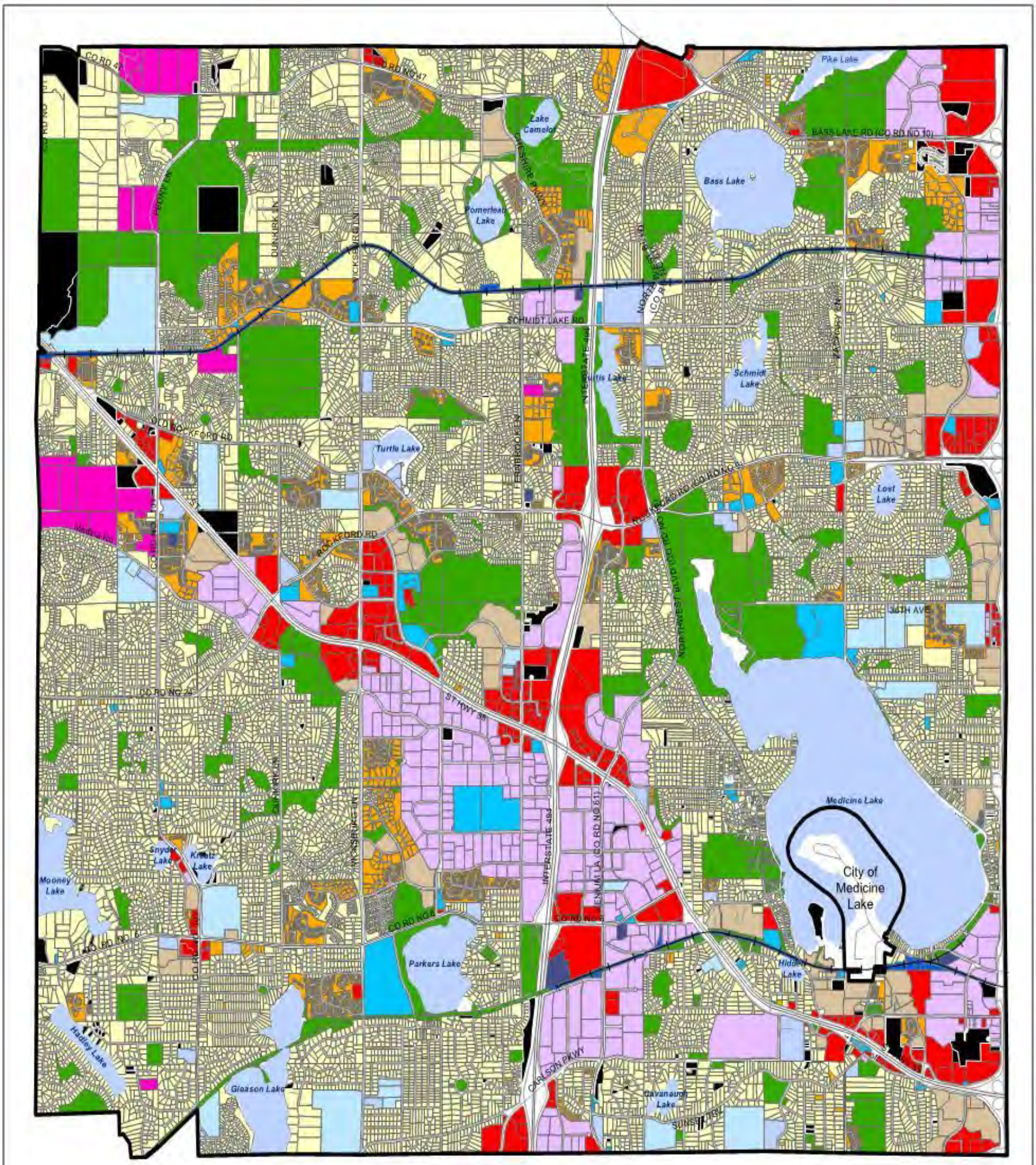



Figure 19

# Existing Land Use

As of 3/1/2016

December, 2017

City of Plymouth

- Attached Non-Apartment
- Apartment
- Single Family Development
- Commercial/Office
- Industrial
- Public
- Church
- School
- Parks & Open Space
- Railroad
- Utilities
- Vacant
- Agriculture

N

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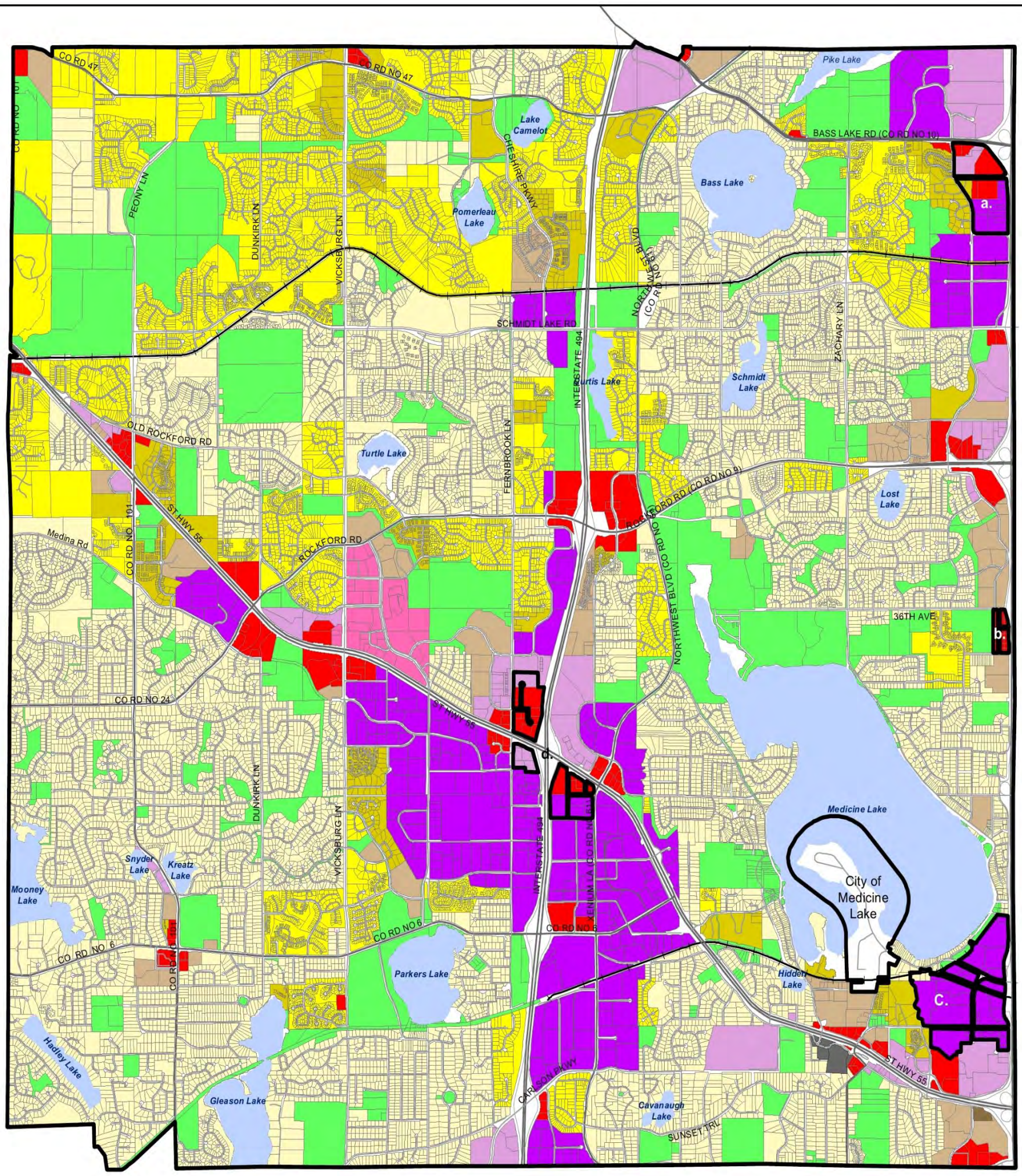



Figure 20

# 2040 Land Use Plan

As of 1/9/2018

July, 2018
City of Plymouth

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N

- Study Areas
- Living Area 1, LA-1 (2-3)
- Living Area 2, LA-2 (3-6)
- Living Area 3, LA-3 (6-12)
- Living Area 4, LA-4 (12-20)
- Living Area 5, LA-5 (20-60)
- Mixed Use, MXD
- Industrial, IND
- Commercial, C
- Commercial Office, CO
- City Center, CC
- Public/Semi-Public/Institutional, P-I

**Areas with Potential Land Use Change**

a. Potential Mixed Use Site
b. Potential Commercial Office / Light Industrial Site
c. Potential Commercial Office south of 10th Avenue and west of Nathan Lane; potential higher density residential north of 10th Avenue
d. Potential Mixed Use site

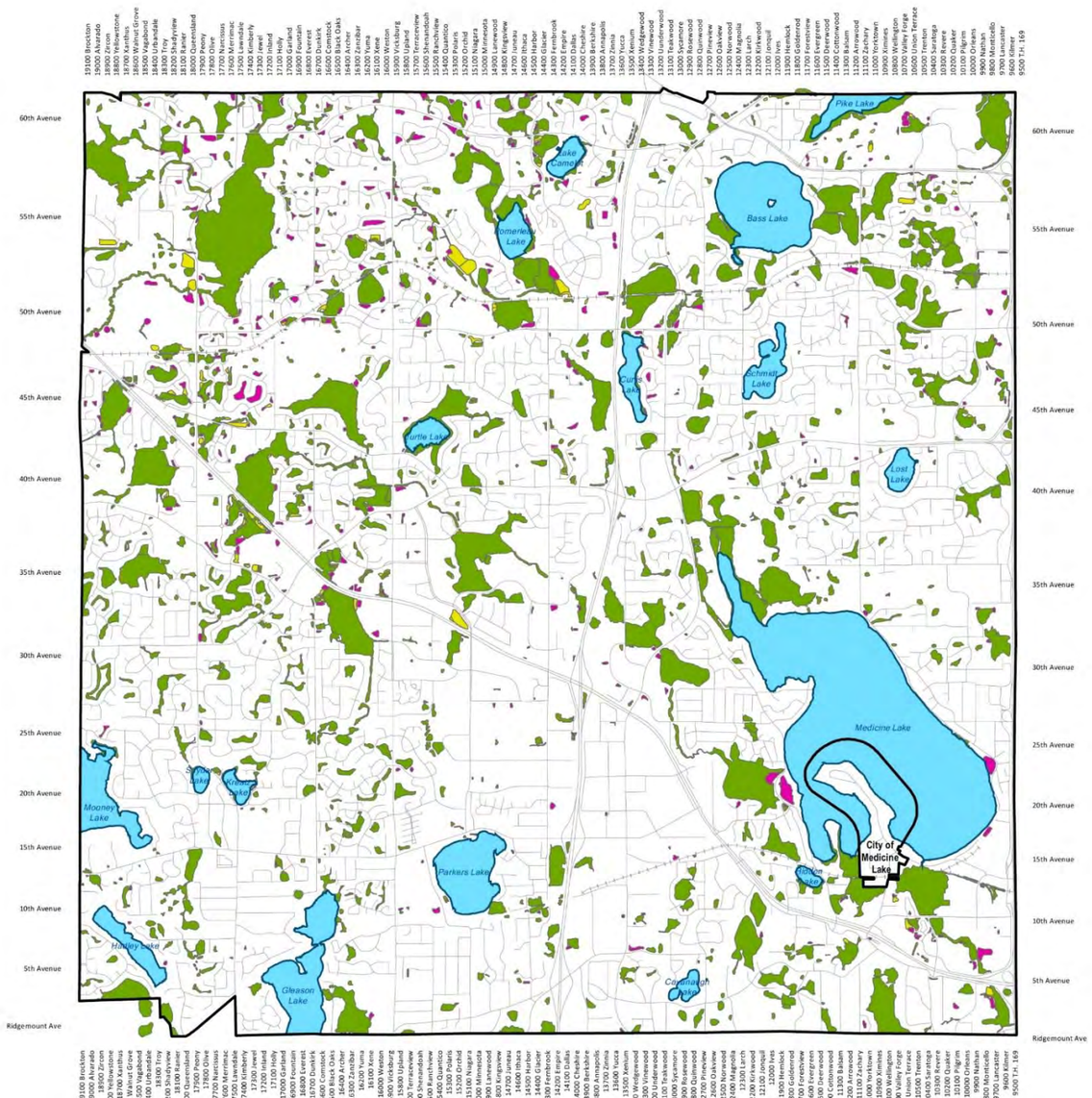



FIGURE 21

# Wetlands & Water Quality Ponds

**Legend**

- Wetland
- Wetland Mitigation
- Water Quality Pond
- Roads
- Railroad
- City Limits
- Lakes

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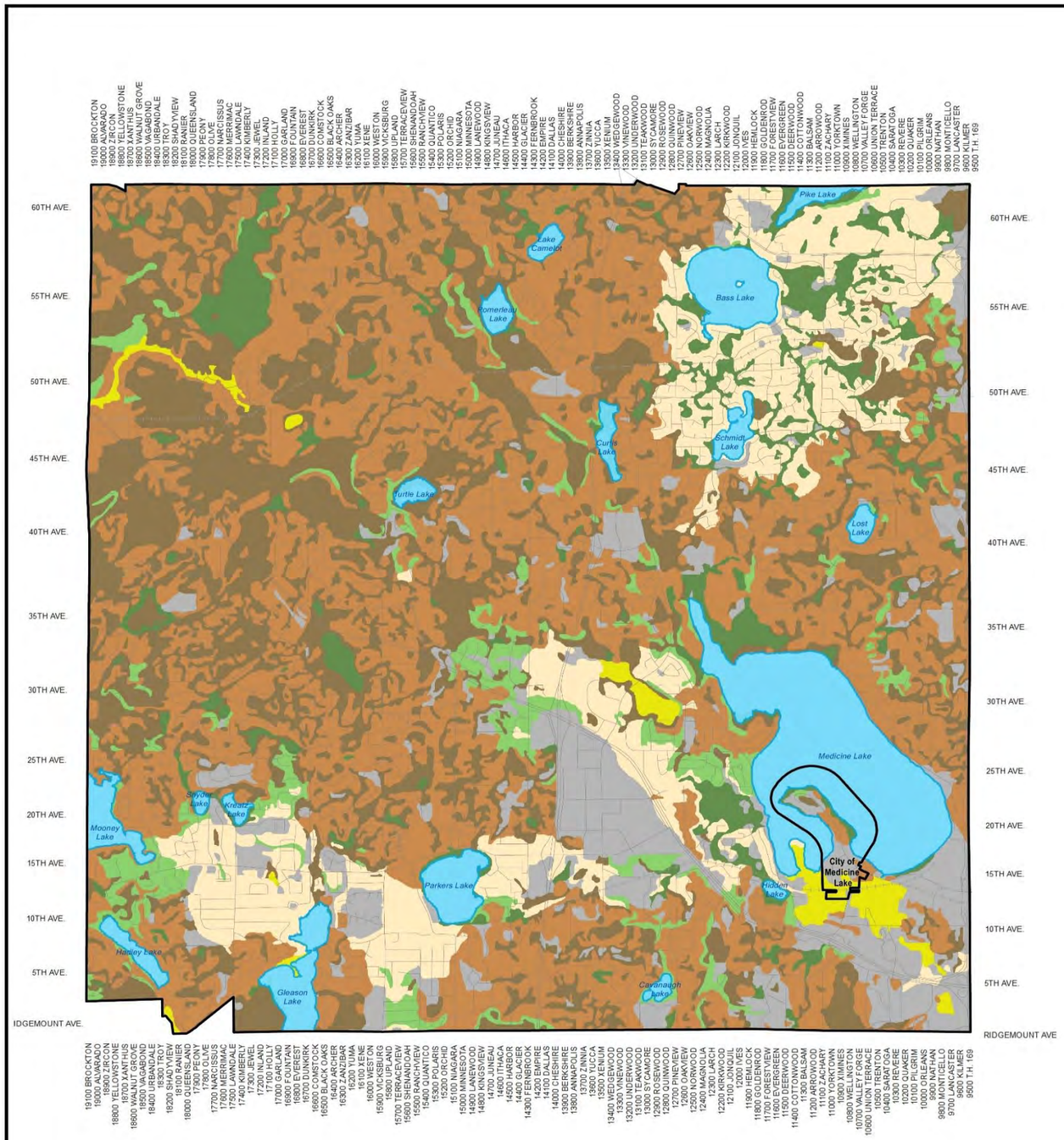
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**Information As of: August 8, 2018**

F

FIGURE 22

# Soil Hydrologic Group Information




## Legend

- Roads
- Railroad

**Soil Hydrologic Group**

- A
- A/D
- B
- B/D
- C
- C/D
- Not Available
- City Limits
- Lakes

N

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Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

City of Plymouth
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**Information As of: February 29, 2016**

**TABLE 3**
**WATERSHEDS**

| Watershed | Area (acres) | Percent of City | Headwater Location |
|---|---|---|---|
| Shingle Creek | 4,371 | 19.1 | Plymouth |
| Bassett Creek | 11,877 | 52.1 | Plymouth |
| Minnehaha Creek | 3,733 | 16.3 | Minnetonka |
| Elm Creek | 2,855 | 12.5 | Medina |
| **Total** | **22,836** | **100.0** | |

### Elm Creek

Elm Creek drains the northwestern corner of Plymouth which includes the majority of the remaining undeveloped property in Plymouth. This area is also the most active area for new single family home developments and the associated infrastructure. Approximately 4,000 acres in Medina drain to Elm Creek before it enters Plymouth. The watershed will coordinate drainage plans for the two cities.

### Shingle Creek

Shingle Creek drains the urbanized north central and northeastern part of Plymouth. Water from this watershed discharges to New Hope under Highway 169 and to Maple Grove through Pike and Eagle Lakes. The major lakes in the watershed include Bass, Pomerleau, Schmidt and Pike.

### Bassett Creek

The predominant water feature in the urbanized Bassett Creek watershed is Medicine Lake, located in the southeastern portion of Plymouth. Medicine Lake's largest tributary is Plymouth Creek whose headwaters begin near the intersection of County Road 101 and State Highway 55 and travel 15,000 linier feet (2.8 miles) to discharge into Medicine Lake. Parkers Lake is also found in

this watershed and has a popular swimming beach and park area. Bassett Creek discharges southeasterly into Golden Valley then through Minneapolis to the Mississippi River.

**Minnehaha Creek**

The Minnehaha Creek basin is a 5.9 square mile area that is located in the southwestern portion of Plymouth. Generally, drainage in the Minnehaha Creek basin drains into either Mooney Lake, Hadley Lake or Gleason Lake before making its way into Lake Minnetonka in Wayzata.

## CLIMATE

The climate of the area is moderate, characterized by large seasonal variations in temperature and rainfall and by moderate snowfall. The summers are warm and moderately humid and the winters are usually cold and moderately humid. The mean annual temperature is 44°F, and the mean monthly temperatures vary from 12°F in January to 73°F in July. The average annual precipitation is approximately 32 to 33 inches, with snowfall averaging approximately 44 inches annually and representing approximately 17 percent of the total precipitation.

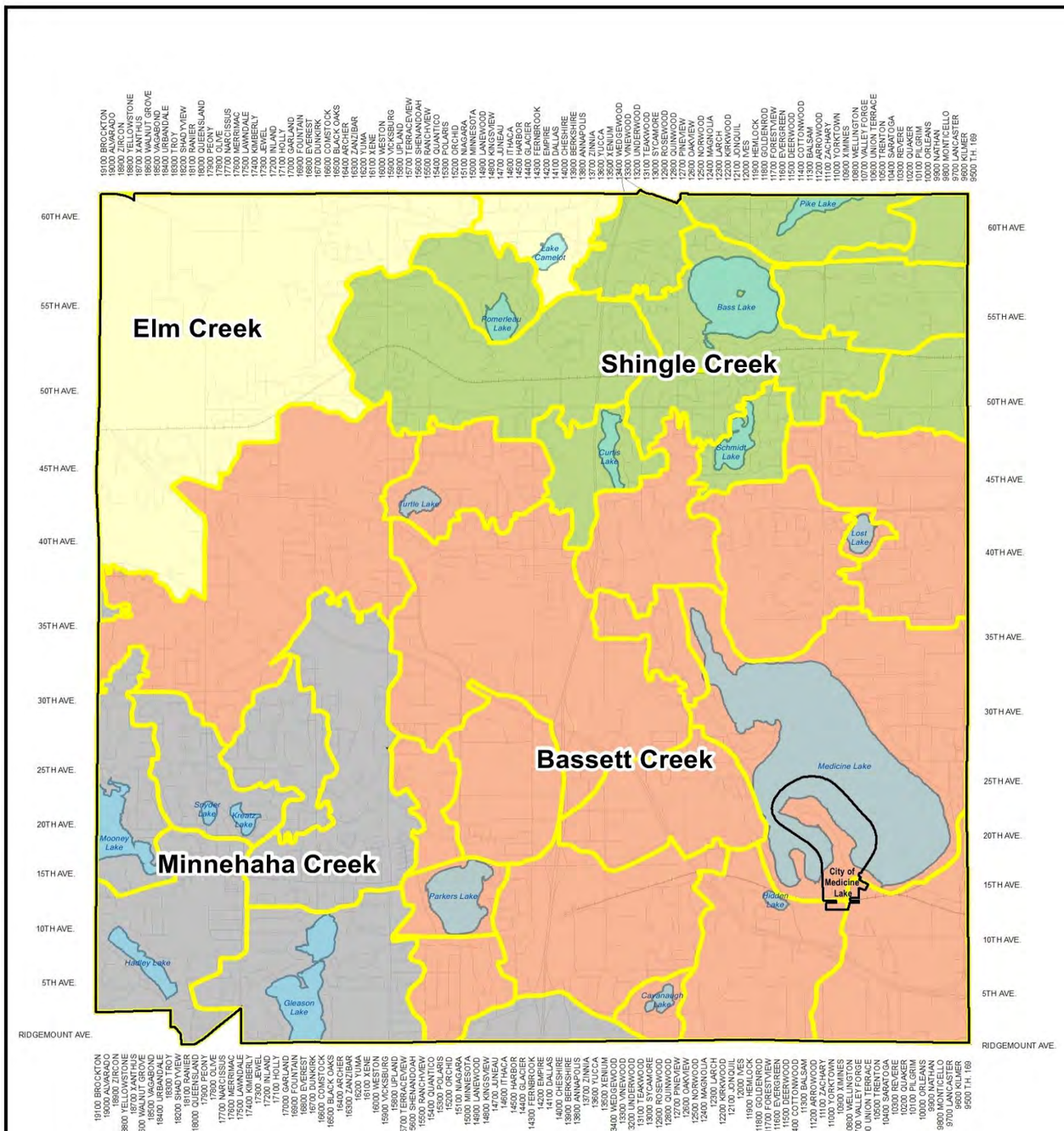



FIGURE 23

# Subwatershed Boundries

**Legend**

- Subwatershed Boundries
- Bassett Creek Watershed Management Organization
- Elm Creek Watershed Management Organization
- Minnehaha Creek Watershed District
- Shingle Creek Watershed Management Organization
- Roads
- Railroad
- City Limits
- Lakes

N

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City of Plymouth
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**Information As of: February 29, 2016**

## ASSESSMENT OF EXISTING OR POTENTIAL WATER RESOURCE RELATED PROBLEMS

The Federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The City of Plymouth, among other agencies, monitors water resources such as lakes, streams, wetlands, ponds and other features on regular intervals. Other monitoring agencies include watersheds, the Three Rivers Park District, and citizens through the Metropolitan Council's Citizen Assisted Monitoring Program (CAMP).

The State of Minnesota sets standards to define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses such as fishing, swimming or drinking. When the assessment indicates a water resource is not meeting the established State standard, it is considered impaired (Table 4). A water body is impaired if it fails to meet one or more of the State water quality standards. All of the water bodies that have been assessed as impaired in the State of Minnesota are listed on the 303(d) Impaired Waters List.

Once a water body is listed on the Impaired Waters List, a total maximum daily load (TMDL) study is required to be completed in order to assess and set pollutant reduction goals that are needed in order to restore the water body and meet water quality requirements.

The Municipal Separate Storm Sewer System (MS4) permit though the Minnesota Pollution Control Agency also establishes baseline intervals for which water resources and other assets are to be assessed for treatment effectiveness and maintenance needs. The goal of these assessments and inspections is to identify any pollution to water resources and eliminate it through procedures established by the city. This permit is scheduled to be updated every 5 years by MPCA Staff and Plymouth will apply for reissuance as required.

The City of Plymouth has identified the following issues that could potentially pose a problem to the water resources or environment within the City,

- Water Quantity (Flooding)
- Water Quality of Lakes, Streams & Wetlands
- Erosion and Sediment Control
- Wetland Protection
- Recreation, Fish and Wildlife Protection and Enhancement
- Groundwater Protection
- Invasive Species

This list is not comprehensive of all problems however shall serve as a baseline for implementation of this Surface Water Management Plan. These items are discussed in the implementation section of this plan.

**TABLE 4**

**PLYMOUTH IMPAIRED WATERS**

| Water | Affected use | Impairment |
|---|---|---|
| Bass Creek | Aquatic Life | Chloride |
| Bass Creek | Aquatic Life | Fish IBI[1] |
| Bassett Creek | Aquatic Life | Chloride |
| Bassett Creek | Aquatic Life | Fish IBI[1] |
| Bassett Creek | Aquatic Recreation | Fecal Coliform |
| Elm Creek | Aquatic Life | Low Oxygen |
| Elm Creek | Aquatic Life | Chloride |
| Elm Creek | Aquatic Life | Invertebrate IBI[1] |
| Elm Creek | Aquatic Life | Fish IBI[1] |
| Elm Creek | Aquatic Recreation | E. Coli |
| Kreatz Lake | Aquatic Recreation | Excess Nutrients |

| | | |
|---|---|---|
| Plymouth Creek | Aquatic Life | Chloride |
| Plymouth Creek | Aquatic Recreation | E. Coli |
| Shingle Creek | Aquatic Life | Chloride |
| Shingle Creek | Aquatic Life | Invertebrate IBI[1] |
| Shingle Creek | Aquatic Life | Low Oxygen |
| Shingle Creek | Aquatic Recreation | E. Coli |
| Bass Lake | Aquatic Recreation | Excess Nutrients |
| Gleason Lake | Aquatic Recreation | Excess Nutrients |
| Hadley Lake | Aquatic Recreation | Excess Nutrients |
| Medicine Lake | Aquatic Recreation | Excess Nutrients |
| Medicine Lake | Aquatic Consumption | Mercury FCA[2] |
| Mooney Lake | Aquatic Recreation | Excess Nutrients |
| Parkers Lake | Aquatic Life | Chloride |
| Parkers Lake | Aquatic Consumption | Mercury FCA |
| Pike Lake | Aquatic Recreation | Excess Nutrients |
| Pike Lake | Aquatic Consumption | Mercury FCA |
| Pomerleau Lake | Aquatic Recreation | Excess Nutrients |

Source: Minnesota Pollution Control Agency, 2018
[1]Index of biological integrity
[2]Fish consumption advisory

## IMPLEMENTATION PLAN

To protect water resources and to address impaired waters, the City implements various projects, practices, and programs. Specifics on these projects, practices, and programs are found in Appendix C. In addition, the City has identified citywide goals, water body goals, and official controls for surface water planning and management functions. The goals and controls were established in accordance with the purposes of the water management programs required by State Statute Sections 103B.201 – 103B.251. Furthermore, they are in conformance with the goals of the watershed management organizations with some level of jurisdiction in Plymouth including the

Bassett Creek, Elm Creek, and Shingle Creek WMOs and the Minnehaha Creek Watershed District.

## CITYWIDE GOALS

### Water Quantity (i.e., Flood Control)

Reduce the potential for flooding and minimize related public capital and maintenance expenditures necessary to control excessive volumes and rates of runoff.

### Water Quality

Achieve water quality standards in lakes, streams, and wetlands consistent with indented use and classification.

### Erosion and Sediment Control

The City will minimize the loss of soil into wetlands, lake, streams and creeks through plan review, education, enforcement and management.

### Wetlands

The City shall administer the State Wetland Conservation Act, consistent with the rules of the Minnesota Board of Water and Soil Resources.

### Public Participation, Information, and Education

The City will continue to promote public involvement and knowledge in management and protection of water resources through public participation and education.

### Monitoring

The City will continue to support a comprehensive water resources monitoring program to help identify progress towards meeting water quality goals and

allocations assigned by Total Maximum Daily Loads (TMDLs). Water quality parameters include, Total Suspended Solids (TSS), Total Phosphorus (TP), Nitrogen (N), and Chloride (Cl).

**Maintenance and Inspection**

The City will preserve the function, quantity, and quality of water resource facilities through routine inspections, regular maintenance activities, and administration of the Minnesota Wetland Conservation Act.

**Recreation, Fish, and Wildlife**

The City may support water recreation activities and improve fish and wildlife habitat by implementation of programs which will improve water quality.

**Invasive Species Management**

The City may support aquatic and upland invasive species management in conjunction with other organizations to minimize their impact on the environment.

**Groundwater**

The City shall strive to prevent contamination of the aquifers and promote groundwater recharge including water conservation practices to maintain base flows in streams.

**Finance**

The City may regularly evaluate and monitor funding sources used to finance water resources management activities.

## WATER BODY GOALS (LAKES AND STREAMS)

### Shallow Lakes

Shallow lakes are defined as lakes with a maximum depth of 15 feet or less and with 80% or more of the lake area shallow enough to support emergent or submergent rooted aquatic plants (littoral zone). The water quality standards are based on the June 1 to September 30 mean values of water quality monitoring data obtained by MPCA, the City of Plymouth, the watershed management organization (WMO) or any combination of the three units of government.

The goal for all shallow lakes within the City is to have an average total phosphorus concentration of 60 µg/l or less, secchi depths greater than 1 meter and to have chlorophyll-a concentrations below 20 µg/l.

The WMO may have different goals for each lake, however in general, 303d listed lakes will need to work towards meeting the specific goals set forth in the US EPA approved TMDL Implementation Plan. The goal for lakes not listed as a 303d Impaired Water is protection of the resource as to prevent the water body from being listed as impaired in the future.

Shallow Lakes in Plymouth and their US EPA Approved TMDL (as applicable):

**TABLE 5**
**SHALLOW LAKES WITH APPROVED TMDLS**

| Lake | Impairment | TMDL |
|---|---|---|
| Bass | Excess Nutrients | Yes |
| Cavanaugh | None | No |
| Camelot | None | No |
| Curtis | None | No |
| Gleason | Excess Nutrients | Yes |
| Hidden | None | No |

| | | |
|---|---|---|
| Kreatz | Excess Nutrients | Yes |
| Lost | None | No |
| Mooney | Excess Nutrients | Yes |
| Pike | Excess Nutrients, Mercury FCA | Yes |
| Schmidt | Delisted (2014) | Yes |
| Snyder | None | No |
| Turtle | None | No |

**Deep Lakes**

Deep lakes are defined as lakes with maximum depths over 15 feet and as having less than 80% of the lake area as shallow enough to support emergent or submergent rooted aquatic plants (littoral zone) The water quality standards are based on the June 1 to September 30 mean values of water quality monitoring data obtained by MPCA, The City of Plymouth, the WMO or any combination of the three units of government.

The goal for all deep lakes within the City is to have an average total phosphorus concentration of 40 µg/l or less, secchi depths greater than 1.4 meters and to have chlorophyll-a concentrations below 14 µg/l.

The WMO may have different goals for each lake, however in general, 303d listed lakes will need to work towards meeting the specific goals set forth in the US EPA approved TMDL plan. The goal for lakes not listed as a 303d Impaired Water is protection of the resource as to prevent the water body from being listed as impaired in the future.

Deep Lakes in Plymouth and their US EPA Approved TMDL (as applicable):

**TABLE 6**
**DEEP LAKES WITH APPROVED TMDLS**

| Lake | Impairment | TMDL |
|---|---|---|
| Hadley | Excess Nutrients | Yes |
| Medicine | Excess Nutrients, Mercury FCA | Yes |
| Parkers | Chloride, Mercury FCA | Yes |
| Pomerleau | Excess Nutrients | Yes |

**Streams**

Streams are important conduits in the water cycle and are instruments in groundwater recharge, and habitat for many aquatic species. Increased rates and volumes of stormwater runoff, resulting from urbanization and other activities, can degrade a stream's hydrology and physical condition. The City shall have water quality goals in streams for E. Coli, dissolved oxygen, chloride, and biotic integrity consistent with State standards.

The WMO may have different goals for each stream, however in general, 303d listed streams will need to work towards meeting the specific goals set forth in the US EPA approved TMDL Implementation Plan. The goal for streams not listed as a 303d Impaired Water is protection of the resource as to prevent the water body from becoming listed as impaired in the future. Streams in Plymouth and their US EPA Approved TMDL (as applicable):

**TABLE 7**
**STREAMS WITH APPROVED TMDLS**

| Stream | Impairment | TMDL |
|---|---|---|
| Bass Creek | Fish and Macroinvertebrate IBI<br>Chloride | Yes |
| Bassett Creek | Fish and Macroinvertebrate IBI<br>Fecal Coliform[3]<br>Chloride[2] | No |
| Elm Creek | Fish and Macroinvertebrate IBI<br>E. Coli<br>Dissolved Oxygen<br>Chloride[2] | No |

| | | |
|---|---|---|
| Plymouth Creek | Chloride[2]<br>E. Coli[3] | No |
| Minnehaha Creek | Chloride[2]<br>E. Coli[3] | Yes |

1 Elm Creek TMDL is anticipated to be approved by US EPA in 2016.
2 Chloride impairment for Elm Creek and Bassett Creek will be covered as part of the Twin Cities Metro Area Chloride TMDL (MPCA 2015)
3 E. *Coli* and Fecal Coliform impairment are addressed by the *Upper Mississippi River Bacteria TMDL Study and Protection Plan* (MPCA 2014)

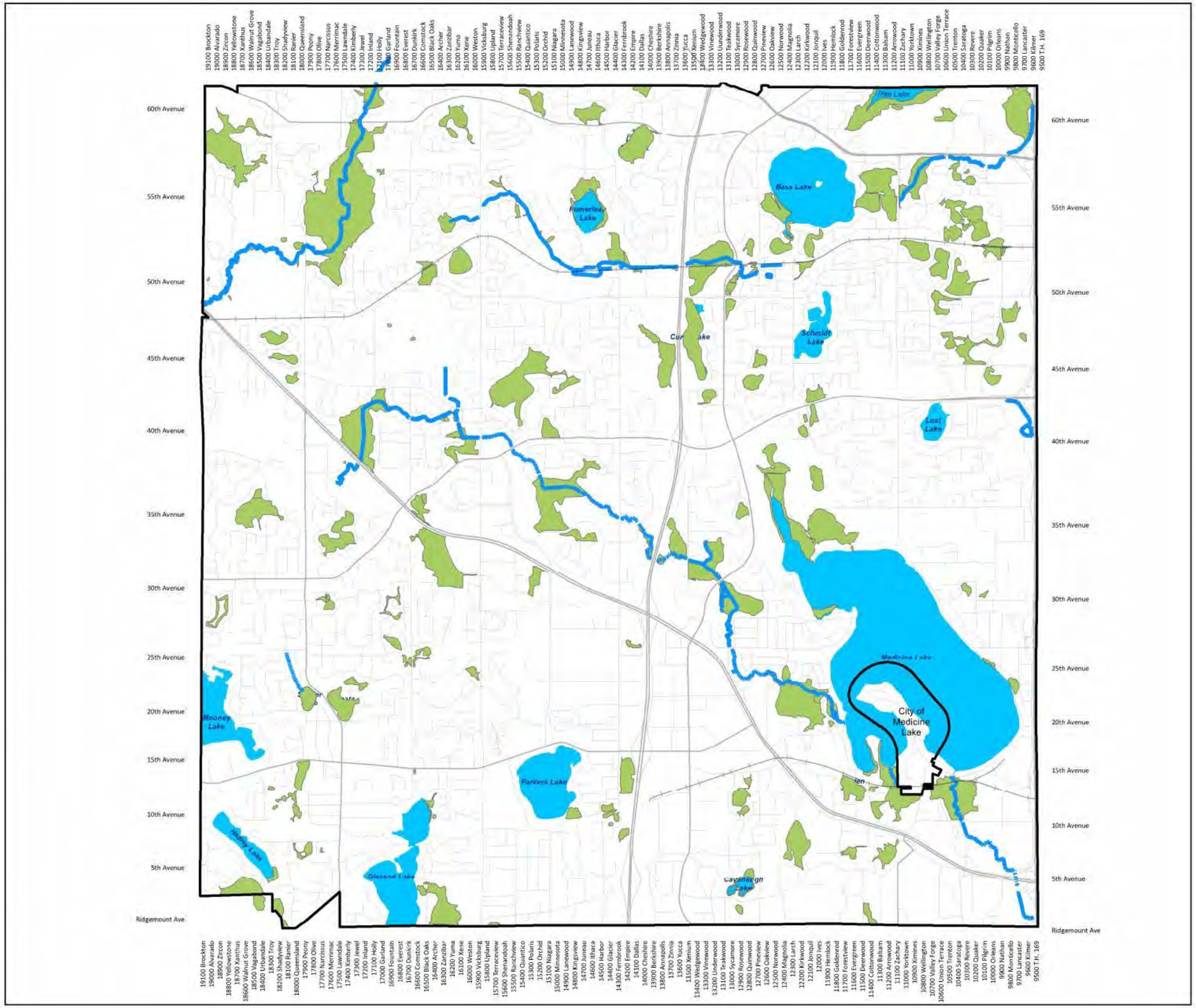



Figure 24

## Minnesota DNR Public Water Wetlands and Creeks

As of 8/17/2018

Creek
MN D.N.R Public Water
Lakes

N
W E
S

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

October 2018
City of Plymouth

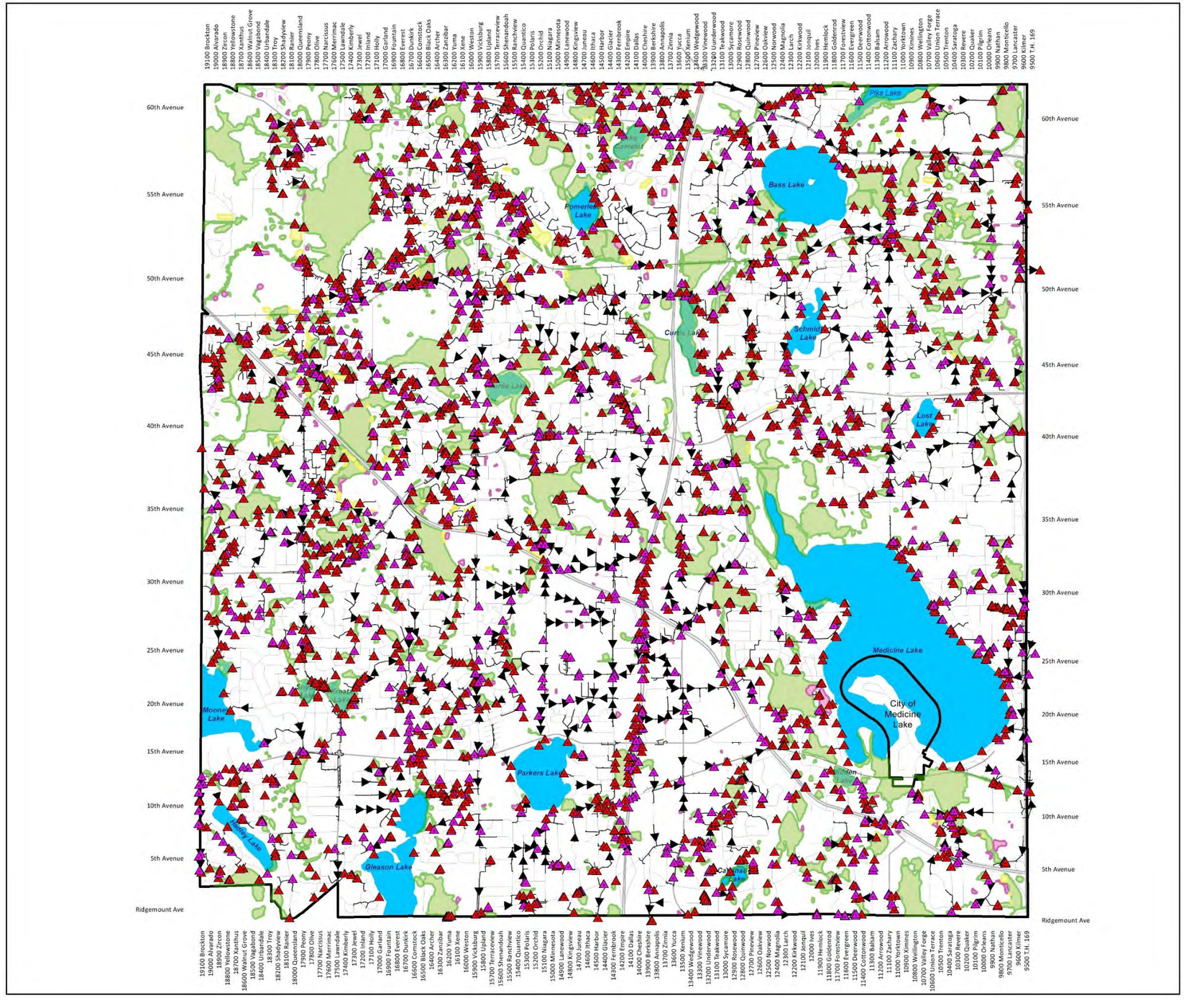



Figure 25

## Storm Sewer System Map

As of 8/17/2018

- Outlet (Water enters system)
- Outfall (Water exits system)
- Storm_Lines
- Lakes
- Wetland
- Wetland Mitigation
- Water Quality Pond

N
W E
S

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

August, 2018

City of Plymouth

## OFFICIAL CONTROLS

Entities currently having some level of administration responsibility within the City of Plymouth include the City of Plymouth, Bassett Creek WMO, Elm Creek WMO, Minnehaha Creek Watershed District, Shingle Creek WMO, Hennepin County, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Board of Water and Soil Resources, United States Army Corps of Engineers, and the Metropolitan Council. The City forwards projects to the Bassett Creek, Shingle Creek, Elm Creek WMO's and Minnehaha Creek WD once City staff has performed preliminary review of the project and has determined the project is ready for Watershed Review. Projects that meet the thresholds set by the Bassett Creek (see the BCWMC Requirements for Improvements and Development Proposals, (2017, as amended), Elm Creek and Shingle Creek Watershed Management Organizations or the Minnehaha Creek Watershed District must also meet the water quality rules in place at the time of application. These thresholds are updated by the Watersheds periodically and can be found in City of Plymouth's Post-Construction Water Quality Management Guidance Document. Additional permits or approvals from the Minnesota DNR, United States Army Corps of Engineers, the Board of Soil and Water Resources and as applicable, Minnehaha Creek Watershed District will be needed if wetland or other water body impacts are identified during the planning stages of the project.

The City's responsibilities include, but are not limited to:

- Comprehensive Plan updates;
- Surface Water Management Plan updates;
- Ordinance review and amendment;
- Local plat review and amendments;
- Permits;
- Administration of the State Wetland Conservation Act;

- Groundwater Management – Wells;
- Financing

Plymouth City Code and the Surface Water Management Plan contain the regulatory procedures, mechanisms and protections for surface water management. The regulatory mechanism that is being adopted with the plan, Minimal Impact Design Standards (MIDS), represents the next generation of stormwater management and aims to deliver a higher clean water performance goal through low impact development and other stormwater management approaches. Several of the codes that relate to surface water management are incorporated by reference into this plan and are listed below (Table 8) and are planned to be updated in early 2019. Updates to City Code or any changes to the Surface Water Management Plan may result in a plan amendment.

**TABLE 8**
**OFFICIAL CONTROLS**

| Official Control | City Code |
|---|---|
| Floodplain Overlay District | Chapter 21 – Section 21660 |
| Shoreland Management Overlay District | Chapter 21 – Section 21665 |
| Wetland District | Chapter 21 – Section 21670 |
| Erosion Control | Chapter 4 – Section 425<br>Chapter 5 – Section 526 |
| Storm Drainage Systems | Chapter 7 – Section 725 |
| Natural Preserves | Chapter 8 – Section 811 |
| Preliminary Platting | Chapter 5 – Section 510 |
| Final Platting | Chapter 5 – Section 512 |

The four watershed management organizations (Bassett, Elm, Minnehaha, Shingle) are responsible for:

- Water Quality, Lake, and Stream Monitoring
- Local plan review and approval
- Projects of regional significance
- Education Activities

## AMENDMENTS TO THE SURFACE WATER MANAGEMENT PLAN

Request for an amendment to any portion of the Surface Water Management Plan (text or maps) shall be made in writing to the City Engineer. Such request shall be accompanied by a fee as set forth in the City Code. Such request shall also be accompanied by detailed written and graphic materials, the number and size as prescribed by the City Engineer, fully explaining the proposed change to the plan, along with a list of property owners located within 750 feet of any subject property in a format prescribed by the City. The application shall be considered as being officially submitted and complete when the applicant has complied with all the specified information requirements.

Upon receipt of a complete application for any type of amendment and following city staff and watershed staff analysis of the application and request, the City Engineer shall set a public hearing. The Environmental Quality Committee shall conduct the hearing and report its findings and make recommendations to the City Council. Notice of said hearing shall be published in the official newspaper at least ten days prior to the hearing and when the amendment affects a particular property.

The Environmental Quality Committee shall review the impact of the proposed amendment. Its judgment shall be based upon, but not limited to, the following factors:

- Evidence submitted by the applicant demonstrating the reason(s) that the plan should be changed, including, but not limited to, whether new information has become available since the Surface Water Management Plan was adopted that supports re-examination of the plan, or that new legislation offers new opportunities or constraints that were not previously considered by the plan.

- A demonstration by the applicant that the proposed amendment has merit beyond the interests of the proponent.

- The possible impacts of the amendment on all specific elements of the Surface Water Management Plan as may be applicable, including, but not limited to:

    - The 9 City Wide Goals
    - The 3 Water-body Goals
    - The Watershed Assessments; and
    - Capital Improvement Program (CIP).

- The impact of the amendment on City Code and the City Comprehensive Plan.

- The impact of the amendment on the Surface Water Management Plan remaining in compliance with local watershed management organizations, watershed district and the Metropolitan Council's rules.

- Consideration of the impact of the proposed amendment upon current and future special assessments and utility area charges, future property tax assessments or other fiscal impacts upon the City of Plymouth.

The City may request additional information from the applicant concerning the requested amendment or retain expert testimony with the consent and at the expense of the applicant, said information to be declared necessary to establish the possible effects or benefits of the proposed Surface Water Plan amendment.

The applicant or a representative thereof may appear before the Environmental Quality Committee in order to present information and answer questions concerning the proposed request.

The Environmental Quality Committee shall make a recommendation on the request. Such recommendations shall be accompanied by the report and recommendation of the City staff and discussion whether or not review by the Watershed Management Organizations, Watershed District, Metropolitan Council or other regulatory agencies as applicable.

The City Council shall not act upon an amendment until it has received a report and recommendation from the Environmental Quality Committee and City staff or until 60 days after the first regular Environmental Quality Committee meeting at which the request was considered.

Upon receiving the report and recommendation of the Environmental Quality Committee and City staff, the city manager shall schedule the application for consideration by the City Council. Such reports and recommendations shall be entered in and made part of the permanent written record of the City Council meeting.

Approval of a proposed amendment shall require passage by a two-thirds vote of the entire City Council.

The City Council may approve an amendment conditionally upon completion of any review by the Metropolitan Council pursuant to the Metropolitan Land Use Planning Act. Or, the City Council may direct staff to submit the amendment recommended by the Environmental Quality Committee to the Metropolitan Council for review prior to City Council consideration of the amendment and consider final passage of the amendment only after completion of the Metropolitan Council's review.

Whenever an application for an amendment has been considered and denied by the City Council, a similar application for an amendment shall not be considered again by the Environmental Quality Committee or City Council for at least six months from the date of its denial; and a subsequent application shall likewise not be considered again by the Environmental Quality Committee or City Council for an additional six months from the date of the second denial unless a decision to reconsider such matter is made by a majority of the full City Council.

Amendment applications shall be approved or denied within 120 days from the date of official and complete submission unless extended by a mutual agreement between the applicant and the City Council.

# Appendix A – Watershed Assessments

The Metropolitan Surface Water Management Act (1982) requires local units of government in the seven-county metropolitan area to prepare and implement watershed management plans through membership in a watershed management organization. A watershed management organization can be organized as either a watershed district, a function of county government, or a joint powers agreement organization. Watershed Districts are governed by Minnesota Statutes Chapter 103D while joint powers organizations are established per MN Statutes 471.59 and are governed by their respective joint powers agreement.

Minnesota Statute 103B.235 requires the City of Plymouth to update its Surface Water Management Plan in conformance with the watershed management plans of Bassett Creek, Elm Creek, Minnehaha Creek, and Shingle Creek watersheds. Per Statute, required contents of the plan include:

- a description of existing and proposed physical environment and land use;
- defined drainage areas and the volumes, rates, and paths of storm water runoff;
- identification of areas and elevations for storm water storage adequate to meet performance standards established in the watershed plan;
- defining water quantity and water quality protection methods adequate to meet performance standards established by the watershed plan;
- identification of regulated areas; and
- set forth an implementation program, including a description of official controls and, as appropriate, a capital improvement program.

The Watershed Assessments Section is intended to meet watershed plan requirements and facilitate decision making at the local level. The Watershed Assessments Section for the Elm Creek, Shingle Creek and Minnehaha Creek Watersheds includes more detailed analysis of sub-watersheds including but not limited to wetlands and natural resources inventories, defined drainage areas, volumes, rates, storm water runoff

directions, impaired waters, established total maximum daily loads, and capital improvements. Hydrologic and hydraulic modeling results for the portion of the City (including drainage area, volumes, and rates) within the Bassett Creek Watershed can be found in the Bassett Creek Watershed Management Commissions XP-SWMMM Phase II Final Report (2017). Unless noted, TMDL implementation, educational activities and associated costs for each sub watershed are represented as a city wide practice. Specific projects identified in the City of Plymouth or Watershed Organizations Capital Improvement Programs are listed separately for each sub watershed.

Over the course of this plan, the City of Plymouth is committed to provide the Bassett Creek Watershed Management Commission with any information that is required to update the watershed wide XP-SWMM Model. The City is also committed to update a sub watershed wide model for the Elm, Shingle and Minnehaha Creek Watersheds with the latest rainfall standard data. At the time of this plan.

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# Bassett Creek Watershed

The Bassett Creek Watershed covers approximately 31 square miles in central Hennepin County. Predominant water features in Plymouth include Medicine Lake, Parkers Lake, Plymouth Creek, and Bassett Creek.

Generally, drainage in the Bassett Creek watershed comes to Plymouth Creek which begins about 1000 feet north of County Road 24, and becomes more of a defined stream at State Highway 55. Plymouth Creek parallels the highway as it flows southeasterly before discharging into Medicine Lake. Medicine Lake serves as the headwaters to Bassett Creek which begins on the south side of Medicine Lake and flows southeasterly into Golden Valley.

## Bassett Creek Watershed Management Organization

Bassett Creek and its three branches extend across nine cities: Plymouth, Medicine Lake, Golden Valley, Robbinsdale, Crystal, New Hope, Minnetonka, St. Louis Park, and Minneapolis. In Minneapolis, Bassett Creek enters a tunnel under the City where it will eventually drain to the Mississippi River. Prior to the adoption of a formal joint powers agreement, the cities in the Bassett Creek Watershed acted together as a committee, which was formed to study flood control issues in the watershed. In 1968, the Bassett Creek Flood Control Commission was formed by adoption of a joint powers agreement between the nine communities in the watershed. In 1984, the Bassett Creek Flood Control Commission revised its joint powers agreement and created the Bassett Creek Watershed Management Commission (BCWMC). The joint powers agreement was most recently approved by the member cities in 2015 and provides for the authorizations and scope of authority of the BCWMC.

The BCWMC Board of Commissioners consists of nine commissioners and nine alternates appointed by the member cities. The term of each commissioner and alternate is three years. Regular meetings of the BCWMC are held on the third Thursday of each month. Funding for the administrative functions of the BCWMC is

via an assessment, generally based on land area and tax capacity, to each member of the organization.

Per Minnesota Rules 8410.008, Subp. 2-8, watershed management organization goals generally fall into the following categories: water quantity, water quality, public drainage systems, groundwater, and wetlands. The BCWMC has established the following goals:

- Manage the surface water resources of the watershed to meet or exceed state standards and BCWMC water quality goals for wetlands, lakes, and streams.
    - BCWMC Management Classifications for Priority Waterbodies in Plymouth
        - Priority Stream — Main Stem Bassett Creek; Plymouth Creek
        - Priority 1 Deep Lakes — Medicine Lake; Parkers Lake
        - Priority 2 Shallow Lakes — Cavanaugh (Sunset Hill) Pond; Lost Lake
- Improve the quality of storm water runoff reaching the Mississippi River by reducing nonpoint source pollution.
- Protect and enhance fish and wildlife habitat in the BCWMC.
- Take into account aesthetics and recreational opportunities within the watershed when completing BCWMC projects.
- Reduce storm water runoff volume for the purposes of improving water quality.
- Protect against flood risks along the Bassett Creek trunk system.
- Protect human life, property, and surface water systems that could be damaged by flood events.
- Reduce storm water runoff rates and volumes to minimize flood problems, flood damages, and the future costs of storm water management systems.
- Provide leadership and assist member cities with coordination of intercommunity storm water runoff issues.

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- Notwithstanding that which occurs from natural processes, minimize erosion and sedimentation to protect the BCWMC's water resources and health, safety, and welfare.
- Increase the quality and quantity of wetlands in the BCWMC.
- Protect the quantity and quality of groundwater resources.
- Manage public ditches in a manner that recognizes their current use as urban drainage systems and as altered natural waterways.
- Raise awareness of the BCWMC's existence and its role in protecting and improving water quality, minimizing flooding, and preserving the watershed's ecological functions and aesthetics.
- Strengthen public confidence in the BCWMC's expertise and enable meaningful public participation in the planning process and ongoing projects conducted by the BCWMC.
- Raise awareness of the impact that individuals, businesses, and organizations have upon water resources and motivate these audiences to change personal/corporate behavior that has a negative impact on the watershed.
- Minimize the spread and manage the adverse impacts of harmful aquatic invasive species.
- Develop a greater understanding of climate change and its impact on water resources, including storm water infrastructure capacity and flooding, and develop strategies to appropriately manage future impacts.

To assist in meeting the goals of the BCWMC, the BCWMC has established a 5-year Capital Improvement Program. Capital improvements are currently funded under an ad-velorum tax through Hennepin County. The current BCWMC Capital Improvement program includes four projects in the City of Plymouth (Table 9)

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**TABLE 9**
**BCWMC CAPITAL IMPROVEMENTS IN PLYMOUTH 2018-2022**

| ID | Name | Plymouth Sub-watershed | Funding Amount | Funding Year |
|---|---|---|---|---|
| 2017CR-P | Plymouth Creek Stream Restoration – Annapolis Lane upstream for 2,500 linier feet | Middle Plymouth Creek | $860,000 | 2017-2018 |
| ML-20 | Mt. Olivet Stream Restoration | NE Medicine Lake | $400,000 | 2021 |
| ML-22 | Ponderosa Woods Stream Restoration | Lower Plymouth Creek | $475,000 | 2024 |
| PL-7 | Parkers Lake Drainage Improvement | North Parkers Lake | $400,000 | 2021-2022 |

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## Bassett Creek Sub-watersheds

The City of Plymouth has divided the portion of the Bassett Creek watershed within the City bounds into 18 sub-watersheds for administrative and management purposes. The 18 sub-watersheds (Figure 23) are:

- Upper Plymouth Creek
- Turtle Lake
- Middle Plymouth Creek
- Fernbrook Lane
- North Parkers Lake
- South Parkers Lake
- Parkers Lake
- Sunset Hills Pond/Cavanaugh Lake
- Plymouth Creek Southwest
- Lower Plymouth Creek
- West Medicine Lake
- North Medicine Lake
- Northeast Medicine Lake
- South Medicine Lake
- Medicine Lake
- Bassett Creek
- Lost Lake
- North Branch of Bassett Creek

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## Upper Plymouth Creek Sub-watershed

*Physical Land Use Characteristics*

The Upper Plymouth Creek sub-watershed is located in west central Plymouth. The sub-watershed is split by State Highway 55 and follows County Road 24 on the south side, extending into and including part of the City of Medina. The sub-watershed extends northeasterly where it is generally bounded by Vicksburg Lane and by 49th Avenue North. The existing land use is primarily a mix of single family residential and commercial/industrial development.

Significant landmarks within this sub-watershed include the headwaters of Plymouth Creek, which is classified as a priority stream by the Bassett Creek Watershed Management Commission and the 129-acre Hollydale Golf Course. The sub-watershed is mostly developed, however, there are a few remaining properties including the golf course which could develop in the next 10 years. This sub-watershed has 284.6 acres of wetland, 12.0 acres of wetland mitigation, and 17.7 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities, however, within the Upper Plymouth Creek sub-watershed there is one 2.7 acre moderate quality Maple-Basswood forest.

**TABLE 10**
**UPPER PLYMOUTH CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Headwater | Figure 26 |
| Downstream-most water body: | BC-12 (17411-NB01) | Figure 26 |
| Discharges to: | Middle Plymouth Creek | Figure 26 |
| Wetlands | 284.6 Acres | Figure 26 |
| Wetland Mitigation | 12.0 Acres | Figure 26 |
| Water Quality Ponding | 17.7 Acres | Figure 26 |
| Lakes | N/A | Figure 26 |
| General Hydrologic Soil Group | Variable | |
| Drainage Area | 1,710.9 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 11) and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 11**
**UPPER PLYMOUTH CREEK SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Plymouth Creek[1] | Chloride & E Coli | 2014 |

1 The E. coli impairment of Plymouth Creek is addressed by the *Upper Mississippi River Bacteria TMDL Study and Protection Plan*

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Figure 26. Upper Plymouth Creek Sub-watershed



*Implementation Program*

Recent projects pre-dating this plan include water flow and ponding improvements, completed in 2005, south of Old Rockford Road and east of Yuma Lane as well as a drainage and water quality improvement project south of the intersection of Old Rockford Road and Holly Lane. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 12.

**TABLE 12**
**UPPER PLYMOUTH CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Upper Plymouth Creek Sub-Watershed has two known impairments through the 2018 impaired water list produced by the State of Minnesota. The Twin Cities Metro Area Chloride TMDL Implementation Plan was approved by the Minnesota Pollution Control Agency in March, 2016. Additionally, the Upper Mississippi River Bacteria TMDL Study and Protection Plan was approved in 2014 and will be implemented during the course of this 10-year Surface Water Management Plan. The Implementation Program for the Upper Plymouth Creek Sub-watershed includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Plymouth Creek and other water bodies within this sub-watershed.

## Turtle Lake Sub-watershed

*Physical Land Use Characteristics*

The Turtle Lake sub-watershed is located in central Plymouth and is generally bounded by Vicksburg Lane to the west and County Road 9 (Rockford Road) to the south, 46th Avenue to the north and Fernbrook Lane to the east. The existing land use is primarily single family residential.

The most significant landmark within this sub-watershed is Turtle Lake itself (Figure 27). The sub-watershed is mostly developed and contains 73.0 acres of wetland, 0.0 acres of wetland mitigation, and 0.6 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high quality natural upland communities but does indicate a small portion of good quality oak forest.

**TABLE 13**
**TURTLE LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Plymouth Creek | |
| Receives runoff from: | Headwater | Figure 27 |
| Downstream-most water body: | Turtle Lake | Figure 27 |
| Discharges to: | Middle Plymouth Creek | Figure 27 |
| Wetlands | 73.0 Acres | Figure 27 |
| Wetland Mitigation | 0.0 Acres | Figure 27 |
| Water Quality Ponding | 0.6 Acres | Figure 27 |
| Lakes | Turtle – 23.7 | Figure 18<br>Figure 27 |
| General Hydrologic Soil Group | B, B/D, C/D | |
| Drainage Area | 409.4 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby

support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality. No impaired waters are identified within the Turtle Lake sub-watershed.

Figure 27. Turtle Lake Sub-watershed



*Implementation Program*

Recent projects pre-dating this plan include drainage improvements east of Turtle Lake and north of 44th Avenue North in the Quail Ridge development. In addition, a feasibility study was completed to review opportunities to manage water levels in Turtle Lake, however, based on low-floor elevations of adjacent properties, no changes to the Turtle Lake outlet and no management of water levels was recommended. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents.

Non-structural, programmatic, and structural solutions to improve water quality within this sub-watershed are shown in Table 14.

**TABLE 14**
**TURTLE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $25,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $25,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Quail Ridge 3rd Addition Drainage Imp | 2017 | NA | $350,000 | Plymouth |

*Conclusions*

The Turtle Lake sub-watershed does not have a known water quality impairment through the 2018 impaired waters list produced by the State of Minnesota. The Implementation Program for the Turtle Lake Sub-watershed includes a number of nonstructural, programmatic, and structural solutions to improve water quality and provide flood protection.

## Middle Plymouth Creek Sub-watershed

*Physical Land Use Characteristics*

The Middle Plymouth Creek Sub-watershed is located in the center of Plymouth, bisected east/west by I-494 and north/south by Highway 55. The sub-watershed receives water from the Upper Plymouth Creek and Turtle Lake Sub-watersheds, before discharging to the Lower Plymouth Creek sub-watershed. The sub-watershed is generally bounded to the north by County Road 9, to the west by Vicksburg Lane and to the south by Campus Drive.

Significant landmarks within this sub-watershed include Plymouth Creek, which is classified as a priority stream by the Bassett Creek Watershed Management Commission and four exceptionally large wetland areas. The sub-watershed is mostly developed and includes a mix of industrial, commercial, and residential areas. This sub-watershed has 284.6 acres of wetland, 12.0 acres of wetland mitigation, and 17.7 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) indicates several high or good quality natural upland communities including Maple/Basswood forests and a 10.9 acre Willow Swamp.

**TABLE 15**
**MIDDLE PLYMOUTH CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Upper Plymouth Creek and Turtle Lake Sub-watersheds | Figure 28 |
| Downstream-most water body: | BC-39 (22442-NB01) | Figure 28 |
| Discharges to: | Lower Plymouth Creek | Figure 28 |
| Wetlands | 247.7 Acres | Figure 28 |
| Wetland Mitigation | 6.3 Acres | Figure 28 |
| Water Quality Ponding | 5.1 Acres | Figure 28 |
| Lakes | None | |
| General Hydrologic Soil Group | B & C/D | |
| Drainage Area | 1583.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 16) and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

A drainage improvement project was completed in 2007 between 38th and 39th Avenues and west of Harbor Lane. A stream restoration project on Plymouth Creek was completed in 2018 from Plymouth Creek playfields to Annapolis Lane and another section of Plymouth Creek was restored just north of 26th Avenue North in 2010.

**TABLE 16**
**MIDDLE PLYMOUTH CREEK SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Plymouth Creek[1] | Chloride & E Coli | 2014 |

1 The E. coli impairment of Plymouth Creek is addressed by the *Upper Mississippi River Bacteria TMDL Study and Protection Plan*

Figure 28. Middle Plymouth Creek Sub-watershed



*Implementation Program*

Recent projects pre-dating this plan include drainage improvements and stream restorations on Plymouth Creek as well as a drainage improvement near the intersection of Ranchview Lane and Medina Road. Non-structural, programmatic, and structural solutions to address impairments within this sub-watershed are shown in Table 17.

**TABLE 17**
**MIDDLE PLYMOUTH CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Plymouth Creek Stream Restoration Plym Crk. Park to Annapolis Lane | 2017-2018 | $86,000 | $860,000 | Plymouth BCWMC |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Middle Plymouth Creek Sub-Watershed has one known impairment through the 2018 impaired water list produced by the State of Minnesota. The Twin Cities Metro Area Chloride TMDL Implementation Plan was approved by the Minnesota Pollution Control Agency in March, 2016. Additionally, the Upper Mississippi River Bacteria TMDL Study and Protection Plan was approved in 2014 and will be implemented during the course of this 10-year Surface Water Management Plan. The Implementation Program for the Middle Plymouth Creek Sub-watershed includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Plymouth Creek and other water bodies within this sub-watershed.

## Fernbrook Lane Sub-watershed

*Physical Land Use Characteristics*

The Fernbrook Lane Sub-watershed is located in south central Plymouth. The sub-watershed is generally bounded by I-494 to the east, Highway 55 to the north, County Road 6 to the south, and Niagara Lane to the west. The existing land use is primarily commercial/industrial with small pockets of multi-family and single family residential.

The sub-watershed is mostly developed, however, there are a few remaining properties which could develop in the next 10 years. This sub-watershed has 3.8 acres of wetland, 0.1 acres of wetland mitigation, and 1.5 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities.

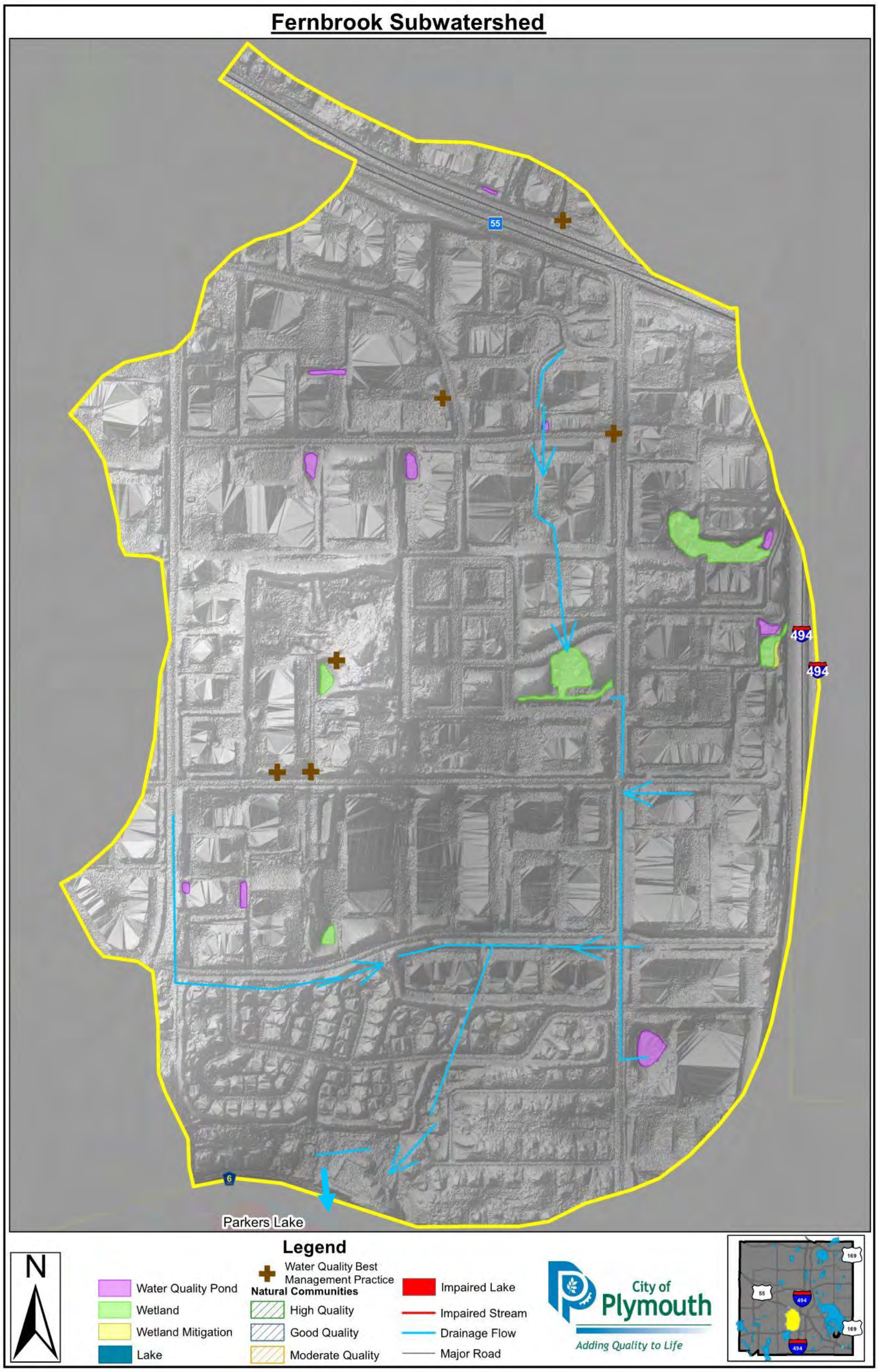
**TABLE 18**
**FERNBROOK LANE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Parkers Lake | |
| Receives runoff from: | Headwater | Figure 29 |
| Downstream-most water body: | Parkers Lake | Figure 29 |
| Discharges to: | Parkers Lake | Figure 29 |
| Wetlands | 3.8 Acres | Figure 29 |
| Wetland Mitigation | 0.1 Acres | Figure 29 |
| Water Quality Ponding | 1.5 Acres | Figure 29 |
| Lakes | None | |
| General Hydrologic Soil Group | B; B/D; C/D | |
| Drainage Area | 491.2 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are no impaired waters currently in the Fernbrook Lane Sub-watershed.

Figure 29. Fernbrook Lane Sub-watershed



*Implementation Program*

There are no recent projects in this sub-watershed predating this plan. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 19.

**TABLE 19**
**FERNBROOK LANE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Fernbrook Lane Sub-Watershed drains to Parkers Lake, a public access water in the City of Plymouth. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Parkers Lake and other water bodies within this sub-watershed.

## North Parkers Lake Sub-watershed

*Physical Land Use Characteristics*

The North Parkers Lake Sub-watershed lies west of and adjacent to Fernbrook Lane, between 26th Avenue North and County Road 6. This sub-watershed is generally bounded to the west by Vicksburg Lane. The existing land use is a combination of multi-family residential, commercial, and park space.

A significant landmark within this sub-watershed is the Parkers Lake Regional Park and Playfields. The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 8.5 acres of wetland, 0.0 acres of wetland mitigation, and 0.0 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities.

**TABLE 20**
**NORTH PARKERS LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Parkers Lake | |
| Receives runoff from: | Headwater | Figure 30 |
| Downstream-most water body: | Parkers Lake | Figure 30 |
| Discharges to: | Parkers Lake | Figure 30 |
| Wetlands | 8.5 acres | Figure 30 |
| Wetland Mitigation | 0.0 acres | Figure 30 |
| Water Quality Ponding | 0.0 acres | Figure 30 |
| Lakes | None | |
| General Hydrologic Soil Group | B; B/D; C/D | |
| Drainage Area | 188.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby

support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently no impairments within the North Parkers Lake Sub-watershed.

Figure 30. North Parkers Lake Sub-watershed



*Implementation Program*

There are no recent projects pre-dating this plan within this sub-watershed. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 21.

**TABLE 21**
**NORTH PARKERS LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $25,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $25,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Parkers Lake Park Drainage Improvement | 2019-2020 | - | $400,000 | Plymouth/ BCWMC |

*Conclusions*

The North Parkers Lake Sub-Watershed does not contain any known impairments through the 2018 impaired water list produced by the State of Minnesota, however, this watershed does eventually drain to three waterbodies with impairments (Parkers Lake, Medicine Lake & Bassett Creek). A TMDL Implementation Plan has been developed for Medicine Lake and a future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Parkers Lake and other water bodies within this sub-watershed and downstream.

## South Parkers Lake Sub-watershed

*Physical Land Use Characteristics*

The South Parkers lake sub-watershed lies directly south of Parkers Lake, generally between Vicksburg Lane and I-494. A small portion of this sub-watershed extends south into neighboring Minnetonka. The existing land use is primarily single family residential.

The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 3.9 acres of wetland, 0.0 acres of wetland mitigation, and 0.3 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities, however, within the South Parkers Lake sub-watershed there is 10.0 acres of poor quality Oak-mesic forest.

**TABLE 22**
**SOUTH PARKERS LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Parkers Lake | |
| Receives runoff from: | Headwater | Figure 31 |
| Downstream-most water body: | Parkers Lake | Figure 31 |
| Discharges to: | Parkers Lake | Figure 31 |
| Wetlands | 3.9 acres | Figure 31 |
| Wetland Mitigation | 0.0 acres | Figure 31 |
| Water Quality Ponding | 0.3 acres | Figure 31 |
| Lakes | None | |
| General Hydrologic Soil Group | B; B/D; A | |
| Drainage Area | 258.2 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be

established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no documented water quality impairments within the Parkers Lake South Sub-watershed.

Figure 31. South Parkers Lake Sub-watershed



*Implementation Program*

Recent projects pre-dating this plan include a water quality pond improvement adjacent to Circle Park (2010), a drainage improvement southwest of Parkers Lake and south of the Luce Line trail (2016) and a storm sewer/stream restoration (2005) at the inflow to Parkers Lake. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 23.

**TABLE 23**
**SOUTH PARKERS LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The South Parkers Lake Sub-Watershed has no known impairments through the 2018 impaired water list produced by the State of Minnesota, however, this sub-watershed eventually drains to three impaired waters (Parkers Lake, Medicine Lake & Bassett Creek). A TMDL Implementation Plan has been developed for Medicine Lake and a future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Parkers Lake and other water bodies within this sub-watershed and downstream.

## Parkers Lake Sub-watershed

*Physical Land Use Characteristics*

The Parkers Lake Sub-watershed lies in south central Plymouth, directly east of Shenandoah Lane and south of County Road 6. The existing land use is primarily Parkers Lake itself, with open space on the west and single family residential on the east.

The significant landmark within this sub-watershed is Parkers Lake, which is classified as a Priority 1 Deep Lake by the Bassett Creek Watershed Management Commission. The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 5.4 acres of wetland, 0.0 acres of wetland mitigation, and 1.2 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities.

**TABLE 24**
**PARKERS LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Parkers Lake | |
| Receives runoff from: | North Parkers Lake<br>Fernbrook Lane<br>South Parkers Lake | Figure 32 |
| Downstream-most water body: | Parkers Lake | Figure 32 |
| Discharges to: | Plymouth Creek SW | Figure 32 |
| Wetlands | 5.4 Acres | Figure 32 |
| Wetland Mitigation | 0.0 Acres | Figure 32 |
| Water Quality Ponding | 1.2 Acres | Figure 32 |
| Lakes | Parkers – 102 acres | Figure 13<br>Figure 32 |
| General Hydrologic Soil Group | B | |
| Drainage Area | 213 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 25) and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 25**
**PARKERS LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Parkers Lake | Chloride & Aquatic Consumption | 2014 |

Figure 32. Parkers Lake Sub-watershed



*Implementation Program*

Recent projects in the Parkers Lake Sub-Watershed pre-dating this plan include the Parkers Lake Rock Weir and the South Parkers Lake tributary stream restoration and erosion repair project. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 26. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents.

**TABLE 26**
**PARKERS LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $10,000 | $100,000 | Plymouth |
| Lake Management | 2019-20128 | $1,000 | $10,000 | Plymouth and Partners |

*Conclusions*

The Parkers Lake Sub-Watershed has two known impairments (chloride & mercury) through the 2018 impaired water list produced by the State of Minnesota. Implementation of best management practices consistent with the TMDL Implementation Plan for chloride will be implemented during the course of this plan. This 10-year Surface Water Management Plan also includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Parkers Lake and other water bodies within this sub-watershed.

## Cavanaugh Lake Sub-watershed

*Physical Land Use Characteristics*

The Cavanaugh Lake Sub-watershed is located in southeastern Plymouth. The sub-watershed extends south into Minnetonka. The existing land use is primarily single family residential but also includes Sunset Hill Elementary School.

The significant landmark within this sub-watershed is Cavanaugh Lake, which is classified as a Priority 2 Shallow Lake by the Bassett Creek Watershed Management Commission. The sub-watershed is developed and redevelopment will be the primary driver of change within this sub-watershed. This sub-watershed has 9.4 acres of wetland, 0.0 acres of wetland mitigation, and 0.1 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities, however, within the Sunset Hills Pond/Cavanaugh Lake sub-watershed there is one 6.2 acre moderate quality Oak forest.

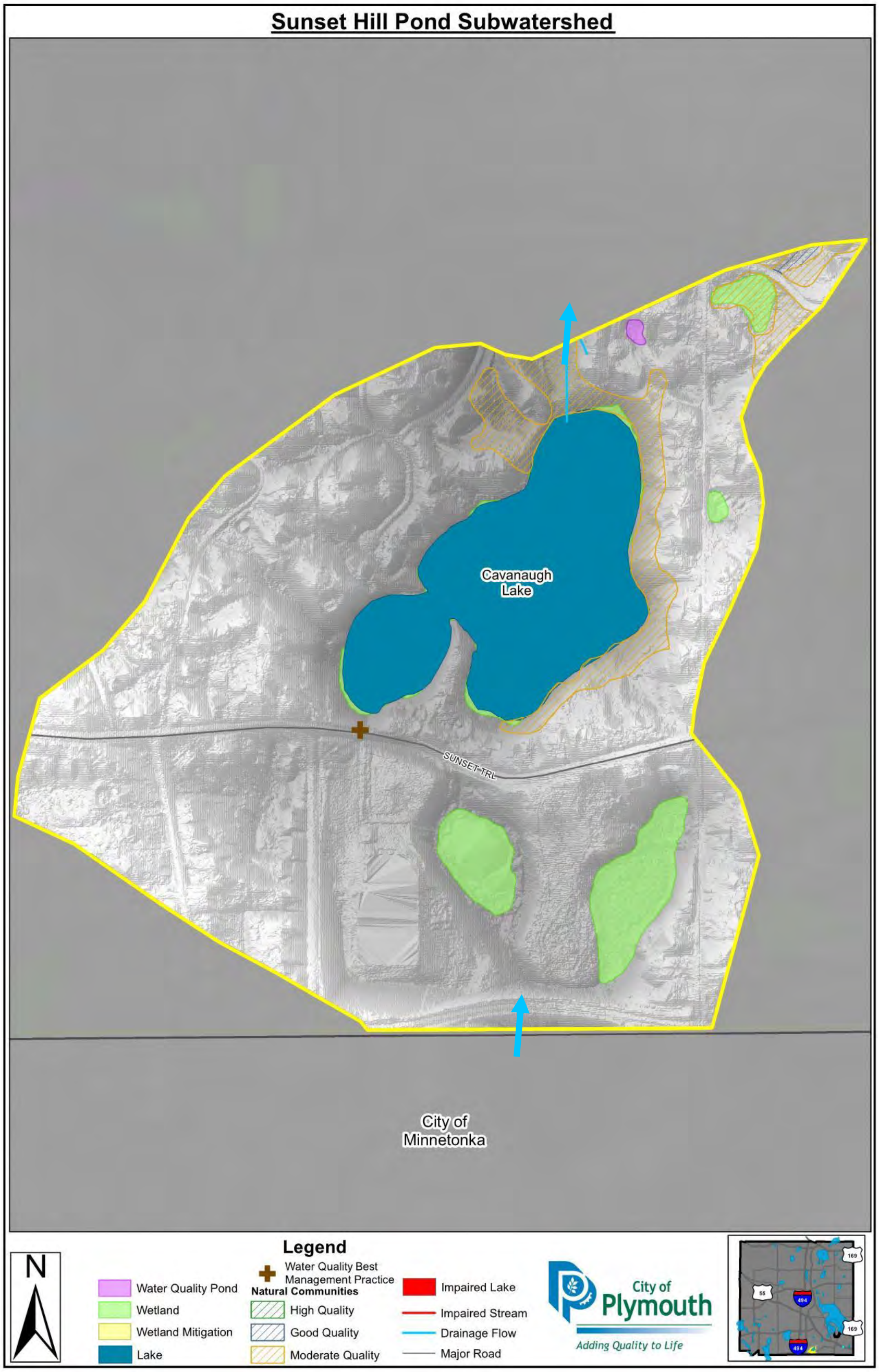
**TABLE 27**
**CAVANAUGH LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Minnetonka | Figure 33 |
| Downstream-most water body: | Medicine Lake | Figure 33 |
| Discharges to: | Plymouth Creek SW | Figure 33 |
| Wetlands | 9.4 Acres | Figure 33 |
| Wetland Mitigation | 0.0 Acres | Figure 33 |
| Water Quality Ponding | 0.1 Acres | Figure 33 |
| Lakes | Cavanaugh-14.2 acres | Figure 3<br>Figure 33 |
| General Hydrologic Soil Group | B; C/D | |
| Drainage Area | 107.4 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently, no know water quality impairments within the Sunset Hills Pond/Cavanaugh Lake Sub-watershed.

Figure 33. Sunset Hills Pond/Cavanaugh Lake Sub-Watershed



*Implementation Program*

There are no recent projects pre-dating this plan, however, non-structural, programmatic, and structural solutions to prevent water quality degradation within or downstream of this sub-watershed are shown in Table 28. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents.

**TABLE 28**
**CAVANAUGH LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth and Partners |

*Conclusions*

The Cavanaugh Lake Sub-Watershed drains to three known impairments through the 2018 impaired water list produced by the State of Minnesota, however, there are no know impairments within the Sunset Hills Pond/Cavanaugh Lake Sub-watershed. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving and protecting water quality in Cavanaugh Lake and other water bodies within this sub-watershed.

## Plymouth Creek Southwest Sub-watershed

*Physical Land Use Characteristics*

The Plymouth Creek Southwest Sub-watershed is located in south-central Plymouth. Bounded generally to the west by I-494 and centered along the Luce Line trail, the Plymouth Creek Southwest sub-watershed receives runoff from the Parkers Lake and the Sunset Hill Pond/Cavanaugh Lake sub-watersheds. The existing land use is primarily commercial/industrial but does have significant pockets of single family residential.

Significant landmarks within this sub-watershed include I-494, County Road 61, and the Luce Line trail. The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 54.0 acres of wetland, 0.0 acres of wetland mitigation, and 2.3 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities, however, within the Plymouth Creek Southwest sub-watershed there are three low quality Oak Forests totaling 10.0 acres and one 2.9 acre moderate quality Maple-Basswood Forest.

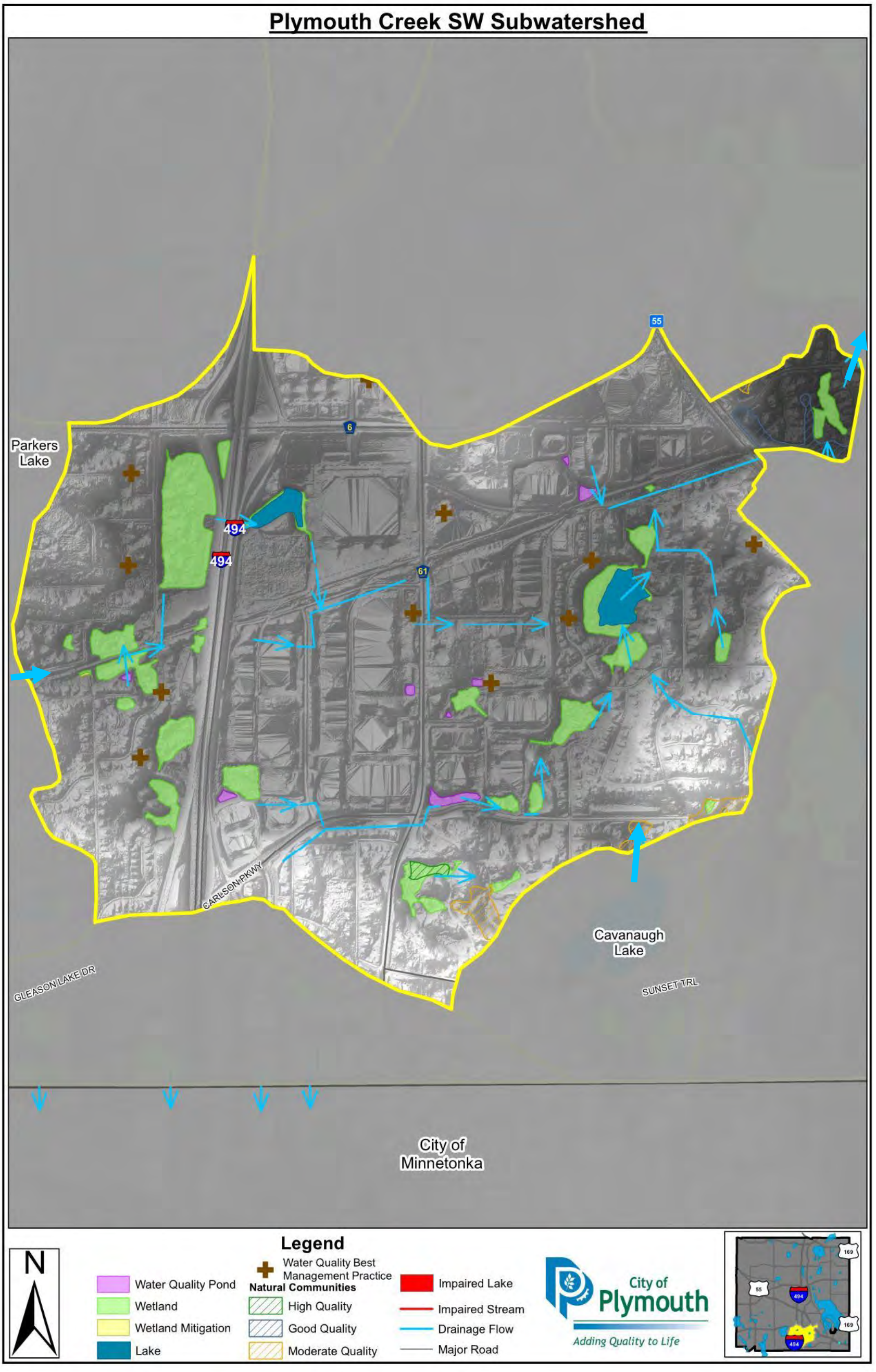
**TABLE 29**
**PLYMOUTH CREEK SOUTHWEST SUB-WATERSHED**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Parkers Lake<br>Sunset Hills<br>Pond/Cavanaugh Lake | Figure 34 |
| Downstream-most water body: | (26313-NB01) | Figure 34 |
| Discharges to: | Lower Plymouth Creek | Figure 34 |
| Wetlands | 54.0 Acres | Figure 34 |
| Wetland Mitigation | 0.0 Acres | Figure 34 |
| Water Quality Ponding | 2.3 Acres | Figure 34 |
| Lakes | None | |
| General Hydrologic Soil Group | B | |
| Drainage Area | 873.7 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently, no know water quality impairments within the Plymouth Creek Southwest Sub-watershed.

Figure 34. Plymouth Creek Southwest Sub-watershed



*Implementation Program*

There are no recent water quality projects pre-dating this plan, however, the City of Plymouth has recently performed rehabilitation work on the Parkers Lake lift station to provide for flood protection. Non-structural, programmatic, and structural solutions to protect and improve water quality within or downstream of this sub-watershed are shown in Table 30.

**TABLE 30**
**PLYMOUTH CREEK SOUTHWEST SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Harbor Place Erosion Repair | 2020 | $200,000 | $200,000 | Plymouth |

*Conclusions*

The Plymouth Creek Southwest Sub-Watershed drains to three known impairments through the 2018 impaired water list produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving and protecting water quality within this sub-watershed and other downstream water bodies.

## Lower Plymouth Creek Sub-watershed

*Physical Land Use Characteristics*

The Lower Plymouth Creek Sub-watershed lies between Medicine Lake and I-494 in southeastern Plymouth. The sub-watershed is bisected northwest to southeast by Highway 55 and is on the receiving end of discharge from about two-thirds of the total contributing area to Medicine Lake. The existing land use is primarily commercial/industrial southwest of Highway 55 and single family residential northeast of Highway 55 with smaller pockets of multi-family residential.

Significant landmarks within this sub-watershed include Highway 55, Plymouth Creek, which is classified by the Bassett Creek Watershed Management Commission as a Priority Stream and two regional water quality ponds in the easternmost portion of the sub-watershed and within West Medicine Lake Park. The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 65.2 acres of wetland, 0.0 acres of wetland mitigation, and 9.3 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities.

**TABLE 31**
**LOWER PLYMOUTH CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Middle Plymouth Creek<br>Plymouth Creek SW | Figure 35 |
| Downstream-most water body: | (26422-NU02) | Figure 35 |
| Discharges to: | Medicine Lake | Figure 35 |
| Wetlands | 65.2 Acres | Figure 35 |
| Wetland Mitigation | 0.0 Acres | Figure 35 |
| Water Quality Ponding | 9.3 Acres | Figure 35 |
| Lakes | None | |
| General Hydrologic Soil Group | A; B | |
| Drainage Area | 518.2 acres | |

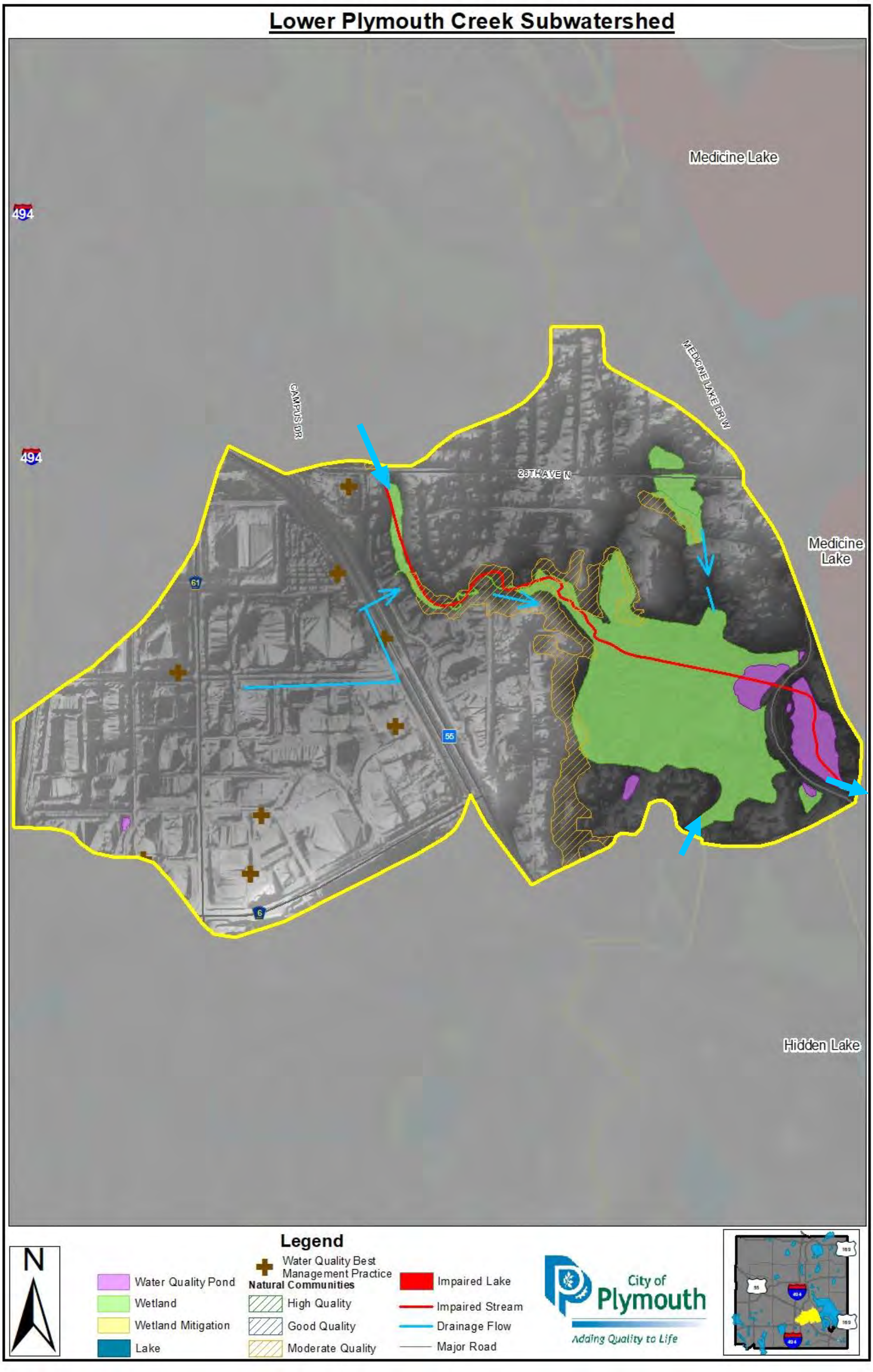
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 32) and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 32**
**LOWER PLYMOUTH CREEK SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Plymouth Creek | Chloride and E. Coli | 2014 |

Figure 35. Lower Plymouth Creek Sub-watershed



*Implementation Program*

To assist in meeting the required load reductions of the Medicine Lake TMDL several improvements have been constructed to date within the Lower Plymouth Creek Sub-watershed. The Plymouth Creek Regional Water Quality Ponds, constructed in 2008, and the Plymouth Creek Stream Restoration (26th Avenue to the Plymouth Creek Regional Water Quality Ponds), constructed in 2010, have reduced phosphorus loading to Medicine Lake by an estimated 1,000 lbs annually. Storm sewer pipes under West Medicine Lake Drive at West Medicine Lake Park were removed and drainage was routed for treatment to the first (west) cell of the Plymouth Creek Regional Water Quality Ponds. In addition, erosion was repaired on the downstream end of the Plymouth Creek Fish Barrier. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 33.

**TABLE 33**
**LOWER PLYMOUTH CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $10,000 | $100,000 | Plymouth |

*Conclusions*

The Lower Plymouth Creek Sub-Watershed drains to three known impairments through the 2018 impaired water list produced by the State of Minnesota. A TMDL plan has been approved for Medicine Lake and the Upper Mississippi River Bacteria TMDL Study and Protection Plan are approved to address the E. Coli and fecal coliform impairments on Plymouth and Bassett Creeks. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## West Medicine Lake Sub-watershed

*Physical Land Use Characteristics*

The West Medicine Lake Sub-watershed lies southeast of the I-494/County Road 9 interchange, directly adjacent to the north end of Medicine Lake. The existing land use is primarily single family residential with an expanse of open space on the east side of Northwest Boulevard that is a part of French Regional Park.

Significant landmarks in this sub-watershed include the western portion of French Regional Park which is operated by the Three Rivers Park District. The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 24.8 acres of wetland, 0.0 acres of wetland mitigation, and 0.0 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities, however, it does indicate a 13.6 acre moderate quality Maple-Basswood Forest and a 1.9 acre low quality Oak Forest.

**TABLE 34**
**WEST MEDICINE LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | NA | NA |
| Downstream-most water body: | Medicine Lake | Figure 36 |
| Discharges to: | Medicine Lake | Figure 36 |
| Wetlands | 24.8 Acres | Figure 36 |
| Wetland Mitigation | 0.0 Acres | Figure 36 |
| Water Quality Ponding | 0.0 Acres | Figure 36 |
| Lakes | None | |
| General Hydrologic Soil Group | B; C/D | |
| Drainage Area | 193.8 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 35) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The TMDL plan for Medicine Lake was approved in 2008. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 35**
**WEST MEDICINE LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Medicine Lake | Excess Nutrients | 2004 |

Figure 36. West Medicine Lake Sub-watershed



*Implementation Program*

There are no recent projects pre-dating this plan, however, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 36.

**TABLE 36**
**WEST MEDICINE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The West Medicine Lake Sub-Watershed drains to two known impairments through the 2018 impaired water list produced by the State of Minnesota. A TMDL plan has been approved for Medicine Lake and future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## North Medicine Lake Sub-watershed

*Physical Land Use Characteristics*

The North Medicine Lake Sub-watershed is located between 48th Avenue North and 39th Avenue, directly north of Medicine Lake. The existing land use is a mix of commercial area located near the interchange of I-494 and County Road 9 and single family residential located primarily north and west of the intersection of County Road 9 and Northwest Boulevard.

Significant landmarks in this sub-watershed include the commercial properties located at the interchange of I-494 and County Road 9. The sub-watershed assessment is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 55.7 acres of wetland, 1.4 acres of wetland mitigation, and 3.1 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities.

**TABLE 37**
**NORTH MEDICINE LAKE SUB-WATERSHED CHARACTERISTICS**

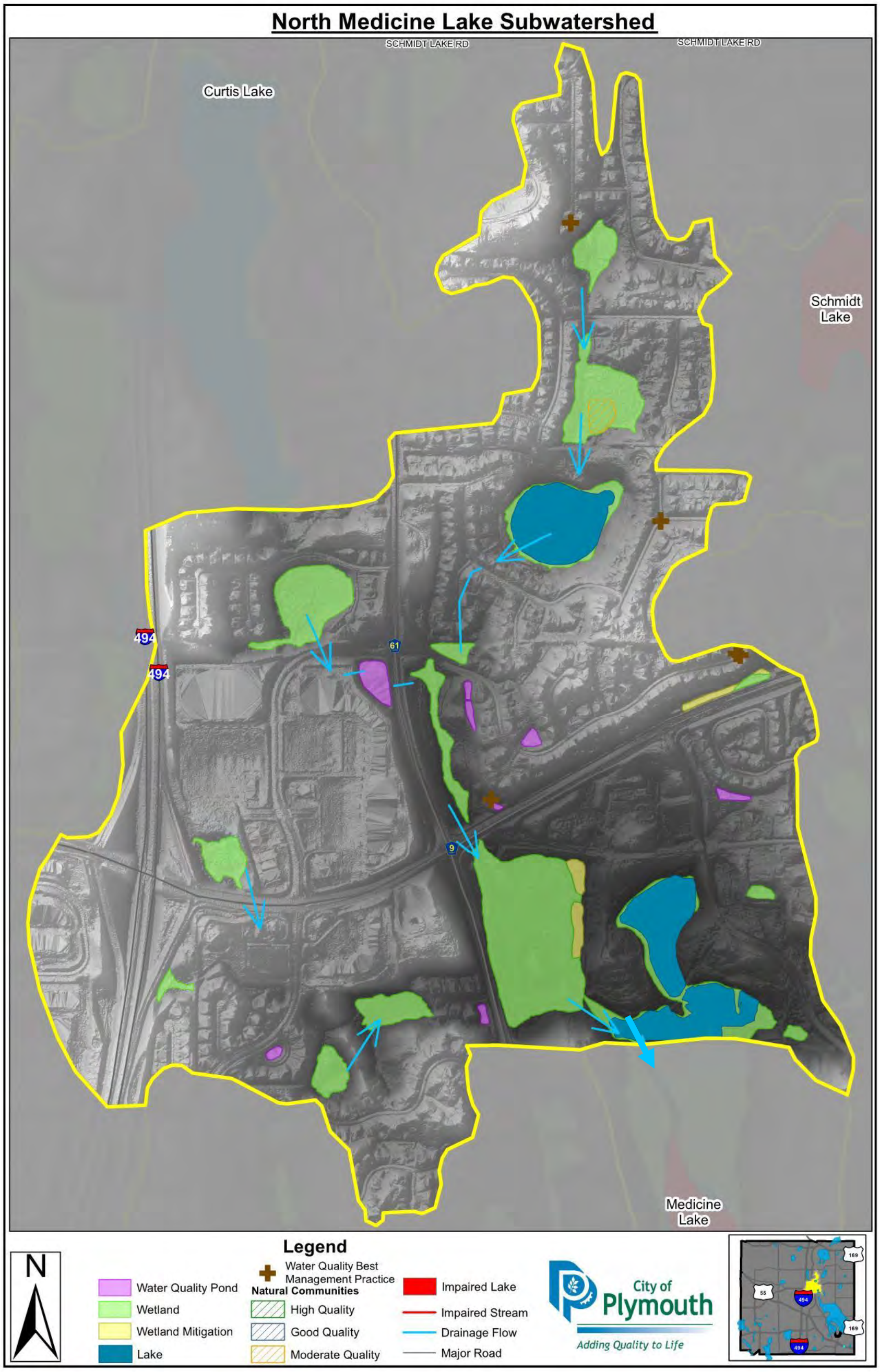
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | NA | NA |
| Downstream-most water body: | (14322-NB01) | Figure 37 |
| Discharges to: | Medicine Lake | Figure 37 |
| Wetlands | 55.7 Acres | Figure 37 |
| Wetland Mitigation | 1.4 Acres | Figure 37 |
| Water Quality Ponding | 3.1 Acres | Figure 37 |
| Lakes | None | |
| General Hydrologic Soil Group | B | |
| Drainage Area | 486.8 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses

they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently no known impairments within the North Medicine Lake Sub-watershed.

Figure 37. North Medicine Lake Sub-watershed



*Implementation Program*

Recent projects pre-dating this plan include the County Road 9/61 Erosion Repair Project (2008) which was cooperatively funded by the City of Plymouth, Three Rivers Park District, and the Board of Water and Soil Resources. Additional non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 38.

**TABLE 38**
**NORTH MEDICINE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The North Medicine Lake Sub-Watershed drains to two known impairments through the 2018 impaired water list produced by the State of Minnesota. A TMDL plan has been approved for Medicine Lake and future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## Northeast Medicine Lake Sub-watershed

*Physical Land Use Characteristics*

The Northeast Medicine Lake Sub-watershed extends from 45th Avenue, south of Schmidt Lake to just south of 36th Avenue where it discharges to Medicine Lake. The sub-watershed is generally bounded to the west by Larch Lane and extends about one-quarter mile east of Zachary Lane. The existing land use is primarily single family residential, however, there is significant open space on the southern portion which is a part of French Regional Park and Zachary Playfields occupy part of the northern portion.

Significant landmarks in this sub-watershed include French Regional Park operated by the Three Rivers Park District. The sub-watershed assessment is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 85.6 acres of wetland, 0.0 acres of wetland mitigation, and 1.5 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural upland communities however it does note 14.9 acres of moderate Maple-Basswood Forest and a 14.9 acre low quality Lowland Hardwood Forest.

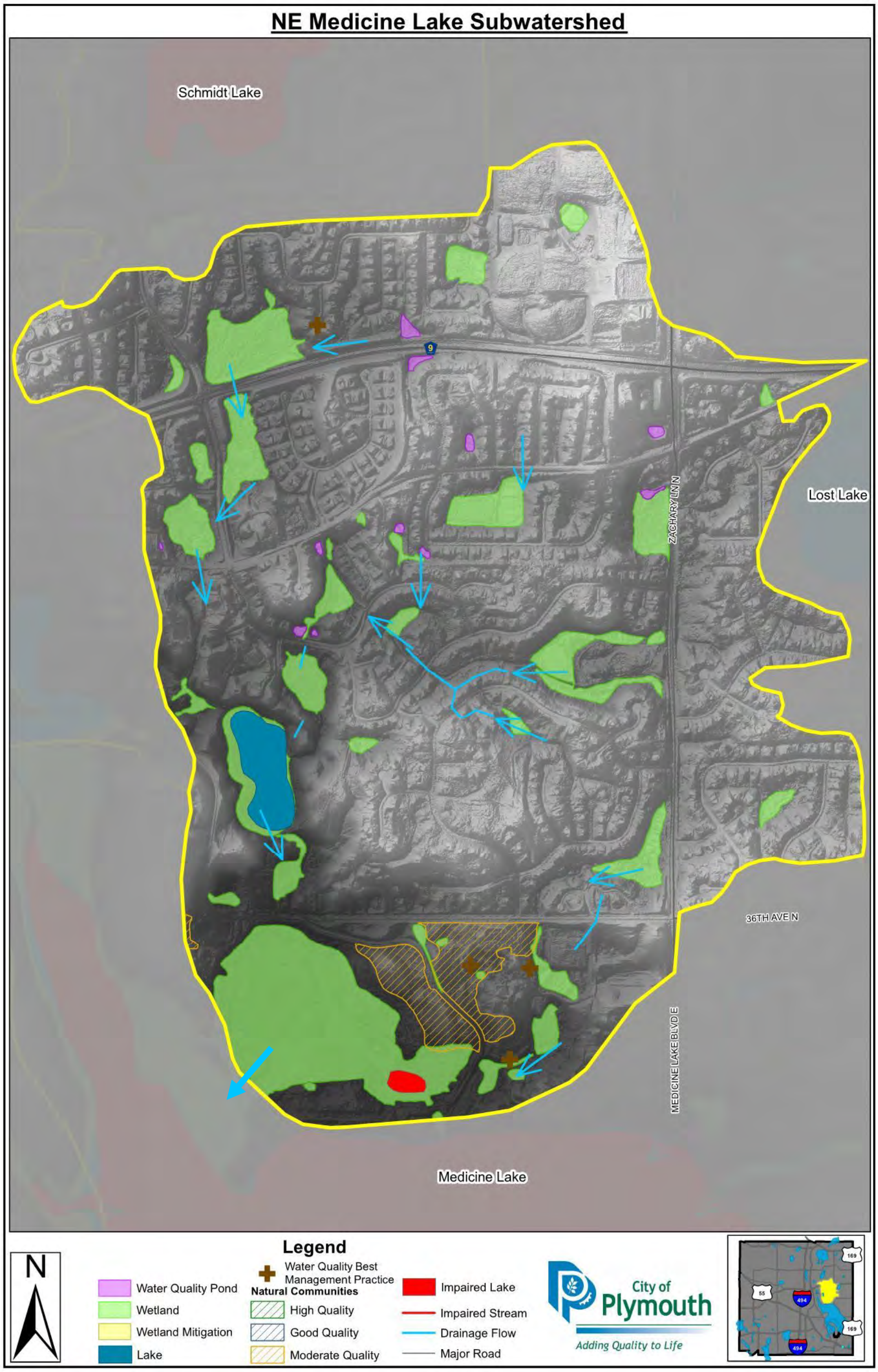
**TABLE 39**
**NORTHEAST MEDICINE LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | NA | NA |
| Downstream-most water body: | (23242-NB01) | Figure 38 |
| Discharges to: | Medicine Lake | Figure 38 |
| Wetlands | 85.6 Acres | Figure 38 |
| Wetland Mitigation | 0.0 Acres | Figure 38 |
| Water Quality Ponding | 1.5 Acres | Figure 38 |
| Lakes | None | |
| General Hydrologic Soil Group | B | |
| Drainage Area | 662.9 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no known impairments within the Northeast Medicine Lake Sub-watershed.

Figure 38. Northeast Medicine Lake Sub-watershed



*Implementation Program*

Drainage improvements were previously completed in the wetland in the northwest corner of the intersection of Old Rockford Road and Larch Lane as well as water quality ponds near the intersection of 41st and Goldenrod. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 40.

**TABLE 40**
**NORTHEAST MEDICINE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Mouth Olivet Stream Restoration | 2019-2020 | $40,000 | $400,000 | Plymouth/ BCWMC |

*Conclusions*

The Northeast Medicine Lake Sub-Watershed drains to two known impairments through the 2018 proposed impaired water list produced by the State of Minnesota. A TMDL plan has been approved for Medicine Lake and future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## South Medicine Lake Sub-watershed

*Physical Land Use Characteristics*

The South Medicine Lake Sub-watershed is located between Balsam Lane and South Shore Drive on the east and Pineview Lane to the west. The South Medicine Lake Sub-watershed receives runoff from the City of Minnetonka (Ridgedale area) and discharges through an open channel/culvert system under Highway 55 and into Medicine Lake. The existing land use is a diverse mix of single family residential and commercial/industrial along the Highway 55 corridor.

Significant landmarks in this sub-watershed include the Crossroads Commons redevelopment at Highway 55 and West Medicine Lake Drive and Wayzata East Middle School. The sub-watershed assessment is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 122.8 acres of wetland, 0.5 acres of wetland mitigation, and 0.9 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) indicates 14.6 acres of good quality Lowland Hardwood Forest. In addition, there are 1.8 acres of poor quality Lowland Hardwood Forest, 7.3 acres of poor quality Maple-Basswood Forest, and 16.6 acres of Oak Forest.

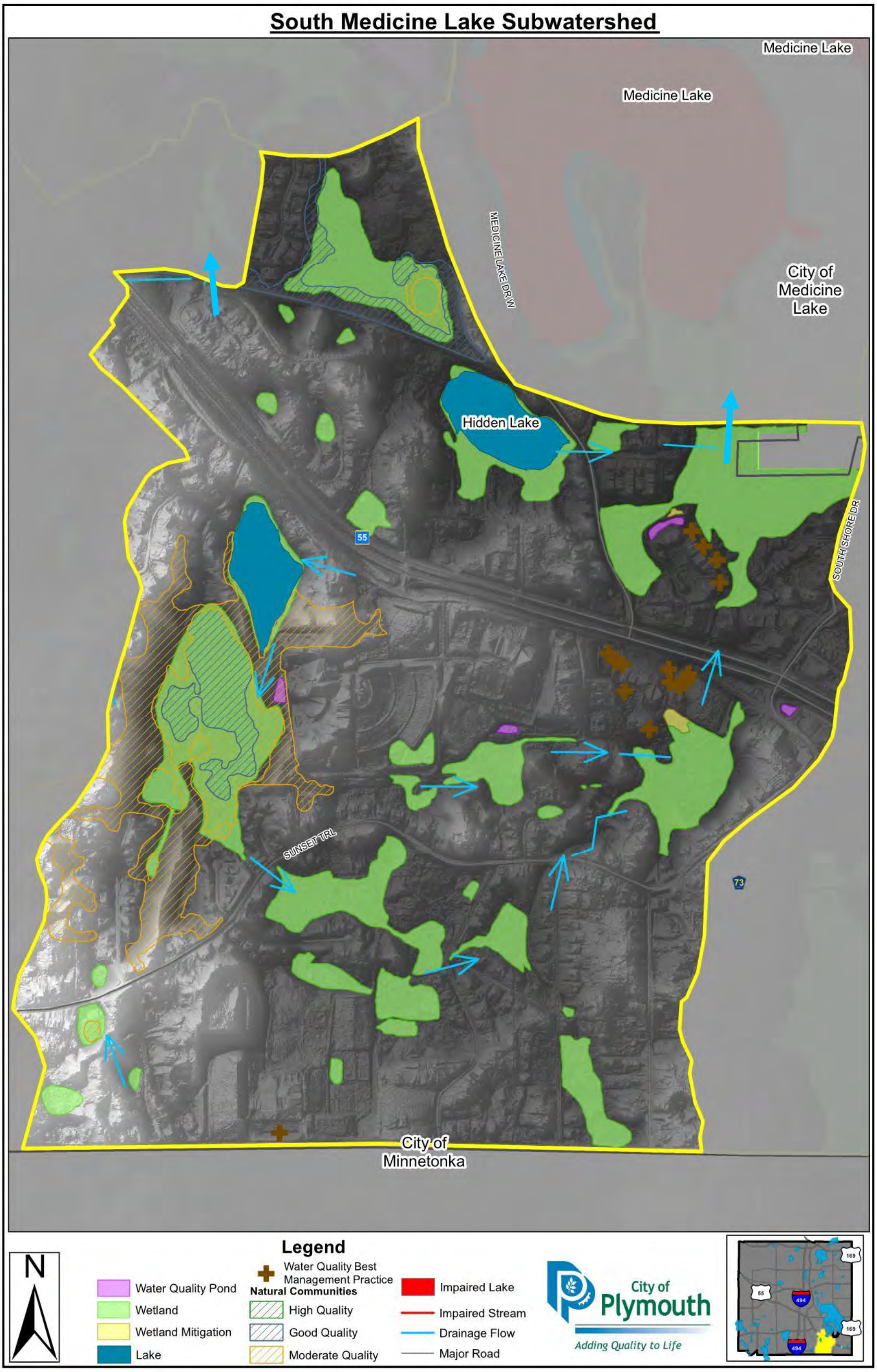
**TABLE 41**
**SOUTH MEDICINE LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | City of Minnetonka | NA |
| Downstream-most water body: | (35111-NB01) | Figure 39 |
| Discharges to: | Medicine Lake | Figure 39 |
| Wetlands | 122.8 Acres | Figure 39 |
| Wetland Mitigation | 0.5 Acres | Figure 39 |
| Water Quality Ponding | 0.9 Acres | Figure 39 |
| Lakes | Hidden (8.5 Acres) | Figure 7<br>Figure 39 |
| General Hydrologic Soil Group | B; C/D | |
| Drainage Area | 694.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no known impairments within the South Medicine Lake Sub-watershed.

Figure 39. South Medicine Lake Sub-watershed



*Implementation Program*

In 2008, the City of Plymouth coordinated with the Minnesota Department of Transportation to relieve a flooding issue under Highway 55 just east of West Medicine Lake Drive and in 2013 the City completed the St. Mary's Drainage Improvement Project. A second drainage improvement in the St. Mary's neighborhood is programmed for the winter of 2018-2019. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents.

Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 42.

**TABLE 42**
**SOUTH MEDICINE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| St. Mary's Drainage Improvement Phase II | 2018-2019 | $135,000 | $135,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |

*Conclusions*

The South Medicine Lake Sub-Watershed drains to two known impairments through the 2018 proposed impaired water list produced by the State of Minnesota. A TMDL plan has been approved for Medicine Lake and future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## Medicine Lake Sub-watershed

*Physical Land Use Characteristics*

The Medicine Lake Sub-watershed is located in southeast Plymouth. Medicine Lake is the largest lake in the City and the second largest in Hennepin County behind Lake Minnetonka. Plymouth Creek is the main discharge into Medicine Lake, however several other intermittent/first order streams discharge to Medicine Lake and are referred to locally as Wood Creek, Timber Creek, and Ridgedale Creek. Medicine Lake also serves as the headwaters of Bassett Creek.

Medicine Lake (Figure 11) is the most significant resource in this sub-watershed and is a heavily used recreational water body, with residents, neighbors and visitors using the trails, parks, and beaches located along the shores of the lake. Medicine Lake is classified by the Bassett Creek Watershed Management Commission as a Priority 1 Deep Lake. The sub-watershed is developed with redevelopment being the primary driver of change within this sub-watershed. This sub-watershed has 128.7 acres of wetland, 0.0 acres of wetland mitigation, and 5.4 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) indicates 6.6 acres of good quality Oak Forest. In addition, there are 31.8 acres of moderate quality Maple-Basswood Forest, 3.6 acres of moderate quality mix emergent, and 0.7 acres of moderate quality wet meadow. Last, there are 18.1 acres of low quality Lowland Hardwood Forest.

**TABLE 43**
**MEDICINE LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Lower Plymouth Creek<br>West Medicine Lake<br>North Medicine Lake<br>NE Medicine Lake<br>South Medicine Lake | Figure 40 |
| Downstream-most water body: | Medicine Lake | Figure 40 |
| Discharges to: | Bassett Creek | Figure 40 |

| | | |
|---|---|---|
| Wetlands | 128.7 Acres | Figure 40 |
| Wetland Mitigation | 0.0 Acres | Figure 40 |
| Water Quality Ponding | 5.4 Acres | Figure 40 |
| Lakes | Medicine (898 Acres) | Figure 11<br>Figure 40 |
| General Hydrologic Soil Group | A, C, C/D | |
| Drainage Area | 1920.4 acres | |

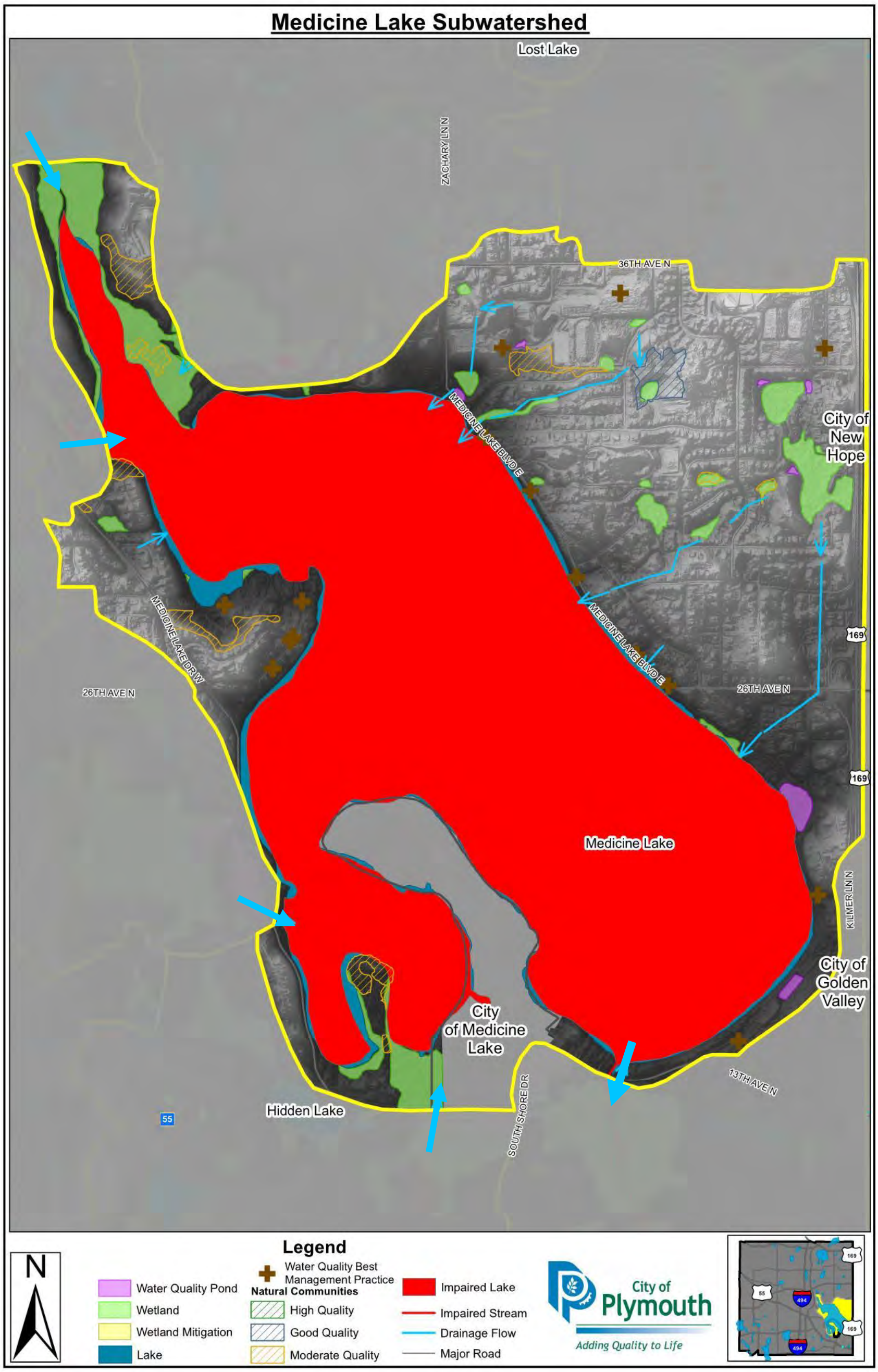
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 44) and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 44**
**MEDICINE LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Medicine Lake | Excess Nutrients | 2004 |
| Bassett Creek | Fish Bio assessment | 2004 |

Figure 40. Medicine Lake Sub-watershed



*Implementation Program*

In 2003, the City of Plymouth and the Bassett Creek Watershed partnered to construct two regional ponds on the east side of Medicine Lake. The first at the intersection of 23rd Avenue and East Medicine Lake Drive and second within East Medicine Lake Park. In 2006, the City of Plymouth completed the Wood Creek Erosion Repair and Drainage Improvement project east of Medicine Lake and between 32nd and 34th Avenues. In 2007, the City of Plymouth completed the Timber Creek Erosion Repair and Drainage improvement project east of Medicine Lake and between 28th and 29th Avenues. The Timber Creek Erosion Repair and Drainage Improvement project also included a stormceptor hydrodynamic separator underneath East Medicine Lake Drive. In 2009, the City of Plymouth completed water quality pond maintenance within the Sunrise Marsh development. City of Plymouth also provided grants to residents for shoreline restoration projects and treated curlyleaf pondweed in Medicine Lake for over a decade before that program was turned over to the Bassett Creek Watershed.

During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents. Future non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 45.

**TABLE 45**
**MEDICINE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $10,000 | $100,000 | Plymouth |
| Kilmer Area Water Quality, Drainage, and Erosion Control Improvements | 2018-2019 | $1,300,000 | $1,300,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |

*Conclusions*

The Medicine Lake Sub-Watershed drains to two known impairments through the 2018 impaired water list produced by the State of Minnesota. A TMDL plan has been approved for Medicine Lake and future TMDL plan will be developed for Bassett Creek. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## Bassett Creek Sub-watershed

*Physical Land Use Characteristics*

The Bassett Creek Sub-Watershed is located in the southeastern corner of Plymouth. Medicine Lake is the headwater for Bassett Creek which will flow southeasterly through Golden Valley and Minneapolis to the Mississippi River.

Significant landmarks in this sub-watershed include Bassett Creek itself, which is classified by the Bassett Creek Watershed Management Commission as a Priority Stream, as well as portions of the commercial/industrial corridors of State Highway 55 and Highway 169. The sub-watershed is developed and has greater impervious surfaces than the average sub-watershed in Plymouth. Redevelopment will be the primary driver of change within this sub-watershed. This sub-watershed has 115.7 acres of wetland, 3.9 acres of wetland mitigation, and 7.5 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any natural resources of significant value.

**TABLE 46**
**BASSETT CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | Medicine Lake | |
| Receives runoff from: | Medicine Lake | Figure 41 |
| Downstream-most water body: | BC105 | Figure 41 |
| Discharges to: | Golden Valley | Figure 41 |
| Wetlands | 115.7 Acres | Figure 41 |
| Wetland Mitigation | 3.9 Acres | Figure 41 |
| Water Quality Ponding | 7.5 Acres | Figure 41 |
| Lakes | None | |
| General Hydrologic Soil Group | A, C, C/D | |
| Drainage Area | 703.4 Acres | |

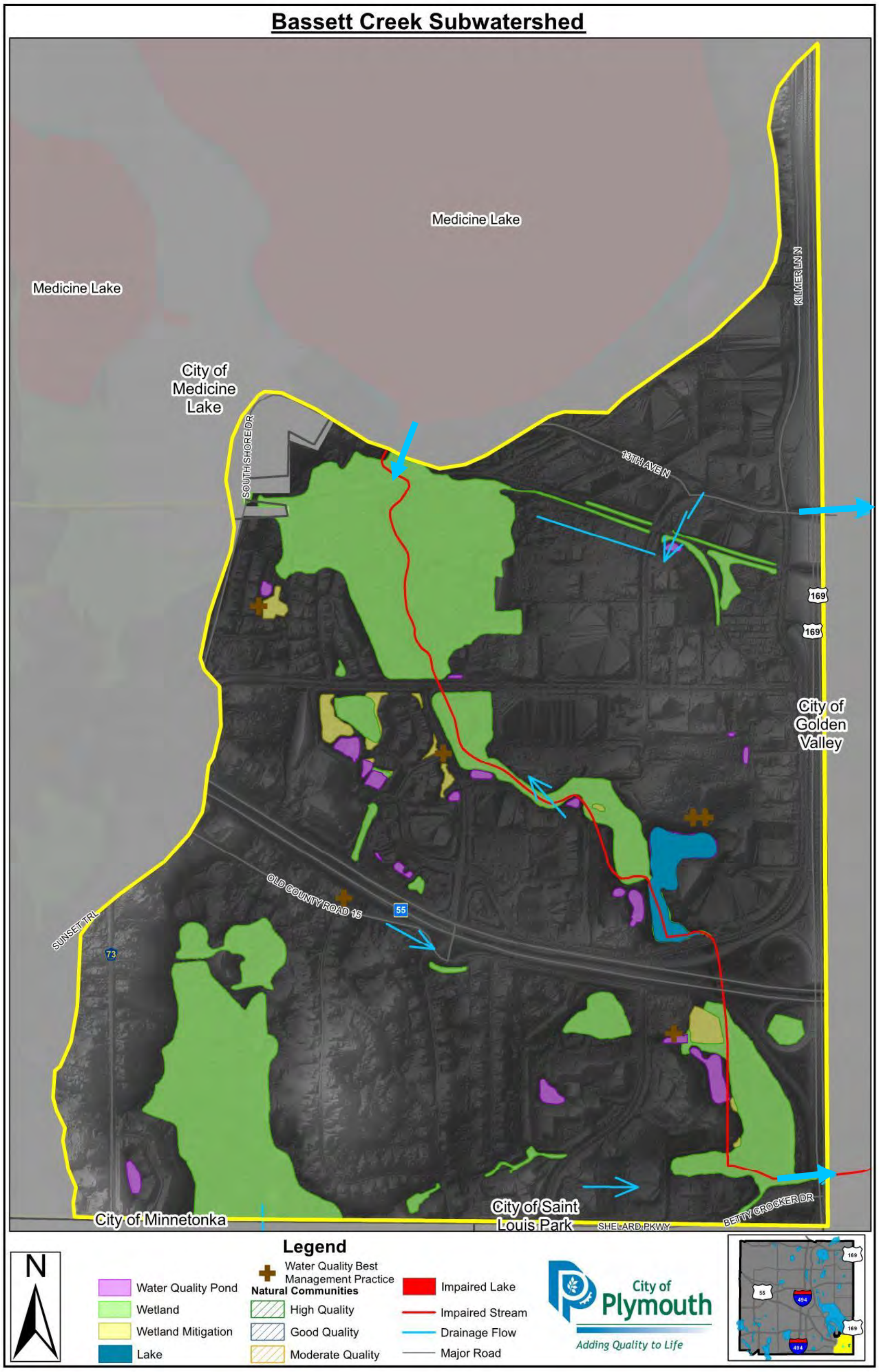
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 47) and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 47**
**BASSETT CREEK SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Bassett Creek | Fish Bio assessments<br>Chloride<br>Fecal coliform | 2004, 2014 |

Figure 41. Bassett Creek Sub-watershed



*Implementation Program*

There are no recent projects pre-dating this plan. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 48.

**TABLE 48**
**BASSETT CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2025-2028 | $1,000 | $3,000 | Plymouth |

*Conclusions*

The Bassett Creek Sub-Watershed drains to three known impairment through the 2018 impaired water list produced by the State of Minnesota. The Upper Mississippi River Bacteria TMDL Study and Protection Plan will address the impairments. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## Lost Lake Sub-watershed

*Physical Land Use Characteristics*

The Lost Lake Sub-watershed is located directly southeast of the Zachary Lane/County Road 9 intersection in east central Plymouth.

The significant landmark in this sub-watershed include Lost Lake, which is surrounded by residential development and is classified by the Bassett Creek Watershed Management Commission as a Priority 2 Shallow Lake. The outlet to Lost Lake, along the south side of County Road 9 is a combination of pipe and open channel. The Bassett Creek Watershed Management Commission prepared the Lost Lake Watershed and Lake Management Plan in 1996, however, at that time it was concluded that structural BMP's to improve lake quality are not practical or cost effective. Lost Lake has a maximum depth of 6.5 feet and a mean depth of 3.5 feet, limiting recreational opportunities. This sub-watershed has 0.0 acres of wetland, 0.0 acres of wetland mitigation, and 0.0 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) does not indicate any natural resources of significant value.

**TABLE 49**
**LOST LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | NA | |
| Receives runoff from: | NA | |
| Downstream-most water body: | Lost Lake | Figure 42 |
| Discharges to: | North Branch | Figure 42 |
| Wetlands | 0.0 acres | Figure 42 |
| Wetland Mitigation | 0.0 acres | Figure 42 |
| Water Quality Ponding | 0.0 acres | Figure 42 |
| Lakes | Lost Lake | Figure 10<br>Figure 42 |
| General Hydrologic Soil Group | C | |
| Drainage Area | 51.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no known impairments within the Lost Lake sub-watershed.

Figure 42. Lost Lake Sub-watershed



*Implementation Program*

There are no recent projects pre-dating this plan. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents.

Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 50.

**Table 50**
**LOST LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |

*Conclusions*

The Lost Lake Sub-watershed is not currently listed as an impaired water by the State of Minnesota, however, it may be listed in the future and a TMDL plan may be developed. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

## North Branch Sub-watershed

*Physical Land Use Characteristics*

The North Branch Sub-watershed is located in east-central Plymouth, between Zachary Lane and Highway 169, north of 35th Avenue and centered about County Road 9.

Significant landmarks in this sub-watershed include the commercial area at the intersection of County Road 9 and Highway 169 and Zachary Lane Elementary school on the western side of the sub-watershed. Redevelopment will be the primary driver of change within this sub-watershed. This sub-watershed has 61.9 acres of wetland, 0.8 acres of wetland mitigation, and 1.2 acres of water quality ponding. The Natural Resources Inventory for Plymouth (2006) indicates 10.2 acres of moderate quality oak forest.

**TABLE 51**
**NORTH BRANCH SUB-WATERSHED CHARACTERISTICS**

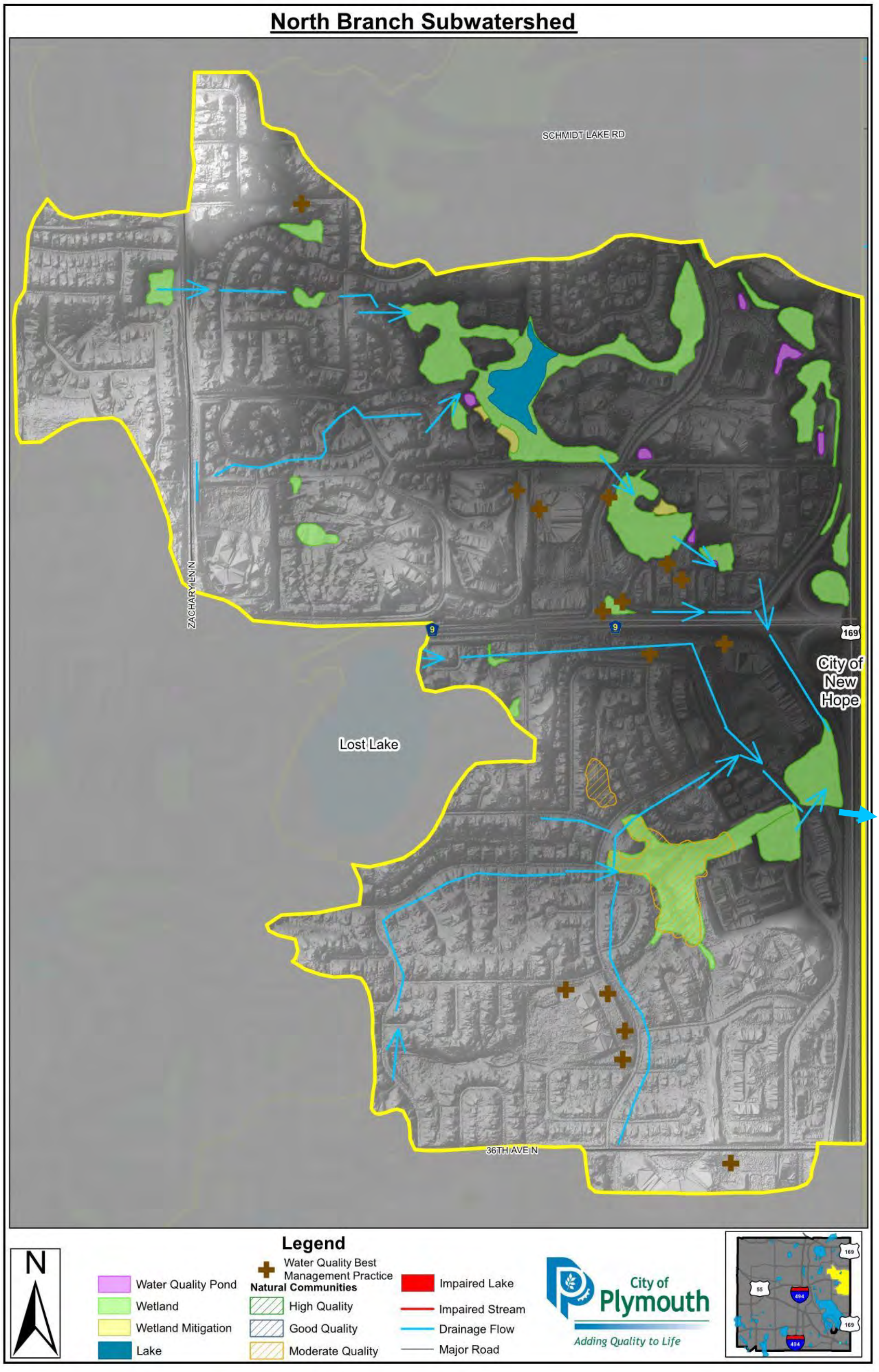
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Bassett Creek | |
| Receiving Water | NA | |
| Receives runoff from: | Lost Lake | NA |
| Downstream-most water body: | NB7 | Figure 43 |
| Discharges to: | New Hope | Figure 43 |
| Wetlands | 61.9 acres | Figure 43 |
| Wetland Mitigation | 0.8 acres | Figure 43 |
| Water Quality Ponding | 1.2 acres | Figure 43 |
| Lakes | None | |
| General Hydrologic Soil Group | A, B/D, C, C/D | |
| Drainage Area | 784.4 | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be

established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no known impairments within the North Branch Sub-watershed.

Figure 43. North Branch Sub-watershed



*Implementation Program*

In 2011, the City of Plymouth completed a drainage improvement project at the SE corner of 45th Avenue North and Nathan Lane to improve upstream flooding issues. Also in 2011, the City of Plymouth and Bassett Creek Watershed partnered on a water quality improvement project for Northwood Lake which is just downstream of this sub-watershed in the city of New Hope. The project, originally a stream restoration west of Lancaster Lane and south of Pilgrim Lane, was not well received by some area residents due to the number of trees to be removed. The project was repurposed as a cooperative project between the City of Plymouth, Bassett Creek Watershed, and a possible developer of the now defunct Four Seasons Mall. The developer, however, did not move forward with the development project and the project was not completed.

Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 52.

**Table 52**
**NORTH BRANCH SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Northwood Lake Improvement Project | TBD | $80,000 | $800,000 | BCWMC |

*Conclusions*

The North Branch Sub-Watershed has no known impairments through the 2018 proposed impaired water list produced by the State of Minnesota, however Northwood Lake, which is directly downstream of this sub watershed in New Hope is on the impaired waters list. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other downstream water bodies.

# Elm Creek Watershed

The Elm Creek Watershed covers approximately 130 square miles in northwestern Hennepin County. Predominant water features in Plymouth include Lake Camelot and Elm Creek.

Elm Creek drains to the northeast from its headwaters in Medina to its confluence with the Mississippi River in Champlin. Within Plymouth, Elm Creek becomes more of a defined stream near the intersection of State Highway 55 and Hennepin County Road 101 where it travels underneath State Highway 55. From there, Elm Creek flows east behind Wayzata High School, underneath Peony Lane North and then flows north underneath Hennepin County Road 47 to the east of Lawndale Lane and into Maple Grove.

## Elm Creek Watershed Management Organization

Elm Creek and its tributaries extend across seven cities: Plymouth, Medina, Corcoran, Rogers, Dayton, Maple Grove, Champlin and the Hennepin Conservation District. In Champlin, Elm Creek enters the Mississippi River just downstream of the Champlin Mill Pond. In 1973, the Elm Creek Watershed Management Commission was formed by adoption of a joint powers agreement between the cities of Champlin, Corcoran, Dayton, Maple Grove, Medina, Plymouth and Hennepin Conservation District, under the authority conferred to the member parties through Minnesota Statutes. On July 18, 1980 the Elm Creek Watershed Management Commission added the Town of Hassan to the Joint Powers Agreement with Rogers following in 1983. Greenfield was in the Commission, but left in 2001. In 2012, the Town of Hassen was annexed by Rogers and is no longer a separate party to the joint powers agreement. The joint powers agreement was most recently approved by the seven member cities in 2004.

The ECWMC Board of Commissioners currently consists of seven commissioners and seven alternates appointed by the member cities. The term of each commissioner and alternate is three years. Regular meetings of the ECWMC are held on the second

Wednesday of each month. Funding for the administrative functions of the EMWMC is via an assessment, generally based on land area and tax capacity, to each member of the organization.

Per Minnesota Rules 8410.008, Subp. 2-8, watershed management organization goals generally fall into the following categories: water quantity, water quality, public drainage systems, groundwater, and wetlands. The ECWMC has established the following goals:

- Maintain the post-development 2-year, 10-year, and 100-year peak rate of runoff at pre-development level for the critical duration precipitation event.
- Maintain the post-development annual runoff volume at pre-development volume.
- Prevent the loss of floodplain storage below the established 100-year elevation.
- Reduce peak flow rates in Elm, Diamond, and Rush Creeks and tributary streams to the Crow and Mississippi and preserve conveyance capacity.
- Improve Total Phosphorus concentration in the impaired lakes by 10% over the 2004-2013 average by 2024.
- Maintain or improve water quality in the lake and streams with no identified impairments.
- Conduct a TMDL/WRAPS progress review every five years following approval of the TMDLs and WRAPS study.
- Identify high priority areas where the Commission will partner with cities and other agencies to provide technical and financial assistance.
- Promote groundwater recharge by requiring abstraction/infiltration of runoff from new development and redevelopment.
- Protect groundwater quality by incorporating wellhead protection study results into development and redevelopment Rules and Standards.
- Preserve the existing functions and values of wetlands within the watershed.
- Promote wetland enhancement or restoration of wetlands in the watershed.

- Continue current Hennepin County jurisdiction over the county ditches in the watershed.
- Identity and operate within a sustainable funding level that is reasonable to member cities.
- Foster implementation of priority TMDL and other implementation project by sharing in their cost and proactively seeking grant funds.
- Operate a public education and outreach program to supplement the NPDES Phase II education requirements for the member cities.
- Operate a monitoring program sufficient to characterize water quantity, water quality, and biotic integrity in the watershed and to evaluate progress toward meeting goals.
- Maintain rules and standards for development and redevelopment that are consistent with local and regional TMDLs, federal guidelines, source water and wellhead protection requirements, non-degradation, and ecosystem management goals.
- Serve as a technical resource for member cities.

To assist in meeting the goals of the ECWMC, the ECWMC has established a 7-year Capital Improvement Program. Capital improvements are currently funded under an ad-velorum tax through Hennepin County. The current ECWMC Capital Improvement program includes a stream restoration project of Elm Creek between State Highway 55 and Wayzata High School. (Table 54)

**TABLE 53**
**ECWMC CAPITAL IMPROVEMENTS IN PLYMOUTH 2018-2024**

| ID | Name | Plymouth Sub-watershed | Funding Amount | Funding Year |
|---|---|---|---|---|
| CIP-2017-PL-01 | Elm Creek Stream Restoration – State Highway 55 to Wayzata High School | Elm Creek | $212,500 | 2018 |

## Elm Creek Sub-watersheds

The City of Plymouth has divided the portion of the Elm Creek watershed within the City limits into 2 sub-watersheds for administrative and management purposes. The 2 sub-watersheds (Figure 34) are:

- Elm Creek
- Lake Camelot

## Elm Creek Sub-Watershed

*Physical Land Use Characteristics*

The Elm Creek sub-watershed is located in northwest Plymouth. The sub-watershed in Plymouth generally follows Hamel Road along its southern border, to the city limits. Along the western and northern boundary, the sub-watershed follows the City limits, however, the watershed extends well into Medina, Corcoran and Maple Grove. The sub-watershed is bound along the eastern border by the jurisdictional border of the Elm Creek Watershed Management Commission and the Lake Camelot sub-watershed, which is discussed later in this plan.

Significant landmarks within this sub-watershed include Wayzata High School, the Plymouth Dog Park and the former Elm Creek Golf Course. This sub-watershed has seen a dramatic transition in land use from large lot residential and agriculture to single family residential in the last 5 years and could be fully developed within the next 10 years. This sub-watershed has 498.5 acres of wetland, 16.6 acres of wetland mitigation, 41.2 acres of water quality ponding, and 34 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) indicates 1 high quality 0.78 acre wet meadow and 7 good quality natural communities that includes 32.3 acres of mesic oak forest, 20.2 acres of maple-basswood forests and 0.4 acres of wet meadow.

**TABLE 54**
**ELM CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Elm Creek | |
| Receiving Water | Maple Grove | |
| Receives runoff from: | Headwaters in Medina | Figure 44 |
| Downstream-most water body: | (05221-NB01) | Figure 44 |
| Discharges to: | Maple Grove | Figure 44 |
| Wetlands | 498.5 Acres | Figure 44 |

| | | |
|---|---|---|
| Wetland Mitigation | 16.6 Acres | Figure 44 |
| Water Quality Ponding | 41.2 Acres | Figure 44 |
| Water Quality Best Management Practices | 34 BMPs | Figure 44 |
| Lakes | NA | |
| General Hydrologic Soil Group | C & D | |
| Drainage Area | 2567.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 55) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 55**
**ELM CREEK SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Elm Creek | Escherichia Coli (E. Coli) | 2010 |
| | Low Dissolved Oxygen | 2004 |
| | Fish Bio assessment | 2014 |
| | Macroinvertebrate bio assessment | 2014 |
| | Chloride[1] | 2014 |

*1. The Chloride impairment for Elm Creek will be addressed in the Twin Cities Metropolitan Area (TCMA) Chloride TMDL and not the Elm Creek Watershed Management Commission TMDL.*

Figure 44. Elm Creek Sub-watershed



*Implementation Program*

This sub-watershed has been involved in a land use transition over the last 5 years from primarily large lot single family residential and agriculture to smaller lot single family residential developments. Each of the new subdivisions have been subject to water quality requirements, which includes water quality and quantity best management practices as outlined in the City of Plymouth Regulatory Program and Elm Creek Watershed Management Commissions Rules and Standards. The land use transition has also removed 17 of the 53 total septic systems from the watershed. This will help further improve water quality by removing the additional sources of excess nutrients and bacteria to surface and groundwater.

Recent projects pre-dating this plan include the Conor Meadows Erosion Repair Project and a stream restoration project, completed in 2016, that stabilized, restored and enhanced 4,500 feet of Elm Creek located just north of Wayzata High School. The stream restoration project also installed two iron-enhanced sand filter systems on the two NURP ponds on the school site to reduce phosphorus loads. Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 56.

**TABLE 56**
**ELM CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Elm Creek Stream Restoration | 2019-2020 | $700,000 | $700,000 | Plymouth /ECWMC |
| Plum Tree 3rd Addition Drainage Improvement | 2019-2020 | $270,000 | $270,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Elm Creek Sub-Watershed has five known impairments through the 2018 impaired water list produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Elm Creek and other water bodies within this sub-watershed. The City will continue to implement best management practices during land use transition and will work to improve the remaining segment of Elm Creek stretching from Wayzata High School to State Highway 55 in 2018/2019.

## Camelot Lake Sub-watershed

*Physical Land Use Characteristics*

The Lake Camelot sub-watershed is located in north central Plymouth and is generally bounded by Interstate I-494 to the east, 56th Ave to the south, the Plymouth – Maple Grove border to the north and Cheshire Parkway / Lanewood Lane N to the west. The existing land use is primarily single family residential.

The most significant landmark within this sub-watershed is Lake Camelot itself (Figure 9). The sub-watershed is mostly developed and contains 68.9 acres of wetland, 3.7 acres of wetland mitigation, 3.9 acres of water quality ponding, and 1 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any high or good quality natural communities.

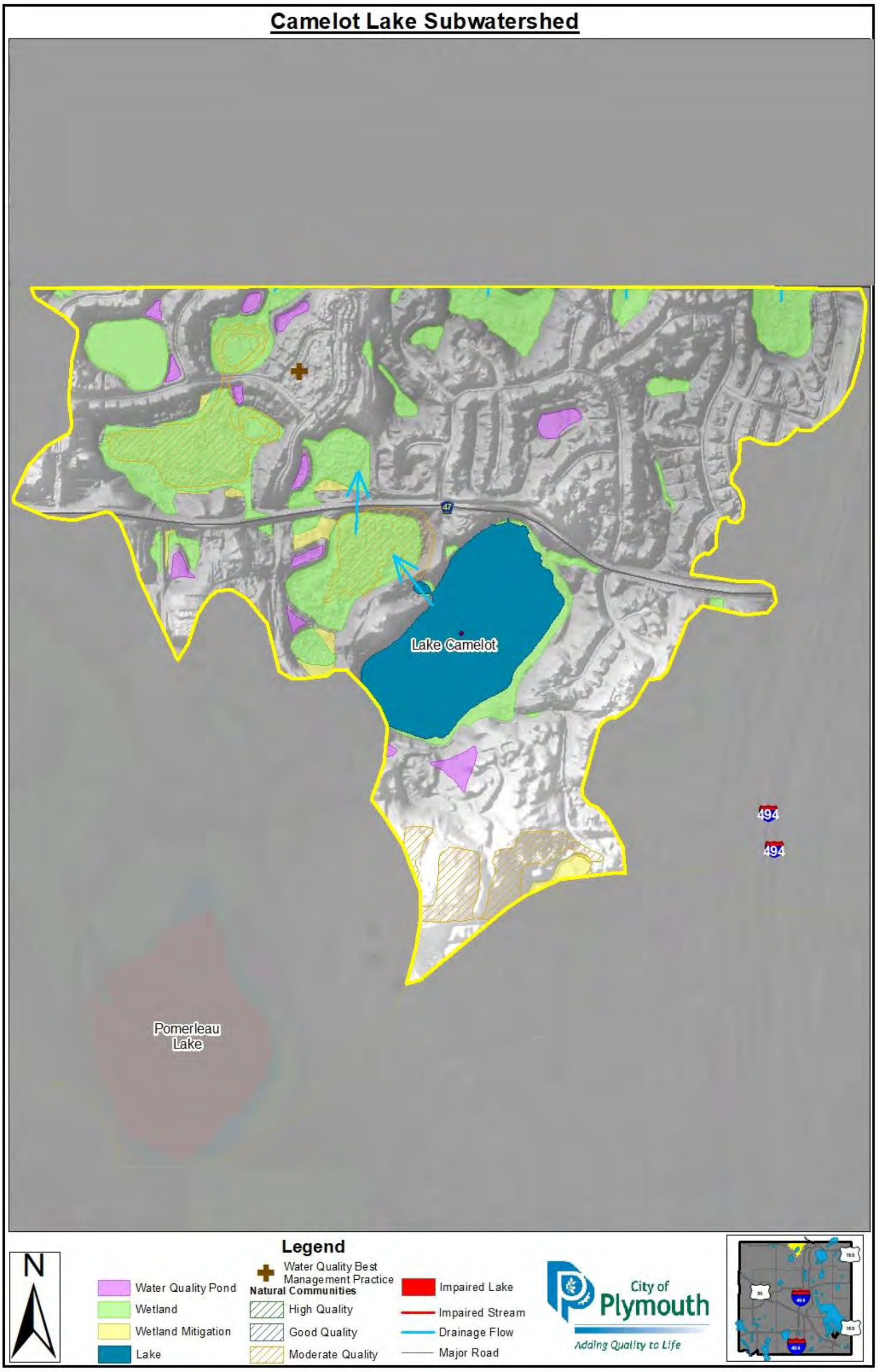
**TABLE 57**
**CAMELOT LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Elm Creek | |
| Receiving Water | N/A | |
| Receives runoff from: | N/A | Figure 45 |
| Downstream-most water body: | Elm Creek | Figure 45 |
| Discharges to: | Maple Grove | Figure 45 |
| Wetlands | 68.9 Acres | Figure 45 |
| Wetland Mitigation | 3.7 Acres | Figure 45 |
| Water Quality Ponding | 3.9 Acres | Figure 45 |
| Water Quality Best Management Practices | 1 BMP | Figure 45 |
| Lakes | Camelot – 22.5 | Figure 9<br>Figure 45 |
| General Hydrologic Soil Group | B/D, C, C/D | |
| Drainage Area | 287.5 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. No impaired waters are identified within the Lake Camelot sub-watershed, however, this sub-watershed drains to Elm Creek and Fish Lake in Maple Grove, which are both impaired.

Figure 45. Camelot Lake Sub-watershed



*Implementation Program*

One project pre-dates this plan, which is the replacement of the outlet to Lake Camelot to provide for better flood protection and reduced erosion.

As this sub-watershed has developed, water quality best management practices have been installed as required by the city and watershed management organization. The northeast portion of this sub-watershed, which was developed in the late 1980's and early 1990's, was built around the existing wetlands, but does not have any water quality ponding. The northwest and southern portions of this sub-watershed, which were developed after 2008, have water quality ponding and best management practices installed to improve water quality.

During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Bassett Creek Watershed, and residents.

Non-structural, programmatic, and structural solutions to address impairments within this sub-watershed are shown in Table 58.

**TABLE 58**
**CAMELOT LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |

*Conclusions*

The Lake Camelot sub-watershed does not have a known water quality impairment through the 2018 impaired water list produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and downstream.

## Minnehaha Creek Watershed

The Minnehaha Creek Watershed District's legal boundary encompasses approximately 178 square miles within the western Twin Cities metropolitan area. Of this area, approximately 148 square miles lies within Hennepin County and approximately 30 square miles lie within Carver County.

The Minnehaha Creek Watershed is comprised of two distinct hydrologic basins. The "Upper Watershed" drains through 104 square miles of rural and suburban land into lake Minnetonka, a 22 square-mile lake that is the tenth largest, and one of the most heavily recreated waterbodies in Minnesota. Lake Minnetonka outlets through a dam controlled by the Minnehaha Creek Watershed District (MCWD) into Minnehaha Creek, which flows for roughly 23 miles and discharges into the Mississippi River in Minneapolis. About 52 square miles, constituting the "Lower Watershed" drains into Minnehaha Creek through the Minneapolis Chain of Lakes, or directly into the creek by means of stormwater conveyances or overland flow. Predominant water features in Plymouth include Mooney Lake, Snyder Lake, Kreatz Lake, Hadley Lake, Gleason Lake and Gleason Creek.

The City of Plymouth has 5.8 square miles or 3.3% of MCWD's total area within the city. Generally, drainage in the portion of the Minnehaha Creek Watershed District that is within Plymouth drains into either Mooney Lake, Hadley Lake or Gleason Lake before making its way into Lake Minnetonka in Wayzata.

## Minnehaha Creek Watershed District

The Minnehaha Creek Watershed District's boundaries encompasses twenty-seven cities and two townships as listed in table 1 below. Additionally, two regional park authorities exist within the District's boundaries: the Minneapolis Park and Recreation Board, and the Three Rivers Park District.

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Table 59: Municipalities within the MCWD

| **Hennepin County** | |
|---|---|
| Deephaven | Minnetrista |
| Edina | Mound |
| Excelsior | Orono |
| Golden Valley | Plymouth |
| Greenwood | Richfield |
| Hopkins | St. Bonifacius |
| Independence | St. Louis Park |
| Long Lake | Shorewood |
| Maple Plain | Spring Park |
| Medina | Tonka Bay |
| Minneapolis | Wayzata |
| Minnetonka | Woodland |
| Minnetonka Beach | |
| **Carver County** | |
| Chanhassen | Victoria |
| Laketown Township | Watertown Township |

On April 12, 1966, the Hennepin County Board of Commissioners petitioned the Minnesota Water Resources Board under authority of Minnesota Statues Chapter 112 (now 103D) to establish the MCWD. The cited purposes for the MCWD were to conserve the watershed's waters and natural resources; improve lakes, marshes, and channels for water storage, drainage, recreation, and other public purposes; reduce

flooding, keep silt from streams; control land erosion; reclaim wetlands; control stormwater; and preserve water quality in lakes and streams. The MCWD was established on March 9, 1967.

Since that time, the MCWD has implemented numerous policies, programs, and projects to advance its goals. It first adopted rules to regulate development in 1967 and began exercising oversight of development to limit water resource impacts from erosion, stormwater flows, floodplain alteration, wetland disturbance, shoreline and stream bank alterations, dredging, and other causes. In 1972, the MCWD accepted authority over eight county and judicial drainage systems located within the watershed.

The MCWD Board of Managers consists of a seven-members that are appointed by the Hennepin and Carver County Board of Commissioners. Regular meetings of the MCWD Board of Managers are held twice each month on the 2nd and 4th Thursdays. Funding for the MCWD is collected through local property taxes.

Per Minnesota Statute 103D.201 watershed districts general purpose is to conserve the natural resources of the state by land use planning, flood control and other conservation projects by using sound scientific principles for the protection of the public health and welfare and the provident use of the natural resources. The MCWD developed watershed management plans in 1969, 1997, 2007 and most recently on January 11, 2018.

MCWD has established the four strategic goals for their 2018 Watershed Management Plan:

- Water Quality – To preserve and improve the quality of surface and groundwater.
- Water Quantity – To manage the volume and flow of stormwater runoff to minimize the impacts of land use change on surface and groundwater.

- Ecological Integrity – To restore, maintain, and improve the health of ecological systems.
- Thriving Communities – To promote and enhance the value of water resources in creating successful, sustainable communities.

While MCWD's plan is organized around these four simple strategic goals, the MCWD recognizes that watershed management requires a holistic approach of ecosystem management. Accordingly, it approaches planning and implementation in a manner that integrates hydrologic, chemical, physical biological and built components of the sub-watershed system.

To assist in meeting the goals of the MCWD, the MCWD has established a 10-year Capital Improvement Plan. This plan describes the District's principle strategy of integrating water resource and land use planning, recognizing the potential for greater public benefit and efficient use of public funds when plans and investments are coordinated and aligned. The current proposed MCWD Capital Improvement program includes 1 project in the City of Plymouth for the Gleason Lake sub-watershed. (Table 60)

**TABLE 60**
**MCWD CAPITAL IMPROVEMENTS IN PLYMOUTH 2018-2027**

| ID | Name | Plymouth Sub-watershed | Funding Amount | Funding Year |
|---|---|---|---|---|
| TBD | Stormwater volume and Pollutant Load Reduction | Gleason Lake | $600,000 | Opportunity-Based |

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## Minnehaha Creek Sub-watersheds

The City of Plymouth has divided the portion of the Minnehaha Creek Watershed District within the City limits into 8 sub-watersheds for administrative and management purposes. The 8 sub-watersheds (Figure 23) are:

- 19th Avenue
- Dunkirk Lane
- Gleason Lake
- Hadley Lake
- Kreatz / Snyder Lakes
- Medina
- Minnetonka Outlet
- Mooney Lake

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## 19th Avenue Sub-Watershed

*Physical Land Use Characteristics*

The 19th Avenue sub-watershed is located in south west Plymouth. The sub-watershed in Plymouth generally follows Dunkirk Lane on its eastern border and shares a larger portion of the border with the Dunkirk Lane sub-watershed that is discussed later in this plan. Along northwestern boarder, the sub-watershed shares the jurisdictional border of the Bassett Creek Watershed Management Commission. The sub-watershed is bound on the southern border by Holly Lane North and 19th Avenue North and the Kreatz / Snyder Lakes sub-watershed that is discussed later in this plan.

Significant landmarks within this sub-watershed include the Shiloh, Ponderosa and Fazendin Neighborhood Parks which are operated by the City of Plymouth. This sub-watershed is fully built out and was developed from the early 1960's to the late 1990's with the majority of the development occurring during the 1970's. This sub-watershed has 25.0 acres of wetland, 0.0 acres of wetland mitigation, 0.0 acres of water quality ponding, and 2 water quality best management practices. The two Water Quality Best Management Practices in this sub-watershed are iron enhanced rain gardens that were installed with the Ponderosa Street Reconstruction Project in 2016. The City of Plymouth received a grant from MCWD to install the BMPs and the city will be monitoring their effectiveness annually until at least 2020. Additional Water Quality Best Management Practices that could be installed include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any high or good quality natural communities within this sub-watershed.

**TABLE 61**
**19th AVENUE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | Gleason Creek & Gleason Lake | |

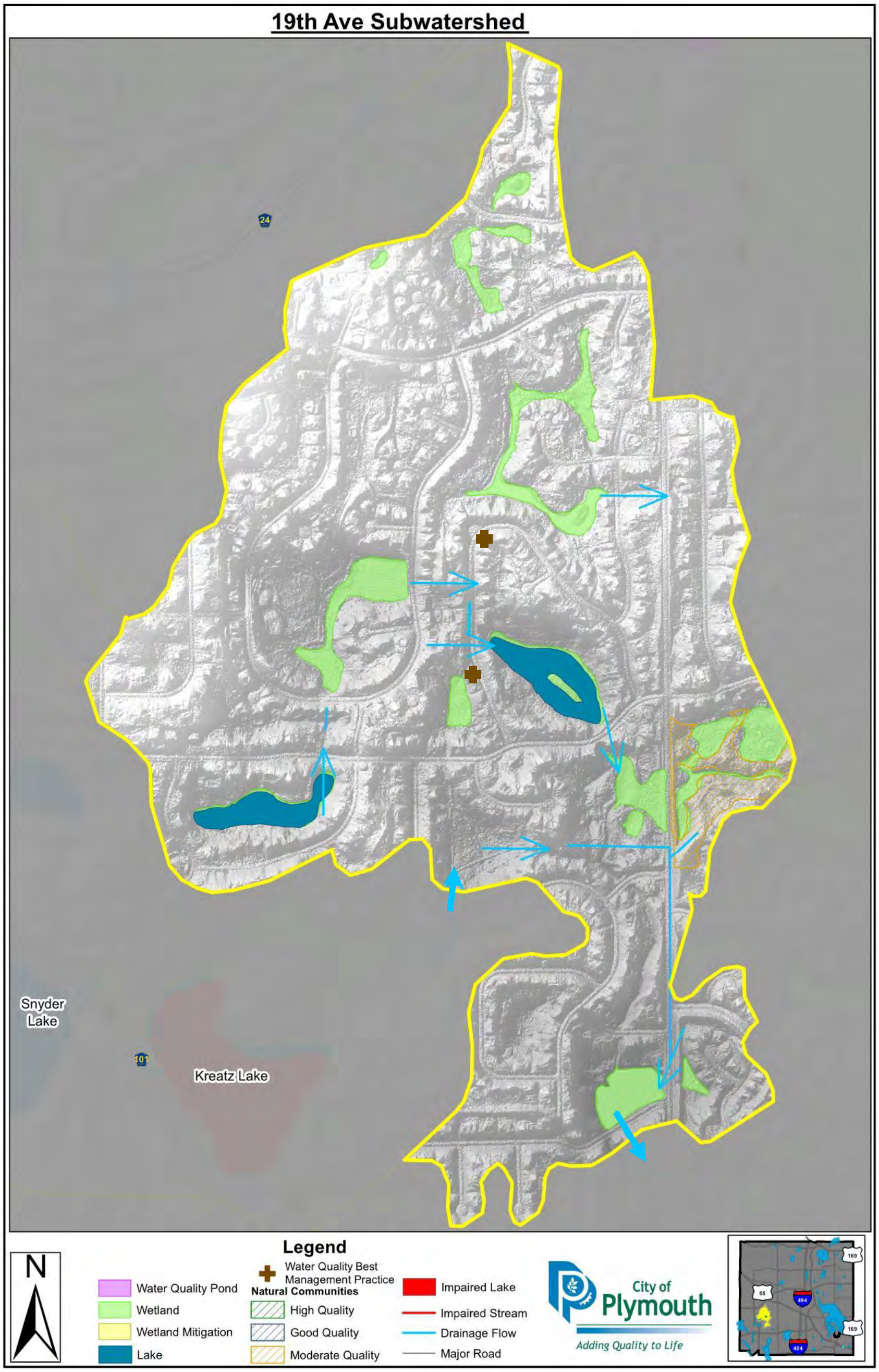
| | | |
|---|---|---|
| Receives runoff from: | Kreatz/Snyder & Dunkirk Lane | Figure 46 |
| Downstream-most water body: | Gleason Lake | Figure 46 |
| Discharges to: | Gleason Creek | Figure 46 |
| Wetlands | 25.0 Acres | Figure 46 |
| Wetland Mitigation | 0 Acres | Figure 46 |
| Water Quality Ponding | 0 Acres | Figure 46 |
| Water Quality Best Management Practices | 2 BMPs | Figure 46 |
| Lakes | N/A | |
| General Hydrologic Soil Group | C | |
| Drainage Area | 341.9 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no known impairments within the 19th Avenue Sub-watershed. While the 19th Avenue sub-watershed does not have any impaired waters within its boundaries, it receives water from Kreatz Lake which is impaired for excess nutrients and drains into Gleason Lake which is also impaired for excess nutrients on the State of Minnesota's 2018 Impaired Waters List.

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Figure 46. 19th Avenue Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the 1990's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

Recent projects pre-dating this plan include two iron enhanced rain gardens that were installed with a street reconstruction project and were partially funded by a grant from the Minnehaha Creek Watershed District. The City of Plymouth also replaced a failing culvert at the intersection of 29th Avenue North and Everest Lane to provide for flood protection. One city capital improvement project (19th Avenue / Dunkirk Lane Pond Improvement Project) is scheduled for 2019-2020. This project would remove accumulated sediment in the pond to increase phosphorus removal and improve water quality for Gleason Lake. Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 62.

**TABLE 62**
**19th AVENUE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| 19th Avenue/Dunkirk Lane Pond Improvement | 2019-2020 | - | $550,000 | Plymouth & MCWD |

*Conclusions*

This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Gleason Lake and other water bodies within this sub-watershed. The City will continue to implement best management practices during street reconstruction projects and will work to improve the other waterbodies within this sub-watershed

## Dunkirk Lane Sub-watershed

*Physical Land Use Characteristics*

The Dunkirk Lane sub-watershed is located in south west Plymouth. The sub-watershed in Plymouth generally follows Vicksburg Lane on its eastern border and shares a larger portion of the border with the 19th Avenue sub-watershed that is discussed earlier in this plan. Along the northern and eastern border, the sub-watershed shares the jurisdictional border of the Bassett Creek Watershed Management Commission. The sub-watershed is bound on the southern border by 12th Avenue North and the Gleason Lakes sub-watershed that is discussed later in this plan.

Significant landmarks within this sub-watershed include Maple Creek South, Gleason Creek and Oakwood Elementary School. This sub-watershed is fully built out and was developed steadily from the early 1950's to the early 2000's with the majority of the development occurring during the 1970's & 1980's. This sub-watershed has 112.8 acres of wetland, 9.2 acres of wetland mitigation, 5.5 acres of water quality ponding, and 8 water quality best management practices. While large scale redevelopment in this watershed will be unlikely, additional Water Quality Best Management Practices that would be installed could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any high or good quality natural communities within this sub-watershed.

**TABLE 63**
**DUNKIRK LANE SUB-WATERSHED CHARACTERISTICS**

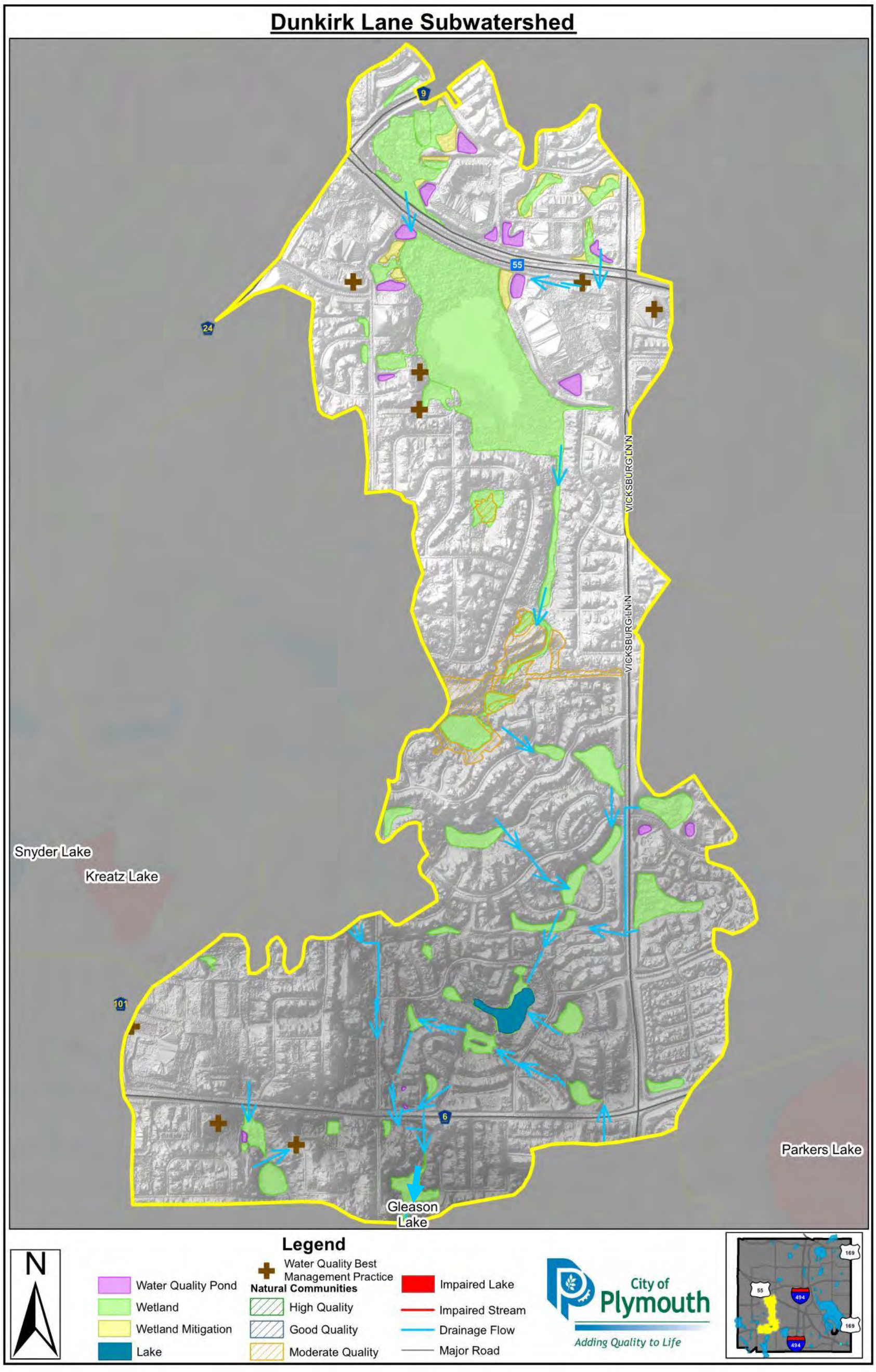
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | Gleason Lake | |
| Receives runoff from: | Kreatz/Snyder & 19th Avenue | Figure 47 |
| Downstream-most water body: | Gleason Lake | Figure 47 |

| | | |
|---|---|---|
| Discharges to: | Gleason Lake | Figure 47 |
| Wetlands | 112.8 Acres | Figure 47 |
| Wetland Mitigation | 9.2 Acres | Figure 47 |
| Water Quality Ponding | 5.5 Acres | Figure 47 |
| Water Quality Best Management Practices | 8 BMP | Figure 47 |
| Lakes | N/A | |
| General Hydrologic Soil Group | C & C/D | |
| Drainage Area | 924.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. Currently, there are no know water quality impairments within the Dunkirk Lane Sub-watershed. While the Dunkirk Lane sub-watershed does not have any impaired waters within its boundaries, it receives water from Kreatz Lake which is impaired for excess nutrients and drains into Gleason Lake which is also impaired for excess nutrients on the State of Minnesota's 2018 Impaired Waters List.

Figure 47. Dunkirk Lane Sub-watershed



*Implementation Program*

As this sub-watershed has developed, water quality best management practices have been installed as required by the city and watershed management organization. The majority of this watershed was built before the 1990's and were built around existing wetlands, but do not include any water quality ponding. The portions of this sub-watershed, which were developed after 2000, have water quality ponding and best management practices installed to improve water quality. Projects pre-dating this plan include the Chelsea Woods Stream Restoration project (2007) and the construction/maintenance of the Gleason Lake Water Quality Ponds by the MCWD.

The City has also identified non-structural, programmatic, and structural solutions to address impairments within this sub-watershed are shown in Table 64.

**TABLE 64**
**DUNKIRK LANE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Chelsea Woods Drainage Improvement Project – Weston Lane to County Road 6 | 2020 | - | $300,000 | Plymouth |
| Weston Lane Storm Sewer Lift Station Rehabilitation | 2018-2021 | - | $550,000 | Plymouth |
| Maple Creek Stream Restoration | 2020-2021 | - | $850,000 | Plymouth & MCWD |

*Conclusions*

The Dunkirk Lane sub-watershed does not have a known water quality impairment through the 2018 proposed impaired water list produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and downstream in Gleason Lake. The City will continue to implement best management practices during street reconstruction projects and will work to improve the other waterbodies within this sub-watershed.

## Gleason Lake Sub-Watershed

*Physical Land Use Characteristics*

The Gleason Lake Sub-watershed is located in south west Plymouth. The sub-watershed in Plymouth generally follows Ranchview Lane on its eastern border, 13th Avenue North on the northern border, County Road 101 / Queensland Lane North on the western border and the City Limits on the southern border.

Significant landmarks within this sub-watershed include Gleason Lake, Gleason Lake Elementary School and Wayzata Central Middle School. Gleason Lake is a 164 acre basin that receives stormwater runoff from the cities of Plymouth, Wayzata, Orono, Medina and Minnetonka. The lake has a maximum depth of 16 feet in the center and has an ordinary high water level of 944.1' above sea level. This sub-watershed is fully built out and was developed from the 1940's to the late 1990's with the majority of the development occurring during the 1960's & 1970's. There are 10 single family lots that range from 1.3 acres to 8.0 acres on the southeast side of Gleason Lake that could potentially redevelop in the future, if this is the case, the redevelopment would be subject to the city's Water Quality Rules and Standards at that time. This sub-watershed has 45.3 acres of wetland, 0.0 acres of wetland mitigation, 1.2 acres of water quality ponding, and 10 water quality best management practices. Additional Water Quality Best Management Practices that would be installed could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any high quality natural communities but does indicate one good quality floating mat wet meadow on the east side of Gleason Lake.

**TABLE 65**
**GLEASON LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | Gleason Lake | |

| | | |
|---|---|---|
| Receives runoff from: | Kreatz/Snyder, 19th Avenue & Dunkirk Lane | Figure 48 |
| Downstream-most water body: | Gleason Lake | Figure 48 |
| Discharges to: | City of Wayzata | Figure 48 |
| Wetlands | 45.3 Acres | Figure 48 |
| Wetland Mitigation | 0 Acres | Figure 48 |
| Water Quality Ponding | 1.2 Acres | Figure 48 |
| Water Quality Best Management Practices | 11 BMPs | Figure 48 |
| Lakes | Gleason Lake | Figure 5<br>Figure 48 |
| General Hydrologic Soil Group | A, C, C/D | |
| Drainage Area | 798.7 acres | |

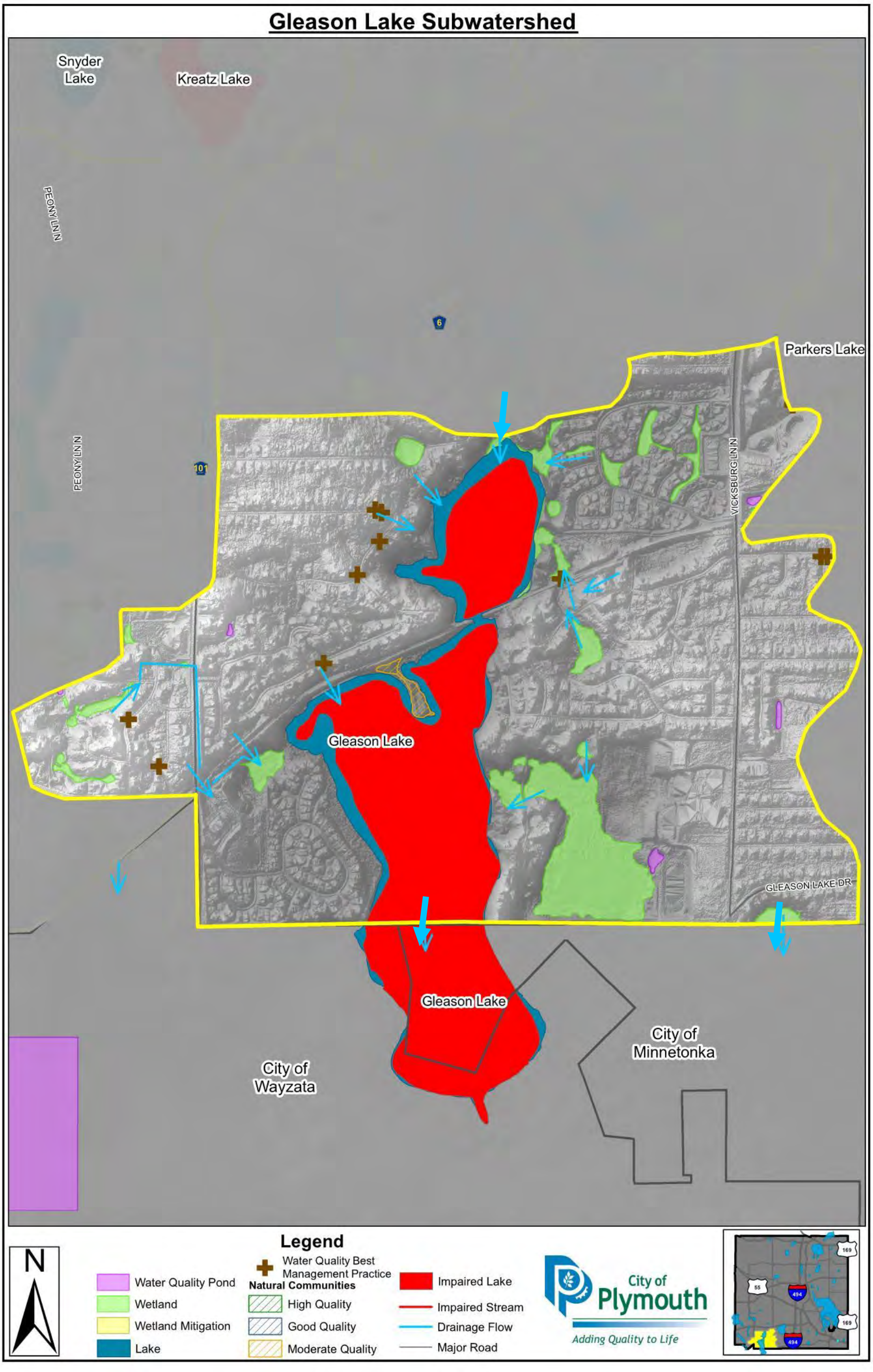
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 66) and a Total Maximum Daily Load (TMDL) was approved in 2014. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality. Gleason Lake which is also impaired for excess nutrients on the State of Minnesota's 2018 Impaired Waters List.

**TABLE 66**
**GLEASON LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Gleason Lake | Excess Nutrients | 2014 |

Figure 48. Gleason Lake Sub-watershed.



*Implementation Program*

This sub-watershed has been developed since the 1990's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

Recent projects pre-dating this plan include five rain gardens and 5 sump manholes that were installed with street reconstruction projects in 2005 and 2007 in this area. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Minnehaha Creek Watershed, and residents.

Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 67.

**TABLE 67**
**GLEASON LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Gleason Lake Sub-Watershed has one known impairment through the 2018 impaired water list produced by the State of Minnesota. While the TMDL plan has

been developed, this 10-year Surface Water Management Plan also includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Gleason Lake and other water bodies within this sub-watershed. The City will continue to implement best management practices during street reconstruction projects and will work to improve the other waterbodies within this sub-watershed.

## Hadley Lake Sub-Watershed

*Physical Land Use Characteristics*

The Hadley Lake sub-watershed is located in the far south west corner of Plymouth. The sub-watershed in Plymouth generally follows County Road 101 / Queensland Lane North on its eastern border, County Road 6 and 19th Avenue North on the northern border and the Plymouth City limits with Orono and Wayzata on the western and southern borders respectively.

The most significant landmark within this sub-watershed is Hadley Lake. Hadley Lake is a 38 acre basin that receives stormwater runoff from Mooney Lake and the cities of Plymouth, Orono and Medina. The maximum depth of this lake has not been measured and it has an ordinary high water level of 961.4' above sea level and a 100 year water elevation of 964.0' above sea level. This sub-watershed is fully built out and was developed from the 1950's to the late 1990's with the majority of the development occurring during the 1960's & 1970's. While unlikely, redevelopment could occur in portions of this sub-watershed over the life of this plan. If this were to happen, the redevelopment would be subject to the city's Water Quality Rules and Standards at that time. This sub-watershed has 61.5 acres of wetland, 0.0 acres of wetland mitigation, 1.1 acres of water quality ponding, and 19 water quality best management practices. Additional Water Quality Best Management Practices that would be installed could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) indicates a 1.28 acre, high quality wet meadow floating mat natural community on the east side of Hadley Lake.

**TABLE 68**
**HADLEY LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | Hadley Lake | |
| Receives runoff from: | Mooney Lake | Figure 49 |

| | | |
|---|---|---|
| Downstream-most water body: | Hadley Lake | Figure 49 |
| Discharges to: | City of Wayzata | Figure 49 |
| Wetlands | 61.5 Acres | Figure 49 |
| Wetland Mitigation | 0 Acres | Figure 49 |
| Water Quality Ponding | 1.1 Acres | Figure 49 |
| Water Quality Best Management Practices | 19 BMPs | Figure 49 |
| Lakes | Gleason Lake | Figure 6<br>Figure 49 |
| General Hydrologic Soil Group | B, C | |
| Drainage Area | 689.1 acres | |

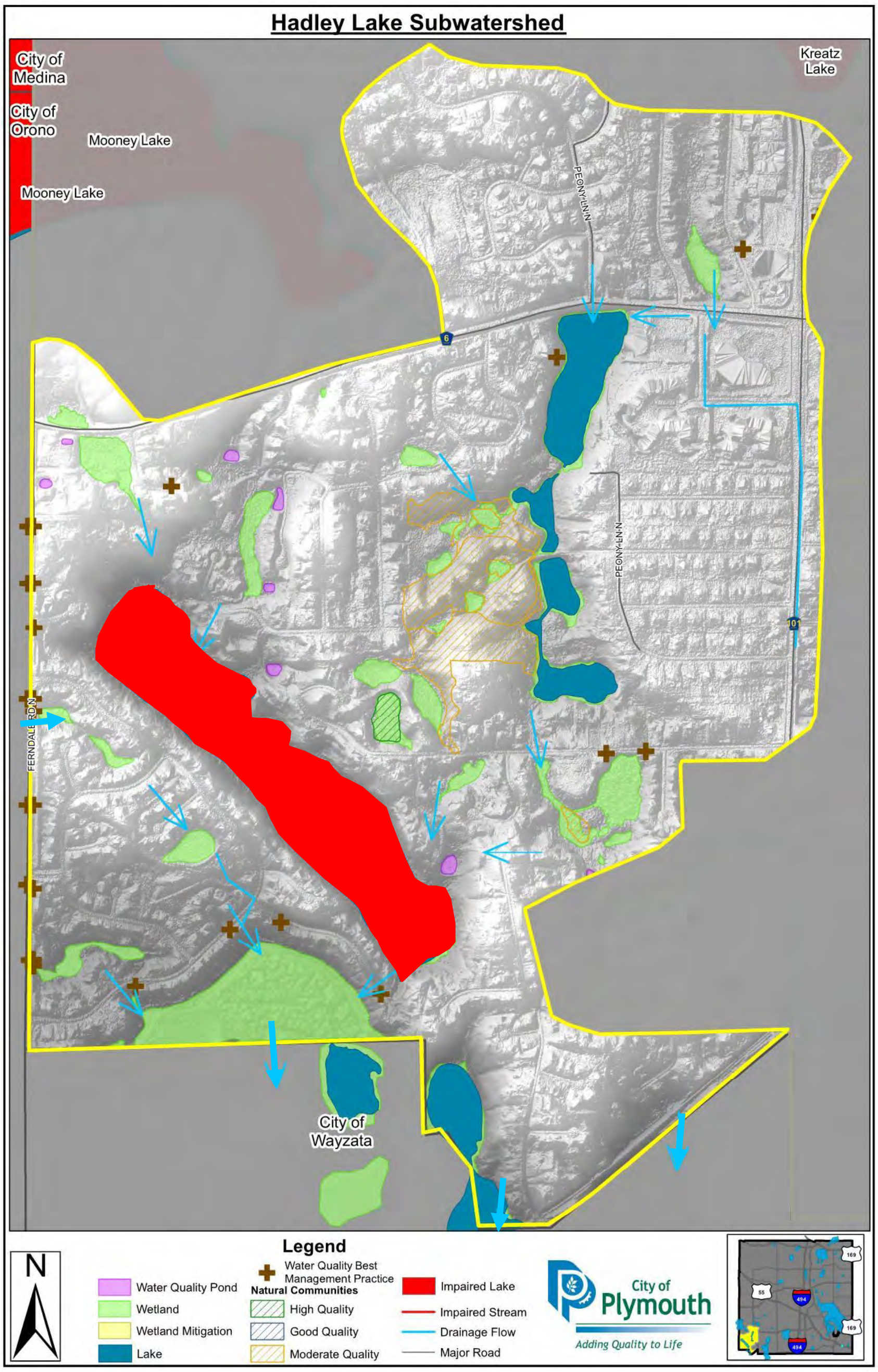
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 69) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality. Hadley Lake is impaired for excess nutrients in the State of Minnesota's 2018 Impaired Waters List.

**TABLE 69**
**HADLEY LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Hadley Lake | Excess Nutrients | 2014 |

Figure 49. Hadley Lake Sub-watershed



*Implementation Program*

This sub-watershed has been mostly developed since the 1990's, however, recent development since 2006 has been occurring on select parcels of land. Once the development activities are completed, this sub-watershed unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

Recent projects pre-dating this plan include 2 sump manholes and a rain garden that were installed as part of street reconstruction and drainage projects in 2010 & 2011. The Villages Stream Restoration Project was also completed in 2013. This project consisted of installing 20 linear feet of storm sewer adjacent to Hadley Lake in order to prevent erosion and property damage and to restore an additional 60 feet of streambank. In addition, during the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Minnehaha Creek Watershed, and residents. Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 70.

**TABLE 70**
**HADLEY LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

| | | | | |
|---|---|---|---|---|
| 4th Avenue North & Zircon Lane North Drainage Improvement | 2018-2019 | | $130,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Hadley Lake Sub-Watershed has one known impairment through the 2018 Impaired Waters List produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Hadley Lake and other water bodies within this sub-watershed. The City will continue to implement best management practices during street reconstruction projects and will work to improve the other waterbodies within this sub-watershed.

## Kreatz & Snyder Lakes Sub-Watershed

*Physical Land Use Characteristics*

The Kreatz & Snyder Lakes Sub-watershed is located in southwest Plymouth between Hennepin County Road 24 and Hennepin County Road 6. The sub-watershed in Plymouth spit in half by Hennepin County Road 101 and generally follows Urbandale Lane North & Vagabond Lane North on its western border, Hennepin County Road 24 on the northern border, 19th Avenue North on the southern border and Garland Lane North & Merrimac Lane North on the eastern border.

The most significant landmarks within this sub-watershed are Kreatz and Snyder Lakes, which are on the east and west sides of Hennepin County Road 101 respectively. Snyder Lake is a 9 acre lake that receives stormwater runoff from the watershed to the north. The lake has a maximum depth of 12 feet in the center and has an estimated ordinary high water level of 977.0' above sea level. Kreatz Lake is a 16 acre lake that receives stormwater runoff from Snyder Lake. The lake has a maximum depth of 7 feet in the center and has an ordinary high water level of 972.3' above sea level. This sub-watershed is fully built out and was steadily developed from the late 1950's to the late 1980's with the majority of the development occurring during the 1960's & 1970's. While unlikely, redevelopment could occur in the portions of this sub-watershed along Hennepin County Road 101 directly adjacent to Kreatz and Snyder Lakes. If this were to happen, the redevelopment would be subject to the city's Water Quality Rules and Standards at that time.

This sub-watershed has 47.9 acres of wetland, 0.2 acres of wetland mitigation, 0.6 acres of water quality ponding, and 5 water quality best management practices. Additional Water Quality Best Management Practices that could be installed include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any good or high natural communities within this sub-watershed.

**TABLE 71**
**KREATZ & SNYDER LAKES SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | Kreatz Lake | |
| Receives runoff from: | N/A | Figure 50 |
| Downstream-most water body: | Kreatz Lake | Figure 50 |
| Discharges to: | 19th Avenue | Figure 50 |
| Wetlands | 47.9 Acres | Figure 50 |
| Wetland Mitigation | 0.2 Acres | Figure 50 |
| Water Quality Ponding | 0.6 Acres | Figure 50 |
| Water Quality Best Management Practices | 5 BMPs | Figure 50 |
| Lakes | Kreatz & Snyder Lakes | Figure 8<br>Figure 17<br>Figure 50 |
| General Hydrologic Soil Group | B, C | |
| Drainage Area | 385.2 acres | |

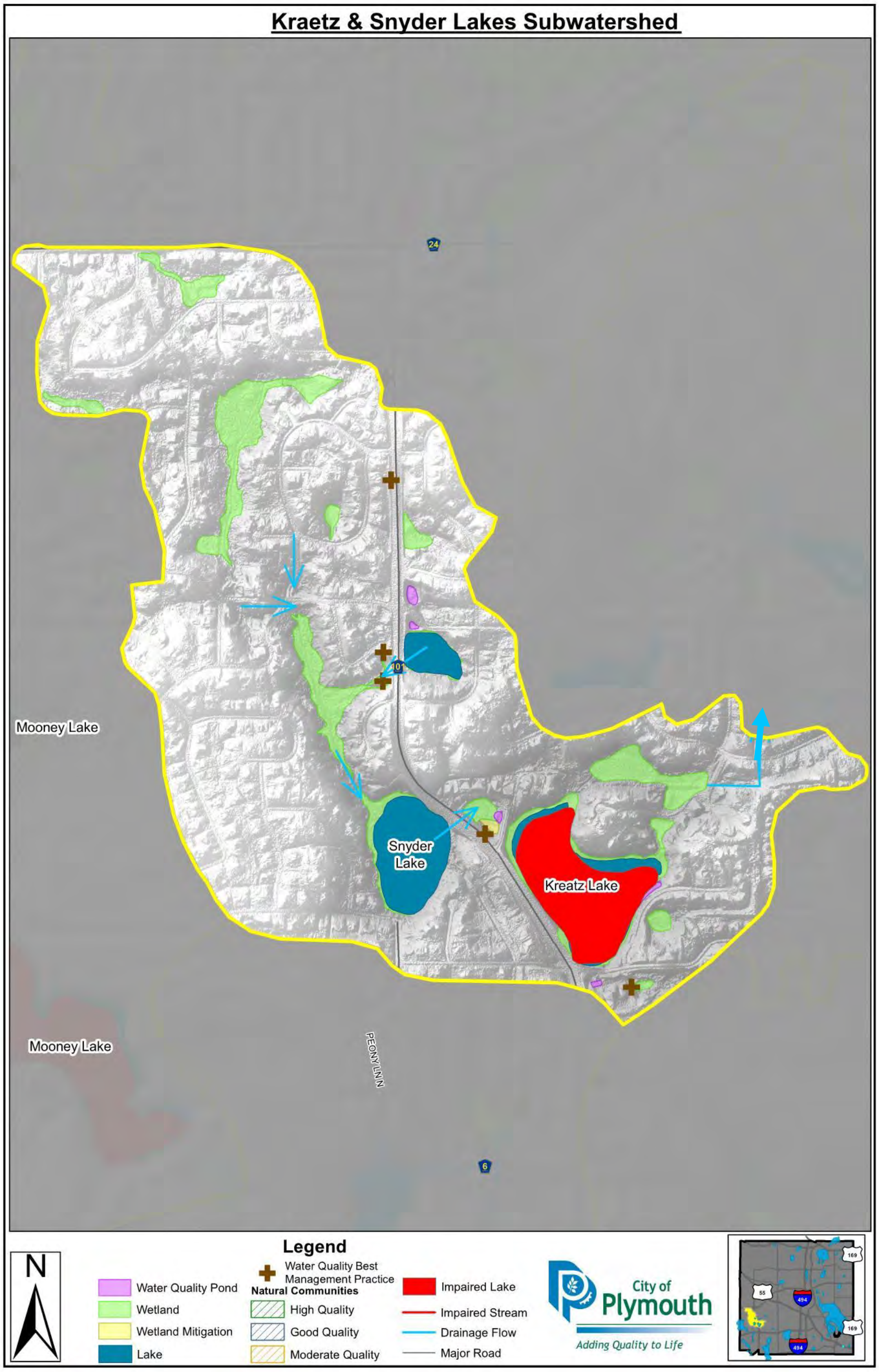
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 72) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality. Kreatz (*MPCA - Snyder*) Lake is impaired for excess nutrients in the State of Minnesota's 2018 Impaired Waters List.

**TABLE 72**
**KREATZ & SNYDER LAKES SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Kreatz Lake (*MPCA - Snyder Lake*) | Excess Nutrients | 2010 |

Figure 50. Kreatz & Snyder Lakes Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the 1990's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

Recent projects pre-dating this plan include the installation of three underground storage chambers and a sand filter as part of the County State Aid Highway (C.S.A.H) 101 Reconstruction Project in 2009 and drainage improvements to reduce erosion at the intersection of 26th Avenue North and Shadyview Lane. During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Minnehaha Creek Watershed, and residents.

Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 73.

**TABLE 73**
**KREATZ & SNYDER LAKES SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Meadow Wood Drainage Improvement Project | 2018 - 2019 | - | $295,000 | Plymouth / MCWD |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Kreatz & Snyder Lakes sub-watershed has one known impairment through the 2018 Impaired Waters List produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan also includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Kreatz (Snyder) Lake and other water bodies within this sub-watershed. The City will continue to implement best management practices during street reconstruction projects and will work to improve the other waterbodies within this sub-watershed.

## Medina Sub-Watershed

*Physical Land Use Characteristics*

The Medina sub-watershed is located in the south west Plymouth. The sub-watershed in Plymouth is within the Bridlewood Farm subdivision and generally follows Medina Road on its northern border, the Plymouth City Limits on the western border, 37th Avenue North on the southern border and Alvarado Lane North on the eastern border.

The most significant landmark within this sub-watershed is the large wetland located in the west central portion of the sub-watershed. This sub-watershed is fully built out and was developed in the early 1990's. This sub-watershed will not undergo redevelopment within the next 10 years. Any future redevelopment would be subject to the city's Water Quality Rules and Standards at that time. This sub-watershed has 1.3 acres of wetland, 0.0 acres of wetland mitigation, 0.0 acres of water quality ponding, and 0 water quality best management practices. Additional Water Quality Best Management Practices that could be installed include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any good or high natural communities within this sub-watershed.

**TABLE 74**
**MEDINA SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | City of Medina | |
| Receives runoff from: | N/A | Figure 51 |
| Downstream-most water body: | City of Medina | Figure 51 |
| Discharges to: | City of Medina | Figure 51 |
| Wetlands | 1.3 Acres | Figure 51 |
| Wetland Mitigation | 0.0 Acres | Figure 51 |
| Water Quality Ponding | 0.0 Acres | Figure 51 |
| Water Quality Best Management Practices | 0 BMPs | Figure 51 |
| Lakes | N/A | |

| | | |
|---|---|---|
| General Hydrologic Soil Group | C, C/D | |
| Drainage Area | 18.4 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently no known water quality impairments within the Medina Sub-watershed.

Figure 51. Medina Sub-watershed



*Implementation Program*

This sub-watershed was developed in the early 1990's will not undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

There have been no water resource improvement projects within this sub-watershed over the last 10 years and there are no projects scheduled in the Plymouth 2018-2022 Capital Improvement Program. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 75.

**TABLE 75**
**MEDINA SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Medina sub-watershed has no known impairments through the 2018 Impaired Waters List produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in water bodies within this sub-watershed and downstream. The City will continue to implement best management practices during street reconstruction projects and will work to improve the waterbody within this sub-watershed.

## Minnetonka Outlet Sub-Watershed

*Physical Land Use Characteristics*

The Minnetonka Outlet sub-watershed is located in south central Plymouth. The sub-watershed generally follows Gleason Lake Road / Carlson Parkway on its northern border, Niagara Lane North on the western border, Plymouth's City Limits on the southern border and Vinewood Lane North on its eastern border.

The most significant landmarks within this sub-watershed are the large commercial office buildings on the east and west sides of Interstate 494, which divides the sub-watershed in half. This sub-watershed is fully built out and was developed in the mid 1980's until the late 1990's. This sub-watershed is unlikely to undergo redevelopment within the next 10 years. Any future redevelopment would be subject to the city's water quality rules and standards at that time.

This sub-watershed has 11.4 acres of wetland, 0.0 acres of wetland mitigation, 0.2 acres of water quality ponding, and 1 water quality best management practice. Additional Water Quality Best Management Practices that could be installed include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any good or high natural communities within this sub-watershed.

**TABLE 76**
**MINNETONKA OUTLET SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | City of Minnetonka | |
| Receives runoff from: | N/A | Figure 52 |
| Downstream-most water body: | City of Minnetonka | Figure 52 |
| Discharges to: | City of Minnetonka | Figure 52 |
| Wetlands | 11.4 Acres | Figure 52 |
| Wetland Mitigation | 0.0 Acres | Figure 52 |

| | | |
|---|---|---|
| Water Quality Ponding | 0.2 Acres | Figure 52 |
| Water Quality Best Management Practices | 1 BMP | Figure 52 |
| Lakes | N/A | |
| General Hydrologic Soil Group | C, C/D | |
| Drainage Area | 179.9 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The Minnetonka Outlet sub watershed drains to Minnehaha Creek which has an approved TMDL.

Figure 52. Minnetonka Outlet Sub-watershed



*Implementation Program*

This sub-watershed was developed in the middle 1980's to the late 1990's is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

There have been no water resource improvement projects within this sub-watershed over the last 10 years and there are no projects scheduled in the Plymouth 2018-2022 Capital Improvement Program. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 77.

**TABLE 77**
**MINNETONKA OUTLET SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Minnetonka Outlet sub-watershed drains to Minnehaha Creek which is listed as impaired through the 2018 Impaired Waters List produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in water bodies within this sub-watershed and downstream. The City will continue to implement best management practices during street reconstruction projects and will work to improve the waterbody within this sub-watershed. The City will continue to implement best management practices during street reconstruction projects and will work to improve the other waterbodies within this sub-watershed.

## Mooney Lake Sub-Watershed

*Physical Land Use Characteristics*

The Mooney Lake sub-watershed is located in southwest Plymouth. The sub-watershed in Plymouth generally follows 33rd Avenue North on its northern border, Plymouth's City Limits with the City of Orono and Medina on the western border, Hennepin County Road 6 on the southern border and Urbandale Lane North on its eastern border. Mooney Lake is the most significant landmark within this sub-watershed, which is a 115 acre land-locked basin that receives stormwater runoff from the cities of Orono, Medina and Plymouth. This lake has a maximum depth of 12 feet in the center and has an ordinary high water level of 988.0' above sea level and the 100-year high water level is 990.0' above sea level. This lake has history of high water concerns that date back to 1976 and a plan for emergency pumping from the lake is discussed later in this plan.

This sub-watershed is fully built out with the majority of development occurring in the 1960's and the early 1990's. This sub-watershed is unlikely to undergo redevelopment within the next 10 years. Any future redevelopment would be subject to the watershed and city water quality rules and standards at that time. This sub-watershed has 19.0 acres of wetland, 0.0 acres of wetland mitigation, 1.2 acres of water quality ponding, and 2 water quality best management practices. Additional Water Quality Best Management Practices that could be installed include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory of Plymouth (2006) does not indicate any good or high natural communities within this sub-watershed.

**TABLE 78**
**MOONEY LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Minnehaha Creek | |
| Receiving Water | Mooney Lake | |

| | | |
|---|---|---|
| Receives runoff from: | N/A | Figure 53 |
| Downstream-most water body: | Mooney Lake | Figure 53 |
| Discharges to: | Hadley Lake | Figure 53 |
| Wetlands | 19.0 Acres | Figure 53 |
| Wetland Mitigation | 0.0 Acres | Figure 53 |
| Water Quality Ponding | 1.2 Acres | Figure 53 |
| Water Quality Best Management Practices | 2 BMPs | Figure 53 |
| Lakes | Mooney | Figure 12<br>Figure 53 |
| General Hydrologic Soil Group | C, C/D | |
| Drainage Area | 179.9 acres | |

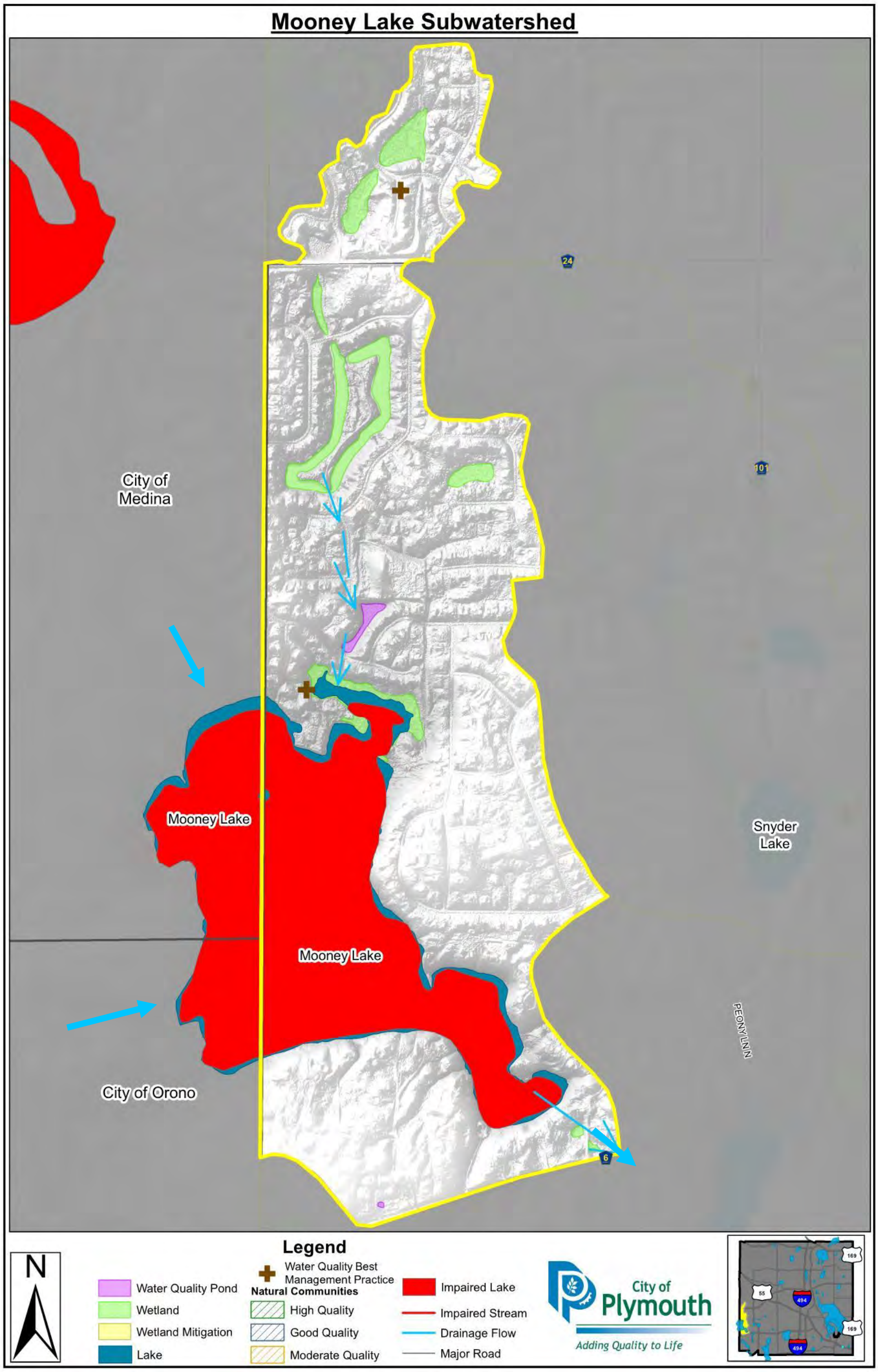
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 79) and ultimately a Total Maximum Daily Load (TMDL) is established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 79**
**MOONEY LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Mooney Lake | Excess Nutrients | 2010 |

Figure 53. Mooney Lake Sub-watershed



*Implementation Program*

This sub-watershed was developed in the 1960's and the early 1990's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and the Minnehaha Creek Watershed Districts Stormwater Management Rules would apply.

There have been several projects in this sub-watershed pre-dating this plan. Maintenance projects were completed to help provide flood control and water quality improvements and were located in the Bay Pointe on Mooney Lake (Pond #30222-NU01) and the Greentree West (19332-NB01) neighborhoods. Additionally, capital improvement projects were also completed in this sub-watershed over the last 10 years. The Xanthus Lane Pipe Replacement Project (WRS 13024) consisted of replacing an existing, failed storm sewer pipe that drained directly into Mooney Lake with a new one. The Mooney Lake Permanent Emergency Outlet Project consisted of the installation of 1,100 linear feet of underground pipe and installation of a left station to connect Mooney Lake to the City storm sewer system. This project was a cooperative project between the City of Plymouth and the Minnehaha Creek Watershed District. The operations for the pumping of Mooney Lake are outlined in the "Mooney Lake Operating Plan for Emergency Pumping – August 2017".

During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Minnehaha Creek Watershed, and residents.

Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 80.

**TABLE 80**
**MOONEY LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | %50,000 | Plymouth |

*Conclusions*

The Mooney Lake sub-watershed has an excess nutrient impairment noted in the 2018 Impaired Waters List produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in water bodies within this sub-watershed and downstream. The City will continue to implement best management practices during street reconstruction projects and will work to improve the waterbody within this sub-watershed.

## Shingle Creek Watershed

The Shingle Creek Watershed covers approximately 44 square miles in northeastern Hennepin County. Predominant water features in Plymouth include Pomerleau Lake, Curtis Lake, Bass Lake, Schmidt Lake, Pike Lake and Bass Creek.

Generally, drainage in the Shingle Creek watershed comes to Bass Creek, which starts in the wetland located to the east of 54th Avenue North and Vicksburg Lane North. The water runs eastbound though a series of wetlands and storm sewer pipes before entering Bass Lake near 54th Avenue North and Norwood Lane North. The water exits Bass Lake on the east side and travels through a series of wetlands before becoming more of a defined stream to the north of the intersection of Zachary Lane North and 56th Avenue North. The water then travels northeast into the wetland located in the northwest corner of the intersection of into the US 169 Right of Way and Bass Lake Road and then east into New Hope.

### Shingle Creek Watershed Management Commission

Shingle Creek and its tributaries extend across nine cities: Plymouth, Brooklyn Center, Brooklyn Park, Crystal, Maple Grove, Minneapolis, New Hope, Osseo and Robbinsdale.

Shingle Creek enters the Mississippi River in North Mississippi Park, which is located to the north of 42nd Avenue North and east of Interstate 94 in Minneapolis. In 1984, the Shingle Creek Watershed Management Commission (SCWMC) was formed using a joint powers agreement between the cities of Brooklyn Center, Brooklyn Park, Crystal, Maple Grove, Minneapolis, New Hope, Osseo, Robbinsdale and Plymouth, under the authority conferred to the member parties through Minnesota Statutes. The joint powers agreement was most recently approved by the nine member cities in 2015.

The SCWMC Board of Commissioners currently consists of nine commissioners and nine alternates appointed by the member cities. The term of each commissioner and

alternate is three years. Regular meetings of the SCWMC are held on the second Thursday of each month. Funding for the administrative functions of the SCWMC is via an assessment, generally based on land area and tax capacity, to each member of the organization.

Per Minnesota Rules 8410.008, Subp. 2-8, watershed management organization goals generally fall into the following categories: water quantity, water quality, public drainage systems, groundwater, wetlands, drainage systems and commission operations and programming. The SCWMC has established the following goals:

- Maintain the existing 100-year flood profile throughout the watersheds.
- Determine ecological low flows for Shingle and Bass Creeks.
- As lake water quality improves and lakes are removed from the State's Impaired Waters list, implement management strategies to protect lake water quality. Schmidt, Lower Twin, and Ryan Lakes were delisted in 2014.
- Implement phosphorus and sediment load reduction actions sufficient to achieve de-listing from the Impaired Waters list for Bass, Eagle, Crystal, and Middle Twin Lakes.
- Improve water clarity in the balance of the lakes by 10% over the average of the previous ten years.
- Improve at least 30% of the length of Shingle Creek to meet Corridor Study and TMDL design standards.
- Maintain nondegradation of all waterbodies compared to 1985 conditions.
- Infiltrate stormwater runoff from new impervious surface.
- Identify opportunities for and implement projects to infiltrate runoff from existing impervious surface.
- Work with the appropriate state agencies to incorporate groundwater assessment into the sustainable water budget analysis for each watershed.
- Maintain the existing functions and values of wetlands identified in the Commissions' Water Quality Plan as high-priority.

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- Informed by the sustainable water budget study, improve functions and values of wetlands.
- Continue current Hennepin County jurisdiction over County Ditch #13.
- Identify and operate within a sustainable funding level that is affordable to member cities.
- Foster implementation of TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.
- Operate a public education and outreach program that meets the NPDES Phase II education requirements for the member cities.
- Operate a monitoring program sufficient to characterize water quantity, water quality, and biotic integrity in the watersheds and to evaluate progress towards meeting TMDL goals.
- Maintain rules and standards for development and redevelopment that are consistent with local and region TMDLs, federal guidelines, source water and wellhead protection requirements, sustainable water yields, nondegradation, and ecosystem management goals.
- Serve as a technical resource for member cities.

To assist in meeting the goals of the SCWMC, the SCWMC has established a 10-year Capital Improvement Program. Capital improvements are currently funded under an ad-velorum tax through Hennepin County. The current SCWMC Capital Improvement program includes two projects in the City of Plymouth (Table 81).

**TABLE 81**
**SCWMC CAPITAL IMPROVEMENTS IN PLYMOUTH 2018-2024**

| ID | Name | Plymouth Sub-watershed | Funding Amount | Funding Year |
|---|---|---|---|---|
| N/A | Palmer Creek Estates Bass Creek Stream Restoration | Bass Lake South | 25% | 2021 |
| N/A | Bass and Pomerleau Lakes Alum Treatment | Bass Lake & Pomerleau | 100% | 2018 |

## Shingle Creek Sub-watersheds

The City of Plymouth has divided the portion of the Shingle Creek watershed within the City limits into 11 sub-watersheds for administrative and management purposes. The 11 sub-watersheds (Figure 23) are:

- Pomerleau Lake
- Upper Shingle Creek
- Curtis Lake
- Bass Lake South
- Schmidt Lake
- Bass Lake
- Bass Lake Northwest
- Pike Lake
- Lower Shingle Creek
- Shingle Creek Outlet
- New Hope

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## Pomerleau Lake Sub-Watershed

*Physical Land Use Characteristics*

The Pomerleau Lake Sub-watershed is located in north central Plymouth. The sub-watershed generally follows County Road 47 along its northern boundary at 60th Avenue North and Niagara Lane. Along the western boundary, the sub-watershed runs through many large lot residential properties. The sub-watershed is bound along the eastern border by the jurisdictional border of the Elm Creek Watershed Management Commission and the Lake Camelot sub-watershed, which is discussed later in this plan and the southern border is the south end of Pomerleau Lake.

The most significant landmark within this sub-watershed is Pomerleau Lake. (Figure 15). The sub-watershed consists of mostly large lot residential and undeveloped land uses, however, single family, townhomes and condominium residential developments have been completed in the past 10 years. This sub-watershed contains 57.8 acres of wetland, 3.7 acres of wetland mitigation, 3.2 acres of water quality ponding, and 9 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) indicates a high quality willow swamp natural community and two good quality natural communities, a mixed hardwood swamp and a willow swamp.

**TABLE 82**
**POMERLEAU LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Pomerleau Lake | |
| Receives runoff from: | N/A | Figure 54 |
| Downstream-most water body: | Pomerleau Lake | Figure 54 |
| Discharges to: | Upper Shingle Creek | Figure 54 |
| Wetlands | 57.8 Acres | Figure 54 |
| Wetland Mitigation | 0.4 Acres | Figure 54 |

| | | |
|---|---|---|
| Water Quality Ponding | 3.1 Acres | Figure 54 |
| Water Quality Best Management Practices | 9 BMPs | Figure 54 |
| Lakes | Pomerleau – 32.1 | Figure 15<br>Figure 54 |
| General Hydrologic Soil Group | C, C/D | |
| Drainage Area | 270.4 acres | |

*Assessment of Water Resource Related Problems*

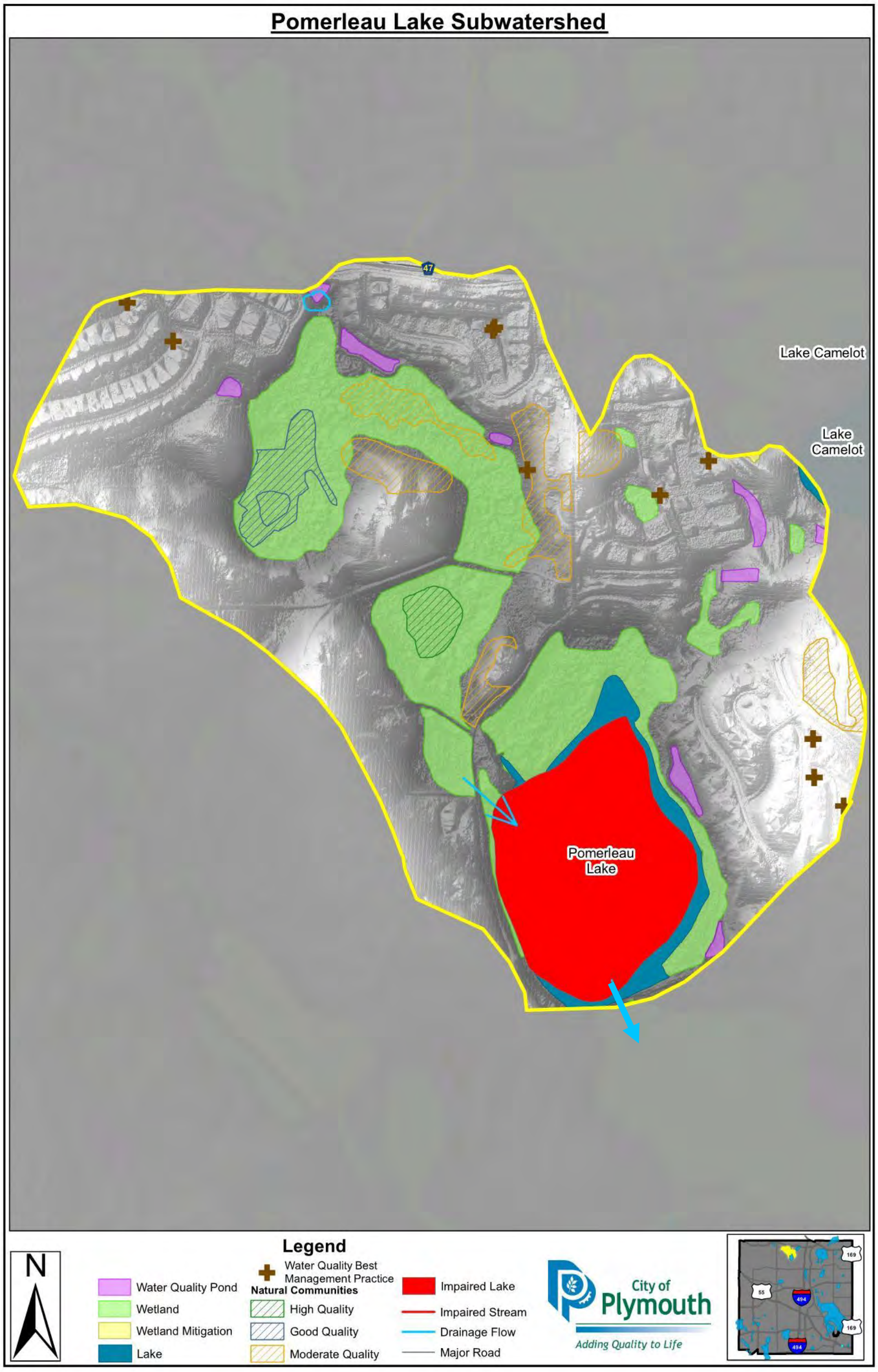
The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 83) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 83**
**POMERLEAU LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Pomerleau Lake | Excess nutrients | 2002 |

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Figure 54. Pomerleau Lake Sub-watershed



*Implementation Program*

This sub-watershed has been involved in a land use transition over the last 10 years from primarily large lot single family residential and agriculture to smaller lot, single family and multi-family residential developments. Each of the new subdivisions have been subject to water quality requirements, which includes water quality and quantity best management practices as outlined in the City of Plymouth Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards.

In addition to improving water quality through stormwater management, the removal of septic systems discharging to surface waters will help to removing additional sources of excess nutrients and bacteria to the surface and groundwater. Some of the original septic systems have been removed during the land use transition previously mentioned and it is anticipated the remaining 17 septic systems in the sub-watershed will be removed when the large lot residential and undeveloped area is developed.

During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Shingle Creek Watershed, and residents.

There have been no city capital improvement projects in this sub-watershed that pre-date this plan, however, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 84.

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**TABLE 84**
**POMERLEAU LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Lake Management | 2019-2028 | $1,000 | $10,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |
| Alum Treatment – Pomerleau | 2019 | $100,000 | $100,000 | SCWMC |

*Conclusions*

The Pomerleau Lake Sub-Watershed has one known impairment identified in the 2018 impaired water list produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Pomerleau Lake and other water bodies within this sub-watershed. The City will continue to implement best management practices during future land use transition.

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## Upper Shingle Creek Sub-Watershed

*Physical Land Use Characteristics*

The Upper Shingle Creek sub-watershed is located in north central Plymouth. The sub-watershed generally bound by 57th Avenue on the north, Northwest Boulevard on the east, 47th Avenue and the jurisdictional border of Bassett Creek Watershed Management Commission on the south and Black Oaks Lane North and the jurisdictional border of the Elm Creek Watershed Management Commission on the west.

The most significant landmark within this sub-watershed is Bass Creek. (Figure 55). The sub-watershed consists primarily of single family residential and multi-family residential, however, there are some land uses on the west side of Interstate 494 that are institutional, commercial and industrial. The majority of the development in this area has taken place in the past 10 years. This sub-watershed contains 178.7 acres of wetland, 22.1 acres of wetland mitigation, 21.6 acres of water quality ponding, and 19 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any high quality or good quality natural communities in this sub-watershed.

**TABLE 85**
**UPPER SHINGLE CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Creek | |
| Receives runoff from: | Pomerleau Lake<br>Curtis Lake | Figure 55 |
| Downstream-most water body: | Bass Lake | Figure 55 |
| Discharges to: | Bass Lake | Figure 55 |
| Wetlands | 178.7 Acres | Figure 55 |
| Wetland Mitigation | 22.1 Acres | Figure 55 |

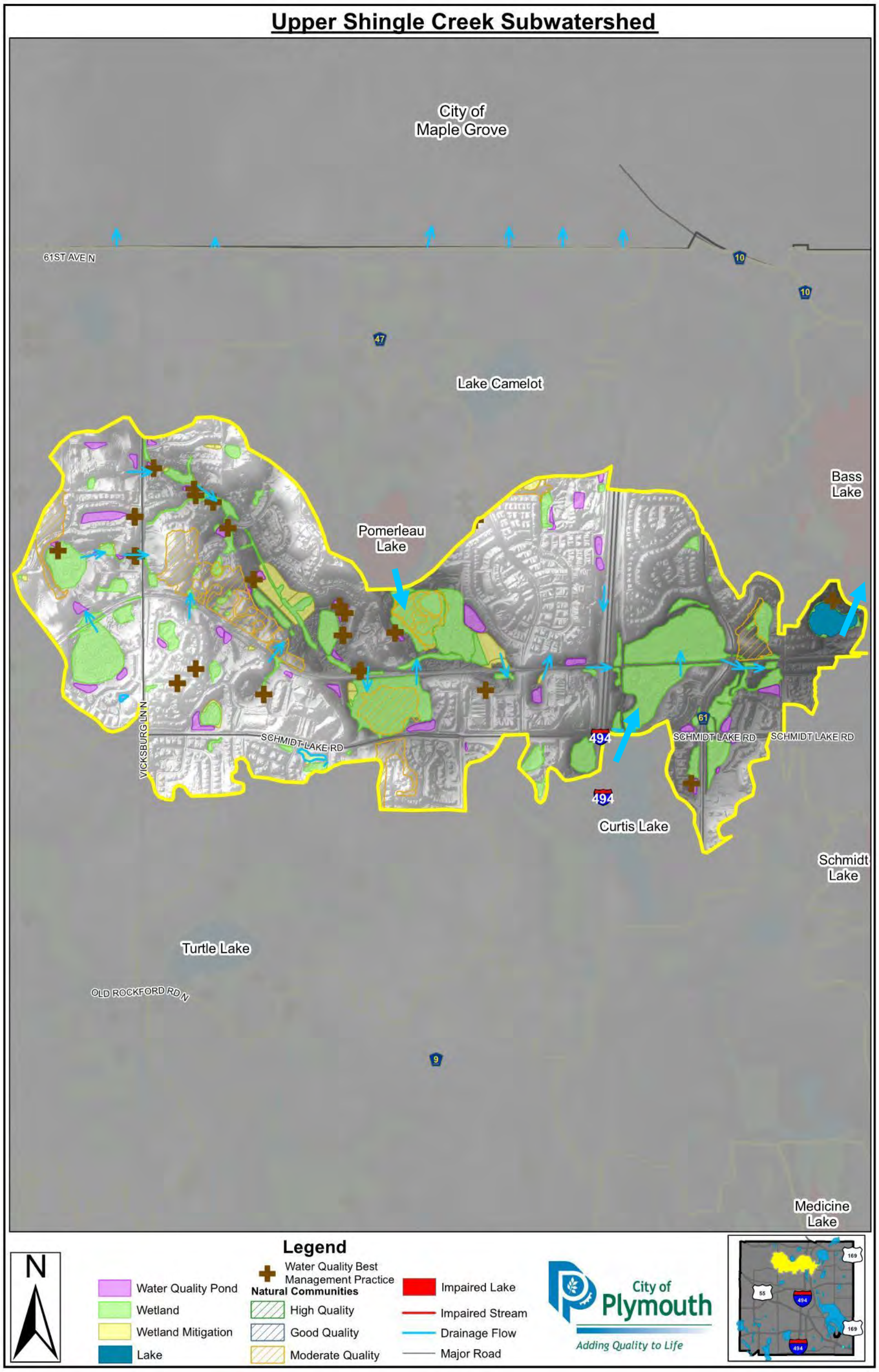
| | | |
|---|---|---|
| Water Quality Ponding | 21.6 Acres | Figure 55 |
| Water Quality Best Management Practices | 19 BMPs | Figure 55 |
| Lakes | N/A | |
| General Hydrologic Soil Group | C, C/D | |
| Drainage Area | 1135.4 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently no known impairments within the Upper Shingle Creek Sub-watershed.

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Figure 55. Upper Shingle Creek Sub-watershed



*Implementation Program*

This sub-watershed has been going through a land use transition over the last 10 years from primarily large lot single family residential, open space, golf course and agriculture to smaller lot, single family and multi-family residential developments. Each of the new subdivisions have been subject to water quality requirements, which includes water quality and quantity best management practices as outlined in the City of Plymouth Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards.

In addition to improving water quality through stormwater management, the removal of septic systems discharging to surface waters will help to removing additional sources of excess nutrients and bacteria to the surface and groundwater. Some of the original septic systems have been removed during the land use transition previously mentioned and it is anticipated the remaining 17 septic systems in the sub-watershed will be removed when the large lot residential and undeveloped area is developed.

There have been no city capital improvement projects in this sub-watershed that pre-date this plan, however, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 86.

**TABLE 86**
**UPPER SHINGLE CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Upper Shingle Creek Sub-watershed has no known impairments identified in the 2018 impaired water list produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality within this sub-watershed and other waterbodies downstream. The City will continue to implement best management practices during future land use transition.

## Curtis Lake Sub-Watershed

*Physical Land Use Characteristics*

The Curtis Lake sub-watershed is located in north central Plymouth. The sub-watershed generally bound by Schmidt Lake Road on the north, Northwest Boulevard on the east, Rockford Road (County Road 9) on the south and Fernbrook Lane on the west.

The most significant landmark within this sub-watershed is Curtis Lake. (Figure 4). The land use in this sub-watershed consists of single family residential, multi-family residential, commercial / industrial and open space. The watershed has a significant amount of undeveloped area on both the east and west sides of the Interstate 494 corridor. The majority of the development in this area took place from the late 1980's to the early 2000's and appropriate water quality treatment practices have been installed. This sub-watershed contains 66.9 acres of wetland, 0.4 acres of wetland mitigation, 4.1 acres of water quality ponding, and 2 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) indicates a high quality oak forest mesic subtype natural community in this sub-watershed.

**TABLE 87**
**CURTIS LAKE SUB-WATERSHED CHARACTERISTICS**

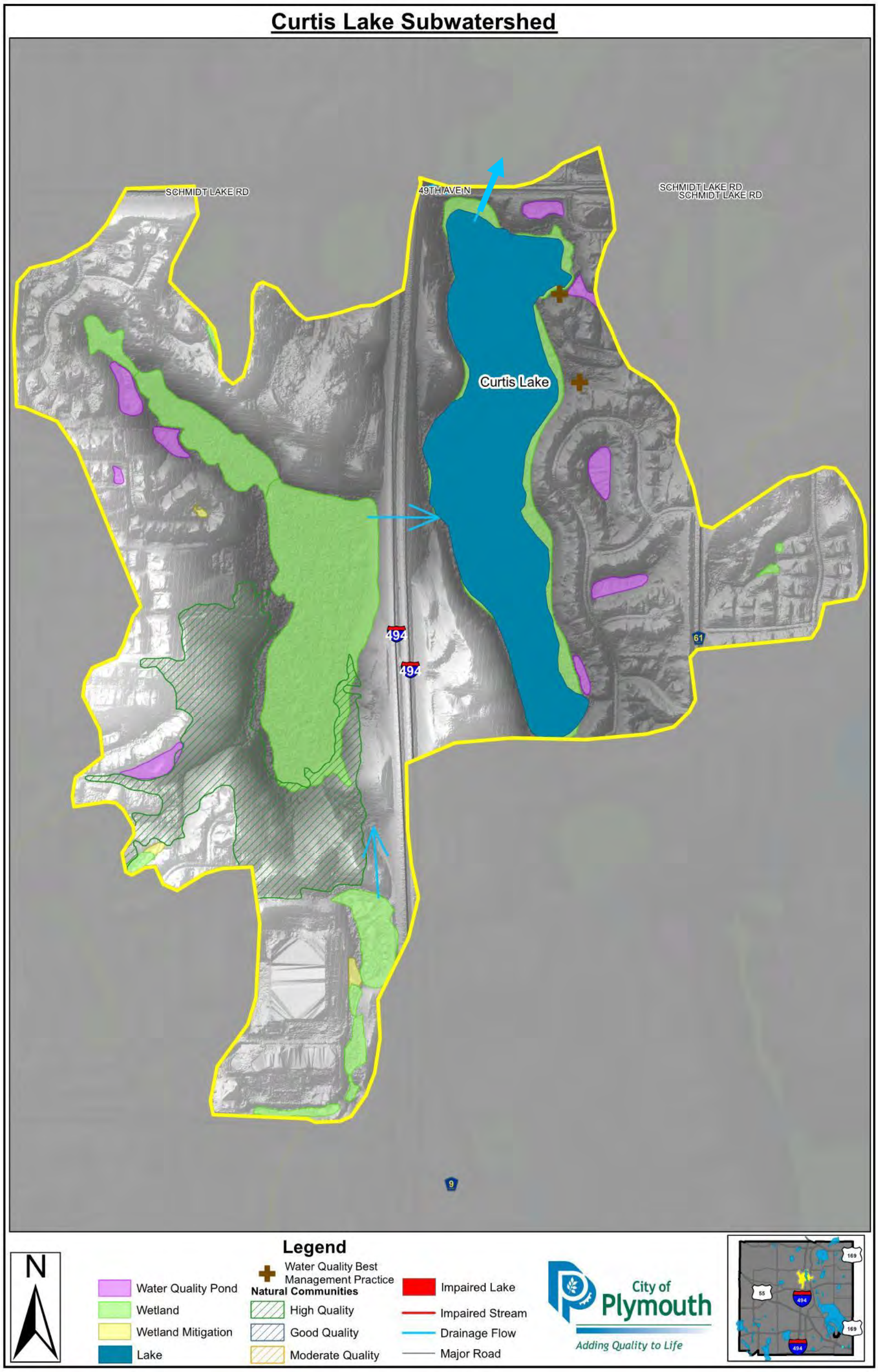
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Creek | |
| Receives runoff from: | N/A | Figure 56 |
| Downstream-most water body: | Bass Lake | Figure 56 |
| Discharges to: | Bass Lake South | Figure 56 |
| Wetlands | 66.9 Acres | Figure 56 |
| Wetland Mitigation | 0.4 Acres | Figure 56 |
| Water Quality Ponding | 4.1 Acres | Figure 56 |

| | | |
|---|---|---|
| Water Quality Best Management Practices | 2 BMPs | Figure 56 |
| Lakes | Curtis – 31.9 acres | Figure 4<br>Figure 56 |
| General Hydrologic Soil Group | C, C/D | |
| Drainage Area | 294.0 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are currently no know water quality impairments within the Curtis Lake Sub-watershed.

Figure 56. Curtis Lake Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the early 2000's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply.

There was one city capital improvement project in this sub-watershed that pre-dated this plan. The Nature Canyon Erosion Repair Project installed storm sewer pipe and drainage swales with rock check dams to reduce erosion and project a high quality oak forest from stormwater runoff before it entered the downstream wetland to the west of Interstate 494.

During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Shingle Creek Watershed, and residents.

Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 88.

**TABLE 88**
**CURTIS LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Curtis Lake Sub-Watershed does not currently have any impaired waters. Water from this sub-watershed drains into Bass Lake and Bass Creek, which are both listed as impaired on the 2018 impaired waters list produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan also includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Lake, Bass Creek and other water bodies within this sub-watershed.

## Schmidt Lake Sub-Watershed

*Physical Land Use Characteristics*

The Schmidt Lake sub-watershed is located in north east Plymouth. The sub-watershed is generally bound by Larch Lane on the west, 50th Avenue on the north, Deerwood Lane on the east and 44th Avenue on the south.

The most significant landmark within this sub-watershed is Schmidt Lake (Figure 16). The land use in this sub-watershed consists primarily of single family residential, with a small amount of park / open space on the north east corner of Schmidt Lake. The sub-watershed was primarily developed in the late 1970's through the 1980's and little to no water quality treatment was installed as part of this development. This sub-watershed contains 1.3 acres of wetland, 0 acres of wetland mitigation, 0.08 acres of water quality ponding and 8 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any natural communities in this sub-watershed.

**TABLE 89**
**SCHMIDT LAKE SUB-WATERSHED CHARACTERISTICS**

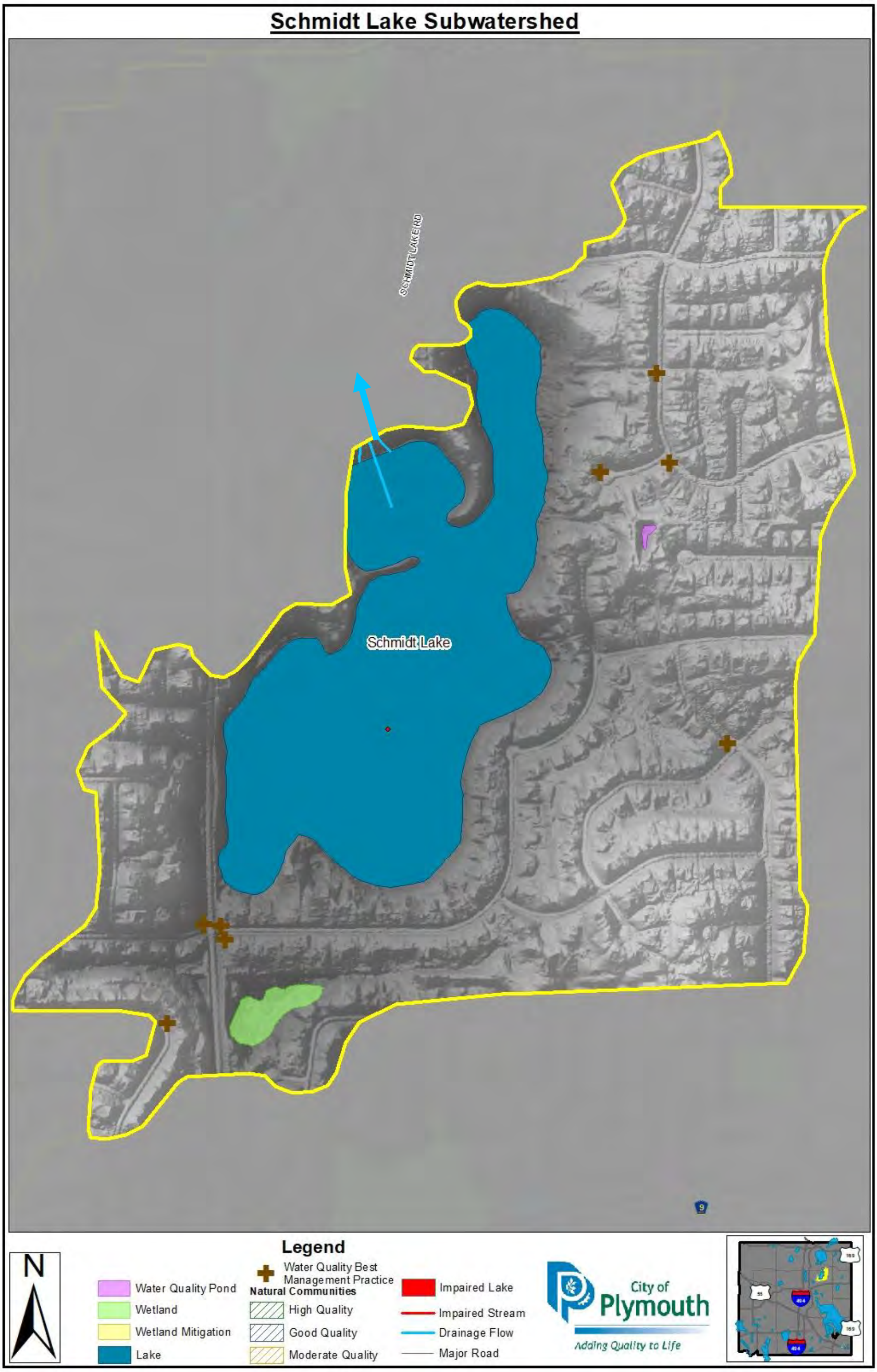
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Creek | |
| Receives runoff from: | N/A | Figure 57 |
| Downstream-most water body: | Bass Lake | Figure 57 |
| Discharges to: | Bass Creek | Figure 57 |
| Wetlands | 1.3 Acres | Figure 57 |
| Wetland Mitigation | 0 Acres | Figure 57 |
| Water Quality Ponding | 0.1 Acres | Figure 57 |
| Water Quality Best Management Practices | 8 BMPs | Figure 57 |
| Lakes | Schmidt – 43.8 | Figure 16<br>Figure 57 |

| | | |
|---|---|---|
| General Hydrologic Soil Group | A, B/D, C, C/D | |
| Drainage Area | 203.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 108) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. This lake has previously been listed as an impaired water for excessive nutrients, a TMDL was completed and the lake was delisted in 2014 due to improved water quality.

Figure 57. Schmidt Lake Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the late 1980's and subsequently does not have much for water quality treatment, additionally, the sub-watershed is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply.

The city has not had any capital improvement projects in this sub-watershed that pre-date this plan. However, sump catch basins have been installed in this sub-watershed as part of street reconstruction projects since 2002 and several rain gardens were installed in cooperation with grant funding from the Metropolitan Council in 2004.

During the course of this plan, the City of Plymouth endeavors to generate partnerships for lake management where there are interested parties to address in-lake issues such as internal nutrient loading, aquatic invasive species management, fish management or other in-lake issues. Partners may include but is not limited to the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, Hennepin County, the Shingle Creek Watershed, and residents.

Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 90.

**TABLE 90**
**SCHMIDT LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Schmidt Lake Sub-Watershed was listed as an impaired lake in 2002, however improvements in the watershed completed by both the City and the active lake association, have led to the lake being delisted in 2014. Water from this sub-watershed drains into Bass Lake and Bass Creek, which are both listed as impaired on the 2016 impaired waters list produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Lake, Bass Creek and other water bodies within this sub-watershed

## Bass Lake South Sub-Watershed

*Physical Land Use Characteristics*

The Bass Lake South sub-watershed is located in north east Plymouth. The sub-watershed is generally bound by Pineview Lane North on the west, the Soo Line Railroad on the north, Forestview Lane North on the east and 48th Avenue North on the south.

The land use in this sub-watershed consists primarily of single family residential, with a small amount of railroad property along the northern border of the sub-watershed. The sub-watershed was primarily developed in the late 1970's through the 1980's and little to no water quality treatment was installed as part of this development. This sub-watershed contains 3.6 acres of wetland, 0 acres of wetland mitigation, 0 acres of water quality ponding and 0 water quality best management practices. The Natural Resources Inventory for Plymouth (2006) does not indicate any natural communities in this sub-watershed.

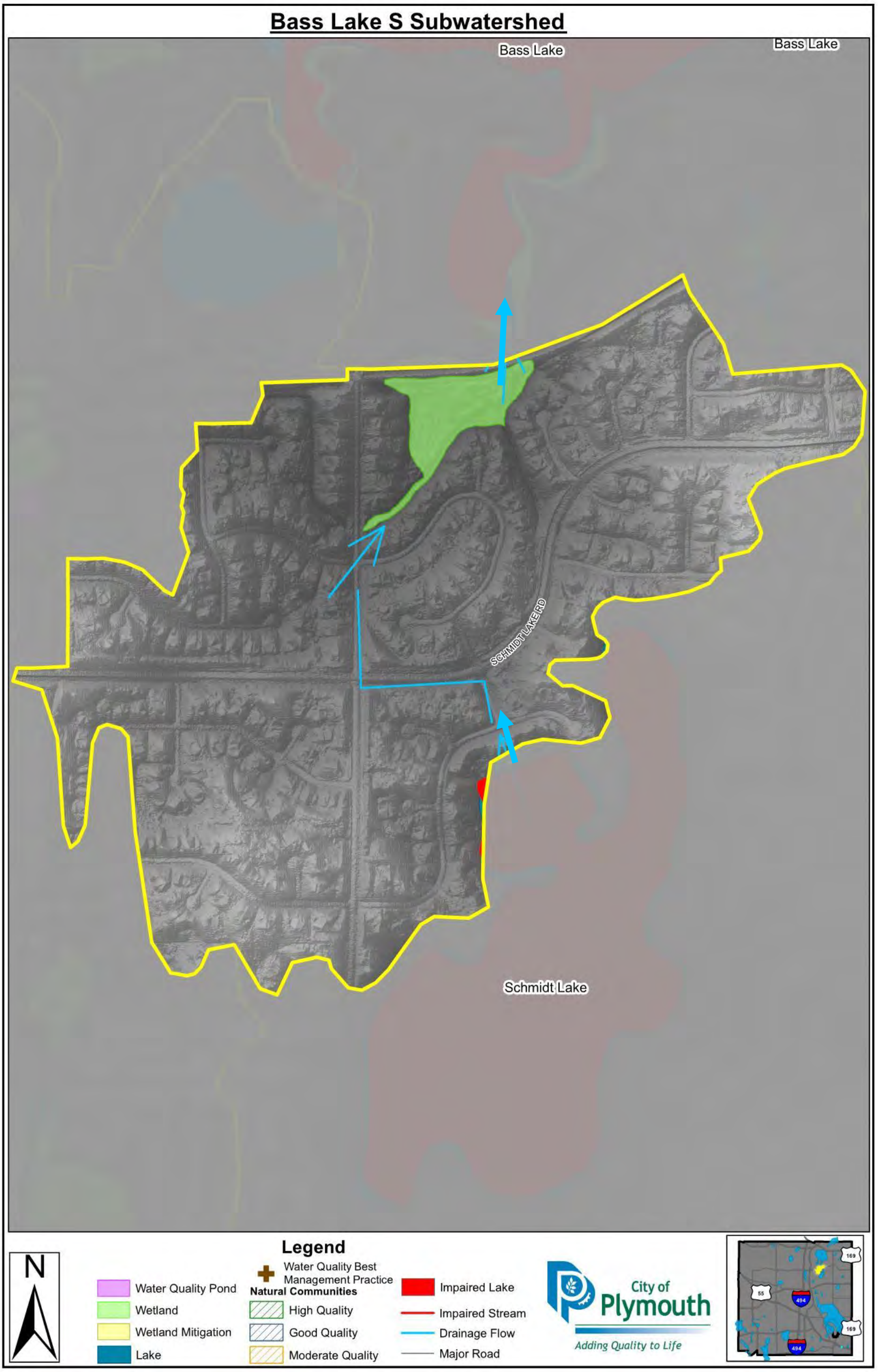
**TABLE 91**
**BASS LAKE SOUTH SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Lake | |
| Receives runoff from: | Schmidt Lake | Figure 58 |
| Downstream-most water body: | Bass Lake | Figure 58 |
| Discharges to: | Bass Lake | Figure 58 |
| Wetlands | 3.6 Acres | Figure 58 |
| Wetland Mitigation | 0 Acres | Figure 58 |
| Water Quality Ponding | 0 Acres | Figure 58 |
| Water Quality Best Management Practices | 0 BMPs | Figure 58 |
| Lakes | N/A | |
| General Hydrologic Soil Group | A | |
| Drainage Area | 245.9 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are no known impairments within the Bass Lake South Sub-watershed.

Figure 58. Bass Lake South Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the late 1980's and subsequently does not have much for water quality treatment, additionally, the sub-watershed is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply.

The city has not had any capital improvement projects in this sub-watershed that pre-date this plan. However, one capital improvement project (Palmer Creek Estates Stream Restoration) is scheduled for 2021-2022. The stream restoration is proposed to restore 1250 linear feet of streambank and will reduce pollutant loading to Bass Lake. Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 92.

**TABLE 92**
**BASS LAKE SOUTH SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Palmer Creek Estates Stream Restoration | 2021-2022 | $450,000 | $450,000 | Plymouth SCWMC |

*Conclusions*

The Bass Lake South Sub-Watershed does not have any impaired waters directly in the sub-watershed. Water from this sub-watershed drains into Bass Lake and Bass Creek, which are both listed as impaired on the 2016 impaired waters list produced by the State of Minnesota. This 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Lake, Bass Creek and other water bodies downstream.

## Bass Lake Northwest Sub-Watershed

*Physical Land Use Characteristics*

The Bass Lake Northwest sub-watershed is located in north central Plymouth. The sub-watershed is generally bound by the Maple Grove Border and Bass Lake Road (County Road 10) on the north, Pineview Lane North on the east, 56th Avenue North on the south and Annapolis Lane North on the west.

The most significant landmarks within this sub-watershed are Interstate 494, County Road 47, Northwest Boulevard (County Road 61) and Bass Lake Road (County Road 10). (Figure 59). The land use in this sub-watershed consists of single family residential, multi-family residential and a business campus. The sub-watershed has a significant amount of open space on the east side of the Interstate 494 corridor north of County Road 47 on the Prudential Business Campus. The majority of the development in this area took place from the late 1980's to the mid 1990's and water quality treatment practices have been installed. This sub-watershed contains 17.2 acres of wetland, 0.0 acres of wetland mitigation, 1.2 acres of water quality ponding, and 0 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) indicates no natural communities in this sub-watershed.

**TABLE 93**
**BASS LAKE NORTHWEST SUB-WATERSHED CHARACTERISTICS**

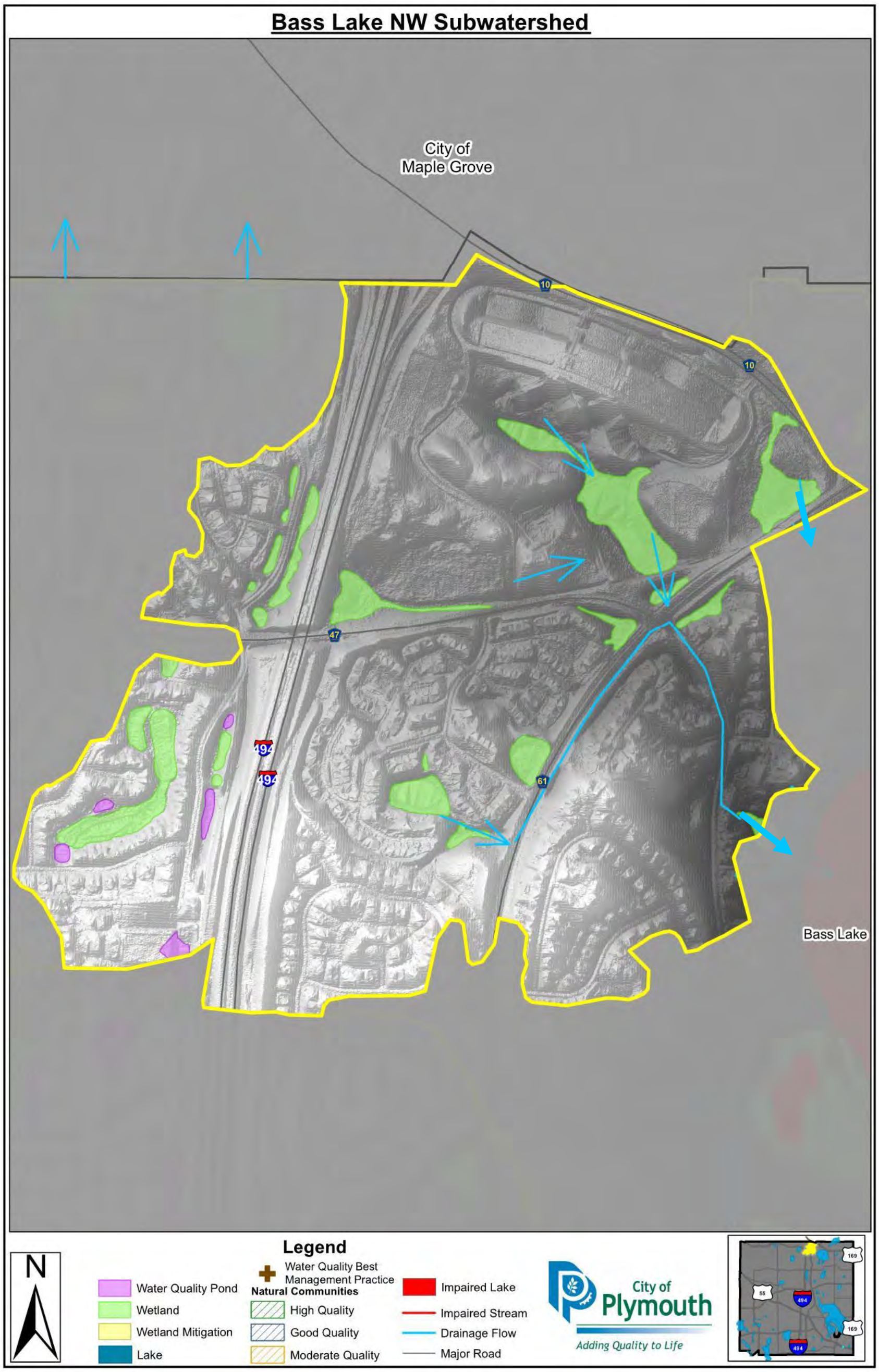
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Lake | |
| Receives runoff from: | N/A | Figure 59 |
| Downstream-most water body: | Bass Lake | Figure 59 |
| Discharges to: | Bass Lake | Figure 59 |
| Wetlands | 17.2 Acres | Figure 59 |

| | | |
|---|---|---|
| Wetland Mitigation | 0.0 Acres | Figure 59 |
| Water Quality Ponding | 1.2 Acres | Figure 59 |
| Water Quality Best Management Practices | 0 BMPs | Figure 59 |
| Lakes | N/A | |
| General Hydrologic Soil Group | C | |
| Drainage Area | 279.9 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are no known water quality impairments within the Bass Lake Northwest Sub-watershed.

Figure 59. Bass Lake Northwest Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the mid 1990's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply.

There have been no city capital improvement projects in this sub-watershed that pre-dated this plan, however, Interstate 494 was reconstructed and expanded from 2 lanes to 3 lanes in each direction in 2015-2016. Water quality treatment practices were installed, however no BMPs were installed within this sub-watershed. Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 94.

**TABLE 94**
**BASS LAKE NORTHWEST SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The Bass Lake Northwest Sub-Watershed does not have any impaired waters directly in the sub-watershed. Water from this sub-watershed drains into Bass Lake and Bass Creek, which are both listed as impaired on the 2016 impaired waters list produced by the State of Minnesota. While the TMDL plans have been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Lake, Bass Creek and other water bodies within this sub-watershed.

## Bass Lake Sub-Watershed

*Physical Land Use Characteristics*

The Bass Lake sub-watershed is located in north east Plymouth. The sub-watershed is generally bound by Northwest Boulevard on the west, Bass Lake Road (County Road 10) on the north, Trenton Lane on the east and 48th Avenue North on the south.

The most significant landmark within this sub-watershed is Bass Lake (Figure 2, Figure 60). The land use in this sub-watershed consists primarily of single family residential, however there are two areas of multi-family and public/open space. The sub-watershed was developed between the late 1950's through the early 2000's and minimal water quality treatment practices were incorporated as part of the development process. This sub-watershed contains 54.1 acres of wetland, 0 acres of wetland mitigation, 2.2 acres of water quality ponding and 4 water quality best management practices. The Natural Resources Inventory for Plymouth (2006) indicated a good quality oak forest mesic subtype in this sub-watershed.

**TABLE 95**
**BASS LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Lake | |
| Receives runoff from: | Bass Lake<br>Northwest<br>Upper Shingle Creek<br>Bass Lake South | Figure 60 |
| Downstream-most water body: | Bass Creek | Figure 60 |
| Discharges to: | Lower Shingle Creek | Figure 60 |
| Wetlands | 54.1 Acres | Figure 60 |
| Wetland Mitigation | 0.0 Acres | Figure 60 |
| Water Quality Ponding | 2.2 Acres | Figure 60 |
| Water Quality Best Management Practices | 4 BMPs | Figure 60 |
| Lakes | Bass Lake – 182.47 | Figure 2<br>Figure 60 |

| | | |
|---|---|---|
| General Hydrologic Soil Group | A | |
| Drainage Area | 679.1 acres | |

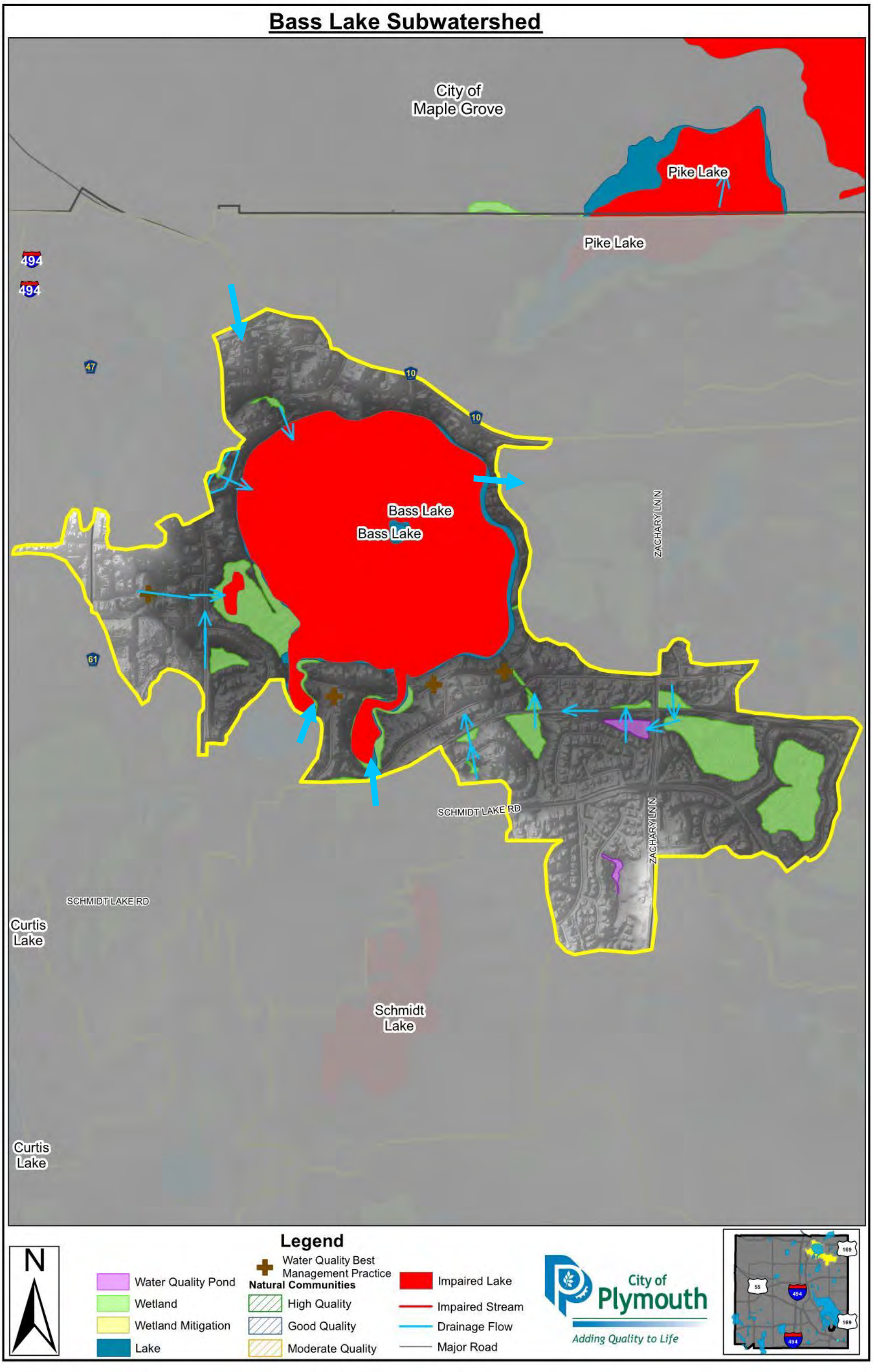
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 96) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 96**
**BASS LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed | Year Delisted |
|---|---|---|---|
| Bass Lake | Excess nutrients | 2002 | N/A |

Figure 60. Bass Lake Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the early 2000's and subsequently does not have much for water quality treatment, additionally, the sub-watershed is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply.

The city has had one capital improvement project in this sub-watershed that pre-dates this plan. The Wild Wings Flood Improvement Project (City Project No. 7135) was completed in the winter of 2010-2011 and improved the flood protection of the wetlands by removing sediments and vegetation that was blocking the natural flow of the water through this wetland system. One city capital improvement project (Wild Wings Western Wetland Improvements) is scheduled for 2020-2021. This project would provide improvement of flow and flood protection near the northeast corner of Zachary Lane and Schmidt Lake Road. One Shingle Creek Watershed Management Organization capital improvement project is also being developed to reduce the internal loading of nutrients in Bass Lake. This project would consist of an alum treatment of the lake sediment and is estimated to reduce the internal loading significantly.

In addition to the projects mentioned above, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 97.

**TABLE 97**
**BASS LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Wild Wings Western Wetland Improvements | 2018-2019 | $225,000 | $225,000 | Plymouth |
| Bass Lake Internal Loading | 2019 | $200,000 | $200,000 | Plymouth SCWMC |
| TMDL Implementation Plan | 2018-2019 | 5,000 | $50,000 | Plymouth |

*Conclusions*

The Bass Lake Sub-Watershed includes Bass Lake, which is an impaired water directly in the sub-watershed. Water from this sub-watershed drains into Bass Creek, which is listed as impaired on the 2016 impaired waters list produced by the State of Minnesota. While the TMDL plans have been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Lake, Bass Creek and other water bodies downstream.

## Pike Lake Sub-Watershed

*Physical Land Use Characteristics*

The Pike Lake sub-watershed is located in northeast Plymouth. The sub-watershed is generally bound by the Maple Grove border on the north, Nathan Lane North on the east, Bass Lake Road (County Road 10) on the south and Quinwood Lane North on the west.

The most significant landmark within this sub-watershed is Pike Lake. (Figure 14, Figure 61). The land use in this sub-watershed consists of single family residential, multi-family residential, commercial and public/institutional. The watershed has a significant amount of undeveloped land directly adjacent to Pike Lake. The majority of the development in this area took place from the mid 1960's to the early 2000's and appropriate water quality treatment practices have been installed as required. This sub-watershed contains 50.8 acres of wetland, 1.9 acres of wetland mitigation, 3.9 acres of water quality ponding, and 2 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any high quality or good quality natural communities in this sub-watershed.

**TABLE 98**
**PIKE LAKE SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Pike Lake | |
| Receives runoff from: | N/A | Figure 61 |
| Downstream-most water body: | Bass Lake | Figure 61 |
| Discharges to: | Bass Lake South | Figure 61 |
| Wetlands | 50.8 Acres | Figure 61 |
| Wetland Mitigation | 1.9 Acres | Figure 61 |
| Water Quality Ponding | 3.9 Acres | Figure 61 |

| | | |
|---|---|---|
| Water Quality Best Management Practices | 2 BMPs | Figure 61 |
| Lakes | Pike Lake – 34.6 | Figure 14<br>Figure 61 |
| General Hydrologic Soil Group | A, C | |
| Drainage Area | 368.2 acres | |

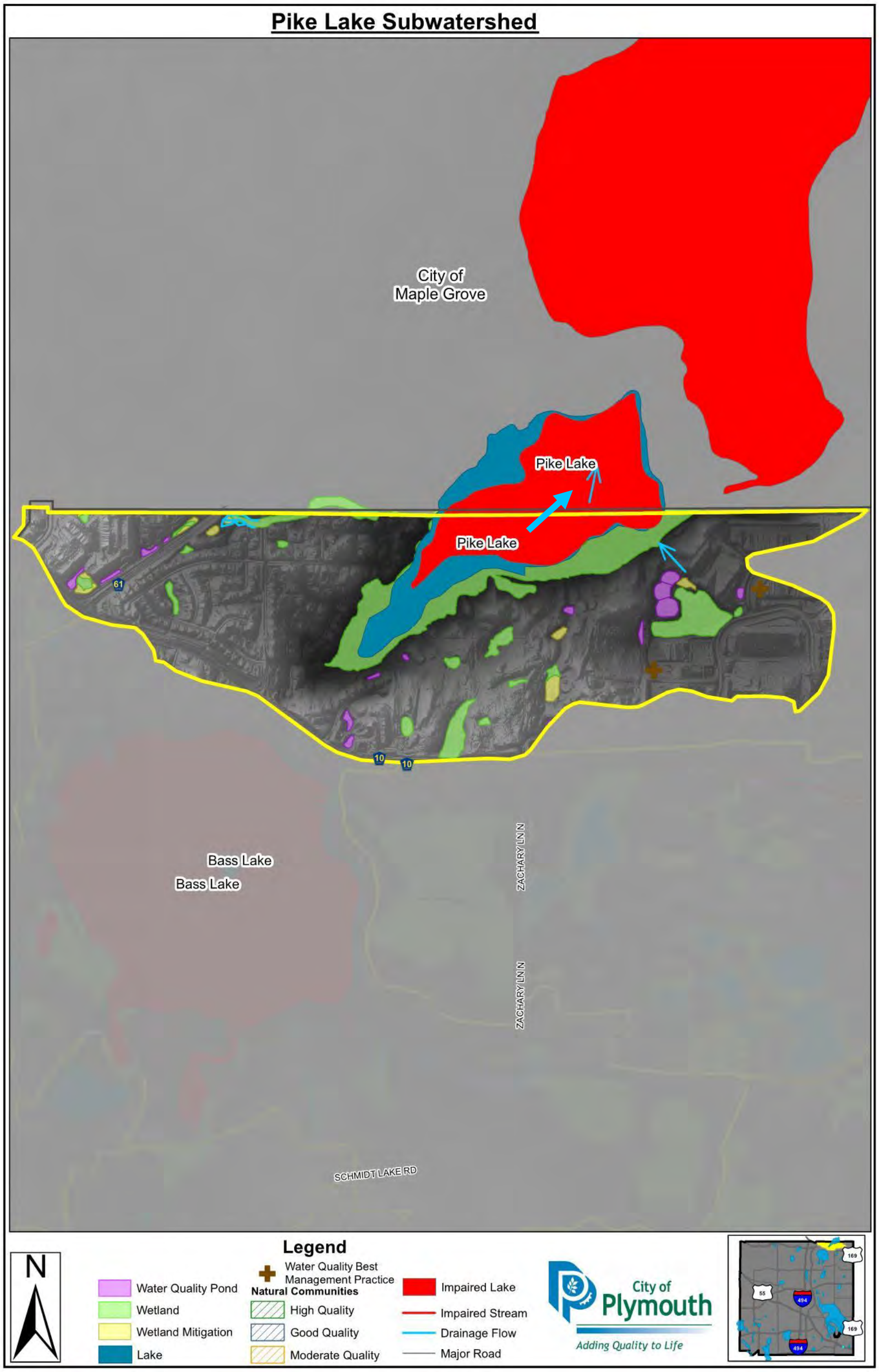
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 99) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 99**
**PIKE LAKE SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Pike Lake | Excess nutrients | 2010 |

Figure 61. Pike Lake Sub-watershed



*Implementation Program*

This sub-watershed has been developed since the early 2000's and is unlikely to undergo redevelopment in the next 10 years. If this area were to redevelop, water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply. The Shingle Creek Watershed Management Organization also completed a sub-watershed assessment of area in 2017. Best management practices identified in this report would be considered as redevelopment or street reconstruction projects occur.

There has been one city capital improvement project in this sub-watershed that pre-dates this plan. The Pike Lake Channel Stabilization Project (City Project 1043) was a cooperative project with the City of Maple Grove between Hemlock Lane and Pike Lake. The project included the installation of a sediment basin in Pike Creek, bank reshaping and gabion structures to help reduce streambank erosion. Maintenance dredging occurred in 2017

In addition to the above mentioned project, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 100.

**TABLE 100**
**PIKE LAKE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Bass Lake Estates Stream Restoration | 2022-2023 | $500,000 | $500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Pike Lake Sub-Watershed has Pike Lake, which is an impaired water directly in the sub-watershed. Water from this sub-watershed drains into Pike Lake and Eagle Lake, which are both listed as impaired on the 2016 impaired waters list produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Pike Lake and other water bodies within this sub-watershed.

## Lower Shingle Creek Sub-Watershed

*Physical Land Use Characteristics*

The Lower Shingle Creek sub-watershed is located in northeast Plymouth. The sub-watershed is generally bound by Bass Lake Road (County Road 10) on the north, US Highway 169 on the east, 52nd Avenue North on the south and Evergreen Lane North on the west.

The most significant landmark within this sub-watershed is Bass Creek. (Figure 62). The land use in this sub-watershed consists of single family residential, multi-family residential, commercial, industrial and public/institutional. The watershed has a significant amount of undeveloped and wetland area on the east and west sides of Zachary Lane and to the east of Union Terrace Lane which will remain undeveloped. This area has undergone steady development since the late 1960's and appropriate water quality treatment practices have been installed as required. This sub-watershed contains 119.7 acres of wetland, 2.4 acres of wetland mitigation, 1.8 acres of water quality ponding, and 6 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any high quality or good quality natural communities in this sub-watershed.

**TABLE 101**
**LOWER SHINGLE CREEK SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Creek | |
| Receives runoff from: | N/A | Figure 62 |
| Downstream-most water body: | Bass Creek | Figure 62 |
| Discharges to: | Shingle Creek Outlet | Figure 62 |
| Wetlands | 119.7 Acres | Figure 62 |
| Wetland Mitigation | 2.4 Acres | Figure 62 |

| | | |
|---|---|---|
| Water Quality Ponding | 1.8 Acres | Figure 62 |
| Water Quality Best Management Practices | 6 BMPs | Figure 62 |
| Lakes | N/A | |
| General Hydrologic Soil Group | A | |
| Drainage Area | 458.9 acres | |

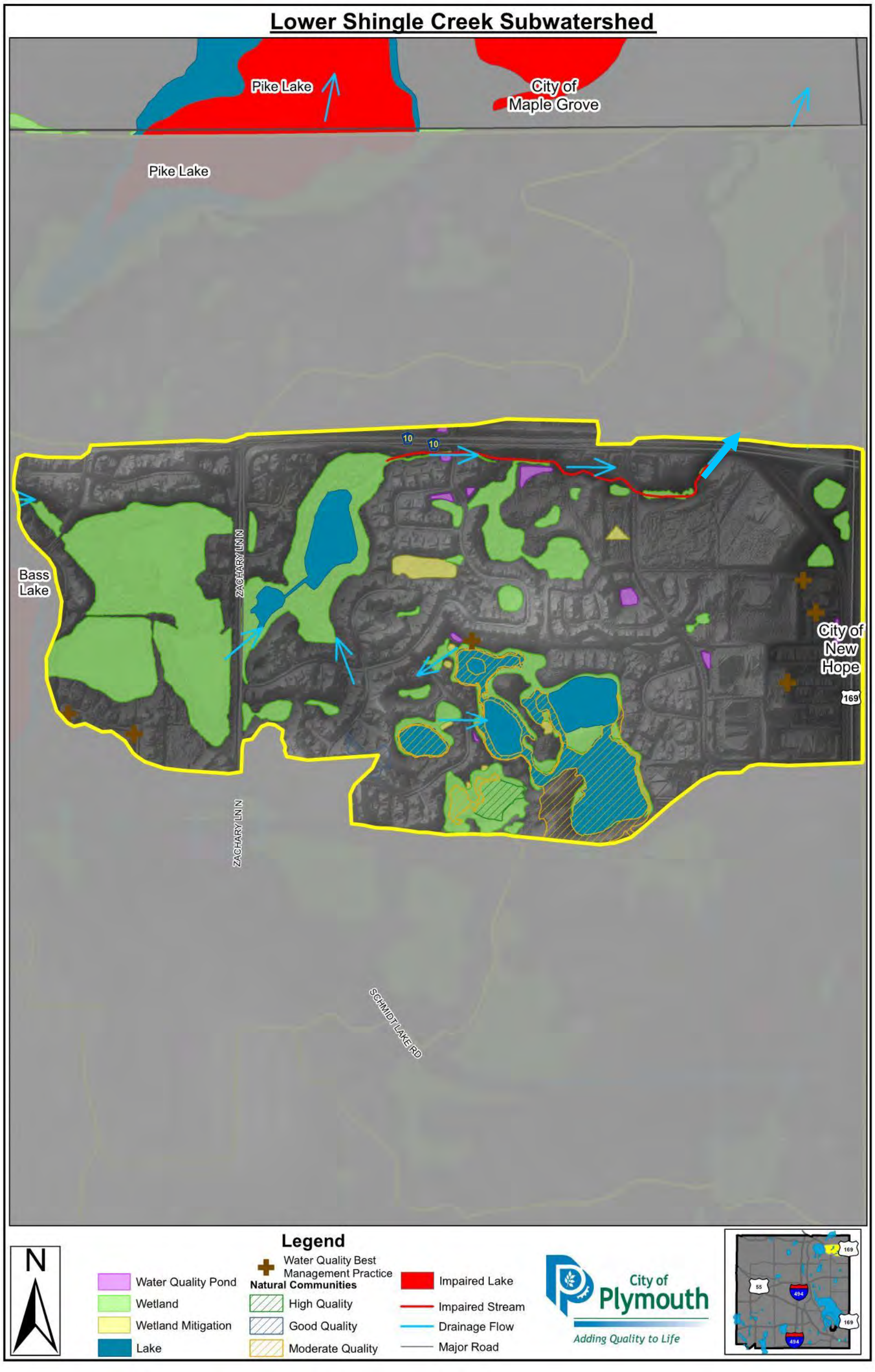
*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 102) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 102**
**LOWER SHINGLE CREEK SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Bass Creek | Chloride | 2010 |
| | Fish bioassessments | 2002 |

Figure 62. Lower Shingle Creek Sub-watershed



*Implementation Program*

This sub-watershed has undergone steady development since the late 1960's and appropriate water quality treatment practices have been installed as required. Future redevelopment of the area east of Nathan Lane North, North of 56th Avenue North, west of US Highway 169 and south of Bass Lake Road (County Road 10) is expected within the next 10 years. Water quantity and quality best management practices as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards would apply as development and redevelopment occurs.

The city has had one capital improvement project within this sub-watershed pre-dating this plan. A drainage improvement project southwest of the intersection of 57th Avenue North and Zachary Lane was completed in 2014. In addition, rain gardens have been installed in this sub-watershed as part of street reconstruction projects since 2006.

Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 103.

**TABLE 103**
**LOWER SHINGLE CREEK SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Lower Shingle Creek Sub-Watershed has Bass Creek, which is an impaired water directly in the sub-watershed. Water from this sub-watershed drains into Bass Creek, which is listed as impaired on the 2016 impaired waters list produced by the State of Minnesota. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Creek and other water bodies within this sub-watershed.

## Shingle Creek Outlet Sub-Watershed

*Physical Land Use Characteristics*

The Shingle Creek Outlet sub-watershed is located in the northeast corner of Plymouth. The sub-watershed is generally bound by the Maple Grove border on the north, US Highway 169 on the east, Bass Lake Road (County Road 10) on the south and Trenton Lane North on the west.

The most significant landmark within this sub-watershed is Bass Creek. (Figure 63). The land use in this sub-watershed consists of commercial, business campus and public/institutional. The watershed has a significant amount of undeveloped and wetland area directly west of US Highway 169 which will remain undeveloped. This area underwent development in the 1990's and appropriate water quality treatment practices have been installed as required. This sub-watershed contains 40.3 acres of wetland, 0.0 acres of wetland mitigation, 0.4 acres of water quality ponding, and 1 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any high quality or good quality natural communities in this sub-watershed.

**TABLE 104**
**SHINGLE CREEK OUTLET SUB-WATERSHED CHARACTERISTICS**

| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Creek | |
| Receives runoff from: | Lower Shingle Creek | Figure 63 |
| Downstream-most water body: | Bass Creek | Figure 63 |
| Discharges to: | New Hope | Figure 63 |
| Wetlands | 40.3 Acres | Figure 63 |
| Wetland Mitigation | 0.0 Acres | Figure 63 |
| Water Quality Ponding | 0.4 Acres | Figure 63 |

| | | |
|---|---|---|
| Water Quality Best Management Practices | 1 BMPs | Figure 63 |
| Lakes | N/A | |
| General Hydrologic Soil Group | A, B/D | |
| Drainage Area | 159.6 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired (Table 105) and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. The City of Plymouth uses these assessments to develop nonstructural, programmatic, and structural solutions to improving the water quality.

**TABLE 105**
**SHINGLE CREEK OUTLET SUB-WATERSHED IMPAIRED WATERS**

| Impaired Waterbody | Impairment(s) | Year Listed |
|---|---|---|
| Bass Creek | Chloride | 2010 |
| | Fish bioassessments | 2002 |

Figure 63. Shingle Creek Outlet Sub-watershed



*Implementation Program*

This sub-watershed underwent development in the 1990's and appropriate water quality treatment practices have been installed as required. Water quantity and quality best management practices would be required as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards if redevelopment occurs.

The city has not had any capital improvement projects in this sub-watershed that pre-date this plan. Additionally, non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 106.

**TABLE 106**
**SHINGLE CREEK OUTLET SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| TMDL Implementation Plan | 2019-2028 | $5,000 | $50,000 | Plymouth |

*Conclusions*

The Shingle Creek Outlet Sub-Watershed has Bass Creek, which is an impaired water, directly in the sub-watershed. While the TMDL plan has been developed, this 10-year Surface Water Management Plan includes a number of nonstructural, programmatic, and structural solutions to improving water quality in Bass Creek and other water bodies within this sub-watershed.

## New Hope Sub-Watershed

*Physical Land Use Characteristics*

The New Hope sub-watershed is located in the northeast corner of Plymouth. The sub-watershed is generally bound by 54th Avenue on the north, US Highway 169 on the east, 48th Avenue on the south and Ximines Lane on the west.

The most significant landmark within this sub-watershed is the intersection of Schmidt Lake Road and US Highway 169. (Figure 64). The land use in this sub-watershed consists of commercial, industrial, single family residential and open space. The watershed has a significant amount of undeveloped and wetland area located throughout the sub-watershed. This sub-watershed area underwent significant development in the 1980's through the 1990's and appropriate water quality treatment practices have been installed as required. More recently, a few remaining vacant parcels in this area has also been developing and newer water quality treatment practices have been installed.

This sub-watershed contains 42.4 acres of wetland, 0.0 acres of wetland mitigation, 2.6 acres of water quality ponding, and 5 water quality best management practices. Examples of Water Quality Best Management Practices could include but is not limited to; rain gardens, infiltration/filtration basins, iron enhanced sand filters, underground storage and pervious pavement. The Natural Resources Inventory for Plymouth (2006) does not indicate any high quality or good quality natural communities in this sub-watershed.

**TABLE 107**
**NEW HOPE SUB-WATERSHED CHARACTERISTICS**

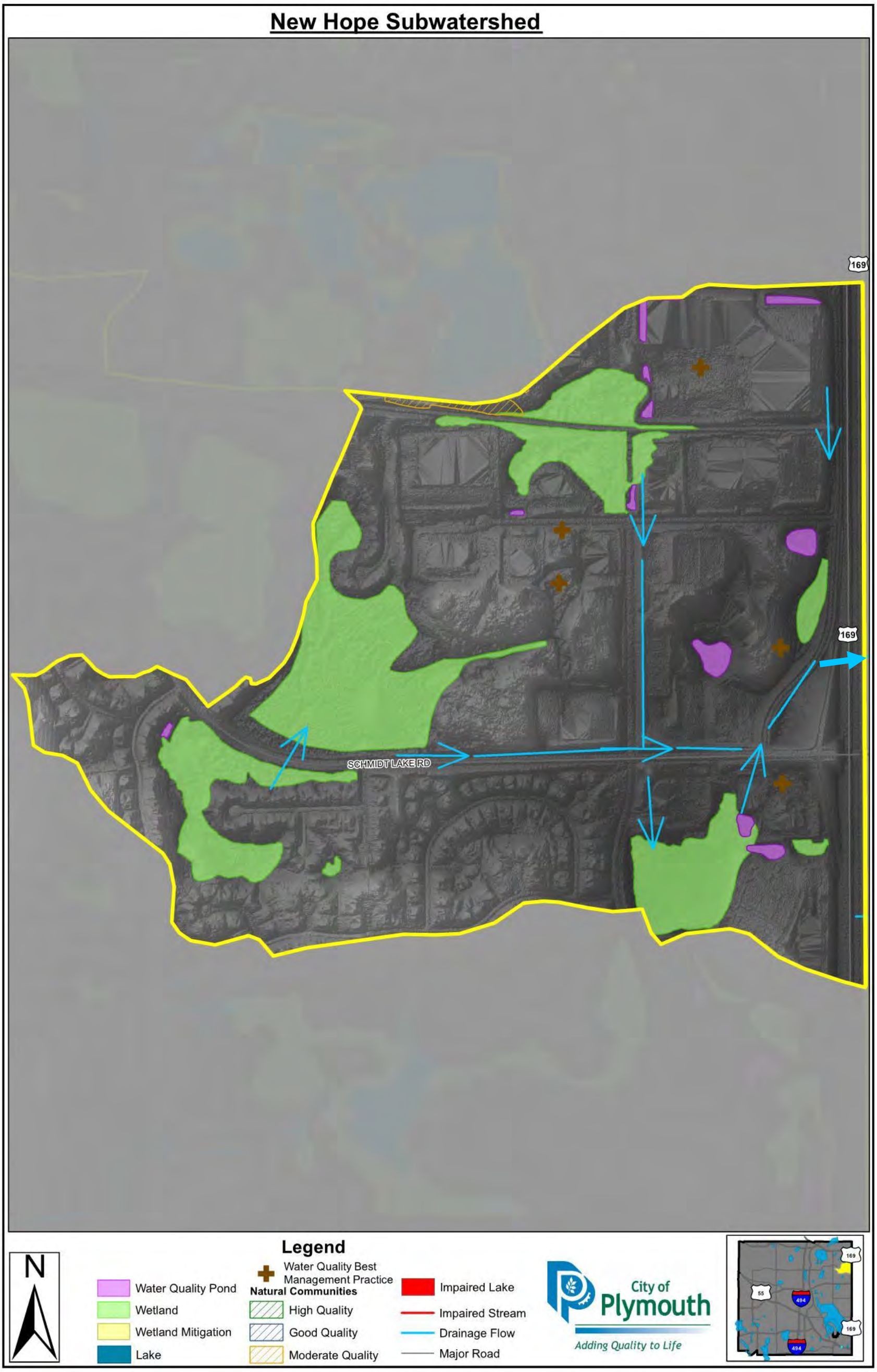
| | Characteristic | Plan Reference |
|---|---|---|
| Watershed | Shingle Creek | |
| Receiving Water | Bass Creek | |
| Receives runoff from: | Lower Shingle Creek | Figure 64 |

| | | |
|---|---|---|
| Downstream-most water body: | Bass Creek | Figure 64 |
| Discharges to: | New Hope | Figure 64 |
| Wetlands | 42.4 Acres | Figure 64 |
| Wetland Mitigation | 0.0 Acres | Figure 64 |
| Water Quality Ponding | 2.6 Acres | Figure 64 |
| Water Quality Best Management Practices | 5 BMPs | Figure 64 |
| Lakes | N/A | |
| General Hydrologic Soil Group | A, B/D | |
| Drainage Area | 276.4 acres | |

*Assessment of Water Resource Related Problems*

The State of Minnesota is required through the federal Clean Water Act to monitor and assess waters to determine if they meet water quality standards and thereby support the beneficial uses they are intended to provide. Waters that do not meet their designated uses because of water quality standard violations are impaired and ultimately a Total Maximum Daily Load (TMDL) will be established at the maximum amount of a pollutant the water body can assimilate before becoming impaired. There are no known water quality impairments within the New Hope Sub-watershed.

Figure 64. New Hope Sub-watershed



*Implementation Program*

This sub-watershed underwent development in the 1980's to the 1990's and appropriate water quality treatment practices have been installed as required. Water quantity and quality best management practices would be required as outlined in the City of Plymouth's Regulatory Program and Shingle Creek Watershed Management Commissions Rules and Standards if development and redevelopment continues to occur as it has in the past 5 years.

The city has no capital improvement projects in this sub-watershed that pre-date this plan. Non-structural, programmatic, and structural solutions to address impairments within or downstream of this sub-watershed are shown in Table 108.

**TABLE 108**
**NEW HOPE SUB-WATERSHED IMPLEMENTATION PROGRAM**

| Implementation Item | Implementation Year(s) | Annual Cost | Total Cost | Funding Source |
|---|---|---|---|---|
| Education | 2019-2028 | $20,000 | $200,000 | Plymouth |
| Regulatory Program | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Street Sweeping | 2019-2028 | $150,000 | $1,500,000 | Plymouth |
| Drainage System Inspections | 2019-2028 | $25,000 | $250,000 | Plymouth |
| Pond Maintenance | 2019-2028 | $150,000 | $1,500,000 | Plymouth |

*Conclusions*

The New Hope Sub-Watershed does not have an impaired water directly in the sub-watershed. The city will continue to implement a number of nonstructural, programmatic, and structural solutions to improving water quality in the water bodies within this sub-watershed.

# APPENDIX B – REGULATORY AND COMPLIANCE PROGRAM

To protect water resources and to address impaired waters, the City has established a regulatory and compliance program consisting of 12 controls including water quantity, water quality, erosion control, wetland, public participation, monitoring, recreation, maintenance, groundwater, and finance. Additionally, the City has goals for shallow lakes, deep lakes, and streams. Stakeholders may be subject to some or all of these controls. These controls were established in accordance with the purposes of the water management programs required by State Statute Sections 103B.201 – 103B.251. Furthermore, they are in conformance with the regulatory programs of the watershed management organizations with some level of jurisdiction in Plymouth including the Bassett Creek, Elm Creek, and Shingle Creek WMOs and the Minnehaha Creek Watershed District.

City policies are indicated for each control of the regulatory and compliance program, followed by requirements to maintain compliance with each policy.

## WATER QUANTITY (FLOOD CONTROL)

Reduce the potential for flooding and minimize related public capital and maintenance expenditures necessary to control excessive volumes and rates of runoff.

- For projects which create over one acre of new or fully reconstructed impervious surface, pre-project flow rates shall be maintained or reduced for the 2, 10, and 100-year storm events.
- NOAA Atlas 14, Volume 8, subsequent updates, or approved equal, be used to calculate precipitation amounts and stormwater runoff rates.
- The City encourages regional detention areas, whenever practical.
- Emergency overflows, outlets to drainage systems or other provisions shall be provided pursuant to the City Engineering Guidelines.
- Encroachment into the flood plain and flood way (volume) below 100-year flood levels shall be prohibited without mitigating action that will preserve

the storage capacity, prevent a surcharge in the flood profile, and minimize excessive velocities.

- The minimum building elevation (lowest floor elevation) for all structures must be two feet above the established 100-year water level in accordance with Plymouth Engineering Guidelines.
- Increased volumes of runoff due to development or redevelopment should be minimized by limiting impervious cover and encouraging infiltration of storm water where soil conditions are appropriate or modifiable.
- The City shall acquire easements covering ponds, wetlands, flood plains, streams, and ditches as part of land development proposals.
- The City shall maintain the drainage system for flood prevention and water flow including excavation, facility management, stream and channel restoration, and removal of debris obstructing water conveyance facilities.
- Stream buffer areas will be regulated as described in the City of Plymouth Zoning Ordinance – Shoreland District.
- The City shall promote disconnection of on-site impervious surfaces to the City's drainage system.
- Residents may obtain the most recent flood mapping and find more information about the Flood Insurance Program in the City of Plymouth Zoning Ordinance – Floodplain Overlay District.

**WATER QUALITY**

The City accepts the Minnesota Pollution Control Agency's Minimal Impact Design Standards (MIDS), or an approved equal as the approved water quality design standard for new, redevelopment and linear projects within the City. MIDS will help to achieve water quality standards and meet Total Maximum Daily Load (TMDL) allocations for shallow and deep lakes, streams and creeks. The City supports the emphasis of MIDS on keeping the raindrop where it falls in order to minimize stormwater runoff, pollution and preserving our natural resources. All best management practices and

site design specifications shall conform to the current version of the Minnesota Stormwater Manual.

- Best management practices shall be designed based on the current version of the Minnesota Stormwater Manual.
- The City shall maintain a response plan to minimize the impact of hazardous spills in accordance with the current version of the Minnesota Pollution Control Agency's MS4 Permit.
- The City shall supplement its regulatory approach with an education-based approach to achieve proper yard care measures that will reduce nutrient loadings to lakes, creeks and wetlands and to reduce the impacts of animal waste.
- The City shall promote the reduction or minimization of impervious areas.
- The City will balance protection of wetlands, use of wetlands to protect the water quality of other water resources (i.e. other wetlands, lakes, streams), and use of wetlands to provide flood control.
- The City will manage its properties in accordance with appropriate and innovative BMPs as an example for its citizens.
- The City requires that NOAA Atlas 14, Volume 8 be used to calculate precipitation amounts and stormwater runoff rates.
- The City will provide plans for best management practices constructed within the City to the BCWMC annually, and upon request.
- The City will collaborate with the BCWMC to determine responsibilities for major rehabilitation and replacement of the Flood Control Project features.
- The City will continue to work towards the chloride reduction goals listed in the Twin Cities Metropolitan Area & applicable creek Chloride Total Maximum Daily Loads.
- The City will collaborate with the Watershed Management Organizations and District to develop policies regarding reductions of E. *coli* and other bacteria to address TMDL impairments.

**EROSION CONTROL**

The City will minimize the loss of soil into wetlands, lakes, streams and creeks through plan review, education, enforcement and management.

- All erosion and sediment control requirements shall conform to the current requirements of the Minnesota Pollution Control Agency's General Permit for Small Municipal Separate Storm Sewer Systems (Permit No. MNR040000), the Minnesota Pollution Control Agency's General Permit for Construction Activity under the National Pollutant Discharge Elimination System / State Disposal System Program (Permit No. MNR10001) and the Minnesota Stormwater Manual.
- Erosion control plans shall be required for grading activities in excess of 50 cubic yards or 10 cubic yards in a shoreland district.
- The City shall continue implementing an erosion control enforcement program for all properties in Plymouth. New, redevelopment and linear projects will receive a higher priority than single family homes.
- The City shall use regulatory measures to control erosion and sediment to extend the effective life of water resource facilities and to reduce pollutant loadings.
- The City will annually report compliance with erosion and sediment control requirements as required by the Minnesota Pollution Control Agency's General Permit for Small Municipal Separate Storm Sewer Systems (Permit No. MNR040000) and the Minnesota Pollution Control Agency's General Permit for Construction Activity under the National Pollutant Discharge Elimination System / State Disposal System Program (Permit No. MNR10001) to the BCWMC annually, and upon request.

**WETLANDS**

The City will provide for wetland protections consistent with State and Federal law and improve the wetland functions and values within the city, where feasible.

- The City shall administer wetland protection and mitigation in accordance with the Minnesota Wetland Conservation Act, as amended, and the City's wetland regulations as described in the City of Plymouth Zoning Ordinance – Wetlands District.
- Wetland Buffers classifications as described in the City Zoning Ordinance – Wetlands District translate according to the following:
    - Exceptional ⟷ Preserve
    - High ⟷ Manage 1
    - Medium ⟷ Manage 2
    - Low ⟷ Manage 3
- Wetlands classified as Preserve are to be inspected annual for invasive vegetation and should be controlled or treated, where feasible.
- Wetland Bounce, Inundation and Runout Control will be regulated as described in the City of Plymouth Zoning Ordinance – Wetlands District
- For development which creates more than 1.0 acres of impervious surface, water quality treatment must be provided prior to discharge to wetlands.
- The City will encourage the use of wetland banking as the primary means to satisfying wetland mitigation requirements.

**PUBLIC PARTICIPATION, INFORMATION, AND EDUCATION**

The City will continue to increase public involvement and knowledge in management and protection of water resources through public participation and education.

- The City will use a public involvement process in resource management decision-making (ex. the Environmental Quality Committee).
- The City will use a variety of media, including newsletters, brochures, local cable television, social media and the City's web site, to inform the community about surface water issues.
- The City will work with existing government and non-government organizations to increase public participation and education in surface water management.

- The City will establish model interpretive sites for public education.
- The City will continue to manage public education grant and rebate programs, including but not limited to, programs for alternative landscapes and water efficiency.
- The City will highlight water quality issues at City sponsored and community events.
- The City will provide speakers and workshops for property owners on shoreline, landscaping and yard care BMPs to protect water quality.

**MONITORING**

The City will continue to support a comprehensive water resources monitoring program to help identify progress towards meeting water quality goals and allocations assigned by Total Maximum Daily Loads (TMDLs). Water Quality parameters include, Total Suspended Solids (TSS), Total Phosphorus (TP), Nitrogen (N), Chloride (Cl) and may include additional parameters.

- The City will conduct in-lake and stormwater flow monitoring programs to develop baseline and long-term water quality records for all city lakes, as well as Bassett, Elm, Plymouth, and Shingle Creeks.
- The City will cooperate with all public agencies to conduct monitoring projects.
- The City will assist with citizen monitoring programs as opportunities arise.

**MAINTENANCE AND INSPECTION**

The City will preserve the function, quantity, and quality of water resource facilities through routine inspections, regular maintenance activities, compliance with MS4 permitting, and administration of the Minnesota Wetland Conservation Act.

- The City will inspect its drainage system to be in compliance with the most recent version of the Minnesota Pollution Control Agency's General Permit for Small Municipal Separate Storm Sewer Systems (Permit No. MNR040000), the City's Pond Maintenance Policy and BCWMC Flood Control Projects.

- The City shall require maintenance of privately owned and operated water quality treatment ponds and water quality best management practices as outlined in any applicable maintenance agreement(s).
- The City shall require adequate access to public and private surface water facilities (ponds, rain gardens, underground storage areas etc.) for inspection and maintenance purposes.
- The City will maintain an inventory of all public and private storm water management facilities as required by the Minnesota Pollution Control Agency's General Permit for Small Municipal Separate Storm Sewer Systems (Permit No. MNR040000) and is available upon request.

**RECREATION, FISH, AND WILDLIFE**

Support water recreation activities and improve fish and wildlife habitat by implementation of programs which will improve water quality.

- Use appropriate BMPs during construction to protect natural areas and wildlife habitat intended for preservation.
- Preserve vegetative buffers around wetlands and riparian areas to provide habitat for wildlife.
- Support programs for controlling exotic and invasive species of plants and animals.
- Design and construct lake outlets to provide a barrier to upstream migration of rough fish whenever practical.
- Balance water recreational activity with water quality and habitat issues.
- Explore new opportunities to integrate surface water-based recreation activities and wildlife interests within wildlife corridors.

**GROUNDWATER**

Prevent contamination of the aquifers and promote groundwater recharge including water conservation practices to maintain base flows in streams.

- The City shall develop and implement controls to protect identified wellhead areas.
- Infiltration practices shall be implemented in accordance with the NPDES General Construction Stormwater Permit, as amended; MIDS, as amended; and the Minnesota Department of Health (MDH) requirements.
- The City shall promote proper well abandonment.
- The City will consider alternatives to conventional storm water detention to enhance groundwater recharge through infiltration.
- Design and installation of on-site wastewater systems shall be in accordance with the standards set forth in Minnesota Rules, Chapter 7080 and the Individual Sewage Treatment System (ISTS) Act.
- The City will implement and enforce the current Water Emergency and Conservation Plan.
- The City shall promote and demonstrate the use of alternative landscape techniques and materials to reduce dependency on groundwater supplies.
- The City will continue to work towards the goals listed in the Shingle Creek and Twin Cities Metropolitan Area Chloride Total Maximum Daily Loads.

**Finance**

Regularly evaluate and monitor funding sources used to finance water resources management activities.

- The City shall continue to help fund surface water management through the surface water utility fee.
- The City will actively pursue grants, donations, in-kind contributions, and watershed resources to help fund surface water management.
- The City shall assist citizens and businesses in their efforts to improve water quality, decrease water quantity and/or improve the functions and values of surface water resources.

## WATER BODY GOALS (LAKES AND STREAMS)

### Shallow Lakes

Shallow lakes are defined as lakes with a maximum depth of 15 feet or less and with 80% or more of the lake area shallow enough to support emergent or submergent rooted aquatic plants (littoral zone). The water quality standards are based on the June 1 to September 30 mean values of water quality monitoring data obtained by MPCA, the City of Plymouth, the watershed management organization (WMO) or any combination of the three units of government.

The goal for all shallow lakes within the City is to have an average total phosphorus concentration of 60 µg/l or less, secchi depths greater than 1 meter and to have chlorophyll-a concentrations below 20 µg/l.

The WMO may have different goals for each lake, however in general, 303d listed lakes will need to work towards meeting the specific goals set forth in the US EPA approved TMDL Implementation Plan. The goal for lakes not listed as a 303d Impaired Water is protection of the resource as to prevent the water body from being listed as impaired in the future.

Shallow Lakes in Plymouth and their US EPA Approved TMDL (as applicable):

**TABLE 109**
**SHALLOW LAKES WITH APPROVED TMDLS**

| Lake | Impairment | TMDL |
|---|---|---|
| Bass | Excess Nutrients | Yes |
| Cavanaugh | None | No |
| Camelot | None | No |
| Curtis | None | No |
| Gleason | Excess Nutrients | Yes |

| | | |
|---|---|---|
| Hidden | None | No |
| Kreatz | Excess Nutrients | Yes |
| Lost | None | No |
| Mooney | Excess Nutrients | Yes |
| Pike | Excess Nutrients, Mercury FCA | Yes |
| Schmidt | Delisted (2014) | Yes |
| Snyder | None | No |
| Turtle | None | No |

**Deep Lakes**

Deep lakes are defined as lakes with maximum depths over 15 feet and as having less than 80% of the lake area as shallow enough to support emergent or submergent rooted aquatic plants (littoral zone) The water quality standards are based on the June 1 to September 30 mean values of water quality monitoring data obtained by MPCA, The City of Plymouth, the WMO or any combination of the three units of government.

The goal for all deep lakes within the City is to have an average total phosphorus concentration of 40 µg/l or less, secchi depths greater than 1.4 meters and to have chlorophyll-a concentrations below 14 µg/l.

The WMO may have different goals for each lake, however in general, 303d listed lakes will need to work towards meeting the specific goals set forth in the US EPA approved TMDL plan. The goal for lakes not listed as a 303d Impaired Water is protection of the resource as to prevent the water body from being listed as impaired in the future.

Deep Lakes in Plymouth and their US EPA Approved TMDL (as applicable):

**TABLE 110**
**DEEP LAKES WITH APPROVED TMDLS**

| Lake | Impairment | TMDL |
|---|---|---|
| Hadley | Excess Nutrients | Yes |
| Medicine | Excess Nutrients, Mercury FCA | Yes |
| Parkers | Chloride, Mercury FCA | Yes |
| Pomerleau | Excess Nutrients | Yes |

## Streams

Streams are important conduits in the water cycle and are instruments in groundwater recharge, and habitat for many aquatic species. Increased rates and volumes of stormwater runoff, resulting from urbanization and other activities, can degrade a stream's hydrology and physical condition. The City shall have water quality goals in streams for E. Coli, dissolved oxygen, chloride, and biotic integrity consistent with State standards.

The WMO may have different goals for each stream, however in general, 303d listed streams will need to work towards meeting the specific goals set forth in the US EPA approved TMDL Implementation Plan. The goal for streams not listed as a 303d Impaired Water is protection of the resource as to prevent the water body from becoming listed as impaired in the future. Streams in Plymouth and their US EPA Approved TMDL (as applicable):

## TABLE 111
## STREAMS WITH APPROVED TMDLS

| Stream | Impairment | TMDL |
|---|---|---|
| Bass Creek | Fish and Macroinvertebrate IBI<br>Chloride | Yes |
| Bassett Creek | Fish and Macroinvertebrate IBI<br>Fecal Coliform[3]<br>Chloride[2] | No |
| Elm Creek | Fish and Macroinvertebrate IBI<br>E. Coli<br>Dissolved Oxygen<br>Chloride[2] | Yes |
| Plymouth Creek | Chloride[2]<br>E. Coli[3] | No |

1 Chloride impairment for Elm Creek and Bassett Creek will be covered as part of the Twin Cities Metro Area Chloride TMDL (MPCA 2015)
2 E. *Coli* and Fecal Coliform impairment are addressed by the *Upper Mississippi River Bacteria TMDL Study and Protection Plan* (MPCA 2014)

## OFFICIAL CONTROLS

Entities currently having some level of administration responsibility within the City of Plymouth include the City of Plymouth, Bassett Creek WMO, Elm Creek WMO, Minnehaha Creek Watershed District, Shingle Creek WMO, Hennepin County, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Minnesota Board of Water and Soil Resources, United States Army Corps of Engineers, and the Metropolitan Council. The City forwards projects to the Bassett Creek, Shingle Creek, Elm Creek WMO's and Minnehaha Creek WD once City staff has performed preliminary review of the project and has determined the project is ready for Watershed Review. Projects that meet the thresholds set by the Bassett Creek (see the BCWMC Requirements for Improvements and Development Proposals, (2017, as amended), Elm Creek and Shingle Creek Watershed Management Organizations or the Minnehaha Creek Watershed District must also meet the water quality rules in place at the time of application. These thresholds are updated by the Watersheds periodically and can be found in City of Plymouth's Post-Construction Water Quality Management Guidance Document. Additional permits or approvals from the Minnesota DNR, United States Army Corps of Engineers, the Board of Soil and Water Resources and as applicable, Minnehaha Creek Watershed District will be needed if wetland or other water body impacts are identified during the planning stages of the project.

The City's responsibilities include, but are not limited to:

- Comprehensive Plan updates;
- Surface Water Management Plan updates;
- Ordinance review and amendment;
- Local plat review and amendments;

- Permits;
- Administration of the State Wetland Conservation Act;
- Groundwater – Wells;
- Financing Alternatives

Plymouth City Code and the Surface Water Management Plan contain the regulatory procedures, mechanisms and protections for surface water management. The regulatory mechanism that is being adopted with the plan, Minimal Impact Design Standards (MIDS), represents the next generation of stormwater management and aims to deliver a higher clean water performance goal through low impact development and other stormwater management approaches. Several of the codes that relate to surface water management are incorporated by reference into this plan and are listed below (Table 8). Updates to City Code or changes to the Surface Water Management Plan may result in a plan amendment.

**TABLE 112**
**OFFICIAL CONTROLS**

| Official Control | City Code |
|---|---|
| Floodplain Overlay District | Chapter 21 – Section 21660 |
| Shoreland Management Overlay District | Chapter 21 – Section 21665 |
| Wetland District | Chapter 21 – Section 21670 |
| Erosion Control | Chapter 4 – Section 425<br>Chapter 5 – Section 526 |
| Storm Drainage Systems | Chapter 7 – Section 725 |
| Natural Preserves | Chapter 8 – Section 811 |
| Preliminary Platting | Chapter 5 – Section 510 |
| Final Platting | Chapter 5 – Section 512 |

The four watershed management organizations (Bassett, Elm, Minnehaha, Shingle) are responsible for:

- Water Quality, Lake, and Stream Monitoring;

- Local plan review and approval;
- Projects of regional significance;
- Education Activities

## APPENDIX C – IMPLEMENTATION PROGRAM

**This Capital Improvement Program is updated annually and subsequent updates to the program can be found here.**

| Project or Program | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|---|---|---|---|
| Chelsea Woods Drainage Improvement (Weston to CR 6) | | | 300,000 | | | | | | | |
| Weston Lane Lift Station Rehabilitation | 75,000 | | 475,000 | | | | | | | |
| Wild Wings Drainage Improvement | | 100,000 | 100,000 | | | | | | | |
| Harbor Place Erosion Repair | | 200,000 | | | | | | | | |
| St. Mary's Addition Drainage Improvement | 125,000 | | | | | | | | | |
| Mengelkochs First Addition Drainage Improvement | 20,000 | 50,000 | | | | | | | | |
| Plum Tree East Drainage Improvement | 20,000 | 250,000 | | | | | | | | |
| Schiebers Addition Erosion Repair | 20,000 | 150,000 | | | | | | | | |
| Elm Creek Stream Restoration (Hwy 55 to Wayzata H.S.) | 663,000 | | | | | | | | | |
| Ivanhoe/Pheasant Hills Drainage Improvement | 100,000 | | | | | | | | | |
| Meadow Wood Drainage Improvement | 250,000 | | | | | | | | | |
| 4th & Zircon Drainage Improvement | 110,000 | | | | | | | | | |
| 19th Avenue and Dunkirk Lane Pond Improvement | 75,000 | 250,000 | | | | | | | | |
| Maple Creek Stream Restoration | | 50,000 | 400,000 | | | | | | | |
| Plymouth Marketplace Drainage Improvement | | 20,000 | 80,000 | | | | | | | |
| County Road 9 / Larch Lane Drainage Improvement | | 75,000 | 100,000 | | | | | | | |
| Courts/Fields of Nantarre Drainage Improvement | | 20,000 | 75,000 | | | | | | | |
| Street Sweeper | | 350,000 | | | | | | | | |
| Palmer Creek Estates Stream Restoration | | | 75,000 | 350,000 | | | | | | |
| Ponderosa Woods Stream Restoration | | | | | 75,000 | | | | | |
| Kingsview Heights Drainage Improvement | | | 25,000 | 125,000 | | | | | | |
| Schmidt Lake Woods Drainage Improvement | | | 50,000 | 200,000 | | | | | | |
| Bass Lake Estates 2nd Addition Stream Restoration | | | | 100,000 | 400,000 | | | | | |
| Water Quality Pond Maintenance | 75,000 | 100,000 | 100,000 | 100,000 | 150,000 | 200,000 | 200,000 | 200,000 | 200,000 | 200,000 |
| Street Sweeping | 175,000 | 175,000 | 175,000 | 175,000 | 175,000 | 175,000 | 175,000 | 175,000 | 175,000 | 175,000 |
| Future Water Resource Improvements | | | 75,000 | 75,000 | 200,000 | 800,000 | 800,000 | 800,000 | 800,000 | 800,000 |
| Education Programing | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| **Total** | **1,728,000** | **2,110,000** | **1,750,000** | **1,145,000** | **1,020,000** | **1,195,000** | **1,195,000** | **1,195,000** | **1,195,000** | **1,195,000** |

## Appendix D - ACRONYMS, ABBREVIATIONS & DEFINITIONS

| | |
|---|---|
| AIS | Aquatic Invasive Species |
| AMLAC | Association of Medicine Lake Area Citizens |
| AUAR | Alternative Urban Area-wide Review |
| BCWMC | Bassett Creek Watershed Management Commission |
| BMPs | Best Management Practices |
| BWSR | Minnesota Board of Water and Soil Resources |
| CAMP | Citizen Assisted Monitoring Program |
| CLMP | Citizen Lake Monitoring Program |
| CFS | Cubic Feet per Second |
| CIP | Capital Improvement Program |
| CLP | Clean Lakes Partnership |
| CWA | Clean Water Act |
| CWF | Clean Water Fund |
| CWP | Clean Water Partnership |
| DEED | Department of Employment and Economic Development |
| DO | Dissolved Oxygen |
| DS | Downstream |
| DUP | Duplicate (sample analyzed for water quality parameters) |
| DWSMA | Drinking Water Supply Management Area |
| EAW | Environmental Assessment Worksheets |
| ECWMC | Elm Creek Watershed Management Commission |
| EIS | Environmental Impact Statement |
| EPT | Ephemeroptera, Plecoptera, and Trichoptera (invertebrate families) |
| EQB | Environmental Quality Board |
| EQIP | Environmental Quality Incentives Program |
| FEMA | Federal Emergency Management Agency |
| FIRM | Flood Insurance Rate Map |
| FIS | Flood Insurance Studies |
| FTO | Flexible Treatment Options |
| GIS | Geographic Information Systems |
| GPS | Geographic Positioning System |
| GWMA | Groundwater Management Areas |
| HBI | Hilsenhoff Biotic Index |
| ICI | Invertebrate Community Index |
| JD | Judicial Ditch |
| JPA | Joint Powers Agreement |

| | |
|---|---|
| LA | Load Allocation |
| LCA | Local Cooperation Agreement |
| LCCMR | Legislative-Citizen Commission on Minnesota Resources |
| LGU | Local Government Unit |
| LOMA | Letter of Map Amendment |
| MCES | Metropolitan Council Environmental Services |
| MCWD | Minnehaha Creek Watershed District |
| MDH | Minnesota Department of Health |
| MDL | Minimum Detection Limit |
| MDNR | Minnesota Department of Natural Resources |
| MIBI | Macroinvertebrate Index of Biological Integrity |
| MIDS | Minimal Impact Design Standards |
| MLCCS | Minnesota Land Cover Classification System |
| MnRAM | Minnesota Rapid Assessment Method |
| MnDOT | Minnesota Department of Transportation |
| MPCA | Minnesota Pollution Control Agency |
| MPRB | Minneapolis Parks and Recreation Board |
| MRL | Minimum Reporting Limit |
| MS4 | Municipal Separate Storm Sewer System |
| MSP | Minneapolis/St. Paul |
| MSW | Mean Stream Width |
| MUSA | Metropolitan Urban Service Area |
| NAPP | National Aerial Photography Program |
| NCDC | National Climatic Data Set |
| NFIP | National Flood Insurance Program |
| NHIS | National Heritage Information System |
| NOAA | National Oceanic and Atmospheric Administration |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NURP | Nationwide Urban Runoff Program |
| NWI | National Wetland Inventory |
| OHWL | Ordinary High Water Level |
| ORP | Oxidation-Reduction Potential |
| ORVW | Outstanding Resource Value Water |
| P8 | Program for Predicting Polluting Particle Passage through Pits, Puddles and Ponds |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCA | Project Cooperation Agreement |
| PWI | Public Waters Inventory |
| RCP | Reinforced Concrete Pipe |
| RPD | Relative Percent Difference |
| RUSS | Remote Underwater Sampling Station |
| SCWMC | Shingle Creek Watershed Management Commission |

| | |
|---|---|
| SDS | State Disposal System |
| SHPO | State Historic Preservation Office |
| SRV | Soil Reference Value |
| SSTS | Individual Sewage Treatment Systems |
| SSURGO | Soil Survey Geographic Dataset maintained by the NRCS |
| SWCS | Soil and Water Conservation Society |
| SWPPP | Storm Water Pollution Prevention Plan |
| TAC | Technical Advisory Committee |
| TEP | Technical Evaluation Panel |
| TIF | Tax Increment Financing |
| TIV | Tolerance Indicator Value |
| TMDL | Total Maximum Daily Load |
| TP | Total Phosphorus |
| TP-40 | Technical Paper Number 40 (Rainfall frequency atlas for the US pre-dating Atlas 14) |
| TRPD | Three Rivers Park District |
| TSI | Trophic State Index |
| TSS | Total Suspended Solids |
| US | Upstream |
| USACE | United States Army Corps of Engineers |
| USEPA | United States Environmental Protection Agency |
| USDA | United States Department of Agriculture |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| VIC | Voluntary Investigation and Cleanup |
| WAVE | Watershed Assessment and Visioning Exercise |
| WCA | Wetland Conservation Act |
| WHEP | Wetland Health Evaluation Program |
| WHPP | Wellhead Protection Plan |
| WLA | Waste Load Allocation |
| WMC | Watershed Management Commission |
| WMO | Watershed Management Organization |
| WMWA | West Metro Watershed Alliance |
| WOMP | Watershed Outlet Monitoring Program |
| WRAPS | Watershed Restoration and Protection Strategy |
| XPSWMM | Storm Water Management Model (interface by XP Solutions) |

CHAPTER 6

# Transportation Plan

# TABLE OF CONTENTS


CHAPTER PURPOSE....1
GOALS AND POLICIES....1
KEY ISSUES....3
ROADWAY SYSTEM....4
Functional Classification....4
Roadway System Improvements....4
*Figure 6-1: Proposed Functional Classification*....5
*Figure 6-2: Identified Major Roadway Improvement Needs*....6
Regional System Improvements....7
County System Improvements....7
Local System Improvements....7
JURISDICTION....8
*TABLE 6-1: Existing (2017) Roadway Miles by Jurisdictional Classification*....8
Access Management....8
*Figure 6-3: Jurisdictional Classification*....10
TRANSIT SYSTEM....11
Key Transit Issues....11
*Figure 6-4: Planned Bus Shoulders*....13
*Figure 6-5: Existing Transit Routes*....14
Transit System Improvements....15
BICYCLE SYSTEM....15
On-Road Bicycle Routes....15
Off-Road Trails on High Volume Roadways....16
Roadway Crossings....16
*Figure 6-6: Major Trail Corridors*....17
AVIATION....18
FUNDING FORECASTS AND REINVESTMENT IN INFRASTRUCTURE....19
Project Development....19
Sources of Funding....19
IMPLEMENTATION....20


# LIST OF APPENDICES


6A TRANSPORTATION CHARACTERISTICS

Chapter 6

# TRANSPORTATION PLAN

## CHAPTER PURPOSE

The Transportation Plan provides the policy and program guidance needed to make appropriate transportation-related decisions when development occurs, when elements of the transportation system need to be upgraded or when transportation problems occur. The Transportation Plan demonstrates how the City of Plymouth will provide for an integrated transportation system that will serve the future needs of its residents and businesses, support the City's development plans and complement the portion of the metropolitan transportation system that lies within the city's boundaries.

There are approximately 388 miles of public roadways in the City of Plymouth, approximately three-quarters of which the City is responsible for operating and maintaining. In addition, the City provides transit service and maintains a system of trails and sidewalks. Maintaining and improving this multi-modal transportation system is important to the ongoing economic health and quality of life of the city. In addition, maintaining and improving the system is needed for people to travel easily and safely to work and other destinations, to develop property and to move goods.

The transportation plan appendix (Appendix 6A) provides additional detail on the individual transportation and transit elements.

## GOALS AND POLICIES

### Provide a high-quality, cost-effective, multi-modal transportation system that provides access to land uses in the city and provides for the safety and efficient movement of people and goods within and through the city and region.

- Treat all modes of transportation and related facilities as one integrated system to be coordinated and developed with other partners and stakeholders.
- Support regional improvements to major transportation facilities to remove bottlenecks and improve safety and traffic flow through the city.

- Promote ridesharing and other travel demand management strategies to help reduce peak hour commuter congestion.
- Require developers to provide the transportation facilities (roadways, transit, and bicycle/pedestrian) needed to support development.
- Where feasible, support on-road facilities on lower volume/lower speed streets (average 400 ADT) that encourage bicycle use for commuting.
- Where feasible, support off-road trails on higher volume/higher speed roadways that encourage bicycle use for commuting.
- Provide pedestrian and bicycle connections among neighborhoods, major activity centers, municipal and regional parks and regional trail systems, and work toward eliminating barriers for pedestrian and bicycle movements at crossings of major trail facilities.
- Support continued rail access to industrial areas to provide options for freight movement.

### Maintain independent high-quality transit services for Plymouth users.

- Provide and support transit services throughout the city to help ensure routes and schedules meet resident and employee needs.
- Promote public participation in transit planning.
- Annually review ridership service levels and per ride costs and make service adjustments where needed to best serve diverse needs.
- Support and promote park-and-ride facilities that are integral to the transit network.
- Integrate transit facilities into land use and other infrastructure to facilitate increased usage.
- Coordinate transit services and infrastructure with other communities and providers to maximize efficiencies and service.

### Enhance safety for users of the transportation system through implementation of best practices, use of design standards, infrastructure maintenance, and enforcement of traffic regulations.

- Restrict and/or limit property access on high-volume roadways and encourage good design/development practices that adhere to access guidelines.
- Discourage pass-through traffic, including non-local truck traffic, on local streets in residential neighborhoods.

- Use best transportation design and maintenance practices.
- Work with law enforcement to address traffic law compliance issues.
- Work toward the elimination of major sources of modal conflict points in the city.
- Limit obstructions to air space where heliports are in place or planned.

### Work to avoid and/or minimize transportation facility impacts on the environment and private property.

- Design roadways and other infrastructure in a manner that is sensitive to the physical, environmental and cultural context in which they are located.
- Promote best management practices in transportation and site design to minimize runoff, erosion and other impacts, and to improve surface water quality.
- Coordinate project development efforts with regulatory and peer agencies.

### Maximize available financial resources to efficiently maintain and improve the transportation system.

- Provide timely reinvestment in essential elements of the transportation system to maintain system functionality and minimize life-cycle cost.
- Use pavement management and other monitoring systems to provide information for making sound investment decisions.
- Seek alternative funding options to leverage local and state aid funds for implementing improvements.
- Balance safety, environmental impacts and cost-effectiveness when making roadway decisions and setting priorities for improvements.

## KEY ISSUES

Specific transportation issues that the City of Plymouth faces include:

- Growing congestion on regional routes such as Highway 55, I-494 and Highway 169, which is causing diversion of traffic to county roads and local streets.
- Expanding traffic and infrastructure needs due to development of northwest Plymouth.
- Changing transportation needs due to an aging population.

- Increasing competition for space between modes (i.e. vehicles and bicycles/pedestrians).
- Streets that are aging, rising reconstruction costs, and limited financial resources, which contribute to a lack of progress on improving infrastructure.

## ROADWAY SYSTEM

The roadway network portion of the transportation system in Plymouth is fairly mature with some additional elements expected to accommodate growth in the northwest part of Plymouth and other additional elements required to respond to congestion, safety, and modal issues. This section of the Transportation Plan addresses the future functional classification system, jurisdictional issues, and future roadway system improvements.

### FUNCTIONAL CLASSIFICATION

Roadway functional classification categories are defined by the role each one plays in serving the flow of trips through the overall roadway system. Within the Twin Cities metropolitan area, the Metropolitan Council has established detailed criteria for roadway functional classifications (refer to Appendix 6A).

The intent of the functional classification system is to create a hierarchy of roads that collect and distribute traffic from neighborhoods to the metropolitan highway system. Roadways with a higher functional classification (arterials) generally provide for longer trips, have more mobility, have limited access and connect larger centers. Roadways with a lower functional classification (collectors and local streets) generally provide for shorter trips, have lower mobility, have more access and provide connection to higher functioning roadways. A balance of all functions of roadways is important to any transportation network. See Figure 6-1.

### ROADWAY SYSTEM IMPROVEMENTS

Major roadway improvement needs are shown on Figure 6-2. They are derived from the combination of future traffic demand, safety, system continuity and connectivity, and the intended function of each roadway as it relates to the adjacent supporting land use. The improvements discussed in this section and shown on Figure 6-2 do not include spot intersection improvements and/or trails.

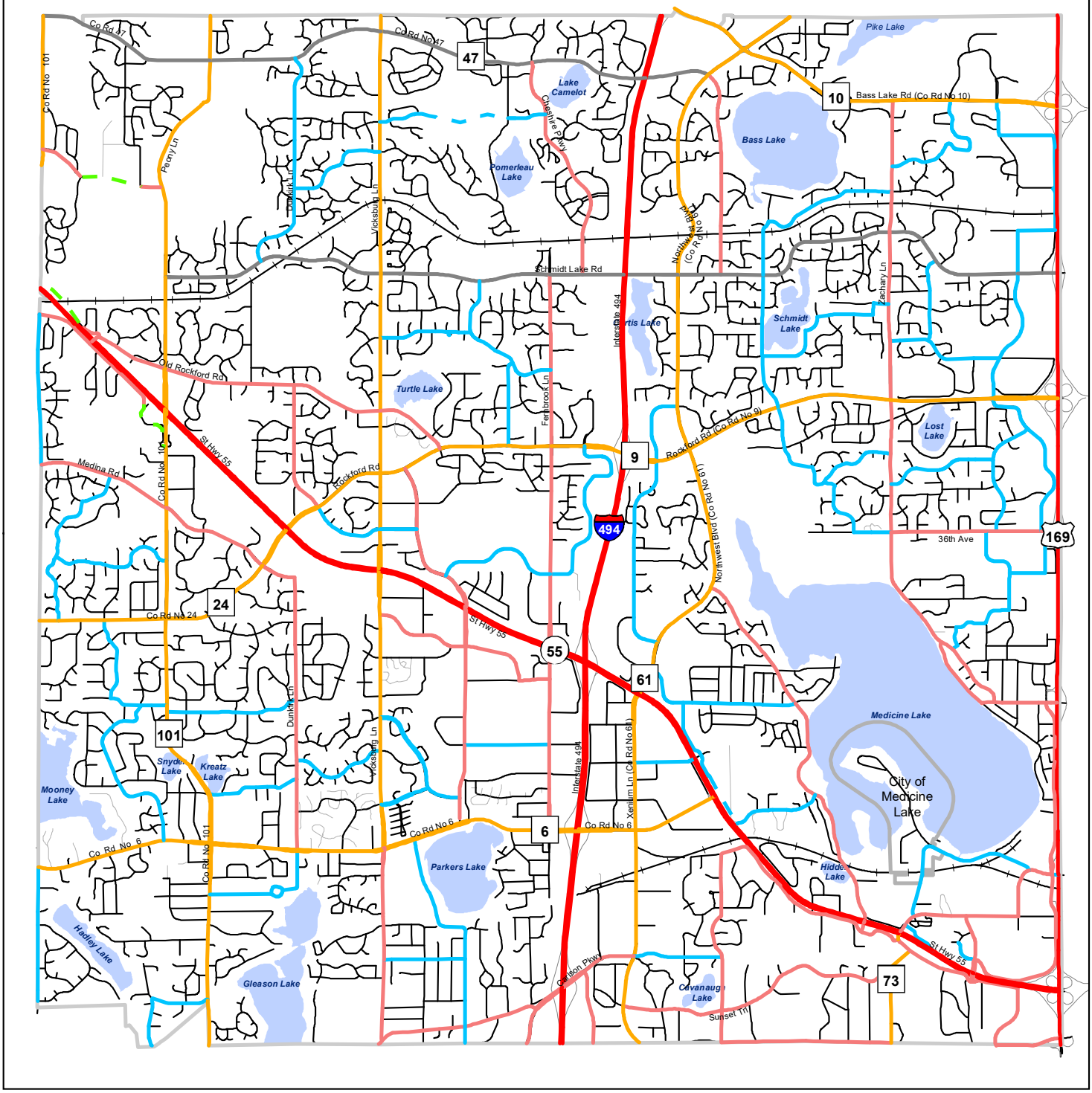



Figure 6-1

# Functional Classification

- Future Major Collector
- Future Minor Collector
- Principal Arterial
- A-Minor Arterial
- Other Arterial
- Major Collector
- Minor Collector

N

City of Plymouth

Source: SRF Consulting, Metropolitan Council, Metro GIS

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Figure 6-2

# Planned Improvements

Bridge Project

Roadway Projects

N

Source: SRF Consulting

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## Regional System Improvements

Plymouth's system plan supports the improvement of Highway 55 from I-494 to its western border, although upgrading this segment of Highway 55 is no longer a MnDOT priority. Other City-identified regional needs include Highway 55 from I-494 to Highway 169 and Highway 169 throughout Plymouth. Currently adopted MnDOT plans likewise do not identify these routes for specific improvements or management strategies.

## County System Improvements

Future capacity improvements will be needed on several Hennepin County roadways within the city. These improvements are not currently programmed. Identified capacity improvements include:

- County State Aid Highway 9 (Rockford Road) in the vicinity of the I-494 interchange – upgrade to a four-lane divided facility with intersection improvements and a widened bridge over I-494;
- County State Aid Highway 73 from Highway 55 to Minnetonka boundary (three-lane);
- County Road 47 from Lawndale Lane to Vicksburg Lane (three-lane);
- County State Aid Highway 24 from County State Aid Highway 101 to west city limits (three-lane);
- County State Aid Highway 6 from Ferndale Road to County State Aid Highway 101 (three-lane);
- County State Aid Highway 61 (Xenium Lane/Northwest Boulevard) – additional turn lanes north and south of Highway 55.

## Local System Improvements

Future improvements will be needed to the following roadways under the City's jurisdiction:

- 57th Avenue from Wood Crest east to Juneau Lane – 57th Avenue serves as an east-west collector through this part of the city.
- 54th Avenue from The Enclave at Elm Creek to Peony Lane.
- 36th Avenue between Highway 169 and Zachary Lane – convert to three lanes when the roadway is milled and overlaid.
- Hamel Road adjacent to Park Nicollet Clinic.

There are additional roadways that may require upgrading prior to 2040. The City will monitor these roadways and add any needed improvements to the City's capital improvements program (CIP).

## JURISDICTION

As with all municipalities, jurisdiction over the roadway system is shared among three levels of government: state, county and city. MnDOT maintains the interstate and trunk highway system on behalf of the state; Hennepin County maintains the county state aid highway (CSAH) and county road (CR) systems, and the remaining streets in the city are the responsibility of the City of Plymouth. The existing jurisdictional classification is shown in Figure 6-3.

The jurisdictional classification system is intended to maintain a balance of responsibility among the agencies. It is organized around the principle that the highest volume, limited access roadways that carry regional trips are primarily maintained by MnDOT, the intermediate volume roadways that carry medium length trips are maintained by Hennepin County, and the local street system that provides access to individual properties is maintained by the city. Occasionally, because of development, changes in traffic patterns, or the construction of new facilities, the jurisdictional classification needs to be adjusted to reflect changes in the way certain roadways are used. County Road 47 and Peony/Lawndale Lanes are roadways that would be reviewed as jurisdictional transfers.

Table 6-1 displays the number of roadway miles in Plymouth by jurisdictional classification.

### TABLE 6-1
### EXISTING (2017) ROADWAY MILES BY JURISDICTIONAL CLASSIFICATION

| Jurisdictional Classification | Miles | Percent of Total Miles |
|---|---|---|
| State | 33.1 | 9% |
| County | 33.3 | 9% |
| Local | 321.5 | 82% |
| Total | 387.9 | 100% |

## ACCESS MANAGEMENT

Control of access to roadways, both in terms of cross-street spacing and driveway placement, is a critical means of preserving or enhancing the efficient operation of the roadway system and improving safety by reducing accident exposure. Access control guidelines are used to preserve the public investment in the roadway system and to give direction to developers for plan preparation. The guidelines balance the public interest (mobility) with the interests of property owners (access). Effective control of driveway access on the entire street system requires cooperation of municipal, county and state officials.

Access management measures include:

- Providing adequate spacing between access points and intersecting streets to separate and reduce conflicts.
- Limiting the number of driveway access points to reduce conflicts.
- Aligning access with other existing access points.
- Sharing access points through internal connectivity between property owners.
- Encouraging indirect access rather than direct access to high volume arterial roads.
- Constructing parallel roads and backage or frontage roads.
- Implementing sight distance guidelines to improve safety.
- Using channelization to manage and control turning movements.

## Access to Principal Arterials

The City of Plymouth will follow metropolitan guidelines for access to principal arterials (see Appendix 6A). These guidelines recommend limiting cross-street access to one-half mile spacing within urbanized areas, with a one-to two-mile spacing being optimal. No new driveway access is permitted to principal arterials.

The City supports consolidation or elimination of direct access to Highway 55 in order to improve the safety and function of this principal arterial. The City will use redevelopment proposals as the avenue to identify and implement alternate access for any parcel that currently has direct access.

## Access to Minor Arterials

The City will follow Hennepin County guidelines for access to the minor arterial system. These guidelines generally call for one-quarter mile spacing of all access points (cross streets and driveways). Plymouth will work with Hennepin County to minimize the number of driveways directly accessing minor arterials in the city.

## Driveway Access on City Streets

Driveways contribute to accidents and reduced traffic flow on major streets in municipalities because they add to the number of locations where vehicle conflicts can occur. Hence, it is desirable to have policies and ordinances in place that:

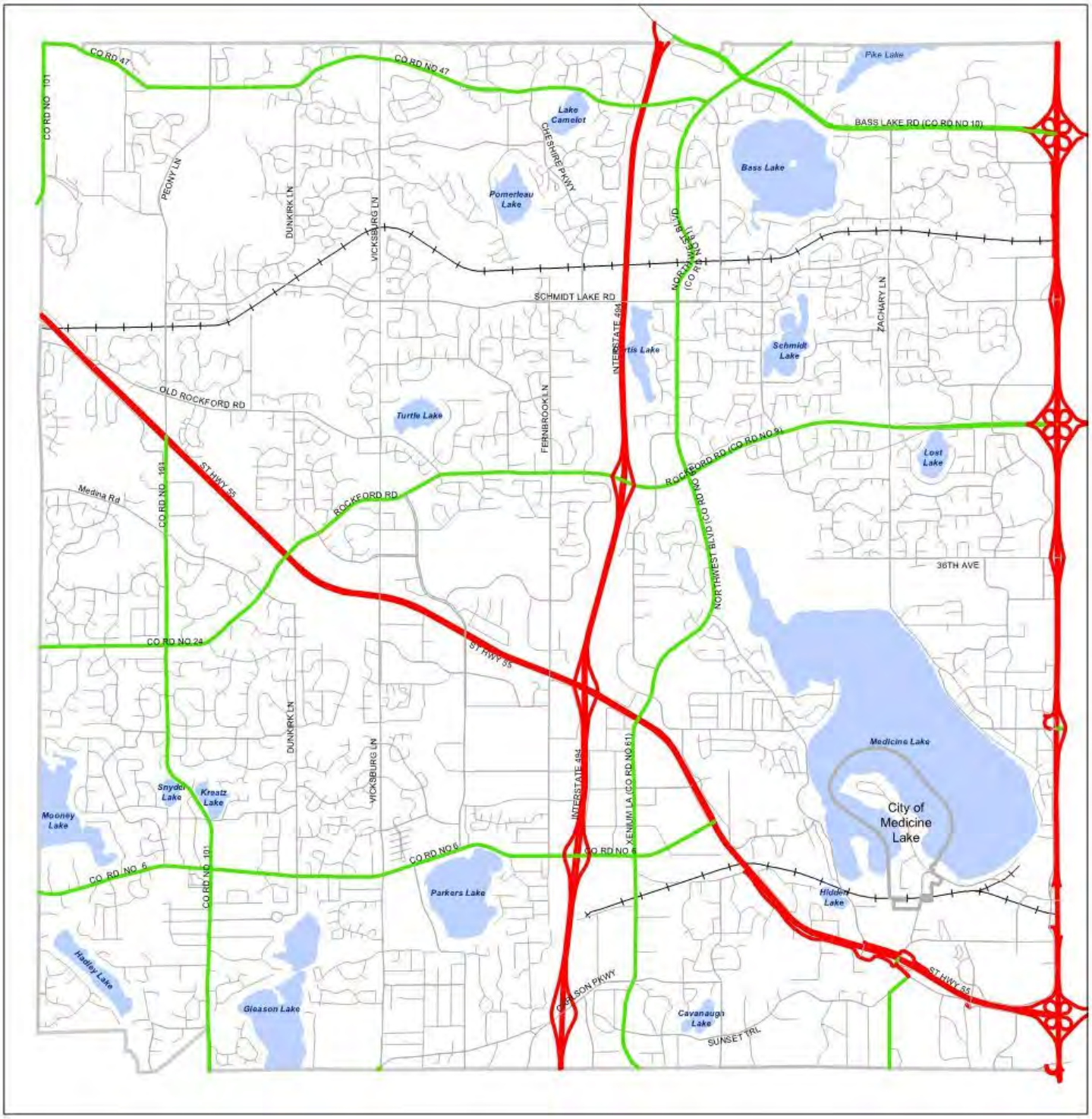



Figure 6-3

# Jurisdictional Classification

**Jurisdictional Classification**

- State Roadways
- County Roadways
- Local Roadways

N

City of Plymouth

Source: SRF Consulting, Metropolitan Council, Hennepin County

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- Limit the number of driveways to those that are actually needed to safely accommodate the traffic generated by each development.
- Provide adequate spacing between driveways so conflicts (and resulting accidents) between vehicles maneuvering at adjacent driveways do not arise.
- Ensure proper design to accommodate driveway traffic and minimize vehicle conflicts without significantly reducing roadway capacity.

The City will consider Hennepin County guidelines for driveway access to major collector roadways. Sometimes topographic features of a particular site or the needs of a particular land use may require special access features in a proposed development. The City will not approve these developments or site changes until a study has been made of the potential impacts on the affected roadways and the adequacy of the proposed access design. The City will require that the following steps be included in the traffic study:

- Estimation of site traffic generation and future non-site traffic;
- Determination of directional distribution of trips;
- Estimation of turning movements at driveways and the resulting level of service;
- Analysis of current and future access requirements; and
- Provision of necessary geometric and operational improvements to safely accommodate the site's access requirements without negative impacts to traffic operation on the adjoining roadways.

## TRANSIT SYSTEM

The City of Plymouth operates an independent transit system under its legislatively permitted status as a suburban transit authority. As part of its transit system, the City provides regular-route express commuter bus service, regular-route scheduled local shuttle bus service and dial-a-ride service. It also operates four park-and-ride facilities and one walk-up bus station. This system plays a significant role in the transportation of Plymouth residents to and from jobs, services, school and activities in the city and surrounding jurisdictions.

### KEY TRANSIT ISSUES

Specific transit issues faced by the City of Plymouth include:

- Continuing to identify a stable and reliable source of funding.

- Increasing demand for transit services, especially express commuter trips. Later bus service is important for non-traditional work schedules, coupled with more trips in the mid-morning following peak morning commute time and night service.
- Need for suburb-to-suburb transit options with sustainable operations and thoughtful implementation.
- Participation in regional transitway development to improve travel time and quality.
- Monitoring the need for service in the northwest part of Plymouth. When density reaches a tipping point, consider the benefits of partnership with the Maple Grove Transit System.
- Continuing to engage the business community to identify changing commuter needs.
- Continuing to monitor bus rapid transit (BRT) studies and transit alternatives along Highway 55 for opportunities to connect service.
- Continuing to assess service performance to improve service where needed and eliminate unproductive trips.

Plymouth is not expected to change from a suburban edge community during this planning period and should continue to maintain a similar level of service in the future.

Currently, planned and constructed transitways do not reach Plymouth. However, as future transitways are completed, more studies will be undertaken to determine if connections to transitway service benefit riders. The construction of transitways may disrupt or change service for some routes that serve Plymouth and should be reviewed periodically.

There are bus shoulder lanes at the present time on Highway 169. Figure 6-4 illustrates current and planned bus shoulder lanes as well as existing and planned MnPASS lanes. Figure 6-5 illustrates the City's existing transit routes.

The City recognizes the close relationship between transportation and land use and actively incorporates all transportation modes into its review of development and redevelopment.

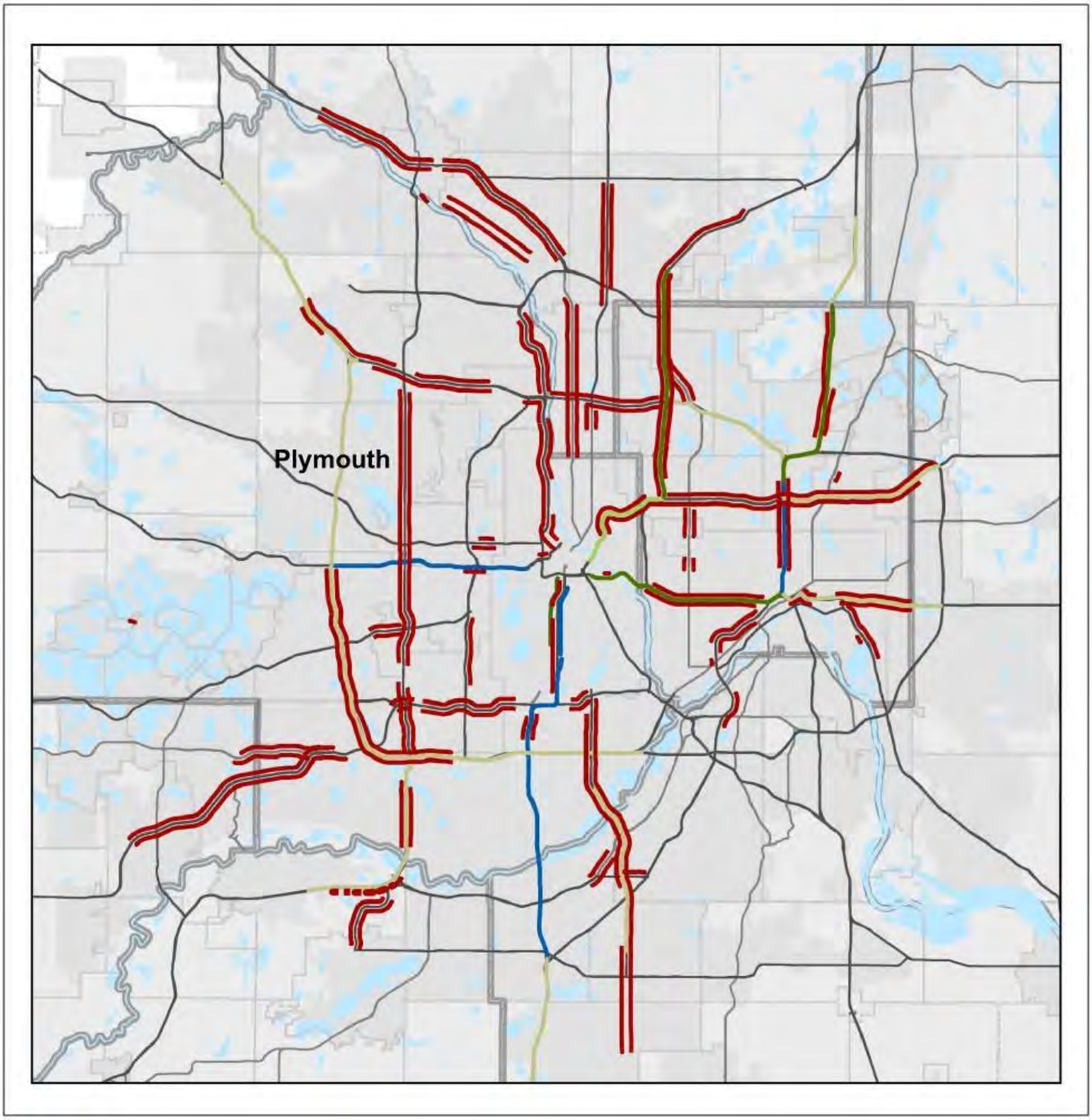



Figure 6-4

## Planned Bus Shoulders

Reference Items

Planned Bus Shoulders

Existing Bus Shoulders

MnPASS *

Existing / Under Construction

Tier 1 MnPASS Expansion

Tier 2 MnPASS Expansion

Tier 3 MnPASS Expansion

* See Highway Investment Direction and Plan for more details

City of Plymouth

As of 11/1/2014

Source: Metropolitan Council
2040 Transportation Policy Plan

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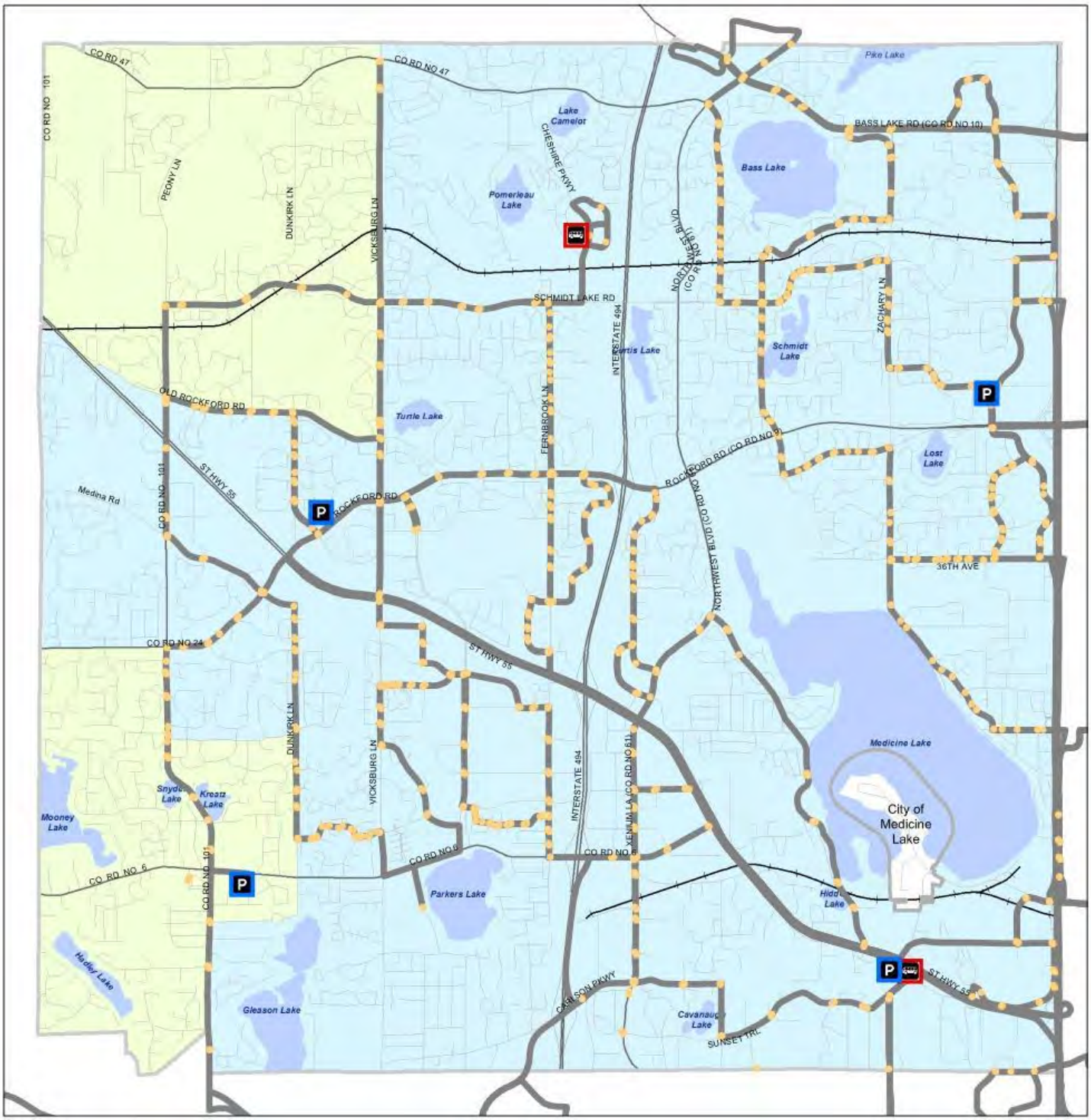



Figure 6-5

# Existing Transit System

As of 12/14/2017

Source: SRF Consulting, Metropolitan Council

Park and Ride
Transit Station
Transit Stops
Transit Routes
Market Area III
Market Area IV
N

City of Plymouth

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### TRANSIT SYSTEM IMPROVEMENTS

Based on a review of the existing transit system and an evaluation of future transit needs, the City will:

- Continue to actively coordinate with adjacent communities and transit service providers on services and facilities.
- Monitor service performance to eliminate low performing trips and allocate resources to where there is service demand.
- Implement improved operating efficiencies in the form of route streamlining, rescheduling, and larger capacity vehicles to contain rising costs.
- Continue to review and plan for additional transit services and facilities where they can be shown to be cost competitive.
- Continue to engage Metro Transit in discussions about regional transit corridors.
- Seek to better integrate transit facilities and services with land use and other infrastructure where appropriate.
- Continually consider possibilities of better locations and partnership agreements for park and ride lots. Partner with local organizations (i.e. churches) that have empty parking lots during weekdays.

## BICYCLE SYSTEM

The plan provides connections to schools, parks, playfields, the Northwest Greenway, and transit facilities as well as existing and proposed regional and state trails. This section of the Transportation Plan focuses on the on-street and off-street trail corridors that serve as transportation routes for commuter bicyclists. The pedestrian and recreational trail system is covered in the Parks, Trails, Open Space and Recreation Plan (Chapter 7). On-road bikeway design standards are also found in the parks plan (Appendix 7A).

### ON-ROAD BICYCLE ROUTES

The City will take an incremental approach to developing an on-road bikeway network. When road construction projects or significant citizen interest arises, the City will evaluate proposed routes on a case-by-case basis to determine the feasibility of implementing an on-road facility. Options and design criteria will include bicycle lane compliant (potentially protected), road shoulder compliant or no designated facilities. The criteria for determining the feasibility of implementing an on-road facility may include roadway traffic volume and design speed, the need for on-street parking, directness of route and cost/benefit analysis.

## OFF-ROAD TRAILS ON HIGH VOLUME ROADWAYS

Certain roadways in Plymouth may pose a safety hazard for pedestrians and bicyclists due to high traffic volumes and speed, number of lanes or other features. These roadways may be considered for trails on both sides in order to provide safe access to the trail system from residences and commercial uses. Figure 6-6 shows the major trail corridors in Plymouth:

- Peony Lane/County State Aid Highway 101
- Vicksburg Lane
- Fernbrook Lane
- Cheshire Lane
- Northwest Boulevard (County State Aid Highway 61)
- Zachary Lane north of 36th Avenue
- County Road 47
- Bass Lake Road (County State Aid Highway 10)
- Schmidt Lake Road
- Rockford Road (County State Aid Highway 9)
- County State Aid Highway 6

## ROADWAY CROSSINGS

Plymouth is cut into quadrants by two major thoroughfares, Highway 55 and I-494. It is also separated from communities to the east by Highway 169. These highways are major obstacles and barriers in the trail system because: bridges are often not pedestrian or bicycle friendly; underpasses do not impart a feeling of safety; and at-grade crossings put pedestrians and bicyclists in conflict with heavy and fast-moving traffic. Pedestrian concern also occurs where two high volume local roadways intersect. Crossings of all these barriers should be improved to better accommodate safe pedestrian and bicycle crossings.

Options for overcoming barriers created by high volume roadways and dangerous intersections include:

- **Grade Separation:** Pedestrian/bicycle bridges or underpasses, expansion of vehicular bridges or underpasses to accommodate bicycles/ pedestrians.

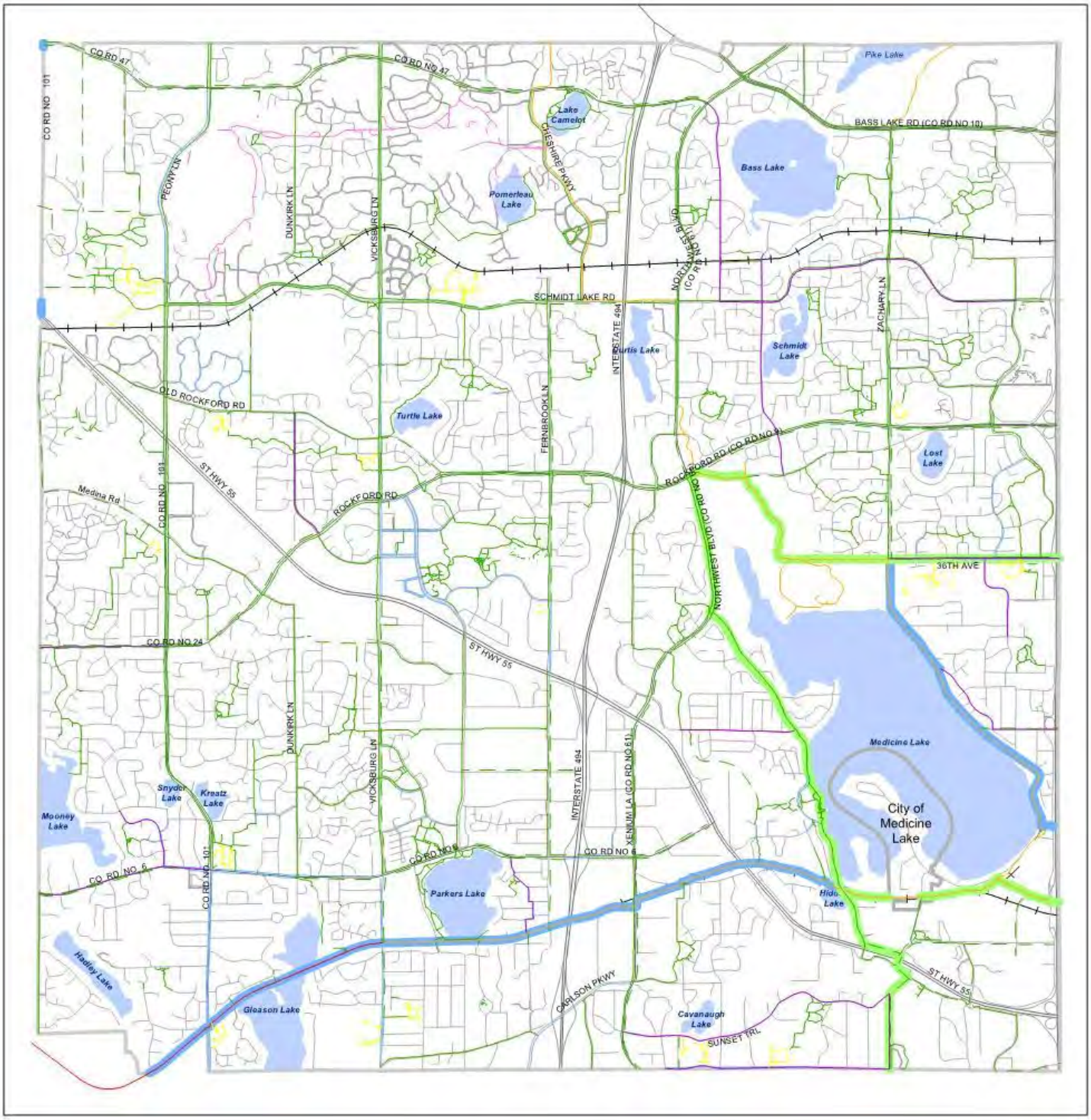



Figure 6-6

# Existing and Planned Sidewalk and Trail System

As of 12/14/2017

Source: SRF Consulting
Metropolitan Council

City of Plymouth

RBTN Tier 1 Alignment
RBTN Tier 2 Alignment
City Sidewalk
City Trail
Minnesota DNR State Trail
Northwest Greenway Trail
On-Road Bike Route
Private Trail
Proposed City Trail
Proposed NW Greenway Trail
School Trail
Three Rivers Park Regional Trail

N

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- **Improved Signalization:** Stoplights/signs for pedestrian/bicycle crossings, pedestrian-only phase at major intersections, advanced pedestrian signals (the pedestrian "jump" signal), pedestrian push buttons in the median (two-step crossing), warning signage or lights to alert vehicles of pedestrian crossing.
- **Intersection/Roadway Reconstruction:** Removal of free right turns, widened medians for pedestrian safety, reconstruction of roadways, driveways and curb lines in commercial areas to restrict the number of access points, installing crosswalks, enhancing crosswalks if conditions warrant, traffic calming measures, such as neckdowns and bumpouts.

## AVIATION

The City of Plymouth's role in the provision of air transportation in the metropolitan area is to ensure that structures of significant height are compatible with air traffic. There are no airports located within the city. Seaplane operations are permitted on Medicine Lake and Schmidt Lake. The City allows heliports in business and institutional districts by conditional use permit. Private heliports are located at:

- Prudential Insurance Company
- Advance Machine Company
- Private residence on Schmidt Lake

According to both Federal Aviation Administration (FAA) and MnDOT aeronautics safety standards, any applicant who proposes to construct a structure 200 feet above the ground level must obtain appropriate approval by submitting FAA Form 7460-1 "Notice of Proposed Construction or Alteration," under Code of Federal Regulations Part 77. These forms must be submitted 30 days before alteration/construction begins or the construction permit is filed, whichever is earlier. MnDOT must also be notified (see MnDOT Rules Chapter 8800).

Federal Regulation Title 14, Part 77 establishes standards and notification requirements for objects affecting navigable airspace. The notification process provides a basis for:

- Evaluating the effect of the construction or alteration on operating procedures;
- Determining the potential hazardous effect of the proposed construction on air navigation;

- Identifying mitigation measures to enhance safe air navigation; and
- Charting of new objects.

Existing obstructions (200 feet or more in height) to air navigation in Plymouth include the self-supporting microwave tower in the Minneapolis Industrial Park at 13300 15th Avenue and the public safety communication tower at the Adult Correctional Facility at 1145 Shenandoah Lane. The microwave tower is 310 feet high and was approved by the FAA in 1972. The public safety communication tower is 350 feet high and was approved by the FAA in 1998.

The City permits microwave towers and radio and television broadcasting towers in areas guided industrial or public/semi-public/institutional. The City will notify the MnDOT Aeronautics Division and the Metropolitan Council when proposed structures are 200 feet or more in height.

## FUNDING FORECASTS AND REINVESTMENT IN INFRASTRUCTURE

### PROJECT DEVELOPMENT

The Transportation Plan is intended to review transportation needs at a policy level and does not make recommendations for design. Each recommended improvement should be studied in greater detail, through an engineering study, to verify the need and to identify the exact nature of the improvement. The ultimate cost and schedule of individual projects will be developed through the design process and considered in updates to the City's CIP.

### SOURCES OF FUNDING

A multi-faceted investment strategy will be required to narrow the potential future funding gap if necessary transportation system improvements are to be implemented. Investment strategies for major future infrastructure improvements have been grouped into three categories: agency or inter-jurisdictional sources; external private sources; and internal local sources. Generally, the probability of funding and level of local control over allocation of funds is highest with the internal local sources and lowest with other agency or private sources.

- **Agency or Inter-jurisdictional Sources**: Examples of agency or inter-jurisdictional sources of transportation funding include cooperative agreements, federal surface transportation (STP), state bonding or federal earmarks or High Priority Projects, and various grant programs. By their nature, these sources of funding usually require the City to seek assistance from another level of

government in a competitive process. In addition, many of the programs have extensive or restrictive qualifying criteria. The City will continue to seek these special sources of funding.

- **Private Sources:** Specific examples of private participation include site specific or general city-wide negotiated developer contributions and third party agreements between private parties and multiple jurisdictions.
- **Internal Local Sources:** Specific examples of internal funding opportunities include various types of city bonding with property tax payback, special assessments, ad valorem taxes, tax incremental financing (TIF), and special fees.

Appendix 6A presents a detailed description of the potential funding sources that are anticipated to play a role in financing future transportation improvements.

## IMPLEMENTATION

| *Description* | *Timing* |
|---|---|
| **Subdivision and Zoning Regulations** (Chapters 5 and 21, Plymouth City Code) – Consider amendments to address the following specific issues identifies by the Transportation Plan:<br>• Guidelines for multi-family, commercial and industrial areas to encourage design compatible with transit use and pedestrian access;<br>• Incorporating transit access into mixed-use developments and mixed-use residential developments; and<br>• Design within public rights-of-way to enhance pedestrian, transit, and bicycle access and safety. | Short |
| **Programmed Roadway Improvements** – Construct roadway and traffic control improvements needed to serve the existing developed area of the city, as identified in the current CIP. | Short |

| *Description* | *Timing* |
|---|---|
| **Future City Roadway Projects –** Monitor the need for the following improvements to city roadways not currently programmed, but projected to be needed prior to 2040:<br>• Highway 55 Frontage Roads – Connect with the property on the north side and with County State Aid Highway 101 and Hamel Road on the south side;<br>• Collector roadways – Provide to serve development in the northwest part of Plymouth; and<br>• Intersection improvements (traffic signals or roundabouts). | Ongoing |
| **Future County Roadway Improvements** – Monitor the need and work with Hennepin County to obtain improvements to county roads not currently programmed:<br>• County State Aid Highway 9 at I-494;<br>• County State Aid Highway 73 from Highway 55 to Minnetonka boundary;<br>• County State Aid Highway 24 from County State Aid Highway 101 to west city limit;<br>• County State Aid Highway 6 from County State Aid Highway 101 to west city limit;<br>• County State Aid Highway 61 (Xenium Lane) south of Highway 55; and<br>• County State Aid Highway 61 (Northwest Boulevard) north of Highway 55. | Ongoing |
| **Future Improvement to County Road 47** – Undertake a study of needed improvements with affected stakeholders, including residents, Hennepin County, Corcoran, Maple Grove and Medina. | Short |

| *Description* | *Timing* |
|---|---|
| **Highway 55 Improvements –**Work with MnDOT and Hennepin County to advance preliminary efforts required for expansion of Highway 55. Cooperate with MnDOT and encourage efforts to manage access along the Highway 55 corridor and to improve capacity through the use of intelligent transportation system (ITS) strategies. When intersection and other roadway improvements are proposed by MnDOT, work to ensure that pedestrian needs are accommodated. | Ongoing |
| **Highway 169 Improvements –** Encourage MnDOT to make improvements, such as construction of additional lanes and interchange reconstruction. | Ongoing |
| **Ramp Meters and HOV Bypass Lanes –** Work with MnDOT and Metro Transit to construct ramp meter bypass lanes at the remaining interchanges on Highway 169 where right-of-way is available and/or HOV use warrants. | Ongoing |
| **Ramp-Meter Storage Capacity –** Work with MnDOT and Hennepin County to ensure adequate vehicle storage is provided for waiting vehicles**.** | Medium |
| **Street Reconstruction Program –** Continue the City's pavement management and street reconstruction and maintenance program, including overlaying and complete reconstruction.<br>• Traffic Control Devices – Continuously monitor the need for new traffic control devices and:<br>• Consider installation of new traffic signals or roundabouts on a site-by-site basis when warrants are met and funding is available; and<br>• Use adopted criteria and procedures to evaluate the need for stop signs. | Ongoing |

| *Description* | *Timing* |
|---|---|
| **Traffic Calming –** Use traffic calming techniques on lower-volume local and minor collector streets where excessive speeds and excessive through traffic pose a safety problem. Evaluate requests for other traffic calming treatments and develop criteria for their use. | Ongoing |
| **Traffic Safety Program** – Develop a traffic safety program to:<br>• Collect and analyze data on traffic crashes;<br>• Establish an inter-departmental mechanism to respond to traffic safety issues; and<br>• Encourage citizen participation. | Short |
| **Pedestrian Facilities –** Design and construct, concurrent with all roadway improvements, pedestrian trails and crossings as identified in the Parks Plan. | Ongoing |
| **On-Road Bicycle Routes –** Consider providing a safe on-road bikeway network for commuter riders. Develop a public informational campaign designed to educate both motorists and bicyclists on bicycle traffic laws. | Ongoing |
| **Transit Service Improvements –** Continuously improve Plymouth's Metrolink Transit Service and establish key service measures for system evaluation. | Ongoing |
| **Park-and-Ride Lots –** Consider new facilities at Peony Lane and County Road 47 and Rockford Road/County Road 9 and Lancaster Lane. | Medium |
| **Rebalance Transit Resource Use –** Consider using a larger percentage of financial resources to expand overloaded express trips and increase average vehicle size to add capacity. | Short |

| *Description* | *Timing* |
| --- | --- |
| **Freight Movement** –<br>• Use the development review process to discourage non-local truck traffic on local streets.<br>• Work to maintain rail access for industrial areas where businesses depend on rail service.<br>• Work with Union Pacific Railroad to schedule trains outside of peak traffic periods. | Ongoing |
| **Aviation –** Notify appropriate agencies of proposed structures 200 feet or more in height so as to ensure that these structures are compatible with air traffic. | Ongoing |
| **Funding –** Continue to evaluate potential funding sources for projects including federal, state, regional, and local funding. Aggressively pursue funds through competitive processes to maximize transportation resources for Plymouth. | Ongoing |

Appendix 6A

# TRANSPORTATION CHARACTERISTICS

## ROADWAY SYSTEM

Plymouth's existing roadway system and current traffic volumes are shown in Figure 6A-1. The key routes are described below:

### STATE ROADS (METROPOLITAN HIGHWAY SYSTEM)

- Interstate 494 (I-494) runs north to south and crosses through the center of Plymouth. This facility is part of the I-494/I-694 beltway that encircles the metropolitan area. Interchanges are located at Carlson Parkway, County State Aid Highway (CSAH) 6, Highway 55, Rockford Road (CSAH 9), and Bass Lake Road (CSAH 10).
- Highway 169 follows the eastern boundary of the City of Plymouth. Interchanges are located at Betty Crocker Drive, Highway 55, Plymouth Avenue, Medicine Lake Road, 36th Avenue, Rockford Road, Schmidt Lake Road and Bass Lake Road.
- Highway 55 runs northwest to southeast through the center section of Plymouth. Interchanges are located at I-494 and Highway 169, and numerous at-grade intersections are also located along the corridor.

### HENNEPIN COUNTY ROADS

- CSAH 9, also known as Rockford Road, runs east/west through the center of the city from Highway 55 to the eastern city limits with connections to Highway 55, I-494 and Highway 169.
- CSAH 10, also known as Bass Lake Road, runs northwest to southeast in the northern portion of Plymouth with connections to CSAH 101, I-494 and Highway 169.
- CSAH 24 is located in western Plymouth and runs southwest from Highway 55 to the western city limits with connections to Highway 55 and CSAH 101.
- CSAH 101 runs north/south through western Plymouth with connections to CSAH 6, CSAH 24 and Highway 55.

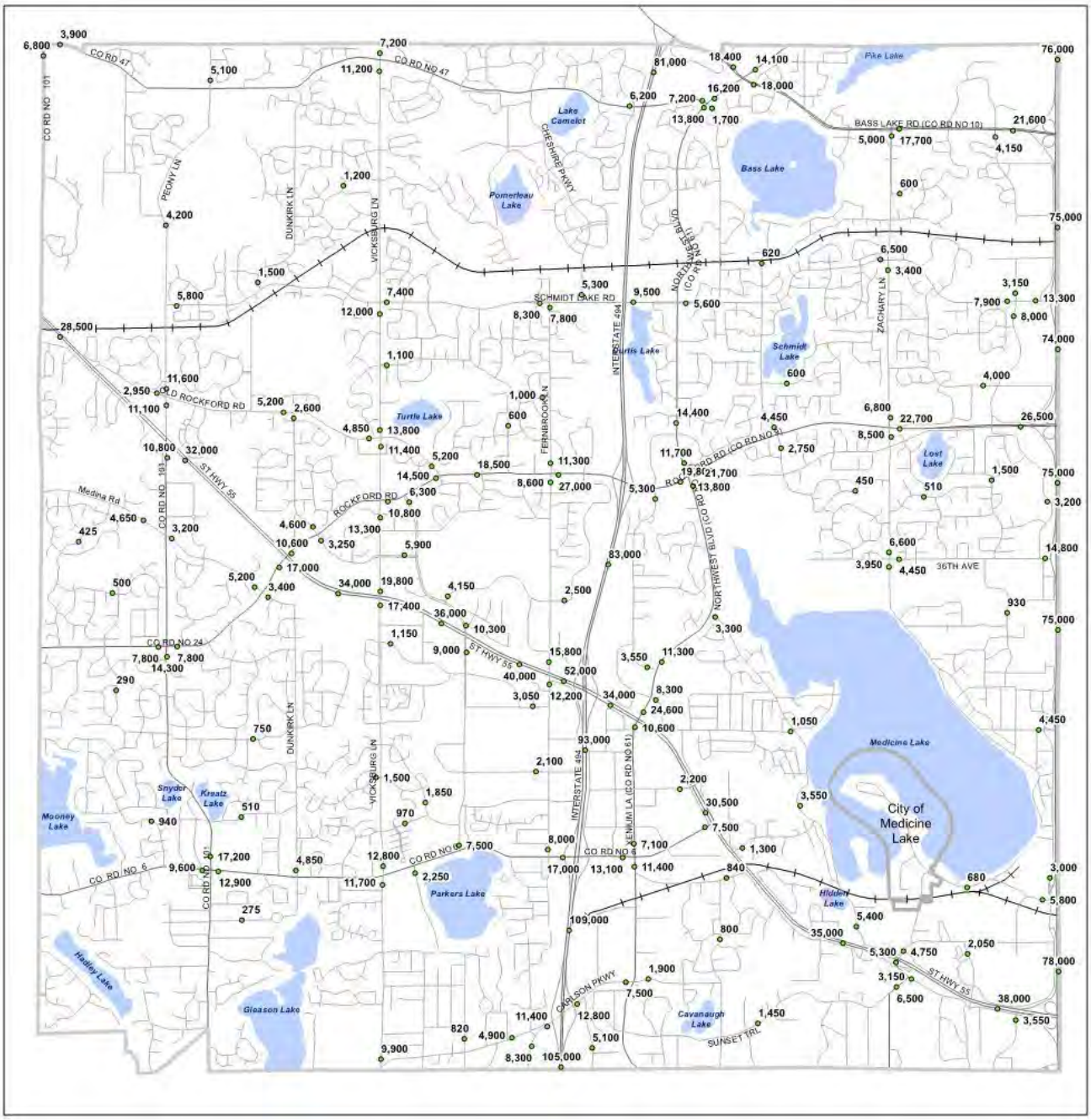



Figure 6A-1

# Existing Roadway System and (2015) Traffic Volumes

* Historical AADT counts were used to assume typical existing conditions, due to construction projects along I-494

Existing 2015 Average Annual Daily Traffic (AADT)

N

Source: SRF Consulting, Minnesota Department of Transportation, Metropolitan Council

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

- CSAH 6 is located in the southern portion of Plymouth, running east to west from the western border of Plymouth to its termination at Highway 55. CSAH 6 connects with CSAH 101, I-494 and Highway 55 in Plymouth.
- CSAH 61 (Xenium Lane/Northwest Boulevard) is a north/south route in Plymouth that runs parallel to I-494. CSAH 61 connects with CSAH 6, Highway 55, CSAH 9, and CSAH 10.
- CSAH 73 is located in eastern Plymouth and runs north/south from Medicine Lake to CSAH 10. CSAH 73 connects with CSAH 9 and CSAH 10 in Plymouth.
- County Road 47 is located in northern Plymouth and runs east/west connecting to CSAH 101, I-494 and CSAH 61.

## LOCAL ROADS

The balance of the roadway system is under the jurisdiction of and maintained by the City of Plymouth. The portion of the local system that remains to be developed is primarily located in the northwest part of Plymouth.

## JURISDICTIONAL CLASSIFICATION

As with all municipalities, jurisdiction over the roadway system is shared among three levels of government: state, county and city. The Minnesota Department of Transportation (MnDOT) maintains the interstate and trunk highway system on behalf of the state; Hennepin County maintains the county state aid highway (CSAH) and county road (CR) systems, and the remaining streets in the city are the responsibility of the City of Plymouth. The number of roadway miles by jurisdiction is shown in Table 6A-1; the existing jurisdictional classification is shown in Figure 6A-2.

### TABLE 6A-1
### EXISTING (2017) ROADWAY MILES BY JURISDICTIONAL CLASSIFICATION

| Jurisdictional Classification | Miles | Percent of Total Miles |
|---|---|---|
| State | 33.1 | 9% |
| County | 33.3 | 9% |
| Local | 321.5 | 82% |
| Totals | 387.9 | 100% |

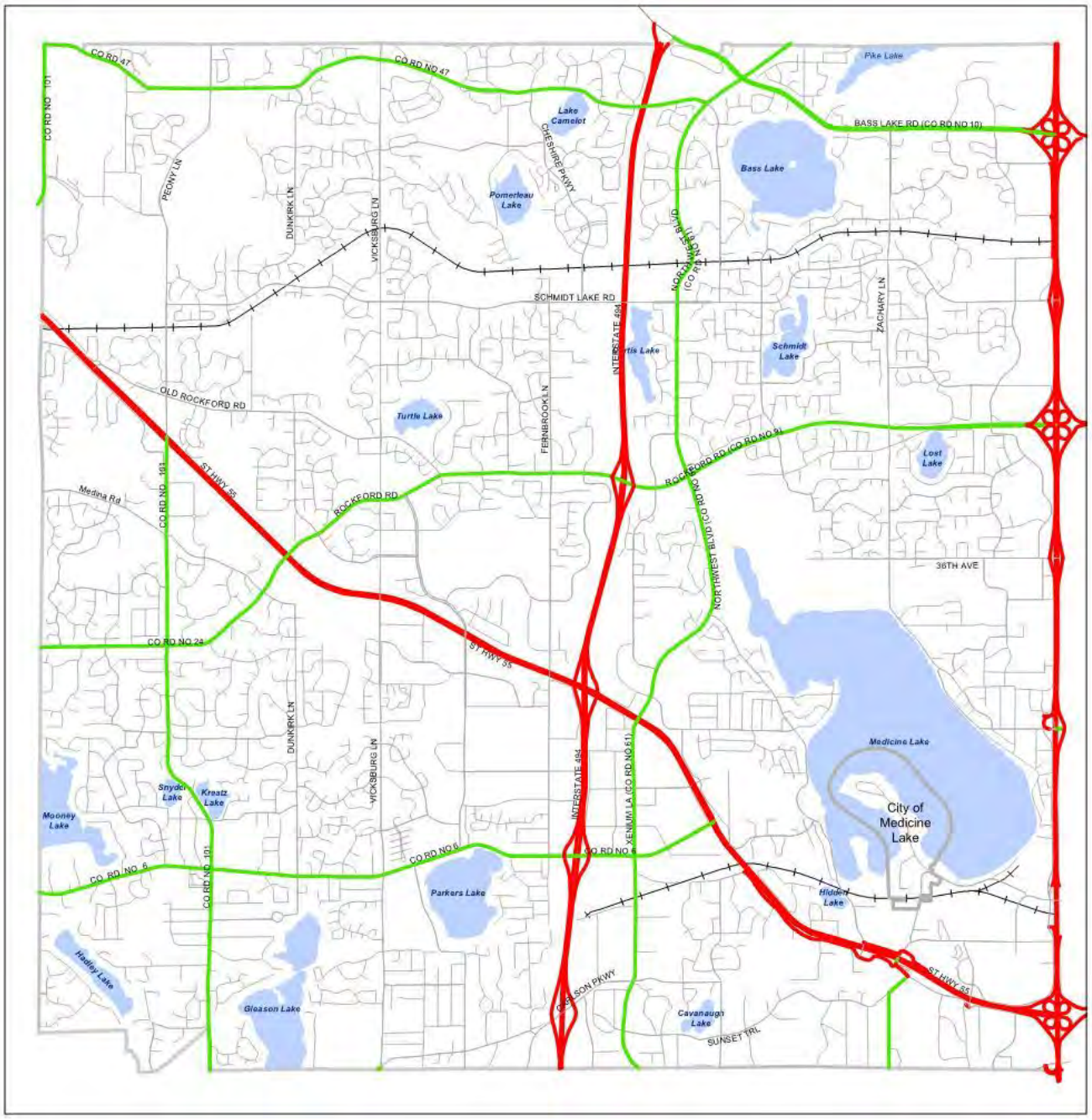



Figure 6A-2

# Existing Roadway Jurisdiction

**Jurisdictional Classification**

- State Roadways
- County Roadways
- Local Roadways

N

City of Plymouth

Source: SRF Consulting, Metropolitan Council, Hennepin County

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

The jurisdictional classification system is intended to maintain a balance of responsibility among the agencies. It is organized around the principle that the highest volume, limited access roadways that carry regional trips are primarily maintained by MnDOT, the intermediate volume roadways that carry medium length trips are maintained by Hennepin County and the local street system that provides access to individual properties is maintained by the City. Occasionally, because of development, changes in traffic patterns or the construction of new facilities, the jurisdictional classification needs to be adjusted to reflect changes in the way certain roadways are used. However, this plan does not envision any significant jurisdictional transfers during the planning period.

## FUNCTIONAL CLASSIFICATION

Roadway functional classification categories are defined by the role roadways play in serving the flow of trips through the overall roadway system. Within the Twin Cities metropolitan area, the Metropolitan Council has established detailed criteria for roadway functional classifications, which are presented in Table 6A-3. Table 6A-2 shows the roadway miles by functional classification.

The intent of the functional classification system is to create a hierarchy of roads that collect and distribute traffic from neighborhoods to the metropolitan highway system. Roadways with a higher functional classification (arterials) generally provide for longer trips, have more mobility, have limited access and connect larger centers. Roadways with a lower functional classification (collectors and local streets) generally provide for shorter trips, have lower mobility, have more access and connect to higher functioning roadways. A balance of all functions of roadways is important to any transportation network.

### TABLE 6A-2
### EXISTING (2017) ROADWAY MILES BY FUNCTIONAL CLASSIFICATIONS

| Functional Classification | Miles | Percent of Total Miles |
|---|---|---|
| Principal Arterial | 33.1 | 9% |
| A Minor Arterial | 37.2 | 10% |
| Other Arterials | 9.5 | 2% |
| Collector Roadways | 77.3 | 20% |
| Local Roadways | 230.8 | 59% |
| Total | 387.9 | 100% |

The existing functional classification of roadways in Plymouth is shown in Figure 6A-3.

TABLE 6A-3
ROADWAY FUNCTIONAL CLASSIFICATIONS

| Criteria | Principal Arterial | Minor Arterial and Other Arterial | Collector | Local Street |
|---|---|---|---|---|
| Place Connections | Connect regional job concentrations and freight terminals within the urban service area | Provide supplementary connections between regional job concentrations, local centers, and freight terminals within the urban service area | Connect neighborhoods and centers within the urban service area. | Connect blocks and land parcels within neighborhoods and within commercial or industrial developments |
| Spacing | Urban communities: 2 – 3 miles<br>Suburban communities: Spacing should vary in relation to development density of land uses served, 2 – 6 miles | Regional job concentrations: 1/4 – 3/4 mile<br>Urban communities: 1/2 – 1 mile<br>Suburban communities: 1 – 2 miles | Job concentrations: 1/8 – 1/2 mile<br>Urban Communities: 1/4 – 3/4 mile<br>Suburban Communities: 1/2 – 1 mile | As needed to access land uses |
| System Connections | To interstate freeways, other principal arterials, and select A-minor arterials. Connections between principal arterials should be of a design type that does not require vehicles to stop. Intersections should be limited to 1-2 miles. | To most interstates, principal arterials, other minor arterials, collectors and some local streets | To minor arterials, other collectors, and local streets | To a few minor arterials<br>To collectors and other local streets |
| Trip-Making Service | Trips greater than 8 miles with at least 5 continuous miles on principal arterials. Express and highway bus rapid transit trips | Medium-to-short tips (2-6 miles depending on development density) at moderate speeds. Longer trips accessing the principal arterial network. Local, limited-stop, and arterial bus rapid transit trips | Short trips (1-4 miles depending on development density) at low-to-moderate speeds | Short trips (under 2 miles) at low speeds, including bicycle and pedestrian trips. Longer trips accessing the collector and arterial network |
| Mobility vs. Land Access | Emphasis is on mobility for longer trips rather than direct land access. Little or no direct land access within the urbanized area | Emphasis on mobility for longer trips rather than on direct land access. Direct land access limited to concentrations of activity including regional job concentrations, local centers, freight terminals, and neighborhoods | Equal emphasis on mobility and land access. Direct land access predominantly to development concentrations | Emphasis on land access, not on mobility. Direct land access predominantly to residential land uses |
| System Mileage | 5-10% | 10-15% | 5-15% | 60-75% |
| Percent of Vehicle Miles Traveled | 15-35% | 15-25% | 10-25% | 10-25% |

| Criteria | Principal Arterial | Minor Arterial and Other Arterial | Collector | Local Street |
|---|---|---|---|---|
| Intersections | Grade separated desirable where appropriate. At a minimum, high-capacity controlled at-grade intersections | Traffic signals, roundabouts, and cross-street stops | Four-way stops and some traffic signals | As required |
| Parking | None | Restricted as necessary | Restricted as necessary | Permitted as necessary |
| Large Trucks | No restrictions | Candidates for local truck network, large trucks restricted as necessary | May be candidates for local truck network, large trucks restricted as necessary | Permitted as necessary |
| Management Tools | Ramp metering, preferential treatment for transit, access control, median barriers, traffic signal progression, staging of reconstruction, intersection spacing | Traffic signal progression and spacing, land access management/control, preferential treatment for transit | Number of lanes, traffic signal timing, land access management | Intersection control, cul-de-sacs, diverters |
| Typical Average Daily Traffic Volumes | 15,000-100,000+ | 5,000-30,000+ | 1,000-15,000+ | Less than 1,500 |
| Posted Speed Limit | 40-65 mph | 30-45 mph | 30-40 mph | Maximum 30 mph |
| Right-of-Way | 100-300 feet | 60-150 feet | 60-100 feet | 50-80 feet |
| Transit Accommodations | Transit advantages that provide priority access and reliable movement for transit in peak periods where possible and needed | Transit advantages for reliable movement where needed. | Regular-route buses, transit advantages for reliable movement, where needed | Normally used as bus routes only in nonresidential areas |
| Bicycle and Pedestrian Accommodations | On facilities that cross or are parallel to the principal arterial, with greater emphasis along transit routes and in activity centers. Crossings should be spaced to allow for adequate crossing opportunities. | On facilities that cross or are parallel to the minor arterial, with greater emphasis along transit routes and in activity centers. Crossings should be spaced to allow for adequate crossing opportunities. | On, along, or crossing the collector with higher emphasis along transit routes and in activity centers. Crossings should be spaced for adequate crossing opportunities. | On, along, or crossing the local road |

Source: Metropolitan Council, 2040 Transportation Policy Plan, 2015
City of Plymouth
This table summarizes characteristics for existing roadways to be used in evaluating functional classification and should not be used as design guidelines.

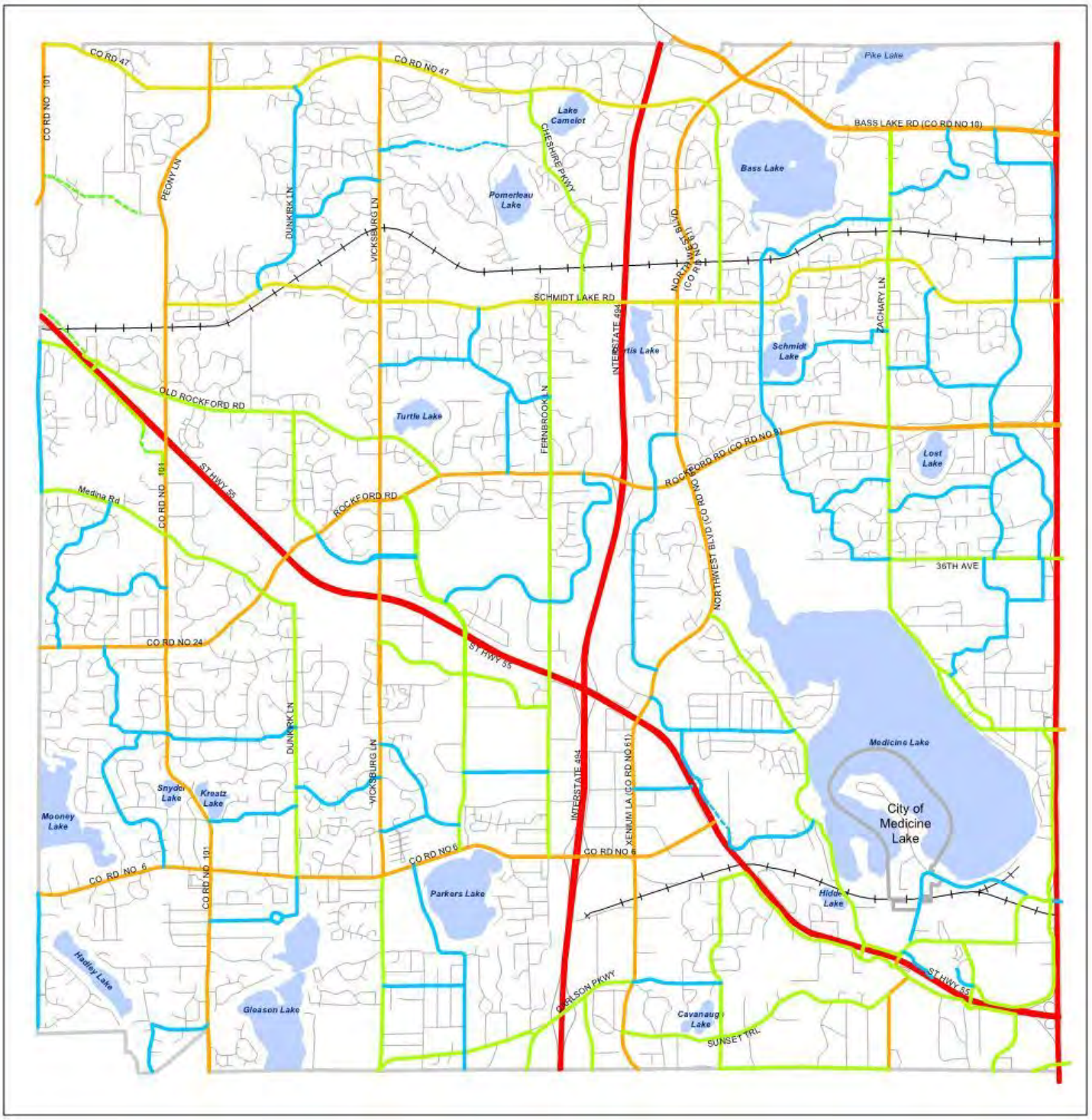



Figure 6A-3

# Existing and Future Functional Classification

Minor Collector Future
Major Collector Future
Principal Arterial
A-Minor Arterial
Other Arterial
Major Collector
Minor Collector

N

City of Plymouth

Source: SRF Consulting, Metropolitan Council

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## Principal Arterials

Principal arterials are part of the metropolitan highway system and provide high-speed mobility between the Twin Cities and important locations outside the metropolitan area. They are also intended to connect the central business districts of the two central cities with each other and with other regional business concentrations in the metropolitan area. Principal arterials are generally constructed as limited access freeways in the urban area, but may also be constructed as multiple-lane divided highways. Plymouth is served by three principal arterials: I-494, Highway 169 and Highway 55 (east of I-494).

## Minor Arterials

Minor arterials also emphasize mobility over land access, serving to connect cities with adjacent communities and the metropolitan highway system. Major business concentrations and other important traffic generators are located on minor arterial roadways. In urbanized areas, one- to two-mile spacing is considered appropriate. Most locations in the City of Plymouth are within one mile of a minor arterial.

'A' minor arterials are roadways that are of regional importance because they relieve, expand or complement the principal arterial system. 'A' minor arterials are categorized into four types, consistent with Metropolitan Council guidelines:

- Relievers – Minor arterials that provide direct relief for metropolitan highway traffic.
- Expanders – Routes that provide a way to make connections between urban areas outside the I-494/I-694 beltway.
- Connectors – Roads that provide good, safe connections to and among communities at the edge of the urbanized area and in rural areas.
- Augmenters – Roadways that augment principal arterials within the I-494/I-694 beltway.

A well-planned and adequately designed system of principal and 'A' minor arterials will allow the City's overall street system to function the way it is intended and discourage through traffic from using residential streets. Volumes on these roadways are expected to be higher than on collector or local roadways. Providing the capacity for these higher volumes will keep volumes on other city streets lower.

'B' minor arterials provide a citywide function, serving medium to long distance trips.

The City of Plymouth is served by 14 'A' minor arterials and one 'B' minor arterial.

### Collectors

Collectors are designed to serve shorter trips that occur within the city and to provide access from neighborhoods to other collector roadways and the arterial system. They are expected to carry less traffic than arterial roads and to provide access to some properties.

### Local Streets

Local streets provide access to adjacent properties and neighborhoods. Local streets are generally low speed and designed to discourage through traffic. All of the remaining roadways in the city that were not listed under the previous functional classifications fall under the local street designation.

## PROGRAMMED AND PLANNED IMPROVEMENTS

Figure 6A-4 identifies programmed roadway improvements from the City of Plymouth's Capital Improvements Program and the Hennepin County CIP. Programmed improvements have gone through the project funding programming process and have funds committed to the improvement in a designated year. Planned projects have been formally studied and/or included in a transportation plan, but typically no commitments to fund the improvement have been completed.

### MnDOT

- CSAH 9 over I-494: expansion of the CSAH 9 bridge over I-494.
- CSAH 9 over Highway 169: realignment of southbound ramps from CSAH 9.

### Hennepin County

- County Road 47 from Vicksburg Lane to CSAH 61 will be expanded to a three-lane facility consistent with the 2004 County Road 47 Corridor Study.

### City of Plymouth

- 57th Avenue from Wood Crest east to Juneau Lane.
- 54th Avenue from The Enclave at Elm Creek to Peony Lane.
- Hamel Road adjacent to Park Nicollet Clinic.




Figure 6A-4

# Planned Improvements

Bridge Project

Roadway Projects

N

Source: SRF Consulting

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## 2040 TRAFFIC FORECASTS

The pattern and intensity of travel within any city is directly related to the distribution and magnitude of households, population and employment within that community, in neighboring communities and in the region as a whole.

Land use, travel patterns, population and employment change over time and affect the efficiency and adequacy of the transportation network. Expected changes in the City's land use pattern, households, population and employment will be the basis for estimating future travel demand within the city.

### Land Use

The City of Plymouth has a community designation of suburban edge located within the Metropolitan Council's urban service area. Existing land use within the City of Plymouth is shown in Community Background (Chapter 2).

As the metropolitan area moves forward with a greater focus on multimodal transportation, new development and redevelopment in Plymouth will be constrained by the existing and future transportation system. The Transportation Plan is designed to assist the City in developing a transportation system that supports land use and provides safe and efficient movement of people and goods.

### Socio-Economic Data

Historic, existing and estimated population, households, and employment levels are shown in Table 6A-4. The Metropolitan Council prepared estimates for the overall regional growth in terms of households, population, and employment for the years 2020, 2030, and 2040, allocating an appropriate portion to each municipality.

TABLE 6A-4
SUMMARY OF SOCIO-ECONOMIC DATA

| Year | Population | Households | Employment |
|---|---|---|---|
| 2010 | 70,576 | 28,663 | 46,227 |
| 2020 | 77,200 | 31,800 | 53,900 |
| 2030 | 81,400 | 33,400 | 57,700 |
| 2040 | 85,100 | 34,700 | 61,500 |

Source: Metropolitan Council, 2017

Using the Land Use Guide Plan and development objectives as guidance, and with the assistance of the Metropolitan Council, the City has estimated existing and future population, employment, and households

for sub-areas of the city called Traffic Analysis Zones (TAZs). This information was required to complete the traffic forecasting procedures used to estimate future traffic volumes. (Refer to Table 6A-5 and Figure 6A-5.)

### Forecast 2040 Traffic Volumes

Historic, existing and 2040 traffic forecasts for the City of Plymouth were prepared using the future households, population, and employment data outlined above. These forecasts are an essential analytical tool to determine the adequacy of the road system to handle future development, as anticipated by the City and the Metropolitan Council. In addition to the programmed roadway projects identified in Figure 6A-4, the traffic forecast model considers future planned improvements that are in the Metropolitan Council's Transportation Policy Plan (TPP) for regional highways outside the city. The results of the 2040 traffic forecasts are shown in Figure 6A-6.

## EXISTING AND ANTICIPATED CAPACITY DEFICIENCIES

Congestion on the roadway system is judged to exist when the ratio of traffic volume to roadway capacity (v/c ratio) approaches or exceeds 1.0. The ratio of volume to capacity provides a measure of congestion along a stretch of roadway and can help determine where roadway improvements, access management, transit services or demand management strategies need to be implemented. It does not, however, provide a basis for determining the need for specific intersection improvements.

Table 6A-6 provides a method to evaluate roadway capacity. For each facility type, the typical planning level average daily traffic (ADT) capacity ranges and maximum ADT volume ranges are listed. These volume ranges are based upon guidance from the Highway Capacity Manual, discussions with the Metropolitan Council and professional engineering judgment. A range is used since the maximum capacity of any roadway design (v/c = 1) is a theoretical measure that can be affected by its functional classification, traffic peaking characteristics, access spacing, speed and other roadway characteristics. Further, to define a facility's "daily capacity," it is recommended that the top of each facility type's volume range be used. This allows for capacity improvements that can be achieved by roadway performance enhancements.

# TABLE 6A-5
# ESTIMATED 2020, 2030 AND 2040 TAZ

| Plymouth TAZ | Met Council TAZ | 2014 Data | | | | | 2020 Estimated Data | | | | | 2030 Estimated Data | | | | | 2040 Estimated Data | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pop | HH | Employment | | | Pop | HH | Employment | | | Pop | HH | Employment | | | Pop | HH | Employment | | |
| | | | | Retail | Non-Retail | Total | | | Retail | Non-Retail | Total | | | Retail | Non-Retail | Total | | | Retail | Non-Retail | Total |
| 1 | 882 | 408 | 166 | 60 | 8 | 68 | 415 | 171 | 70 | 8 | 78 | 422 | 173 | 75 | 8 | 83 | 424 | 173 | 80 | 10 | 90 |
| 2 | 882 | 666 | 279 | 0 | 8 | 8 | 677 | 279 | 0 | 8 | 8 | 680 | 279 | 0 | 8 | 8 | 684 | 279 | 2 | 8 | 10 |
| 3 | 882 | | | | | | | | | | | | | | | | | | | | |
| 4 | 882 | 935 | 380 | 0 | 10 | 10 | 923 | 380 | 0 | 10 | 10 | 926 | 380 | 0 | 10 | 10 | 932 | 380 | 0 | 10 | 10 |
| 5 | 882 | 130 | 53 | 0 | 2 | 2 | 888 | 366 | 0 | 2 | 2 | 1,343 | 551 | 0 | 50 | 50 | 1,351 | 551 | 5 | 100 | 105 |
| 6 | 882 | 202 | 82 | 0 | 5 | 5 | 469 | 193 | 0 | 5 | 5 | 483 | 198 | 0 | 5 | 5 | 486 | 199 | 0 | 10 | 10 |
| 7 | 882 | 730 | 297 | 0 | 30 | 30 | 765 | 315 | 1 | 30 | 31 | 843 | 346 | 1 | 30 | 31 | 1,135 | 464 | 2 | 50 | 52 |
| 8 | 882 | 2,553 | 1,038 | 0 | 20 | 20 | 2,520 | 1,038 | 1 | 20 | 21 | 2,576 | 1,057 | 1 | 20 | 21 | 2,582 | 1,057 | 2 | 20 | 22 |
| 9 | 882 | 322 | 131 | 0 | 105 | 105 | 318 | 131 | 2 | 105 | 107 | 319 | 131 | 2 | 105 | 107 | 321 | 131 | 3 | 105 | 110 |
| 10 | 882 | 0 | 0 | 0 | 300 | 300 | 0 | 0 | 2 | 421 | 423 | 0 | 0 | 2 | 424 | 426 | 0 | 0 | 5 | 474 | 479 |
| 11 | 883 | 376 | 153 | 0 | 20 | 20 | 371 | 153 | 1 | 20 | 21 | 373 | 153 | 1 | 20 | 21 | 375 | 153 | 2 | 20 | 22 |
| 12 | 883 | 423 | 172 | 78 | 350 | 428 | 418 | 172 | 88 | 365 | 453 | 419 | 172 | 93 | 375 | 468 | 422 | 172 | 98 | 402 | 500 |
| 13 | 884 | 598 | 243 | 0 | 10 | 10 | 590 | 243 | 0 | 10 | 10 | 592 | 243 | 0 | 10 | 10 | 596 | 243 | 0 | 10 | 10 |
| 14 | 884 | 723 | 294 | 0 | 20 | 20 | 714 | 294 | 0 | 20 | 20 | 717 | 294 | 0 | 20 | 20 | 721 | 294 | 0 | 20 | 20 |
| 15 | 884 | 568 | 231 | 0 | 30 | 30 | 561 | 231 | 1 | 30 | 31 | 563 | 231 | 1 | 30 | 31 | 566 | 231 | 2 | 30 | 32 |
| 16 | 884 | 666 | 279 | 0 | 15 | 15 | 677 | 279 | 1 | 15 | 16 | 680 | 279 | 1 | 15 | 16 | 684 | 279 | 2 | 15 | 17 |
| 17 | 884 | 814 | 331 | 0 | 10 | 10 | 804 | 331 | 0 | 10 | 10 | 807 | 331 | 0 | 10 | 10 | 812 | 331 | 0 | 10 | 10 |
| 18 | 885 | 1,512 | 615 | 0 | 20 | 20 | 1,493 | 615 | 0 | 20 | 20 | 1,499 | 615 | 0 | 20 | 20 | 1,508 | 615 | 0 | 20 | 20 |
| 19 | 885 | 595 | 242 | 0 | 10 | 10 | 587 | 242 | 1 | 10 | 11 | 590 | 242 | 1 | 10 | 11 | 593 | 242 | 2 | 10 | 12 |
| 20 | 886 | 403 | 164 | 0 | 10 | 10 | 398 | 164 | 0 | 10 | 10 | 485 | 199 | 0 | 10 | 10 | 488 | 199 | 0 | 10 | 10 |
| 21 | 886 | 0 | 0 | 20 | 1,541 | 1,561 | 0 | 0 | 20 | 1,650 | 1,670 | 0 | 0 | 23 | 1,715 | 1,738 | 0 | 0 | 25 | 1,841 | 1,866 |
| 22 | 886 | 0 | 0 | 222 | 20 | 242 | 0 | 0 | 252 | 20 | 272 | 0 | 0 | 254 | 20 | 274 | 0 | 0 | 296 | 20 | 316 |
| 23 | 887 | 0 | 0 | 10 | 350 | 360 | 0 | 0 | 15 | 365 | 380 | 0 | 0 | 17 | 365 | 382 | 0 | 0 | 20 | 400 | 420 |
| 24 | 887 | 610 | 248 | 0 | 5 | 5 | 692 | 248 | 0 | 5 | 5 | 604 | 248 | 0 | 5 | 5 | 608 | 248 | 0 | 10 | 10 |
| 25 | 887 | 199 | 81 | 10 | 5 | 15 | 197 | 81 | 12 | 5 | 17 | 197 | 81 | 13 | 5 | 18 | 199 | 81 | 15 | 10 | 25 |
| 26 | 887 | 1,397 | 568 | 20 | 850 | 870 | 1,379 | 568 | 35 | 850 | 885 | 1,384 | 568 | 31 | 935 | 966 | 1,393 | 568 | 40 | 1,000 | 1,040 |
| 27 | 888 | 0 | 0 | 30 | 300 | 330 | 0 | 0 | 50 | 300 | 350 | 0 | 0 | 62 | 310 | 372 | 0 | 0 | 90 | 400 | 490 |
| 28 | 888 | 0 | 0 | 330 | 50 | 380 | 0 | 0 | 350 | 50 | 400 | 0 | 0 | 360 | 50 | 410 | 0 | 0 | 405 | 56 | 461 |
| 29 | 889 | 288 | 117 | 0 | 5 | 5 | 284 | 117 | 0 | 5 | 5 | 285 | 117 | 0 | 5 | 5 | 287 | 117 | 0 | 10 | 10 |
| 30 | 889 | 0 | 0 | 190 | 415 | 605 | 0 | 0 | 200 | 450 | 650 | 0 | 0 | 210 | 455 | 665 | 0 | 0 | 230 | 485 | 715 |
| 31 | 890 | 708 | 288 | 0 | 111 | 111 | 698 | 288 | 0 | 111 | 111 | 702 | 288 | 0 | 111 | 111 | 706 | 288 | 0 | 111 | 111 |
| 32 | 891 | 413 | 168 | 0 | 50 | 50 | 408 | 168 | 0 | 52 | 52 | 409 | 168 | 0 | 52 | 52 | 412 | 168 | 0 | 58 | 58 |
| 33 | 891 | 531 | 216 | 0 | 10 | 10 | 524 | 216 | 0 | 10 | 10 | 526 | 216 | 0 | 10 | 10 | 530 | 216 | 0 | 10 | 10 |
| 34 | 891 | 0 | 0 | 15 | 25 | 40 | 0 | 0 | 18 | 26 | 44 | 0 | 0 | 20 | 26 | 46 | 0 | 0 | 23 | 28 | 51 |
| 35 | 892 | 320 | 130 | 0 | 10 | 10 | 316 | 130 | 0 | 10 | 10 | 317 | 130 | 0 | 10 | 10 | 319 | 130 | 0 | 10 | 10 |
| 36 | 892 | 325 | 132 | 15 | 30 | 45 | 320 | 132 | 17 | 30 | 47 | 322 | 132 | 18 | 30 | 48 | 324 | 132 | 20 | 30 | 50 |
| 37 | 892 | 337 | 137 | 0 | 5 | 5 | 333 | 137 | 0 | 5 | 5 | 456 | 187 | 0 | 5 | 5 | 459 | 187 | 0 | 10 | 10 |
| 38 | 892 | 347 | 141 | 0 | 5 | 5 | 342 | 141 | 0 | 5 | 5 | 344 | 141 | 0 | 5 | 5 | 346 | 141 | 0 | 10 | 10 |
| 39 | 893 | 2 | 1 | 0 | 20 | 20 | 291 | 120 | 0 | 20 | 20 | 346 | 142 | 0 | 20 | 20 | 348 | 142 | 0 | 10 | 10 |
| 40 | 893 | 0 | 0 | 0 | 350 | 350 | 0 | 0 | 2 | 403 | 405 | 0 | 0 | 4 | 423 | 427 | 0 | 0 | 10 | 450 | 460 |
| 41 | 893 | 428 | 174 | 0 | 10 | 10 | 422 | 174 | 0 | 10 | 10 | 424 | 174 | 0 | 10 | 10 | 427 | 174 | 0 | 10 | 10 |
| 42 | 893 | 12 | 5 | 75 | 40 | 115 | 206 | 85 | 85 | 40 | 125 | 319 | 131 | 89 | 40 | 129 | 321 | 131 | 100 | 45 | 145 |
| 43 | 894 | 15 | 6 | 0 | 2 | 2 | 112 | 46 | 0 | 2 | 2 | 124 | 51 | 0 | 2 | 2 | 515 | 210 | 0 | 10 | 10 |
| 44 | 894 | 39 | 16 | 0 | 3 | 3 | 592 | 244 | 0 | 170 | 170 | 1,231 | 505 | 0 | 170 | 170 | 1,238 | 505 | 0 | 170 | 170 |
| 45 | 894 | 39 | 16 | 0 | 2 | 2 | 240 | 99 | 0 | 151 | 151 | 302 | 124 | 0 | 151 | 151 | 804 | 328 | 0 | 160 | 160 |
| 46 | 895 | 22 | 9 | 0 | 2 | 2 | 184 | 89 | 0 | 2 | 2 | 229 | 94 | 0 | 2 | 2 | 311 | 127 | 0 | 10 | 10 |
| 47 | 895 | 248 | 101 | 0 | 3 | 3 | 245 | 101 | 0 | 3 | 3 | 246 | 101 | 0 | 3 | 3 | 441 | 180 | 0 | 15 | 15 |
| 48 | 895 | 52 | 21 | 0 | 2 | 2 | 291 | 120 | 0 | 2 | 2 | 390 | 160 | 0 | 2 | 2 | 459 | 187 | 0 | 20 | 20 |
| 49 | 895 | 467 | 190 | 0 | 10 | 10 | 1,029 | 424 | 0 | 15 | 15 | 1,041 | 427 | 0 | 15 | 15 | 1,047 | 427 | 0 | 20 | 20 |
| 50 | 895 | 1,094 | 445 | 0 | 10 | 10 | 1,080 | 445 | 0 | 15 | 15 | 1,175 | 482 | 0 | 15 | 15 | 1,317 | 537 | 0 | 20 | 20 |
| 51 | 895 | 401 | 163 | 0 | 10 | 10 | 396 | 163 | 0 | 10 | 10 | 397 | 163 | 0 | 10 | 10 | 469 | 187 | 0 | 10 | 10 |
| 52 | 896 | 0 | 0 | 0 | 70 | 70 | 0 | 0 | 0 | 70 | 70 | 0 | 0 | 0 | 70 | 70 | 0 | 0 | 0 | 70 | 70 |
| 53 | 896 | 165 | 67 | 0 | 5 | 5 | 163 | 67 | 0 | 5 | 5 | 163 | 67 | 0 | 5 | 5 | 164 | 67 | 0 | 10 | 10 |
| 54 | 897 | 0 | 0 | 10 | 850 | 860 | 0 | 0 | 15 | 1,021 | 1,036 | 0 | 0 | 16 | 1,196 | 1,216 | 0 | 0 | 20 | 1,249 | 1,269 |
| 55 | 998 | 379 | 154 | 15 | 20 | 35 | 374 | 154 | 16 | 20 | 36 | 375 | 154 | 17 | 20 | 37 | 378 | 154 | 20 | 20 | 40 |
| 56 | 998 | 617 | 251 | 0 | 5 | 5 | 609 | 251 | 0 | 5 | 5 | 612 | 251 | 0 | 5 | 5 | 616 | 251 | 0 | 5 | 5 |
| 57 | 999 | 566 | 230 | 0 | 51 | 51 | 558 | 230 | 0 | 51 | 51 | 561 | 230 | 0 | 51 | 51 | 603 | 246 | 0 | 51 | 51 |
| 58 | 999 | 787 | 320 | 0 | 110 | 110 | 777 | 320 | 0 | 110 | 110 | 780 | 320 | 0 | 110 | 110 | 785 | 320 | 0 | 110 | 110 |
| 59 | 1000 | 858 | 349 | 15 | 5 | 20 | 847 | 349 | 16 | 5 | 21 | 851 | 349 | 17 | 5 | 22 | 856 | 349 | 20 | 11 | 31 |
| 60 | 1000 | 317 | 129 | 0 | 150 | 150 | 313 | 129 | 0 | 151 | 151 | 314 | 128 | 0 | 151 | 151 | 316 | 128 | 0 | 160 | 160 |
| 61 | 1001 | 922 | 375 | 28 | 20 | 48 | 910 | 376 | 30 | 20 | 50 | 914 | 375 | 31 | 20 | 51 | 920 | 375 | 35 | 21 | 56 |
| 62 | 1001 | 278 | 113 | 0 | 150 | 150 | 274 | 113 | 0 | 152 | 152 | 275 | 113 | 0 | 152 | 152 | 277 | 113 | 0 | 160 | 160 |
| 63 | 1002 | 642 | 261 | 40 | 20 | 60 | 634 | 261 | 46 | 20 | 66 | 636 | 261 | 48 | 20 | 68 | 640 | 261 | 55 | 21 | 76 |
| 64 | 1002 | 312 | 127 | 0 | 110 | 110 | 308 | 127 | 0 | 110 | 110 | 310 | 127 | 0 | 110 | 110 | 311 | 127 | 0 | 110 | 110 |
| 65 | 1002 | 453 | 184 | 0 | 5 | 5 | 447 | 184 | 0 | 5 | 5 | 463 | 190 | 0 | 5 | 5 | 466 | 190 | 0 | 10 | 10 |
| 66 | 1002 | 730 | 297 | 0 | 10 | 10 | 724 | 297 | 0 | 10 | 10 | 724 | 297 | 0 | 10 | 10 | 728 | 297 | 0 | 20 | 20 |
| 67 | 1003 | 935 | 380 | 0 | 10 | 10 | 923 | 380 | 0 | 10 | 10 | 926 | 380 | 0 | 10 | 10 | 932 | 380 | 0 | 15 | 15 |
| 68 | 1003 | 767 | 312 | 0 | 30 | 30 | 757 | 312 | 0 | 30 | 30 | 760 | 312 | 0 | 30 | 30 | 765 | 312 | 0 | 30 | 30 |
| 69 | 1003 | 484 | 197 | 80 | 20 | 100 | 476 | 197 | 90 | 20 | 110 | 480 | 197 | 97 | 20 | 117 | 483 | 197 | 115 | 30 | 145 |
| 70 | 1004 | 605 | 246 | 0 | 10 | 10 | 597 | 246 | 0 | 10 | 10 | 600 | 246 | 0 | 10 | 10 | 603 | 246 | 0 | 15 | 15 |
| 71 | 1004 | 322 | 131 | 0 | 120 | 120 | 318 | 131 | 0 | 120 | 120 | 319 | 131 | 0 | 120 | 120 | 321 | 131 | 0 | 120 | 120 |
| 72 | 1005 | 1,225 | 498 | 0 | 20 | 20 | 1,209 | 498 | 0 | 20 | 20 | 1,214 | 498 | 0 | 20 | 20 | 1,221 | 498 | 0 | 20 | 20 |
| 73 | 1006 | 339 | 138 | 0 | 10 | 10 | 335 | 138 | 0 | 10 | 10 | 336 | 138 | 0 | 10 | 10 | 338 | 138 | 0 | 10 | 10 |
| 74 | 1007 | 620 | 252 | 0 | 120 | 120 | 612 | 252 | 0 | 120 | 120 | 614 | 252 | 0 | 120 | 120 | 618 | 252 | 0 | 120 | 120 |
| 75 | 1007 | 903 | 367 | 0 | 20 | 20 | 891 | 367 | 0 | 20 | 20 | 894 | 367 | 0 | 20 | 20 | 900 | 367 | 0 | 20 | 20 |
| 76 | 1008 | 180 | 73 | 0 | 2 | 2 | 546 | 225 | 5 | 2 | 7 | 548 | 225 | 10 | 2 | 12 | 552 | 225 | 20 | 20 | 40 |
| 77 | 1008 | 148 | 60 | 0 | 25 | 25 | 206 | 85 | 0 | 145 | 145 | 826 | 339 | 0 | 145 | 145 | 959 | 391 | 10 | 150 | 160 |
| 78 | 1009 | 925 | 376 | 15 | 20 | 35 | 913 | 378 | 16 | 20 | 36 | 916 | 376 | 17 | 20 | 37 | 922 | 376 | 20 | 20 | 40 |
| 79 | 1009 | 0 | 0 | 15 | 800 | 815 | 0 | 0 | 16 | 905 | 921 | 0 | 0 | 17 | 955 | 972 | 0 | 0 | 20 | 1,009 | 1,029 |
| 80 | 1010 | 0 | 0 | 260 | 0 | 260 | 0 | 0 | 275 | 0 | 275 | 0 | 0 | 285 | 0 | 285 | 0 | 0 | 300 | 0 | 300 |
| 81 | 1010 | 234 | 95 | 170 | 5 | 175 | 231 | 95 | 180 | 5 | 185 | 232 | 95 | 185 | 5 | 190 | 233 | 96 | 200 | 10 | 210 |
| 82 | 1010 | 401 | 163 | 0 | 10 | 10 | 396 | 163 | 0 | 10 | 10 | 397 | 163 | 0 | 10 | 10 | 400 | 163 | 0 | 15 | 15 |
| 83 | 1010 | 194 | 79 | 0 | 2 | 2 | 192 | 79 | 0 | 2 | 2 | 193 | 79 | 0 | 2 | 2 | 194 | 79 | 0 | 5 | 5 |
| 84 | 1010 | 603 | 245 | 0 | 10 | 10 | 595 | 245 | 0 | 10 | 10 | 597 | 245 | 0 | 10 | 10 | 601 | 245 | 0 | 10 | 10 |
| 85 | 1010 | 826 | 336 | 0 | 5 | 5 | 816 | 336 | 0 | 5 | 5 | 819 | 336 | 0 | 5 | 5 | 824 | 336 | 0 | 15 | 15 |
| 86 | 1011 | 0 | 0 | 75 | 350 | 425 | 0 | 0 | 80 | 353 | 433 | 0 | 0 | 86 | 367 | 453 | 0 | 0 | 95 | 400 | 495 |
| 87 | 1011 | | | | | | | | | | | | | | | | | | | | |
| 88 | 1011 | 0 | 0 | 0 | 845 | 845 | 0 | 0 | 2 | 845 | 847 | 0 | 0 | 3 | 902 | 905 | 0 | 0 | 5 | 951 | 956 |
| 89 | 1011 | 0 | 0 | 0 | 536 | 536 | 0 | 0 | 2 | 536 | 538 | 0 | 0 | 3 | 536 | 539 | 0 | 0 | 5 | 525 | 530 |
| 90 | 1011 | 0 | 0 | 0 | 650 | 650 | 0 | 0 | 2 | 746 | 748 | 0 | 0 | 3 | 756 | 759 | 0 | 0 | 5 | 800 | 805 |
| 91 | 1011 | 666 | 271 | 0 | 5 | 5 | 658 | 271 | 0 | 5 | 5 | 660 | 271 | 0 | 5 | 5 | 665 | 271 | 0 | 5 | 5 |
| 92 | 1011 | 0 | 0 | 0 | 675 | 675 | 0 | 0 | 2 | 752 | 754 | 0 | 0 | 3 | 782 | 785 | 0 | 0 | 3 | 800 | 803 |
| 93 | 1011 | 1,697 | 690 | 0 | 30 | 30 | 1,675 | 690 | 2 | 30 | 32 | 1,682 | 690 | 3 | 30 | 33 | 1,692 | 690 | 5 | 30 | 35 |
| 94 | 1011 | 575 | 234 | 0 | 5 | 5 | 568 | 234 | 0 | 5 | 5 | 570 | 234 | 0 | 5 | 5 | 574 | 234 | 0 | 5 | 5 |
| 95 | 1011 | 157 | 64 | 0 | 2 | 2 | 155 | 64 | 0 | 2 | 2 | 156 | 64 | 0 | 2 | 2 | 157 | 64 | 0 | 2 | 2 |
| 96 | 1011 | 330 | 134 | 0 | 5 | 5 | 326 | 134 | 0 | 5 | 5 | 327 | 134 | 0 | 5 | 5 | 329 | 134 | 0 | 5 | 5 |
| 97 | 1012 | 0 | 0 | 70 | 805 | 875 | 0 | 0 | 75 | 855 | 930 | 0 | 0 | 76 | 867 | 943 | 0 | 0 | 80 | 905 | 985 |
| 98 | 1012 | 0 | 0 | 0 | 1,562 | 1,562 | 0 | 0 | 0 | 1,683 | 1,683 | 0 | 0 | 0 | 1,708 | 1,708 | 0 | 0 | 0 | 1,855 | 1,855 |

TABLE 6A-5
ESTIMATED 2020, 2030 AND 20140 TAZ: Continued

| Plymouth TAZ | Met Council TAZ | 2014 Data | | | | | 2020 Estimated Data | | | | | 2030 Estimated Data | | | | | 2040 Estimated Data | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pop | HH | Employment | | | Pop | HH | Employment | | | Pop | HH | Employment | | | Pop | HH | Employment | | |
| | | | | Retail | Non-Retail | Total | | | Retail | Non-Retail | Total | | | Retail | Non-Retail | Total | | | Retail | Non-Retail | Total |
| 99 | 1012 | 0 | 0 | 0 | 1,733 | 1,733 | 0 | 0 | 0 | 1,822 | 1,822 | 0 | 0 | 0 | 1,979 | 1,979 | 0 | 0 | 0 | 2,100 | 2,100 |
| 100 | 1012 | 600 | 244 | 0 | 10 | 10 | 592 | 244 | 0 | 10 | 10 | 595 | 244 | 0 | 10 | 10 | 598 | 244 | 0 | 20 | 20 |
| 101 | 1013 | 0 | 0 | 0 | 975 | 975 | 0 | 0 | 0 | 975 | 975 | 0 | 0 | 0 | 975 | 975 | 0 | 0 | 0 | 1,010 | 1,010 |
| 102 | 1013 | 0 | 0 | 0 | 985 | 985 | 0 | 0 | 0 | 985 | 985 | 0 | 0 | 0 | 985 | 985 | 0 | 0 | 0 | 1,005 | 1,005 |
| 103 | 1043 | 184 | 75 | 0 | 0 | 0 | 182 | 75 | 0 | 0 | 0 | 183 | 75 | 0 | 0 | 0 | 184 | 75 | 0 | 5 | 5 |
| 104 | 1043 | 0 | 0 | 160 | 601 | 761 | 0 | 0 | 170 | 623 | 793 | 0 | 0 | 175 | 623 | 798 | 0 | 0 | 185 | 659 | 844 |
| 105 | 1043 | 0 | 0 | 0 | 302 | 302 | 0 | 0 | 0 | 308 | 308 | 0 | 0 | 0 | 308 | 308 | 0 | 0 | 0 | 314 | 314 |
| 106 | 1044 | 0 | 0 | 0 | 1,163 | 1,163 | 0 | 0 | 0 | 1,653 | 1,653 | 0 | 0 | 0 | 1,802 | 1,802 | 0 | 0 | 0 | 1,951 | 1,951 |
| 107 | 1044 | 0 | 0 | 0 | 1,552 | 1,552 | 0 | 0 | 0 | 1,752 | 1,752 | 0 | 0 | 0 | 1,932 | 1,932 | 0 | 0 | 0 | 1,954 | 1,954 |
| 108 | 1045 | 0 | 0 | 325 | 257 | 582 | 0 | 0 | 325 | 257 | 582 | 502 | 206 | 325 | 275 | 600 | 505 | 206 | 211 | 300 | 511 |
| 109 | 1045 | 0 | 0 | 0 | 652 | 652 | 0 | 0 | 0 | 671 | 671 | 0 | 0 | 0 | 682 | 682 | 0 | 0 | 0 | 720 | 720 |
| 110 | 1045 | 0 | 0 | 295 | 675 | 970 | 0 | 0 | 310 | 675 | 985 | 0 | 0 | 315 | 678 | 993 | 0 | 0 | 348 | 720 | 1,068 |
| 111 | 1046 | 0 | 0 | 0 | 933 | 933 | 0 | 0 | 0 | 1,088 | 1,088 | 0 | 0 | 0 | 1,150 | 1,150 | 0 | 0 | 0 | 1,300 | 1,300 |
| 112 | 1046 | 0 | 0 | 0 | 978 | 978 | 0 | 0 | 0 | 1,003 | 1,003 | 0 | 0 | 0 | 1,083 | 1,083 | 0 | 0 | 0 | 1,178 | 1,178 |
| 113 | 1046 | 0 | 0 | 0 | 978 | 978 | 0 | 0 | 0 | 1,052 | 1,052 | 0 | 0 | 0 | 1,077 | 1,077 | 0 | 0 | 0 | 1,178 | 1,178 |
| 114 | 1047 | 0 | 0 | 0 | 750 | 750 | 0 | 0 | 0 | 755 | 755 | 0 | 0 | 0 | 755 | 755 | 0 | 0 | 0 | 777 | 777 |
| 115 | 1047 | 0 | 0 | 0 | 652 | 652 | 0 | 0 | 0 | 673 | 673 | 0 | 0 | 0 | 673 | 673 | 0 | 0 | 0 | 700 | 700 |
| 116 | 1047 | 359 | 146 | 0 | 10 | 10 | 354 | 146 | 0 | 60 | 60 | 356 | 146 | 0 | 75 | 75 | 358 | 146 | 0 | 100 | 100 |
| 117 | 1047 | 359 | 146 | 0 | 10 | 10 | 354 | 146 | 0 | 10 | 10 | 356 | 146 | 0 | 10 | 10 | 358 | 146 | 0 | 10 | 10 |
| 118 | 1047 | 0 | 0 | 0 | 943 | 943 | 0 | 0 | 0 | 988 | 988 | 0 | 0 | 0 | 988 | 988 | 0 | 0 | 0 | 1,079 | 1,079 |
| 119 | 1047 | 12 | 5 | 0 | 801 | 801 | 231 | 95 | 20 | 801 | 821 | 324 | 133 | 30 | 801 | 831 | 383 | 156 | 50 | 855 | 905 |
| 120 | 1047 | | | | | | | | | | | | | | | | | | | | |
| 121 | 1047 | 192 | 78 | 20 | 5 | 25 | 189 | 78 | 25 | 5 | 30 | 190 | 78 | 27 | 5 | 32 | 191 | 78 | 30 | 5 | 35 |
| 122 | 1047 | 66 | 27 | 0 | 0 | 0 | 66 | 27 | 0 | 0 | 0 | 66 | 27 | 0 | 0 | 0 | 66 | 27 | 0 | 2 | 2 |
| 123 | 1047 | 278 | 113 | 0 | 5 | 5 | 274 | 113 | 0 | 5 | 5 | 275 | 113 | 0 | 8 | 8 | 277 | 113 | 0 | 15 | 15 |
| 124 | 1048 | 283 | 115 | 0 | 5 | 5 | 279 | 115 | 0 | 5 | 5 | 280 | 115 | 0 | 6 | 6 | 282 | 115 | 0 | 10 | 10 |
| 125 | 1048 | 152 | 62 | 0 | 175 | 175 | 151 | 62 | 0 | 175 | 175 | 151 | 62 | 0 | 175 | 175 | 152 | 62 | 0 | 180 | 180 |
| 126 | 1048 | 118 | 48 | 0 | 110 | 110 | 117 | 48 | 0 | 110 | 110 | 117 | 48 | 0 | 110 | 110 | 118 | 48 | 0 | 110 | 110 |
| 127 | 1049 | 93 | 38 | 0 | 5 | 5 | 92 | 38 | 0 | 5 | 5 | 93 | 38 | 0 | 10 | 10 | 93 | 38 | 0 | 20 | 20 |
| 128 | 1049 | 207 | 84 | 0 | 35 | 35 | 204 | 84 | 0 | 35 | 35 | 205 | 84 | 0 | 37 | 37 | 206 | 84 | 0 | 60 | 60 |
| 129 | 1049 | 1,456 | 592 | 145 | 5 | 150 | 1,806 | 744 | 155 | 5 | 160 | 1,813 | 744 | 175 | 6 | 181 | 1,825 | 744 | 200 | 10 | 210 |
| 130 | 1050 | 160 | 65 | 45 | 5 | 50 | 156 | 65 | 45 | 5 | 50 | 156 | 65 | 47 | 5 | 52 | 159 | 65 | 52 | 5 | 57 |
| 131 | 1050 | 0 | 0 | 5 | 2,812 | 2,817 | 0 | 0 | 8 | 3,337 | 3,343 | 0 | 0 | 7 | 3,545 | 3,552 | 0 | 0 | 10 | 3,647 | 3,657 |
| 132 | 1050 | 285 | 116 | 0 | 321 | 321 | 282 | 116 | 0 | 380 | 380 | 283 | 116 | 0 | 383 | 383 | 284 | 116 | 0 | 438 | 438 |
| 133 | 1050 | 0 | 0 | 312 | 267 | 579 | 0 | 0 | 330 | 267 | 597 | 0 | 0 | 353 | 267 | 620 | 0 | 0 | 398 | 300 | 698 |
| 134 | 1051 | | | | | | | | | | | | | | | | | | | | |
| 135 | 1051 | 106 | 43 | 0 | 2 | 2 | 104 | 43 | 0 | 2 | 2 | 105 | 43 | 0 | 2 | 2 | 105 | 43 | 0 | 2 | 2 |
| 136 | 1051 | 0 | 0 | 0 | 200 | 200 | 0 | 0 | 20 | 352 | 372 | 0 | 0 | 60 | 353 | 413 | 144 | 222 | 100 | 380 | 480 |
| 137 | 1051 | 0 | 0 | 0 | 459 | 459 | 0 | 0 | 0 | 578 | 578 | 0 | 0 | 0 | 578 | 578 | 0 | 0 | 0 | 648 | 648 |
| 138 | 1051 | 413 | 166 | 30 | 30 | 60 | 408 | 168 | 45 | 30 | 75 | 438 | 179 | 52 | 30 | 82 | 439 | 179 | 90 | 30 | 120 |
| 139 | 1052 | 1,134 | 461 | 70 | 180 | 250 | 1,214 | 500 | 71 | 180 | 251 | 1,277 | 524 | 75 | 180 | 255 | 1,285 | 524 | 82 | 180 | 262 |
| 140 | 1052 | 935 | 380 | 0 | 250 | 250 | 923 | 380 | 0 | 250 | 250 | 926 | 380 | 0 | 250 | 250 | 1,270 | 518 | 0 | 255 | 255 |
| 141 | 1052 | 605 | 246 | 0 | 5 | 5 | 597 | 246 | 0 | 5 | 5 | 600 | 246 | 0 | 8 | 8 | 603 | 246 | 0 | 10 | 10 |
| 142 | 1052 | 735 | 299 | 0 | 5 | 5 | 726 | 299 | 0 | 5 | 5 | 729 | 299 | 0 | 7 | 7 | 733 | 299 | 0 | 10 | 10 |
| 143 | 1053 | 856 | 348 | 0 | 5 | 5 | 845 | 348 | 0 | 5 | 5 | 848 | 348 | 0 | 6 | 6 | 853 | 348 | 0 | 20 | 20 |
| 144 | 1053 | 0 | 0 | 0 | 692 | 692 | 0 | 0 | 0 | 753 | 753 | 0 | 0 | 0 | 753 | 753 | 0 | 0 | 0 | 893 | 893 |
| 145 | 1053 | 307 | 125 | 0 | 5 | 5 | 303 | 125 | 0 | 5 | 5 | 305 | 125 | 0 | 5 | 5 | 307 | 125 | 0 | 5 | 5 |
| 146 | 1053 | | | | | | | | | | | | | | | | | | | | |
| 147 | 1053 | 0 | 0 | 85 | 0 | 85 | 0 | 0 | 95 | 0 | 95 | 0 | 0 | 100 | 0 | 100 | 0 | 0 | 105 | 0 | 105 |
| 148 | 1053 | 334 | 136 | 0 | 5 | 5 | 330 | 136 | 0 | 5 | 5 | 331 | 136 | 0 | 9 | 9 | 334 | 136 | 0 | 10 | 10 |
| 149 | 1053 | 16 | 6 | 0 | 486 | 486 | 16 | 6 | 0 | 603 | 603 | 16 | 6 | 0 | 503 | 503 | 16 | 6 | 0 | 561 | 561 |
| 150 | 1053 | 202 | 82 | 0 | 5 | 5 | 199 | 82 | 0 | 5 | 5 | 200 | 82 | 0 | 7 | 7 | 201 | 82 | 0 | 10 | 10 |
| 151 | 1053 | 539 | 219 | 0 | 5 | 5 | 532 | 219 | 0 | 5 | 5 | 534 | 219 | 0 | 6 | 6 | 537 | 219 | 0 | 10 | 10 |
| 152 | 1053 | 831 | 338 | 10 | 10 | 20 | 821 | 336 | 15 | 10 | 25 | 828 | 381 | 16 | 10 | 26 | 834 | 381 | 20 | 10 | 30 |
| 153 | 1053 | 224 | 91 | 0 | 20 | 20 | 221 | 91 | 10 | 20 | 30 | 222 | 91 | 15 | 20 | 35 | 223 | 91 | 30 | 20 | 50 |
| 154 | 1054 | 772 | 314 | 40 | 5 | 45 | 762 | 314 | 42 | 5 | 47 | 843 | 346 | 43 | 5 | 48 | 849 | 346 | 50 | 5 | 55 |
| 155 | 1054 | 0 | 0 | 60 | 2,722 | 2,782 | 0 | 0 | 63 | 2,799 | 2,862 | 0 | 0 | 68 | 3,967 | 4,035 | 0 | 0 | 75 | 3,211 | 3,286 |
| 156 | 1055 | 364 | 148 | 0 | 5 | 5 | 359 | 148 | 0 | 5 | 5 | 361 | 148 | 0 | 5 | 5 | 363 | 148 | 0 | 5 | 5 |
| 157 | 1055 | 285 | 116 | 41 | 0 | 41 | 282 | 116 | 46 | 0 | 46 | 283 | 116 | 47 | 0 | 47 | 284 | 116 | 50 | 0 | 50 |
| 158 | 1055 | 0 | 0 | 0 | 173 | 173 | 0 | 0 | 0 | 173 | 173 | 0 | 0 | 0 | 173 | 173 | 0 | 0 | 0 | 175 | 175 |
| 159 | 1056 | 828 | 337 | 0 | 30 | 30 | 818 | 337 | 0 | 30 | 30 | 821 | 337 | 0 | 30 | 30 | 826 | 337 | 0 | 40 | 40 |
| 160 | 1056 | 794 | 323 | 0 | 30 | 30 | 784 | 323 | 0 | 30 | 30 | 787 | 323 | 0 | 30 | 30 | 792 | 323 | 0 | 31 | 31 |
| 161 | 1056 | 787 | 320 | 0 | 135 | 135 | 777 | 320 | 0 | 135 | 135 | 780 | 320 | 0 | 135 | 135 | 896 | 394 | 0 | 100 | 100 |
| 162 | 1057 | 337 | 137 | 0 | 30 | 30 | 333 | 137 | 0 | 30 | 30 | 836 | 343 | 0 | 65 | 65 | 841 | 343 | 150 | 125 | 275 |
| 163 | 1057 | 968 | 393 | 0 | 5 | 5 | 954 | 393 | 0 | 5 | 5 | 958 | 393 | 0 | 7 | 7 | 964 | 393 | 0 | 10 | 10 |
| 164 | 1057 | 2,248 | 913 | 0 | 20 | 20 | 2,216 | 913 | 0 | 20 | 20 | 2,225 | 913 | 0 | 20 | 20 | 2,238 | 913 | 0 | 20 | 20 |
| 165 | 1057 | 302 | 123 | 0 | 0 | 0 | 298 | 123 | 0 | 0 | 0 | 300 | 123 | 0 | 0 | 0 | 302 | 123 | 0 | 110 | 110 |
| 166 | 1058 | 856 | 348 | 0 | 5 | 5 | 845 | 348 | 0 | 5 | 5 | 848 | 348 | 0 | 7 | 7 | 853 | 348 | 0 | 10 | 10 |
| 167 | 1058 | 772 | 314 | 0 | 5 | 5 | 762 | 314 | 0 | 5 | 5 | 765 | 314 | 0 | 7 | 7 | 770 | 314 | 0 | 10 | 10 |
| 168 | 1058 | 789 | 321 | 40 | 257 | 297 | 779 | 321 | 43 | 286 | 329 | 782 | 321 | 43 | 286 | 329 | 787 | 321 | 50 | 300 | 350 |
| 169 | 1058 | 0 | 0 | 73 | 241 | 314 | 0 | 0 | 75 | 241 | 316 | 0 | 0 | 76 | 241 | 317 | 0 | 0 | 83 | 242 | 325 |
| 170 | 1058 | 903 | 367 | 0 | 110 | 110 | 891 | 367 | 0 | 110 | 110 | 894 | 367 | 0 | 110 | 110 | 900 | 367 | 0 | 120 | 120 |
| 171 | 1059 | 753 | 306 | 0 | 5 | 5 | 743 | 306 | 0 | 5 | 5 | 746 | 306 | 0 | 6 | 6 | 750 | 306 | 0 | 10 | 10 |
| 172 | 1059 | 952 | 391 | 0 | 7 | 7 | 949 | 391 | 0 | 7 | 7 | 953 | 391 | 0 | 8 | 8 | 959 | 391 | 0 | 25 | 25 |
| 173 | 1060 | 757 | 308 | 0 | 2 | 2 | 748 | 308 | 0 | 2 | 2 | 751 | 308 | 0 | 4 | 4 | 755 | 308 | 0 | 10 | 10 |
| 174 | 1060 | 455 | 185 | 0 | 4 | 4 | 449 | 185 | 0 | 4 | 4 | 451 | 185 | 0 | 8 | 8 | 454 | 185 | 0 | 10 | 10 |
| 175 | 1061 | 502 | 204 | 0 | 3 | 3 | 496 | 204 | 0 | 3 | 3 | 497 | 204 | 0 | 5 | 5 | 500 | 204 | 0 | 10 | 10 |
| 176 | 1061 | 0 | 0 | 350 | 0 | 350 | 0 | 0 | 400 | 0 | 400 | 0 | 0 | 621 | 0 | 621 | 0 | 0 | 881 | 0 | 881 |
| 177 | 1062 | 1,072 | 436 | 0 | 25 | 25 | 1,058 | 436 | 0 | 25 | 25 | 1,063 | 436 | 0 | 25 | 25 | 1,069 | 436 | 0 | 30 | 30 |
| 178 | 1062 | 0 | 0 | 0 | 20 | 20 | 0 | 0 | 0 | 20 | 20 | 0 | 0 | 0 | 20 | 20 | 0 | 0 | 0 | 20 | 20 |
| 179 | 1063 | 0 | 0 | 0 | 1,455 | 1,455 | 0 | 0 | 0 | 1,523 | 1,523 | 0 | 0 | 0 | 1,596 | 1,596 | 0 | 0 | 0 | 1,740 | 1,740 |
| 180 | 1064 | 266 | 108 | 0 | 3 | 3 | 262 | 108 | 0 | 3 | 3 | 263 | 108 | 0 | 6 | 6 | 265 | 108 | 0 | 10 | 10 |
| 181 | 1064 | 214 | 87 | 0 | 2 | 2 | 211 | 87 | 0 | 2 | 2 | 212 | 87 | 0 | 5 | 5 | 213 | 87 | 0 | 10 | 10 |
| 182 | 1064 | 411 | 167 | 0 | 6 | 6 | 405 | 167 | 0 | 6 | 6 | 407 | 167 | 0 | 8 | 8 | 410 | 167 | 0 | 10 | 10 |
| 183 | 1064 | 529 | 215 | 0 | 5 | 5 | 522 | 215 | 0 | 5 | 5 | 524 | 215 | 0 | 7 | 7 | 527 | 215 | 0 | 10 | 10 |
| 184 | 1064 | 278 | 113 | 0 | 2 | 2 | 274 | 113 | 0 | 2 | 2 | 275 | 113 | 0 | 2 | 2 | 277 | 113 | 0 | 5 | 5 |
| 185 | 1064 | 180 | 73 | 0 | 5 | 5 | 177 | 73 | 0 | 5 | 5 | 178 | 73 | 0 | 5 | 5 | 179 | 73 | 0 | 5 | 5 |
| 186 | 1065 | 480 | 195 | 55 | 330 | 385 | 473 | 196 | 60 | 330 | 390 | 475 | 195 | 65 | 330 | 395 | 617 | 251 | 75 | 345 | 420 |
| 187 | 1065 | 860 | 358 | 0 | 20 | 20 | 869 | 358 | 0 | 20 | 20 | 872 | 358 | 0 | 20 | 20 | 879 | 358 | 0 | 20 | 20 |
| 188 | 1065 | 167 | 64 | 42 | 905 | 947 | 165 | 64 | 43 | 995 | 1,038 | 166 | 64 | 46 | 995 | 1,041 | 168 | 64 | 50 | 1,055 | 1,105 |
| 189 | 1065 | 216 | 88 | 0 | 0 | 0 | 215 | 88 | 0 | 0 | 0 | 214 | 88 | 0 | 0 | 0 | 217 | 88 | 0 | 5 | 5 |
| 190 | 1065 | 0 | 0 | 0 | 1,642 | 1,642 | 0 | 0 | 0 | 1,773 | 1,773 | 0 | 0 | 0 | 1,888 | 1,888 | 0 | 0 | 0 | 1,971 | 1,971 |
| 191 | 1066 | 242 | 98 | 0 | 0 | 0 | 239 | 98 | 0 | 0 | 0 | 239 | 98 | 0 | 0 | 0 | 241 | 98 | 0 | 5 | 5 |
| 192 | 1066 | 281 | 114 | 41 | 0 | 41 | 278 | 114 | 43 | 0 | 43 | 278 | 114 | 44 | 0 | 44 | 281 | 114 | 48 | 0 | 48 |
| 193 | 1066 | 0 | 0 | 15 | 0 | 15 | 0 | 0 | 16 | 0 | 16 | 0 | 0 | 16 | 0 | 16 | 0 | 0 | 20 | 0 | 20 |
| 194 | 1066 | 0 | 0 | 0 | 2,422 | 2,422 | 0 | 0 | 0 | 2,512 | 2,512 | 0 | 0 | 0 | 2,804 | 2,804 | 0 | 0 | 0 | 3,100 | 3,136 |
| 195 | 1067 | 637 | 340 | 50 | 5 | 55 | 626 | 340 | 60 | 5 | 65 | 626 | 340 | 60 | 7 | 67 | 635 | 340 | 75 | 15 | 90 |
| Total | | 73,633 | 29,941 | 4,177 | 45,230 | 49,407 | 77,200 | 31,800 | 4,619 | 49,281 | 53,900 | 81,400 | 33,400 | 5,099 | 52,601 | 57,700 | 85,100 | 34,700 | 6,033 | 55,431 | 61,500 |

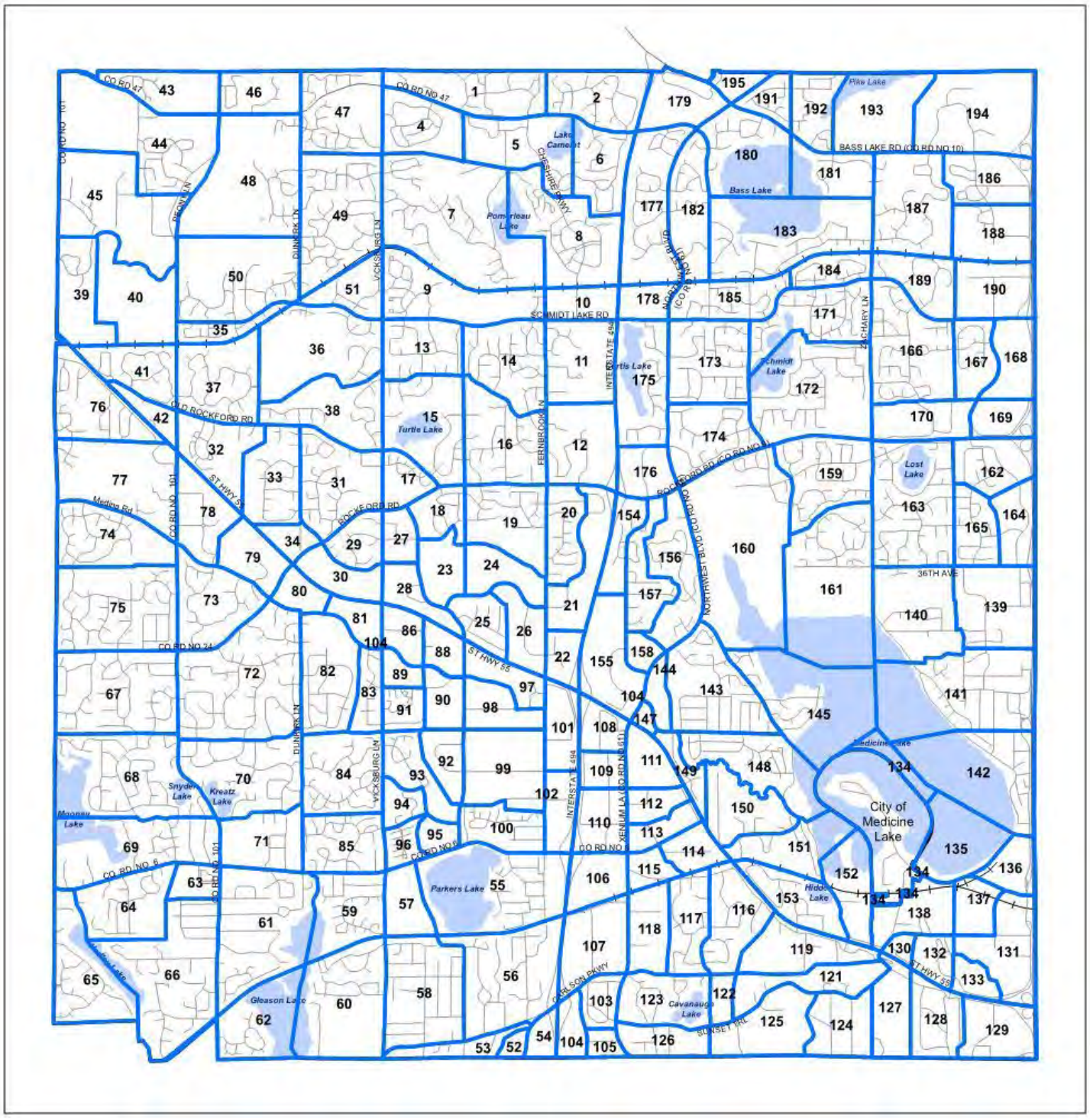



Figure 6A-5

# Traffic Analysis Zones

Plymouth TAZ Structure (2017)

N

City of Plymouth

Source: Metropolitan Council, SRF Consulting

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.




Figure 6A-6

# 2040 Forecast Annual Average Daily Traffic (AADT)

- Forecasted 2040 AADT
- Future Roadways (2017-2021 CIP)

N

City of Plymouth

Source: SRF Consulting, Minnesota Department of Transportation, Metropolitan Council

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

TABLE 6A-6
PLANNING-LEVEL ROADWAY CAPACITIES BY FACILITY TYPE

| Facility Type | Planning Level Daily Capacity Ranges (ADT) | Plymouth Daily Capacity (ADT) |
|---|---|---|
| Two-lane undivided urban | 8,000-10,000 | 10,000 |
| Two-lane undivided rural | 14,000-15,000 | 15,000 |
| Three-lane urban (two-lane divided with turn lanes) | 14,000-17,000 | 17,000 |
| Four-lane undivided urban | 18,000-22,000 | 22,000 |
| Five-lane urban (four-lane divided with turn lanes) | 28,000-32,000 | 32,000 |
| Four-lane divided rural | 35,000-38,000 | 38,000 |
| Four-lane freeway | 60,000-80,000 | 80,000 |
| Six-lane freeway | 90,000-120,000 | 120,000 |

## Existing Capacity Deficiencies

Using the methodology described above, existing capacity deficiencies were identified by comparing existing Annual ADT volumes to the thresholds in Table 6A-6 to identify and map roadways that currently exhibit capacity deficiencies. The existing traffic volumes and the existing number of lanes shown in Figure 6A-7 were used to develop the existing capacity deficiencies shown in Figure 6A-8. As illustrated in Figure 6A-8, "congested" roadway segments are defined as those with a volume-to-capacity ratio at or above 1.0, which signifies that a segment of road has observed volumes that exceed its design capacity, as identified in Table 6A-6.

TABLE 6A-7
ROADWAYS APPROACHING CAPACITY

| Roadway | V/C | Extent | |
|---|---|---|---|
| Highway 55 | 0.89 | Niagara Lane | Fernbrook Lane |
| Schmidt Lake Road | 0.95 | Cheshire Parkway | Underwood Lane |
| I-494 | 0.91 | South City Limits | North of CSAH 6 |
| Highway 169 | 0.98 | Highway 55 | 13th Avenue |
| Highway 169 | 0.94 | South of 26th Avenue | North City Limits |

TABLE 6A-8
ROADWAYS OVER CAPACITY

| Roadway | V/C | Extent | |
|---|---|---|---|
| 36th Avenue | 1.48 | Union Terrace Lane | East City Limits |
| Highway 169 | 1.08 | Highway 55 | South of 26th Avenue |

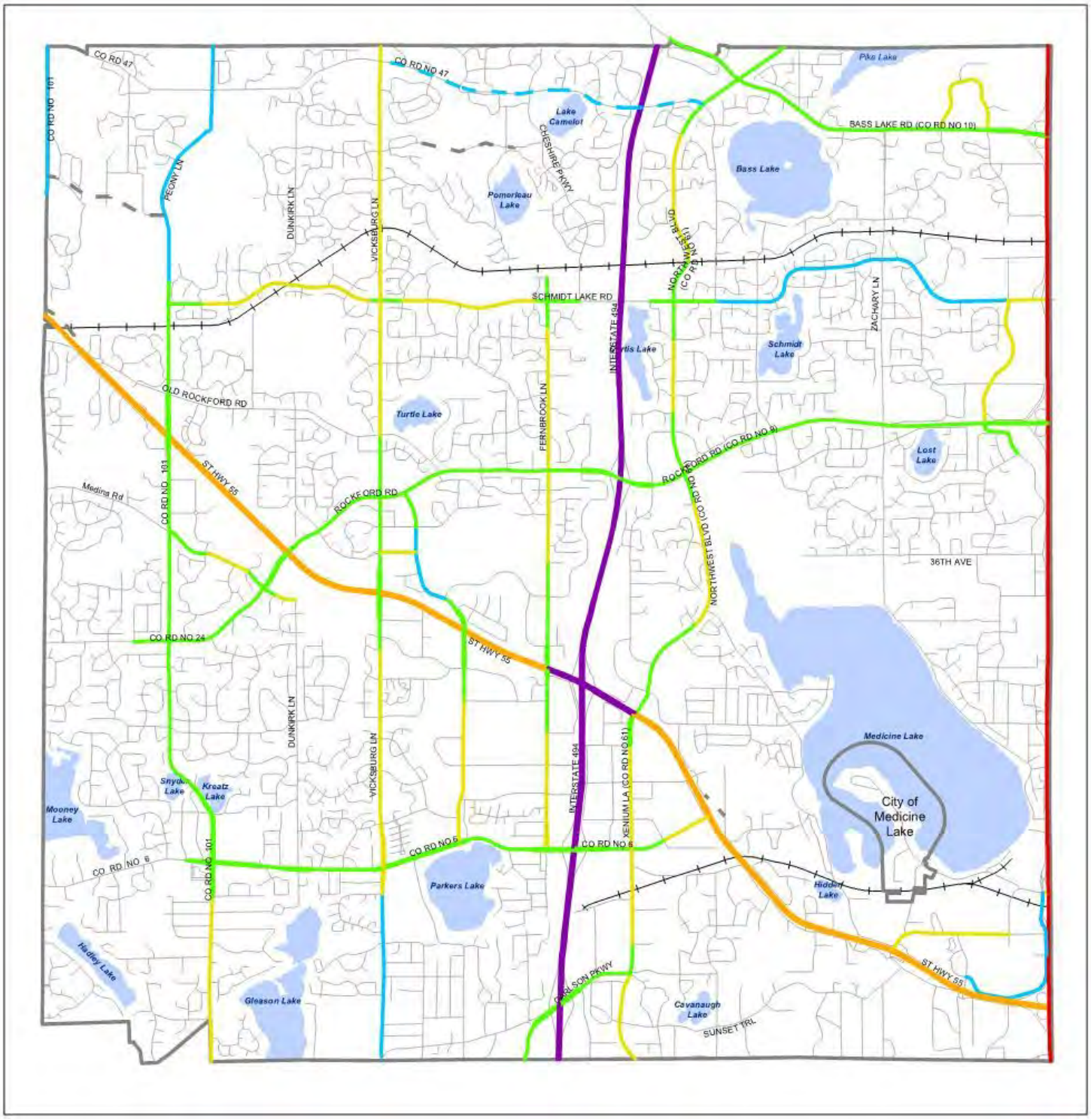



Figure 6A-7

# Existing and Future Roadway Characteristics

Source: SRF Consulting, Metropolitan Council, Hennepin County

- Two-lane roadway
- Two-lane divided urban (3-lane)
- Four-lane divided urban (5-lane)
- Four-lane undivided urban
- Four-lane expressway rural
- Four-lane freeway
- Six-lane freeway
- Future two-lane roadway
- Future two-lane divided urban (3-lane)

N

City of Plymouth

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Figure 6A-8

# Existing Capacity Deficiencies

**Existing Volume to Capaticy Ratio**

- Approaching Capacity (0.85 - 1.0)
- Over Capacity ( >1.0)

N

City of Plymouth

Source: SRF Consulting, Hennepin County, Metropolitan Council

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The methodology described above is a planning-level analysis that uses average daily traffic volumes and is not appropriate for all traffic conditions. For example, traffic conditions that do not fit the average daily traffic criteria (e.g., weekend travel, holiday travel, special events, etc.) are likely to produce different levels of congestion. Additionally, factors such as the amount of access and roadway geometrics may influence capacity.

## Congestion on the Regional Highway System

MnDOT defines congestion on freeway or highway facilities as traffic flowing at speeds less than or equal to 45 miles per hour (mph). According to MnDOT's annual (2015) *Metropolitan Freeway System Congestion Report*, there are a number of segments along I-494 and Highway 169 in Plymouth that are congested during both the morning and afternoon peak periods, trending more during the afternoon peak periods. The highest level of peak hour congestion in Plymouth occurs in the afternoon peak period along northbound I-494 and Highway 169. The City will continue to advocate for improvements to these roadways.

## Future Capacity Deficiencies

A planning-level analysis was performed on the existing roadway system to identify locations where capacity problems are expected to occur by the planning horizon year. Demand was estimated using the 2040 traffic forecasts shown in Figure 6A-6. Capacity was based upon the existing and proposed roadway geometrics and included the programmed roadway system improvements shown in Figure 6A-4. Figure 6A-7 shows the number of lanes that were assumed for the 2040 roadway system.

A similar volume to capacity analysis was conducted for forecasted 2040 conditions. Using this methodology, Figure 6A-9 illustrates Plymouth's anticipated future capacity problem areas.

The City will use this data as it develops plans for roadway improvements.

### TABLE 6A-9
### ROADWAYS APPROACHING CAPACITY

| Roadway | V/C | Extent | |
|---|---|---|---|
| Highway 55 | 0.91 | West City Limits | Vicksburg Lane |
| CSAH 101 | 0.90 | South City Limits | 13th Avenue |
| I-494 | 0.93 | North of CSAH 6 | South of CSAH 9 |
| CSAH 9 | 0.91 | Fernbrook Lane | End of East Interchange |
| Highway 169 | 1.00 | South of Schmidt Lake Road | CSAH 9 |
| Highway 55 | 0.89 | CSAH 6 | Highway 169 |

TABLE 6A-10
ROADWAYS OVER CAPACITY

| Roadway | V/C | Extent | |
|---|---|---|---|
| Highway 55 | 1.02 | Vicksburg Lane | Fernbrook Lane |
| I-494 | 1.07 | South City Limits | North of CSAH 6 |
| Schmidt Lake Road | 1.14 | Cheshire Parkway | Underwood Lane |
| Highway 169 | 1.05 | North City Limits | South of Schmidt Lake Road |
| Highway 169 | 1.01 | CSAH 9 | Highway 55 |
| 36th Avenue | 1.60 | Union Terrace Lane | East City Limits |

## SAFETY ISSUES

To assist in the evaluation of crashes, MnDOT maintains a database of crash records from around the State of Minnesota. These records identify the location, severity and circumstances associated with each crash. This dataset was reviewed to identify the number, location, and severity of crashes in Plymouth for the years 2011- 2015. These crashes were generally widely distributed throughout the city with most locations accounting for only one or two incidents, suggesting that a crash at that location was a random event. However, several of these crashes were concentrated at a limited number of locations. The ten intersection locations with the highest frequency of crashes between 2011 and 2015 are listed in Table 6A-11 and illustrated in Figure 6A-10. These intersections were also evaluated for critical index using MnDOT's crash rate methodology, shown in Table 6A-12. Per MnDOT, a critical index of 1.00 or less indicates performance within statewide trends. A critical index above 1.00 indicates that the intersection operates outside the expected, normal range.

There is a high correlation between the frequency of crashes and traffic volumes. Roadways with higher volumes are expected to have more total crashes than a lower volume roadway. Consequently, further investigation is warranted at the crash locations identified to evaluate the types of crashes occurring.

TABLE 6A-11
MOTOR VEHICLE CRASHES IN PLYMOUTH 2011 TO 2015

| Year | Fatal | Personal Injury Crashes | | | Property Damage | Total Crashes |
|---|---|---|---|---|---|---|
| | | Type A Incapacitating Injury | Type B Non-Incapacitating Injury | Type C Possible Injury | | |
| 2011 | 1 | 5 | 35 | 135 | 382 | 558 |
| 2012 | 2 | 5 | 45 | 143 | 480 | 676 |
| 2013 | 0 | 3 | 48 | 148 | 547 | 747 |
| 2014 | 1 | 5 | 42 | 175 | 589 | 811 |
| 2015 | 0 | 3 | 54 | 161 | 734 | 953 |
| Totals | 4 | 21 | 224 | 762 | 2,732 | 3,745 |

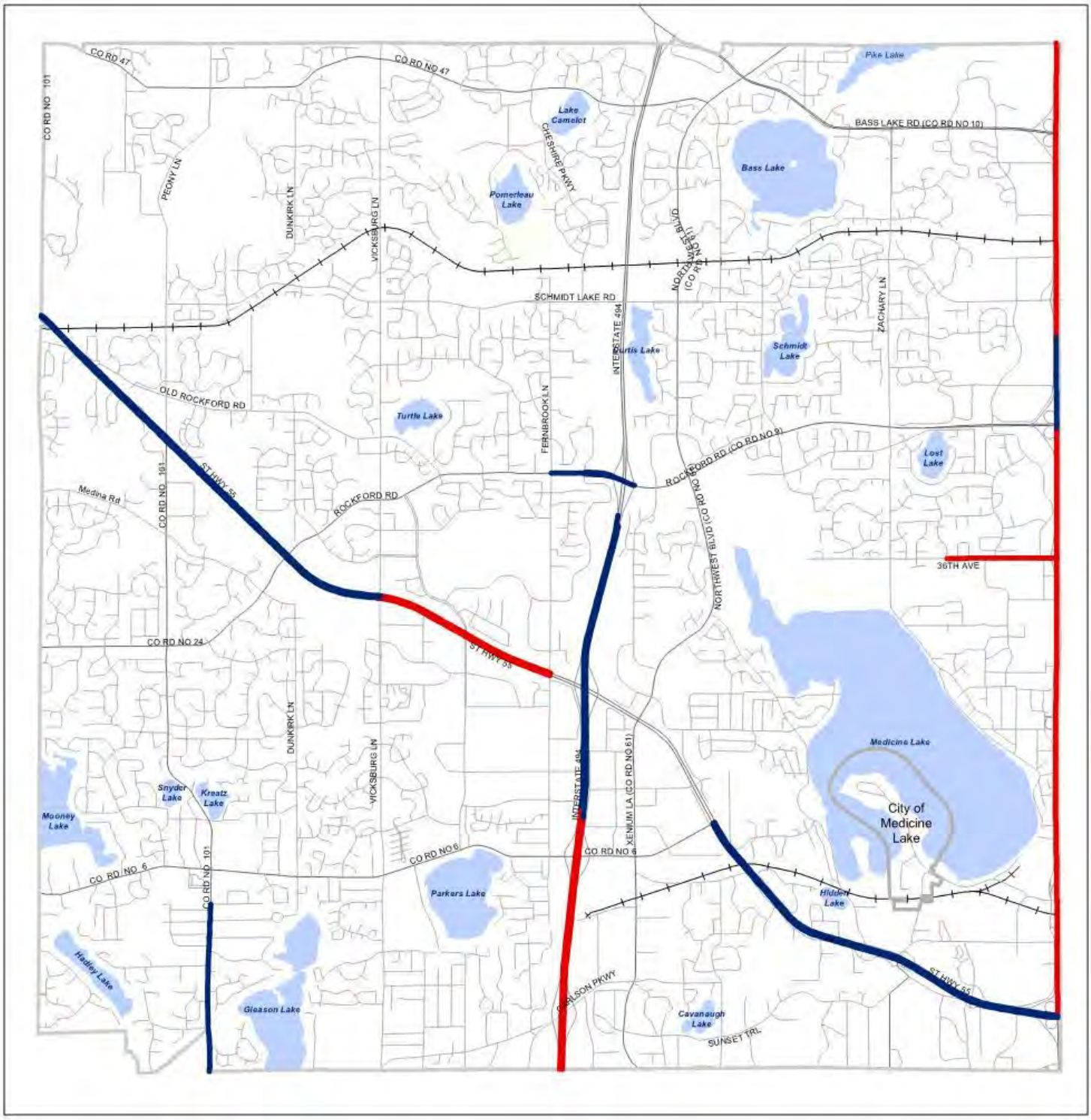



Figure 6A-9

# Forecasted (2040) Capacity Deficiencies

**Future Volume to Capacity Ratio**

- Approaching Capacity (0.85 - 1.0)
- Over Capacity ( >1.0)

N

City of Plymouth

Source: SRF Consulting, Hennepin County, Metropolitan Council

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TABLE 6A-12
TOP 10 INTERSECTION CRASH LOCATIONS IN PLYMOUTH 2011-2015 (BY FREQUENCY OF CRASHES)

| Intersection | | Severity | | | | | Traffic Control | Critical Index All Crashes | Critical Index Fatal & Type A |
|---|---|---|---|---|---|---|---|---|---|
| | | Fatal | Type A | Type B | Type C | Property Damage | | | |
| 1. | Highway 55 Vicksburg Lane | 0 | 0 | 3 | 16 | 50 | Signal | 1.11 | 0.00 |
| 2. | I-494 Northbound Ramp CSAH 9 | 0 | 0 | 2 | 14 | 48 | Signal | 1.59 | 0.00 |
| 3. | Highway 55 CSAH 24/CSAH 9 | 0 | 0 | 8 | 10 | 39 | Signal | 1.03 | 0.00 |
| 4. | Highway 55 South Shore Drive/CSAH 73 | 0 | 0 | 9 | 10 | 37 | Signal | 1.03 | 0.00 |
| 5. | Highway 55 Northwest Boulevard/Xenium Lane | 1 | 1 | 7 | 6 | 34 | Signal | 0.84 | 1.13 |
| 6. | Northwest Boulevard Bass Lake Road | 0 | 0 | 2 | 12 | 32 | Signal | 0.96 | 0.00 |
| 7. | Highway 55 Fernbrook Lane | 0 | 0 | 2 | 7 | 36 | Signal | 0.66 | 0.00 |
| 8. | Highway 55 CSAH 101/Peony Lane | 0 | 0 | 2 | 13 | 28 | Signal | 0.82 | 0.00 |
| 9. | Highway 55 Niagara Lane/Plymouth Boulevard | 0 | 1 | 2 | 12 | 25 | Signal | 0.72 | 0.58 |
| 10. | Highway 55 Revere Lane | 0 | 0 | 4 | 5 | 30 | Signal | 0.77 | 0.00 |

It is worth noting that the I-494 and CSAH 9 interchange area is represented here by the I-494 northbound ramp intersection. The I-494 southbound ramp intersection has a crash frequency outside of the Top 10 within the city; however, as a system these two intersections are each affected by poor geometric conditions between the ramp accesses and CSAH 9. The severity of crashes at the I-494 southbound ramp is generally high.

## Right-of-Way Preservation

Right-of-way (ROW) is a valuable public asset. Therefore, it needs to be protected and managed in a way that respects the roadway's intended function, while serving the greatest public good. Plymouth will need to reconstruct, widen, and construct new roadway segments to meet future capacity and connectivity demands due to its current and anticipated growth. Refer to Figure 6A-9 for 2040 capacity deficiencies. Future improvements will require adequate ROW be maintained or secured. The City will coordinate with MnDOT and Hennepin County for ROW acquisition along state and county routes, respectively.

## Access Management

Access management is an important aspect of providing a safe and efficient roadway network. Access management measures include:

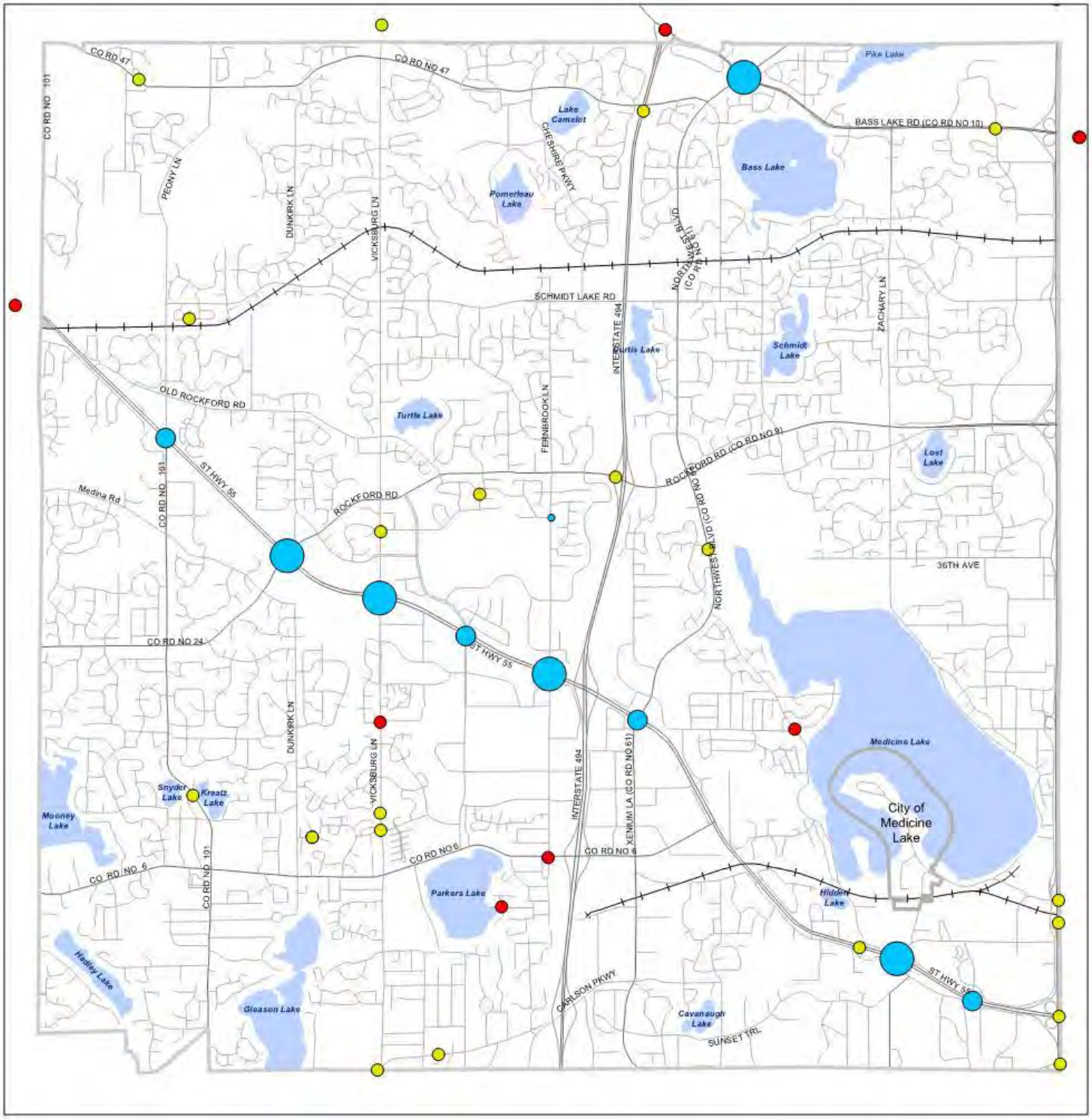



Figure 6A-10

# Crash Data (2011-2015)

**Crash Frequency at Top 10 Intersections**

- 0 - 5
- 6 - 45
- 46 - 60

**High Severity Crashes**

- Incapacitating Injury
- Fatality

N

City of Plymouth

Source: SRF Consulting, Minnesota Department of Transportation

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- Providing adequate spacing between access points and intersecting streets to separate and reduce conflicts.
- Limiting the number of driveway access points to reduce conflicts.
- Aligning access with other existing access points.
- Sharing access points, through internal connectivity between property owners.
- Encouraging indirect access rather than direct access to high volume arterial roads.
- Constructing parallel roads and backage or frontage roads.
- Implementing sight distance guidelines to improve safety.
- Using channelization to manage and control turning movements.

Access review is a major aspect of the City's project review process. The goal is to maintain the safety and capacity of the city's roadways, while providing adequate land access.

The City will continue to support MnDOT and Hennepin County's Access Management guidelines on the principal and minor arterial roadway network in the city through the measures listed above. In addition, the City uses Hennepin County's access spacing guidelines to guide access decisions on the City's arterial and major collector roadway network.

## PAVEMENT CONDITION

The City of Plymouth applies varying pavement preservation techniques to its roadway mileage to maintain it in a state of good repair. Most recently the City has been applying the edge mill and overlay program. This came as a result of the Pavement Management Report 2010 and Beyond. The City also applies the Pavement Surface Evaluation and Rating (PASER) methodology for rating the street system, along with PASER-recommended pavement management strategies.

In 2010, the system-wide weighted average PASER rating was 6.6 (good). Since 2010, the City has invested $19,000,000 in the edge mill and overlay program and $1,750,000 in the mill and overlay program (full width milling), which equates to $210,000 per mile. This investment also represents 55 percent of the total investment in the City's street system since 2010, excluding large transportation projects like Peony Lane and Vicksburg Lane. Street reconstruction and new streets make up the remaining 45 percent of the total investment. Following completion of these improvements, the system-wide average PASER rating was 7.4 (good) in 2016.

## PASER System

PASER, developed by University of Wisconsin-Madison and Wisconsin Department of Transportation, holds regional relevancy. This pavement rating system is a 1 to 10 visual rating system, 1 being the worst pavement condition (failed) and 10 the best (excellent). Each visual rank is then related to a needed maintenance or repair. Table 6A-13 shows the PASER rating system and related maintenance or repair. Figure 6A-11 represents the existing (2016) pavement quality according to the PASER rating system.

### TABLE 6A-13
### ADAPTED PASER PAVEMENT RATING

| Surface Rating | | General Condition | Needed Maintenance |
|---|---|---|---|
| 10 | Excellent | New construction. | Routine maintenance |
| 9 | | Recent overlay. Like new. | |
| 8 | Very Good | Recent sealcoat or new cold mix. Little or no maintenance required. | |
| 7 | Good | First signs of aging. Maintain with routine crack filling. | |
| 6 | | Shows signs of aging. Sound structural condition. Could extend life with sealcoat. | Mill and overlay |
| 5 | Fair | Surface aging. Sound structural condition. Needs sealcoat or thin, non-structural overlay (less than 2”). | |
| 4 | | Significant aging and first signs of need for strengthening. Would benefit from a structural overlay (2” or more). | |
| 3 | Poor | Needs patching and repair prior to major overlay. Milling and removal of deterioration extends the life of overlay. | Reconstruction |
| 2 | Very Poor | Severe deterioration. Needs reconstruction with extensive base repair. Pulverization of old pavement is effective. | |
| 1 | Failed | Failed. Needs total reconstruction. | |

## TRAFFIC MANAGEMENT STRATEGIES

### Traffic Signals

A well-coordinated traffic signal system will promote the efficient flow of traffic along the ‘A’ minor arterials in the city. Such a system reduces the likelihood that through traffic will divert to local streets.

The City will work with Hennepin County to periodically monitor the progression of traffic signals on key county roadways to ensure efficient system operation.

Operational refinement of the signal system will take place on an ongoing basis. New traffic signals will be built at intersections where specific signal warrants are met and funding is available. Intersection improvements will be considered on a site-by-site basis. They will be constructed consistent with the warrants identified in the state Manual on Uniform Traffic Control Devices, when funding is available. Warrants include specific thresholds relating to traffic volumes and considerations of safety and pedestrian activity.

## Stop Signs

The City of Plymouth receives many requests for the installation of stop signs to manage speed and other perceived traffic safety problems in residential neighborhoods. City staff evaluates each stop sign request by either applying the City's neighborhood traffic calming program for local or minor streets in residential areas or by using the state uniform traffic warrant criteria for all other stop sign requests. The City Council then considers the request in light of adopted City policies.

## Traffic Calming

The primary function of minor collector and local streets is to provide access to homes and other uses along the street. However, these streets may also provide routes for traveling to and from a neighborhood or for passing through a neighborhood. Conflicts arise between these latter functions when residents become concerned about traffic volumes, traffic speeds and pedestrian safety.

Traffic calming generally refers to strategic physical changes made to streets to reduce vehicle speeds, improve safety, discourage through traffic on residential streets and decrease the automobile's visual dominance in a neighborhood setting. There are many different activities that may be referred to as traffic calming.

Examples include raised intersections and crosswalks, traffic circles, neck-downs, curvilinear streets, street narrowing, medians and islands, pedestrian treatments, and streetscaping. These traffic-calming treatments are appropriate on low volume local and minor collector streets where excessive speeds pose a safety problem.

Cut-through traffic in neighborhoods can best be discouraged by having an arterial system that is spaced and operated so that through traffic finds the arterial system more attractive to use than the neighborhood streets.

The City will consider requests for traffic calming devices on a case-by-case basis, consistent with the City's adopted neighborhood traffic calming program.

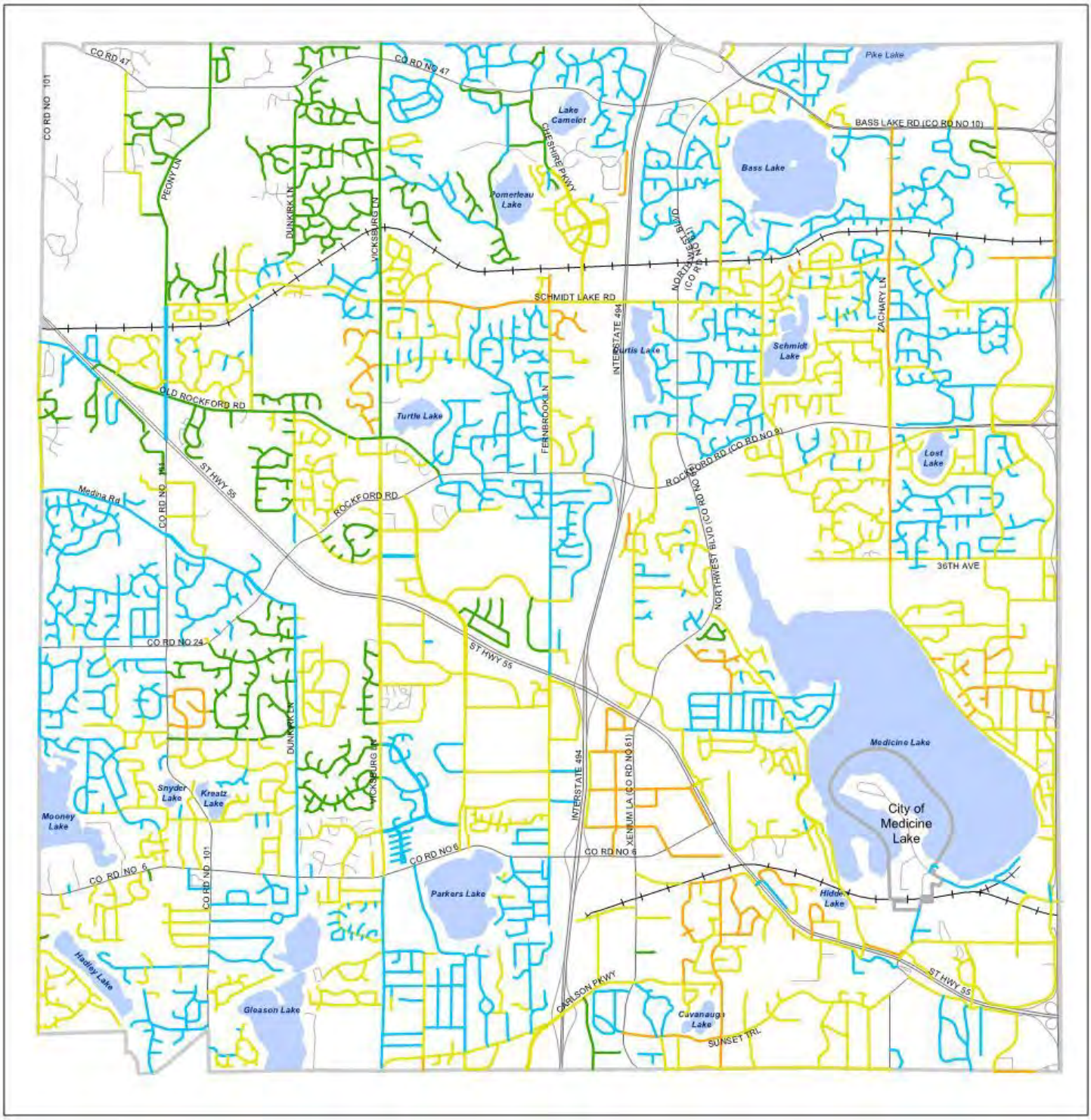



Figure 6A-11

# Pavement Quality 2016

Source: SRF Consulting

**Existing Pavement Rankings**

- Fair (4-5)
- Good (6-7)
- Very Good (8)
- Excellent (9-10)

N

City of Plymouth

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## TRANSIT SYSTEM

The City of Plymouth operates an independent transit system under its legislatively permitted status as a suburban transit authority. Plymouth Metrolink, the City's transit service, provides nine regular-route express commuter bus service to downtown Minneapolis and the University of Minnesota, four local connection routes, and dial-a-ride service. Plymouth Metrolink also operates four park-and-ride facilities and one walk-up bus station. There are six Metro Transit routes that serve either in or near the border of Plymouth in areas where people who live or work in Plymouth may catch the bus. Plymouth's transit system and bus routes that serve nearby help Plymouth residents access jobs, services, school and activities in the city and surrounding jurisdictions. Plymouth enjoys transit advantages that allow transit priority over private vehicle traffic. In Plymouth there are bus-only shoulders along Highway 169 through the city limits, and there is one meter bypass at 36th Avenue and Highway 169 that supports routes 790 and 793.

### TABLE 6-14
### BUS ROUTES THAT SERVE PLYMOUTH RESIDENTS

| Transit Service | Commuter | Reverse Commuter | Metro Transit Routes |
|---|---|---|---|
| Express | 772, 774, 776, 777, 790, 793, 795 | 742, 747 | - - - |
| Local | 771, 791 | 740, 741 | 717, 755 |

Plymouth continues to be classified with the community designation of suburban edge in the most recent update of the Metropolitan Council's Thrive MSP 2040 plan. In the Metropolitan Council's Transportation Policy Plan, most of Plymouth is designated as Transit Market Area III, while the expanding northwest and southwest corners of the city are designated as Transit Market Area IV. Transit Market Area III is characterized by a focus on express commuter services, with local routes that provide basic coverage, and dial-a-ride is sometimes offered as a complement. Transit Market Area IV has about half of the ridership potential as compared to Area III, offering peak period express service where there is appropriate demand and public dial-a-ride.

Two Metro Transit local routes connect Plymouth to neighboring suburban municipalities to the east. Route 717 is a local route operated by Metro Transit that connects Brooklyn Center, Robbinsdale, and the Nathan Lane Park-and-Ride in Plymouth hourly between 6:30 a.m. and 10:00 p.m. on weekdays. Route 755 connects employers on Trenton Lane north of Bass Lake Road to New Hope, Crystal, and Golden Valley before ending in downtown Minneapolis with six routes every half-hour for peak travel times in the morning and afternoon.

## STATIONS AND PARK AND RIDES

There are four park-and-ride facilities in Plymouth, with a total parking capacity of 588 spaces as of the end of 2016.

Station 73 is the main hub for commuter routes. With 288 parking spaces and under 60 percent utilization, Station 73 can accommodate growth. Eight routes serve Station 73, three local routes and five commuter routes. There is an indoor climate-controlled waiting area with a restroom and drinking fountain.

Nathan Lane Park-and-Ride has 120 parking spaces, though utilization has been consistently below 50 percent since 2014. Nathan Lane is served by two express routes, one local connector route, and one regional route operated by Metro Transit, 717. This park-and-ride facility may be relocated to the former Four Seasons Mall site if that site is redeveloped.

The Olive Lane Park-and-Ride had been near or at capacity since 2013. In 2016, an agreement was reached with a nearby church, St. Phillip the Deacon, that they would allow use of 100 of their parking spaces, a five-space increase. With the relocation, Olive Lane was renamed St. Phillip. St. Phillip offers a bike rack in addition to parking spaces.

Dunkirk Lane Park-and-Ride, a shared space with Plymouth Presbyterian Church, was opened in 2016. There are spaces for 50 vehicles, and although use was reported in MetroTransit's 2016 Annual Regional Park-and-Ride System Report as below 30 percent, it has risen as the station has become more well-known. Currently, only Express Route 774 serves Dunkirk Lane, though Route 776 stops nearby.

Reserve Transit Station is a walk-up station in a high-density housing development served by Route 777. This station is climate-controlled and offers restrooms.

## BUS STOPS

Bus stops in Plymouth are signed. Some bus stops have benches or other amenities such as bike racks. Plymouth MetroLink buses stop for passengers at any safe intersection, in addition to formal bus stops.

## KEY TRANSIT ISSUES

Specific transit issues faced by the City of Plymouth include:

- Continuing to identify a stable and reliable source of funding.
- Increasing demand for transit services, especially express commuter trips. Later bus service is important for non-traditional work schedules, coupled with more trips in the mid-morning following peak morning commute time and night service.
- Need for suburb-to-suburb transit options with sustainable operations and thoughtful implementation.
- Participation in regional transitway development to improve travel time and quality.
- Monitoring the need for service in the northwest part of Plymouth. When density reaches a tipping point, consider the benefits of partnership with Maple Grove Transit System.
- Continuing to engage the business community to identify changing commuter needs.
- Continuing to monitor bus rapid transit (BRT) studies and transit alternatives along Highway 55 for opportunities to connect service.
- Continuing to assess service performance to improve service where needed and eliminate unproductive trips.

Plymouth is not expected to change from a suburban edge community, and should continue to maintain a similar level of service.

Currently, planned and constructed transitways do not reach Plymouth. However, as future transitways are completed, more studies will be undertaken to determine if connections to transitway service benefit riders. The construction of transitways may disrupt or change service for some routes that serve Plymouth and should be reviewed periodically.

The City recognizes that transit is more successful when surrounded by appropriate land use, and actively incorporates all transportation modes into its review of development and redevelopment.

## TRANSIT SYSTEM IMPROVEMENTS

Based on a review of the existing transit system and an evaluation of future transit needs, the City will:

- Continue to actively coordinate with adjacent communities and transit service providers on services and facilities.
- Monitor service performance to eliminate low performing trips and allocate resources to where there is service demand.

- Implement improved operating efficiencies in the form of route streamlining, rescheduling, and larger capacity vehicles to contain rising costs.
- Continue to review and plan for additional transit services and facilities where they can be shown to be cost competitive.
- Continue to engage Metro Transit in discussions about regional transit corridors.
- Seek to better integrate transit facilities and services with land use and other infrastructure where appropriate.
- Continually consider possibilities of better locations and partnership agreements for park and ride lots. Partner with local organizations (i.e., churches) that have empty parking lots during weekdays.

## EXISTING BICYCLE FACILITIES

Plymouth has a well-developed local bicycle system, much of which emanates from local parks and schools, and connects to the broader transportation system, including three regional trails. Over the last decade, Plymouth has also incorporated off-street trails or sidewalks into major roadway improvements, which has been transformative for the bikeway network.

### RBTN NETWORK

The Regional Bicycle Transportation Network (RBTN), developed as an outcome to the Regional Bicycle System Study, serves as a framework of designated regional corridors and alignments and defines critical bicycle transportation links, to help cities guide their bikeway planning and development. The RBTN is subdivided into two tiers for regional planning and investment prioritization:

- Tier 1 – Priority Regional Bicycle Transportation Corridors and Alignments. These corridors and alignments have been determined to provide the best transportation connections to regional facilities and developed areas, and are given the highest priority for transportation funding.
- Tier 2 - Regional Bicycle Transportation Network Corridors and Alignments. These corridors and alignments are the second highest priority for funding. They provide connections to regional facilities in neighboring cities, and serve to connect priority regional bicycle transportation corridors and alignments.

The Tier 1 Corridors and Alignments in Plymouth primarily follow a north-south and east-west orientation, emanating from Clifton E. French Regional Park and connecting to the west to the Rockford

Road/County Road 24 corridor, to the east along 36th Avenue to the Winnetka Avenue north-south corridor, and south to the Hopkins Crossroad north-south corridor.

The Tier 2 Corridors and Alignments intersect the priority segments, most notably north-south along Vicksburg Lane, and segments of Peony Lane, Northwest Boulevard, Zachary Lane, and Highway 169, making connections to Eagle Lake Regional Park in Plymouth, and further north to Elm Creek Park Reserve. East-west segments, including Rockford Road/County Road 24, Old Rockford Road, Bass Lake Road, and Medicine Lake Road, stretch to enhance connections to regional facilities such as Crow Hassan Park Reserve and Baker Park Reserve, as well as significant development centers.

## LINKING LOCAL TRAILS TO THE RBTN NETWORK

The existing and planned network of bikeways in Plymouth is strong. The three existing regional trails closely relate to the designated RTBN alignments, except for Medicine Lake Regional Trail, which runs just east of one of the Tier 1 Corridor areas.

Locally, Plymouth has extensive existing and planned bikeways in each of the RBTN Corridors – in particular, the north-south corridors. Plans to extend trails on the western edge of Plymouth, including the Northwest Greenway and 24th Avenue, will further strengthen the connection to Crow Hassan Park Reserve and Baker Park Reserve.

On a regional level, the plan includes three Regional Trail 2040 System Additions and Search Corridors. These search corridors propose regional trails to provide connections between regional park system facilities where the trail alignment has not yet been planned. These include:

- Eagle Lake Regional Trail Search Corridor – connecting to Fish Lake, Eagle Lake and Clifton E. French Regional Parks, in addition to Medicine Lake, Luce Line and Lake Minnetonka LRT Regional Trails.
- Lake Sarah Regional Trail Search Corridor – connecting Lake Rebecca and Baker Park Reserves, in addition to Crow River, Lake Independence and Medicine Lake Regional Trails, and Diamond Lake Regional Trail Search Corridor.
- North-South 2 Regional Trail Search Corridor – connecting Medicine Lake Regional Trail, French Regional Park, Luce Line Regional Trail, Lake Minnetonka LRT Regional Trail, Minnesota River Bluffs LRT Regional Trail, Bryant Lake Regional Park, and County Road 61 Regional Trail Search Corridor.

The RBTN Corridors within Plymouth correspond closely to these areas, except for the North-South 2 Regional Trail Search Corridor.

The main routes, through both existing and planned facilities, that fulfill the RBTN network are:

- North-South corridors: Vicksburg Lane, Zachary Lane, Medicine Lake Regional Trail and Northwest Boulevard.
- East West corridors: Northwest Greenway, Luce Line Regional Trail, and County Road 24/Rockford Road.

## CONNECTIONS TO REGIONAL EMPLOYMENT CLUSTERS

The City of Plymouth has three regional employment clusters that are characterized by significant development with important connections to the community due to their concentrated areas of professional, commercial, retail, and industrial uses. Finding ways to reduce single-occupancy trips is more important than ever. Enhancing connections to these areas has a positive impact on the creation of more diverse mode-share split opportunities. The three regional employment clusters are:

- I-494 and Highway 55
- Highway 169 and Bass Lake Road
- Highway 169 and 13th Avenue

Creating a strong relationship to the existing and planned local and regional bicycle facilities is critical in each area. The largest, Cluster 1, located at I-494 and Highway 55, is centrally located within Plymouth, and falls mostly within the RBTN Corridor network. The city's local system traverses this node at several north-south and east-west corridors, providing a solid grid for commuters.

Clusters 2 and 3, located at the intersections of Highway 169 and Bass Lake Road and Highway 169 and 13th Avenue, respectively, are both located along the eastern edge of the city. Both clusters correspond to the RBTN Corridor. Cluster 2 has a weak connection to the Eagle Lake Regional Trail, which extends out of Plymouth. Cluster 3 is connected via the Luce Line Regional Trail, also an RBTN-designated alignment. Within each cluster, there are local trails that can be added to enhance connections to the larger system.

The following sections identify and describe gaps within the existing and planned system, to enhance and complete these connections.

## GAPS IN THE EXISTING TRAIL SYSTEM

Plymouth has planned for and made significant investments in trail infrastructure. Identifying gaps in the local trail system, including connections to city parks, schools, regional employment clusters, regional trails and the RBTN, will help identify specific locations to improve trail connections throughout the city (refer to Figure 6A-24). There are four categories of identified gaps:

- Connections to the Regional Bicycle Transportation Network (RBTN)
- Connections to local regional employment clusters
- Connections to regional parks and trails
- Local connections

## PEDESTRIAN SYSTEM NEEDS

Plymouth has experienced significant growth since the 1990s. The City has built bikeways into planned developments. In addition, the city has extensive sidewalk and on-street bikeway facilities. A major feature in the northwest part of the city is the Northwest Greenway, which connects residents to natural areas and the larger regional network. A full discussion of pedestrian system needs is found in Chapter 7.

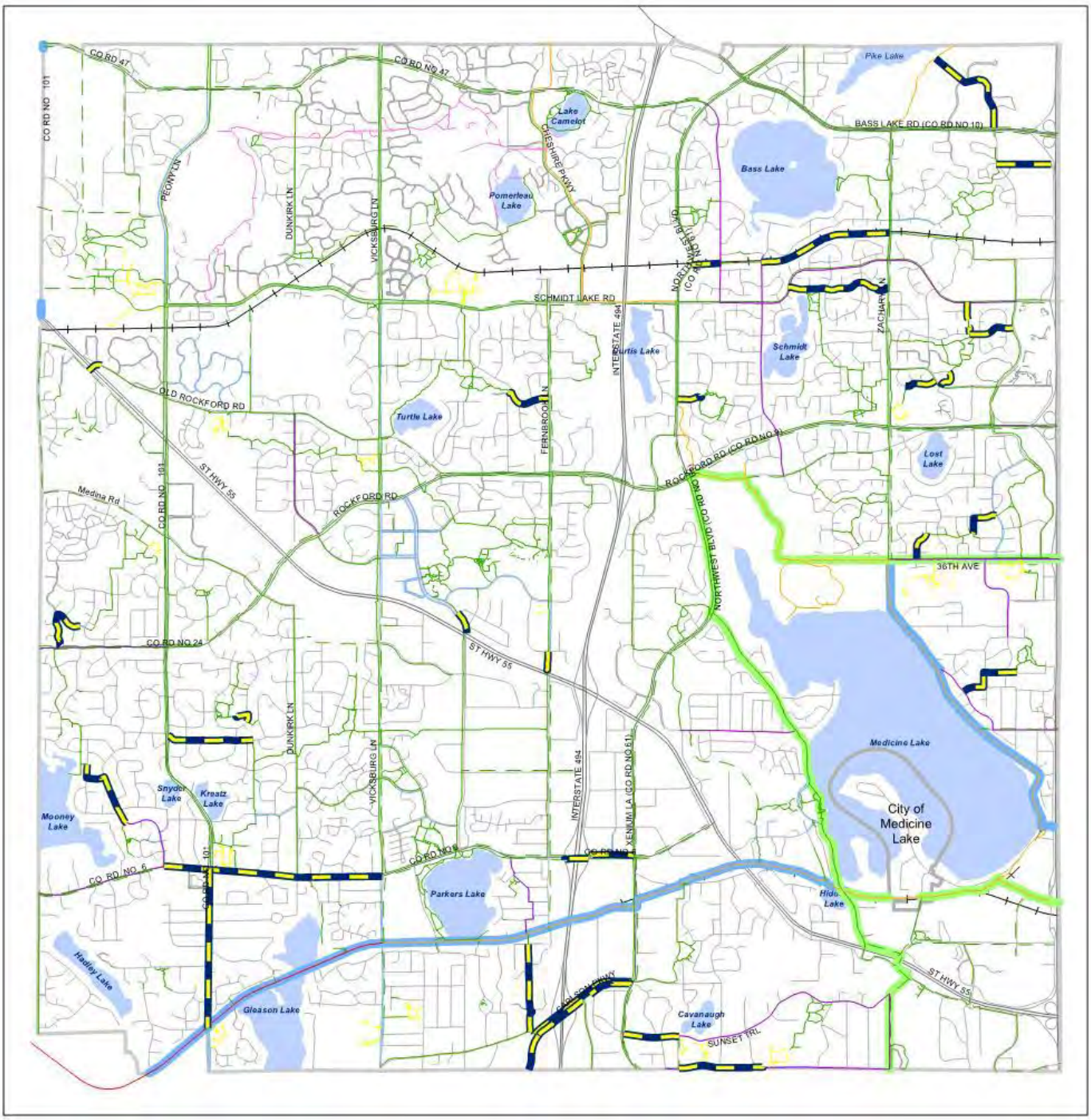



Figure 6A-24

**Existing and Planned Sidewalk & Trial System: Gaps Identified**

RBTN Tier 1 Alignment
RBTN Tier 2 Alignment
TrailGaps
City Sidewalk
City Trail
Minnesota DNR State Trail
Northwest Greenway Trail
On-Road Bike Route
Private Trail
Proposed City Trail
Proposed NW Greenway Trail
School Trail
Three Rivers Park Regional Trail

City of Plymouth

Source: SRF Consulting
Metropolitan Council

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THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## AVIATION PLAN

The City of Plymouth's role in the provision of air transportation in the metropolitan area is to ensure that structures of significant height are compatible with air traffic. There are no airports located with the city. Seaplane operations are permitted on Medicine Lake and Schmidt Lake. The City allows heliports in business and institutional districts by conditional use permit. Private heliports are located at:

- Prudential Insurance Company
- Advance Machine Company
- Private residence on Schmidt Lake

According to both Federal Aviation Administration (FAA) and MnDOT Aeronautics safety standards, any applicant who proposes to construct a structure 200 feet above the ground level must obtain appropriate approval by submitting FAA Form 7460-1 "Notice of Proposed Construction or Alteration," under Code of Federal Regulations Part 77. These forms must be submitted 30 days before alteration/construction begins or the construction permit is filed, whichever is earlier. MnDOT must also be notified (see MnDOT Rules Chapter 8800).

Federal Regulation Title 14, Part 77 establishes standards and notification requirements for objects affecting navigable airspace. The notification process provides a basis for:

- Evaluating the effect of the construction or alteration on operating procedures;
- Determining the potential hazardous effect of the proposed construction on air navigation;
- Identifying mitigation measures to enhance safe air navigation; and
- Charting of new objects.

Existing obstructions (200 feet or more in height) to air navigation in Plymouth include the self-supporting microwave tower in the Minneapolis Industrial Park at 13300 15th Avenue and the public safety communication tower at the Adult Correctional Facility at 1145 Shenandoah Lane. The microwave tower is 310 feet high and was approved by the FAA in 1972. The public safety communication tower is 350 feet high and was approved by the FAA in 1998.

The City permits microwave towers and radio and television broadcasting towers in areas guided industrial or public/semi-public/institutional. The City will notify the MnDOT Aeronautics Division and the Metropolitan Council when proposed structures are 200 feet or more in height.

## FREIGHT SYSTEM PLAN

A major component of Plymouth's freight system is the roadway network. Key freight corridors within Plymouth include I-494 and non-interstate highway corridors, including Highway 169 and Highway 55. Highway 169 is a limited access roadway that provides for uninterrupted traffic flows with a relatively high level of service. Highway 169 was identified as a major freight corridor that serves several industrial centers in the 2016 Hennepin County Freight Study.

The County State Aid Highway (CSAH) System connects to heavy freight corridors and provides first- and last-mile connections to local customers and businesses. CSAH routes that parallel interstate highways or connect to industrial and commercial centers support the transportation of freight within Plymouth. These routes include CSAH 61, which parallels I-494, and CSAH 9 and CSAH 6, which intersect a major industrial area at the I-494/Highway 55 interchange.

The rail network in the City of Plymouth includes an active line located in the southeastern portion of the city operated by Union Pacific and an east-west rail line that traverses the northern portion of the city and is owned by Canadian Pacific (refer to Figure 6A-25). An abandoned rail line extends west from the active Union Pacific rail line. The Canadian Pacific rail line provides important regional and local connections, most notably to downtown Minneapolis and intercepts the economic center along Highway 169 between CSAH 9 and CSAH 10 (refer to Figure 6A-25). The Union Pacific railroad provides access to the freight intensive area near the I-494/Highway 55 interchange.

There are no barge facilities or intermodal freight terminals within the City of Plymouth.

### FREIGHT GENERATORS

Figure 6A-25 illustrates the location of freight generators that include major economic centers. Of these economic centers, the I-494/Highway 55 interchange area is significant to the City's freight network as it was identified as a freight intensive cluster in the 2016 Hennepin County Freight Study. Freight intensive clusters generate large amounts of truck, rail, or intermodal activity. The I-494/Highway 55 cluster consists primarily of manufacturing, wholesale trade, transportation and warehousing establishments and a few agriculture facilities. An active railroad track operated by Union Pacific provides access to the southern portion of this cluster.

## HEAVY COMMERCIAL VEHICLE VOLUMES

Existing (2013) heavy commercial annual average daily traffic (HCAADT) volumes are depicted in Figure 6A-25. High volume corridors include I-494, Highway 169, Highway 55 and the I-494/Highway 55 interchange area. CSAH 6, CSAH 9 and CSAH 61 in the city have been identified as among the most heavily used routes within Hennepin County. Segments of these roadways are estimated to support up to 500 trucks per day. CSAH 61 is estimated to carry over 1,000 trucks per day, based on 2015 data.

## SAFETY AND CAPACITY ISSUES

All industrial areas in Plymouth are located within adequate access to the metropolitan highway system. The interstate and Minnesota trunk highway systems in Plymouth are all built to 10-ton axle loading standards, and are part of either the National Truck Network or the Minnesota Twin Trailer Network, allowing extra capacity and flexibility for commercial trucking. This major highway coverage reduces the impact of truck traffic on local roadways and minimizes the potential for disruption of neighborhoods.

It is important that commercial vehicle traffic from industrial, warehouse and commercial land uses be adequately considered. Increased traffic can be sufficiently accommodated through the following measures:

- Locating freight-intensive land uses in areas with proximity to the metropolitan highway system and with ample access to minor arterials;
- Using acceptable design standards on arterials, ensuring adequate turning radius, pavement depth, and space for commercial vehicles; and
- Providing adequate signage and marking along roadways to minimize commercial vehicle traffic through residential neighborhoods.

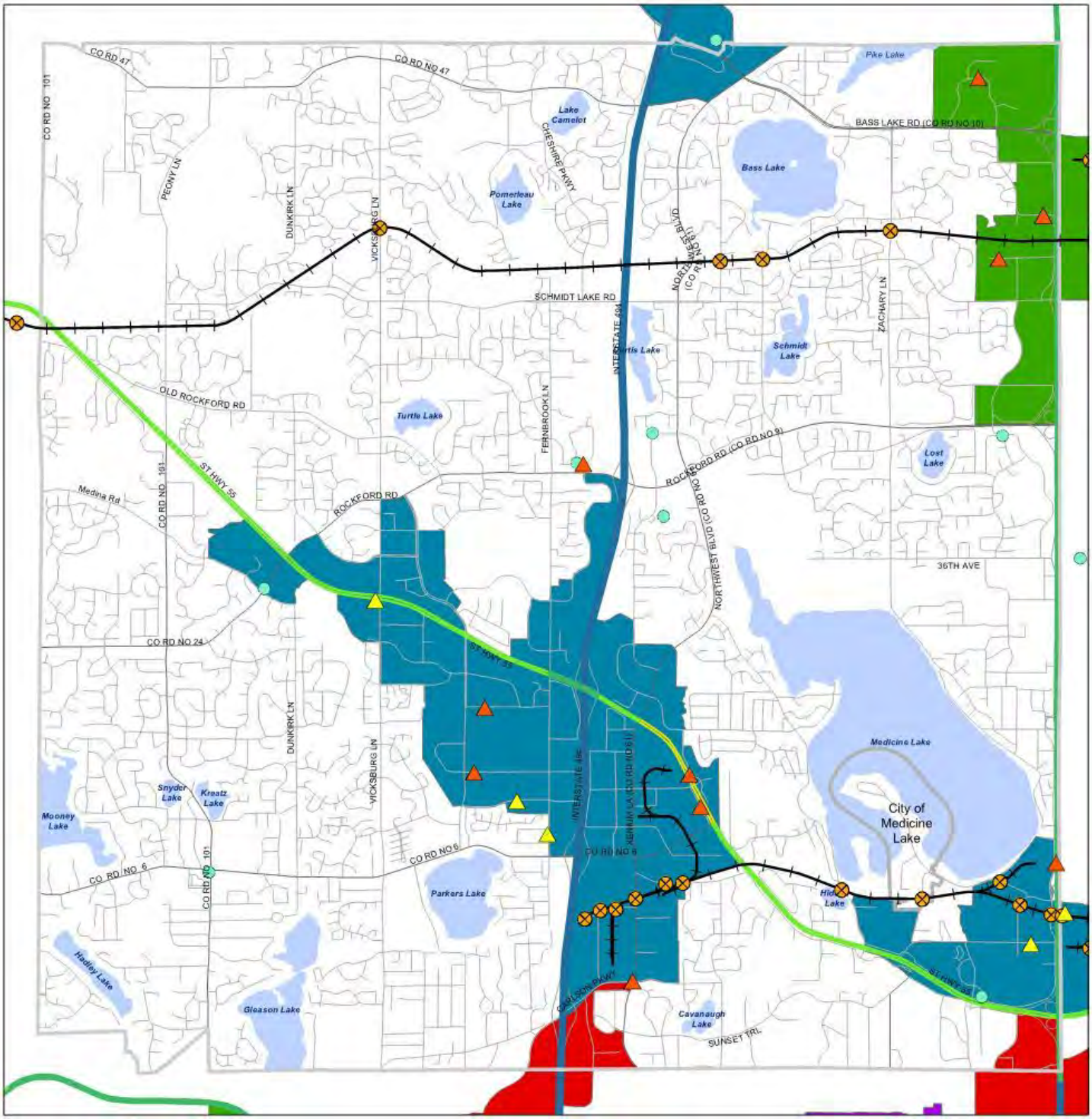



Figure 6A-25

# Existing Freight System

**Freight Generators**
- Manufacturing Plant
- Wholesale or Distribution Center
- Shopping Centers
- Rail Grade Crossings
- Existing Railroad

**HCAADT (2013)**
- <1,000
- 1,000 - 2,000
- 2,000 - 5,000
- 5,000 - 10,000
- >10,000

**Job & Activity Centers**
- Activity
- Diversified
- Industrial
- Professional

City of Plymouth

Source: SRF Consulting, Metropolitan Council, Minnesota Department of Transportation

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

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Truck travel reliability and freight mobility concerns have been identified within the City's freight network. Poor truck travel time reliability generally coincides with routes that contain several intersections. The CSAH 9 and CSAH 61 corridors contain several large intersections within a relatively short distance. Additionally, traffic congestion resulting from proximity to major interstates and busy industrial centers can create mobility challenges for freight transportation. The 2016 Hennepin County Freight Study identified freight mobility issues along CSAH 61 between Highway 55 and I-394 and CSAH 6 between Highway 55 and I-494.

## IMPROVEMENT PROJECTS/FUTURE CONSIDERATIONS

Planned projects of the interstate and county roadway system that support the freight network in the city include:

- CSAH 9 over I-494: expansion of the CSAH 9 bridge over I-494.

Additional future studies such as corridor-level assessments, bridge inventory, and sign inventory can assist the City in increased understanding of freight transportation issues.

In recent years, e-commerce and day-of deliveries have become increasingly important to the national economy. This trend is also reflected at the regional level. The demands of customers to receive any product of their choosing within a moment's notice has, and will continue to increase freight traffic on major and local roadways. Given the proximity of Plymouth to the central cities and several industrial clusters, Plymouth will plan for these trends in order to maintain traffic flows and avoid congestion along roadways in the city.

## ROADWAY CROSSINGS

Plymouth is cut into quadrants by two major thoroughfares, Highway 55 and I-494. It is also separated from communities to the east by Highway 169. These highways are major obstacles and barriers in the trail system because: bridges are often not pedestrian or bicycle friendly; underpasses do not impart a feeling of safety; and at-grade crossings put pedestrians and bicyclists in conflict with heavy and fast-moving traffic. There are several other roadway crossings in Plymouth that may also prove to be of concern for pedestrians. These occur where two high volume local roadways intersect. Crossings of these major barriers should be improved to better accommodate safe pedestrian and bicycle crossings.

## FUNDING STRATEGIES

Roadways under City jurisdiction are maintained, preserved, constructed, and reconstructed by the City's Public Works Department. Funding for these activities, including the administrative costs of operating the department, are obtained from a variety of sources, including ad valorem taxes, special assessments, development fees, and tax increment financing. A major city concern is the availability of sufficient funds for maintenance and construction activities. If funds are unavailable, needed projects may be delayed or terminated and maintenance of existing facilities may fall short of acceptable standards. The following explains the existing sources of funding and potential new sources of revenue.

### STATE AID

State-aid is an extremely important source of revenue to Plymouth. A network of city streets designated as municipal state-aid streets (MSAS) is eligible for funding assistance with revenue from the Highway User Tax Distribution Fund. This constitutionally-protected funding allocation is comprised of gasoline taxes and vehicle registration fees, and is allocated based on a formula that considers the population of a city and the financial construction needs of its MSAS system.

### AD VALOREM TAXES

If 40-percent of the cost of a city project (current City policy) can be assessed to the adjacent property owners, the remaining cost of the project can be added to the ad valorem or property taxes of the remaining property owners in the city. Ad valorem taxes for street improvements are excluded from the state-mandated levy limits.

### TAX INCREMENT FINANCING

Establishing a tax increment financing (TIF) district is a method of funding infrastructure improvements that are needed immediately, using the additional tax revenue to be generated in future years by a specific development. Municipal bonds are issued against this future revenue, which is dedicated for a period of years to the repayment of the bonds or to other improvements within the TIF project area. When used appropriately, a TIF district can accelerate economic development in an area by ensuring that the needed infrastructure is in place without requiring support from the usual funding.

### Grant Funding

There are many opportunities for metropolitan cities to take advantage of various grant funding initiatives. Regional Solicitation and Highway Safety Improvement Program (HSIP) are the more popular grant solicitations for the Twin Cities metropolitan area. The City should monitor the grant funding opportunities available and submit applications when applicable.

# PLANNING FOR THE FUTURE

Throughout the City of Plymouth's comprehensive planning effort, the City will need to consider how to address existing transportation needs, while setting the stage for future growth. Items for consideration include the following:

- System Preservation
- Assisted Driving and Autonomous Vehicles
- Travel Demand Management
- Complete Streets and Safe Routes to School
- Future Projects and Considerations

## SYSTEM PRESERVATION

Infrastructure systems (e.g. roads, bridges, culverts, and sidewalks) have become very expensive and difficult to maintain in today's environment with aging infrastructure, rising costs of materials, and stagnant or declining revenue. Many local agencies are being forced to pause, and ask questions about the costs and benefits of continuing to maintain assets throughout their entire system, or if other approaches should be explored to better balance needs with available resources. The City of Plymouth has already taken steps to integrate pavement preservation practices into its everyday course of business (i.e. edge mill and overlay program, PASER rating system). Generally, considerations to include are:

- **Performance Standards and Measures.** A performance-based approach improves the accountability of local infrastructure investments, assesses risks related to different performance levels, monitors progress and increases transparency.
- **Project Prioritization.** Project prioritization can help cities rank infrastructure needs in a manner that is consistent with preservation goals and objectives. This technique can help avoid the typical "worst first" approach to programming preservation projects that tends to invest limited resources in the most expensive "fixes" (reconstruction) instead of directing maintenance funds to infrastructure that merely need rehabilitation, which will provide more cost-effective solutions in a timely manner.
- **New Revenue Sources.** There are methods to capture new revenue streams to close the financial gap in maintaining assets in a "state of good repair." Exploring new revenue sources will allow the city to expand and accelerate preservation initiatives.

- **New Maintenance Techniques**. There are new maintenance techniques that can extend the lifecycle of an asset. For example, new maintenance techniques for roadway surfaces can provide longer service life and higher traffic volume thresholds, resulting in more stable road maintenance costs. Cost reduction of life cycle extension strategies that save money, or extend surface life, can directly benefit preservation needs, and minimize any identified financial gap.
- **Asset Management**. Tracking assets and their condition will provide a stronger outlook on lifecycle costs and replacement schedules. This will help establish funding plans and identified future funding gaps or shortfalls.

## ASSISTED DRIVING AND AUTONOMOUS VEHICLES

Fully autonomous cars are still in the advanced testing stages, but partially automated technology and low-speed cars are beginning to embed themselves into markets across the country. In that respect, understanding autonomous vehicles will play an important role in how agencies manage their transportation assets, while setting the stage for investments. In addition to fully autonomous vehicles, there are connected vehicles that will interact with the transportation system (vehicles that communicate with the roadside to complete driving functions or provide information to the driver to make informed decisions).

Aside from some of the more obvious predicted impacts such as the continued growth of car-sharing and on-demand taxi services like Uber and Lyft, autonomous vehicles (AVs) and connected vehicles (CVs) also stand to disrupt the norms of both transportation and land use planning. Parking minimums, street design, right-of-way needs, development demand, signage and signalization, building siting and design, access management, and their accompanying norms and standards have the potential to change dramatically over the next 40 to 50 years.

Researchers have concluded that AVs and CVs will reshape future road right-of-ways. Autonomous vehicles are likely to be smaller than existing passenger vehicles, permitting narrower lanes, likely will not require medians, and due to wireless communication between vehicles, will allow travel much closer to one another. By accommodating the same or more volume in less space, newly available roadway can be reapportioned to other road users such as pedestrians and bicycles.

Although newly available roadway can be configured for additional multimodal use, there are some potential drawbacks for pedestrians, bicyclists, and other road users that the City will need to be conscious of when moving toward a more automated roadway-type infrastructure. The reapportioning of

right-of-ways may allow for expanded sidewalks and more dedicated bike lanes; however, due to potential signal removal, this may cause longer waits at intersections dominated by free-flowing vehicles. Adding pick-up and drop-off locations could also fragment the streetscape, complicating travel for multimodal users.

The redevelopment of former parking lots has the potential to transform existing urban centers, such as Plymouth and surrounding communities. Future site designs will be impacted by the implementation of autonomous vehicle structures, potentially allowing for buildings to more regularly front streets rather than parking lots. Accommodation for pick-up and drop-off locations within these parking areas will need to be a consideration. However, off-site parking reservoirs will reshape future site designs.

The City of Plymouth will need to be mindful of the potential infrastructure impacts caused by adoption of autonomous and connected vehicle culture. As the City looks to redevelop larger roadways, thoughtful consideration for how roadway infrastructure can be expanded to compliment autonomous vehicles is crucial to keeping Plymouth a vital asset within the Twin Cities metropolitan region.

## TRAVEL DEMAND MANAGEMENT

Research has shown that Travel Demand Management (TDM) strategies are a useful technique in helping alleviate parking demands in a geographical area. TDM strategies are applied to help reduce the number of single occupancy vehicles traveling and parking in a certain area. Opportunities to encourage TDM strategies include the business developments currently being planned in the city. Examples of TDM strategies from a development review perspective are highlighted throughout this section.

- **Bicycle Amenities.** Actively promoting bicycling as an alternative means of travel to and from a destination can be achieved through information dissemination and the provision of bicycle storage facilities and adding on-street bicycle lanes and additional connections to trails. These actions can help decrease the demand for vehicle parking.
- **Car Sharing Provisions.** Car sharing programs provide mobility options to a cross section of residents who would not otherwise have access to a vehicle. These programs encourage the efficient use of a single vehicle among multiple users, while reducing the amount of parking needed to accommodate each resident within a neighborhood. Zoning language can encourage or require new developments of a certain size to include off-street parking provisions for car sharing programs.
- **Shared Mobility.** Shared mobility includes bikesharing, carsharing, and ridesourcing services provided by companies such as Uber and Lyft. Predictions indicate that by creating a robust

network of mobility options, these new modes will help reduce car ownership and increase use of public transit, which will continue to function as the backbone of an integrated, multimodal transportation system.

- **Travel Demand Management Plans (TDMP).** A TDMP outline measures to mitigate parking demand as part of the development permit process, which can result in innovative solutions that are tailored to the specific needs of a neighborhood or district. These types of plans may require specific strategies for reducing single-occupancy vehicle trips and promoting alternative modes of transportation.

## COMPLETE STREETS AND SAFE ROUTES TO SCHOOL

Complete Streets are commonly defined as roadways that accommodate all users (e.g. , pedestrians, bicyclist, vehicles and transit), regardless of age and ability. This is important to consider when recognizing the diversity of people traveling throughout the community.

The City of Plymouth has not established design guidelines related to complete streets. However, the Transportation Plan's goals and policies do embrace several elements of completes streets (e.g. safety for pedestrians and bicyclists). MnDOT has adopted a Complete Streets Policy (updated May 2016) and has committed to assessing opportunities for incorporating complete street design principles in all MnDOT projects. MnDOT's Complete Streets Policy can serve as a resource to the City for incorporating complete street design standards into City projects.

Safe Routes to School is a national initiative to increase safety and promote walking and bicycling for America's youth. The Safe Routes to School program will assist in providing infrastructure and non-infrastructure grants to build trails, paths, and safe connections to local schools.

Planning for safe routes to schools will require specific attention to certain elements such as bike routes, complete street treatments, sidewalk networks, pedestrian/bicycle amenities and wayfinding signage. Combined, these elements can create Safe Routes to Schools or Complete Streets.

CHAPTER 7

# Parks, Trails, Open Space and Recreation Plan

# TABLE OF CONTENTS


CHAPTER PURPOSE....1
PARKS GOALS AND POLICIES....1
PARKS....3
TYPES OF PARKS....3
*TABLE 7-1: Parks, Trails And Open Space System*....4
*TABLE 7-2: Types Of City Parks*....5
Citywide Facilities....5
Neighborhood Facilities....6
Regional and Quasi Public/Private Facilities....6
*Figure 7-1: Existing Parks and Open Space*....7
*Figure 7-2: Park and Trail Systems Plan*....8
PARK FACILITIES NEEDS....9
Citywide Facilities Needs Analysis....9
Citywide Facility Needs....9
Community Parks....10
Playfields....10
Special Use/City Recreation Facilities....10
*TABLE 7-3: Possible Special Facilities*....10
Neighborhood Park Facilities....10
TRAILS AND SIDEWALKS....11
TYPES OF TRAILS AND SIDEWALKS....11
PRINCIPAL TRAIL CORRIDORS IN PLYMOUTH....12
*Figure 7-3: Existing Trails and Sidewalks*....13
*Figure 7-4: Trail and Sidewalk Plan*....14
*Figure 7-5: Northwest Greenway*....15
TRAIL AND SIDEWALK CONNECTIONS....17
Three Rivers Park District....17
Hennepin County 2040 Bicycle Transportation Plan....18
Trail and Sidewalks in Adjacent Communities....18
*Figure 7-6: Regional Trails Plan*....19
*Figure 7-7: Hennepin County Bicycle Plan*....20
TRAIL AND SIDEWALK NEEDS....21
INFORMAL RAILROAD CROSSINGS....22
IMPLEMENTATION....22

# LIST OF APPENDICES

7A PARKS, TRAILS, OPEN SPACE AND RECREATION PROGRAM DETAILS
7B PARK FACILITIES INVENTORY
7C COMPREHENSIVE PLAN TECHNICAL REVIEW

Chapter 7

# PARK SYSTEM PLAN

## CHAPTER PURPOSE

The Park System outlines recreation and open space needs in Plymouth through the year 2040. The Park System is comprised of parks, trails, open spaces and facilities that are important community amenities that Plymouth residents highly value. Parks offer venues for a wide variety of outdoor/indoor activities that range from natural open spaces to park buildings to lighted playfields. Plymouth's recreation programs entertain, educate, teach and offer a multitude of leisure opportunities to residents, fostering a community that lives together and plays together. Therefore, it is important that the park system and recreation programs are prepared to meet future demands. These demands will be influenced by changing demographics, community growth and emerging trends.

Many different facilities and programs make up the Plymouth Park System. These facilities and programs are grouped as follows: parks; trails and sidewalks; natural areas and open space; recreation; and the Northwest Greenway (Table 7.1). Additional detail on each is included in the parks appendices (Appendix 7A, 7B and 7C).

## PARKS GOALS AND POLICIES

### Provide a high-quality park and open space system that offers a balance of active and passive recreational opportunities.

- Continue to maintain and renovate the Park System.
- Build and maintain the Northwest Greenway.
- Acquire the land needed for new parks and trails by requiring dedication in new developments and by purchasing land for community-wide park needs.
- Add and enhance cultural resources and historic interpretive opportunities.
- Continue to include natural areas as a component of the Park System.
- Consider acquiring areas of unique, high-quality open space or natural resources that are not adequately protected by regulations.
- Establish regulations and incentives that will require or encourage private preservation of open space and natural resources.

- Prohibit private parks from serving as a substitute for any segment of the public park system.

## Develop and maintain a trails and sidewalk system throughout the community to provide recreation opportunities and encourage non-motorized transportation.

- Provide trails and sidewalk connections among municipal and regional parks, neighborhoods and major activity centers.
- Provide trails and sidewalk connections to state, regional, county and adjoining community trail systems.
- Identify physical barriers to non-motorized access and provide connections across these barriers at key locations where feasible.
- Consider providing trails and sidewalks on both sides of streets when roadway traffic speed, volumes or other safety considerations warrant.
- Establish a functional hierarchy of trails and sidewalks relating to maintenance, jurisdiction and financing.
- Remove snow from designated trails and sidewalks based on defined City Council approved criteria.

## Provide recreation programs and facilities that are well used, accessible and cost-effective.

- Monitor recreation trends and use patterns, and respond with appropriate programs and facilities.
- Continue to maintain and seek additional partnerships with school districts, athletic associations, contractors and other providers of recreational opportunities.
- Where there are opportunities for partnerships, act as a facilitator rather than the provider of new recreational facilities and programs.
- Assess user fees to offset operation and maintenance costs for public facilities when warranted.
- Continue to update and provide accessible programs, facilities, parks and trails.

# PARKS

Parks help accomplish a variety of City goals. These goals include preserving natural resources, linking trails/city sidewalks and offering recreational opportunities. Parks may be owned by the City or may exist as a cooperative agreement between the City and a school district or another governmental agency. The park system needs to grow with the community to ensure that both current and future residents continue to be adequately served.

All of the elements listed below should be considered as the City acquires and develops new parks and existing parks. Land for new parks should be acquired in excess of identified park needs in order to maintain reserve land for emerging and unanticipated future park needs.

*Recreational uses* are the primary focus of most parks.

*Ornamental elements* are often included in parks to increase park diversity and improve aesthetics. Examples include flower and native planting beds, trees, plazas, and ornamental lighting.

*Open Space* is an undeveloped park that is currently set aside as a natural environment for non-organized use.

*Reserve park land* is undesignated, City-owned park property. Reserve land provides space for parks that may be needed as the City responds to changing trends.

*Cultural elements* may include interpretation, structures or programs aimed at increasing awareness of local history and the arts.

## TYPES OF PARKS

The parks component of the Plymouth park system is defined by five broad categories of facilities – citywide, neighborhood, regional, quasi-public/private (Table 7.1) and the Northwest Greenway. The City currently has 79 park properties in its system (including school parks and special use facilities), totaling over 1,728.38 acres. There are five community parks (261.13 acres), ten natural areas and open space parcels (156.74 acres), 40 neighborhood and mini parks (500.84 acres), the Northwest Greenway (311.41 acres), ten playfields (239.48 acres), seven school parks (118.11 acres) and six special use parks and city facilities (140.69 acres). Specific facilities at each of these parks are identified in Appendix 7B. Figure 7-1 identifies the existing park facilities in Plymouth and Figure 7-2 identifies the Park System.

TABLE 7-1
PARKS, TRAILS AND OPEN SPACE SYSTEM

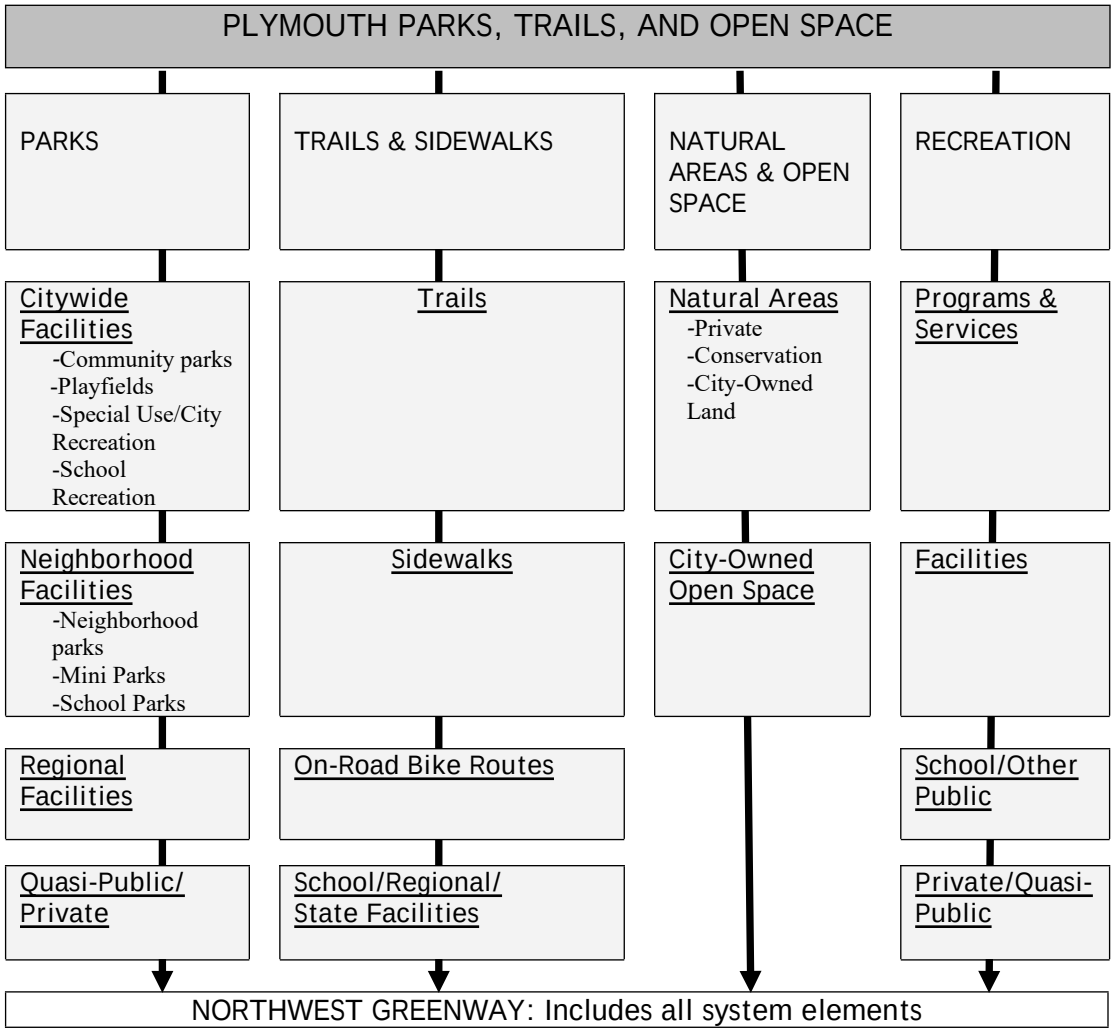


Table 7-2 shows the city-wide and neighborhood facilities and identifies the eight different types of parks within them.

TABLE 7-2
TYPES OF CITY PARKS

| Citywide Facilities—Serve the Entire Community | | |
|---|---|---|
| Type | Size | Primary Focus |
| **Community Parks** | 10+ acres | Passive and active recreation, events |
| **Playfield** | 10+ acres | Organized recreation |
| **Special Use/City Recreation** | As needed | Specific use not found elsewhere in city |
| **School Recreational** | | Organized recreation |
| Neighborhood Facilities—Serve ½ mile or less radius | | |
| Type | Size | Primary Focus |
| **Neighborhood Parks** | 5-20 acres | Active informal play |
| **Mini Parks** | 1-5 acres | Active informal play |
| **School Parks** | 5-20 acres | Active informal play |
| Northwest Greenway-Serves the Entire Community | | |

## Citywide Facilities

**Community Parks:** A large park facility focused on natural amenities while providing unique amenities and/or experiences. When appropriate, community parks may serve a dual role as both a neighborhood and a community park. When this occurs, the facility will include the appropriate neighborhood amenities as described in Appendix 7A.

**Playfields:** A facility primarily serving organized recreation. Playfields may serve as neighborhood parks in some instances. In these cases, the amenities listed under "neighborhood parks" in Appendix 7A should be provided at the facility.

**Special Use/City Recreation:** A city facility with a unique focus not found elsewhere in the community (e.g. nature area, splash pad, an off-road biking facility, amphitheaters, disc golf facility or a skate park, Plymouth Ice Center, Fieldhouse, Plymouth Creek Center, and Bass Lake Park building).

**School Recreational:** Any school in Plymouth that is not considered a school park (defined below) is considered a school recreational facility. The City may use fields, gyms or other amenities at these facilities. All middle and high schools are considered school recreational facilities.

## Neighborhood Facilities

These facilities provide for park needs within a single service area based on a radius of one-half mile or less. Amenities will vary based on acreage and site conditions. Neighborhood park service areas are shown in Appendix 7A.

**Neighborhood Park:** Defined as a park that typically provides amenities such as play structures, green space, trails, and shelter within walking distance for nearby residents.

**Mini-Park:** Defined as a smaller version of a neighborhood park with reduced amenities. Mini-parks are provided in areas that are geographically isolated from other parks and/or available land that totals less than five acres.

**School Park:** Defined as a park in a service area that is not served by a City neighborhood park.

## Regional and Quasi Public/Private Facilities

These facilities are owned and operated by a private or other public organization. They provide the community additional recreational opportunities (e.g. regional facilities, fitness clubs and dance studios).

## Northwest Greenway

The Northwest Greenway (NWG) is an ecological and recreational trail corridor that connects open spaces, parks and trails, and preserves high quality ecosystems. The NWG includes all park system elements. Figure 7-5 shows the overall NWG.

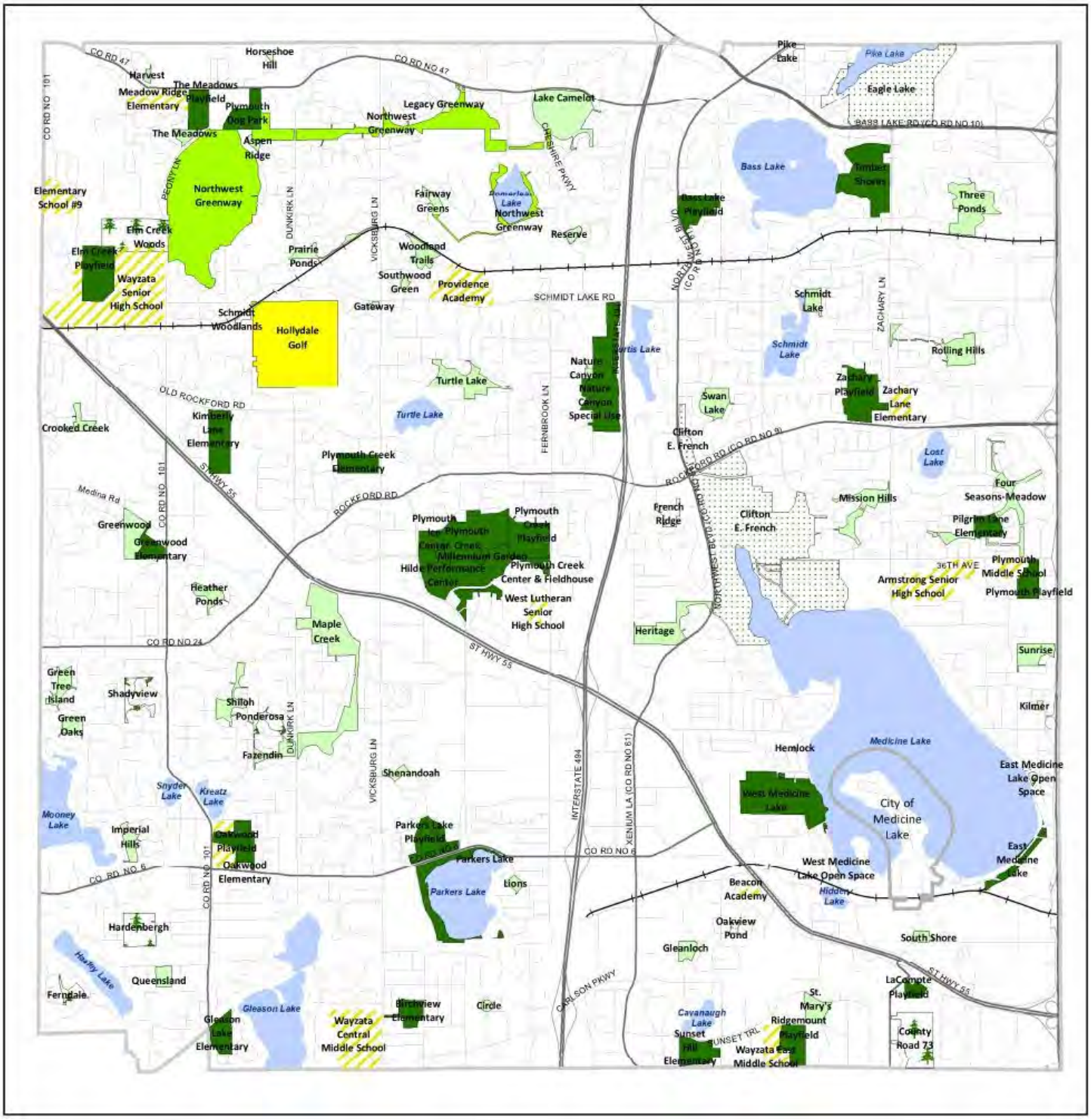



**Figure 7-1**

# Existing Parks & Open Space

As of December 12, 2018

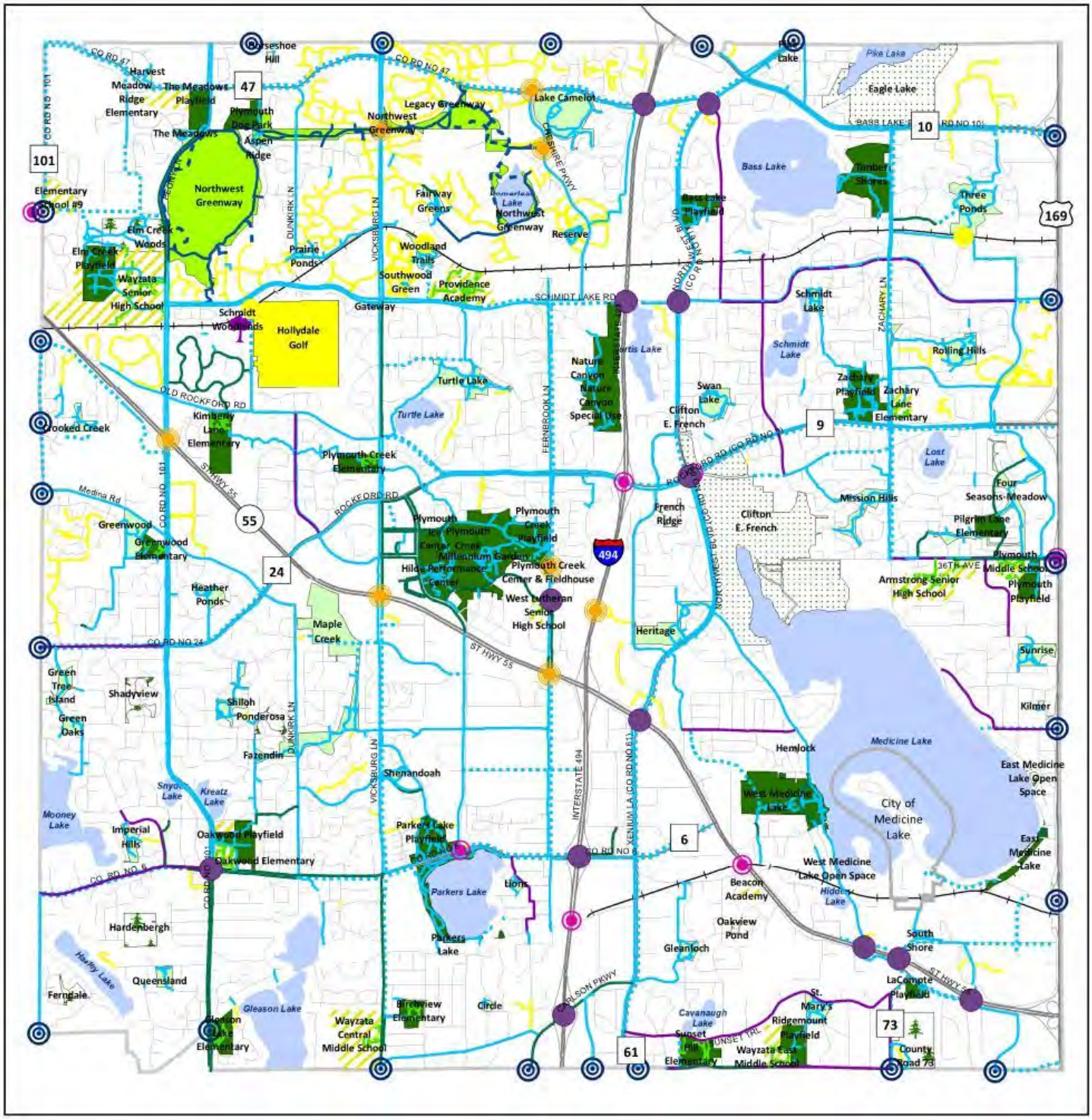
N

**Legend**

- Citywide Facilities
- Neighborhood Facilities
- Natural Areas & Open Space
- Northwest Greenway
- Regional Park
- School Recreational Facility
- Private Golf Course

City of Plymouth

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# Figure 7-2

# Park & Trail Systems Plan

As of December 12, 2018

City of Plymouth

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## Legend

- Trail Connection to Adjacent Community
- Existing Grade-Separated Crossing
- Proposed Grade-Separated Crossing
- Proposed Crossing Improvement
- Proposed At-Grade Railroad Crossing
- Proposed Neighborhood or Mini Park Location
- City Trail
- City Sidewalk
- NW Greenway
- School Trail
- On-Road Bike Route
- Private Roadside
- Proposed City Trail
- Proposed City Sidewalk
- Proposed NW Greenway
- Citywide Facilities
- Neighborhood Facilities
- Natural Areas & Open Space
- Northwest Greenway
- Regional Park
- School Recreational Facility
- Private Golf Course

N

## PARK FACILITIES NEEDS

To assess needs for citywide and neighborhood-based park facilities, the City uses several different analysis methods. The need for citywide facilities is based on population, demographics, participation rates and trends. The need for neighborhood facilities is based on park service area and location (Figure 7A-1). The need for Northwest Greenway property and/or amenities are defined as part of the master plan based on participation, usage and trends.

### Citywide Facilities Needs Analysis

The National Recreation and Park Association (NRPA) draws upon the Park Metrics database to help agencies apply a set of national comparative benchmarking standards. Park Metrics is the most comprehensive source of data standards and insights for parks and recreation agencies across the country. A benchmarking standard for park service is the amount of developed park land available per 1,000 residents. This is an estimate based upon reporting agency data.

The 2018 NRPA community standard is 17.4 acres of developed park land per 1,000 people for the upper quartile (highest 25 percent) for communities with a population of 50,000 to 99,999. The median NRPA community standard is 10.1 acres of developed park land per 1,000 residents for agencies of all sizes. The City's estimated 2016 population according to the Metropolitan Council was 75,452 with a total of 1,571.64 acres of developed park land. Based on Plymouth's 2016 population, the city has 20.82 acres of developed park land per 1,000 people. In 2040, the Metropolitan Council has estimated the population to reach 85,100. Based on this population estimate and additional future park acquisitions, Plymouth will have 18.47 acres of park land per 1,000 people.

### Citywide Facility Needs

In the years to come, the City will examine, evaluate and develop land and facilities based on trends, forecasts, participation and community needs.

The City commissioned a Comprehensive Plan Technical Review (CPTR) in 2009 of undeveloped park land, future land acquisition needs and redevelopment of existing facilities. In 2016, the CPTR was reviewed and updated. This report is located in Appendix 7C and provides concept plans and illustrations for enhancements.

### Community Parks

The final community park, The Meadows, located in the northwest corner of Plymouth, will be developed in the near future. The current community parks will continue to be maintained and evaluated for possible repurposing in the future based on current trends.

### Playfields

The need for playfields and/or redevelopment of these facilities is primarily based on program use, participation rates and trends. To adequately accommodate playfield activities in the future, the City will continue to monitor usage.

There are five types of facilities (detailed descriptions are provided in Appendix 7A) that are used for organized sports: ball fields; multi-use fields (soccer, football, lacrosse, cricket and rugby); sand volleyball courts; gyms; and hockey rinks.

### Special Use/City Recreation Facilities

Special use/city recreation facilities (additional information provided in Appendix 7A) are unique recreational amenities not included in a typical park. They are intended to increase the recreational diversity of Plymouth's park system. Table 7-3 identifies possible facilities that may be provided as part of an existing park or as a stand-alone facility.

TABLE 7-3

| Facility Type | Potential Provider |
|---|---|
| Town Team Ballfield | City of Plymouth/Private Provider |
| Adult Playground | City of Plymouth |
| Indoor Playground | City of Plymouth/Private Provider |
| Indoor Active Space/Gym | City of Plymouth |
| Outdoor Pool/Water Park | City of Plymouth/Private Provider |
| Art/Sculpture Park | City of Plymouth/Non-profit Arts Group |
| Environmental Park | City of Plymouth/Non-profit Stewardship Group |
| BMX Park | City of Plymouth/Non-profit Group |
| Off-Road Bike Trail | City of Plymouth/Non-profit Group |
| Spray Park/Splash Pad | City of Plymouth |

## Neighborhood Park Facilities

The need for neighborhood parks is primarily based on geography and assumes a desired walking distance of approximately a one-half mile radius. A park service area is a small geographic area that, to

the extent feasible, is free from barriers such as major roadways and major bodies of water. Convenient and safe non-motorized access should be available to the park facility within the service area.

As residential development continues in northwest Plymouth, the City will acquire land and develop three to four additional neighborhood/mini-parks. Recommended sites for new park facilities are identified on Figure 7-2. Detailed analysis on each park service area and park enhancements is provided in Appendix 7A.

## TRAILS AND SIDEWALKS

Plymouth's current trail and sidewalk system is an established network of more than 171 miles of city, regional and state trails and sidewalks that connect most neighborhoods to parks, schools, transit and commercial areas. A multi-use trail system is a key amenity to the community because it provides for healthy, non-motorized transportation such as walking, jogging and bicycling. Trails also contribute to the community's overall transportation system.

Elements of the trail and sidewalk system that function to move pedestrians and bicyclists between key community and inter-community destinations are included in the Transportation Plan (Chapter 6). Figure 7-3 identifies Plymouth's existing system, which includes both public and private trails and sidewalks. Trails and sidewalks may be constructed by a public agency or required as part of a new development or redevelopment of private property. The private trails and sidewalks are maintained by property owners or associations.

The Trail and Sidewalk Plan will help Plymouth continue to effectively implement a high-quality, multi-use trail system. It provides a framework for future connectivity to serve the transportation and recreation needs of the community.

### TYPES OF TRAILS AND SIDEWALKS

There are four types of trails in the Trail and Sidewalk Plan. The design standards are provided in Appendix 7A.

**Trail** – Off-road, multi-modal, non-motorized surface that is eight- to 12-feet wide. The surfaces may include, but are not limited to asphalt, concrete, crushed aggregate, or mulch, depending on the type of trail (independent, nature, boulevard or roadside).

**Sidewalk** – Off-road, multi-modal, non-motorized surface that is five-feet wide. The surface is usually concrete. Public sidewalks are located on public property or within public rights-of-way and easements. Private sidewalks are located on private property.

**On-Road Bike Route** –Striped and/or signed bikeways on an existing road. All existing and planned on-road bike routes are included in the Trail and Sidewalk Plan.

**School/Regional/State Facilities** – Trails and sidewalks owned by other public entities.

## PRINCIPAL TRAIL CORRIDORS IN PLYMOUTH

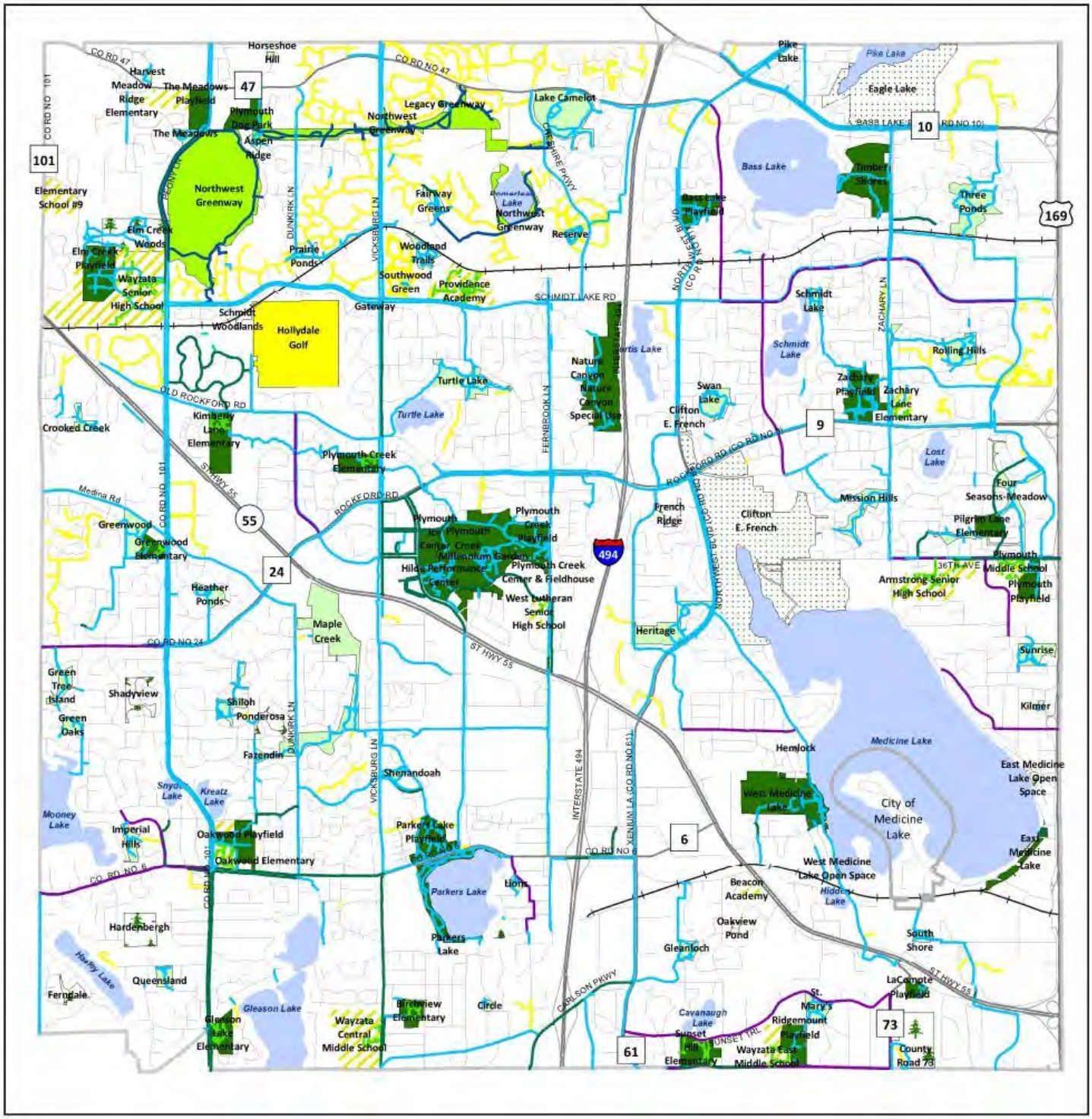
Several regional and city trails serve as the backbone of the trail system. They create an integrated system that connects neighborhoods, parks, schools, transit and commercial areas. Some of these corridors offer long distance recreation opportunities; others serve both recreation and transportation opportunities that are reflected in the Transportation Plan. The following is a list of the principal corridors and planned extensions.

**County Road 9 (Rockford Road)/County Road 24** – An east-west corridor that connects most of the commercial uses in the city and is one of the highest volume roadways in Plymouth. A pedestrian bridge is located at the I-494 crossing. The corridor is continuous through most of the commercial area, but lacks trail and sidewalk connection across Highway 169 to the City of New Hope on the eastern side of the city.

**County Road 61 (Northwest Boulevard/Xenium Lane) –** A major north-south corridor connecting neighborhoods with commercial/industrial employment centers south of Highway 55. A gap exists in this trail at Highway 55 and 26th Avenue. The trail does not have a grade-separated crossing at Highway 55.

**County Road 101/Peony Lane/Lawndale Lane –** An important north-south route through the western portion of the city. The trail does not have a grade-separated crossing at Highway 55.

**Luce Line Trail –** An off-road trail that runs through the southern portion of Plymouth. The regional facility is operated by Three Rivers Park District heading east from Vicksburg Lane and connects with the regional trail system in Minneapolis. The Department of Natural Resources operates the facility heading west from Vicksburg Lane to Hutchinson.




## Figure 7-3

# Existing Trails & Sidewalks

As of December 12, 2018

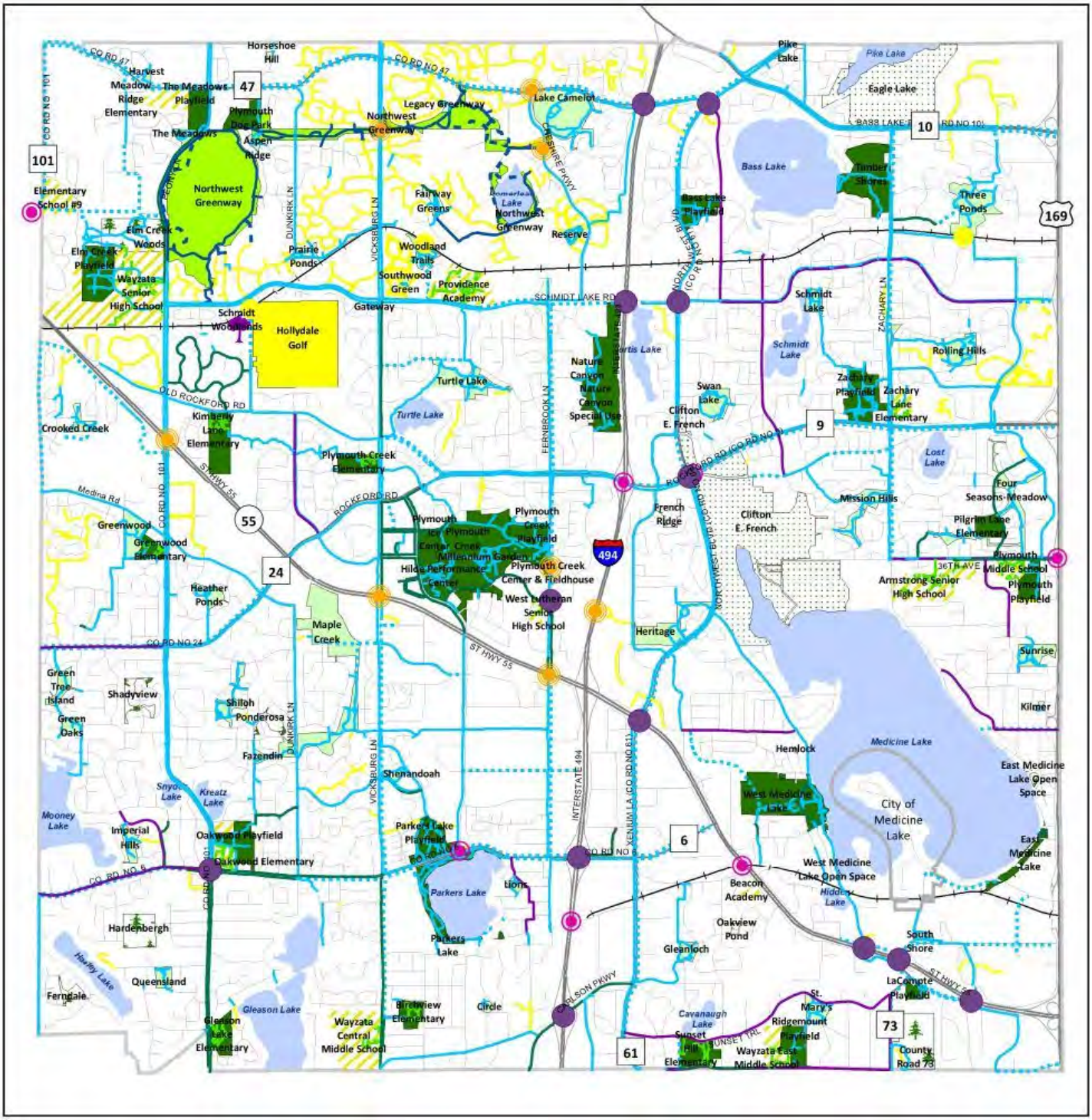
**Legend**

- City Trail
- City Sidewalk
- NW Greenway
- School Trail
- On-Road Bike Route
- Private Roadside
- Citywide Facilities
- Neighborhood Facilities
- Natural Areas & Open Space
- Northwest Greenway
- Regional Park
- School Recreational Facility
- Private Golf Course

N

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# Figure 7-4

# City Trail & Sidewalk Plan

As of December 12, 2018

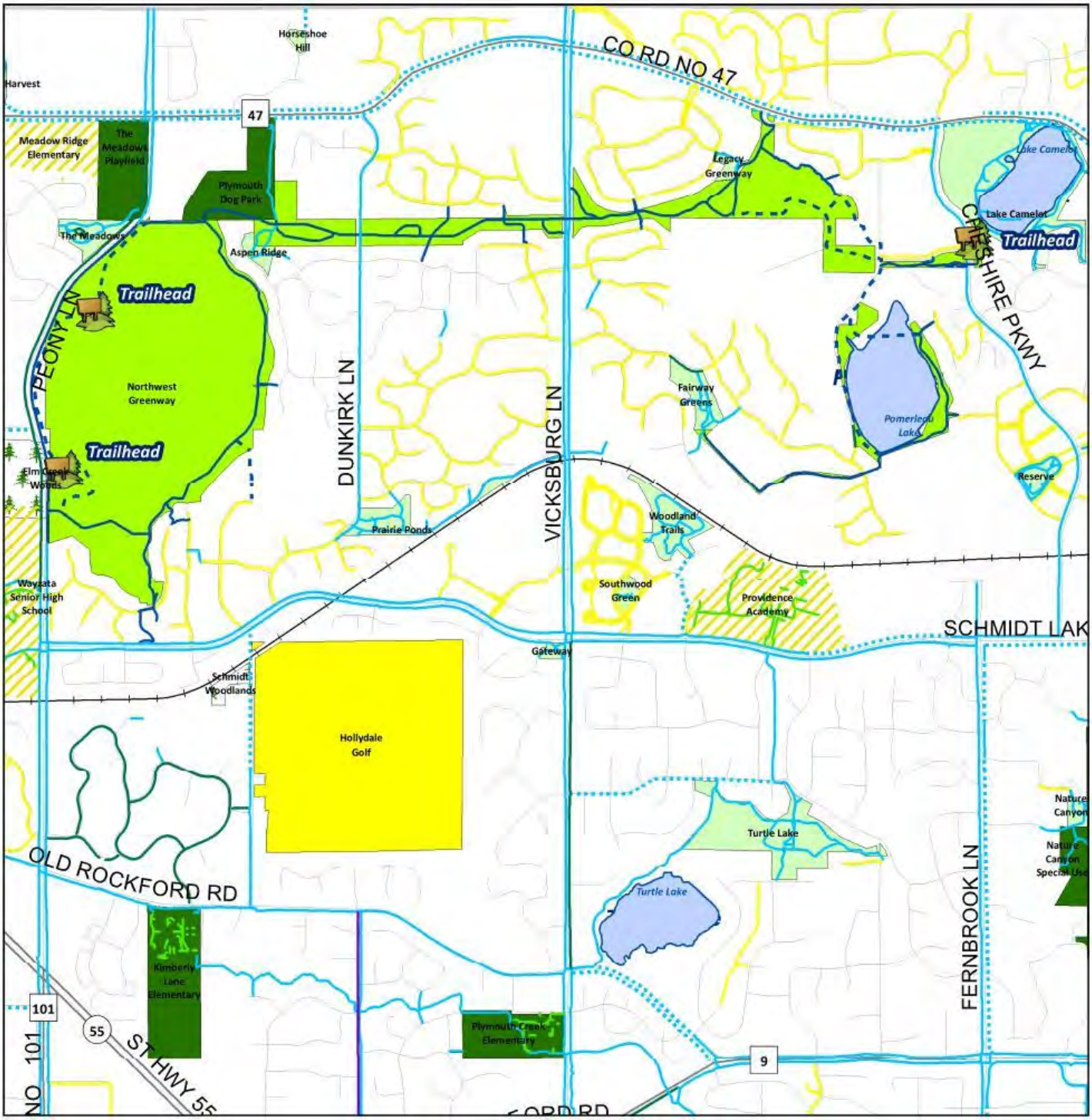
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## Legend

- Existing Grade-Separated Crossing
- Proposed Grade-Separated Crossing
- Proposed Crossing Improvement
- Proposed At-Grade Railroad Crossing
- Proposed Neighborhood or Mini Park Location
- City Trail
- City Sidewalk
- NW Greenway
- School Trail
- On-Road Bike Route
- Private Roadside
- Proposed City Trail
- Proposed City Sidewalk
- Proposed NW Greenway
- Citywide Facilities
- Neighborhood Facilities
- Natural Areas & Open Space
- Northwest Greenway
- Regional Park
- School Recreational Facility
- Private Golf Course

N




## Figure 7-5

# Northwest Greenway

As of December 12, 2018

City of Plymouth

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**Legend**

- Trailhead
- City Trail
- City Sidewalk
- NW Greenway
- School Trail
- On-Road Bike Route
- Private Roadside
- Proposed City Trail
- Proposed City Sidewalk
- Proposed NW Greenway
- Citywide Facilities
- Neighborhood Facilities
- Natural Areas & Open Space
- Northwest Greenway
- Regional Park
- School Recreational Facility
- Private Golf Course

N

**Medicine Lake Regional Trail –** Begins at its connection with the Luce Line Regional Trail at the southeast corner of Medicine Lake. The trail follows the eastern side of Medicine Lake and travels through Clifton E. French Regional Park to Fish Lake Regional Park and Elm Creek Park Reserve in Maple Grove. This trail also connects to the Northwest Greenway.

**Northwest Greenway** (NWG) - an ecological, long-distance recreational trail corridor that connects parks, neighborhoods and community while preserving open spaces and high-quality ecosystems for wildlife. The NWG provides a significant amenity for existing and future residents of Plymouth. Figure 7-5 shows the overall plan of the NWG.

The NWG stretches from Wayzata High School and the Elm Creek Playfield eastward to Lake Camelot Park and the Medicine Lake Regional Trail, which in turn connects to Elm Creek Park Reserve in Maple Grove. It includes grade-separated crossings of Cheshire Parkway and Vicksburg Lane.

The NWG corridor varies in width surrounded by urban forest or grassland buffers. Right-of-way for the greenway corridor is secured through acquisition, dedication or easement. Additional updates to the NWG may include:

- **Additional Greenway Width –** If feasible, undeveloped property west of Juneau Lane and south of the existing NWG trail alignment may be acquired to widen the corridor and preserve the wooded hillside.
- **Juneau Lane Connection –** The NWG requires a connection to the existing trail alignment on the east side of Juneau Lane running parallel to 57$^{th}$ Avenue. The city will work with current property owner(s) or future developments to acquire land for the connection.
- **Trailhead Locations –** Three trailhead connections are proposed along the greenway. Two trailheads will be located on the east side of Peony Lane abutting the Elm Creek wetland. The third trailhead is located on Cheshire Parkway.
- **Plymouth Creek Trail** – This trail will connect West Medicine Lake Regional Trail and West Medicine Lake Park with Elm Creek Playfield. The trail will pass through two parks, a community playfield, two elementary schools, City Center and several residential neighborhoods. It will also connect with existing and proposed trails along County Road 61 (Northwest Boulevard), Fernbrook Lane, County Road 9 (Rockford Road), Vicksburg Lane and Peony Lane. This trail is about 75 percent complete with several remaining gaps. For

most of its length, the Plymouth Creek Trail is an independent trail with grade-separated crossings of major roadways.

- **Vicksburg Lane Trail –** A major north-south corridor connecting neighborhoods to City Center. Improvement to the Highway 55 crossing is important for the safety of pedestrians.

## TRAIL AND SIDEWALK CONNECTIONS

Plymouth's Trail and Sidewalk Plan is complemented by a variety of additional trail corridors. State and regional trails along with Hennepin County's *2040 Bicycle Transportation Plan* elements are all present within the city. In addition, many adjacent communities have trails that connect or could connect to Plymouth's trails and sidewalks. Understanding and linking to state, regional, and neighboring community trails will increase the recreational and transportation opportunities Plymouth can offer its residents.

### Three Rivers Park District

Three Rivers Park District has a comprehensive trail plan that will link west metro parks, commercial centers and communities. These trails are used for both recreation and transportation. Figure 7-6 identifies the Regional Trails Plan as it relates to Plymouth.

- **Luce Line Regional Trail** begins at Vicksburg Lane and runs eastward to Highway 169. The trail continues east through Golden Valley and connects to Wirth Parkway in Minneapolis. The trail provides grade-separated crossings of I-494, Xenium Lane and Highway 55. Highlights of the trail include two 900-foot boardwalks through the wetlands immediately south of Medicine Lake, and the ability to complete a loop around Medicine Lake using Park District and city trails. The Luce Line State Trail, operated and maintained by the Minnesota DNR, is an extension of the regional trail that runs west from Vicksburg Lane in Plymouth to Hutchinson.

- **Medicine Lake Regional Trail** begins its connection with the Luce Line Regional Trail at the southeast corner of Medicine Lake. The trail follows the eastern side of Medicine Lake and travels through Clifton E. French Regional Park. From French Park, the trail follows Northwest Boulevard to Schmidt Lake Road, where it heads west and goes under I-494. The trail then heads north along Cheshire Parkway and connects on the north side of County 47 and continues to Fish Lake Regional Park and Elm Creek Park Reserve. This regional trail connects to the Northwest Greenway at Cheshire Parkway and 57th Avenue.

- **Bassett Creek Regional Trail** begins in Clifton E. French Regional Park and runs east along 36th Avenue. A pedestrian bridge over Highway 169 connects Plymouth to New Hope. When completed, the regional trail will travel through Crystal and Golden Valley, connecting to Wirth Parkway in Minneapolis.

The Regional Parks Policy Plan identifies regional trail search corridors that will be planned and developed in the future by Three Rivers Park District. Figure 7-6 identifies the regional search corridors.

- **Eagle Lake-Bassett Creek Regional Trail Search Corridor** travels through Plymouth and New Hope as it connects Eagle Lake Regional Park and Bassett Creek Regional Trail.

- **Lake Sarah Extension Regional Trail Search Corridor** was added to the Regional Parks System as part of the *2040 Regional Parks Policy Plan*. The search corridor travels through Medina and Plymouth as it extends the Lake Sarah Regional Trail Search Corridor east to connect Baker Park Reserve to Medicine Lake Regional Trail.

- **North-South 2 Regional Trail Search Corridor** was also added to the Regional Parks System as part of the *2040 Regional Parks Policy Plan*. The search corridor travels through Plymouth, Minnetonka and Eden Prairie as it connects Medicine Lake Regional Trail, French Regional Park, Luce Line Regional Trail, Lake Minnetonka LRT Regional Trail, Minnesota River Bluffs LRT Regional Trail, Bryant Lake Regional Park and County Road 61 Regional Trail Search Corridor in Chanhassen.

## Hennepin County 2040 Bicycle Transportation Plan

The County bicycle plan was published in 2015. It provides design guidelines for on- and off-road trails, suggests crossing improvements and shows a plan for the County's ultimate bicycle transportation system. Figure 7-7 identifies the plan as it relates to Plymouth and adjacent communities.

### Trail and Sidewalks in Adjacent Communities

Communities adjacent to Plymouth are also implementing trail plans. Connecting to neighboring systems will allow access to additional commercial, recreational and employment opportunities for Plymouth residents. Current and proposed trail connections are identified on Figure 7-4.

- The City of Medicine Lake connects to Plymouth on South Shore Drive.

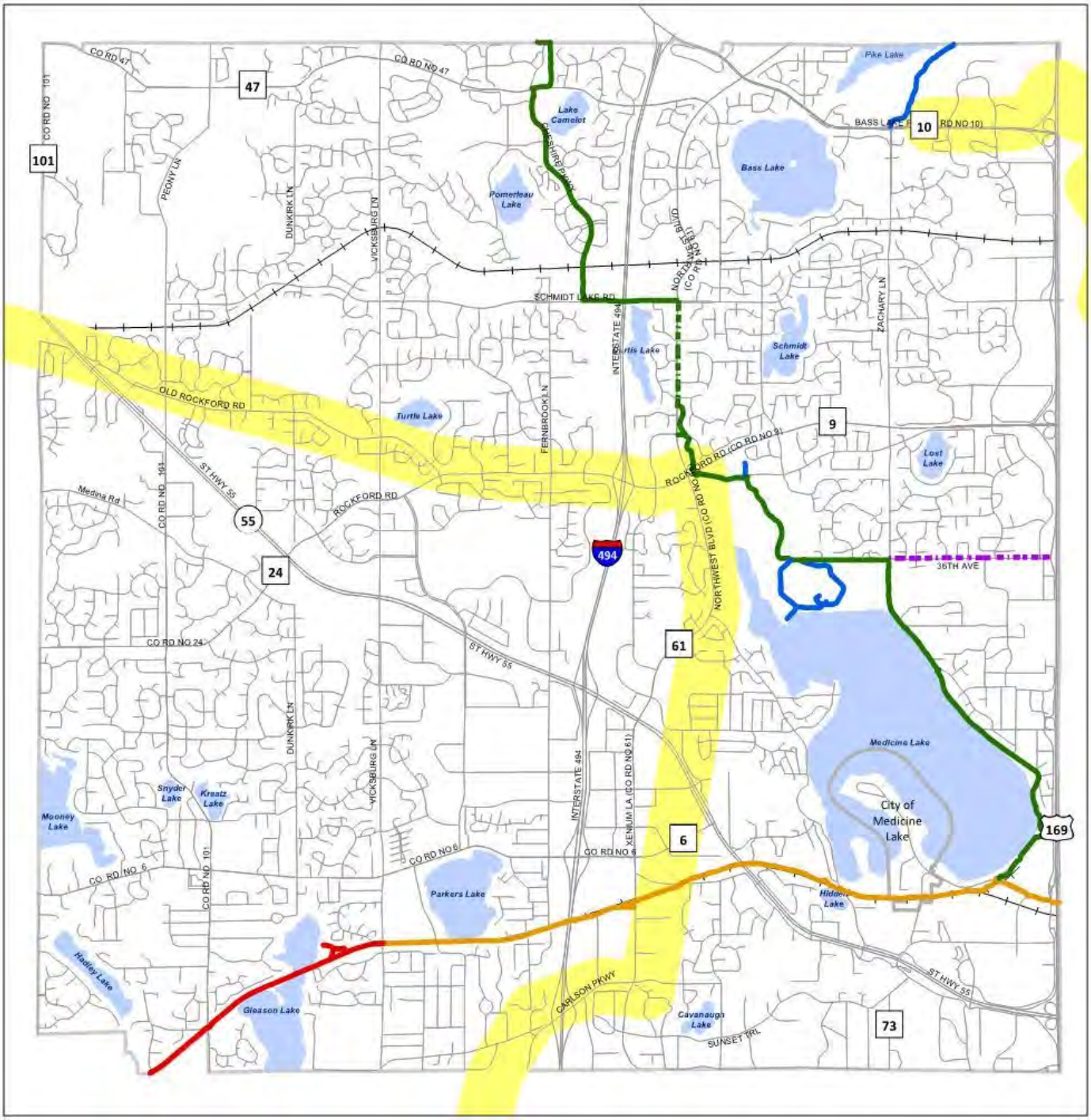



**Figure 7-6**

# Regional Trails Plan

**Legend**

- Regional Trail Search Corridor
- Luce Line Regional Trail
- Luce Line State Trail
- Medicine Lake Regional Trail
- Regional Park Trail
- Proposed Bassett Creek Regional Trail
- Proposed Medicine Lake Regional Trail

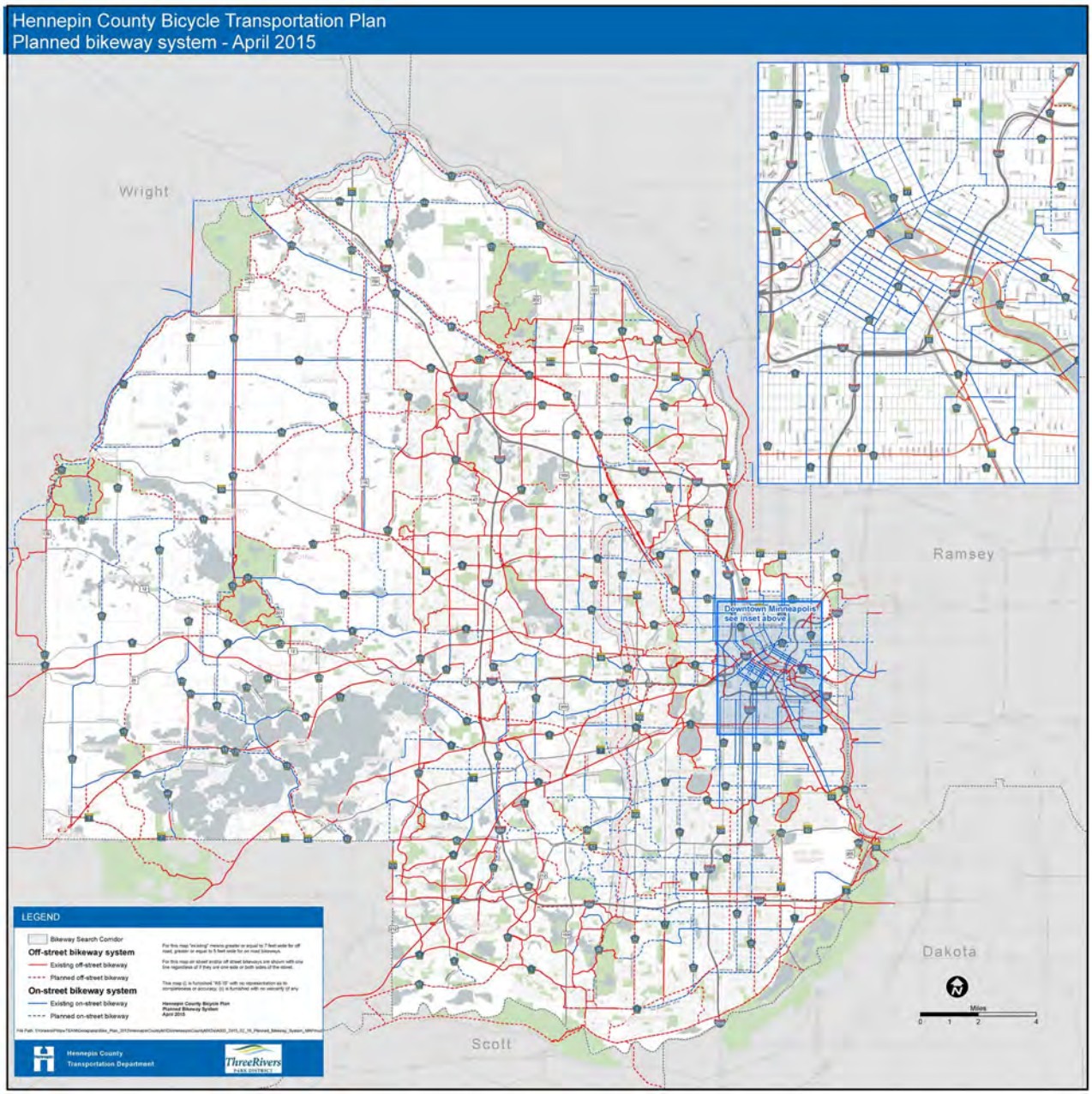
City of Plymouth

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- Corcoran and Medina connect to Plymouth at County Road 47, which turns into Hackamore Road.

- Golden Valley has proposed trail connections into the city at 26th Avenue. The City currently has a connection into Golden Valley via the Luce Line Regional Trail at 13th

FIGURE 7-7
HENNEPIN COUNTY BICYCLE PLAN




Source: Hennepin County Bicycle Transportation Plan

- Avenue. An additional trail connection at Betty Crocker Drive/Shelard Parkway should be considered for future improvement.

- Maple Grove connects to Plymouth by the Medicine Lake Regional Trail. Plymouth also provides connection into Maple Grove along multiple roadways including Hemlock Lane, Quinwood Lane, County Road 61 ( Northwest Boulevard), County Road 10 (Bass Lake Road), Ithaca Lane, Vicksburg Lane, Lawndale Lane (Peony Lane), Vagabond Lane and County Road 101.

- Medina's parks, trails and open space plan shows proposed trails running into Plymouth just north of Wayzata High School. A grade-separated crossing at County Road 101 has been built. Additional trail connections include Evergreen Road, Hamel Road, Medina Road and County Road 24.

- Minnetonka has connections into Plymouth on Carlson Parkway (Gleason Lake Road), Cheshire Lane, County Road 61 (Xenium Lane), Ridgemount Avenue and County Road 73 (Zachary Lane).

- New Hope has connections into Plymouth at Schmidt Lake Road and at County Road 10 (Bass Lake Road) over Highway 169. The City currently has a connection into New Hope via the Bassett Creek Regional Trail pedestrian bridge over Highway 169 on 36th Avenue and Schmidt Lake Road.

- Orono connects to Plymouth at County Road 6.

- St. Louis Park has connections into Plymouth along Shelard Parkway that connects to Nathan Lane in Plymouth.

- Wayzata has connections to Plymouth at Ferndale Road, County Road 101, Gleason Lake Road (County Road 15) and the Luce Line State Trail.

## TRAIL AND SIDEWALK NEEDS

A major goal of the Trail and Sidewalk Plan is to improve and increase use of trails and sidewalks by adding new connections and by filling gaps within the network. This will provide more trail and sidewalk

opportunities along with better access to schools, parks, transit facilities and other destinations. The proposed city trails, sidewalks and on-road bicycle facilities are shown on Figure 7-4. The criteria used to select proposed trail segments include the following.

**Corridor Gap Closures –** Some established linear routes are not connected along their entire length. These gaps should be filled in order to offer a continuous transportation or recreation opportunity.

**Extensions –** Some existing trails and sidewalks may be extended to connect to a point of interest not currently served.

**Connections Between Corridors –** Where feasible, corridors should be connected together.

**New Corridors –** New corridors are proposed, primarily in northwest Plymouth.

### INFORMAL RAILROAD CROSSINGS

There are several at-grade trail crossings of railroad corridors in the Plymouth trail system that should be provided for effective and safe trail/park connections. Many of these sites already have existing informal trail crossings. To improve safety, a "pedestrian maze," should be considered at Holly Lane (Schmidt Woodlands Park), Woodland Trails Park and Three Ponds Park (see Appendix 7C). This is an acceptable concept with the railroad companies. Because these crossings are in residential areas, "no horn zones" should be required.

## IMPLEMENTATION

| *Description* | *Timing* |
|---|---|
| **Maintain the Parks and Trail System –** Maintain the quality of the existing parks and trail system and fund the replacement of buildings, trails and playgrounds through the Park Replacement Fund. Determine priorities and plan for short-term funding needs through the annual review of the Capital Improvements Program (CIP). | Ongoing |
| **Develop The Meadows Community Park –** Develop the park as trends and needs dictate and funds become available. | Medium |

| *Description* | *Timing* |
|---|---|
| **Organized Sports Facilities –** Monitor and respond to the need for ball fields, multi-use fields (soccer, football, lacrosse, cricket and rugby), sand volleyball courts, outdoor hockey and gyms. | Ongoing |
| **Outdoor Hockey/Figure Skating –** Continue to maintain and update outdoor rinks to focus on providing quality ice facilities. Additional modifications may include:<br>• Installing ¾ size rinks;<br>• Adding sunscreens over the rinks; and<br>• Adding new dasher boards. | Short |
| **Develop Nature Canyon Park –** Develop this special use recreation facility as a blended site that combines both active and passive uses. Consider looking for possible development partnerships. | Medium |
| **Special Recreation Facilities –** Consider providing special recreation facilities such as an art park, environmental park and bike park, in response to demonstrated need. | Ongoing |
| **Plymouth Creek Center Renovation and Expansion –** Renovate and expand the facility to keep current with trends, and to meet community needs for recreation programming, community gathering and rental space. | Short /Medium |
| **Park and Recreation Facility Renovations –** As the park system continues to age, consider making improvements, renovations and updates to existing park buildings and facilities to meet current trends and community needs, and to ensure appropriate programming and gathering space. Park buildings and facilities include:<br>• Plymouth Creek Park<br>• LaCompte Playfield<br>• Zachary Playfield<br>• Bass Lake Playfield<br>• Oakwood Playfield<br>• Parkers Lake Park | Ongoing |
| **Neighborhood Park Improvements –** Implement improvements within each park service area according to Table 7A-5 in Appendix 7A. | Varies by service area |

| *Description* | *Timing* |
|---|---|
| **Trail Gaps, Connections and Crossings –** Continue to improve the recreational use of the trail system by considering:<br>• Making corridor gap closures, trail extensions and connections that will provide better access to schools, parks, neighboring communities, transit facilities and other destinations;<br>• Providing trails on both sides of designated high volume roadways; and<br>• Providing safe roadway crossings of major community obstacles and/or barriers in the trail system as designated in the plan. | Ongoing |
| **Trail Railroad Crossings –** Consider providing safe at-grade trail crossings of the following railroad corridors in the trail system:<br>• Holly Lane;<br>• Quantico Lane; and<br>• Three Ponds Park. | Medium |
| **Northwest Greenway –** Continue acquisition and development of the ecological and recreational trail corridor:<br>• Secure the last few land parcels.<br>• Develop trail corridor connections from Cheshire Parkway to Legacy Greenway Park and around Lake Pomerleau.<br>• Develop the south trailhead on Peony Lane to incorporate a large three-season picnic facility with restrooms, space for event staging, playground, trails and parking.<br>• Develop the north trailhead on Peony Lane to incorporate a year-round building, a wetland viewing area, open space for events, trails and parking. | Short/ Medium |
| **Natural Area Protection –** Continue to protect natural areas through:<br>• Management of conservation areas within parks; and<br>• City regulation of shoreland, floodplain and wetlands. | Ongoing |
| **Management of City-owned Open Space –** Update and follow the management plan for each existing and future City-owned open space parcel. | Ongoing |

| *Description* | *Timing* |
|---|---|
| **Recreation Programs –** Continue to provide a broad range of recreation programs that meet the needs of all age groups, from pre-school to seniors, in a cost effective manner. Emphasize the commitment to health, wellness and fitness. | Ongoing |
| **Special Events –** Continue to sponsor or co-sponsor special community events to provide a common ground for celebration and development of community pride. | Ongoing |
| **Collaboration –** Continue to work with other public, private and non-profit groups and agencies, local units of government and school districts to enhance the City's limited resources and the array of programs available to residents. | Ongoing |
| **Volunteers –** Continue to use volunteers to help stretch taxpayer dollars. | Ongoing |
| **Historic Preservation –** Identify historic landmarks in the city and work to preserve and promote them. | Ongoing |

Appendix 7A

# PARKS, TRAILS, OPEN SPACE AND RECREATION PROGRAM DETAILS

## PARKS

### TYPES OF PARKS

The parks component of the system is defined by four broad categories – citywide facilities, neighborhood facilities, regional and quasi-public/private facilities and Northwest Greenway. The categories of citywide and neighborhood facilities consist of seven different types of parks. Criteria and guidelines for each type of park facility are provided in Table 7A-1.

#### Citywide Facilities

Community parks, playfields**,** special use/city and school recreational facilities provide for citywide park amenities that serve the entire community.

#### Neighborhood Facilities

Neighborhood, mini and school park facilities provide for park needs within a single service area based on a radius of one-half mile or less. Neighborhood park service areas are shown on Figure 7A-1.

#### Regional and Quasi Public/Private Facilities

These facilities are owned and operated by a private or other public organization to provide the community additional recreational opportunities.

#### Northwest Greenway

The Northwest Greenway (NWG) is an ecological and recreational trail corridor that connects open spaces, parks and trails, and preserves high quality ecosystems. Figure 7-5 shows the overall NWG.

# TABLE 7A-1
# DESCRIPTION OF PARK TYPES

| Park Type | Area Served | Park Size | Focus | Primary Access | Ownership/ Management | Types of Amenities | | Support Facilities |
|---|---|---|---|---|---|---|---|---|
| | | | | | | *Active | *Passive | |
| **City-Wide Facilities** | | | | | | | | |
| Community | Entire City | 20+ acres | Passive and active recreation, natural resources, programmed events | Bike, walk, car, transit | Entirely owned and maintained by City | e.g. Playground structure, sport fields, beach/swimming area, hard surface courts | e.g. Trails, picnicking, fishing, natural habitat | General purpose building with restrooms, off-street parking, other as required |
| Playfield | Entire City | 20-65 acres | Organized recreation | Bike, walk, car, transit | Entirely maintained by City; some leased from School Districts | e.g. Playground structure, sport fields, hard surface courts, rinks | e.g. Trails, natural habitat, spectator seating | Off-street parking, concession/ restroom structure, other as required |
| Special Use | Entire City | As needed | Specific use not found elsewhere in City | Bike, walk, car, transit | Entirely owned and maintained by City | e.g. Skate board park, disc golf | e.g. Trails, natural habitat, dog park, garden, amphitheater | Off-street parking, concession/ restroom structure, other as required |
| City Recreation Facility | Entire City | As needed | Organized recreation | Bike, walk, car, transit | Entirely owned and maintained by City | e.g. Sport field, ice rinks, fitness space | e.g. Meeting, class and conference rooms | Off-street parking, concession/ restroom structure, other as required |
| School Recreation Facility | Entire City | As needed | Organized recreation | Bike, walk, car, transit | Owned and maintained by the School – may be programmed by city | e.g. Sports field, play structure, hard surface courts, ice rinks | e.g. Trails, natural habitat, spectator seating | Off-street parking, concession/ restroom structure, other as required |
| **Neighborhood Facilities** | | | | | | | | |
| Neighborhood Park | 1/2 mi. radius (one park service area) | 5-20 acres | Active informal play | Walk, bike | Entirely owned and maintained by City | e.g. Playground structure, hard surface court | e.g. Open field, trails, natural habitat, picnic shelter | Limited off-street parking (primarily accessible spaces), open air shelter |
| Mini park | Less than 1/2 mi. radius | 1-5 acres | Active informal play | Walk, bike | Entirely owned and maintained by City | e.g. Playground structure, hard surface | e.g. trails, natural habitat, picnic shelter | Limited off-street parking (primarily accessible spaces), open air shelter |
| School Park | 1/2 mi. radius (one park service area) | 5-20 acres | Active informal play | Walk, bike | Owned by School, sports fields may be maintained and programmed by City | e.g. Playground structure, hard surface court | e.g. Open field, trails, natural habitat, picnic shelter | Limited off-street parking (primarily accessible spaces), open air shelter |
| **Regional Facilities** | | | | | | | | |
| Regional | Hennepin County | As needed | Passive and active recreation, natural resources, programmed events | Bike, walk, car, transit | Entirely owned and maintained by other agency | e.g. Playground structure, sport fields, beach/swimming area, hard surface courts | e.g. Trails, picnicking, fishing, natural habitat | Off-street parking, other as required |
| **Quasi-Public/Private Facilities** | | | | | | | | |
| Misc. Facilities (e.g. fitness club, golf course) | Entire City | As needed | Passive and active recreation, programmed events | Bike, walk, car, transit | Entirely owned and maintained by other agency | e.g. Golf, fitness space, hard surface courts, etc. | e.g. Meeting, class and conference rooms & social gathering space | Off-street parking, other as required |

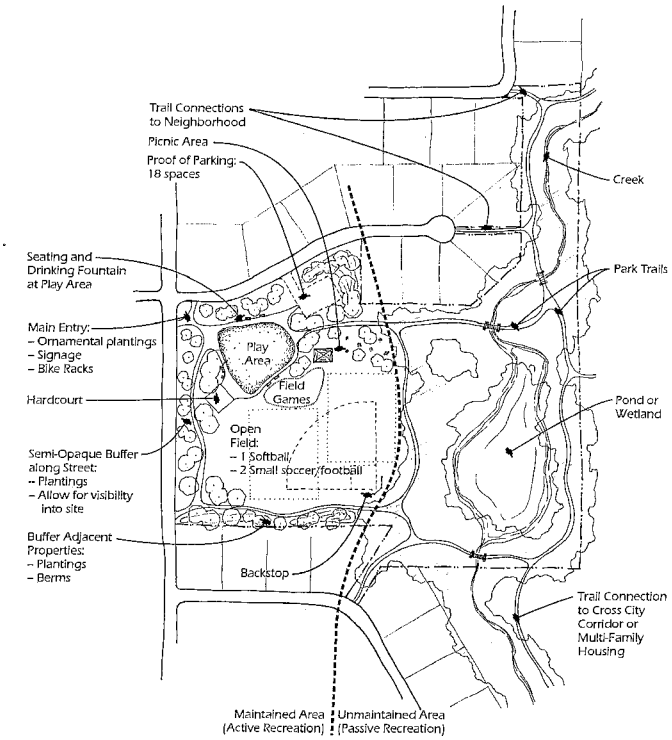
*ACTIVE RECREATION FACILITIES – Typically areas where competitive, and/or organized team activities take place and requires intensive management and maintenance. The active areas typically require specially built facilities (e.g. playgrounds, sports fields, skate parks, court surfaces, swimming facilities, and skating rinks).

*PASSIVE RECREATION FACILITIES – Typically low intensity areas that are unstructured and unscheduled facilities that emphasize natural habitat and/or low level of development (e.g. hiking/walking trails, picnic/sitting areas, fishing, nature areas and general open space).

## Neighborhood Park Prototype

**5 – 20 acres**

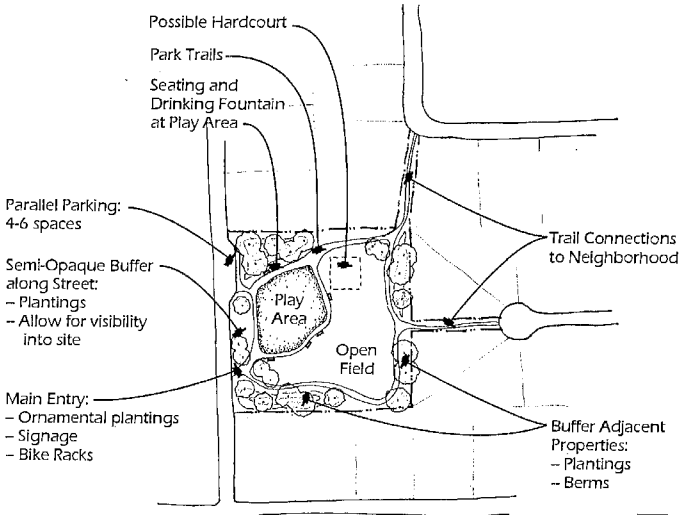
*(Acreage and design will vary according to conditions)*




## Mini-Park Prototype

**1 – 5 acres**

*(Acreage and design will vary according to conditions)*



## COMMUNITY PLAYFIELD/SPORT FACILITIES

The City's playfield/sports facilities accommodate a variety of traditional and non-traditional organized sports. Therefore, flexibility in design of new athletic facilities is crucial to accommodate current needs and to effectively adapt to future needs.

There are essentially five types of facilities that are used for organized sports: ball fields; multi-use fields (soccer, football, lacrosse, cricket and rugby); sand volleyball courts; gyms; and hockey rinks. Each type of facility is described below with actions and/or consideration that will be needed to accommodate future trends.

### Ball Fields

The City will need to pay particular attention to the type and size of any future facilities to ensure flexibility for adequate field needs. The following items will be important to ensuring that these needs continue to be met in the future.

- Flexibility in field design is key in developing new facilities for baseball and softball. These sports pose scheduling and facility development challenges because of varying baseline/pitching mound requirements and the need to provide both grass and dirt infields.

- Scheduling game efficiency is an effective way of maximizing field usage. The City will encourage baseball/softball organizers to devise ways to maximize the number of games that can be scheduled on fields.

- Monitoring participation trends will be important to determining whether the City should consider ball field amenities at the proposed 10$^{th}$ playfield site.

### Multi-use Fields

Soccer, football, lacrosse, cricket and rugby participation is on the increase. The traditional programs of soccer and football are now competing with lacrosse, cricket and rugby for the same facilities. It will be important to ensure that proper maintenance and field care are provided so that the fields are able to handle the increased usage. The City will take the following actions to meet future needs:

- Addition of a 10th Playfield will increase both the quantity and quality of facilities that can accommodate the various grass field sports.

### Sand Volleyball Courts

A majority of sand volleyball players prefer unorganized, impromptu games. In recent years, the City has seen steady use of these facilities. The City will monitor use and develop new sand volleyball courts if demand requires it.

### Gymnasiums

The City has built four City/school courts (two each at Wayzata and Armstrong high schools) and a field house facility at Plymouth Creek Center. These facilities do not meet the current demand. The City will continue to work with Plymouth's school districts to maximize court time and to monitor the need for indoor court facilities for traditional and new sport programs. The City should also consider additional active programming and/or gymnasium space at the Plymouth Creek Center.

### Hockey/ Skating Rinks

In 2005, the City partnered with the Wayzata Hockey Association and Providence Academy to add a third sheet of ice to the Plymouth Ice Center. The addition of the rink has adequately accommodated the high demand for hockey ice time. The City has seen a reduction in the use of outdoor ice facilities by the community. However, organized hockey program use has been stable. The City will take the following actions to address demonstrated needs:

- Monitor activity levels to track trends in hockey and figure skating.

- Focus on maintaining six outdoor rink locations (Bass Lake, Oakwood, Parkers Lake, Plymouth Creek, Ridgemount and Zachary) and consider adding a facility at Elm Creek Playfield. Continue to maintain these facilities to ensure quality ice and enhanced experiences.

## SPECIAL RECREATION FACILITIES

Special facilities are unique recreational amenities not included in the programming of a typical park and are intended to increase the recreational diversity of Plymouth's park system. These special facilities may be provided as part of an existing park or as a stand-alone facility. Table 7A-4 identifies existing special facilities and their providers.

TABLE 7A-4
EXISTING SPECIAL FACILITIES

| Facility Type | Provider |
|---|---|
| Banquet Hall | City of Plymouth (part of the Plymouth Creek Center) |
| Bocce Ball Courts | City of Plymouth (Plymouth Creek Park) |
| Community Gardens | City of Plymouth Millennium Garden (Plymouth Creek Center) |
| Community Gardens | Hennepin County Workhouse and City of Plymouth |
| Community Center (PCC) | City of Plymouth |
| Disc Golf | City of Plymouth (Plymouth Creek Park and Zachary Playfield) |
| Dog Park | City of Plymouth (Plymouth Dog Park, 4 Paws Dog Park at Plymouth Playfield and Happy Tails Dog Park [Seasonal] at Oakwood Playfield ) |
| Field House | City of Plymouth (Plymouth Creek Center) |
| Fishing Piers | City of Plymouth (East Medicine Lake, Lake Camelot, Parkers Lake, Three Ponds, Timber Shores and West Medicine Lake Parks) |
| Greenway (Distance trails) | City of Plymouth (Northwest Greenway) |
| Historical Interpretation | City of Plymouth, Plymouth Historical Society (Old Town Hall and Parkers Lake Log Cabin) |
| Ice Arena | City of Plymouth (Plymouth Ice Center) |
| In-line Hockey | City of Plymouth (Plymouth Creek Playfield) |
| Performing Arts Venues | City of Plymouth (Hilde Performance Center) |
| Pickleball Courts (dedicated) | City of Plymouth (Bass Lake Playfield) |
| Picnic Facilities | Three Rivers Park District (Clifton E. French Regional Park), City of Plymouth (Parkers Lake Park and West Medicine Lake Parks) |
| Pump Track | City of Plymouth (Plymouth Playfield) |
| Skate Park | City of Plymouth (Plymouth Creek Playfield) |
| Sliding Hills | City of Plymouth (Ridgemount Playfield) |

Source: City of Plymouth

The City of Plymouth has a variety of special recreation facilities in the community for residents to use and enjoy. Below are details on several of the City's larger facilities. Other facilities include the Hilde Performance Center, home to Music in Plymouth, the Millennium Garden next to the Plymouth Creek Center, Egan Dog Park and the skate park.

## Plymouth Ice Center

The Plymouth Ice Center, located at 3650 Plymouth Boulevard, opened in June of 1997 with two ice sheets: an Olympic and a professional sheet. In 2004, the facility added a third professional ice sheet with seating for 420 spectators. The expansion also included additional parking, an enlarged and remodeled lobby/concessions area, and additional restrooms, locker rooms, offices and storage. In 2015, the City added approximately 7,000 square feet of dryland training space to be leased to a private vendor. In 2017, the Olympic sheet of ice was converted to a professional size rink along with upgrades to the refrigeration system.

The ice center includes ten locker rooms, one figure skating room with mirrored walls and ballet bars and two officials' rooms. There are upper and lower level lobbies. Concessions are located upstairs with

vending machines and restrooms on both levels. The facility also includes two meeting rooms: the Center Ice Room (seating for 175) and the Blue Line Room (seating for 39).

The Plymouth Ice Center offers learn-to-skate classes and specialty classes as well as public open skating, parent and tot skating and adult open hockey.

Wayzata and Providence Academy high school hockey teams use the Plymouth Ice Center. The facility is also used by Wayzata Youth Hockey, Armstrong Youth Hockey and many other groups.

## Plymouth Life Time Fitness Recreation Center

The Plymouth Life Time Recreation Center, located at 3600 Plymouth Boulevard, is a three-way joint venture among the City of Plymouth, Life Time Fitness and the Wayzata School District. The fitness center is attached to the Plymouth Ice Center and is adjacent to Plymouth City Hall. Life Time is a for-profit, private fitness company. The facility offers a broad range of weight and fitness training equipment, aerobic classes, sports programs, youth program areas and indoor and outdoor aquatic facilities. As part of its agreement with Plymouth, Life Time allows Plymouth residents to purchase daily passes for the use of their facility.

## Plymouth Creek Center and Field House

Plymouth Creek Center is Plymouth's community center and has three main components.

**Activity Center** – Opened in 2000 and expanded in 2004. This facility contains a large ballroom (capacity 350) with windows and decking on two sides overlooking gardens and a park reserve. This 75-foot by 75-foot room, which includes a stage and dance floor, accommodates over 50 wedding receptions and other large social events each year. It can be divided in half, and one side can be further split in half. Next to the ballroom is the Fireside room (capacity 50), which is heavily used for seniors' activities during the day and community use on nights and weekends. There are also three multi-purpose meeting rooms with capacities from 35-70, a Black Box theater (capacity 150), two music rooms and two conference rooms. In 2016, the Alcove room was added to accommodate an additional space that can be used as a dressing room for bridal parties, bridal and baby showers, small meeting room, etc. Countless park and recreation classes, senior programs, corporate meetings, and socials events take place at the activity center. A feasibility study was completed in 2017 for the Plymouth Creek Center to include the potential of a renovation and expansion of the current facility.

**Millennium Garden** – These community gardens, which were completed in 2003, host about 40 wedding ceremonies a year and thousands of daily visitors. Included are fountains, a stage, sound system and a labyrinth. Over the years, site amenities, the fountain and pond restoration have been completed.

**Field House** – Opened in the fall of 1999. It contains a full-size artificial grass field (60 yards by 100 yards) in the center of a one-fifth mile track that is made of the same artificial grass material. The dome was replaced in 2017 and updated with LED lighting and new netting. The track is eight-feet wide and handles over 200 walkers/joggers per day on average. The field, which can be used full size or divided with a net for two half fields, is used for park and recreation classes and leagues. It is also rented to community athletic associations and schools for soccer, lacrosse, football, rugby, softball, baseball and golf. From November through April, the field is covered with a dome that allows the City to use the field about 80 hours per week during those months.

## Potential Special Facilities and/or Amenities

The implementation of special facilities relies heavily on resident desires. A variety of special facilities is possible as described below. Special facilities should be provided by the City only to respond to demonstrated need.

An *environmental park* can meet both education and conservation goals. In addition to preserving and restoring a rare or endangered ecosystem, it provides for the interpretation of that ecosystem and of any restoration efforts taking place. The scale of such a park may range from natural surface trails with interpretive signage to a fully-staffed, year-round interpretive building. An environmental park could be implemented either within an existing park or as a new addition to the park system.

*Golf* is recognized by the City as a sport that is important to many Plymouth residents. The consideration of public golf in the city is important for the following three reasons:

- **Recreational diversity** – The City of Plymouth strives to provide a variety of recreational opportunities to its residents.

- **Provision of green space** – Golf requires large tracts of undeveloped land and, therefore, golf courses provide the opportunity to maintain large areas of the community as green space that would otherwise be developed. However, golf courses need to be designed to ensure compatibility with the City's natural resource preservation goals. Golf courses should be sited on suitable land of appropriate size to allow for the retention or creation of natural habitats between and around holes. Golf courses should include on-site storm water retention and buffering of wetlands and streams. The use of chemical fertilizers, pesticides and herbicides should be limited. Native plant materials should be used.

- **Quality of life** – Many Plymouth residents have come to expect the presence of public golf courses in the community and nearby. As Plymouth's population increases, it will be

important to ensure that this recreational diversity, natural resource preservation and quality of life are continued.

*Policies Related To Golf Courses*

In order to satisfy the desires of many residents and to maintain the present high level of service, quality of life, recreational diversity and protection and enhancement of natural areas, it is important that Plymouth strive to preserve publicly accessible golf courses in the city. A decision to seek public ownership of any of the existing private golf courses in the city would need to be made following a detailed analysis of the facilities and financing options. In addition to economic considerations, the City would also review physical characteristics, including location, accessibility, topography, soils and water resources.

*Indoor playgrounds* have been successful in the Twin Cities area. They offer the benefits of active and varied play experiences, the safety of a controlled environment and the advantage of accessibility, even during inclement weather. Indoor playgrounds require a large indoor space. They could be developed in conjunction with future City facilities or established in cooperation with a partner.

*Outdoor pools, water parks* are popular in the Twin Cities. The City has four swimming beaches, but does not have a City pool or water park. By adding a pool facility, the City would eliminate the water quality issues that are associated with lake swimming.

*Pump tracks* are becoming more popular in the United States. The City built the first one in Minnesota in 2016. It is a continuous loop that can be ridden using body momentum. The track consists of a series of bumps (rollers) and banked corners (berms) that allow the rider to gain momentum. The City's pump track was designed to cater to a range of abilities.

The operation of *remote control boats, airplanes and drones* is increasing in popularity. This type of facility demands an area free from other disturbances such as swimmers, anglers, power lines or tree cover. There are lakeside parks in Plymouth that could accommodate an area for small remote control boats, and open fields within existing parks that could be designated for use by remote airplane or drone operators.

*Single track* describes a type of mountain biking trail that is approximately the width of the bike. It is often smooth and flowing, but may also feature technical rocky sections, go over tree roots and include berms, banked turns, switch-backs, hills, drops and jumps. Mountain biking has been gaining momentum with more trails being added in the Twin Cities.

*Skate parks* provide a venue for skateboarding and in-line trick skating. Both activities are experiencing an increased level of popularity. The City currently has a heavily used skate park located at Plymouth Creek Playfield. An additional facility should be considered if the sport's popularity remains stable.

*Spray parks* have become a very popular, safe and fun alternative to traditional swimming pools. They provide users with a variety of above ground interactive wet play components such as spraying cannons, water tunnels, ground gushers, and other equipment that envelop the user in refreshing mists and/or gushes of water. Spray parks provide entertaining recreational opportunity for the entire family. A spray park would most likely be constructed within an existing park facility.

## Regional and Quasi-Public/Private Facilities

There are a number of other regional and quasi-public facilities that are available for recreation use on a cooperative, member-based or limited basis. There are many different businesses and facilities within Plymouth that serve a recreational purpose. Some of these include: fitness facilities, dance studios, gymnastic studios, martial art schools, preschools, gun club, community club, banquet and meeting facilities. The following are larger regional or quasi-public/private facilities located in the Plymouth area:

**Golf Courses** – The City of Plymouth is home to two golf courses: Eagle Lake Regional Park (nine-hole Three Rivers Park District facility/public) and Hollydale Golf Course (18-hole private owner/open to the public). In addition, there are over a dozen golf facilities within ten miles of Plymouth including New Hope Village, Rush Creek, Brookview, Shamrock, Orono Public, and Baker National Golf Course.

**Hennepin County Library** – The library is a valuable resource for reference and multi-media materials. The Plymouth Library offers a variety of programs centered on reading for all ages. The library was re-construction in 2008. It is approximately 30,000 square feet in size and incorporates flexible space for children, teens and adults, expanded collection, computers, environmentally-friendly landscape and other features.

**Three Rivers Park District** – Clifton E. French Regional Park is located in Plymouth. It provides a variety of recreational resources including: boat launch; children's play area; swimming beach; large group picnic sites; naturalist-led activities; and two meeting rooms available for community use. Eagle Lake Regional Park is on the northern boundary between Plymouth and Maple Grove and provides an instructional nine-hole golf course, mini-golf course, boat carry-in access, fishing pier, picnicking, biking, hiking, cross-country skiing, skijoring and snowshoeing.

**Historic Sites** – Plymouth's Old Town Hall is located at Plymouth Creek Park. It houses the Plymouth Historical Society and is open to the public once a month or by appointment. The Gilfillan Log Cabin replica was dedicated in February of 1998 and is located in Parkers Lake Park.

**Neighboring Parks and Recreation Departments** – The neighboring cities of Maple Grove, Brooklyn Park, New Hope, Golden Valley, St. Louis Park and Minnetonka all have parks and recreation departments. They have a wide variety of facilities and program offerings. Plymouth has participated in a range of collaborative programs with them, from teen program to senior trips to youth and adult athletics.

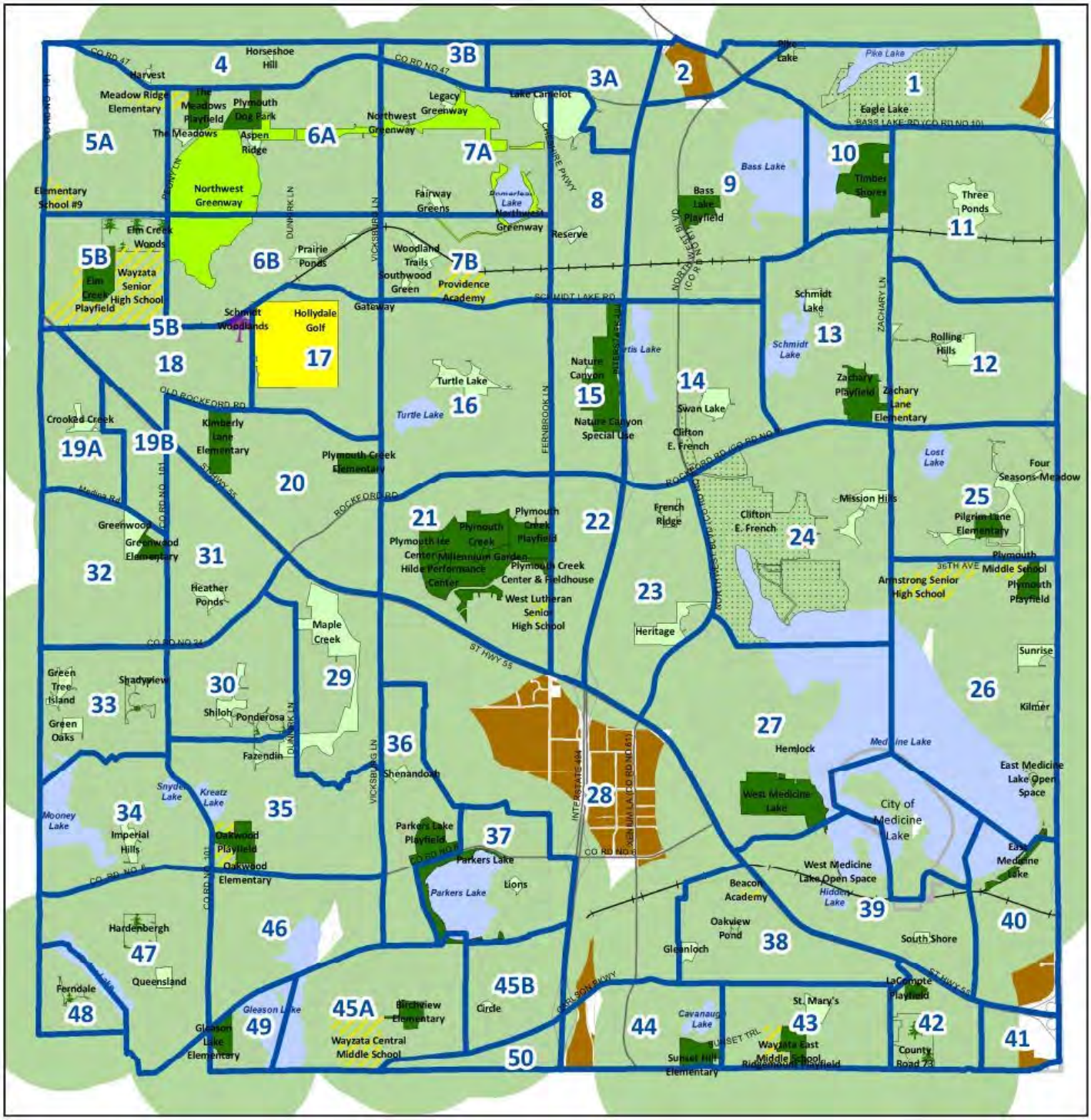
**Parkers Lake Golf Center** – This facility is owned and operated by the Hennepin County Adult Correctional Facility. The City offers a variety of golf lessons at this facility.

**Plymouth City Hall** – The meeting spaces and public hallways at City Hall have been used for a variety of meetings, classes, and art exhibits.

## PARK FACILITY SERVICE AREA ANALYSIS

**Park Facilities Service Areas** – Plymouth has been divided into park service areas, each of which should be served by a neighborhood, a school, or one or more mini-parks. Figure 7A-1 shows the service areas/zones that represent a one-half mile walking distance to existing parks.

The planned improvements for each service area range from establishing better connections within neighborhoods, through signage or minor trail connections, to acquisition and development of new parks. Specific improvements are based on how well the area is currently served, the availability of land for parks, trails or greenways, and resident needs. The general types of improvements and the service areas to which they should be applied are summarized in Table 7A-5. Detailed analysis on the proposed neighborhood park location is provided in Appendix 7C.




## Figure 7A-1

# Park Service Areas

As of December 12, 2018

City of Plymouth

**Legend**

- Citywide Facilities
- Neighborhood Facilities
- Natural Areas & Open Space
- Northwest Greenway
- Regional Park
- School Recreational Facility
- Private Golf Course
- Park Service Area
- Proposed Neighborhood or Mini Park Location
- Half Mile Parks Buffer
- Half Mile of Proposed Parks Buffer
- Industrial/Commercial Zone

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

# 7A-5 PARK SERVICE AREAS ANALYSIS

Plymouth has been divided into park service areas, each of which should be served by a neighborhood, a school, or one or more mini parks. Figure 7A-1 in the 2030 Comprehensive Plan shows the service areas/zones that represent a one-half mile walking distance to existing parks.

The planned improvements for each area range from establishing better connections within neighborhoods, through signage or minor trail connections, to acquisition and development of new parks. Specific improvements are based on how well the area is currently serviced, the availability of land for parks, trails or greenways, and resident needs. The table below provides general types of improvements and the services areas to which they should be applied.

| PARK SERVICE AREA | DEVELOPMENT/ RENOVATION OF EXISTING FACILITIES | ACQUISITION & DEVELOPMENT | TRAILS & ROADWAY CROSSING |
|---|---|---|---|
| **#1 Eagle Lake Regional Park** | | ▪ Consider development of mini neighborhood park (Hemlock Ln & 61st Ave. – PID 02-118-22-21-0041 & 02-118-22-21-0086 ) | ▪ Provide roadside trail along Bass Lak e Road from Nathan Lane to the 169 interchange - access into New Hope |
| **#2 Bass Creek** | | ▪ If Prudential develops, explore possibility of mini park or negotiate for park on corporate grounds | ▪Provide roadside trails along both sides of County Road 47<br>▪Improve trail access under I-494<br>▪Provide roadside trails along west side of Northwest Boulevard |
| **#3a Lake Camelot** | ▪ Consider parking lot expansion<br>▪ Shelter renovation<br>▪ Consider removal of south boardwalk versus replacement | | ▪Provide roadside trails along both sides of County Road 47<br>▪North boardwalk improvements<br>▪Remove south boardwalk and place trail on land |
| **#3b** | | | ▪Provide roadside trails along both sides of County Road 47 |
| **#4** | | ▪ Acquire/develop (2) mini parks north of County Road 47 – one east of Peony Lane and one west of Peony Lane | ▪Provide roadside trails along both sides of County Road 47<br>▪Provide trail access to Plymouth Dog Park |
| **#5a** | | | ▪Provide roadside trails along both sides of County Road 47<br>▪Provide roadside trail along Troy Lane |

| | | | |
|---|---|---|---|
| **#5b Elm Creek Playfield** | ▪ Consider artificial turf installation<br>▪ Consider park enhancements to better serve future neighborhood to west<br>▪ Consider nature trail development in Big Woods | ▪ If possible, acquire additional land to preserve Big Woods | ▪Provide trail connections from Creekside Hills to playfield<br>▪Provide roadside trail along Troy Lane<br>▪Provide east/west roadside trail connection into Medina near 55th and Troy Lane to County Road 101 and Sioux Drive grade separated crossing |
| **#6a Aspen Hollow Northwest Greenway Plymouth Dog Park The Meadows** | ▪ Renovate Dog Park play features<br>▪ If necessary, fence Dog Park borders | ▪ Develop "The Meadows" site with neighborhood and city park amenities<br>▪ Build Northwest Greenway System and trailheads | ▪ Renovate Dog Park boardwalk/bridges<br>▪ If possible provide safe trail crossing of Peony Lane from Northwest Greenway to The Meadows |
| **#6b Prairie Ponds** | | | ▪Provide trail access under Vicksburg Lane and along railroad tracks with connections to Fairway Greens and Woodland Trails |
| **#7a Fairway Greens, Legacy Greenway and Northwest Greenway** | | ▪ Acquire land along Juneau Lane needed for NWG trail connection<br>▪ Build Northwest Greenway System and trailhead at Lake Pomerleau | ▪Develop trail around Lake Pomerleau and connect to Northwest Greenway |
| **#7b Woodland Trails and Southward Green** | ▪ Address ADA accessibility issues | | ▪Provide trail railroad crossing from Woodland Trails to access Fairway Greens<br>▪Provide trail connection between Woodland Trails and Turtle Lake Parks across Schmidt Lake Road |
| **#8 Reserve** | ▪ Address ADA accessibility issues | | |
| **#9 Bass Lake Playfield** | ▪ Renovation of Bass Lake building – ADA modifications | | |
| **#10 Timber Shores** | ▪ Shelter renovation | | ▪ Consider boardwalk/fishing pier improvements or provide structured boardwalk |
| **#11 Three Ponds** | ▪ Shelter renovation | | ▪Provide roadside trail along Bass Lake Road from Nathan Lane to 169 interchange - access into New Hope<br>▪Provide trail railroad crossing to access Three Ponds<br>▪Complete trail connection to Three Ponds on Union Terrace |
| **#12 Rolling Hills** | ▪ ADA modifications | | |
| **#13 Schmidt Lake/Zachary Playfield** | ▪ Zachary – ADA modifications to site and buildings<br>▪ Zachary -Parking lot enhancements<br>▪ Zachary – consider | | ▪Provide roadside trail (east side) along Zachary Lane from about 48th Avenue to Schmidt Lake Road |

| | | | |
|---|---|---|---|
| | park building renovation<br>▪ Schmidt Lake –ADA fishing pier renovation | | |
| **#14 Swan Lake** | ▪ Address ADA accessibility issues (e.g. picnic shelter, routes from parking lot and courts) | | ▪ Improve crossing of Northwest Boulevard and Rockford Road<br>▪ Rockford Road trail connection (north side) to regional trail<br>▪ Provide trail connection on west side of Northwest Boulevard from Rockford Road to 42nd Avenue |
| **#15 Nature Canyon** | ▪ Develop Nature Canyon Park | • Consider a long-term lease with Aero Systems Engineering to expand park area | ▪ Improve existing connection across Fernbrook Lane to Turtle Lake Park |
| **#16 Turtle Lake** | | | ▪ Provide trail connection on east side of Old Rockford Road to Vicksburg Lane |
| **#17 Gateway** | | ▪ If Hollydale Golf Course redevelops, a park is needed | ▪ Provide trail railroad crossing to access on Holly Lane<br>▪ Provide trail extension along west side of Holly Lane |
| **#18** | | ▪ If Hollydale Golf Course redevelops, a park is needed | ▪ Provide trail railroad crossing to access on Holly Lane<br>▪ Provide trail extension along west side of Holly Lane |
| **#19a Crooked Creek** | ▪ Complete development of neighborhood park | ▪ Acquire additional land to complete park<br>▪ If possible acquire easement or property to provide a trail connection between new park and Urbandale Court | ▪ Improve connections to Hamel Legion Park in Medina<br>▪ Provide trail on east side of Brockton Lane<br>▪ Provide trail on Hamel Road from Brockton Lane to Peony Lane/County Road 101<br>▪ Provide trail on Medina Road (south side) from Brockton Lane to Greenwood school<br>▪ Improve trail crossing of Medina Road and Brockton Lane |
| **#19b** | | ▪ If possible acquire easement or property to provide a trail connection between new park and Urbandale Court | ▪ Provide trail on Hamel Road from Brockton Lane to Peony Lane/County Road 101 |
| **#20 Plymouth Creek Elem/Kimberly Lane Elem.** | | | |
| **#21** | ▪ Renovation or | ▪ Consider | ▪ Improve crossing of Fernbrook Lane to |

| | | | |
|---|---|---|---|
| **Plymouth Creek** | replacement of park building – ADA modifications<br>▪ Consider parking lot expansion<br>▪ Renovation of disc golf facility<br>▪ Renovation and expansion of PCC<br>▪ Fieldhouse retaining wall maintenance & repair<br>▪ Fieldhouse turf replacement | purchasing parcel 3535 Fernbrook Lane that is surrounded by park | Plymouth Creek Park<br>▪ Provide trail on east side of Fernbrook Lane from Rockford Road to Highway 55<br>▪ If possible provide trail connection/tunnel under I-494 for Plymouth Creek Trail |
| **#22** | | | ▪ Improve crossing of Fernbrook Lane to Plymouth Creek Park<br>▪ Provide trail on east side of Fernbrook Lane from Rockford Road to Highway 55 |
| **#23 Heritage/French Ridge** | | | |
| **#24 Mission Hills/French Regional Park** | | | ▪ Provide trail connection on Old Rockford Road from Larch Lane/41st Avenue into French Park<br>▪ Provide trail connection on Old Rockford Road from Evergreen to Zachary Lane |
| **#25 Four Seasons/Pilgrim Lane** | | | ▪ Consider changing Pilgrim Lane sidewalk into trail<br>▪ Provide trail connection on east side of Zachary Lane from 36th Avenue to Rockford Road |
| **#26 Plymouth Playfield Sunrise/Kilmer** | | | ▪ Provide trail connection on 26th Avenue from lake to Highway 169 |
| **#27 West Medicine Lake Park** | ▪ Develop year-round building to enhance park experiences<br>▪ Consider parking lot expansion<br>▪ Consider park renovations (e.g. shelters, fishing pier, beach enhancements) | | ▪ Develop Plymouth Creek trail from 26th Avenue into West Medicine Lake Park |
| **#28 Industrial** | | | ▪ Extend trail on Xenium Lane(County Road 61) into Minnetonka |
| **#29 Maple Creek** | | | ▪ Extend trail from park northwest to Dunkirk Lane and east to Vicksburg Lane |

| | | | |
|---|---|---|---|
| **#30 Shiloh** | | | |
| **#31 Heather Ponds** | | | |
| **#32 Greenwood School Park** | | | ▪ Provide trail on Medina Road (south side) from Brockton Lane to Greenwood school<br>▪ Improve trail crossing of Medina Road and Brockton Lane |
| **#33 Green Oaks** | | | ▪ Provide roadside trail and connection on County Road 24 to Medina |
| **#34 Imperial Hills** | | | ▪ Provide roadside trail and connection on County Road 6 to Orono |
| **#35 Oakwood/Fazendin** | | | |
| **#36 Parkers Lake/Shenandoah** | | | |
| **#37 Parkers Lake/Lions** | ▪ Consider expanding the building and making beach improvements | | ▪ Provide roadside trail on County Road 6 between Vicksburg and Fernbrook Lanes |
| **#38 Gleanloch/St. Mary's** | | | |
| **#39 South Shore** | | | ▪ Provide roadside trail and connection on South Shore Drive to the City of Medicine Lake<br>▪ Improve trail connection on Highway 55 frontage road from South Shore Drive to Medicine Lake Drive<br>▪ Provide roadside trail from South Shore Park to Highway 55 frontage road on South Shore Drive<br>▪ Improve/provide trail crossing of Highway 55 at South Shore Drive |
| **#40 East Medicine Lake Park** | ▪ Consider general park improvements | | ▪ Provide roadside trail and connection on South Shore Drive from City of Medicine Lake to East Medicine Lake Park<br>▪ Provide roadside trail- Nathan Lane from 13th Avenue<br>▪ Provide roadside trail on the south side of 10th Avenue from Kilmer Lane to Revere Lane |
| **#41** | | | |
| **#42 LaCompte** | ▪ Redevelopment of park | ▪ Consider partial acquisition of PID's 36-118-22-32-0006; 0007; 0008 to connect LaCompte with | ▪ Provide roadside trail on Old County Road 15 (frontage road from Revere Lane/Highway 55 to County Road 73/Sunset Trail and to Highway 55 crossing<br>▪ Provide roadside trail on County Road 73/Sunset Trail from Old County Road 15 to |

| | | | |
|---|---|---|---|
| | | park property | Ridgemount Avenue |
| **#43 St. Mary's/ Ridgemount** | ▪ Consider building improvements to building at Ridgemount (e.g. restrooms) | | |
| **#44 Sunset Hills Elem.** | | | |
| **#45a Birchview Elem.** | | | |
| **#45b Circle** | | | |
| **#46** | | | |
| **#47 Queensland** | | | ▪ Provide roadside trail and connection on County Road 6 to Orono |
| **#48 Ferndale** | ▪ Consider development of Ferndale property to neighborhood park | | |
| **#49 Gleason Lake School** | | | |
| **#50** | | | |

# TRAILS, SIDEWALKS AND ON-ROAD BICYCLE ROUTES

## TRAIL DESIGN

The trail standards that will be used for new construction in Plymouth are described below. Some dimensions may vary in the detailed design phase due to existing conditions, right-of-way width and other factors. Choosing a trail design for a particular corridor or portion of a corridor should be based on several factors:

- **Existing Conditions –** roadway or independent corridor, type of roadway, traffic volumes on roadway, type of natural environment in independent corridor-wetland, woodland, and feasibility of trail construction;

- **Type of Connection –** regional corridor or local connector, transportation, recreation, or both, anticipated travel distance;

- **Use of Corridor –** anticipated traffic volume on trail user types (bikers, walkers, inline skating, equestrians), user skill (highly skilled bike commuters, families with small children); and

- **User Desires**.

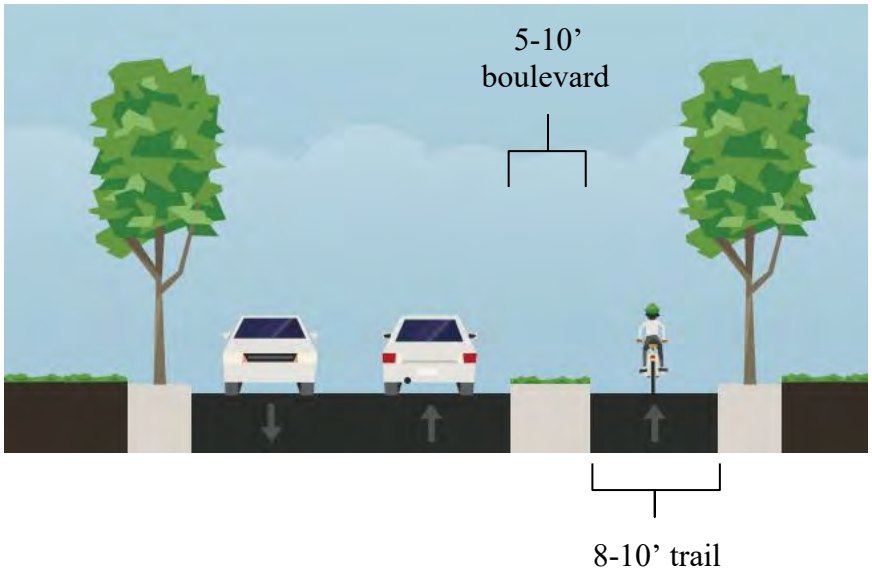
## DESIGN STANDARDS

The design of a trail is directly related to the corridor's use. Each corridor must be analyzed in relation to type of use, skill level of users, purpose and conditions. The following pages depict general design standards for trails (boulevard, multi-use, nature and roadside), sidewalks and on-road bicycle routes.

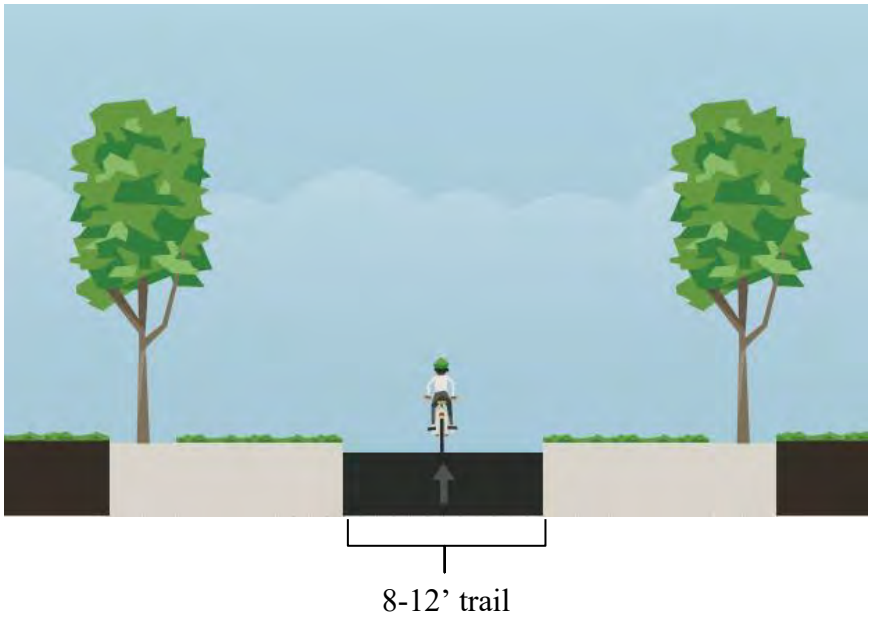
## Trail Design Standards

| | Boulevard Trail | Multi-use Trail | Nature Trail | Roadside Trail |
|---|---|---|---|---|
| Surface | Bituminous or concrete | Bituminous or concrete | Woodchip, crushed limestone, turfgrass or aggregate | Bituminous or concrete |
| Location | Within road right-of-way, runs parallel to the road with a 5 – 10 foot boulevard | Within existing parks and other non-roadway corridors | Within existing parks or sensitive corridors | Within road right-of-way, runs parallel to the road at the curb line |
| Width | 8 – 10 feet | 8 – 12 feet | 6 – 10 feet | 8 – 10 feet |
| Use | Recreational use along a roadway | Recreational use within a park or other non-roadway corridors | Interpretive loops within a park or open space | Recreational use along a roadway |

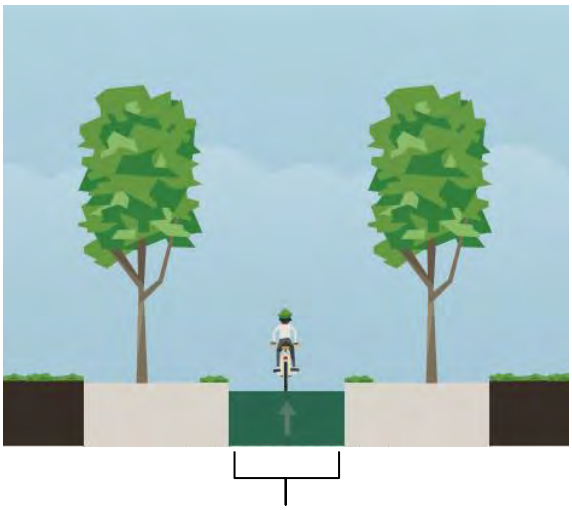
**Boulevard Trail**



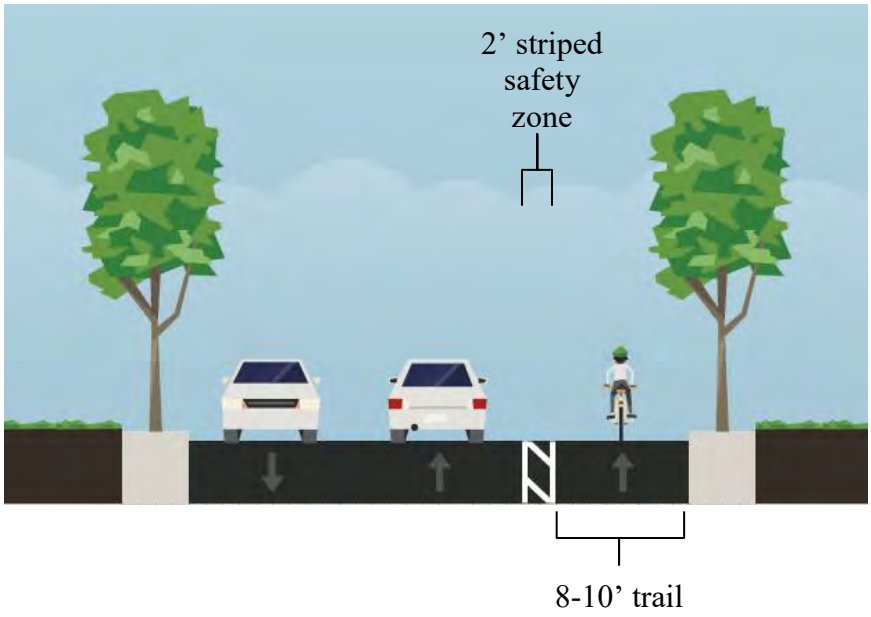

**Multi-use Trail**



**Nature Trail**



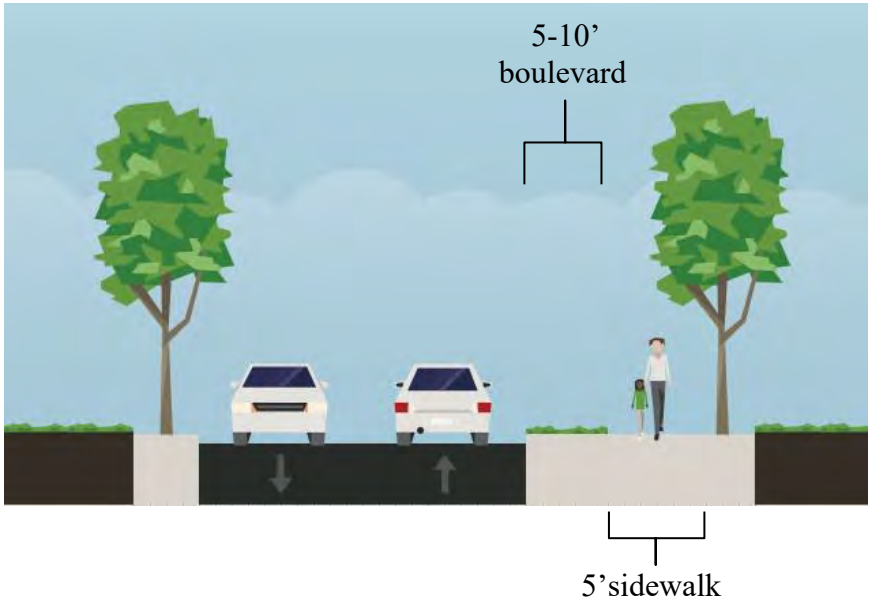

**Roadside Trail**



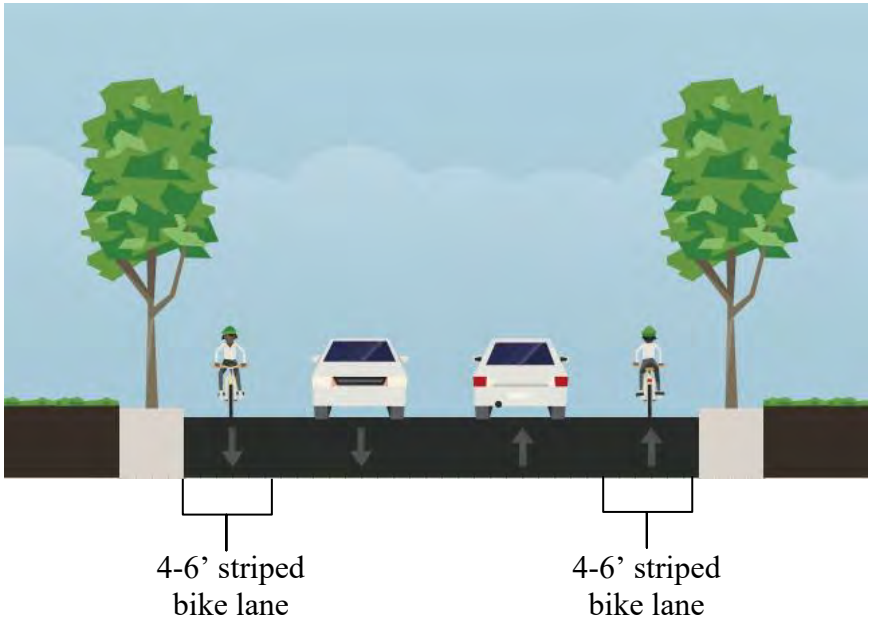

## Sidewalk and On-Road Bike Design Standards

| | Sidewalk | On-Road Bike |
|---|---|---|
| Surface | Concrete | Bituminous |
| Location | Adjacent to roadway, at back of curb or separated by 5 – 10 foot boulevard | On existing roadway, denoted by signage and striping |
| Width | 5 feet | 4 – 6 feet from edge of drive lane to gutter |
| Use | Pedestrian links along minor roadways | Major roadways with limited right-of-way, county bike routes, non-motorized transportation |

**Sidewalk**




**On-Road Bike**




## NATURAL AREAS AND OPEN SPACE

Plymouth has made a strong commitment to the preservation of natural communities through both acquisition and regulation of unique natural resources. Equipped with an understanding of the existing natural resources within the community and the means of protecting and managing them, Plymouth can ensure that it will continue to benefit from high quality natural areas, clean water, diverse wildlife and plant life and unique recreational opportunities.

## NATURAL RESOURCES INVENTORY

Hennepin County Department of Environmental Services completed a natural resources inventory (NRI) of Plymouth in 2006. The purpose of the inventory was to identify the significant natural resource areas in the city. The significant areas identified though the NRI are classified into their unique type of natural community.

The NRI includes a ranking of each natural community based on its ecological quality. Quality rankings of A through D were given, with A being the highest quality communities and D being poor condition communities. The inventory identified 162 total natural areas of sufficient quality to receive natural community quality rankings under the Minnesota Department of Natural Resources guidelines. Of these 162 natural areas, 23 received the highest quality ranking (either A or B). These areas are illustrated on Figures 7A-2 and 7A-2.1. Of this group, 81 percent are forested communities and the remaining 18 percent are wetland communities.

The high quality wetland communities are protected through the Wetland Conservation Act. The City owns 51 percent of the high quality forested areas. The remaining high quality forested communities are currently unprotected lands that are privately owned.

The remaining level C and D areas are natural communities of moderate or poor quality. In urbanized communities such as Plymouth, the dominance of non-native, invasive species and the extent of cultural uses are keys in determining natural quality. Natural communities that have been given a level C or D ranking have experienced past disturbance and include invasive species. As a result, the City will not pursue preservation of these areas over level A and B areas. However, the City still strongly encourages preservation of these areas.

## PROTECTION OF NATURAL AREAS

By acquiring or otherwise protecting high quality resource parcels, and by connecting those parcels using natural corridors, Plymouth can assure an overall system that meets its open space preservation goals. The selection of natural resource parcels to be preserved and appropriate preservation methods is a complex process. The process must consider other needs that may compete with preservation, including housing development, active recreation and sports facilities and roadway expansion. The City has three basic methods for preservation: acquisition; regulation; and in some cases, conservation easements**.** The City has and will continue to use these methods for preserving natural areas.

## MANAGEMENT OF CITY-OWNED OPEN SPACES

To ensure the preservation and restoration of high quality natural areas, the City will develop and apply a management plan for each existing and future City-owned open space parcel. Figure 7A-3 identifies City-owned open space.

# RECREATION

The purpose of the City of Plymouth's recreation program is to assist individual and community development, improve physical and mental health, enhance social functioning and improve the quality of life for all residents.

There are a number of current trends that will influence the future direction of recreation programs in the City of Plymouth. These include the following:

**Aging Population –** As the population continues to age, increasing demands will be placed on health and social service agencies. The programs/services offered can and will make a difference in the quality of life for older adults.

**Wellness –** Since the mid-seventies, the prevalence of obesity has increased sharply for both children and adults. These increasing rates raise concern because of their implications for Americans' health. Being overweight or obese increases the risk of many diseases and health conditions, including hypertension, high total cholesterol, Type 2 diabetes, coronary heart disease, stroke, and cancer. A strong commitment to active, creative recreation can pay big dividends by building a healthier community.

**Diversity –** As the ethnic makeup of Plymouth becomes more diverse, recreation activities provide a positive avenue for engagement and integration into community life. Integrated and accessible leisure services are also critical to the quality of life for people with disabilities and disadvantaged individuals.

**Environmental Emphasis** – Plymouth residents have a high level of interest in preserving a healthy environment that includes parks and open space as well as activities and programs. As people become more enveloped by technology, they have a need to reconnect with the natural world around them. Recreation has the opportunity to provide not just wholesome, nature-based facilities, but also programs that can provide a philosophical basis for living in harmony with the world.

**Prevention –** Positive programs, with connections to good role models, make a difference in the lives of not just youth, but all age groups. Leisure opportunities for youth provide positive lifestyle choices and




**Figure 7A-2**

## Significant Natural Communities

As of April 18, 2018

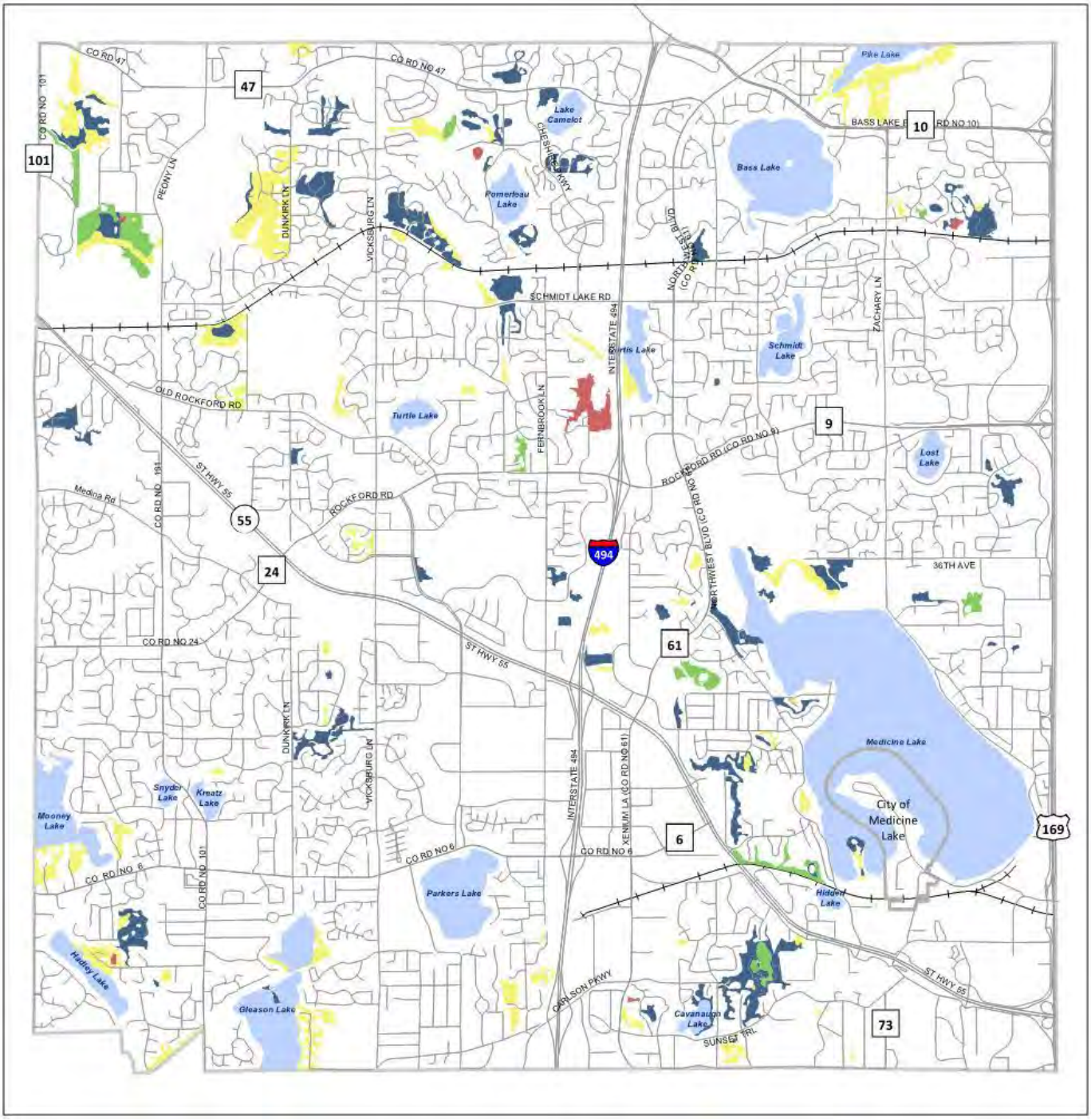
Source: Hennepin County and Great River Greening

City of Plymouth

N

- City-Owned Parcels
- Lowland hardwood forest
- Maple-basswood forest
- Mixed hardwood swamp
- Oak forest mesic subtype
- Wet meadow
- Wet meadow - seasonally flooded
- Wet meadow floating mat subtype
- Wet meadow shrub subtype
- Willow swamp
- Willow swamp - semipermanently flooded

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.




## Figure 7A-2.1

## Natural Communities Classifications

As of April 18, 2018

Source: Hennepin County and Great River Greening

N

High Quality

Moderate Quality

Good Quality

Poor Quality

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.




# Figure 7A-3

# Natural Areas & Open Space

As of December 12, 2018

Natural Areas & Open Space

Open Space Owned by Hennepin Parks Aquired in 1995 Bond Referendum

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

alternatives to self-destructive behavior. Healthy social interaction, promoted by positive recreation programs, is an economical prescription for mental and social health.

**The Search for Meaning –** Individuals are looking for more than just a pleasant diversion. Purposeful and fulfilling leisure activities will appeal to a population interested in personal growth and development. Meaningful leisure activity is an essential source of self-esteem and positive self-image.

**Volunteerism –** Increasingly, schools are requiring students to volunteer as part of their curriculum. Volunteers want to use and develop skills and abilities that are not being used in other areas of their lives. Volunteering is a way for individuals to connect with their community and with other individuals.

## PROGRAMS AND SERVICES

Plymouth provides a broad range of recreational experiences for all ages: pre-school; youth; teens; adults; and seniors. The City's emphasis is on enhanced self-esteem rather than on perfecting performance. The desired outcome is for the participants to feel good about themselves and their relationship with the other participants and instructor(s) and to have gained an appreciation for the skill or activity. These opportunities allow individuals to pursue personal interests, maintain physical and mental fitness, meet and socialize with neighbors and build a greater sense of community.

### Adaptive and Inclusion

Plymouth refers adaptive participants to Reach for Resources, Windows of Opportunity, Project SOAR and Courage Kenny Rehabilitation Institute. Plymouth Parks and Recreation prides itself on providing quality programs and activities for people of all abilities. Staff work with families to develop inclusion plans and schedules staff to provide reasonable accommodations as requested and needed.

### Arts

Plymouth is committed to promoting creative expression and artistic excellence through support of arts education and performance, artists, arts organizations and public art. Increased public awareness and enjoyment of the arts provide a platform of diverse artistic expression and contribute to public vitality and enhance community identity.

The City continues to expand opportunities for residents to participate in and enjoy arts education, presentations, performances and public art exhibits and installations. Recreation programs include visual and performing classes and workshops for all ages, including dance classes, and music lessons through the "Music for Everyone" consortium.

The Plymouth Arts Council (PAC) is a non-profit organization that is affiliated with the Plymouth Parks and Recreation Department. Its mission is to share, learn, grow and express the arts. Directed by a board of community residents, it has been in existence since 1995 and receives funding from the City. Funds are dispersed to Plymouth Concert Band and the annual Plymouth Reads program. The PAC coordinates the Primavera Springtime Celebration of the Arts, monthly art exhibits in City facilities and spotlight youth art during February.

In the future, as the interest and participation in the arts continues to grow, the City will be faced with several challenges. They include:

- Developing and implementing a strategic direction and platform for enhancing the arts in Plymouth.

- Identifying funding, support and dedicated space for specialized arts programs (e.g., pottery and sculpture classes) to keep pace with community interest.

## Aquatic Programs

Plymouth provides an extensive aquatics program that includes a variety of Red Cross-authorized swimming lessons, specialized programs and open swim opportunities. The City operates guarded beach facilities at West Medicine Lake Park and Parkers Lake Park and an unguarded facility at East Medicine Lake Park. In addition, the City leases indoor pool facility space at Wayzata East and West Middle Schools. The need and interest in aquatics continues to grow in the community, particularly for general learn-to-swim programs. A shortage of trained aquatic staff has had a major impact in these areas. In the future, staff recruitment and incentives will be a continuing priority for the school year program. (The Life Time aquatic program and other swim schools have had a negative impact on summer lessons and the availability of staff.)

## Educational Programs

Educational programs provide residents at any stage of life with opportunities for personal development and growth in fun social settings. Examples of programs include STEM programming, cooking classes, lectures on current events and travel, and bridge classes. The City makes an effort to provide affordable and unique educational programs for all ages.

### Seniors

Senior programs and services are a valued and essential service in Plymouth, especially as the community ages. Most of the senior programs are held at Plymouth Creek Center. They include a variety of classes, trips, clubs, events, volunteer opportunities and other social activities. In the future, Plymouth will focus on leisure and recreational trends for the baby boomer generation.

## Sports

This is the City's largest program area. A wide variety of sports program opportunities are available across all age ranges from preschoolers to adults.

City sports programs augment the variety of athletic association and school district programs with a special focus on non-competitive fun and fitness. Many of the sports programs the City offers are in collaboration and/or partnership with locally based organizations such as "Sports Unlimited" and nationally based organizations such as Skyhawk's. Examples of the programs provided by Plymouth Parks and Recreation include sports camps, lessons and leagues, and after school programs.

Adult sports leagues are an area where Plymouth has long been an innovator. The City offers the traditional officiated sports (softball, basketball and soccer) and touch football as well as a comparable choice of unofficiated sports (3-man basketball, 5-man basketball, 4-man football, indoor volleyball, sand volleyball and floor hockey).

### Special Events

Special events are an important focus of the Recreation Division. These events promote community identity and contribute to the quality of life in Plymouth.

The City of Plymouth annually sponsors or co-sponsors several community and special events for its residents. These events provide a common ground for celebration and develop community pride. Table 7A-6 identifies the more significant events.

TABLE 7A-6
EVENTS ATTENDANCE

| Community Events | Attend | Special Events | Attend |
|---|---|---|---|
| Fire & Ice Festival | 3,500-4,500 | Home Expo | 1,000 |
| Healthy Living Fair | 500-1,000 | Primavera Art Show | 700-1,500 |
| Bark in the Park | 1,500-2,500 | Music in Plymouth | 10,000-15,000 |
| Kids Fest | 1,800-2,500 | Plymouth on Parade | 6,000-6,500 |
| Summer Concert Series | 5,500-10,000 | Water Ski Shows | 1,000-2,000 |
| Arts Fair | 1,100-1,300 | Farmers Market | 9,200-9,500 |
| Old Fashioned Christmas | 1200-1600 | Halloween at the Creek | 800-1,000 |
| Volunteer Recognition | 300-350 | Senior Events | 2,500 |

Source: City of Plymouth

The City evaluates these events annually. When necessary, the City transitions them out and/or makes adjustments to meet the changing interests and needs of the community. Current practices of event promotion and collaboration in sponsorship have increased to accommodate growth and maintain resident satisfaction. Additional resources will need to be allocated to create a unified public relations plan for staying in touch with the community.

## Wellness (Health, Fitness and Nutrition)

Plymouth is committed to providing programming that promotes and encourages health and wellness. Recent media attention on the growing health risks and costs for both adults and youth has raised the public's awareness and interest in health-related programs. People are looking for programs that provide them with information and instruction to improve their own overall health.

The City offers a wide variety of programs that support and encourage residents to be more active and develop healthy life habits. Wellness programs are focused on providing participants with increased energy and balance, improved flexibility and breathing, enhanced strength and aerobic capacity, and reduced stress. The Healthy Living Fair and Farmer’s Market have helped to achieve these goals. Program offerings in this area will continue to expand in the future as community awareness and need grow. One area of planned expansion is nutrition. The aim will be to provide the community with helpful, comprehensive information on individual nutrition needs as well as healthy foods and eating habits.

## COLLABORATIONS AND PARTNERSHIPS

Plymouth Park and Recreation places a high value on cooperative efforts. Collaboration creates synergy that yields an outcome greater than the sum of its parts. The City partners with a wide range of agencies, organizations, schools and businesses. This allows the City to leverage resources to present a wider variety of quality programs.

### Schools and Athletic Associations

Plymouth is served by four school districts and several private schools. All of the schools serving Plymouth residents provide a variety of programs through community education and community outreach. Typically programs include adult basic education, adult enrichment classes, family education, youth development and childcare. While there are cases of competition and overlap in some program areas, the relationship is cooperative and supportive.

The City partners and collaborates with approximately 26 athletic associations that provide sports services and training for community youth. Many of the youth association activities and some of Plymouth's indoor recreation programs are scheduled at school facilities.

**District 284/Wayzata** – The district serves 64 percent of city residents. Wayzata School District has eight elementary schools, two middle schools and one high school in Plymouth. These facilities have housed City recreation programs at one time or another. During the summer, the City's Recreation Supervisor schedules use of the district's outdoor sports facilities. City recreation use has priority for scheduling indoor school facilities after school district events and youth athletic associations.

There are seven elementary school parks within District 284. The district contributed funds toward the construction of the Plymouth Ice Center and Life Time Fitness in exchange for priority use of those facilities. The City of Plymouth paid for the cost of constructing two additional gymnasiums at the new high school for City priority use. Several Wayzata sports teams rely heavily on the use of park facilities for practices and games. The City has worked with the district to upgrade outdoor sports facilities and playgrounds at a number of schools.

**District 281/Robbinsdale** – The Robbinsdale district serves 20.5 percent of Plymouth residents. Robbinsdale School District has one elementary school, one magnet school (K-3), one middle school and one high school within city boundaries. All of these facilities have housed City recreation programs at one time or another. During the summer, the City's Recreation Supervisor schedules use of the district's outdoor sports facilities. City recreation use has priority for scheduling indoor school facilities after school district events.

The City of Plymouth paid for the addition of two gymnasiums at Armstrong High School for community use. The City's Recreation Supervisor schedules this gym after 6:00 p.m. One joint school/park complex is shared with District 281. Several Armstrong sports teams rely heavily on the use of City facilities for practices and games. The City has worked with the district to upgrade outdoor sports facilities at a number of schools and outdoor playgrounds at school sites.

**Districts 279/Osseo and District 270/Hopkins –** The districts service 12.7 percent and 2.8 percent of Plymouth residents, respectively. Neither district has any school facilities within city boundaries. The amount of interaction with these districts is minimal. Youth athletic associations serving Osseo residents use Bass Lake Playfield and the Plymouth Ice Center.

Being served by four school districts presents many challenges to the City, but the dedicated efforts of volunteers in their athletic associations have given all Plymouth youth a wide array of quality sports programs.

For the Wayzata and Robbinsdale districts, Plymouth supplies outdoor and ice arena facilities based on the percentage of Plymouth residents in each program. The City maintains soccer/football and baseball/softball fields with mowing, painting of lines and dragging of infields. The City also supplies extensive field lighting. Plymouth has one playfield in the Osseo district that is used by those residents. Plymouth's population in the Hopkins district is small, as has been its involvement with its district's athletic associations.

**West Lutheran High School** – The City has a joint powers agreement for outdoor field use with West Lutheran High School.

**Youth Athletic Associations** – There are currently 26 youth athletic associations offering opportunities throughout the four school districts.

## Community Groups and Non-Public Partnerships

Plymouth Parks and Recreation has developed many relationships through formal and informal agreements and collaborations with community groups and non-public providers. These collaborations enhance the opportunities and programming available to Plymouth residents. The following is a list of current community group collaborations:

- Plymouth Concert Band
- Plymouth Arts Council

- Plymouth Civic League
- Plymouth Rockers
- Plymouth Rotary

The non-public partnerships are ever changing, depending on needs analysis and participant demand. Many of the current partnerships are listed in Table 7A-7.

## TABLE 7A-7
## NON-PUBLIC PARTNERSHIPS

| Current Non-Public Partnerships | | |
|---|---|---|
| 3rd Lair | Islamic Resource Group | Science Explorers |
| Abbott Northwestern WestHealth | KidCreate | Senior Community Services |
| Abrakadoodle | Lifetime Fitness | Shockwave Ski Team |
| All About Drawing | Lynch Basketball Camp | Skyhawks |
| Anytime Fitness | MN Cricket Association | Skyrock Farm |
| Artistic Moments | MN Highway Safety Center | Sports Unlimited |
| Art Innovators Palette Up | Music For Everyone | STEM Builders |
| Bricks 4 Kidz | myHealth for teen and young adults | Sue McLean and Associates |
| Challenge Island | New Reflections Salon | Tech Tac Toe |
| Computer Explorers | Northwest Animal Hospital | Tippi Toes Dance |
| Concordia Language Villages | Parkers Lake Golf Center | Twin Cities Chess Club |
| Constantine Dance | Pilates MN | Ultimate Martial Arts |
| Delish Dish LLC | Prairie Fire Theatre | Westwood Nature Center Staff |
| Engineering for Kids | Rev Sports | Youth Tech Inc. |
| Generation Endurance | Safe Sitter | |

## STRATEGIES FOR FUTURE ACTIONS

The following strategies will provide direction for the selection and implementation of recreation programs over the next 20 years in the City of Plymouth.

- The City will enhance programs and services that promote and encourage healthy lifestyles for the entire family. Wellness (fitness, health and nutrition) opportunities will be focused on: 1) improving community awareness and participation in healthy programs; 2) the expansion of health and fitness classes with an emphasis on reducing youth obesity; and 3) the establishment of nutrition programs that will educate and encourage healthy eating habits.

- The City will continue to partner with community organizations to enhance leisure opportunities that would not be otherwise possible.

- New ideas and activities will be arriving at an increasing speed. The City will need to remain flexible and open to change. The City will need a solid foundation of philosophy and policy to keep the changes positive for the City's customers.

- Adequate staffing will continue to be a concern. The number of qualified candidates for seasonal and part-time recreation positions has been dwindling. The City will be creative in the search for job candidates and staff development and retention.

- Senior programs will become a more significant part of programming as that population continues to grow. The City will need to remain abreast of the needs and wants of this age group as the baby boomers come of age with more active lifestyles and different expectations.

- The arts add much to the heart of a community. The City will continue to nurture and support public art, art education and the performing arts.

- Teenagers are the future of the community and country. The City will continue to find ways to engage them in activities that meet their interests and further their positive development.

- The City will continue to offer special events to build a sense of community and provide common ground for citizens to come together.

- The City will continue to view volunteers as a valuable community resource that can be tapped in creative ways.

- The City may want to identify its historic landmarks and work with the Plymouth Historical Society to preserve and promote them.

# Plymouth Parks & Recreation Parks Listing

Printed: 08/22/17

| Park Name | Owner | Acres | Type | Address |
|---|---|---|---|---|
| **Community Park** | | | | |
| East Medicine Lake | City | 12.30 | Community Park | 1740 E Medicine Lake Boulevard |
| Parkers Lake | City | 26.52 | Community Park | 15205 County Road 6 |
| Plymouth Creek | City | 94.76 | Community Park | 14800 34th Avenue N |
| The Meadows (Future Park) | City | 23.69 | Community Park | TBD |
| Timber Shores | City | 57.56 | Community Park | 11250 53rd Avenue N |
| West Medicine Lake | City | 70.98 | Community Park | 1920 W Medicine Lake Drive |
| **Category Count** | **6** | **Category Acres** | **285.82** | |
| **Natural Areas & Open Space** | | | | |
| County Road 73 | City | 39.87 | Natural Areas & Open Space | 120 Zachary Lane |
| Elm Creek Woods | City | 57.46 | Natural Areas & Open Space | 5315 Peony Lane N |
| Ferndale | City | 5.95 | Natural Areas & Open Space | 18820 4th Avenue N |
| French Ridge | City | 8.77 | Natural Areas & Open Space | 39th Avenue N & Vinewood Lane N |
| Hardenbergh | City | 22.81 | Natural Areas & Open Space | 18025 12th Avenue N |
| Oakview Pond | City | 1.80 | Natural Areas & Open Space | 1101 Oakview Lane N |
| Ponderosa | City | 8.07 | Natural Areas & Open Space | 2700 Garland Lane N |
| Schmidt Woodlands Park | City | 2.54 | Natural Areas & Open Space | 4835 Holly Lane N |
| Shadyview | City | 9.19 | Natural Areas & Open Space | 2730 Shadyview Lane N |
| West Medicine Lake | City | 0.24 | Natural Areas & Open Space | TBD |
| **Category Count** | **10** | **Category Acres** | **156.70** | |
| **Neighborhood & Mini Park** | | | | |
| Aspen Ridge | City | 2.39 | Neighborhood & Mini Park | 5670 Garland Lane N |
| Circle | City | 2.20 | Neighborhood & Mini Park | 440 Lanewood Lane N |
| Crooked Creek | City | 7.62 | Neighborhood & Mini Park | 4255 Walnut Grove Lane N |
| Fairway Greens | City | 6.47 | Neighborhood & Mini Park | 15455 55th Avenue N |
| Fazendin | City | 9.70 | Neighborhood & Mini Park | 17040 24th Avenue N |
| Four Seasons-Meadow | City | 26.67 | Neighborhood & Mini Park | 3780 Pilgrim Lane N & 3710 Union Terrace Lane N |
| Future Park | City | 1.04 | Neighborhood & Mini Park | 6110 Garland Lane N |
| Future Park | City | 1.83 | Neighborhood & Mini Park | 18101 61st Avenue N |
| Future Park | City | 3.27 | Neighborhood & Mini Park | TBD |
| Gateway | City | 1.27 | Neighborhood & Mini Park | 4960 Weston Lane N |
| Gleanloch | City | 6.83 | Neighborhood & Mini Park | 735 Sycamore Lane N |
| Green Oaks | City | 6.84 | Neighborhood & Mini Park | 2600 Zircon Lane N |
| Green Tree Island | City | 10.56 | Neighborhood & Mini Park | 18915 30th Avenue N |
| Greenwood Park | Lease | 17.34 | Neighborhood & Mini Park | 18115 Medina Road |
| Heather Ponds | City | 8.93 | Neighborhood & Mini Park | 3426 Lawndale Lane N |
| Hemlock | City | 0.30 | Neighborhood & Mini Park | 2400 Hemlock Lane N |
| Heritage | City | 26.69 | Neighborhood & Mini Park | 3005 Northwest Boulevard |
| Imperial Hills | City | 9.29 | Neighborhood & Mini Park | 18215 17th Avenue N |
| Kilmer | City | 1.35 | Neighborhood & Mini Park | 2715 Kilmer Lane N |
| Lake Camelot | City | 50.82 | Neighborhood & Mini Park | 14105 County Road 47 |

| Park Name | Owner | Acres | Type | Address |
|---|---|---|---|---|
| Legacy Greenway | City | 1.97 | Neighborhood & Mini Park | 15365 59th Place N |
| Lions | City | 3.43 | Neighborhood & Mini Park | 14525 14th Avenue N |
| Maple Creek | City | 79.16 | Neighborhood & Mini Park | 2695 Weston Lane N |
| Mission Hills | City | 18.71 | Neighborhood & Mini Park | 3955 Zachary Lane N |
| Nature Canyon | City | 1.91 | Neighborhood & Mini Park | 13919 45th Avenue N |
| Prairie Ponds | City | 8.33 | Neighborhood & Mini Park | 5150 Dunkirk Lane N |
| Queensland | City | 6.94 | Neighborhood & Mini Park | 17915 8th Avenue N |
| Reserve | City | 3.47 | Neighborhood & Mini Park | 5310 Empire Lane N |
| Rolling Hills | City | 19.68 | Neighborhood & Mini Park | 10355 48th Avenue N |
| Schmidt Lake | City | 8.67 | Neighborhood & Mini Park | 11755 50th Avenue N |
| Shenandoah | City | 4.99 | Neighborhood & Mini Park | 2225 Shenandoah Lane N |
| Shiloh | City | 13.55 | Neighborhood & Mini Park | 2700 Jewel Lane N |
| South Shore | City | 4.04 | Neighborhood & Mini Park | 10877 South Shore Drive |
| Southwood Green | City | 1.80 | Neighborhood & Mini Park | 5001 Shenandoah Lane N |
| St. Mary's | City | 11.30 | Neighborhood & Mini Park | 401 Forestview Lane N |
| Sunrise | City | 14.35 | Neighborhood & Mini Park | 2995 Kilmer Lane N |
| Swan Lake | City | 16.10 | Neighborhood & Mini Park | 4480 Quinwood Lane N |
| Three Ponds | City | 36.69 | Neighborhood & Mini Park | 5360 Union Terrace Lane N |
| Turtle Lake | City | 28.84 | Neighborhood & Mini Park | 14991 45th Avenue N |
| Woodland Trails | City | 10.35 | Neighborhood & Mini Park | 5130 Terraceview Lane N |
| **Category Count** | **40** | **Category Acres** | **495.69** | |

## Northwest Greenway

| | | | | |
|---|---|---|---|---|
| Northwest Greenway | City | 305.96 | Northwest Greenway | 5605 Lawndale Lane N |
| **Category Count** | **1** | **Category Acres** | **305.96** | |

## Playfield

| | | | | |
|---|---|---|---|---|
| Bass Lake Playfield | City | 23.14 | Playfield | 5450 Northwest Boulevard |
| Elm Creek Playfield | City | 37.29 | Playfield | 4905 Peony Lane N |
| LaCompte Playfield | City | 6.34 | Playfield | 10795 Old County Road 15 |
| Oakwood Playfield | Lease | 23.81 | Playfield | 1700 County Road 101 |
| Parkers Lake Playfield | City | 27.32 | Playfield | 15500 County Road 6 |
| Plymouth Creek Playfield | City | 32.34 | Playfield | 3625 Fernbrook Lane N |
| Plymouth Playfield | Lease | 15.21 | Playfield | 9755 36th Avenue N |
| Ridgemount Playfield | Lease | 19.35 | Playfield | 11950 Ridgemount Avenue W |
| Zachary Playfield | City | 36.66 | Playfield | 4355 Zachary Lane N |
| **Category Count** | **9** | **Category Acres** | **221.45** | |

## School Park

| | | | | |
|---|---|---|---|---|
| Birchview Elementary | ISD 284 | 13.25 | School Park | 425 Ranchview Lane |
| Gleason Lake Elementary | ISD 284 | 15.56 | School Park | 310 County Road 101 N |
| Greenwood Elementary | ISD 284 | 10.91 | School Park | 18005 Medina Road |
| Kimberly Lane Elementary | ISD 284 | 29.40 | School Park | 17405 Old Rockford Road |
| Pilgrim Lane Elementary | ISD 281 | 11.84 | School Park | 3725 Pilgrim Lane N |
| Plymouth Creek Elementary | ISD 284 | 16.70 | School Park | 16005 41st Avenue N |
| Sunset Hill Elementary | ISD 284 | 20.38 | School Park | 13005 Sunset Trail |
| **Category Count** | **7** | **Category Acres** | **118.05** | |

| Park Name | Owner | Acres | Type | Address |
|---|---|---|---|---|
| **Special Use & City Recreation Facility** | | | | |
| Hilde Performance Center | City | 11.72 | Special Use & City Recreation Facility | 3500 Plymouth Boulevard |
| Millennium Garden | City | 2.72 | Special Use & City Recreation Facility | 14800 34th Avenue N |
| Nature Canyon | City | 69.30 | Special Use & City Recreation Facility | 13919 45th Avenue N |
| Plymouth Creek Center & Fieldhouse | City | 19.73 | Special Use & City Recreation Facility | 14800 34th Avenue N |
| Plymouth Dog Park | City | 20.37 | Special Use & City Recreation Facility | 17005 County Road 47 |
| Plymouth Ice Center | City | 15.90 | Special Use & City Recreation Facility | 3650 Plymouth Boulevard |
| **Category Count** | **6** | **Category Acres** | **139.73** | |
| **Park Count** | **79** | **Park Acres** | **1,723.40** | |

Appendix 7C

# COMPREHENSIVE PLAN TECHNICAL REVIEW

## NORTHWEST PLYMOUTH FUTURE NEIGHBORHOOD AND MINI-PARK LOCATIONS

### INTRODUCTION/ PURPOSE

The City is expecting to see an intensification of residential development from rural to urban in the northwest area of Plymouth. The projected increase in residential density will require the development of new neighborhood parks and mini-parks. This appendix provides background analysis for new neighborhood and mini-park locations for that area of the city. The analysis results in recommendations for specific parcel acquisitions or park locations.

### PARK SITE ANALYSIS

Seven park service areas have been identified, based on the service area criteria of 0.5 miles. Recommendations for future park parcel acquisitions are detailed below.

### Park Service Area 18

- The park service area is bounded by the Soo Line Railroad on the north, Hollydale Golf Course on the east, Old Rockford Road on the south and Peony Lane on the west (see Figure 7C-1).
- A feature within the service area is the Hollydale Golf Course. The residential area west of Holly Lane and the residential area south of the golf course are developed at a density between two and three units per acre.
- The residential area west of Holly Lane contains a mini-park that is owned and maintained by the homeowners association.
- Significant woodland exists immediately south of the railroad and west of the golf course.
- The woodland is also classified as a wetland. A significant wetland also exists south of the golf course and smaller wetlands are scattered throughout the residential areas.

**FIGURE 7C-1**
**PARK SERVICE AREA 18**




## Special Considerations

Two trails have been constructed to connect the new residential area west of Holly Lane to the woodland – one off Merrimac Court and the other adjacent to 46th Avenue. Currently, the trails terminate at the edge of the residential development.

## Park Alternatives

Site 7A encompasses the area south and/or east of the Schmidt Woodlands property (2.54 acres) donated by Roger Schmidt in 2013. The preservation of this unique woodland area will provide a valuable addition to the City's park system. The existing trails that extend from the residential developments to the west and south will have connection to Schmidt Woodlands via residential sidewalks.

### Recommendations

Site 7A and/or the surrounding area needs to be considered as a future neighborhood park site for Service Area 18. Any additional land acquired should be connected to the existing 2.54 acre Schmidt Woodlands parcel. In the future, as deemed necessary additional land (2.5 – 10 acres) may be needed to develop a neighborhood park facility.

## OFF-LEASH DOG PARKS

### INTRODUCTION/ PURPOSE

The City currently has one year-round dog park and two off-leash dog areas. These areas are designed so dogs can run free within the facility. Plymouth Dog Park is an exclusive park located in the northwest quadrant of the city and is a year-round facility. 4 Paws Dog Park is an off-leash facility located at Plymouth Playfield in the southeast quadrant of the city. Happy Trails Dog Park is a seasonal off-leash dog area located at Oakwood Playfield in the southwest quadrant of the city.

### ADDITIONAL LOCATIONS FOR OFF-LEASH DOG AREAS

As the city continues to grow, additional off-leash dog areas may need to be added into the park system. Fenced off-leash areas can be included with new park development or redevelopment.

If an off-leash dog area is incorporated into a larger, mixed use park, care should be taken to design the facility in a manner that minimizes confusion about the existence and boundaries of the off-leash area. This can be achieved using fencing, planted vegetation strips, roadways and paths as boundaries and changes in topography to separate uses.

The following amenities should be provided in fenced, off-leash dog facilities to support user comfort – shade (canopy or shelter); trash receptacles; access to doggie bags, benches or picnic tables; access to water (if possible); and signage.

If an off-leash dog area is incorporated into a larger, mixed use park, care should be taken to design the park in a manner that minimizes confusion about the existence and boundaries of the off-leash area. This can be achieved by using: planted vegetation strips; roadways and paths as boundaries; changes in topography to separate uses; and fencing.

# PLYMOUTH CREEK PARK HILLSIDE CONCEPTS

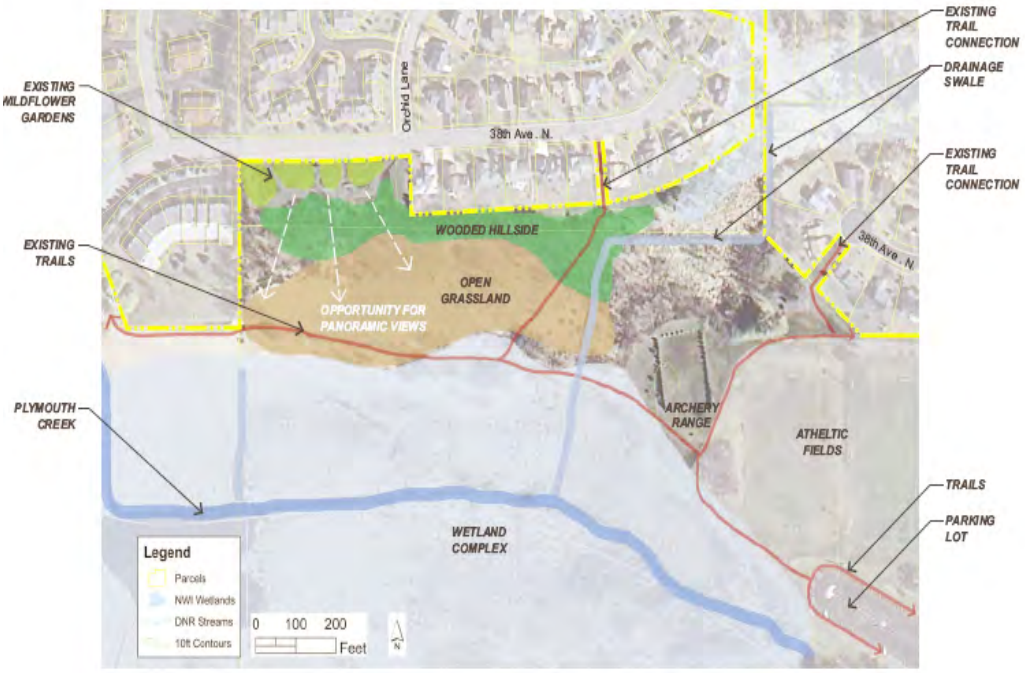
## INTRODUCTION/ PURPOSE

Plymouth Creek Park is classified as a city park. The main feature of this park is a large wetland complex that surrounds Plymouth Creek. The park is the civic center for the community with the Plymouth Creek Center, the Millennium Garden, Life Time Fitness, the Plymouth Ice Center and the Hilde Performance Center all located within the park. The park forms the eastern edge of City Center. City Hall is also located immediately west of the park. The east end of the park includes a community playfield with play equipment and various playfields. A wooded hillside exists along the northernmost section of the park. It is currently functioning as an open space element within the park. Several concepts have been developed for alternative uses.

## EXISTING CONDITIONS

Currently, the top of the hillside is being used as a wildflower garden on the western portion of the site (see Figure 7C-2). The eastern portion of the hilltop is adjacent to single-family homes. A hillside exists south of the wildflower garden area/residential lots, with an elevation change ranging from 15 to 40 feet between the wildflower garden area/residential lots and the wetland complex. The northern portion of this hillside is wooded and the southern portion is predominantly covered with grasses. An existing bituminous trail separates the Plymouth Creek wetland complex from the hillside. A pedestrian trail and stairway connection is provided between 38th Avenue and the existing wetland trail, which approximately defines the toe of the hillside. East of this trail, a linear drainage swale traverses a wet area. Archery was removed from the site for safety reasons.

FIGURE 7C-2
PLYMOUTH CREEK PARK EXISTING CONDITIONS




## PARK CONCEPTS

Three concepts have been developed to provide a range of uses for this hillside and the adjacent drainage swale area.

### Community Gardens Concept

This concept provides community garden spaces along the southern portion of the hillside (see Figure 7C-3). There are a number of multi-family housing units within walking distance of the park. Community garden plots would provide vegetable and flower gardening opportunities for adjacent residents, along with other city residents whose housing situation is not conducive to gardening. The concept shows 120, 20-foot by 20-foot garden plots, terraced as necessary into the hillside. An open shelter is centered in the garden area to provide a shaded rest area. A central water supply would also be provided. Ornate fencing would be necessary around the gardens to discourage other park users from taking flowers or vegetables from the gardens.

A small parking lot is provided off 38th Avenue for gardeners who are not within walking distance of the gardens. Alternatively, gardeners could park in the existing parking lot near the athletic fields and walk to the community gardens. A new trail would be provided into the park from 38th Avenue. Woodlands would be preserved on the northern hillside slopes for slope protection and to buffer the housing from the park. A portion of the existing wildflower gardens would be preserved on the top of the hillside. A small overlook would be created to take advantage of the extended views the hilltop offers. The existing drainage swale east of the hillside would be realigned to enhance its aesthetic character. The area around it would be re-graded and planted to provide storm water treatment prior to reaching Plymouth Creek. This area could be designed as one basin or a series of basins. The treatment basin will slow the movement of the water. This would:

- Assist in plant uptake of the water, thus reducing water volume reaching the creek.
- Cause sediments to drop out of the water into the basin, resulting in a reduction of phosphorus levels and pollutants that enter the creek.
- Provide habitat, seasonal color and interest because plants within the basins would be native wetland and prairie species.

FIGURE 7C-3
PLYMOUTH CREEK PARK-COMMUNITY GARDEN CONCEPT



## Bird Sanctuary Concept

In this concept, a bird sanctuary is created on the hillside and in the adjacent drainage swale area (see Figure 7C-4). Two pond areas would be excavated to provide varying habitats that would attract birds. The drainage swale would be reconfigured to provide additional meanders through the sanctuary area. With the exception of the newly created pond areas, the entire area would be planted to receive a canopy cover. A number of small footpaths would traverse the sanctuary, moving through the wooded hillside, over the drainage swale and along the new ponds.

The existing wildflower gardens would be maintained, as these native plants would attract birds to this area. Two footpath connections would be provided from the wildflower garden area into the sanctuary. Four footpath access points would also be provided off the existing trail network. Observation blinds and/or benches would be provided to support bird watching activities. This area may need to incorporate fencing or signs to discourage dogs from entering the sanctuary area.

FIGURE 7C-4
PLYMOUTH CREEK PARK-BIRD SANCTUARY CONCEPT




## Lawn Game Concept

This last concept provides lawn areas at both the top and bottom of the hillside that could be used for lawn games such as croquet and bocce ball (see Figure 7C-5). The area on top of the hillside would be supplemented with additional canopy trees to provide shade and visual interest. This area would also

include a trail and small overlook to take advantage of the extended views the hilltop offers. The woodland canopy would be extended further down the hillside to protect the slopes and provide habitat within the park. The lawn area at the base of the slope would be supplemented with a picnic shelter and benches to support the lawn game activities.

The wet area adjacent to the drainage swale would be restored as a wetland through the eradication of weed species and restoration of native wetland species. Native wetland species provide habitat along with seasonal color and interest.

**FIGURE 7C-5**
**PLYMOUTH CREEK PARK-LAWN GAME CONCEPT**




# NATURE CANYON PARK CONCEPTS

## INTRODUCTION/ PURPOSE

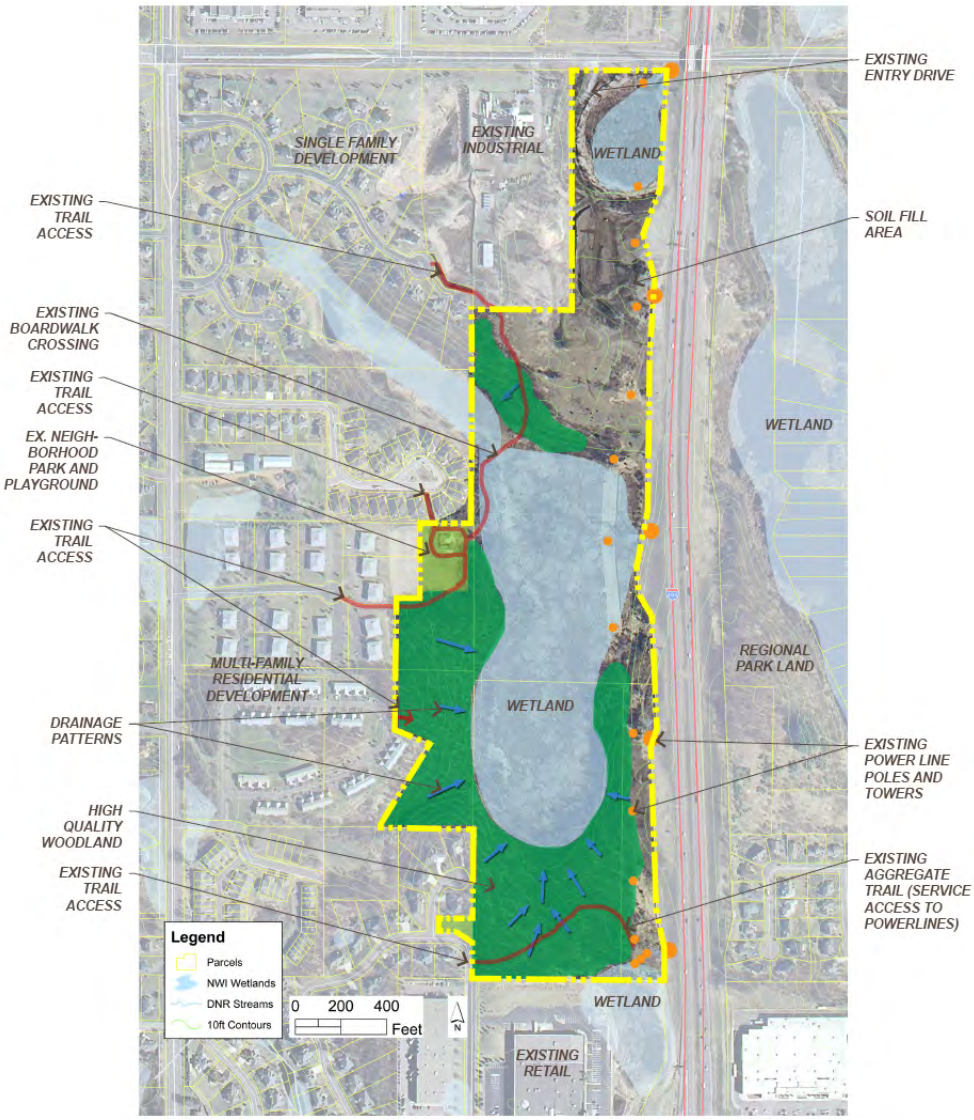
Nature Canyon Park, located immediately west of I-494 and south of Schmidt Lake Road, is largely undeveloped at this time. The northern portion of the site has been used by the City as a soil fill location. The site will reach its capacity to receive additional fill in the near future. Residential development has also occurred near this park, which warrants the development of the park. The City has prepared several concepts for how this park could be developed in the future.

## EXISTING CONDITIONS

The City's current park system plan denotes that the northern portion of the park may potentially serve as a community playfield, the southern portion as a special use facility and along the west side, a neighborhood park. The neighborhood park component has already been developed and includes play equipment, trails and boardwalk crossing of a portion of the wetland.

Two overhead power transmission lines traverse the eastern edge of the site, paralleling the I-494 corridor (see Figure 7C-6). An aggregate drive passes through the southern portion of the park, providing access to the overhead power lines. The City is currently placing soil fill in the northern portion of the site. The mid portion of the site contains a wetland. The southern portion consists of a wooded valley. The woodlands are classified by the Department of Natural Resources as an area of biodiversity significance. Currently, there are five trail access points into the park.

FIGURE 7C-6
NATURE CANYON PARK EXISTING CONDITIONS




## PARK CONCEPTS

### Active Use Park Concept

This concept maximizes active recreation activities within the park (see Figure 7C-7). The northern portion of the site contains: multi-purpose fields, a parking lot with access from Schmidt Lake Road, a concession/restroom building, and a new trail access from Schmidt Lake Road.

Several of the westerly power line poles may need to be relocated to accommodate the multi-purpose fields. Actual locations of the power poles need to be field-verified.

An active trail that is approximately one-half mile in length encircles the existing center wetland and a smaller active trail loop is provided south of the wetland in the wooded valley. A small parking lot is also provided on the southern portion of the site with access off Berkshire Lane. The lot would function as a trailhead.

While providing an active recreation program for the middle and southern portions of the park, these facilities could possibly cause erosion problems or damage sensitive plant communities and wildlife habitat.

The existing play equipment is maintained along the west side of the park. This is supplemented with an adventure play course on the wooded hillside immediately south of the play equipment. The adventure play course is envisioned as an area where children would better experience the natural environment while playing and climbing on natural elements, such as boulders and logs. Other components could include programmed events where children construct forts from branches or a low ropes course where children, teens or adults could learn teamwork skills and develop motor skills.

FIGURE 7C-7

NATURE CANYON PARK-ACTIVE USE CONCEPT




## Passive Use Park Concept

In this concept, passive recreation activities are prevalent within the park (see Figure 7C-8). The primary element of this concept is the incorporation of an art/cultural/nature center building within the

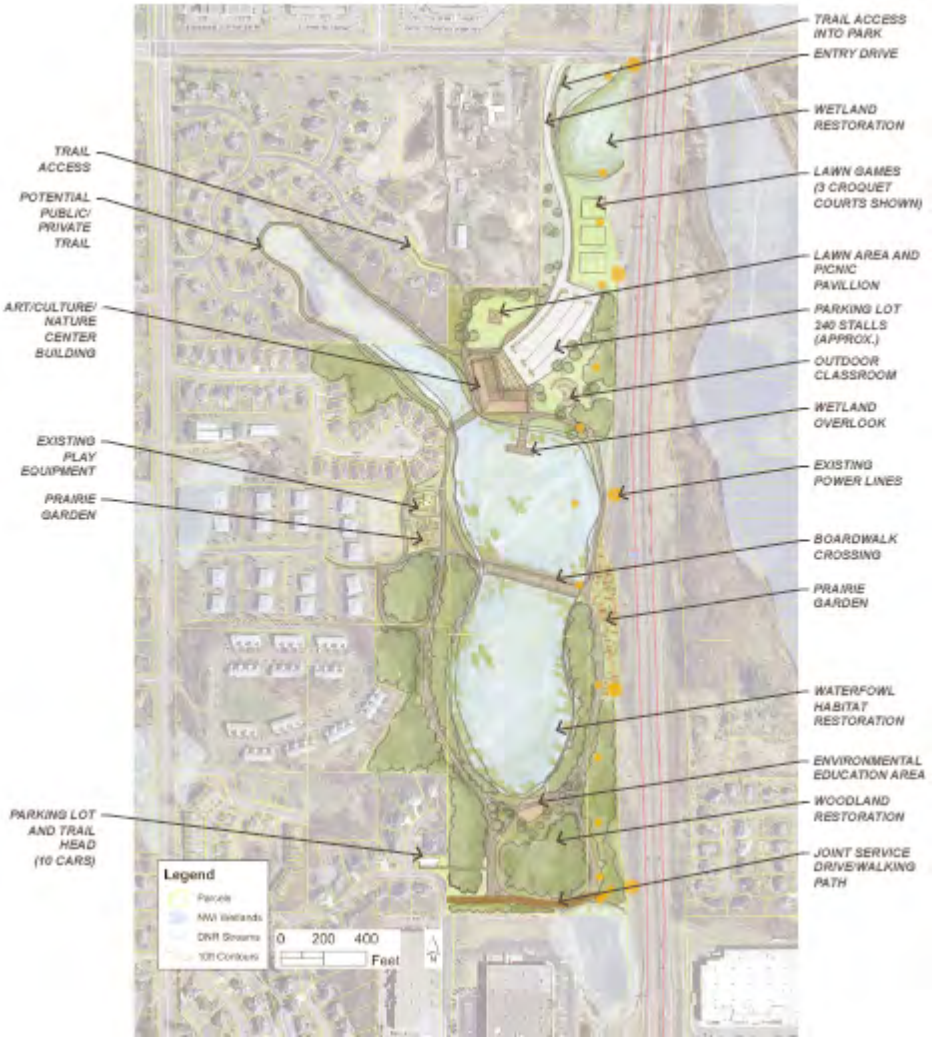
park. The center would provide nature education programs or promote the public's enjoyment of both the visual and performing arts that could include painting, sculpture, pottery, dance, theater, music or spoken word. The building would accommodate performance space, classrooms, studios, exhibit and retail space and possibly space for a guest artist. The park also includes a small amphitheater that could be used as a performance space or as an outdoor classroom.

The center would need to be unique, active, programmed and continually evolving. Art organizations are continually looking for opportunities to bring art into the suburbs and could be brought into the organizational structure of this concept. Corporate funding would be needed to operate the center.

In addition to the art/cultural/nature center and amphitheater, the northern portion of the site would have a parking lot, a picnic shelter, a wetland overlook and open lawn that could be used for croquet, bocce ball or other lawn games. The parking lot access would be provided from Schmidt Lake Road. A new trail would be brought down from Schmidt Lake Road into the park.

Bituminous walking trails would be provided around the wetland and a new boardwalk structure would cross the wetland. The trail would be extended south from the wetland to create a smaller loop within the wooded valley. A portion of this loop would also double as the access drive to the overhead power lines. Another trail extends from the main wetland area to the northwest to encircle a narrow leg of the wetland. A trail easement from approximately 17 property owners would be necessary to construct this segment of the trail network. The trails shown would provide a variety of experiences and trail lengths for park users.

FIGURE 7C-8
NATURE CANYON PARK-PASSIVE USE CONCEPT




The existing play equipment on the west side of the park would remain to provide a traditional neighborhood function. The existing turf hillside immediately south of the play equipment would be planted as a prairie garden. This, along with the establishment of another prairie garden located between the wetland and I-494, would provide a third plant community within the park. At the juncture of the wetlands and the woodlands, another outdoor classroom or interpretive space would be provided that focuses on environmental education. As part of the development of this park, the City would remove exotic species from both the wetlands and woodlands and restore them to a condition that better reflects the native plant communities for these areas.

A second parking lot would be provided for the southern park entrance. This parking lot would be located north of Berkshire Lane on the current turf area.

### Mixed Use Park Concept

This last concept mixes both active and passive recreation activities within the park, with the northern portion of the site being used for active recreation; the middle and southern portions for passive recreation and the western edge for traditional neighborhood park uses (see Figure 7C-9). The active component of the park includes an off-leash dog area located immediately south of the small wetland in the north leg of the park. The wetland, freeway and entrance drive provide good boundaries for the off-leash area. A fence may be needed to provide a barrier between the ball field and dog area. The northern portion of the site would also contain three ball fields and a parking lot. The sizing of the ball fields would accommodate either adult softball or youth baseball. It appears that one power line pole may need to be relocated to accommodate one of the ball fields. Actual location of the poles will need to be field-verified.

Passive recreation would be provided in the middle and southern portions of the park through the construction of a bituminous walking trail around the wetland and through the wooded valley. A portion of the trail through the wooded valley would double as the access drive to the overhead power lines. A new boardwalk would cross the wetland and a wetland overlook would be provided on the north side of the wetland. Interpretive signs would be interspersed along the trail, providing environmental education. Benches would be strategically placed to provide rest and scenic views.

A second parking lot would be provided for the southern park entrance. This parking lot would be located on the adjacent commercial parcel with access provided from the existing parking lot driveway. Alternatively, a shared use agreement would be developed with the adjacent commercial property owner, where park users could park in a portion of the existing parking lot and trail access would be provided into the park. A possible drawback is the truck loading area, which may pose safety concerns.

FIGURE 7C-9
NATURE CANYON PARK-MIXED USE CONCEPT



# BEACH ENHANCEMENTS

## INTRODUCTION/PURPOSE

The suggested improvement for the existing beach areas of Parkers Lake, West Medicine Lake and East Medicine Lake will enhance users' experience, convenience and comfort, provide additional active and passive recreational opportunities and improve beach access and circulation.

## PARK CONCEPTS

### Parkers Lake

#### Existing Conditions

This park currently features a narrow linear sand beach area defined by a low stone retaining wall and an adjacent hillside lawn gently sloping toward the waterfront. Immediately north of the lawn is a multi-use trail and parking lot. The multi-use trail leads to a pedestrian underpass of County Road 6 that connects to additional parking and a playfield on the north side of the road. An existing concession building currently features an unsheltered outdoor patio and seating. Access to the beach area is currently via a staircase on the west end of the beach or via an ADA pathway west of the concession building. There are few trees near the beach to provide shade.

After large storm events the lake experiences a large bounce, where the entire sand beach up to the retaining wall will be covered with water for several days. During these periods, users enter the lake directly from the turf hillside.

#### Proposed Improvements

This concept focuses on the enhancement of access and circulation to and through the beach area as well as the incorporation of infrastructure to support active/passive recreational opportunities (see Figure 7C-10). Components include:

- Ornate metal railing with stone columns located along County Road 6 to discourage at-grade pedestrian crossing of the roadway outside of marked crosswalks. The materials and form of the railing and columns will replicate the existing stone entrance columns and existing ornate railings in the pedestrian underpass. The fence height should be at least 42 inches, to discourage climbing.

- Landscaping is proposed at the west fence terminus. The landscaping will visually blend with existing landscaping near the beach house entrance and enhanced landscaping at the park

entrance located at the southwest quadrant of the County Road 6 and Niagara intersection. This will also complement the existing park entrance signage and landscaping.

FIGURE 7C-10
PARKERS LAKE BEACH ENHANCEMENT CONCEPT




- Seat walls at the beach perimeter and into the hillside lawn area provide enhanced seating opportunities for water ski shows and periods of high water levels. Figure 7C-10 provides a representative image of a seat wall.

- Two stairways extending down from the seat wall to the beach.

- A handrail added to the existing ADA water access path to improve water accessibility.

- A vertical gateway feature to define entrance/arrival at the beach's southern access point.

- Overstory trees at the northern edge of the hillside lawn provide shade for patrons while allowing for an unobstructed view to the waterfront.

- A picnic shelter at the eastern end of the beach area will provide picnic opportunities close to the waterfront and provide a physical/visual terminus to the beach area. The design of the shelter will complement the existing concession building.

- A water-volleyball floating court (see Figure 7C-10).

- A trellis shade structure attached to the existing concession building to provide shade for patrons using the outdoor patio.

- A gathering space and lake overlook on the west side of the beach house, containing a gas-fueled fire ring and stair access to the lakeshore. Low stone seat walls similar to the seat walls at the beach area will provide overlook seating and enhanced landscaping will surround the gathering space (see Figure 7C-10).

- A trail connection on the north side of County Road 6 along the existing parking lot to better connect an existing multi-use trail to the pedestrian underpass (see Figure 7C-11).

FIGURE 7C-11
PARKERS LAKE ACCESS CONCEPT



## West Medicine Lake

### Existing Conditions

West Medicine Lake is a popular community destination. Hard-court basketball, a sand volleyball court, play containers, a fishing pier, picnic shelters and a large sand beach provide ample opportunities for play and gathering. A couple of mature trees provide some shade for patrons behind the beach area and beach users often congregate there. Other portions of the park feature maintained lawn areas with few mature trees to provide shade for park users. A multi-use trail that encircles the lake passes through the center of the park's high activity areas, which creates numerous potential conflict points between bicyclists and pedestrians moving between the beach and play equipment/hard-court area.

### Proposed Improvements

This concept suggests enhancements that reinforce the stone and timber detailing in the existing picnic shelters to create a unique and high amenity venue (see Figure 7C-12). Components include:

- A realigned multi-use trail outside the high activity areas to minimize pedestrian conflicts.

- This will entail the realignment of the path from the parking lot to the beach that will provide a safe pedestrian crossing of the multi-use trail and a gateway feature to signify entrance to the beach area.

FIGURE 7C-12
WEST MEDICINE LAKE BEACH ENHANCEMENTS



- A promenade of varying width between the beach and lawn area. This will promote opportunities for gathering. The promenade terminates at the lake with an overlook and seating area shaded by an overhead arbor. Overstory trees and chaise lounges (see Figure 7C-12) would be incorporated into the promenade to provide patrons unique seating options along the beach.

- Picnic tables relocated from the picnic shelters into shaded lawn areas to provide outdoor seating and gathering. Several game tables will be placed in the picnic shelters to replace some of the relocated picnic tables.

- Shade umbrellas on the beach to provide shade and visual interest.

- An ADA water access path with a handrail to improve accessibility to the water.

- An enclosure for the portable restrooms (see Figure 7C-12).

- Native plantings at picnic shelters provide landscape interest and year-round color and texture.

- Overstory trees incorporated into the lawn area north of the sand volleyball court.

- Overstory trees and picnic tables incorporated near the northern picnic shelters.

- Additional parking spaces at the western edge of the northern parking lot.

- An automatic irrigation system for all lawn areas within park to facilitate the establishment and maintenance of healthy turf areas.

- A second boat dock near the boat ramp to facilitate the pick-up/drop off of boat passengers.

# JOINT INITIATIVES

## INTRODUCTION

The City of Plymouth has a successful history of collaborating with other public agencies and private entities to develop and manage shared recreation facilities for the community. Joint development and

management of facilities saves on capital expenditures, maintenance and programming. The City has been in the forefront of the metropolitan area for its innovative, creative and wise provision of recreational opportunities. This document highlights some of the successful joint initiatives that have been achieved to date and suggests other opportunities.

## SCHOOLS

The City of Plymouth is served by four public school districts and several private schools.

Many school facilities including play fields, play equipment and gym space can serve the general public during periods when they are not needed for school functions or programs.

### Successes

- The community playfields at Wayzata High School are owned by the City.
- School gymnasiums are used in the evenings for community recreation programs.
- The Plymouth Ice Center is used by Wayzata High School and Providence Academy for home hockey games.

### Opportunities

- An opportunity exists to develop a joint indoor tennis facility with one of the schools.
- The City could partner with schools on developing rain gardens or other environmental features on school properties that would provide environmental education/recreation opportunities.

## THREE RIVERS PARK DISTRICT

Three Rivers Park District (TRPD) operates two regional parks in Plymouth, including Clifton E. French Regional Park and Eagle Lake Regional Park. The district has also developed several regional trails that traverse the city and connect to the larger metropolitan area bicycle network.

### Successes

- Water quality in Medicine Lake is jointly monitored by the City and the park district.

- The City worked with the park district to develop Medicine Lake Regional Trail.

- The City worked with the park district, using federal TAP grants for the installation of a new trail connection along Fernbrook Lane onto the Luce Line Trail.

### Opportunities

- The City could partner with TRPD to design and implement a way-finding system and trail signs.

- The City could partner with TRPD to implement additional regional trails in the community.

## OTHER PUBLIC AGENCIES

### Opportunities

- The City could work with the Hennepin County Transportation Division to develop trail provisions and safe trail crossings of county roads.

- The City could work with the Minnesota Department of Transportation to develop safe trail crossings of Highway 55, Highway 169 and I-494.

## PRIVATE ENTITIES OR NON-PROFIT ORGANIZATIONS

### Successes

- The City has a unique public private partnership with Life Time Fitness. This partnership has provided residents with access to both fitness and aquatic facilities through discounted initiation fees, daily user fees and discounted daily passes for low income individuals.

- The City partners with Plymouth public and private schools, Three Rivers Park District, the University of Minnesota, Perpich Center for the Arts, engineering firms, and biologists.

### Opportunities

- The City recently approved a new park pavilion at East Medicine Lake Park. A portion of the new pavilion could be leased to a private entity to provide food and beverage services, such as a coffee shop or concession vendor.

- Public art opportunities are desired by the community. The City could collaborate with a non-profit art organization to develop a public art framework plan and selection process for public artists.

# PUBLIC ART

## INTRODUCTION/PURPOSE

The City of Plymouth supports public art within the community. This document provides examples of how public art can be implemented through various forms and media. Public art can be defined as: *Visual art in a public place; art permanently installed in a public place; publicly accessible art that enriches the city as it evokes meaning in the public realm.*

While public art can take many forms, the focus of this document is how the visual arts can be brought into the landscape and built environment. Public art can be integrated into numerous functional landscape, streetscape and building components or can take the form of discrete visual and sculptural elements.

## BENEFITS OF PUBLIC ART

Public art provides a unique opportunity to enrich the lives of city residents and visitors. Good public art is engaging and promotes civic dialog. It can strengthen community identity, create distinctive places and promote economic vitality within the community. Additional benefits that public art can provide include promoting multi-cultural/multi-generational understanding; commemorating and celebrating the lives of civic leaders; interpreting historic, cultural and environmental information; and providing recreational opportunities and visitor attractions.

## PUBLIC ART OPPORTUNITIES

Public art opportunities can be categorized into four broad categories – streetscapes; parks; buildings and building sites; and infrastructure.

### Streetscapes

Streetscapes are a primary community public space. Placing public art within the street right-of-way allows a large number and diverse range of residents to experience it on a daily basis. Some examples of streetscape spaces or elements that can incorporate or host public art include street lights, fountains, planters, banner poles, kiosks, signs, utility boxes and parking lot fences.

### Parks

Parks are community public spaces that draw a diverse range of community members. Parks provide opportunities for creating and displaying temporary installations, such as ice or sand sculptures. Types of park spaces and elements that can incorporate or host public art include open lawns for sculptures, benches, planting boxes and drinking fountains.

### Buildings and Building Sites

This category includes both public and private buildings. Public buildings, such as City Hall and Plymouth Library, can host a variety of interior and exterior public art forms. Buildings that are not open to the public can still contribute to the quality of the public realm through the incorporation of public art on building facades, entrance plazas and lawns. Buildings and building site components that can incorporate public art include building facades, entrance plazas, atriums, windows, waiting areas, hand rails and wall murals.

### Infrastructure

Public art could influence the design of many infrastructure elements that provide critical transportation, health and safety functions for residents. Infrastructure elements that can incorporate or host public art include but are not limited to roadway and pedestrian bridges, transit shelters, crosswalks, roadway pavements and retaining walls.

## RAILROAD TRAIL CROSSINGS

### INTRODUCTION/ PURPOSE

Conceptual plans were prepared for at-grade trail crossings of a railroad corridor at Holly Lane, Woodland Trails Park and Three Ponds Park. At all three locations, existing informal trail crossings already exist. Several of the sites have multiple informal crossings in relatively close proximity to one another. The purpose of providing an improved formal pedestrian railroad crossing at these locations is to consolidate the existing informal crossings to one crossing location and to enhance the safety of the consolidated crossing. Refer to Figures 7C-13 through 7C-18.

## SITE EVALUATION CRITERIA

When reviewing potential railroad crossing locations and developing concepts, the following physical site characteristics were analyzed and addressed, as needed.

- Provide a minimum of ¼ mile unobstructed view in each direction at the railroad crossings.
- Maintain existing drainage patterns adjacent to the railroad.
- Review adjacent land uses to determine appropriate locations and lengths of fencing.
- Locate crossings to make connections to existing or future trails and to minimize site impacts.

## AT-GRADE CROSSING CONCEPTS

The crossing concepts are based on the premise that the railroad corridor has been designated as a quiet zone. A pedestrian maze approach is utilized in all of the concepts to improve safety at the trail crossing of the railroad. The maze concept uses fencing to prohibit undesired crossings and direct crossings to one safe location. At the crossing, the fence is configured in such a manner as to require bicyclists to slow down while approaching the railroad. The maze forces trail users to direct their views both up and down the railroad corridor. Bicyclists may need to dismount when maneuvering through the maze. Longer lengths of fencing extend out from the maze on one side of the railroad to block existing informal trail crossings and to provide additional safety benefits for adjacent land uses (i.e. adjacent to single family homes where younger children may reside). Longer lengths of fencing can only be used along one side of the railroad to avoid trapping pedestrians in the railroad corridor. Fifty-foot fence segments are proposed to extend out from the maze on the opposite side of the railroad to discourage trail users from going around the maze. Black, vinyl-coated chain link fencing is proposed as a cost effective fence style that minimizes the visual impact of the fencing.

The concepts show a proposed concrete railroad crossing. Railroad companies typically allow crossings to be constructed from wood timbers, concrete or rubber. The City would propose concrete, as it provides a mid-price, safe and comfortable surface for pedestrians and bicyclists at the railroad crossing. Lighting is proposed at the crossings to increase visibility and safety for users.

All of the concepts show fill material being brought in to provide level trail approaches to the railroad crossing. This will likely require the installation of culverts under the trail crossings to maintain existing drainage patterns adjacent to the railroad crossings.

## PROPOSED IMPLEMENTATION STEPS

The following is a typical implementation scenario to facilitate new pedestrian crossing approval by the railroad and construction. Prior to formal meetings with the railroad, the City will hold an informational meeting with each neighborhood to obtain input and support for the project.

- Introduce the City's desire and design concepts for new pedestrian crossings in a meeting with the Canadian Pacific public crossing manager. Discuss the existing conditions at the crossing sites and the City's desire to reduce the number of informal crossings while improving pedestrian safety.

- As part of the discussion and negotiations with Canadian Pacific Railroad, the City will likely be required to meet the following requirements:

    - Obtain easements from the railroad for the crossings.

    - Indemnify the railroad of any liability and provide proof of insurance for any future incident that might happen at the crossings.

    - Construct safety improvements at the crossings. Minimum safety treatment would be pedestrian mazes. A maximum level of treatment would include active warning devices such as lights, gates and bells, which would require new control systems and bungalows at each crossing.

    - The railroad may require the City to obtain a Mn/DOT crossing order. Additional research is needed to determine if this is applicable for pedestrian crossings.

- Construction within the railroad right of way is performed by the railroad and billed back to the City.

FIGURE 7C-13
HOLLY LANE CROSSING EXISTING CONDITIONS




HOLLY LANE CROSSING EXISTING CONDITIONS DIAGRAM







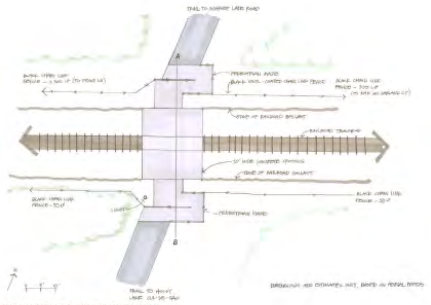
HOLLY LANE CROSSING ISSUES AND CONSTRAINTS:

- Park and trail system under development on South side of rail road tracks
- 1/4 mile view of tracks to the west and clear unobstructed view to the east
- Both sides of tracks are bordered by drainage swales And steep grades
- Private residential neighborhood located on the north side of the tracks



HOLLY LANE CROSSING EXISTING CROSS-SECTION LOOKING NORTHEAST

FIGURE 7C-14
HOLLY LANE CROSSING CONCEPT



HOLLY LANE CROSSING CONCEPT PLAN




HOLLY LANE CROSSING KEY MAP

HOLLY LANE CROSSING CONCEPT

- Maze formalizes and improves safety of an informal crossing
- Fence on one side of railroad tracks ad jacent to multi-family housing provides additional safety measures for residents
- Maze requires bicyclists to reduce speed as they approach railroad tracks
- Maze directs pedestrians to look in both directions prior to crossing railroad tracks
- Concrete railroad crossing provides smooth crossing surface
- 50' fence section discourages bypassing southern maze
- Light to enhance visibility



TYPICAL PEDESTRIAN MAZE



HOLLY LANE CROSSING CONCEPT - SECTION A-B, LOOKING NORTHEAST

FIGURE 7C-15
WOODLAND TRAILS PARK CROSSING EXISTING CONDITIONS




EXISTING CONDITIONS DIAGRAM

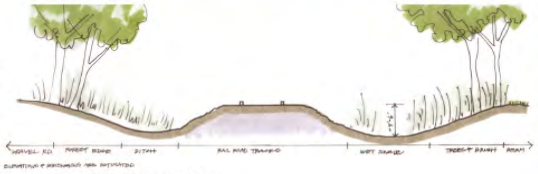






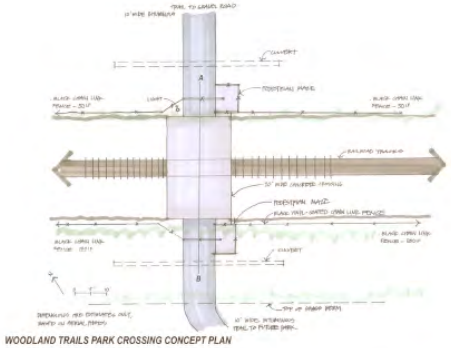
**WOODLAND TRAILS PARK CROSSING ISSUES AND CONSTRAINTS:**

- Park and trail system under development on south side of rail road tracks
- 1/4 mile view of tracks to the west and clear obstructed view to the east
- Both sides of tracks are bordered by drainage swales And steep grades
- Private residential neighborhood located on the north side of the tracks



EXISTING CROSS-SECTION LOOKING SOUTHEAST

FIGURE 7C-16
WOODLAND TRAILS PARK CROSSING CONCEPT



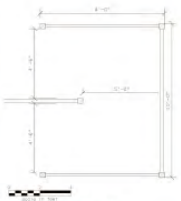
WOODLAND TRAILS PARK CROSSING CONCEPT PLAN



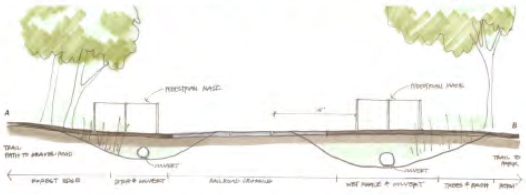

WOODLAND TRAILS PARK CROSSING KEY MAP

**WOODLAND TRAILS PARK CROSSING CONCEPT**

- Fencing on south side of railroad tracks provides additional safety measures for adjacent residents and park users
- Culverts required to maintain drainage adjacent to railroad tracks
- As area continues to develop, increased crossing activity can be anticipated
- Maze requires bicyclists to reduce speed as they approach railroad tracks
- Maze directs pedestrians to look in both directions prior to crossing railroad tracks
- Concrete railroad crossing provides smooth crossing surface
- 50' fence on north side discourages bypassing pedestrian maze
- Light to enhance visibility



TYPICAL PEDESTRIAN MAZE

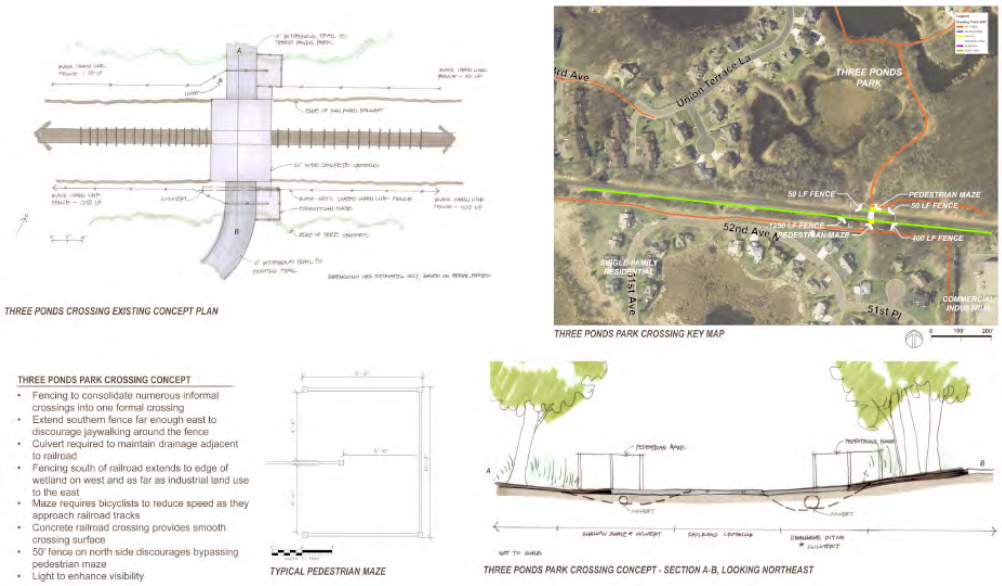


WOODLAND TRAILS PARK CROSSING CONCEPT - SECTION A-B, LOOKING SOUTHEAST

FIGURE 7C-17
THREE PONDS PARK CROSSING EXISTING CONDITIONS




FIGURE 7C- 18
THREE PONDS PARK CROSSING CONCEPT



CHAPTER 8

# Water Supply and Distribution Plan

# TABLE OF CONTENTS


CHAPTER PURPOSE ..... 1
GOALS AND POLICIES ..... 1
OVERVIEW ..... 2
WATER SUPPLY AND DISTRIBUTION SYSTEM ..... 3
STORAGE ..... 3
SUPPLY ..... 3
*Figure 8-1: Existing Distribution System* ..... 4
*Figure 8-2: 2040 Distribution System Plan* ..... 5
TREATMENT ..... 6
DISTRIBUTION ..... 6
CURRENT WATER DEMANDS AND TRENDS ..... 7
*TABLE 8-1: Recent Water Demands and Maximum Day Peaking Factors* ..... 7
PEAKING DEMAND FACTORS ..... 7
WATER DEMAND ..... 8
POPULATION TRENDS ..... 8
*TABLE 8-2: Population Projections* ..... *8*
PROJECTED WATER DEMANDS ..... 8
*TABLE 8-3: Future Estimated Water Demands – Per Capita Basis* ..... 9
*TABLE 8-4: Future Estimated Water Demands – Land Use Basis* ..... 10
SYSTEM IMPROVEMENT NEEDS ..... 10
STORAGE ..... 10
WATER SUPPLY ..... 10
TREATED WATER SUPPLY STRATEGY ..... 11
WATER TREATMENT ..... 12
DISTRIBUTION SYSTEM ..... 13
*Figure 8-3: Static Water Pressure* ..... 14
DISTRIBUTION SYSTEM RECOMMENDATIONS ..... 15
FUNDING MECHANISMS ..... 15
IMPLEMENTATION ..... 16


# LIST OF APPENDICES


8A INVENTORY OF FACILITIES
8B SYSTEM INVENTORY AND ANALYSIS
8C WATER SUPPLY PLAN

Chapter 8

# WATER SUPPLY AND DISTRIBUTION PLAN

## CHAPTER PURPOSE

The Water Supply and Distribution Plan examines the City's water system to assess the capability of the system to provide safe, reliable drinking water and meet current and future water demands. To that end, this analysis of the capacity and hydraulic properties of storage, supply, treatment, and distribution has been undertaken.

Capital improvement recommendations have been developed to address the facilities and improvements needed to maintain or improve existing water system infrastructure, while ensuring an adequate supply of safe water is available in the future. The capital improvement recommendations provided in this plan address system needs through 2040.

## GOALS AND POLICIES

### Provide residents and businesses with affordable potable water that is safe and high quality.

- Meet or exceed all federal and state drinking water standards.
- Inform customers of maintenance practices that may affect water quality.

### Provide a low-maintenance, cost-effective water system that meets the long-term needs of residents and businesses.

- Design and construct a water system that supports the City's Land Use Plan at ultimate development.
- Establish assessment rates, fees, and connection charges to ensure that new development pays for construction of the initial system.
- Require developers to pay the cost of off-site water facilities necessary for any development that occurs in a non-sequential order.
- Operate and maintain the water system to ensure its long-term function with equitable user charges.

### Provide adequate water supply and pressure for residents and businesses.

- Design and construct a water system that meets demands for fire protection.
- Require that new structures with a ground elevation of 1,040 feet or higher above sea level install booster pumps if static pressure is 35 pounds per square inch (psi) or lower.
- Work with residents to find solutions for low water pressure.

### Continue working with adjacent communities to provide a cooperative water system for emergency service.

### Provide water service for developing areas in a planned manner by constructing new mains, wells, and water treatment plant, if demand requires.

### Protect the City's sustainable water supply through conservation by reducing the demand for water, improving the efficiency of water use, and reducing loss and waste of water.

- Conform to the Water Supply Plan (formerly called Emergency and Conservation Plan).
- Continue a tiered system of charges that increase rates with increased use.
- Inform customers about individual water conservation practices.
- Evaluate a program to provide homes with low-flow water fixtures.

### Protect the groundwater source from contamination by conforming to the Wellhead Protection Plan.

## OVERVIEW

The City's water supply and distribution system has expanded in conjunction with land development. Decades of long-range planning efforts have resulted in a cost effective trunk water system. Except for some areas yet to develop (located primarily in the northwest portion of the city), the majority of the city is served with municipal water service.

## WATER SUPPLY AND DISTRIBUTION SYSTEM

The City's water system consists of storage, supply, treatment, and distribution components, as described below. Figure 8-1 presents the locations of existing storage, supply, treatment, and distribution facilities. Figure 8-2 presents the 2040 Distribution System Plan.

### STORAGE

The distribution system includes six water storage tanks, which provide a total usable storage capacity of 12.5 million gallons of water. Four of the tanks are elevated (Zachary, Central, MIP, and Highway 101), one is an above-ground standpipe (County Road 6), and one is a below-ground reservoir (Vicksburg).

### SUPPLY

The City presently has 18 groundwater wells. The wells use the Prairie Du Chien-Jordan Sandstone aquifer. Seven wells pump to the Zachary Water Treatment Plant (Wells 8, 9, 10, 11, 14, 15, and 16), and eight wells pump to the Central Water Treatment Plant (Wells 2, 3, 4, 6, 7, 12, 13, and 17). The MIP Well (also known as Well 1) is used only for emergencies. The Four Seasons Well was recently upgraded, and pumps groundwater to the Zachary Water Treatment Plant. The capacity of Well 5 has been significantly reduced, and is no longer being used.

"Firm capacity" is defined as the well pumping capacity that is provided when the largest well pump for each treatment plant is out of service. It is important to know how much treated water can be reliably provided into the distribution system during maintenance activities and emergencies. Firm capacity is used for design and planning purposes because it generally represents a worst-case scenario. The City needs to ensure that pumping capacity is adequate to meet peak day demands under firm capacity conditions. Additional discussion of firm capacity is provided later in this plan.

During the peak water use season, the water supply wells are not always able to pump water at their design rate due to fluctuating water levels in the aquifer. This lowers the pumping capacity of each well to roughly 90 percent of its rated capacity (seasonal reliable capacity). In addition, Wells 4 and 11 are performing significantly below their design levels, and Well 5 is not presently being used due to ongoing sand problems.

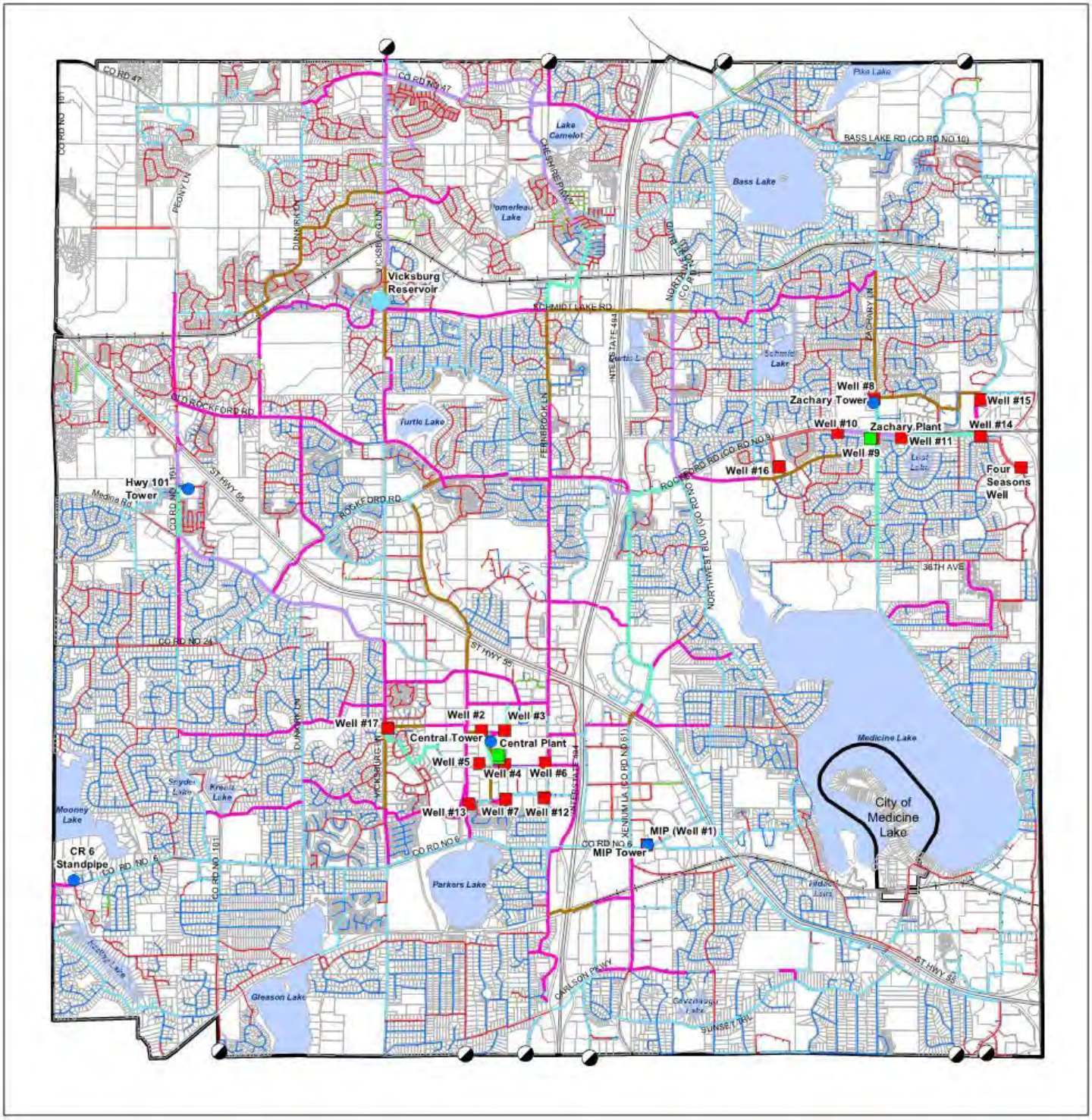



Figure 8-1

# Existing Distribution System

As of 10/18/2017

Source: SEH, Inc.

- Water Connections
- Reservoir
- Treatment Plant
- Well
- Water Tower

**Diameter in Inches**

| | | |
|---|---|---|
| 3 | 12 | 20 |
| 4 | 14 | 24 |
| 6 | 16 | 30 |
| 8 | 17 | 36 |
| 10 | 18 | 50 |

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

City of Plymouth

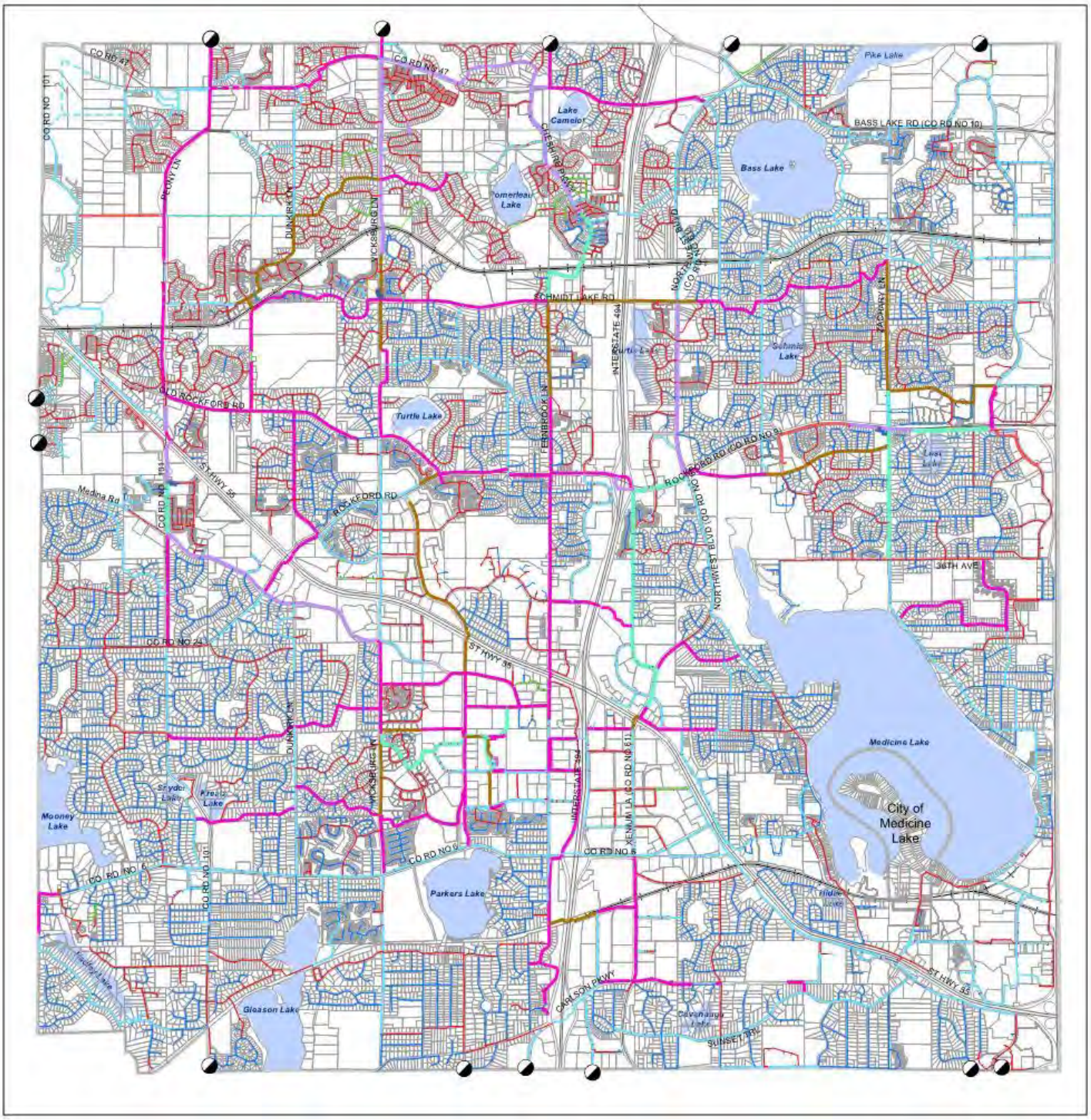



Figure 8-2

# 2040 Distribution System Plan

As of10/18/2017

Source: SEH, Inc.

City of Plymouth

**Existing Watermain Size Inches**

3 4 6 8 10 12 14 16 17 18 20 24 30 36 50

**Future Watermain Size Inches**

8 12 16 18 20

Water Connections

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## TREATMENT

The Central and Zachary Water Treatment Plants remove iron and manganese by chemical precipitation and filtration. Chemical precipitation is accomplished with aeration, chlorine and sodium permanganate addition. Fluoride is added at each plant for dental care. Orthophosphate is also added at each plant to control lead and copper and improve water quality in the distribution system.

The Central Water Treatment Plant was placed into service in 2006 and has a rated treatment capacity of 13 million gallons per day (MGD). The Zachary Water Treatment Plant was expanded in 2006 and currently has a rated treatment capacity of 15 MGD. The Zachary plant has the capability of being expanded to treat up to 17 MGD if additional wells are added to the Zachary well field in the future.

## DISTRIBUTION

The City's water system is comprised of water mains ranging in size from six inches to 30 inches in diameter. The system has been designed with larger trunk main loops and smaller branch mains.

The ground elevation in Plymouth ranges from roughly 880 feet to 1,050 feet above sea level. The system is designed to serve these ground elevations. Water pressures in the distribution system are correlated with elevations, with properties at lower elevations receiving higher pressure and vice versa.

With the exception of the Vicksburg Reservoir, all of the City's tanks have their high water elevation set at 1,130 feet above sea level. That elevation establishes the highest hydraulic grade (pressure) in the system.

The Vicksburg Reservoir uses large pumps to transfer water from the lower hydraulic grade of the reservoir to the higher hydraulic grade of the distribution system. Water is pumped from the reservoir into the distribution system by three pumps. Each pump has a capacity of 2,400 gallons per minute (GPM). Pumping from the reservoir typically takes place during daytime hours when water demands are highest. The reservoir is filled by drawing from the distribution system at night when system demands are lowest.

## CURRENT WATER DEMANDS AND TRENDS

Water utility records indicate that in 2006 the average daily water demand was 9.7 MGD, and the maximum day demand was 24.56 MGD. Another high water use year was 2012, which had an average daily water demand of 9.9 MGD and a maximum day demand of 21.1 MGD. Table 8-1 shows water demands from 2006 through 2016.

### TABLE 8-1
### RECENT WATER DEMANDS AND MAXIMUM DAY PEAKING FACTORS

| Year | Total Population (est.) | Population Served (est.) | Total Water Pumped (MG) | Ave. Day Demand (MGD) | Max. Day Demand (MGD) | Per Capita Demand (gpd) | MD Peaking Factor |
|---|---|---|---|---|---|---|---|
| 2006 | 70,676 | 70,176 | 3,540.6 | 9.70 | 24.56 | 138.2 | 2.5 |
| 2007 | 71,147 | 70,647 | 3,609.8 | 9.89 | 25.76 | 130.0 | 2.6 |
| 2008 | 71,536 | 71,036 | 3,400.6 | 9.32 | 25.46 | 125.3 | 2.7 |
| 2009 | 71,930 | 71,430 | 3,523.9 | 9.65 | 23.11 | 122.0 | 2.4 |
| 2010* | 70,576 | 70,076 | 3,182.8 | 8.72 | 18.94 | 113.4 | 2.2 |
| 2011 | 71,263 | 70,763 | 3,146.8 | 8.62 | 17.81 | 108.2 | 2.1 |
| 2012 | 72,644 | 72,144 | 3,629.6 | 9.94 | 21.1 | 128.0 | 2.1 |
| 2013 | 72,969 | 72,644 | 2,962.9 | 8.05 | 21.3 | 111.7 | 2.6 |
| 2014 | 73,633 | 73,308 | 2,645.0 | 7.25 | 17.87 | 95.5 | 2.5 |
| 2015 | 74,592 | 73,633 | 2,663.6 | 7.16 | 15.1 | 99.1 | 2.1 |
| 2016 | 75,452 | 74,966 | 2,740.2 | 7.29 | 17.6 | 100.4 | 2.4 |

* Census Year

## PEAKING DEMAND FACTORS

Peaking factors are used in analysis of water systems. They are representative of temporal variation in water demands. A maximum day (MD) peaking factor for a water system is the ratio of the maximum day demand rate to the average daily demand rate. It normally indicates the magnitude of seasonal differences in water demands. Maximum day peaking factors are provided in Table 8-1. This historical information is used to assess the capacity of existing water system facilities and to estimate future needs. For future demand projections, a maximum day peaking factor of 2.5 was assumed. The 2.5 figure is close to the highest maximum day peaking factor experienced from 2006 through 2016.

### WATER DEMAND

Water demands are variable throughout the day and year. On an annual basis, the heaviest demand conditions (maximum day demands) typically occur during the summer, when lawn irrigation and other outdoor water use activities increase. Water demand also varies over the course of a given day. Residential water use is typically higher in the late afternoon and early evening. The demand lessens considerably into the late evening hours. Commercial and industrial water uses are generally more constrained and predictable.

### POPULATION TRENDS

Table 8-2 presents population projections through 2040. Served population is the population served by the public water system. Unserved population is the population served by private wells.

TABLE 8-2
POPULATION PROJECTIONS

| Year | Served Population | Unserved Population | Total Population |
|---|---|---|---|
| 2020 | 76,850 | 350 | 77,200 |
| 2030 | 81,130 | 270 | 81,400 |
| 2040 | 84,860 | 240 | 85,100 |

Source: Metropolitan Council

## PROJECTED WATER DEMANDS

The future average daily water demand projections used in this plan were compared using two approaches. The first approach was based on projected population and per capita water use. The second approach was based on proposed land use of developable acres.

For the first approach (per capita method), Table 8-3 shows a projected maximum day demand of 24.9 million gallons per day (MGD) for 2040. The projected 2040 maximum day (MD) demand is similar to what the maximum day (MD) demand was in 2006, even though the population is projected to increase by roughly 14,000 residents from 2006 to 2040.

TABLE 8-3
FUTURE ESTIMATED WATER DEMANDS – PER CAPITA BASIS

| Year | Met Council Projected Total Population | City Projected Population Served | Projected AD Demand (MGD) | Projected MD Demand (MGD) |
|---|---|---|---|---|
| 2006 | 70,676 | 70,176 | 9.7 | 24.56 |
| 2017 | 75,700 | 74,966 | 8.8 | 22.0 |
| 2020 | 77,200 | 76,850 | 9.0 | 22.5 |
| 2025* | 79,000 | 78,690 | 9.2 | 23.1 |
| 2030 | 81,400 | 81,130 | 9.5 | 23.8 |
| 2035* | 83,250 | 82,995 | 9.7 | 24.3 |
| 2040 | 85,100 | 84,860 | 10.0 | 24.9 |

* Interpolated

For the second approach (land use method), future water demands were projected using the proposed land use of developable acres. Table 8-4 shows maximum day (MD) demand rates for each undeveloped land use type. Table 8-4 shows a projected maximum day demand of 25.3 MGD for 2040, using the land use method.

The City's plan models the approach that yields the highest demand, which is the second approach (land use method). Based on the model, the 2040 design maximum day (MD) demand is 25.3 MGD. For comparison, the City's 2030 Comprehensive Plan (completed in 2009) estimated a future 2030 maximum day (MD) demand of 32.1 MGD.

TABLE 8-4
FUTURE ESTIMATED WATER DEMANDS – LAND USE BASIS

| Land Use Description | Developable Acres | MD Demand Rate (gpm per acre), or (g/day/ac)* | MD Demand Added (gpm) |
|---|---|---|---|
| Commercial, C | 10 | 2,000* | 35 |
| Commercial Office, CO | 19 | 2,000* | 65 |
| Living Area 1, LA-1 (2-3) | 192 | 1.30 | 250 |
| Living Area 2, LA-2 (3-6) | 191 | 2.60 | 497 |
| Living Area 3, LA-3 (6-12) | 26 | 4.17 | 108 |
| Living Area 4, LA-4 (12-20) | 17 | 6.94 | 118 |
| MXD-R (12-25) | 34 | 6.94 | 236 |
| Total Developable Added (gpm) | | | 1,068 |
| Total Developable Added (MGD) | | | 1.5 |
| Redevelopment of Existing Areas (444 acres) | | | 1.8 |
| Existing MD Demand (MGD) | | | 22.0 |
| 2040 MD Demand (MGD) | | | 25.3 |

## SYSTEM IMPROVEMENT NEEDS

### STORAGE

In planning for water storage needs, consideration must be given to average daily demands, peak demands and emergency needs. Fire protection is an important factor when calculating required storage capacity. To provide adequate fire protection, 3,500 GPM must be available for three hours, while simultaneously meeting system equalization needs (assumed to be 25 percent of the maximum day demand). System equalization is the storage necessary to balance demand fluctuations experienced throughout the day. The existing water storage facilities have adequate capacity to supply proper fire flow for the required length of time during peak demands. Furthermore, design standards suggest that a City's total storage capacity should be sized to provide one average day of water demand for emergency reserve. The City's current total storage volume of 12.5 million gallons is more than the 2040 projected average day demand of 9.8 million gallons.

### WATER SUPPLY

Firm capacity (the water that can be reliably supplied with the largest well out of service at each treatment plant) should be equal to or greater than the maximum day demand. When projected maximum day demands reach firm capacity, it is an indication that additional water supply capacity is needed.

The supply capacity is based on the firm capacity and seasonal reliable capacity (90 percent of firm capacity). Required well supply capacity is as calculated follows:

- Existing Firm Capacity Zachary Well Field: 10,800 gpm
- Existing Firm Capacity Central Well Field: 11,800 gpm
- Existing Total Firm Well Capacity: 22,600 gpm (32.5 MGD)
- Existing Total Seasonal Reliable Firm Well Capacity: 18,500 gpm (26.7 MGD)
- Required Well Supply (100% of MD Demand): 20,300 gpm (29.3 MGD)

Based on this data, the existing well supply is adequate.

## TREATED WATER SUPPLY STRATEGY

The existing treated water supply (wells and water treatment) capacity is adequate to meet the estimated 2040 design water demands. However, several potential scenarios could play out that may require Plymouth to construct additional wells and treatment in the future, including:

- New, higher water use customers in existing land use areas.
- Changes in weather and water conservation practices that may increase overall per capita water use to values seen prior to 2012.
- Continued reduction in well supply capacity from existing wells (from either aquifer levels receding or from aging well facilities that need to be replaced).

To prepare for the above scenarios, the City will implement the following strategies:

- Continue to encourage water conservation measures to reduce overall water use, and especially to reduce peak day water use (typically for outdoor irrigation).
- Use the City's billing software to track existing water use, especially in the potential change areas. This data can then be used to analyze the potential increase in water use as areas redevelop.
- Continue to evaluate the performance of the Zachary and Central Well Fields by monitoring static and pumping water levels. Continue to cooperate in regional groundwater planning activities.
- Begin to develop a well replacement schedule, especially for some of the older wells in the Central Well Field.
- Continue to refine operation of the Zachary and Central Water Treatment Plants to provide as close to 24-hour per day operation on peak days as is feasible.

- Continue to program for additional water supply wells and treatment in the Vicksburg Reservoir area, if development deems this necessary. Two potential future wells (Wells 18 and 19) have previously been recommended to be constructed in a new well field on the site of the Vicksburg Reservoir. These wells could pump into a new treatment plant at the Vicksburg Reservoir site. This location has been chosen based on land availability, while an additional supply source near the Vicksburg Reservoir would help to alleviate some of the pressure problems experienced in the area around the reservoir when it is filling. Preliminary studies estimate that wells drilled in this area would be able to produce approximately 1,000 gpm each. It is recommended that test pumping of the aquifer be conducted at this site with a test well to determine aquifer properties and sustainable production capabilities.

## WATER TREATMENT

The water treatment facilities must be able to process (treat) and pump uninterrupted into the distribution system at a rate equal to 100 percent of the MD demand. Typically, some allowance is provided to allow the treatment plants a chance to backwash and "catch up," rather than assuming the plants provide uninterrupted flow 24 hours per day. For purposes of this plan, it is assumed that the plants can comfortably operate 20 out of 24 hours on multiple, back-to-back peak days. The required treatment capacity is determined as follows:

- Existing Zachary WTP Capacity (24 Hours): 17.0 MGD
- Existing Zachary WTP Capacity 20/24 Hours: 14.2 MGD
- Existing Central WTP Capacity (24 Hours): 13.0 MGD
- Existing Central WTP Capacity 20/24 Hours: 10.8 MGD
- Total WTP Capacity (24-Hour Operation): 30.0 MGD
- Total WTP Capacity 20/24 Hours: 25.0 MGD
- Required WTP Capacity 25.3 MGD

Based on this data, the existing water treatment plant capacity is adequate.

## DISTRIBUTION SYSTEM

The trunk water distribution system is essentially complete. Water mains are being extended as development occurs to provide water service to each new lot. Detailed analysis and hydraulic modeling of the trunk distribution system has been the subject of numerous engineering studies as the city has developed. Specific recommendations for improving fire flows in isolated areas and the recommendation to require in-home booster stations for all properties at elevations higher than 1,040 feet above sea level have been previously published and were, therefore, not re-evaluated.

Static water pressure in the existing system ranges from 35 pounds per square inch (psi) to 100 psi (see Figure 8-3). In actual practice on maximum day demand conditions, the pressure across the system ranges from 30 to 102 psi. Industry standards recommend that the normal working pressure in water distribution systems be in the range of 60 to 80 psi, and not less than 35 psi. In addition, pressures in excess of 100 psi are not recommended in the distribution system. The Minnesota Plumbing Code requires that building plumbing systems not exceed 80 psi. Many of the areas with pressures greater than 100 psi are localized on the system (limited to the eastern edge of the city and in localized low lying areas around lakes). Where pressures exceed 80 psi, individual homes or businesses should use pressure reducing valves on the service line near the entrance to the building, as recommended by the Minnesota Plumbing Code. Properties located at relatively high elevations (1,040 feet or more above sea level) in the western portion of the system may experience lower water pressure under certain conditions. This is a result of lower water levels in the City's water towers during peak water use, which results in an overall drop in water pressure. The area most susceptible to low pressures occurs along the western border of the city. An area surrounding the Vicksburg Reservoir (Vicksburg Lane and Schmidt Lake Road) also cannot achieve ideal operating pressures under high demand conditions. This area is at a relatively high elevation. The filling of the Vicksburg Reservoir contributes to this problem. When the reservoir fills at a rate of approximately 3,000 gpm, this causes a significant pressure drop in a localized area around the reservoir.

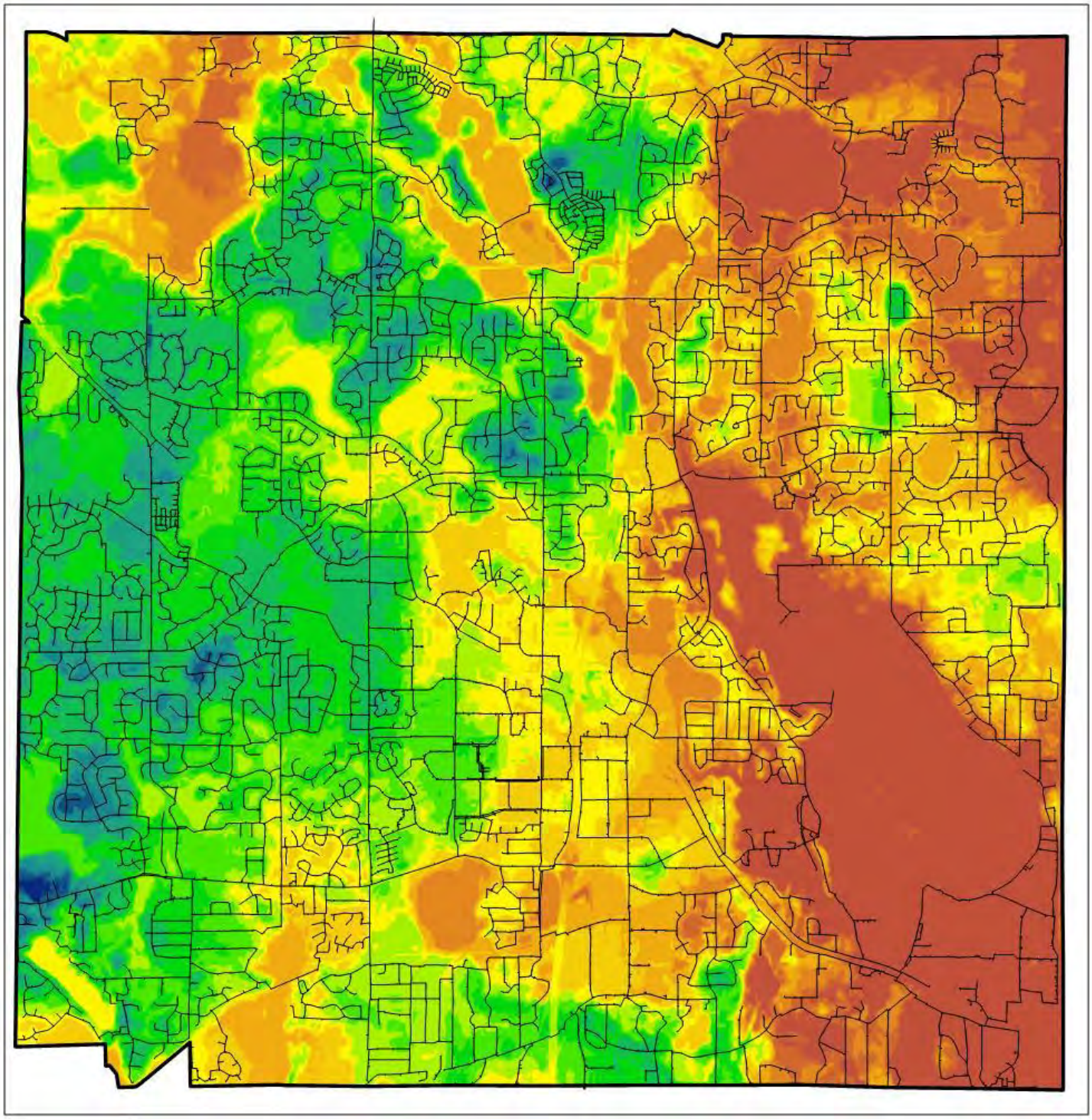


Figure 8-3

**Static Water Pressure**

Watermains
Less than 35 psi
35-40 psi
40-45 psi
45-50 psi
50-55 psi
55-60 psi
60-65 psi
65-70 psi
70-75 psi
75-80 psi
80-85 psi
85-90 psi
90-95 psi
95-100 psi

City of Plymouth

Source: SEH, Inc

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

### DISTRIBUTION SYSTEM RECOMMENDATIONS

The City will continue to evaluate existing fire flows compared to desired fire flows neighborhood by neighborhood, based on site-specific requirements or as street reconstruction projects are planned. The following areas were identified in the 2009 plan as areas with potentially less than desirable fire flows. These areas were not evaluated, but are included in this plan. The City will monitor existing fire flow requirements in the following areas, as identified in the 2009 plan:

- The two commercial parcels on the northwest corner of the intersection at Highway 55 and Rockford Road may have less than 2,500 gpm on the branch main serving the properties. Recent testing indicates that the flows for this area are 3,170 gpm. The City will continue to monitor this area.
- Some of the branched lines serving the industrial properties in the southeast quadrant of the Vicksburg Lane and Highway 55 intersection may provide less than 2,500 gpm in isolated locations.
- The hydrants along 12th Avenue east of West Medicine Lake Drive have available fire flow less than 1,500 gpm. These hydrants appear to serve a high density residential development. They are located on a 6-inch dead end main. This main should be increased if greater fire flow is needed from those hydrants.
- The hydrants serving commercial properties along Highway 55 near the eastern extent of the city (between South Shore Drive and Nathan Lane), and along Nathan Lane south of Highway 55, currently have available fire flow less than 2,000 gpm.

## FUNDING MECHANISMS

The City uses three main sources of funding to pay for the water supply and distribution system:

- Area charges are commonly used to cover the cost of trunk distribution facilities.
- Connection fees are commonly used to cover the costs of trunk distribution facilities, water supply wells, pumping facilities, reservoirs and treatment facilities.
- Water rates are commonly used to cover the costs of maintenance and enhancements to the system.

The City's Utility Rate Study is updated annually, and provides additional detail on funding sources.

## IMPLEMENTATION

| *Description* | *Timing* |
|---|---|
| **Capital Improvements Program –** Annually review the need for the capital improvements identified by this chapter and adjust the scheduled projects to meet the needs of new development. A complete listing of water supply and distribution related projects can be found in the City's current capital improvements program (CIP). | Ongoing |
| **Water User Charges –** Review current water user charges to ensure that they will be sufficient to fund future operation, treatment and maintenance costs. | Ongoing |
| **Water Conservation Plan –** Implement the strategies identified in the Water Supply Plan (see Appendix 8C). | Ongoing |

Appendix 8A

# INVENTORY OF FACILITIES

## EXISTING FACILITIES

### Wells

| | Capacity (gpm) | Capacity (MGD) |
|---|---|---|
| **Total Well Capacity** | 24,800 | 35.7 |
| **Firm Well Capacity** | 22,800 | 32.8 |
| **Total Capacity to Zachary Plant** | 11,000 | 15.8 |
| **Firm Capacity to Zachary Plant** | 9,000 | 13.0 |
| **Total Capacity to Central Plant** | 11,800 | 17.0 |
| **Firm Capacity to Central Plant** | 9,800 | 14.1 |
| **Firm Treatment Plant Supply Capacity (assumes largest well out of service at each treatment plant)** | 18,800 | 27.1 |
| **Actual Peak Season Supply Capacity (90% of Firm Treatment Plant Supply Capacity)** | **16,920** | **24.4** |

| Facility | Total Volume (MG) | Useable Volume (MG) | Style |
|---|---|---|---|
| Zachary Water Tower | 2.0 | 2.0 | Elevated |
| Central Water Tower | 1.0 | 1.0 | Elevated |
| MIP Water Tower[(1)] | 0.5 | 0.0 | Elevated |
| County Road 6 Standpipe | 1.0 | 0.5 | Standpipe |
| Highway 101 Water Tower | 3.0 | 3.0 | Elevated |
| Vicksburg Reservoir | 6.0 | 6.0 | Below-ground Storage |
| **Total** | **13.5** | **12.5** | |

| Facility | Maximum Production Rate (MGD) |
|---|---|
| Zachary WTP | 17 |
| Central WTP | 13 |

Note: The MIP Tower useable volume is 0.5 MG, but due to potential plans to decommission this facility, its volume was not considered to contribute to the overall storage capacity of the system

| Well Name | Unique # | Yr. Installed | Depth/Casing Depth (ft) | Diameter (in) | Capacity (gpm) | Capacity (MGD) | Aquifer | Status |
|---|---|---|---|---|---|---|---|---|
| #1 (MIP) | 204617 | 1961 | 505/442 | 16 | 1000 | 1.4 | Prairie Du Chien-Jordan | Active (Emergency) |
| #2 | 204619 | 1970 | 409/280 | 20 | 1800 | 2.6 | Prairie Du Chien-Jordan | Active |
| #3 | 204618 | 1972 | 448/276 | 16 | 1500 | 2.2 | Prairie Du Chien-Jordan | Active |
| #4 | 112202 | 1975 | 470/274 | 20 | 1200 | 1.7 | Prairie Du Chien-Jordan | Active |
| #5(1) | 160023 | 1979 | 437/252 | 20 | 0 | 0.0 | Prairie Du Chien-Jordan | Inactive |
| #6 | 449814 | 1980 | 417/260 | 18 | 2000 | 2.9 | Prairie Du Chien-Jordan | Active |
| #7 | 184882 | 1982 | 455/271 | 18 | 1700 | 2.4 | Prairie Du Chien-Jordan | Active |
| #8 | 432026 | 1987 | 416/192 | 18 | 1900 | 2.7 | Prairie Du Chien-Jordan | Active |
| #9 | 432024 | 1987 | 420/225 | 24 | 1900 | 2.7 | Prairie Du Chien-Jordan | Active |
| #10 | 439796 | 1988 | 353/199 | 18 | 1900 | 2.7 | Prairie Du Chien-Jordan | Active |
| #11 | 481659 | 1993 | 380/230 | 30 | 1300 | 1.9 | Prairie Du Chien-Jordan | Active |
| #12 | 508300 | 1990 | 302/255 | 24 | 1600 | 2.3 | Prairie Du Chien-Jordan | Active |
| #13 | 462918 | 1991 | 473/270 | 18 | 2000 | 2.9 | Prairie Du Chien-Jordan | Active |
| #14 | 655943 | 2004 | 405/225 | 24 | 2000 | 2.9 | Prairie Du Chien-Jordan | Active |
| #15 | 705459 | 2004 | 405/255 | 24 | 2000 | 2.9 | Prairie Du Chien-Jordan | Active |
| #16 | 759585 | 2012 | 398/204 | 18 | 2000 | 2.9 | Prairie Du Chien-Jordan | Active |
| #17 | 786206 | 2012 | 423/352 | 18 | 2000 | 2.9 | Prairie Du Chien-Jordan | Active |
| Four Seasons | 204272 | 1966 | 390/301 | 16 | 1000 | 1.4 | Prairie Du Chien-Jordan | Active (Emergency) |

Notes

(1) The capacity of Well 5 has been significantly reduced, and is currently only used intermittently. It is assumed that this well will not be a reliable water source for the city in the future.

## Storage Tanks

1 Central 1.0 MG Elevated Last Painted 2002

- Built 1970
- Painted 1987 (Color) Beeswax
- Painted 2002 (Color) Beeswax
- 2019 - Planned for Rehab including Paint



2 Zachary 2.0 MG Elevated Last Painted 2018

- Built 1975 (Color) White
- Painted 1991 (Color) Beeswax
- 2001 Inspected Interior - Liquid Eng.
- 2003 Exterior Washed
- 2018 - Completed Rehab including Paint




3 MIP 0.5 MG Elevated Last Painted: 2012

- Built 1959
- Painted 1973 (Color) White
- Painted 1986 (Color) Beeswax Tenyer Coatings
- Painted 2012 (Color) Beeswax



4 C.R. 6 1.0 MG Standpipe Last Painted: 2006

- Built 1976
- Painted 1986 Spot painted exterior, total interior
- Inspected Interior - Liquid Eng.
- 2006 - Completed Rehab - SEH Eng - MK Painting



5 Hwy 101 3.0 MG Hydropillar Last Painted: 2013

- Built 1990 - Painted by Tenyer
- Inspected Interior (some peeling of exterior roof area seen)
- Painted 2013 (Color) Beeswax



Appendix 8B

# SYSTEM INVENTORY AND ANALYSIS

## EXISTING WATER SUPPLY AND DISTRIBUTION SYSTEM

All City-owned pipes six inches in diameter and larger were included in the computer model of the distribution system. Water pumping records were used to represent current demands on the system. These demands were geographically distributed in the model by using individual billing records associated with a parcel data set. Each parcel's water use was assigned to the nearest node in the distribution system model. Storage and supply facilities were modeled, based on specifications and construction as-built drawings.

The distribution system model was calibrated through the use of hydrant flow test data. Hydrant flow tests provide flow rates and residual pressures at various points on the distribution system that can be replicated in the model. Model parameters were adjusted until calibration meeting or exceeding industry standards was attained, and model results reflected observed flow results.

### SYSTEM PRESSURE CALCULATIONS

Water pressures in the existing system under average day demands and maximum day demands were calculated by the computer model. The model calculates pressures in the range of 32 to 105 pounds per square inch (psi) throughout the existing water system under average day conditions. Under simulated maximum day demand conditions, the pressure range is 30 to 102 psi.

There is not a great fluctuation in water pressure across the distribution system. There is a general trend from lower to higher pressure from west to east across the city due to elevation changes. Industry standards recommend that the normal working pressure in water distribution systems be in the range of 60 to 80 psi and not less than 35 psi. In addition, pressures in excess of 100 psi are not recommended in the distribution system. The Minnesota Plumbing Code requires that building plumbing systems not exceed 80 psi.

Many of the areas with pressures greater than 100 psi are localized on the system (limited to the eastern edge of the city and in localized low lying areas around lakes). Where pressures exceed 80 psi, individual homes or businesses should use pressure reducing valves on the service line near the entrance to the building, as recommended by the Minnesota Plumbing Code.

## LOW PRESSURE AREAS

Properties located at relatively high elevations (over 1,040 feet above sea level) in the western portion of the system may be experiencing lower water pressure under certain system conditions. This is a result of slightly lower water levels in the City's water towers during peak water use. These lower levels result in an overall drop in system pressures. The area most susceptible to low pressures occurs along the western border of the city. In addition, an area surrounding the Vicksburg Reservoir (Vicksburg Lane and Schmidt Lake Road) cannot achieve ideal operating pressures under high demand conditions. This area is also at a relatively high elevation. The filling of the Vicksburg Reservoir contributes to this problem. When this reservoir fills at a rate of approximately 3,000 gallons per minute (gpm), this causes a significant pressure drop in a localized area around the reservoir.

## PIPE VELOCITIES AND FRICTION LOSS

The hydraulic model of the distribution system does not detect any areas with excessive velocities under normal operating conditions. This includes peak demand periods with treatment plants at full production.

## AVAILABLE FIRE FLOW

Available fire flows were calculated using the computer model with a residual pressure of 20 psi. According to the American Water Works Association (AWWA), the minimum fire flow available at any given point in a system should not be less than 500 gpm at a residual pressure of 20 psi. This minimum criterion represents the amount of water required to provide for two standard hose streams on a fire in a typical residential area for residential dwellings with spacing greater than 100 feet. The distance between buildings and the corresponding recommended fire flow for residential areas is summarized below.

TABLE 8B-1
RECOMMENDED RESIDENTIAL FIRE FLOWS

| Distance Between Buildings (ft) | Needed Fire Flow (gpm) |
|---|---|
| More than 100 | 500 |
| 31-100 | 750 |
| 11-30 | 1,000 |
| Less than 11 | 1,500 |

The needed fire flow rate varies considerably for residential, commercial and industrial developments and is based on several characteristics of individual buildings:

- Type of construction, as defined in state fire and building codes;
- Occupancy type, as defined in state fire and building codes;
- Proximity and characteristics of nearby properties; and
- Presence or absence of a fire sprinkling system.

While the fire flow requirements of commercial and industrial properties should be evaluated on a case-by-case basis, a general rule of thumb is that a municipal water system should provide 3,500 gpm to this type of land use. The Insurance Services Office (ISO), in determining a city's fire insurance classification, only considers flow rates up to 3,500 gpm.

Available fire flows appear to be robust throughout most of the distribution system. There are local areas where the computer model predicts restricted flow. This occurs on smaller branched and dead-end mains, where friction losses become a significant factor in reducing pressure at high flow rates. There are a few areas that are listed with a commercial or industrial land use where available fire flow is modeled at less than 3,500 gpm. Notable are:

- The two commercial parcels on the northwest corner of the intersection at Highway 55 and Rockford Road may have less than 2,500 gpm on the branch main serving the properties. The computer model shows that fire flows could be increased to greater than 3,000 gpm if the lateral line serving these properties is increased to 12 inches.

- Some of the branched lines serving the industrial properties in the southeast quadrant of Vicksburg Lane and Highway 55 may provide less than 2,500 gpm in isolated locations. If that area redevelops and if deemed necessary to provide greater than 2,500 gpm for this property, the City should consider increasing the size of mains along 32nd Avenue between Vicksburg and Ranchview Lanes and along Ranchview Lane between 31st and 32nd Avenues. An analysis of this area with upgrading these main segments to 12-inch shows that available fire flow is increased to greater than 3,500 gpm at all of the hydrant locations in the area.

- The hydrants along 12th Avenue east of West Medicine Lake Drive have available fire flow less than 1,500 gpm. These hydrants serve a high density residential development and are located on a six-inch dead end main. This main should be increased if greater fire flow is needed from those hydrants. With a 12-inch main replacement, the model shows fire flows increase to approximately 3,500 gpm.

- The hydrants serving commercial properties along Highway 55 on the east side of the city (between South Shore Drive and Nathan Lane) and along Nathan Lane south of Highway 55 currently have available fire flow less than 2,000 gpm. This available fire flow can be increased to greater than 3,500 gpm by creating a 12-inch connection on Revere Lane between 10th Avenue and the current water main stub north of 6th Avenue and upgrading the main in Nathan Lane south of Highway 55 to 12 inches.

## EXTENDED PERIOD SIMULATION AND TOWER BALANCING

An extended period simulation (EPS) was conducted using the model to analyze system operations during several days of maximum day demands. The primary purpose of this simulation was to check for cumulative system imbalances that are not evident in standard simulations and to verify if system operations can be maintained under high demand conditions.

The locations of supply and storage facilities as well as the sizes of distribution system pipes contribute to imbalances. Considerable distances between supply and storage locations and inadequately-sized water mains can contribute to a reduced storage-replenishment rate and hinder the ability to refill towers at night during low demand periods.

A 72-hour period with three consecutive maximum day (MD) demand conditions was simulated. This time period was chosen since most supply and distribution system deficiencies will be exposed in three days of operations with MD demands. For example, if tanks are unable to refill daily under high demand conditions, a trend will emerge in tank level data produced by the simulation.

The EPS analysis shows that the Highway 101 elevated tank and County Road 6 standpipe lag behind the Central, Zachary and MIP water towers. The model predicts that MIP also drains much faster than Central and Zachary tanks during peak demands. This is caused by the proximity of the Central and Zachary tanks to the treatment plants and the relatively small volume of the MIP tank. It is likely contributing to the reduced pressures experienced in the western portion of the distribution system at high elevations during peak demand days. Under an average day demand scenario, it appears that the situation corrects itself (the tanks are more in balance with one another across the system).

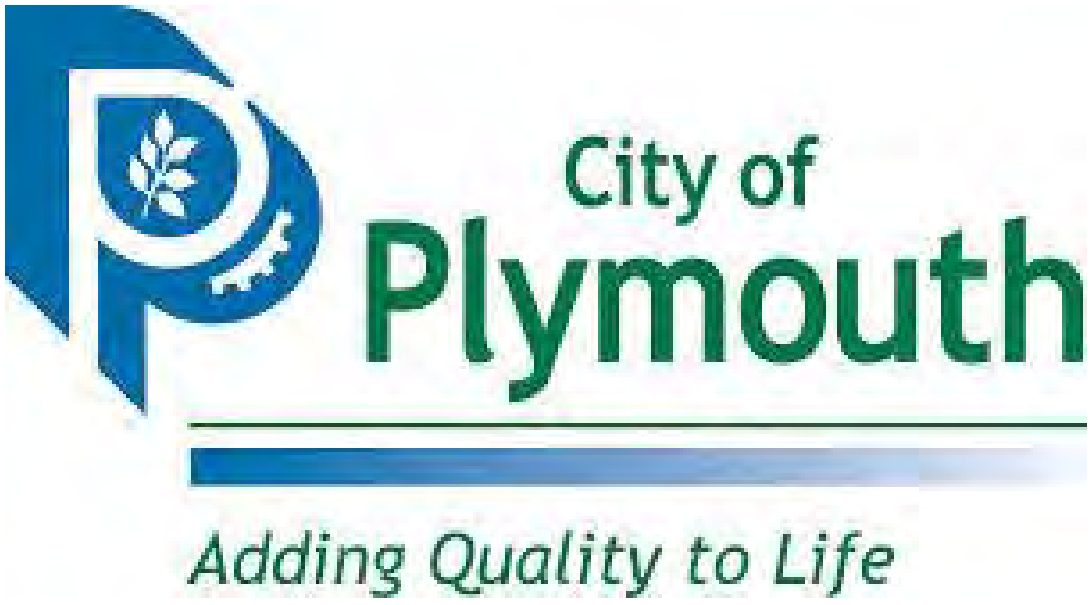
Appendix 8C

# WATER SUPPLY PLAN

## Plymouth, Minnesota

April 5, 2018

*Formerly called Water Emergency & Water Conservation Plan*



DEPARTMENT OF NATURAL RESOURCES

For more information on this Water Supply Plan Template, please contact the DNR Division of Ecological and Water Resources at (651) 259-5034 or (651) 259-5100.

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This information is available in an alternative format upon request.

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# Table of contents

INTRODUCTION TO WATER SUPPLY PLANS (WSP) ..... 6

Who needs to complete a Water Supply Plan ..... 6

Groundwater Management Areas (GWMA) ..... 6

Benefits of completing a WSP ..... 6

WSP Approval Process ..... 7

PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION ..... 9

A. Analysis of Water Demand ..... 9

B. Treatment and Storage Capacity ..... 11

Treatment and storage capacity versus demand ..... 12

C. Water Sources ..... 12

Limits on Emergency Interconnections ..... 14

D. Future Demand Projections – *Key Metropolitan Council Benchmark* ..... 14

Water Use Trends ..... 14

Projection Method ..... 15

E. Resource Sustainability ..... 15

Monitoring – *Key DNR Benchmark* ..... 15

Water Level Data ..... 18

Potential Water Supply Issues & Natural Resource Impacts – *Key DNR & Metropolitan Council Benchmark* ..... 20

Wellhead Protection (WHP) and Source Water Protection (SWP) Plans ..... 25

F. Capital Improvement Plan (CIP) ..... 27

Adequacy of Water Supply System ..... 27

Proposed Future Water Sources ..... 28

Water Source Alternatives - *Key Metropolitan Council Benchmark* ..... 28

PART 2. EMERGENCY PREPAREDNESS PROCEDURES ..... 29

A. Emergency Response Plan ..... 29

B. Operational Contingency Plan ..... 29

C. Emergency Response Procedures ..... 30

Emergency Telephone List ....30
Current Water Sources and Service Area ....30
Procedure for Augmenting Water Supplies....30
Allocation and Demand Reduction Procedures....32
Notification Procedures....34
Enforcement....35
PART 3. WATER CONSERVATION PLAN....36
Progress since 2006 ....36
A. Triggers for Allocation and Demand Reduction Actions ....37
B. Conservation Objectives and Strategies – *Key benchmark for DNR* ....38
Objective 1: Reduce Unaccounted (Non-Revenue) Water loss to Less than 10% ....38
Objective 2: Achieve Less than 75 Residential Gallons per Capita Demand (GPCD) ....40
Objective 3: Achieve at least 1.5% annual reduction in non-residential per capita water use ....41
Objective 4: Achieve a Decreasing Trend in Total Per Capita Demand ....42
Objective 5: Reduce Ratio of Maximum day (peak day) to the Average Day Demand to Less Than 2.6....42
Objective 6: Implement Demand Reduction Measures ....43
Objective 7: Additional strategies to Reduce Water Use and Support Wellhead Protection Planning....45
Objective 8: Tracking Success: How will you track or measure success through the next ten years? ....46
C. Regulation ....46
D. Retrofitting Programs....47
Retrofitting Programs....47
E. Education and Information Programs ....48
Proposed Education Programs ....48
PART 4. ITEMS FOR METROPOLITAN AREA COMMUNITIES ....51
A. Water Demand Projections through 2040 ....51

B. Potential Water Supply Issues....51
C. Proposed Alternative Approaches to Meet Extended Water Demand Projections....51
D. Value-Added Water Supply Planning Efforts (Optional)....52
Source Water Protection Strategies....52
Technical assistance....52
GLOSSARY....53
Acronyms and Initialisms....55
APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER....55
Appendix 1: Well Records and Maintenance Summaries....56
Appendix 2: Water Level Monitoring Plan....67
Appendix 3: Water Level Graphs for Each Water Supply Well....69
Appendix 4: Capital Improvement Plan....70
Appendix 5: Emergency Telephone List....77
Appendix 6: Cooperative Agreements for Emergency Services....77
Appendix 7: Municipal Critical Water Deficiency Ordinance....77
Appendix 8: Graph of Ten Years of Annual Per Capita Water Demand for Each Customer Category....78
Appendix 9: Water Rate Structure....79
Appendix 10: Ordinances or Regulations Related to Water Use....80
Appendix 11: Implementation Checklist....81

# INTRODUCTION TO WATER SUPPLY PLANS (WSP)

## Who needs to complete a Water Supply Plan

Public water suppliers serving more than 1,000 people, large private water suppliers in designated Groundwater Management Areas, and all water suppliers in the Twin Cities metropolitan area are required to prepare and submit a water supply plan.

The goal of the WSP is to help water suppliers: 1) implement long term water sustainability and conservation measures; and 2) develop critical emergency preparedness measures. Your community needs to know what measures will be implemented in case of a water crisis. A lot of emergencies can be avoided or mitigated if long term sustainability measures are implemented.

## Groundwater Management Areas (GWMA)

The DNR has designated three areas of the state as Groundwater Management Areas (GWMAs) to focus groundwater management efforts in specific geographies where there is an added risk of overuse or water quality degradation. A plan directing the DNRs actions within each GWMA has been prepared. Although there are no specific additional requirements with respect to the water supply planning for communities within designated GWMAs, communities should be aware of the issues and actions planned if they are within the boundary of one of the GWMAs. The three GWMAs are the North and East Metro GWMA (Twin Cities Metro), the Bonanza Valley GWMA and the Straight River GWMA (near Park Rapids). Additional information and maps are included in the DNR Groundwater Management Areas webpage.

## Benefits of completing a WSP

Completing a WSP using this template, fulfills a water supplier's statutory obligations under M.S. M.S.103G.291 to complete a water supply plan. For water suppliers in the metropolitan area, the WSP will help local governmental units to fulfill their requirements under M.S. 473.859 to complete a local comprehensive plan. Additional benefits of completing WSP template:

- The standardized format allows for quicker and easier review and approval
- Help water suppliers prepare for droughts and water emergencies.
- Create eligibility for funding requests to the Minnesota Department of Health (MDH) for the Drinking Water Revolving Fund.
- Allow water suppliers to submit requests for new wells or expanded capacity of existing wells.
- Simplify the development of county comprehensive water plans and watershed plans.
- Fulfill the contingency plan provisions required in the MDH wellhead protection and surface water protection plans.
- Fulfill the demand reduction requirements of Minnesota Statutes, section 103G.291 subd 3 and 4.

- Upon implementation, contribute to maintaining aquifer levels, reducing potential well interference and water use conflicts, and reducing the need to drill new wells or expand system capacity.
- Enable DNR to compile and analyze water use and conservation data to help guide decisions.
- Conserve Minnesota's water resources

If your community needs assistance completing the Water Supply Plan, assistance is available from your area hydrologist or groundwater specialist, the MN Rural Waters Association circuit rider program, or in the metropolitan area from Metropolitan Council staff. Many private consultants are also available.

## WSP Approval Process

**10 Basic Steps for completing a 10-Year Water Supply Plan**

1. Download the DNR/Metropolitan Council Water Supply Plan Template from the DNR Water Supply Plan webpage.
2. Save the document with a file name with this naming convention: WSP_cityname_permitnumber_date.doc.
3. The template is a form that should be completed electronically.
4. Compile the required water use data (Part 1) and emergency procedures information (Part 2)
5. The Water Conservation section (Part 3) may need discussion with the water department, council, or planning commission, if your community does not already have an active water conservation program.
6. Communities in the seven-county Twin Cities metropolitan area should complete all the information discussed in Part 4. The Metropolitan Council has additional guidance information on their Water Supply webpage. All out-state water suppliers ***do not*** need to complete the content addressed in Part 4.
7. Use the Plan instructions and Checklist document from the DNR Water Supply Plan webpage to insure all data is complete and attachments are included. This will allow for a quicker approval process.
8. Plans should be submitted electronically using the MPARS website – no paper documents are required.
9. DNR hydrologist will review plans (in cooperation with Metropolitan Council in Metro area) and approve the plan or make recommendations.
10. Once approved, communities should complete a Certification of Adoption form, and send a copy to the DNR.

Complete Table 1 with information about the public water supply system covered by this WSP.

**Table 1. General information regarding this WSP**

| Requested Information | Description |
|---|---|
| DNR Water Appropriation Permit Number(s) | **1978-6376** |
| Ownership | ☒ Public or ☐ Private |
| Metropolitan Council Area | ☒ Yes or ☐ No (Hennepin County) |
| Street Address | **3400 Plymouth Boulevard** |
| City, State, Zip | **Plymouth, MN 55447** |
| Contact Person Name | Kevin Mastey |
| Title | Utilities Supervisor |
| Phone Number | 763-509-5998 |
| MDH Supplier Classification | Municipal |

# PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

The first step in any water supply analysis is to assess the current status of demand and availability. Information summarized in Part 1 can be used to develop Emergency Preparedness Procedures (Part 2) and the Water Conservation Plan (Part 3). This data is also needed to track progress for water efficiency measures.

## A. Analysis of Water Demand

Complete Table 2 showing the past 10 years of water demand data.

- Some of this information may be in your Wellhead Protection Plan.
- If you do not have this information, do your best, call your engineer for assistance or if necessary leave blank.

If your customer categories are different than the ones listed in Table 2, please describe the differences below:

| |
|---|
| NA |

**Table 2. Historic water demand (see definitions in the glossary after Part 4 of this template)**

| Year | Pop. Served | Total Connections | Residential Water Delivered (MG) | C/I/I Water Delivered (MG) | Water used for Non-essential | Wholesale Deliveries (MG) | Total Water Delivered (gal) | Total Water Pumped (MG) | Water Supplier Services | Percent Unmetered/ Unaccounted | Average Daily Demand (MGD) | Max. Daily Demand (MGD) | Date of Max. Demand | Residential Per Capita Demand (GPCD) | Total per capita Demand (GPCD) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2006 | 70,176 | 23,042 | 2,433,868,821 | 565,477,138 | 63,361,588 | 0 | 2,999,345,959 | 3540.6 | | 18% | 9.7 | 24.6 | 7/13/2006 | 95.0 | 138.2 |
| 2007 | 70647 | 20,741 | 2,480,766,907 | 873,221,672 | 24,345,398 | 0 | 3,378,333,977 | 3609.8 | | 7% | 9.89 | 25.76 | 8/3/2007 | 96.2 | 131.01 |
| 2008 | 71036 | 20,879 | 2,378,073,790 | 872,096,419 | 20,725,256 | 0 | 3,270,895,465 | 3400.6 | | 4% | 9.32 | 25.46 | 7/4/2008 | 91.7 | 126.15 |
| 2009 | 71430 | 21,041 | 2,490,713,228 | 821,543,891 | 24,688,720 | 0 | 3,336,945,839 | 3523.9 | | 6% | 9.65 | 23.11 | 5/25/2009 | 95.5 | 127.99 |
| 2010 | 70076 | 21,175 | 2,176,773,763 | 724,821,666 | 46,347,070 | 0 | 2,947,942,499 | 3182.8 | | 9% | 8.72 | 18.94 | 7/17/2010 | 85.1 | 115.25 |
| 2011 | 70763 | 21,659 | 2,083,813,431 | 712,509,966 | 49,677,738 | 0 | 2,846,001,135 | 3146.8 | | 11% | 8.62 | 17.81 | 9/12/2011 | 80.7 | 110.19 |
| 2012 | 72144 | 21,912 | 2,565,874,723 | 806,788,776 | 62,971,184 | 0 | 3,435,634,683 | 3629.6 | | 7% | 9.94 | 21.11 | 7/13/2012 | 97.4 | 130.47 |
| 2013 | 72,644 | 22,172 | 2,242,672,163 | 720,207,304 | 45,967,848 | 0 | 3,008,847,315 | 2936.9 | | -1% | 8.05 | 21.3 | 8/28/2013 | 84.6 | 113.48 |
| 2014 | 73308 | 22,337 | 1,881,829,633 | 673,531,523 | 40,479,590 | 0 | 2,595,840,746 | 2645 | | 2% | 7.25 | 17.87 | 8/16/2014 | 70.3 | 97.01 |
| 2015 | 73,633 | 22,810 | 2,000,192,590 | 663,380,832 | 33,944,896 | 0 | 2,697,518,318 | 2613.9 | 4 | 2% | 7.16 | 15.1 | 8/8/2015 | 74.4 | 100.37 |
| 2016 | 74,966 | 22,838 | 2,068,446,376 | 671,762,835 | 13,444,391 | 0 | 2,753,653,602 | 2659.3 | | -3% | 7.29 | 17.6 | 7/2/2016 | 75.6 | 100.64 |
| Avg. 2007-2016 | | 21,756 | 2,236,915,660 | 753,986,488 | 36,259,209 | 0 | 3,027,161,358 | 3,135 | 0.4 | 4% | 8.59 | 20.41 | NA | 85.2 | 115.3 |

MG – **Million Gallons** MGD – **Million Gallons per Day** GPCD **– Gallons per Capita per Day**

See Glossary for definitions. A list of Acronyms and Initialisms can be found after the Glossary.

Complete Table 3 by listing the top 10 water users by volume, from largest to smallest. For each user, include information about the category of use (residential, commercial, industrial, institutional, or wholesale), the amount of water used in gallons per year, the percent of total water delivered, and the status of water conservation measures.

**Table 3. Large volume users (2016)**

| Customer | Use Category (Residential, Industrial, Commercial, Institutional, Wholesale) | Amount Used (Gallons per Year) | Percent of Total Annual Water Delivered | Implementing Water Conservation Measures? (Yes/No/Unknown) |
|---|---|---|---|---|
| 1. MEDIVATORS | INDUSTRIAL | 496,854,609 | 18.1 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 2. WAYZATA | INSTITUTIONAL | 94,597,394 | 3.5 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 3. AACRON | INDUSTRIAL | 92,638,060 | 3.4 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 4. HONEYWELL | INDUSTRIAL | 58,766,420 | 2.1 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 5. AGA MEDICAL | COMMERCIAL | 33,973,352 | 1.2 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 6. REGENCY PLYMOUTH VENTURES | COMMERCIAL | 30,863,081 | 1.1 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 7. LIFETIME FITNESS | COMMERCIAL | 28,905,415 | 1.1 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 8. WAGNER SPRAY TECH | INDUSTRIAL | 19,672,505 | 0.7 | YES TIERED BILLING, RESTRICTIONS, EDUCATION |
| 9. BOSTON SCIENTIFIC | INDUSTRIAL | 19,429,837 | 0.7 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |
| 10. HENNEPIN COUNTY | INSTITUTIONAL | 11,608,043 | 0.4 | YES, TIERED BILLING, RESTRICTIONS, EDUCATION |

## B. Treatment and Storage Capacity

Complete Table 4 with a description of where water is treated, the year treatment facilities were constructed, water treatment capacity, the treatment methods (i.e. chemical addition, reverse osmosis, coagulation, sedimentation, etc.) and treatment types used (i.e. fluoridation, softening, chlorination, Fe/MN removal, coagulation, etc.). Also describe the annual amount and method of disposal of treatment residuals. Add rows to the table as needed.

**Table 4. Water treatment capacity and treatment processes**

| Treatment Site ID (Plant Name or Well ID) | Year Constructed | Treatment Capacity (GPD) | Treatment Method | Treatment Type | Annual Volume of Residuals (MG) | Disposal Process for Residuals | Do You Reclaim Filter Backwash Water? |
|---|---|---|---|---|---|---|---|
| Zachary Treatment Plant | 2006 (Expansion) | 17,000,000 | Filtration, chem addition, disinfection | Fe/Mn removal, $KMnO_4$, chlorination, fluoridation, orthophosphate | 15 | Sanitary Sewer | 95% |
| Central Treatment Plant | 2006 | 13,000,000 | Filtration, chem addition, disinfection | Fe/Mn removal, $KMnO_4$, chlorination, fluoridation, orthophosphate | 15 | Sanitary Sewer | 95% |
| Total | NA | 30,000,000 | NA | NA | 30 | NA | |

Complete Table 5 with information about storage structures. Describe the type (i.e. elevated, ground, etc.), the storage capacity of each type of structure, the year each structure was constructed, and the primary material for each structure. Add rows to the table as needed.

**Table 5. Storage capacity, as of the end of the last calendar year**

| Structure Name | Type of Storage Structure | Year Constructed | Primary Material | Storage Capacity (Gallons) |
|---|---|---|---|---|
| Zachary Tower | Elevated storage | 1975 | Steel | 2,000,000 |
| Central Tower | Elevated storage | 1970 | Steel | 1,000,000 |
| MIP Tower | Elevated storage | 1959 | Steel | 500,000 |
| Highway 101 Tower | Elevated storage | 1990 | Steel | 3,000,000 |
| Vicksburg Below-Ground Reservoir | Ground storage | 2005 | Concrete | 6,000,000 |
| County Road 6 Standpipe | Standpipe | 1976 | Steel | 1,000,000 |
| Total | NA | NA | NA | 13,500,000 |

### Treatment and storage capacity versus demand

It is recommended that total storage equal or exceed the average daily demand.

Discuss the difference between current storage and treatment capacity versus the water supplier's projected average water demand over the next 10 years (see Table 7 for projected water demand):

## C. Water Sources

Complete Table 6 by listing all types of water sources that supply water to the system, including groundwater, surface water, interconnections with other water suppliers, or others. Provide the name

of each source (aquifer name, river or lake name, name of interconnecting water supplier) and the Minnesota unique well number or intake ID, as appropriate. Report the year the source was installed or established and the current capacity. Provide information about the depth of all wells. Describe the status of the source (active, inactive, emergency only, retail/wholesale interconnection) and if the source facilities have a dedicated emergency power source. Add rows to the table as needed for each installation.

Include copies of well records and maintenance summary for each well that has occurred since your last approved plan in **Appendix 1.**

**Table 6. Water sources and status**

| Resource Type (Groundwater, Surface water, Interconnection) | Resource Name | MN Unique Well # or Intake ID | Year Installed | Capacity (Gallons per Minute) | Well Depth (Feet) | Status of Normal and Emergency Operations (active, inactive, emergency only, retail/wholesale interconnection)) | Does this Source have a Dedicated Emergency Power Source? (Yes or No) |
|---|---|---|---|---|---|---|---|
| Groundwater | Well 1 | 00204617 | 1961 | 1000 | 505 | Emergency | No |
| Groundwater | Well 2 | 00204619 | 1970 | 1800 | 409 | Active | Yes |
| Groundwater | Well 3 | 00204618 | 1972 | 1500 | 448 | Active | Yes |
| Groundwater | Well 4 | 00112202 | 1975 | 1200 | 470 | Active | Yes |
| Groundwater | Well 5 | 00160023 | 1979 | 0 | 437 | Standby | NO |
| Groundwater | Well 6 | 00449814 | 1980 | 2000 | 417 | Active | No |
| Groundwater | Well 7 | 184882 | 1982 | 1700 | 455 | Active | No |
| Groundwater | Well 8 | 432026 | 1987 | 1900 | 416 | Active | No |
| Groundwater | Well 9 | 432024 | 1987 | 1900 | 420 | Active | Yes |
| Groundwater | Well 10 | 439796 | 1988 | 1900 | 353 | Active | No |
| Groundwater | Well 11 | 481659 | 1993 | 1300 | 380 | Active | Yes |
| Groundwater | Well 12 | 508300 | 1990 | 1600 | 302 | Active | No |
| Groundwater | Well 13 | 462918 | 1991 | 2000 | 473 | Active | Yes |
| Groundwater | Well 14 | 655943 | 2004 | 2000 | 405 | Active | Yes |
| Groundwater | Well 15 | 705459 | 2004 | 2000 | 405 | Active | Yes |
| Groundwater | Well 16 | 759585 | 2012 | 2000 | 398 | Active | Yes |
| Groundwater | Well 17 | 786206 | 2012 | 2000 | 423 | Active | Yes |
| Groundwater | Four Seasons | 204272 | 1966 | 1000 | 390 | Emergency | Yes |

**Table 6 Notes:**

- **The design capacity of all sources identified in the table above is 20,300 gpm (29.3 MGD) after adjusting the firm capacity (described below) for typical seasonal capacity reductions.**
- **Well #4 and Well #11 are performing below their design capacity (1200 GPM and 1300 GPM respectively).**
- **Well #5 has been significantly reduced due to sand issues and is only used intermittently.**
- **Zachary WTP Supply Firm Capacity = 10,800 gpm (15.6 MGD) (Wells 8, 9, 10, 11, 14, 15, 16 with Well 15 as standby).**

- **Central WTP Supply Firm Capacity = 11,800 gpm (17.0 MGD) (Wells 2, 3, 4, 5, 6, 7, 12, 13, 17 with Well 13 as standby).**
- **Therefore, the total Firm Capacity is the design capacity less reductions to account for these supply issues, or 20,300 gpm (29.3 MGD).**

### Limits on Emergency Interconnections

Discuss any limitations on the use of the water sources (e.g. not to be operated simultaneously, limitations due to blending, aquifer recovery issues etc.) and the use of interconnections, including capacity limits or timing constraints (i.e. only 200 gallons per minute are available from the City of Prior Lake, and it is estimated to take 6 hours to establish the emergency connection). If there are no limitations, list none.

| Water Supply System | Capacity (GPM/MGD) | Note any limitations on use |
|---|---|---|
| Maple Grove (5) | 3.6 MGD (2-16", 1-12", 1-6" unmetered) | Emergency use only. The City has previously purchased water from Maple Grove. |
| Minnetonka (4) | Unknown (2-12", 2- 6" unmetered) | Emergency use only. Minnetonka's water towers are at a lower elevation than Plymouth's. |
| Wayzata (1) | Unknown (1-6" unmetered) | Emergency use only. This area of Wayzata is served by Minnetonka (see above for limitations). |
| St. Louis Park (1) | Unknown (1-8" unmetered) | Emergency use only |
| Medina (2) | Unknown (2-8" unmetered) | Emergency use only |

GPM – Gallons per Minute MGD – Million Gallons per Day

## D. Future Demand Projections – *Key Metropolitan Council Benchmark*

### Water Use Trends

Use the data in Table 2 to describe trends in 1) population served; 2) total per capita water demand; 3) average daily demand; 4) maximum daily demand. Then explain the causes for upward or downward trends. For example, over the ten years has the average daily demand trended up or down? Why is this occurring?

1) Population served has increased slowly but steadily by 4,790 people since 2006.
2) Total per capita demand has varied from 98 gpcd to 138 gpcd since 2006.
3) Average Day Demand has varied from 7.16 MGD to 9.9 MGD since 2006.
4) Maximum Day Demand has varied from 15.1 MGD (205 gpcd) to 25.8 MGD (365 gpcd).

In general, total per capita and average day demand is decreasing. This decrease correlates with an overall decreasing trend in residential and commercial water delivered, and improved metering and water accounting. Maximum day demands are more dependent on weather patterns and external factors, but generally are also decreasing due to water conservation measures and improved efficiencies in irrigation. Water supply, treatment, and storage facilities are sized to meet Maximum Day Demand. The maximum demand has been near or above 293 gpcd in six of the past ten years, which represents a significant decrease over four of the past ten years when the maximum demand was 323 to 364 gpcd.

Use the water use trend information discussed above to complete Table 7 with projected annual demand for the next ten years. Communities in the seven-county Twin Cities metropolitan area must also include projections for 2030 and 2040 as part of their local comprehensive planning.

Projected demand should be consistent with trends evident in the historical data in Table 2, as discussed above. Projected demand should also reflect state demographer population projections and/or other planning projections.

**Table 7. Projected annual water demand**

| Year | Projected Total Population | Projected Population Served | Projected Total Per Capita Water Demand (GPCD) | Projected Average Daily Demand (MGD) | Projected Maximum Daily Demand (MGD) |
|---|---|---|---|---|---|
| 2016 | 75,500 | 74,966 | | 7.3 | 17.6 |
| *2006* | *70,676* | *70,176* | *350 (MD Per Capita)* | *9.7* | *24.6* |
| 2017 | 75,700 | 74,966 | 293 (MD Per Capita) | 8.8 | 22.0 |
| 2018 | 75,900 | 75,483 | 293 | 8.9 | 22.1 |
| 2019 | 76,100 | 75,742 | 293 | 8.9 | 22.2 |
| 2020 | 77,200 | 76,850 | 293 | 9.0 | 22.5 |
| 2021 | 77,560 | 77,218 | 293 | 9.0 | 22.6 |
| 2022 | 77,920 | 77,586 | 293 | 9.1 | 22.7 |
| 2023 | 78,280 | 77,954 | 293 | 9.1 | 22.8 |
| 2024 | 78,640 | 78,322 | 293 | 9.2 | 22.9 |
| 2025 | 79,000 | 78,690 | 293 | 9.2 | 23.1 |
| 2030 | 81,400 | 81,130 | 293 | 9.5 | 23.8 |
| 2040 | 85,100 | 84,860 | 293 | 10.0 | 24.9 |

**GPCD** – Gallons per Capita per Day **MGD** – Million Gallons per Day

### Projection Method

Describe the method used to project water demand, including assumptions for population and business growth and how water conservation and efficiency programs affect projected water demand:

Population projections provided by City of Plymouth, with straight line interpolation between official Plymouth projections. Projected water demands assume limited success with conservation measures for fiscally conservative capital improvement planning. Actual water use and projection will be revisited prior to capital projects.

## E. Resource Sustainability

### Monitoring – *Key DNR Benchmark*

Complete Table 8 by inserting information about source water quality and quantity monitoring efforts. The list should include all production wells, observation wells, and source water intakes or reservoirs. Groundwater level data for DNR's statewide network of observation wells are available online through the DNR's Cooperative Groundwater Monitoring (CGM) webpage.

**Table 8. Information about source water quality and quantity monitoring**

| MN Unique Well # or Surface Water ID | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|
| 204617 (Well 1) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |

| MN Unique Well # or Surface Water ID | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|
| 204619 (Well 2) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 204618 (Well 3) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 112202 (Well 4) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 160023 (Well 5) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 449814 (Well 6) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 184882 (Well 7) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 432026 (Well 8) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |

| MN Unique Well # or Surface Water ID | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|
| 432024 (Well 9) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 439796 (Well 10) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 481659 (Well 11) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 508300 (Well 12) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 462918 (Well 13) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 655943 (Well 14) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 705459 (Well 15) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |

| MN Unique Well # or Surface Water ID | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|
| 759585 (Well 16) | ☒ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |
| 204272 (Four Seasons) | ☐ production well<br>☐ observation well<br>☐ source water intake<br>☐ source water reservoir | ☒ routine MDH sampling<br>☒ routine water utility sampling<br>☐ other | ☐ continuous<br>☐ hourly<br>☒ daily<br>☐ monthly<br>☐ quarterly<br>☐ annually | ☒ SCADA<br>☒ grab sampling<br>☐ steel tape<br>☐ stream gauge |

## Water Level Data

A water level monitoring plan that includes monitoring locations and a schedule for water level readings must be submitted as **Appendix 2**. If one does not already exist, it needs to be prepared and submitted with the WSP. Ideally, all production and observation wells are monitored at least monthly.

Complete Table 9 to summarize water level data for each well being monitored. Provide the name of the aquifer and a brief description of how much water levels vary over the season (the difference between the highest and lowest water levels measured during the year) and the long-term trends for each well. If water levels are not measured and recorded on a routine basis, then provide the static water level when each well was constructed and the most recent water level measured during the same season the well was constructed. Also include all water level data taken during any well and pump maintenance. Add rows to the table as needed.

Groundwater hydrographs illustrate the historical record of aquifer water levels measured within a well and can indicate water level trends over time. For each well in your system, provide a hydrograph for the life of the well, or for as many years as water levels have been measured. Include the hydrographs in **Appendix 3**. An example of a hydrograph can be found on the DNR's Groundwater Hydrograph webpage. Hydrographs for DNR Observation wells can be found in the CGM discussed above.

**Table 9. Water level data**

| Unique Well Number or Well ID | Aquifer Name | Seasonal Variation (Feet) | Long-term Trend in water level data | Water level measured during well/pumping maintenance |
|---|---|---|---|---|
| 204617 (Well 1) | Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 204619 (Well 2) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |

| Unique Well Number or Well ID | Aquifer Name | Seasonal Variation (Feet) | Long-term Trend in water level data | Water level measured during well/pumping maintenance |
|---|---|---|---|---|
| 204618 (Well 3) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 112202 (Well 4) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 160023 (Well 5) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 449814 (Well 6) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 184882 (Well 7) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 432026 (Well 8) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 432024 (Well 9) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 439796 (Well 10) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 481659 (Well 11) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 508300 (Well 12) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 462918 (Well 13) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 655943 (Well 14) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 705459 (Well 15) | Prairie Du Chien-Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 759585 (Well 16) | Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |
| 204272 (Four Seasons) | Jordan | | ☐ Falling<br>☒ Stable<br>☐ Rising | MM/DD/YY:Monthly<br>MM/DD/YY:____<br>MM/DD/YY:____ |

**Potential Water Supply Issues & Natural Resource Impacts – *Key DNR & Metropolitan Council Benchmark***

Complete Table 10 by listing the types of natural resources that are or could potentially be impacted by permitted water withdrawals in the future. You do not need to identify every single water resource in your entire community. The goal is to help you triage the most important water resources and/or the water resources that may be impacted by your water supply system – perhaps during a drought or when the population has grown significantly in ten years. This is emerging science, so do the best you can with available data. For identified resources, provide the name of specific resources that may be impacted. Identify what the greatest risks to the resource are and how the risks are being assessed. Identify any resource protection thresholds – formal or informal – that have been established to identify when actions should be taken to mitigate impacts. Provide information about the potential mitigation actions that may be taken, if a resource protection threshold is crossed. Add additional rows to the table as needed. See the glossary at the end of the template for definitions.

Some of this baseline data should have been in your earlier water supply plans or county comprehensive water plans. When filling out this table, think of what are the water supply risks, identify the resources, determine the threshold and then determine what your community will do to mitigate the impacts.

Your DNR area hydrologist is available to assist with this table.

For communities in the seven-county Twin Cities metropolitan area, the Master Water Supply Plan *Appendix 1 (Water Supply Profiles)*, provides information about potential water supply issues and natural resource impacts for your community.

**Steps for completing Table 10**

1. ***Identify the potential for natural resource impacts/issues within the community***
   First, review available information to identify resources that may be impacted by the operation of your water supply system (such as pumping).
   ***Potential Sources of Information:***
   - County Geologic Atlas
   - Local studies
   - Metropolitan Council System Statement (for metro communities)
   - Metropolitan Council Master Water Supply Plan (for metro communities)

   ACTION: Check the resource type(s) that may be impacted in the column "Resource Type"

2. ***Identify where your water supply system is most likely to impact those resources (and vice versa).***
   ***Potential Sources of Information:***
   - Drinking Water Supply Management Areas
   - Geologic Atlas - Sensitivity
   - If no WHPA or other information exists, consider rivers, lakes, wetlands and significant within 1.5 miles of wells; and calcareous fens and trout streams within 5 miles of wells

ACTION: Focus the rest of your work in these areas.

### 3. *Within focus areas, identify specific features of value to the community*

You know your community best. What resources are important to pay attention to? It may be useful to check in with your community's planning and zoning staff and others.

***Potential Sources of Information:***

- Park plans
- Local studies
- Natural resource inventories
- Tourist attractions/recreational areas/valued community resource

ACTION: Identify specific features that the community prioritizes in the "Resource Name" column (for example: North Lake, Long River, Brook Trout Stream, or Green Fen). If, based on a review of available information, no features are likely to be at risk, note "None".

### 4. *Identify what impact(s) the resource is at risk for*

***Potential Sources of Information:***

- Wellhead Protection Plan
- Water Appropriation Permit
- County Geologic Atlas
- MDH or PCA reports of the area
- Metropolitan Council System Statement (for metro communities)
- Metropolitan Council Master Water Supply Plan (for metro communities)

ACTION: Check the risk type in the column "Risk". If, based on a review of available information, no risk is identified, note "None anticipated".

### 5. *Describe how the risk was assessed*

***Potential Sources of Information:***

- Local studies
- Monitoring data (community, WMO, DNR, etc.)
- Aquifer testing
- County Geologic Atlas or other hydrogeologic studies
- Regional or state studies, such as DNR's report 'Definitions and Thresholds for Negative Impacts to Surface Waters'
- Well boring logs

ACTION: Identify the method(s) used to identify the risk to the resource in the "Risk Assessed Through" column

### 6. *Describe protection threshold/goals*

What is the goal, if any, for protecting these resources? For example, is there a lower limit on acceptable flow in a river or stream? Water quality outside of an accepted range? A lower limit on acceptable aquifer level decline at one or more monitoring wells? Withdrawals that exceed some percent of the total amount available from a source? Or a lower limit on acceptable changes to a protected habitat?

*Potential Sources of Information:*

- County Comprehensive Water Plans
- Watershed Plans or One Watershed/One Plan
- Groundwater or Aquifer Plans
- Metropolitan Master Plans
- DNR Thresholds study
- Community parks, open space, and natural resource plans

ACTION: Describe resource protection goals in the "Describe Resource Protection Threshold" column or reference an existing plan/document/webpage

7. ***If a goal/threshold should trigger action, describe the plan that will be implemented.***
Identify specific action, mitigation measures or management plan that the water supplier will implement, or refer to a partner's plan that includes actions to be taken.

*Potential Sources of Information:*

- County Comprehensive Water Plans
- Watershed Plans or One Watershed/One Plan
- Groundwater or Aquifer Plans
- Metropolitan Master Plans
- Studies such as DNR Thresholds study

ACTION: Describe the mitigation measure or management plan in the "Mitigation Measure or Management Plan" column.

8. ***Describe work to evaluate these risks going forward.***
For example, what is the plan to regularly check in to stay current on plans or new data?

Identify specific action that the water supplier will take to identify the creation of or change to goals/thresholds, or refer to a partner's plan that includes actions to be taken.

*Potential Sources of Information:*

- County Comprehensive Water Plans
- Watershed Plans or One Watershed/One Plan
- Groundwater or Aquifer Plans
- Metropolitan Master Plans
- Studies such as DNR Thresholds study

ACTION: Describe what will be done to evaluate risks going forward, including any changes to goals or protection thresholds in the "Describe how Changes to Goals are monitored" column.

Table 10. Natural resource impacts (*List specific resources in Appendix 12)

| Resource Type | Resource Name | Risk | Risk Assessed Through * | Describe Resource Protection Threshold or Goal * | Mitigation Measures or Management Plan | Describe How Thresholds or Goals are Monitored |
|---|---|---|---|---|---|---|
| ☐ River or stream | | ☐ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☐Proximity (<1.5 miles)<br>☐ Other: _____ | ☐ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ No data available<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |
| ☐ Calcareous fen | | ☐ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed Report<br>☐Proximity (<5 miles)<br>☐ Other: _____<br>☐ Other: ___ | ☐ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |

| Resource Type | Resource Name | Risk | Risk Assessed Through * | Describe Resource Protection Threshold or Goal * | Mitigation Measures or Management Plan | Describe How Thresholds or Goals are Monitored |
|---|---|---|---|---|---|---|
| ☐ Lake | | ☐ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☐Proximity (<1.5 miles)<br>☐ Other: _____<br>☐ Other: ___ | ☐ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |
| ☐ Wetland | | ☐ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☐Proximity (<1.5 miles)<br>☐ Other: _____ | ☐ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |

| Resource Type | Resource Name | Risk | Risk Assessed Through * | Describe Resource Protection Threshold or Goal * | Mitigation Measures or Management Plan | Describe How Thresholds or Goals are Monitored |
|---|---|---|---|---|---|---|
| ☐ Trout stream | | ☐ None anticipated<br>☐ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☐ Monitoring<br>☐ Aquifer testing<br>☐WRAPS or other watershed report<br>☐Proximity (< 5 miles)<br>☐ Other: _____ | ☐ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☐ Other: _____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☐ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |
| ☒ Aquifer | Prairie Du-Chien Jordan | ☐ None anticipated<br>☒ Flow/water level decline<br>☐ Degrading water quality trends<br>☐ Impacts on endangered, threatened, or special concern species habitat<br>☐ Other: _____ | ☐ Geologic atlas or other mapping<br>☐ Modeling<br>☒ Monitoring<br>☐ Aquifer testing<br>☐Proximity (obwell < 5 miles)<br>☐ Other: _____ | ☐ Not applicable<br>☐ Additional data is needed to establish<br>☐ See report: _____<br>☒ Other: _See below_____ | ☐Not applicable<br>☐ Change groundwater pumping<br>☒ Increase conservation<br>☐ Other: _____ | ☐Not applicable<br>☐ Newly collected data will be analyzed<br>☐ Regular check-in with these partners: _____<br>☐ Other: _____ |

Aquifer Impacts form Municipal Pumping

The City's existing wells utilize the Prairie du Chein - Jordan aquifer. Neighboring communities use similar aquifers. Data collected from the City SCADA seems to indicate that temporary, localized water level drawdowns occur near each well during the summer pumping months. Over the years, the City has had to lower the pump setting in some of its municipal wells, and has had to plan for reduced capacity from the wells during peak days, however all of these situations are manageable. To date, none of this pumping has created a problem with City well pump operations, nearby private wells, neighboring municipal wells, or natural resources. Plymouth and neighboring communities should continue to collect data in subsequent years and re-evaluate aquifer levels annually.

### Wellhead Protection (WHP) and Source Water Protection (SWP) Plans

Complete Table 11 to provide status information about WHP and SWP plans.

The emergency procedures in this plan are intended to comply with the contingency plan provisions required in the Minnesota Department of Health's (MDH) Wellhead Protection (WHP) Plan and Surface Water Protection (SWP) Plan.

**Table 11. Status of Wellhead Protection and Source Water Protection Plans**

| Plan Type | Status | Date Adopted | Date for Update |
|---|---|---|---|
| WHP | ☒ In Process<br>☐ Completed<br>☐ Not Applicable | January, 2007 | 2018 |
| SWP | ☐ In Process<br>☐ Completed<br>☒ Not Applicable | | |

**WHP** – Wellhead Protection Plan **SWP** – Source Water Protection Plan

## F. Capital Improvement Plan (CIP)

Please note that any wells that received approval under a ten-year permit, but that were not built, are now expired and must submit a water appropriations permit.

### Adequacy of Water Supply System

Complete Table 12 with information about the adequacy of wells and/or intakes, storage facilities, treatment facilities, and distribution systems to sustain current and projected demands. List planned capital improvements for any system components, in chronological order. Communities in the seven-county Twin Cities metropolitan area should also include information about plans through 2040.

The assessment can be the general status by category; it is not necessary to identify every single well, storage facility, treatment facility, lift station, and mile of pipe.

Please attach your latest Capital Improvement Plan as **Appendix 4**.

**Table 12. Adequacy of Water Supply System**

| System Component | Planned action | Anticipated Construction Year | Notes |
|---|---|---|---|
| Wells/Intakes | ☐ No action planned - adequate<br>☒ Repair/replacement<br>☐ Expansion/addition | Ongoing | As needed due to age and maintenance records |
| Water Storage Facilities | ☐ No action planned - adequate<br>☒ Repair/replacement<br>☐ Expansion/addition | Ongoing | As needed due to age and maintenance records |
| Water Treatment Facilities | ☐ No action planned - adequate<br>☒ Repair/replacement<br>☐ Expansion/addition | Ongoing | As needed due to age and maintenance records |
| Distribution Systems<br>(Pipes, valves, etc.) | ☐ No action planned - adequate<br>☒ Repair/replacement<br>☒ Expansion/addition | Ongoing | As needed due to age and maintenance records |

| System Component | Planned action | Anticipated Construction Year | Notes |
|---|---|---|---|
| Pressure Zones | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |
| Other: | ☒ No action planned - adequate<br>☐ Repair/replacement<br>☐ Expansion/addition | | |

## Proposed Future Water Sources

Complete Table 13 to identify new water source installation planned over the next ten years. Add rows to the table as needed.

**Table 13. Proposed future installations/sources**

| Source | Installation Location (approximate) | Resource Name | Proposed Pumping Capacity (gpm) | Planned Installation Year | Planned Partnerships |
|---|---|---|---|---|---|
| Groundwater | N/A | | | | |
| Surface Water | N/A | | | | |
| Interconnection to another supplier | N/A | | | | |

## Water Source Alternatives - *Key Metropolitan Council Benchmark*

Do you anticipate the need for alternative water sources in the next 10 years? Yes ☐ No ☒

For metro communities, will you need alternative water sources by the year 2040? Yes ☐ No ☒

**If you answered yes for either question, then complete table 14. If no, insert NA.**

Complete Table 14 by checking the box next to alternative approaches that your community is considering, including approximate locations (if known), the estimated amount of future demand that could be met through the approach, the estimated timeframe to implement the approach, potential partnerships, and the major benefits and challenges of the approach. Add rows to the table as needed.

For communities in the seven-county Twin Cities metropolitan area, these alternatives should include approaches the community is considering to meet projected 2040 water demand.

**Table 14. Alternative water sources**

| Alternative Source Considered | Source and/or Installation Location (approximate) | Estimated Amount of Future Demand (%) | Timeframe to Implement (YYYY) | Potential Partners | Benefits | Challenges |
|---|---|---|---|---|---|---|
| ☐ Groundwater | | | | | | |
| ☐ Surface Water | | | | | | |

| Alternative Source Considered | Source and/or Installation Location (approximate) | Estimated Amount of Future Demand (%) | Timeframe to Implement (YYYY) | Potential Partners | Benefits | Challenges |
|---|---|---|---|---|---|---|
| ☐ Reclaimed stormwater | | | | | | |
| ☐ Reclaimed wastewater | | | | | | |
| ☐ Interconnection to another supplier | | | | | | |

# PART 2. EMERGENCY PREPAREDNESS PROCEDURES

The emergency preparedness procedures outlined in this plan are intended to comply with the contingency plan provisions required by MDH in the WHP and SWP. Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failings, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan. Municipalities that already have written procedures dealing with water emergencies should review the following information and update existing procedures to address these water supply protection measures.

## A. Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act, (Public Law 107-188, Title IV- Drinking Water Security and Safety) requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan. MDH recommends that Emergency Response Plans are updated annually.

**Do you have an Emergency Response Plan?** Yes ☒ No ☐

**Have you updated the Emergency Response Plan in the last year? Yes ☒ No ☐**

**When did you last update your Emergency Response Plan? __November 2, 2017_____**

Complete Table 15 by inserting the noted information regarding your completed Emergency Response Plan.

**Table 15. Emergency Response Plan contact information**

| Emergency Response Plan Role | Contact Person | Contact Phone Number | Contact Email |
|---|---|---|---|
| Emergency Response Lead | Kevin Mastey | 763-509-5998 | KMASTEY@PLYMOUTHMN.GOV |
| Alternate Emergency Response Lead | JOE PAUMEN | 763-509-5996 | JPAUMEN@PLYMOUTHMN.GOV |

## B. Operational Contingency Plan

All utilities should have a written operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures as well as routine maintenance.

**Do you have a written operational contingency plan?** Yes ☒ No ☐

At a minimum, a water supplier should prepare and maintain an emergency contact list of contractors and suppliers.

## C. Emergency Response Procedures

Water suppliers must meet the requirements of MN Rules 4720.5280. Accordingly, the Minnesota Department of Natural Resources (DNR) requires public water suppliers serving more than 1,000 people to submit Emergency and Conservation Plans. Water emergency and conservation plans that have been approved by the DNR, under provisions of Minnesota Statute 186 and Minnesota Rules, part 6115.0770, will be considered equivalent to an approved WHP contingency plan.

### Emergency Telephone List

Prepare and attach a list of emergency contacts, including the MN Duty Officer (1-800-422-0798), as **Appendix 5**. An Emergency Contact List template is available at the MnDNR Water Supply Plans webpage.

The list should include key utility and community personnel, contacts in adjacent water suppliers, and appropriate local, state and federal emergency contacts. Please be sure to verify and update the contacts on the emergency telephone list and date it. Thereafter, update on a regular basis (once a year is recommended). In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the Emergency Manager for that community. Responsibilities and services for each contact should be defined.

### Current Water Sources and Service Area

Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation and maintenance records should be maintained in secured central and back-up locations so that the records are accessible for emergency purposes. A detailed map of the system showing the treatment plants, water sources, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. It is critical that public water supplier representatives and emergency response personnel communicate about the response procedures and be able to easily obtain this kind of information both in electronic and hard copy formats (in case of a power outage).

**Do records and maps exist?** Yes ☒ No ☐

**Can staff access records and maps from a central secured location in the event of an emergency?**

Yes ☒ No ☐

**Does the appropriate staff know where the materials are located?**

Yes ☒ No ☐

### Procedure for Augmenting Water Supplies

Complete Tables 16 – 17 by listing all available sources of water that can be used to augment or replace existing sources in an emergency. Add rows to the tables as needed.

In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Municipalities are encouraged to execute cooperative agreements for potential emergency water services and copies should be included in **Appendix 6**. Outstate Communities may consider using nearby high capacity wells (industry, golf course) as emergency water sources.

WSP should include information on any physical or chemical problems that may limit interconnections to other sources of water. Approvals from the MDH are required for interconnections or the reuse of water.

| **Table 16. Interconnections with other water supply systems to supply water in an emergencyOther Water Supply System Owner** | **Capacity (GPM & MGD)** | **Note Any Limitations On Use** | **List of services, equipment, supplies available to respond** |
|---|---|---|---|
| Maple Grove (5) | 3.6 MGD (2-16", 1-12", 1-6" unmetered) | Emergency use only. The City has previously purchased water from Maple Grove. | Personnel and equipment such as gate valve key as needed |
| Minnetonka (4) | Unknown (2-12", 2-6" unmetered) | Emergency use only. Minnetonka's water towers are at a lower elevation than Plymouth's. | Personnel and equipment such as gate valve key as needed |
| Wayzata (1) | Unknown (1-6" unmetered) | Emergency use only. This area of Wayzata is actually served by Minnetonka currently (see above for limitation). | Personnel and equipment such as gate valve key as needed |
| St. Louis Park (1) | Unknown (1-8" unmetered) | Emergency use only. | Personnel and equipment such as gate valve key as needed |
| Medina (2) | Unknown (2-8" unmetered) | Emergency use only. | Personnel and equipment such as gate valve key as needed |

**GPM – Gallons per minute MGD – million gallons per day**

**Table 17. Utilizing surface water as an alternative source**

| **Surface Water Source Name** | **Capacity (GPM)** | **Capacity (MGD)** | **Treatment Needs** | **Note Any Limitations On Use** |
|---|---|---|---|---|
| Insert name of surface water source here | N/A | | | |
| Add rows as needed | | | | |

If not covered above, describe additional emergency measures for providing water (obtaining bottled water, or steps to obtain National Guard services, etc.)

Bottled water, other agencies.

## Allocation and Demand Reduction Procedures

Complete Table 18 by adding information about how decisions will be made to allocate water and reduce demand during an emergency. Provide information for each customer category, including its priority ranking, average day demand, and demand reduction potential for each customer category. Modify the customer categories as needed, and add additional lines if necessary.

Water use categories should be prioritized in a way that is consistent with Minnesota Statutes 103G.261 (#1 is highest priority) as follows:

1. Water use for human needs such as cooking, cleaning, drinking, washing and waste disposal; use for on-farm livestock watering; and use for power production that meets contingency requirements.
2. Water use involving consumption of less than 10,000 gallons per day (usually from private wells or surface water intakes)
3. Water use for agricultural irrigation and processing of agricultural products involving consumption of more than 10,000 gallons per day (usually from private high-capacity wells or surface water intakes)
4. Water use for power production above the use provided for in the contingency plan.
5. All other water use involving consumption of more than 10,000 gallons per day.
6. Nonessential uses – car washes, golf courses, etc.

Water used for human needs at hospitals, nursing homes and similar types of facilities should be designated as a high priority to be maintained in an emergency. Lower priority uses will need to address water used for human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. The volume of water and other types of water uses at these facilities must be carefully considered. After reviewing the data, common sense should dictate local allocation priorities to protect domestic requirements over certain types of economic needs. Water use for lawn sprinkling, vehicle washing, golf courses, and recreation are legislatively considered non-essential.

**Table 18. Water use priorities**

| Customer Category | Allocation Priority | Average Daily Demand (GDP) | Short-Term Emergency Demand Reduction Potential (GPD) |
|---|---|---|---|
| Residential | 1 | 5,700,000 | 4,400,000 |
| Comm/Ind/Inst | 2 | 3,300,000 | 2,200,000 |
| Agricultural | 3 | NA | NA |
| Power | 4 | NA | NA |
| Unaccounted | 5 | 700,000 | 0 |

| Customer Category | Allocation Priority | Average Daily Demand (GDP) | Short-Term Emergency Demand Reduction Potential (GPD) |
|---|---|---|---|
| Wholesale | NA | NA | NA |
| Non-Essential | 6 | 0 | 0 |
| TOTAL | | 9,700,000 | 6,600,000 |

**GPD** – Gallons per Day

***Tip: Calculating Emergency Demand Reduction Potential***

The emergency demand reduction potential for all uses will typically equal the difference between maximum use (summer demand) and base use (winter demand). In extreme emergency situations, lower priority water uses must be restricted or eliminated to protect priority domestic water requirements. Emergency demand reduction potential should be based on average day demands for customer categories within each priority class. Use the tables in Part 3 on water conservation to help you determine strategies.

Complete Table 19 by selecting the triggers and actions during water supply disruption conditions.

**Table 19. Emergency demand reduction conditions, triggers and actions (Select all that may apply and describe)**

| Emergency Triggers | Short-term Actions | Long-term Actions |
|---|---|---|
| ☒ Contamination<br>☒ Loss of production<br>☒ Infrastructure failure<br>☒ Executive order by Governor<br>☐ Other: _____ | ☐ Supply augmentation through ____<br>☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Water allocation through____<br>☒ Meet with large water users to discuss their contingency plan. | ☐ Supply augmentation through ____<br>☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Water allocation through priority 4<br>☒ Meet with large water users to discuss their contingency plan. |

## Notification Procedures

Complete Table 20 by selecting trigger for informing customers regarding conservation requests, water use restrictions, and suspensions; notification frequencies; and partners that may assist in the notification process. Add rows to the table as needed.

**Table 20. Plan to inform customers regarding conservation requests, water use restrictions, and suspensions**

| Notification Trigger(s) | Methods (select all that apply) | Update Frequency | Partners |
|---|---|---|---|
| ☒ Short-term demand reduction declared (< 1 year) | ☒ Website<br>☒ Email list serve<br>☒ Social media (e.g. Twitter, Facebook)<br>☐ Direct customer mailing,<br>☒ Press release (TV, radio, newspaper),<br>☐ Meeting with large water users (> 10% of total city use)<br>☐ Other: _____ | ☒ Daily<br>☒ Weekly<br>☐ Monthly<br>☐ Annually | Media, other agencies |
| ☒ Long-term Ongoing demand reduction declared | ☒ Website<br>☐ Email list serve<br>☐ Social media (e.g. Twitter, Facebook)<br>☐ Direct customer mailing,<br>☐ Press release (TV, radio, newspaper),<br>☒ Meeting with large water users (> 10% of total city use)<br>☐ Other: _____ | ☐ Daily<br>☐ Weekly<br>☐ Monthly<br>☒ Annually | |
| ☒ Governor's critical water deficiency declared | ☒ Website<br>☐ Email list serve<br>☐ Social media (e.g. Twitter, Facebook) | ☒ Daily<br>☒ Weekly<br>☐ Monthly<br>☐ Annually | |

| Notification Trigger(s) | Methods (select all that apply) | Update Frequency | Partners |
|---|---|---|---|
| | ☐ Direct customer mailing,<br>☒ Press release (TV, radio, newspaper),<br>☒ Meeting with large water users (> 10% of total city use)<br>☐ Other: _____ | | |

## Enforcement

Prior to a water emergency, municipal water suppliers must adopt regulations that restrict water use and outline the enforcement response plan. The enforcement response plan must outline how conditions will be monitored to know when enforcement actions are triggered, what enforcement tools will be used, who will be responsible for enforcement, and what timelines for corrective actions will be expected.

Affected operations, communications, and enforcement staff must then be trained to rapidly implement those provisions during emergency conditions.

***Important Note:***

Disregard of critical water deficiency orders, even though total appropriation remains less than permitted, is adequate grounds for immediate modification of a public water supply authority's water use permit (2013 MN Statutes 103G.291)

**Does the city have a critical water deficiency restriction/official control in place that includes provisions to restrict water use and enforce the restrictions? (This restriction may be an ordinance, rule, regulation, policy under a council directive, or other official control)** Yes ☐ No ☒

If yes, attach the official control document to this WSP as **Appendix 7**.

If no, the municipality must adopt such an official control within 6 months of submitting this WSP and submit it to the DNR as an amendment to this WSP.

**Irrespective of whether a critical water deficiency control is in place, does the public water supply utility, city manager, mayor, or emergency manager have standing authority to implement water restrictions?** Yes ☐ No ☒

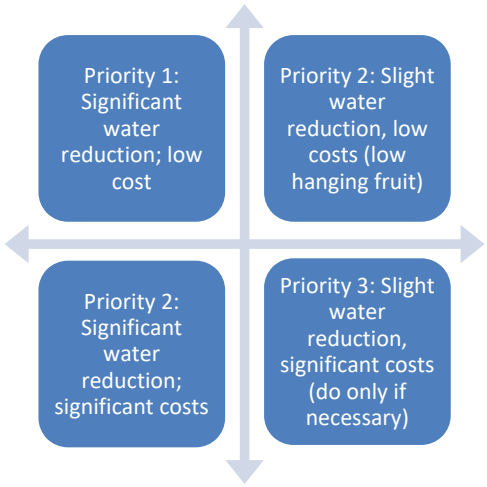
**If yes, cite the regulatory authority reference: __City Council_____.**

**If no, who has authority to implement water use restrictions in an emergency?**

See Plymouth City Code (Attachment I). The City Council has and will hold special City Council meetings to declare water emergencies. In the past, the City Council has also given staff the authority to declare water emergencies when triggers are met in order to reduce delays in implementing emergency responses.

# PART 3. WATER CONSERVATION PLAN

Minnesotans have historically benefited from the state's abundant water supplies, reducing the need for conservation. There are however, limits to the available supplies of water and increasing threats to the quality of our drinking water. Causes of water supply limitation may include: population increases, economic trends, uneven statewide availability of groundwater, climatic changes, and degraded water quality. Examples of threats to drinking water quality include: the presence of contaminant plumes from past land use activities, exceedances of water quality standards from natural and human sources, contaminants of emerging concern, and increasing pollutant trends from nonpoint sources.




There are many incentives for conserving water; conservation:

- reduces the potential for pumping-induced transfer of contaminants into the deeper aquifers, which can add treatment costs
- reduces the need for capital projects to expand system capacity
- reduces the likelihood of water use conflicts, like well interference, aquatic habitat loss, and declining lake levels
- conserves energy, because less energy is needed to extract, treat and distribute water (and less energy production also conserves water since water is used to produce energy)
- maintains water supplies that can then be available during times of drought

It is therefore imperative that water suppliers implement water conservation plans. The first step in water conservation is identifying opportunities for behavioral or engineering changes that could be made to reduce water use by conducting a thorough analysis of:

- Water use by customer
- Extraction, treatment, distribution and irrigation system efficiencies
- Industrial processing system efficiencies
- Regulatory and barriers to conservation
- Cultural barriers to conservation
- Water reuse opportunities

Once accurate data is compiled, water suppliers can set achievable goals for reducing water use. A successful water conservation plan follows a logical sequence of events. The plan should address both conservation on the supply side (leak detection and repairs, metering), as well as on the demand side (reductions in usage). Implementation should be conducted in phases, starting with the most obvious and lowest-cost options. In some cases, one of the early steps will be reviewing regulatory constraints to water conservation, such as lawn irrigation requirements. Outside funding and grants may be available for implementation of projects. Engage water system operators and maintenance staff and customers in brainstorming opportunities to reduce water use. Ask the question: "How can I help save water?"

## Progress since 2006

**Is this your community's first Water Supply Plan?** Yes ☐ No ☒

If yes, describe conservation practices that you are already implementing, such as: pricing, system improvements, education, regulation, appliance retrofitting, enforcement, etc.

| |
|---|
| |

If no, complete Table 21 to summarize conservation actions taken since the adoption of the 2006 water supply plan.

**Table 21. Implementation of previous ten-year Conservation Plan**

| 2006 Plan Commitments | Action Taken? |
|---|---|
| Change water rates structure to provide conservation pricing | ☒ Yes<br>☐ No |
| Water supply system improvements (e.g. leak repairs, valve replacements, etc.) | ☒ Yes<br>☐ No |
| Educational efforts | ☒ Yes<br>☐ No |
| New water conservation ordinances | ☒ Yes<br>☐ No |
| Rebate or retrofitting Program (e.g. for toilet, faucets, appliances, showerheads, dish washers, washing machines, irrigation systems, rain barrels, water softeners, etc. | ☒ Yes<br>☐ No |
| Enforcement | ☒ Yes<br>☐ No |
| Describe other, None | ☐ Yes<br>☐ No |

**What are the results you have seen from the actions in Table 21 and how were results measured?**

| |
|---|
| **Decrease in water usage as measured by yearly pumping records** |

## A. Triggers for Allocation and Demand Reduction Actions

Complete table 22 by checking each trigger below, as appropriate, and the actions to be taken at various levels or stages of severity. Add in additional rows to the table as needed.

**Table 22. Short and long-term demand reduction conditions, triggers and actions**

| Objective | Triggers | Actions |
|---|---|---|
| Protect surface water flows | ☐ Low stream flow conditions | ☐ Increase promotion of conservation measures |

| Objective | Triggers | Actions |
|---|---|---|
| | ☐ Reports of declining wetland and lake levels<br>☐ Other: _____ | ☐ Other: _____ |
| Short-term demand reduction (less than 1 year | ☒ Extremely high seasonal water demand (more than double winter demand)<br>☒ Loss of treatment capacity<br>☐ Lack of water in storage<br>☒ State drought plan<br>☐ Well interference<br>☐ Other: _____ | ☒ Adopt (if not already) and enforce the critical water deficiency ordinance to restrict or prohibit lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Supply augmentation through ____<br>☐ Water allocation through____<br>☐ Meet with large water users to discuss user's contingency plan. |
| Long-term demand reduction (>1 year) | ☒ Per capita demand increasing<br>☒ Total demand increase (higher population or more industry). Water level in well(s) below elevation of _____<br>☐ Other: _____ | ☒ Develop a critical water deficiency ordinance that is or can be quickly adopted to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses.<br>☐ Enact a water waste ordinance that targets overwatering (causing water to flow off the landscape into streets, parking lots, or similar), watering impervious surfaces (streets, driveways or other hardscape areas), and negligence of known leaks, breaks, or malfunctions.<br>☒ Meet with large water users to discuss user's contingency plan.<br>☐ Enhanced monitoring and reporting: audits, meters, billing, etc. |
| Governor's "Critical Water Deficiency Order" declared | ☒ Describe<br>Drought | ☒ Describe<br>Watering ban |

## B. Conservation Objectives and Strategies – *Key benchmark for DNR*

This section establishes water conservation objectives and strategies for eight major areas of water use.

### Objective 1: Reduce Unaccounted (Non-Revenue) Water loss to Less than 10%

The Minnesota Rural Water Association, the Metropolitan Council and the Department of Natural Resources recommend that all water uses be metered. Metering can help identify high use locations and times, along with leaks within buildings that have multiple meters.

It is difficult to quantify specific unmetered water use such as that associated with firefighting and system flushing or system leaks. Typically, water suppliers subtract metered water use from total water pumped to calculate unaccounted or non-revenue water loss.

**Is your five-year average (2005-2014) unaccounted Water Use in Table 2 higher than 10%?**

Yes ☐ No ☐

**What is your leak detection monitoring schedule? (e.g. Monitor 1/3rd of the city lines per year)**

| Monitor about 20 miles per year |
|---|

***Water Audits*** - are designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. The American Water Works Association (AWWA) has a recommended water audit methodology which is presented in AWWA's M36 Manual of Water Supply Practices: Water Audits and Loss Control Programs. AWWA also provides a free spreadsheet-based water audit tool that water suppliers can use to conduct their own water audits. This free water audit tool can be found on AWWA's Water Loss Control webpage. Another resource for water audit and water loss control information is Minnesota Rural Water Association.

**What is the date of your most recent water audit? __2017_____**

**Frequency of water audits:** ☒ **yearly** ☐ **other (specify frequency) _____**
**Leak detection and survey:** ☒ **every year** ☐ **every other year** ☐ **periodic as needed**
**Year last leak detection survey completed: __2017_____**

If Table 2 shows annual water losses over 10% or an increasing trend over time, describe what actions will be taken to reach the <10% loss objective and within what timeframe

| |
|---|
| |

***Metering*** -AWWA recommends that every water supplier install meters to account for all water taken into its system, along with all water distributed from its system at each customer's point of service. An effective metering program relies upon periodic performance testing, repair, maintenance or replacement of all meters. Drinking Water Revolving Loan Funds are available for purchase of new meters when new plants are built. AWWA also recommends that water suppliers conduct regular water audits to account for unmetered unbilled consumption, metered unbilled consumption and source water and customer metering inaccuracies. Some cities install separate meters for interior and exterior water use, but some research suggests that this may not result in water conservation.

Complete Table 23 by adding the requested information regarding the number, types, testing and maintenance of customer meters.

**Table 23. Information about customer meters**

| Customer Category | Number of Customers | Number of Metered Connections | Number of Automated Meter Readers | Meter testing intervals (years) | Average age/meter replacement schedule (years |
|---|---|---|---|---|---|
| Residential | 22,177 | 22,177 | 22,177 | As needed (all are automated) | _1_ / _20 |
| Irrigation meters | 0 | 0 | 0 | As needed (all are automated) | _1_ / _20 |

| Customer Category | Number of Customers | Number of Metered Connections | Number of Automated Meter Readers | Meter testing intervals (years) | Average age/meter replacement schedule (years |
|---|---|---|---|---|---|
| Institutional | 0 | 0 | 0 | As needed (all are automated) | _1_ / _20 |
| Commercial | 790 | 790 | 790 | As needed (all are automated) | _1_ / _20 |
| Industrial | 29 | 29 | 29 | As needed (all are automated) | _1_ / _20 |
| Public facilities | 0 | 0 | 0 | As needed (all are automated) | _1_ / _20 |
| Other | 0 | 0 | 0 | As needed (all are automated) | _1_ / _20 |
| TOTALS | 22,996 | 22,996 | 22,996 | NA | NA |

For unmetered systems, describe any plans to install meters or replace current meters with advanced technology meters. Provide an estimate of the cost to implement the plan and the projected water savings from implementing the plan.

**Table 24. Water source meters**

| | Number of Meters | Meter testing schedule (years) | Number of Automated Meter Readers | Average age/meter replacement schedule (years |
|---|---|---|---|---|
| Water source (wells/intakes) | 16 | Yearly | All | 8-10 years / as needed |
| Treatment plant | 4 | yearly | All | 12 years / as needed |

## Objective 2: Achieve Less than 75 Residential Gallons per Capita Demand (GPCD)

The 2002 average residential per capita demand in the Twin Cities Metropolitan area was 75 gallons per capita per day.

**Is your average 2010-2015 residential per capita water demand in Table 2 more than 75?** Yes ☐ No ☐

**What was your 2010 – 2015 five-year average residential per capita water demand? ___ g/person/day**

Describe the water use trend over that timeframe:

Complete Table 25 by checking which strategies you will use to continue reducing residential per capita demand and project a likely timeframe for completing each checked strategy (Select all that apply and add rows for additional strategies):

**Table 25. Strategies and timeframe to reduce residential per capita demand**

| Strategy to reduce residential per capita demand | Timeframe for completing work |
|---|---|
| ☐ Revise city ordinances/codes to encourage or require water efficient landscaping. | |
| ☐ Revise city ordinance/codes to permit water reuse options, especially for non-potable purposes like irrigation, groundwater recharge, and industrial use. Check with plumbing authority to see if internal buildings reuse is permitted | |
| ☐ Revise ordinances to limit irrigation. Describe the restricted irrigation plan: | |
| ☒ Revise outdoor irrigation installations codes to require high efficiency systems (e.g. those with soil moisture sensors or programmable watering areas) in new installations or system replacements. | 2018 |
| ☒ Make water system infrastructure improvements | Ongoing |
| ☐ Offer free or reduced cost water use audits) for residential customers. | |
| ☐ Implement a notification system to inform customers when water availability conditions change. | |
| ☒ Provide rebates or incentives for installing water efficient appliances and/or fixtures indoors (e.g., low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet aerators, water softeners, etc.) | Ongoing |
| ☒ Provide rebates or incentives to reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.) | Ongoing |
| ☐ Identify supplemental Water Resources | |
| ☒ Conduct audience-appropriate water conservation education and outreach. | Ongoing |
| ☐ Describe other plans | |

### Objective 3: Achieve at least 1.5% annual reduction in non-residential per capita water use

(For each of the next ten years, or a 15% total reduction over ten years.) This includes commercial, institutional, industrial and agricultural water users.

Complete Table 26 by checking which strategies you will used to continue reducing non-residential customer use demand and project a likely timeframe for completing each checked strategy (add rows for additional strategies).

Where possible, substitute recycled water used in one process for reuse in another. (For example, spent rinse water can often be reused in a cooling tower.) Keep in mind the true cost of water is the amount on the water bill PLUS the expenses to heat, cool, treat, pump, and dispose of/discharge the water. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment. Often reducing water use also saves electrical and other utility costs. Note: as of 2015, water reuse, and is not allowed by the state plumbing code, M.R. 4715 (a variance is needed). However, several state agencies are addressing this issue.

**Table 26. Strategies and timeframe to reduce institutional, commercial industrial, and agricultural and non-revenue use demand**

| Strategy to reduce total business, industry, agricultural demand | Timeframe for completing work |
|---|---|
| ☐ Conduct a facility water use audit for both indoor and outdoor use, including system components | |
| ☒ Install enhanced meters capable of automated readings to detect spikes in consumption | Completed in 2017 |
| ☐ Compare facility water use to related industry benchmarks, if available (e.g., meat processing, dairy, fruit and vegetable, beverage, textiles, paper/pulp, metals, technology, petroleum refining etc.) | |
| ☐ Install water conservation fixtures and appliances or change processes to conserve water | |
| ☒ Repair leaking system components (e.g., pipes, valves) | Ongoing |
| ☒ Investigate the reuse of reclaimed water (e.g., stormwater, wastewater effluent, process wastewater, etc.) | Ongoing |
| ☒ Reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.) | 2018 and ongoing |
| ☐ Train employees how to conserve water | |
| ☐ Implement a notification system to inform non-residential customers when water availability conditions change. | |
| ☐ Nonpotable rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, industrial processes, water features, vehicle washing facilities, cooling tower makeup, and similar uses shall be approved by the commissioner. Plumbing code 4714.1702, Published October 31, 2016 | |
| ☐ Describe other plans: | |

### Objective 4: Achieve a Decreasing Trend in Total Per Capita Demand

Include as **Appendix 8** one graph showing total per capita water demand for each customer category (i.e., residential, institutional, commercial, industrial) from 2005-2014 and add the calculated/estimated linear trend for the next 10 years.

Describe the trend for each customer category; explain the reason(s) for the trends, and where trends are increasing.

### Objective 5: Reduce Ratio of Maximum day (peak day) to the Average Day Demand to Less Than 2.6

**Is the ratio of average 2007-2016 maximum day demand to average 2007-2016 average day demand reported in Table 2 more than 2.6?** Yes ☐ No ☒

**Calculate a ten-year average (2007 – 2016) of the ratio of maximum day demand to average day demand: 2.38**

The position of the DNR has been that a peak day/average day ratio that is above 2.6 for in summer indicates that the water being used for irrigation by the residents in a community is too large and that efforts should be made to reduce the peak day use by the community.

It should be noted that by reducing the peak day use, communities can also reduce the amount of infrastructure that is required to meet the peak day use. This infrastructure includes new wells, new water towers which can be costly items.

## Objective 6: Implement Demand Reduction Measures

### *Water Conservation Program*

Municipal water suppliers serving over 1,000 people are required to adopt demand reduction measures that include a conservation rate structure, or a uniform rate structure with a conservation program that achieves demand reduction. These measures must achieve demand reduction in ways that reduce water demand, water losses, peak water demands, and nonessential water uses. These measures must be approved before a community may request well construction approval from the Department of Health or before requesting an increase in water appropriations permit volume (Minnesota Statutes, section 103G.291, subd. 3 and 4). Rates should be adjusted on a regular basis to ensure that revenue of the system is adequate under reduced demand scenarios. If a municipal water supplier intends to use a Uniform Rate Structure, a community-wide Water Conservation Program that will achieve demand reduction must be provided.

### *Current Water Rates*

Include a copy of the actual rate structure in **Appendix 9** or list current water rates including base/service fees and volume charges below.

Volume included in base rate or service charge: __X___ gallons or _____ cubic feet ___ other

Frequency of billing: ☐ Monthly ☒ Bimonthly ☐ Quarterly ☐ Other: _____

Water Rate Evaluation Frequency: ☒ every year ☐ every ___ years ☐ no schedule

Date of last rate change: _1/1/17_____

**Table 27. Rate structures for each customer category (Select all that apply and add additional rows as needed)**

| Customer Category | Conservation Billing Strategies in Use * | Conservation Neutral Billing Strategies in Use ** | Non-Conserving Billing Strategies in Use *** |
|---|---|---|---|
| Residential | ☐ Monthly billing<br>☒ Increasing block rates (volume tiered rates)<br>☒ Seasonal rates<br>☐ Time of use rates | ☐ Uniform<br>☒ Odd/even day watering | ☐ Service charge based on water volume<br>☐ Declining block<br>☒ Flat<br>☐ Other (describe) |

| Customer Category | Conservation Billing Strategies in Use * | Conservation Neutral Billing Strategies in Use ** | Non-Conserving Billing Strategies in Use *** |
|---|---|---|---|
| | ☒ Water bills reported in gallons<br>☐ Individualized goal rates<br>☒ Excess use rates<br>☐ Drought surcharge<br>☐ Use water bill to provide comparisons<br>☒ Service charge not based on water volume<br>☐ Other (describe) | | |
| Commercial/ Industrial/ Institutional | ☒ Monthly billing<br>☐ Increasing block rates (volume tiered rates)<br>☐ Seasonal rates<br>☐ Time of use rates<br>☒ Water bills reported in gallons<br>☐ Individualized goal rates<br>☐ Excess use rates<br>☐ Drought surcharge<br>☐ Use water bill to provide comparisons<br>☒ Service charge not based on water volume<br>☐ Other (describe) | ☒ Uniform | ☐ Service charge based on water volume<br>☐ Declining block<br>☒ Flat<br>☐ Other (describe) |
| ☐ Other | | | |

*** Rate Structures components that may promote water conservation:**

- **Monthly billing:** is encouraged to help people see their water usage so they can consider changing behavior.
- **Increasing block rates (also known as a tiered residential rate structure):** Typically, these have at least three tiers: should have at least three tiers.
    - The first tier is for the winter average water use.
    - The second tier is the year-round average use, which is lower than typical summer use. This rate should be set to cover the full cost of service.
    - The third tier should be above the average annual use and should be priced high enough to encourage conservation, as should any higher tiers. For this to be effective, the difference in block rates should be significant.
- **Seasonal rate:** higher rates in summer to reduce peak demands
- **Time of Use rates:** lower rates for off peak water use
- **Bill water use in gallons:** this allows customers to compare their use to average rates
- **Individualized goal rates:** typically used for industry, business or other large water users to promote water conservation if they keep within agreed upon goals. **Excess Use rates**: if water use goes above an agreed upon amount this higher rate is charged
- **Drought surcharge:** an extra fee is charged for guaranteed water use during drought
- **Use water bill to provide comparisons**: simple graphics comparing individual use over time or compare individual use to others.

- **Service charge or base fee that does not include a water volume** – a base charge or fee to cover universal city expenses that are not customer dependent and/or to provide minimal water at a lower rate (e.g., an amount less than the average residential per capita demand for the water supplier for the last 5 years)
- **Emergency rates** -A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

****Conservation Neutral****

- **Uniform rate**: rate per unit used is the same regardless of the volume used
- **Odd/even day watering** –This approach reduces peak demand on a daily basis for system operation, but it does not reduce overall water use.

***** Non-Conserving *****

- **Service charge or base fee with water volume:** an amount of water larger than the average residential per capita demand for the water supplier for the last 5 years
- **Declining block rate:** the rate per unit used decreases as water use increases.
- **Flat rate:** one fee regardless of how much water is used (usually unmetered).

Provide justification for any conservation neutral or non-conserving rate structures. If intending to adopt a conservation rate structure, include the timeframe to do so:

| |
|---|
| |

## Objective 7: Additional strategies to Reduce Water Use and Support Wellhead Protection Planning

Development and redevelopment projects can provide additional water conservation opportunities, such as the actions listed below. If a Uniform Rate Structure is in place, the water supplier must provide a Water Conservation Program that includes at <u>least two</u> of the actions listed below. Check those actions that you intent to implement within the next 10 years.

**Table 28. Additional strategies to Reduce Water Use & Support Wellhead Protection**

| | |
|---|---|
| ☐ | Participate in the GreenStep Cities Program, including implementation of at least one of the 20 "Best Practices" for water |
| ☐ | Prepare a master plan for smart growth (compact urban growth that avoids sprawl) |
| ☐ | Prepare a comprehensive open space plan (areas for parks, green spaces, natural areas) |
| ☒ | Adopt a water use restriction ordinance (lawn irrigation, car washing, pools, etc.) |
| ☐ | Adopt an outdoor lawn irrigation ordinance |
| ☐ | Adopt a private well ordinance (private wells in a city must comply with water restrictions) |
| ☐ | Implement a stormwater management program |
| ☐ | Adopt non-zoning wetlands ordinance (can further protect wetlands beyond state/federal laws-for vernal pools, buffer areas, restrictions on filling or alterations) |
| ☐ | Adopt a water offset program (primarily for new development or expansion) |
| ☐ | Implement a water conservation outreach program |
| ☐ | Hire a water conservation coordinator (part-time) |
| ☒ | Implement a rebate program for water efficient appliances, fixtures, or outdoor water management |
| ☐ | Other |

**Objective 8: Tracking Success: How will you track or measure success through the next ten years?**

Yearly pumping reports and utility billing records

***Tip: The process to monitor demand reduction and/or a rate structure includes:***

a) The DNR Hydrologist will call or visit the community the first 1-3 years after the water supply plan is completed.
b) They will discuss what activities the community is doing to conserve water and if they feel their actions are successful. The Water Supply Plan, Part 3 tables and responses will guide the discussion. For example, they will discuss efforts to reduce unaccounted for water loss if that is a problem, or go through Tables 33, 34 and 35 to discuss new initiatives.
c) The city representative and the hydrologist will discuss total per capita water use, residential per capita water use, and business/industry use. They will note trends.
d) They will also discuss options for improvement and/or collect case studies of success stories to share with other communities. One option may be to change the rate structure, but there are many other paths to successful water conservation.
e) If appropriate, they will cooperatively develop a simple work plan for the next few years, targeting a couple areas where the city might focus efforts.

## C. Regulation

Complete Table 29 by selecting which regulations are used to reduce demand and improve water efficiencies. Add additional rows as needed.

Copies of adopted regulations or proposed restrictions or should be included in **Appendix 10** (a list with hyperlinks is acceptable).

**Table 29. Regulations for short-term reductions in demand and long-term improvements in water efficiencies**

| Regulations Utilized | When is it applied (in effect)? |
|---|---|
| ☒ Rainfall sensors required on landscape irrigation systems | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared Emergencies |
| ☒ Water efficient plumbing fixtures required | ☐ New development<br>☐ Replacement<br>☒ Rebate Programs |
| ☒ Critical/Emergency Water Deficiency ordinance | ☒ Only during declared Emergencies |
| ☒ Watering restriction requirements (time of day, allowable days, etc.) | ☒ Odd/even<br>☐ 2 days/week<br>☐ Only during declared Emergencies |
| ☒ Water waste prohibited (for example, having a fine for irrigators spraying on the street) | ☐ Ongoing<br>☒ Seasonal<br>☐ Only during declared Emergencies |
| ☐ Limitations on turf areas (requiring lots to have 10% - 25% of the space in natural areas) | ☐ New development<br>☐ Shoreland/zoning<br>☐ Other |

| Regulations Utilized | When is it applied (in effect)? |
|---|---|
| ☐ Soil preparation requirement s (after construction, requiring topsoil to be applied to promote good root growth) | ☐ New Development<br>☐ Construction Projects<br>☐ Other |
| ☐ Tree ratios (requiring a certain number of trees per square foot of lawn) | ☐ New development<br>☐ Shoreland/zoning<br>☐ Other |
| ☐ Permit to fill swimming pool and/or requiring pools to be covered (to prevent evaporation) | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared Emergencies |
| ☐ Ordinances that permit stormwater irrigation, reuse of water, or other alternative water use (Note: be sure to check current plumbing codes for updates) | ☐ Describe |

## D. Retrofitting Programs

Education and incentive programs aimed at replacing inefficient plumbing fixtures and appliances can help reduce per capita water use, as well as energy costs. It is recommended that municipal water suppliers develop a long-term plan to retrofit public buildings with water efficient plumbing fixtures and appliances. Some water suppliers have developed partnerships with organizations having similar conservation goals, such as electric or gas suppliers, to develop cooperative rebate and retrofit programs.

A study by the AWWA Research Foundation (Residential End Uses of Water, 1999) found that the average indoor water use for a non-conserving home is 69.3 gallons per capita per day (gpcd). The average indoor water use in a conserving home is 45.2 gpcd and most of the decrease in water use is related to water efficient plumbing fixtures and appliances that can reduce water, sewer and energy costs. In Minnesota, certain electric and gas providers are required (Minnesota Statute 216B.241) to fund programs that will conserve energy resources and some utilities have distributed water efficient showerheads to customers to help reduce energy demands required to supply hot water.

### Retrofitting Programs

Complete Table 30 by checking which water uses are targeted, the outreach methods used, the measures used to identify success, and any participating partners.

**Table 30. Retrofitting programs (Select all that apply)**

| Water Use Targets | Outreach Methods | Partners |
|---|---|---|
| ☒ Low flush toilets,<br>☐ Toilet leak tablets,<br>☐ Low flow showerheads,<br>☐ Faucet aerators; | ☐ Education about<br>☐ Free distribution of<br>☒ Rebate for<br>☐ Other | ☐ Gas company<br>☐ Electric company<br>☐ Watershed organization |
| ☒ Water conserving washing machines,<br>☐ Dish washers,<br>☐ Water softeners; | ☐ Education about<br>☐ Free distribution of<br>☒ Rebate for<br>☐ Other | ☐ Gas company<br>☐ Electric company<br>☐ Watershed organization |

| Water Use Targets | Outreach Methods | Partners |
|---|---|---|
| ☒ Rain gardens,<br>☒ Rain barrels,<br>☒ Native/drought tolerant landscaping, etc. | ☒ Education about<br>☐ Free distribution of<br>☒ Rebate for<br>☐ Other | ☒ Gas company<br>☐ Electric company<br>☒ Watershed organization |

Briefly discuss measures of success from the above table (e.g. number of items distributed, dollar value of rebates, gallons of water conserved, etc.):

Approximately 100 for rain gardens, rain barrels and native plant/drought tolerant landscaping have been installed with grants or rebates.

## E. Education and Information Programs

Customer education should take place in three different circumstances. First, customers should be provided information on how to conserve water and improve water use efficiencies. Second, information should be provided at appropriate times to address peak demands. Third, emergency notices and educational materials about how to reduce water use should be available for quick distribution during an emergency.

### Proposed Education Programs

Complete Table 31 by selecting which methods are used to provide water conservation and information, including the frequency of program components. Select all that apply and add additional lines as needed.

**Table 31. Current and Proposed Education Programs**

| Education Methods | General summary of topics | #/Year | Frequency |
|---|---|---|---|
| Billing inserts or tips printed on the actual bill | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Consumer Confidence Reports | Water usage and conservation | 1 | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Press releases to traditional local news outlets (e.g., newspapers, radio and TV) | Water usage and conservation | As needed | ☐ Ongoing<br>☐ Seasonal<br>☒ Only during declared emergencies |
| Social media distribution (e.g., emails, Facebook, Twitter) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |

| Education Methods | General summary of topics | #/Year | Frequency |
|---|---|---|---|
| Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Presentations to community groups | Activities at Plymouth community events | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Staff training | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Facility tours | Water usage and conservation | 6 | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Displays and exhibits | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices) | Rebate program in place | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Community news letters | Upcoming events, city news, municipal programs, important seasonal reminders | 6 | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Direct mailings (water audit/retrofit kits, showerheads, brochures) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Information kiosk at utility and public buildings | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Public service announcements | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Cable TV Programs | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Demonstration projects (landscaping or plumbing) | Rain garden guide on website | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |

| Education Methods | General summary of topics | #/Year | Frequency |
|---|---|---|---|
| K-12 education programs (Project Wet, Drinking Water Institute, presentations) | Classroom lessons | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Community events (children's water festivals, environmental fairs) | Environmental Quality Fair, watershed clean up events, adopt-a-storm drain program | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Community education classes | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Water week promotions | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Website (www.plymouthmn.gov) | Conservation, rebate programs, environmental education, news and updates | | ☒ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Targeted efforts (large volume users, users with large increases) | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Notices of ordinances | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Emergency conservation notices | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |
| Other: | | | ☐ Ongoing<br>☐ Seasonal<br>☐ Only during declared emergencies |

Briefly discuss what future education and information activities your community is considering in the future:

Increase use of social media

# PART 4. ITEMS FOR METROPOLITAN AREA COMMUNITIES

Minnesota Statute 473.859 requires WSPs to be completed for all local units of government in the seven-county Metropolitan Area as part of the local comprehensive planning process.

Much of the information in Parts 1-3 addresses water demand for the next 10 years. However, additional information is needed to address water demand through 2040, which will make the WSP consistent with the Metropolitan Land Use Planning Act, upon which the local comprehensive plans are based.

This Part 4 provides guidance to complete the WSP in a way that addresses plans for water supply through 2040.

## A. Water Demand Projections through 2040

Complete Table 7 in Part 1D by filling in information about long-term water demand projections through 2040. Total Community Population projections should be consistent with the community's system statement, which can be found on the Metropolitan Council's website and which was sent to the community in September 2015.

Projected Average Day, Maximum Day, and Annual Water Demands may either be calculated using the method outlined in *Appendix 2* of the *2015 Master Water Supply Plan* or by a method developed by the individual water supplier.

## B. Potential Water Supply Issues

Complete Table 10 in Part 1E by providing information about the potential water supply issues in your community, including those that might occur due to 2040 projected water use.

The Master Water Supply Plan provides information about potential issues for your community in *Appendix 1 (Water Supply Profiles).* This resource may be useful in completing Table 10.

You may document results of local work done to evaluate impact of planned uses by attaching a feasibility assessment or providing a citation and link to where the plan is available electronically.

## C. Proposed Alternative Approaches to Meet Extended Water Demand Projections

Complete Table 12 in Part 1F with information about potential water supply infrastructure impacts (such as replacements, expansions or additions to wells/intakes, water storage and treatment capacity, distribution systems, and emergency interconnections) of extended plans for development and redevelopment, in 10-year increments through 2040. It may be useful to refer to information in the community's local Land Use Plan, if available.

Complete Table 14 in Part 1F by checking each approach your community is considering to meet future demand. For each approach your community is considering, provide information about the amount of

future water demand to be met using that approach, the timeframe to implement the approach, potential partners, and current understanding of the key benefits and challenges of the approach.

As challenges are being discussed, consider the need for: evaluation of geologic conditions (mapping, aquifer tests, modeling), identification of areas where domestic wells could be impacted, measurement and analysis of water levels & pumping rates, triggers & associated actions to protect water levels, etc.

## D. Value-Added Water Supply Planning Efforts (Optional)

The following information is not required to be completed as part of the local water supply plan, but completing this can help strengthen source water protection throughout the region and help Metropolitan Council and partners in the region to better support local efforts.

### Source Water Protection Strategies

**Does a Drinking Water Supply Management Area for a neighboring public water supplier overlap your community?** Yes ☐ No ☒

If you answered no, skip this section. If you answered yes, please complete Table 32 with information about new water demand or land use planning-related local controls that are being considered to provide additional protection in this area.

**Table 32. Local controls and schedule to protect Drinking Water Supply Management Areas**

| Local Control | Schedule to Implement | Potential Partners |
|---|---|---|
| ☐ None at this time | | |
| ☐ Comprehensive planning that guides development in vulnerable drinking water supply management areas | | |
| ☐ Zoning overlay | | |
| ☐ Other: | | |

### Technical assistance

From your community's perspective, what are the most important topics for the Metropolitan Council to address, guided by the region's Metropolitan Area Water Supply Advisory Committee and Technical Advisory Committee, as part of its ongoing water supply planning role?

☐ Coordination of state, regional and local water supply planning roles
☐ Regional water use goals
☐ Water use reporting standards
☐ Regional and sub-regional partnership opportunities
☐ Identifying and prioritizing data gaps and input for regional and sub-regional analyses
☐ Others: _____

# GLOSSARY

**Agricultural/Irrigation Water Use** - Water used for crop and non-crop irrigation, livestock watering, chemigation, golf course irrigation, landscape and athletic field irrigation.

**Average Daily Demand** - The total water pumped during the year divided by 365 days.

**Calcareous Fen** - Calcareous fens are rare and distinctive wetlands dependent on a constant supply of cold groundwater. Because they are dependent on groundwater and are one of the rarest natural communities in the United States, they are a protected resource in MN. Approximately 200 have been located in Minnesota. They may not be filled, drained or otherwise degraded.

**Commercial/Institutional Water Use** - Water used by motels, hotels, restaurants, office buildings, commercial facilities and institutions (both civilian and military). Consider maintaining separate institutional water use records for emergency planning and allocation purposes. Water used by multi-family dwellings, apartment buildings, senior housing complexes, and mobile home parks should be reported as Residential Water Use.

**Commercial/Institutional/Industrial (C/I/I) Water Sold** - The sum of water delivered for commercial/institutional or industrial purposes.

**Conservation Rate Structure** - A rate structure that encourages conservation and may include increasing block rates, seasonal rates, time of use rates, individualized goal rates, or excess use rates. If a conservation rate is applied to multifamily dwellings, the rate structure must consider each residential unit as an individual user. A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

**Date of Maximum Daily Demand** - The date of the maximum (highest) water demand. Typically this is a day in July or August.

**Declining Rate Structure** - Under a declining block rate structure, a consumer pays less per additional unit of water as usage increases. This rate structure does not promote water conservation.

**Distribution System** - Water distribution systems consist of an interconnected series of pipes, valves, storage facilities (water tanks, water towers, reservoirs), water purification facilities, pumping stations, flushing hydrants, and components that convey drinking water and meeting fire protection needs for cities, homes, schools, hospitals, businesses, industries and other facilities.

**Flat Rate Structure** - Flat fee rates do not vary by customer characteristics or water usage. This rate structure does not promote water conservation.

**Industrial Water Use** - Water used for thermonuclear power (electric utility generation) and other industrial use such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.

**Low Flow Fixtures/Appliances** - Plumbing fixtures and appliances that significantly reduce the amount of water released per use are labeled “low flow”. These fixtures and appliances use just enough water to be effective, saving excess, clean drinking water that usually goes down the drain.

**Maximum Daily Demand** - The maximum (highest) amount of water used in one day.

**Metered Residential Connections** - The number of residential connections to the water system that have meters. For multifamily dwellings, report each residential unit as an individual user.

**Percent Unmetered/Unaccounted For** - Unaccounted for water use is the volume of water withdrawn from all sources minus the volume of water delivered. This value represents water “lost” by miscalculated water use due to inaccurate meters, water lost through leaks, or water that is used but unmetered or otherwise undocumented. Water used for public services such as hydrant flushing, ice skating rinks, and public swimming pools should be reported under the category “Water Supplier Services”.

**Population Served** - The number of people who are served by the community's public water supply system. This includes the number of people in the community who are connected to the public water supply system, as well as people in neighboring communities who use water supplied by the community's public water supply system. It should not include residents in the community who have private wells or get their water from neighboring water supply.

**Residential Connections** - The total number of residential connections to the water system. For multifamily dwellings, report each residential unit as an individual user.

**Residential Per Capita Demand** - The total residential water delivered during the year divided by the population served divided by 365 days.

**Residential Water Use** - Water used for normal household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Should include all water delivered to single family private residences, multi-family dwellings, apartment buildings, senior housing complexes, mobile home parks, etc.

**Smart Meter -** Smart meters can be used by municipalities or by individual homeowners. Smart metering generally indicates the presence of one or more of the following:

- Smart irrigation water meters are controllers that look at factors such as weather, soil, slope, etc. and adjust watering time up or down based on data. Smart controllers in a typical summer will reduce water use by 30%-50%. Just changing the spray nozzle to new efficient models can reduce water use by 40%.
- Smart Meters on customer premises that measure consumption during specific time periods and communicate it to the utility, often on a daily basis.
- A communication channel that permits the utility, at a minimum, to obtain meter reads on demand, to ascertain whether water has recently been flowing through the meter and onto the premises, and to issue commands to the meter to perform specific tasks such as disconnecting or restricting water flow.

**Total Connections** - The number of connections to the public water supply system.

**Total Per Capita Demand** - The total amount of water withdrawn from all water supply sources during the year divided by the population served divided by 365 days.

**Total Water Pumped** - The cumulative amount of water withdrawn from all water supply sources during the year.

**Total Water Delivered** - The sum of residential, commercial, industrial, institutional, water supplier services, wholesale and other water delivered.

**Ultimate (Full Build-Out)** - Time period representing the community's estimated total amount and location of potential development, or when the community is fully built out at the final planned density.

**Unaccounted (Non-revenue) Loss** - See definitions for "percent unmetered/unaccounted for loss".

**Uniform Rate Structure** - A uniform rate structure charges the same price-per-unit for water usage beyond the fixed customer charge, which covers some fixed costs. The rate sends a price signal to the customer because the water bill will vary by usage. Uniform rates by class charge the same price-per-unit for all customers within a customer class (e.g. residential or non-residential). This price structure is generally considered less effective in encouraging water conservation.

**Water Supplier Services** - Water used for public services such as hydrant flushing, ice skating rinks, public swimming pools, city park irrigation, back-flushing at water treatment facilities, and/or other uses.

**Water Used for Nonessential Purposes** - Water used for lawn irrigation, golf course and park irrigation, car washes, ornamental fountains, and other non-essential uses.

**Wholesale Deliveries** - The amount of water delivered in bulk to other public water suppliers.

## Acronyms and Initialisms

**AWWA** – American Water Works Association
**C/I/I** – Commercial/Institutional/Industrial
**CIP** – Capital Improvement Plan
**GIS** – Geographic Information System
**GPCD** – Gallons per capita per day
**GWMA** – Groundwater Management Area – North and East Metro, Straight River, Bonanza,
**MDH** – Minnesota Department of Health
**MGD** – Million gallons per day
**MG** – Million gallons
**MGL** – Maximum Contaminant Level
**MnTAP** – Minnesota Technical Assistance Program (University of Minnesota)
**MPARS** – MN/DNR Permitting and Reporting System (new electronic permitting system)
**MRWA** – Minnesota Rural Waters Association
**SWP** – Source Water Protection
**WHP** – Wellhead Protection

# APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER

## Appendix 1: Well Records and Maintenance Summaries

Go to Part 1C for information on what to include in appendix

## Appendix 2: Water Level Monitoring Plan

Go to Part 1E for information on what to include in appendix

## Appendix 3: Water Level Graphs for Each Water Supply Well

Go to Part 1E for information on what to include in appendix

## Appendix 4: Capital Improvement Plan

Go to Part 1E for information on what to include in appendix

## Appendix 5: Emergency Telephone List

Go to Part 2C for information on what to include in appendix

## Appendix 6: Cooperative Agreements for Emergency Services

Go to Part 2C for information on what to include in appendix

## Appendix 7: Municipal Critical Water Deficiency Ordinance

Go to Part 2C for information on what to include in appendix

## Appendix 8: Graph of Ten Years of Annual Per Capita Water Demand for Each Customer Category

Go to Objective 4 in Part 3B for information on what to include in appendix

## Appendix 9: Water Rate Structure

Go to Objective 6 in Part 3B for information on what to include in appendix

## Appendix 10: Ordinances or Regulations Related to Water Use

Go to Objective 7 in Part 3B for information on what to include in appendix

## Appendix 11: Implementation Checklist

Provide a table that summarizes all the actions that the public water supplier is doing, or proposes to do, with estimated implementation dates.

## Appendix 1 – Well Records and Maintenance Summaries

# Well #2 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| 2015 | |
| 2014 | Keys Well pulled well. All new column pipe epoxy coated inside and out. Rebuilt pump, had motor inspected. |
| 2007 | EH Renner pulled well. A number of spiders were cracked or Broken near top of column, might be cause of pump packing failing. Replace 170 ft of column pipe and SS shaft. Rebuild bowls, new level monitor, had motor gone through |
| 2005 | New pump shaft and stuffing box , (BC) |
| 2000 | Pull well for maintenance. B.C. – level monitor, 20 new column Pipe, 8 SS shaft, rebuild pump set at 250' |
| 1993 | Pulled for maintenance |
| 1989 | Add 20ft of pipe - Renner |
| 1986 | Pump fell in hole BC |
| 1985 | New pipe and bowls |

# Well #3 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2009 | Traut Well pull for routine maintenance Seven new column pipe, 13 new SS shafts, rebuild pump bowls, new draw down monitor, new discharge pressure monitor. Back on line 3/27/2009 |
| 2006 | Motor burnt out, BC rebuilt it |
| 2002 | Motor burnt out, BC rebuilt it |
| 2001 | Pull for maintenance, add 10' and replace column pipe, SS shaft below water line. Well depth 422', new pump setting 250', add draw down monitor |
| 1994 | Pull for maintenance |
| 1989 | New Bowls BC |
| 1988 | Set bowls BC |
| 1987 | Bail sand/big slough |
| 1986 | New pipe and bowls |

# Well #4 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2014 | Keys Well pulled well for routine inspection. New column pipe epoxy coated and new SS shaft. Rebuilt pump and right angle drive televised well. |
| 1998 | Pull for routine maintenance add 50' column (bowls at 260 now) add drawdown rube (Bergerson-Casell) |
| 1992 | Angle drive-new |
| 1986 | bail new bowls (key) |

# Well #5 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2007 | EH Renner pulled well, televised and found sand pockets. Well was redeveloped by air lifting 200 yards. Sand removed 120' of column replaced all new SS shaft, rebuild bowls had motor gone through, new level monitor. Well still pumps sand over 1,000 gallons/minute. |
| 2006 | June - well started pumping sand. |
| 2004 | November - Renner installed rebuilt GE motor - US upper bearing bad. |
| 2001 | March - install open impellers in pump, add 40' of very fine well screen to keep rocks out of pump, air lift bores hole and well to try to remove rocks at 280'. |
| 2000 | Rebuild both 250 HP motors for this well install US leave GE as backup. Pull well in September because of vibration. TV well found rocks on ledges at 280'. |
| 1999 | Pull well rock got into bowl impeller, install new pump, SS strainer discharge head, electronic sounder, motor shaft, packing box and aligned discharge piping. |
| 1997 | Add 20' column pipe. Bowls are at 240' now. They forgot to install the sounder tube. |
| 1994 | Rebuilt, new base, shafts straightened, new head shaft (BC). |
| 1993 | Pulled for repairs by Traut |
| 1989 | Vibration problem Layne |
| 1987 | New bowls |
| 1985 | Pump and motor |

# Well #6 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2011 | BC - Pull for routine maintenance, rebuild 350 HP motor, re build pump bowls, new power cable (240'), replace 6 column pipes, new check valve in column, back on line full time June 1st. |
| 2005 | Motor was burnt up by Technician when he pushed starter closed with his foot. Sent to Sun Star by Traut. Had BRA Engineering Design and installed new panel. New level monitor start up 6/15/05. |
| 2003 | 4/2/03 start up. Traut Well - new 350 HP Sun Star motor, new column pipes, rebuild pump, one new impeller, level monitor. |
| 1996 | 3/20 Start up - Alberg pulled for routine, ok - 5 meg on motor, three column pipes replaced, new check valve installed on column televised. |
| 1990 | Rebuilt pump and motor (Layne) |

# Well #7 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2013 | New control panel installed by Total Control. Bergerson/Caswell pulled for routine maintenance. BJ Motor with spare indar, new Goulds pump, new column check valve, replace three column pipe, purchased SME 300 HP motor for spare. Brushed and televised casing. |
| 2006 | Bergerson/Caswell - Rebuild BJ motor, rebuild bowl, new power cable, add pressure and level monitors, new swing check in pit, replace 230' column pipe. |
| 1999 | Motor quit. Pulled well, rebuild motor at Sun Star, add 20' of column, new cable from panel to motor, all new column pipe, get oil out of well, rebuild bowls. This took until spring of 1999 because motor had to go to Sun Star twice. (Key Well Co) |
| 1995 | Pull pump and motor (BC) oil in well, dried motor bad meg some minor repairs. |
| 1991 | Rebuilt pump and motor (BC) (Dynex) |
| 1985 | 1/10 Start up new |

# Well #8 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2010 | Bergerson-Caswell - Pull for routine maintenance. Removed right angle drive and second motor, new pump bowl, column pipe, level monitor. Now fiber telemetry from plant to well to tower. |
| 2002 | Bergerson Caswell - Pull for routine maintenance. Install all new SS Shaft, five new column, level monitor, found bacteria in well and treated. |
| 1995 | Pull for routine maintenance |
| 1988 | 5/6 start up through plant |
| 1987 | 6/2 star temp pump direct to system |

# Well #9 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2011 | BC - Pull for routine maintenance, new column pipe, rebuild pump bowls, new flowmatic column check - $18,920 |
| 2007 | EH Renner - Motor burnt out, installed new Hitachi motor and well monitor and put well back in, no other equipment replaced. |
| 2003 | EH Renner - Pull well for routine maintenance. Add 10' column level monitor, 183' to bowl, new bowl, cable, some column. Install new spare Plueger motor. |
| 1998 | Well lost production, pulled well, found impellor of one stage of bowl had came loose. Motor megged 10 meg ohms at Renners shop. |
| 1996 | 3/20 Start up, pulled for routine maintenance, 160' new column pipe. |
| 1990 | Rebuilt motor (Layne) |
| 1988 | 6/10 new start up |

# Well #10 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2012 | EH Renner - Pulled for routine maintenance, Total Control installing new panel, new column pipe, check valve, rebuild pump bowls, new level monitor, purchase new spare SME 125 HP motor. |
| 2007 | EH Renner - Motor burnt out, new Hitachi motor, foot valve, no other new parts. |
| 2004 | EH Renner - Pulled for routine maintenance, new motor, new cable, new column pipe, rebuild pump bowls, install level monitor and discharge pressure monitor. |
| 1999 | Cable burnt off at pitless, Bergerson out and installed new lugs. |
| 1997 | Rebuild pump, replace column pipe, motor megged good. Televised well, installed draw down tube, new foot valve. |
| 1992 | Rebuilt pump (used motor installed by Dynex) |
| 1989 | New installation |

# Well #11 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2009 | Traut Well pull for routine maintenance, six new column pipes. 10 SS shaft, rebuild pump bowls, install new draw down monitor, new discharge pressure monitor, on line 3/27/09. |
| 2001 | Pull for routine maintenance. Add 10' and replace 8 column ipes, 8 new SS shaft below water. Well depth 369', new bowl setting 180'. |
| 1994 | New |

# Well #12 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2014 | Bergerson/Caswell – Installed new spare motor, rebuilt pump |
| 2006 | Bergerson/Caswell – Install new motor, it burnt out after 3 days Re-build motor, rebuild bowls, new column, new power cable, New swing check valve in pit, new level & pressure monitors. Re-built motor failed. New Indar motor from Spain installed. **Purchased spare Indar motor, stored at Reservoir** |
| 2000 | Motor burnt out in fall of 98 was sent into Sun Star, re-installed started it on a Friday and on Monday it megged 0, sent it into Sun Star, re-stalled it and it ran a week and bearing failed and burnt out motor and destroyed impellers in pump. Sun Star repaired motor and we installed new J-line bowls. Start up was 1/10/00. Motor megged 50 on our megger on 1/24 |
| 1998 | Pull well routine maintenance, motor 85 megohmns, column pipe ok, rebuild bowls, new column check valve. (EH Renner) |
| 1992 | Rebuilt bowls and motor |

# Well #13 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2011 | BC – Pull for routine maintenance – Total Control installing new panel. Replace 7 column pipe – Rebuild pump bowls – Install flowmatic check in column - Replace hydraulic check with swing check in pit. New level monitor and pressure monitor with panel. Start up March 30. $26,595 |
| 2003 | EH Renner - Pull well, motor bad sent to Sun Star, new cable from panel to well and new drop cable, new column pipe add 10', level monitor, new starter contracts, rebuild pump bowls. |
| 1997 | Key Well - Rebuild pump replace column pipe, motor megged good, televised well. |
| 1992 | New start up |

# Well #14 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2012 | EH Renner – Pulled for routine maintenance. Replace 9 column pipe, all new rubber bearings on shaft (no shaft) rebuild pump bowls. Bacteria samples of casing and aquifer. |
| 2004 | New keys well drilled. Thor Construction general contractor. EH Renner installed pump and motor. |

# Well #15 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2013 | Bergerson/Caswell - Pulled for routine maintenance. Replaced 6 column pipe, rebuild pump, replace SS line shaft sleeves, brush and video casing. |
| 2004 | New. Traut Well drilled. Thor construction general contractor. Well pumps cloudy water. Test pump to waste. Water cleared after well put into full use June 2005. |

# Well #16 Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2009 | New. EH Renner drilled. Fedler Construction general contractor. Pump set at 160'. |

# Well #17 Maintenance Records

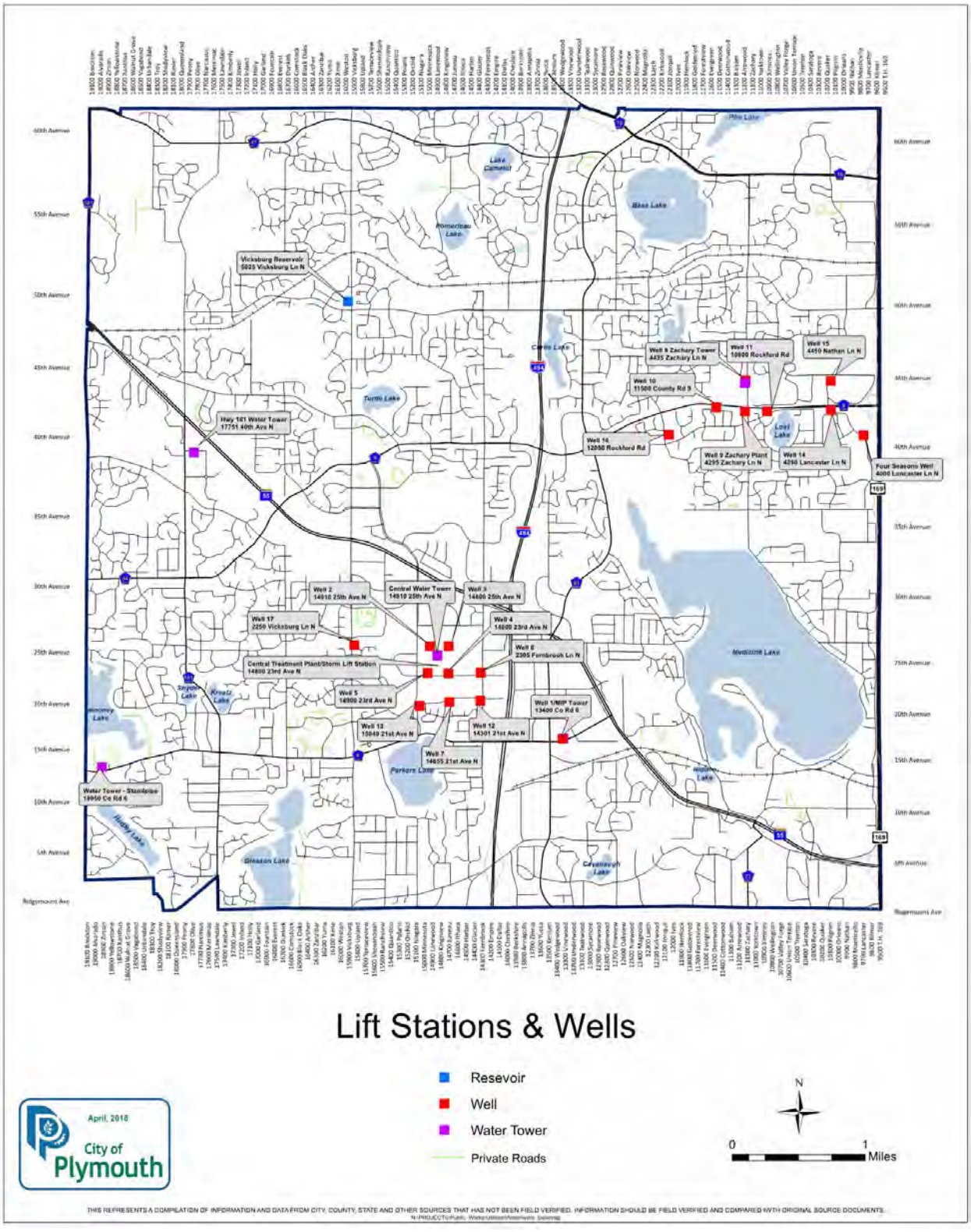
| Year | Maintenance Work Completed |
|---|---|
| | |
| 2013 | New EH Renner Drilled. Rise Lake Construction general contractor. Keys Well supplied pitless, pump and motor. |

# Four Seasons Maintenance Records

| Year | Maintenance Work Completed |
|---|---|
| | |
| 2010 | Refurbish well and pump house. Pipe to plant. BC supplied new pump and motor. |

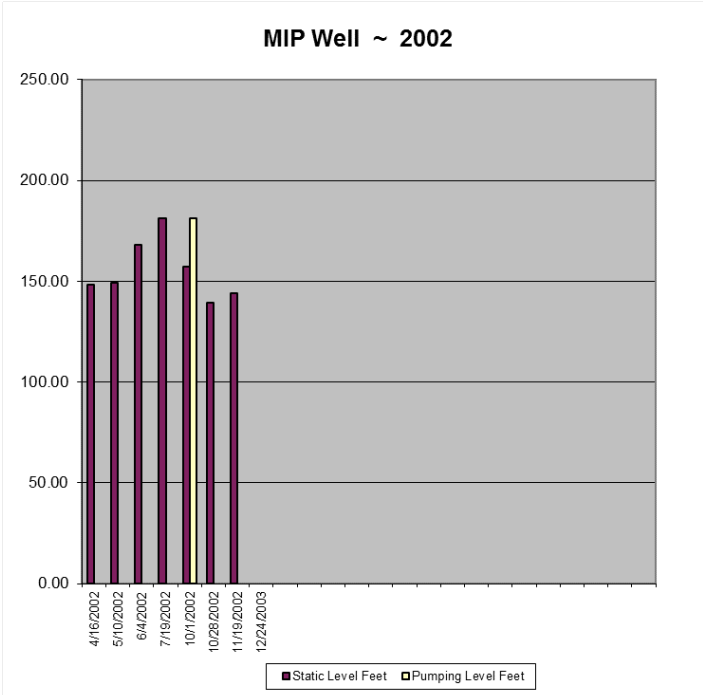
# Appendix 2 – Water Level Monitoring Plan

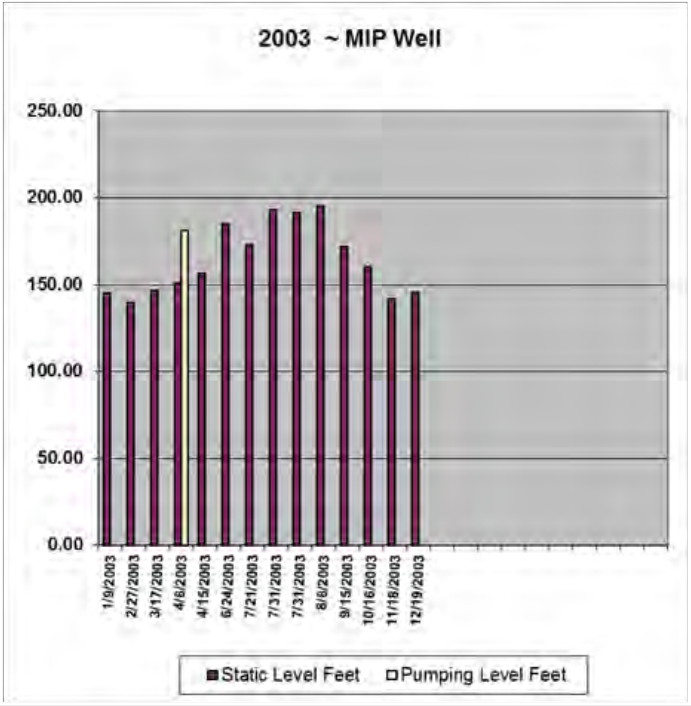
| MN Unique Well # or Intake ID | Resource Name | Aquifer Name | Type of monitoring point | Monitoring program | Frequency of monitoring | Monitoring Method |
|---|---|---|---|---|---|---|
| 204617 | Well 1 | Jordan | Production Well | City of Plymouth | Monthly | Tape |
| 204619 | Well 2 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 204618 | Well 3 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 112202 | Well 4 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Monthly | Tape |
| 160023 | Well 5 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 449814 | Well 6 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 184882 | Well 7 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 432026 | Well 8 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 432024 | Well 9 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 439796 | Well 10 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 481659 | Well 11 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 508300 | Well 12 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 462918 | Well 13 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 655943 | Well 14 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 705459 | Well 15 | Prairie Du Chien-Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 759585 | Well 16 | Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 786206 | Well 17 | Jordan | Production Well | City of Plymouth | Continuous | SCADA |
| 204272 | Four Seasons | Jordan | Production Well | City of Plymouth | Continuous | SCADA |

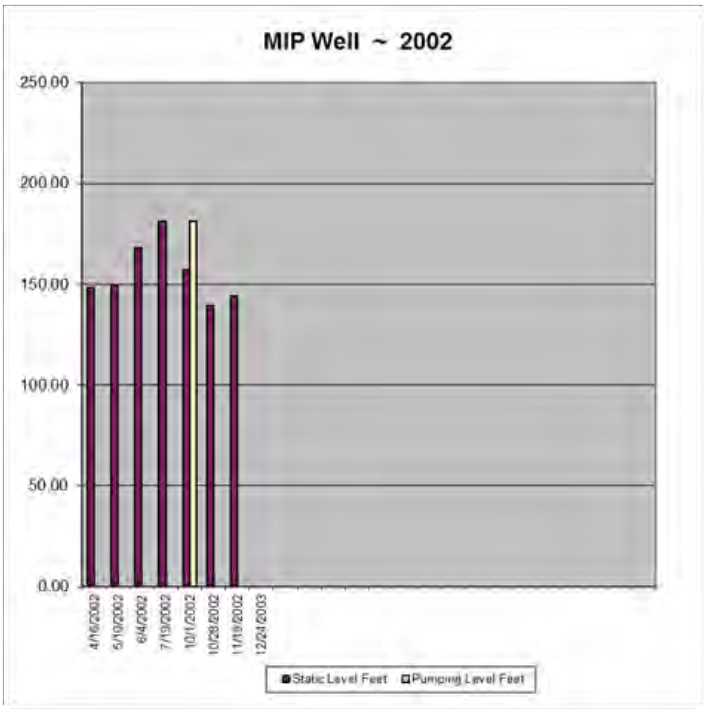

Vicksburg Reservoir
5025 Vicksburg Ln N
Hwy 101 Water Tower
17751 40th Ave N
Well 2
14910 25th Ave N
Central Water Tower
14910 25th Ave N
Well 3
14600 25th Ave N
Well 17
2250 Vicksburg Ln N
Well 4
14600 23rd Ave N
Well 8
2305 Fernbrook Ln N
Central Treatment Plant/Storm Lift Station
14800 23rd Ave N
Well 5
14900 23rd Ave N
Well 13
15049 21st Ave N
Well 12
14301 21st Ave N
Well 1/MIP Tower
13400 Co Rd 6
Well 7
14605 21st Ave N
Water Tower - Standpipe
19950 Co Rd 6
Well 6 Zachary Tower
4435 Zachary Ln N
Well 11
10800 Rockford Rd
Well 15
4450 Nathan Ln N
Well 10
11500 County Rd 9
Well 16
12050 Rockford Rd
Well 9 Zachary Plant
4295 Zachary Ln N
Well 14
4290 Lancaster Ln N
Four Seasons Well
4000 Lancaster Ln N
Lake Camelot
Pomerleau Lake
Bass Lake
Turtle Lake
Medicine Lake
Parkers Lake
Gleason Lake
Cavanaugh Lake
Lost Lake
Smyrna Lake
Kreatz Lake
Rice Lake
Hidden Lake
Hourly Lake
494
55
169
Lift Stations & Wells
Resevoir
Well
Water Tower
Private Roads
N
0
1
Miles
April, 2010
City of Plymouth
THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

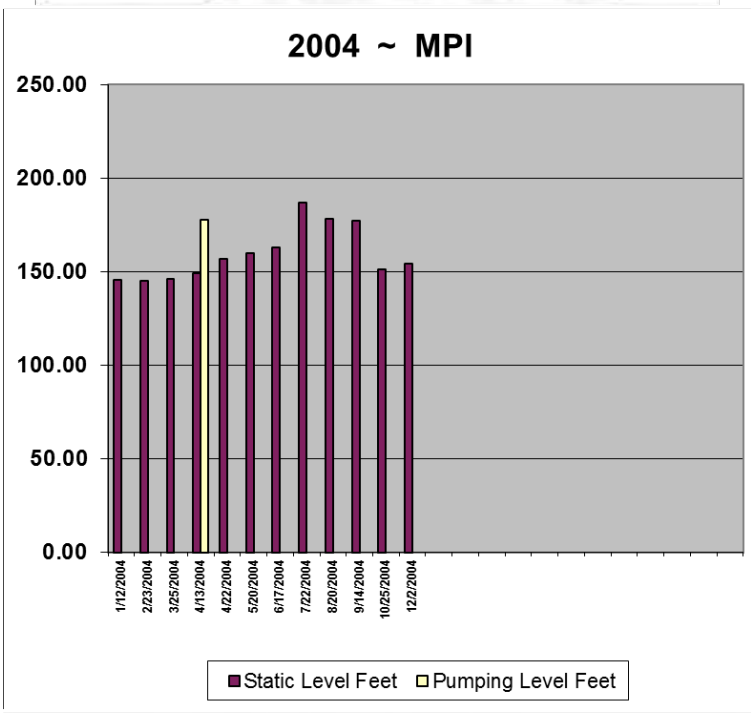
## Appendix 3 – Water Level Graphs for Each Water Supply Well

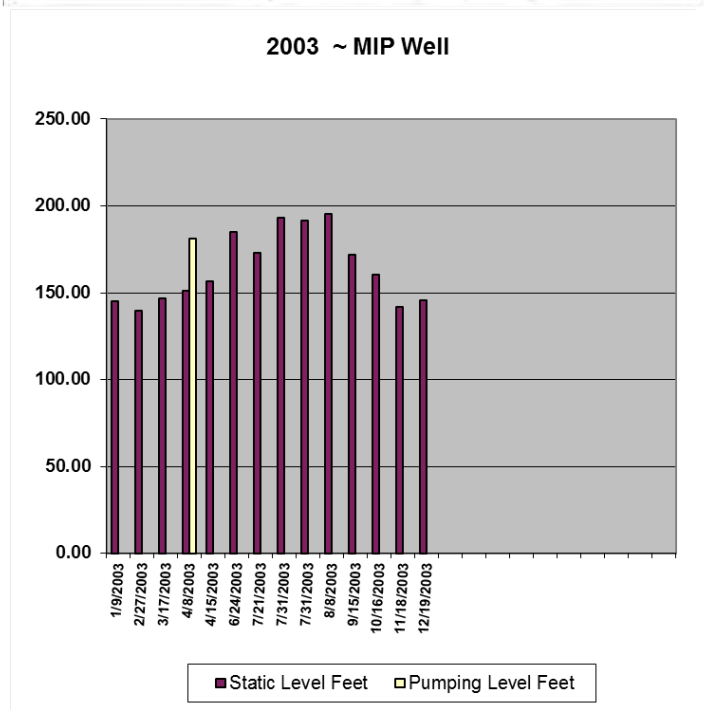
(Note:  Pages within Appendix 3 are not numbered – page numbers resume with Appendix 4 on Page 70.)

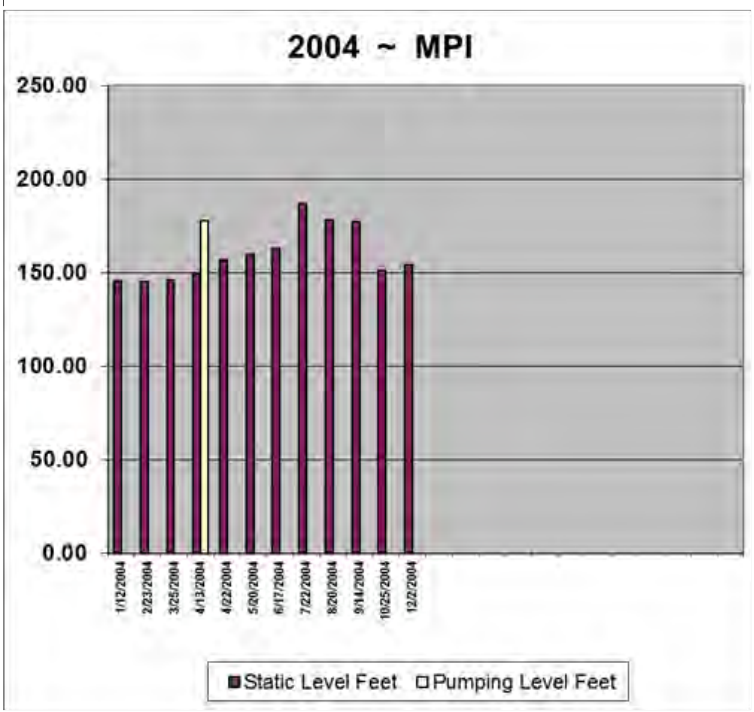

MIP Well ~ 2002
250.00
200.00
150.00
100.00
50.00
0.00
4/16/2002
5/10/2002
6/4/2002
7/19/2002
10/1/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

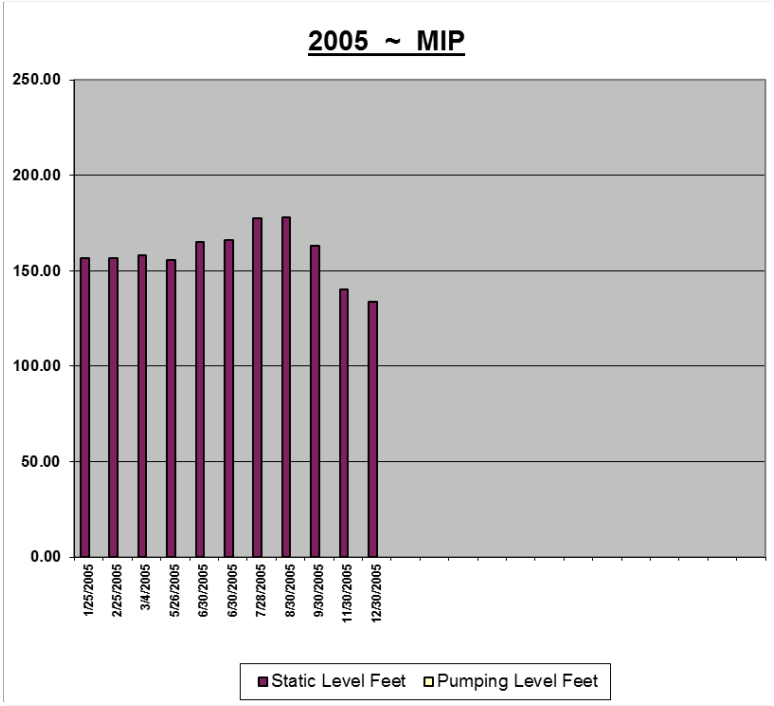

2003 ~ MIP Well
250.00
200.00
150.00
100.00
50.00
0.00
1/9/2003
2/27/2003
3/17/2003
4/8/2003
4/15/2003
6/24/2003
7/21/2003
7/31/2003
8/8/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet

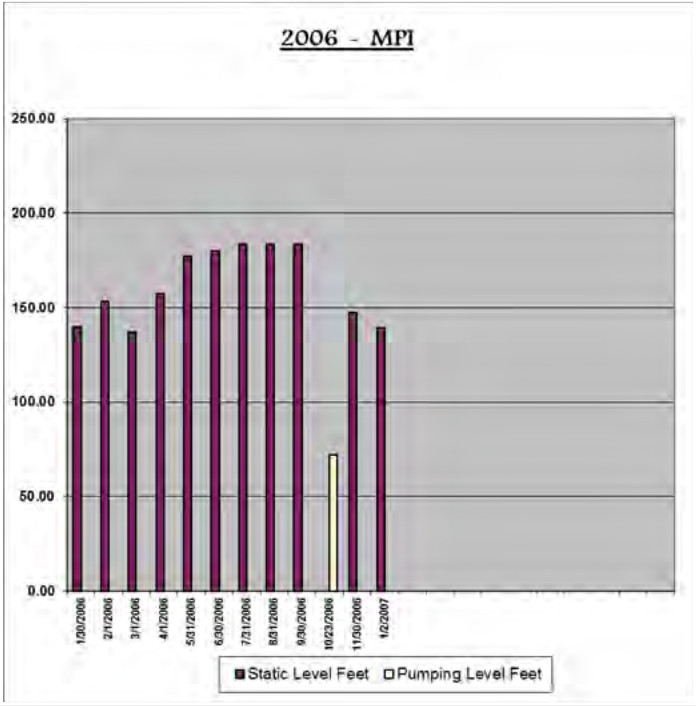

MIP Well ~ 2002
250.00
200.00
150.00
100.00
50.00
0.00
4/16/2002
5/10/2002
6/4/2002
7/19/2002
10/1/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

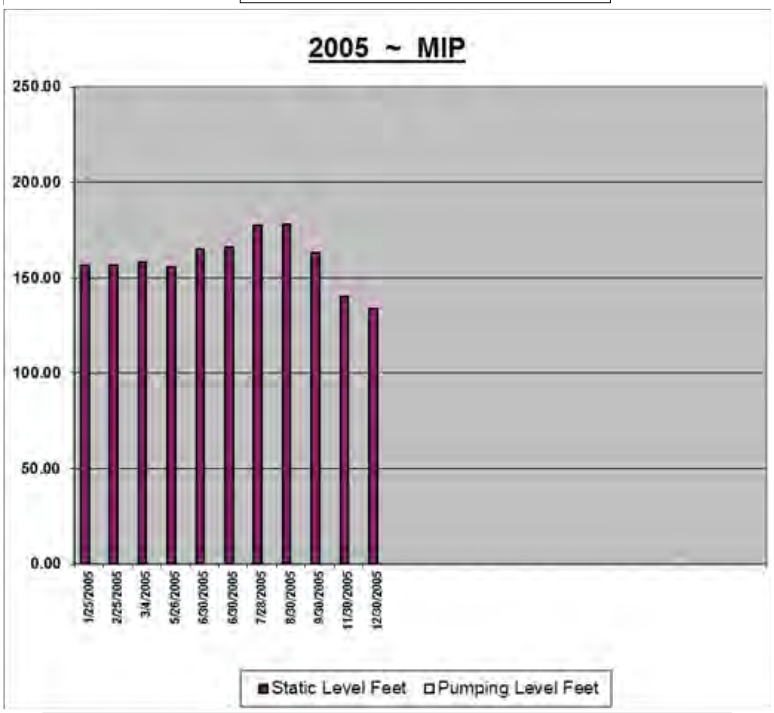

2004 ~ MPI
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/13/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

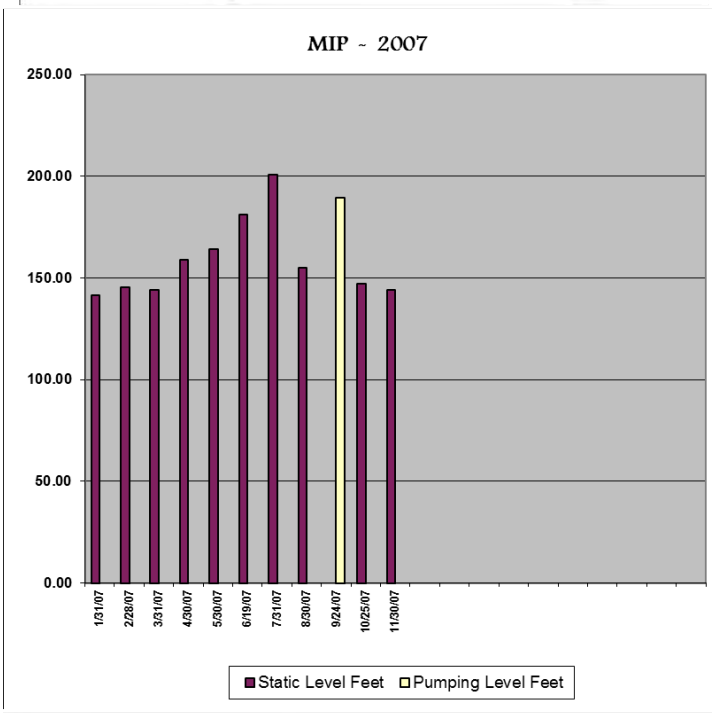

2003 ~ MIP Well
250.00
200.00
150.00
100.00
50.00
0.00
1/9/2003
2/27/2003
3/17/2003
4/8/2003
4/15/2003
6/24/2003
7/21/2003
7/31/2003
8/8/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet

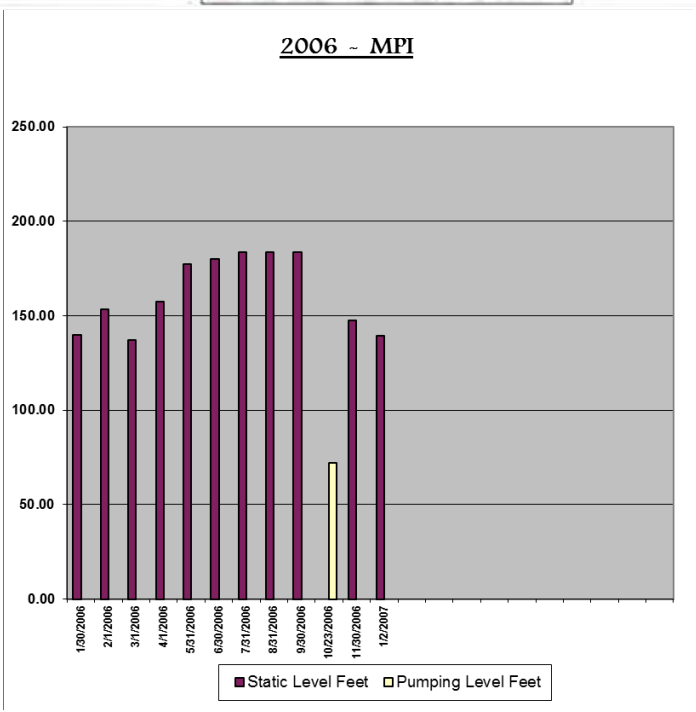

2004 ~ MPI
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/13/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

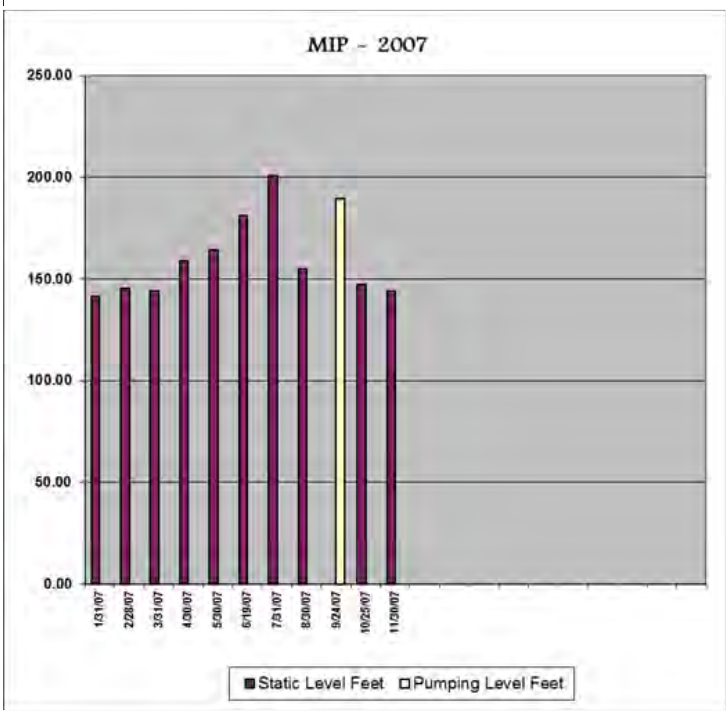

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250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
6/30/2005
7/28/2005
8/30/2005
9/30/2005
11/30/2005
12/30/2005
Static Level Feet
Pumping Level Feet

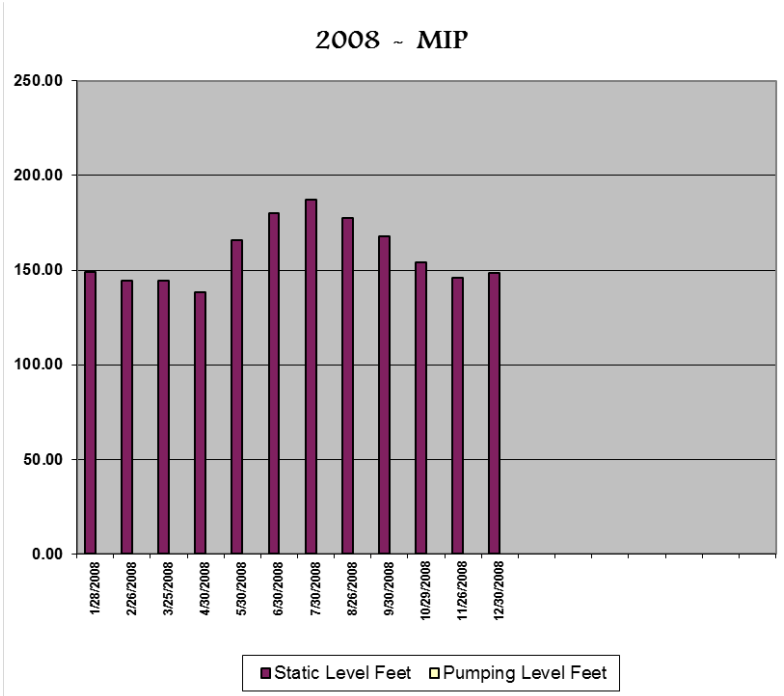

2006 ~ MPI
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/23/2006
11/30/2006
1/2/2007
Static Level Feet
Pumping Level Feet

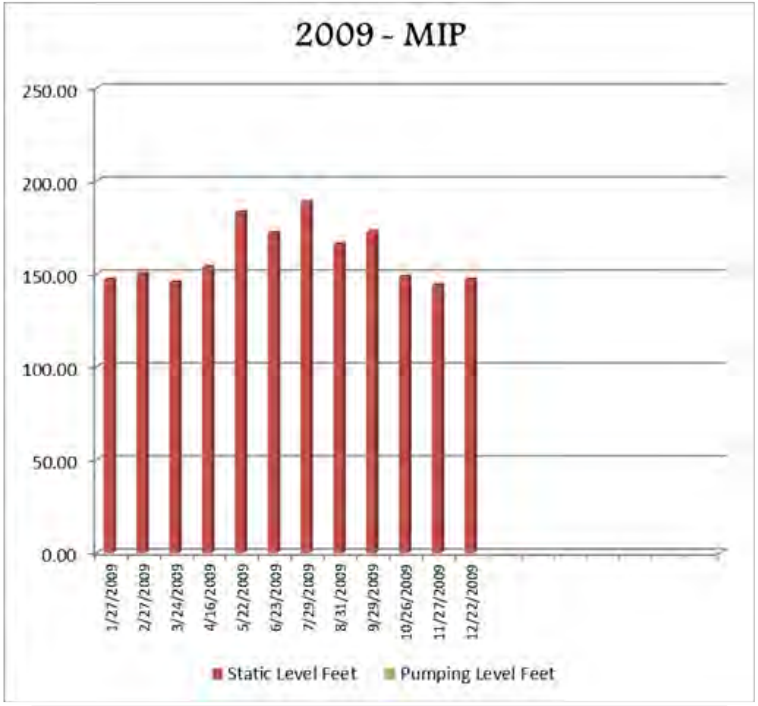

2005 ~ MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
6/30/2005
7/28/2005
8/30/2005
9/30/2005
11/30/2005
12/30/2005
Static Level Feet
Pumping Level Feet

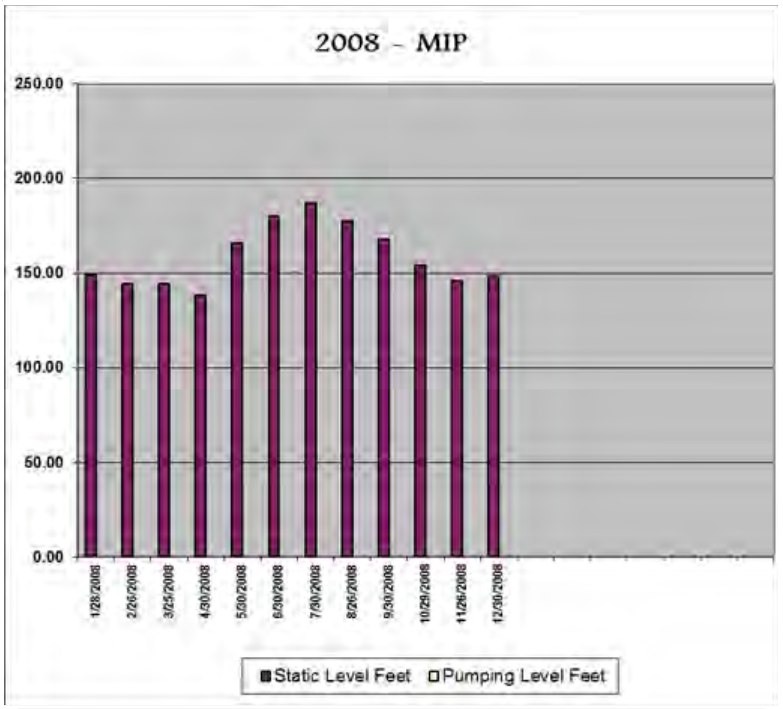

MIP ~ 2007
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200.00
150.00
100.00
50.00
0.00
1/31/07
2/28/07
3/31/07
4/30/07
5/30/07
6/19/07
7/31/07
8/30/07
9/24/07
10/25/07
11/30/07
Static Level Feet
Pumping Level Feet

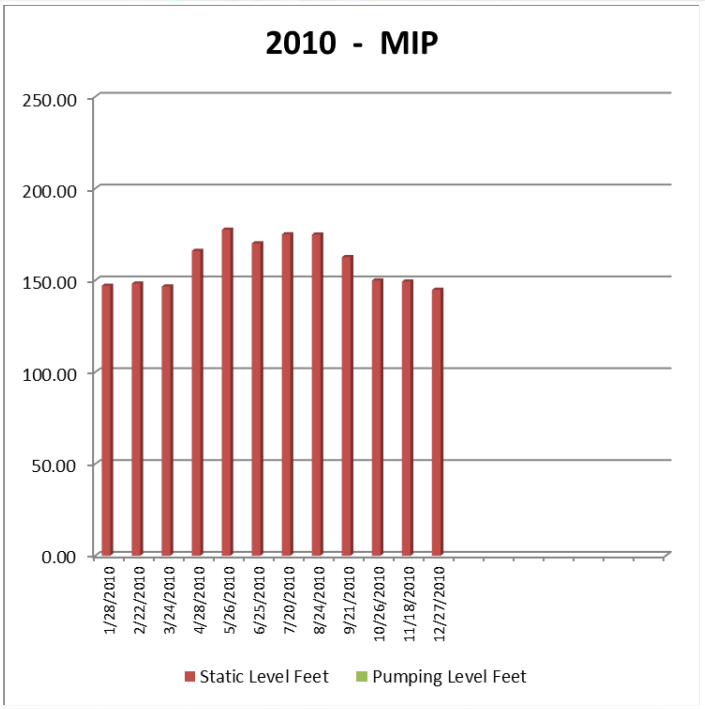

2006 ~ MPI
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200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/23/2006
11/30/2006
1/2/2007
Static Level Feet
Pumping Level Feet

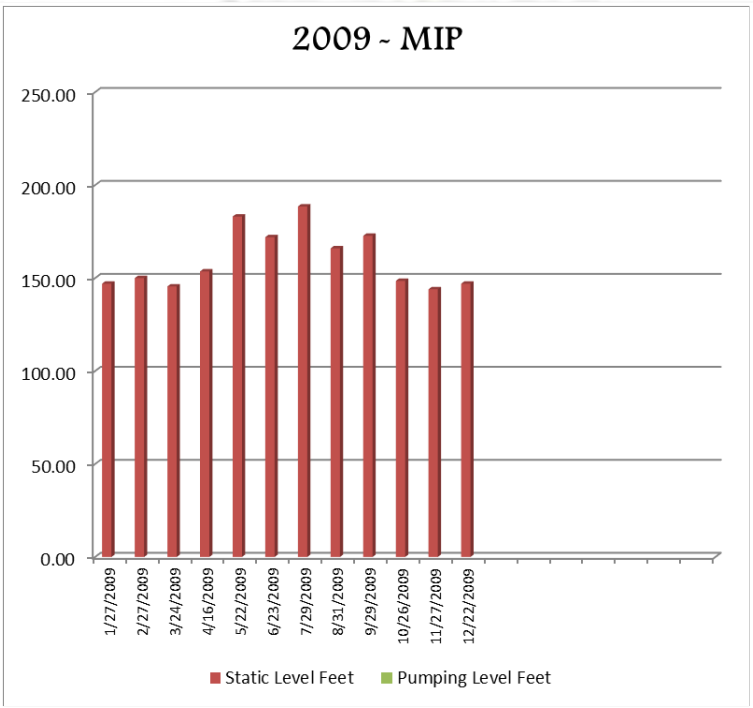

MIP ~ 2007
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200.00
150.00
100.00
50.00
0.00
1/31/07
2/28/07
3/31/07
4/30/07
5/30/07
6/19/07
7/31/07
8/30/07
9/24/07
10/25/07
11/30/07
Static Level Feet
Pumping Level Feet

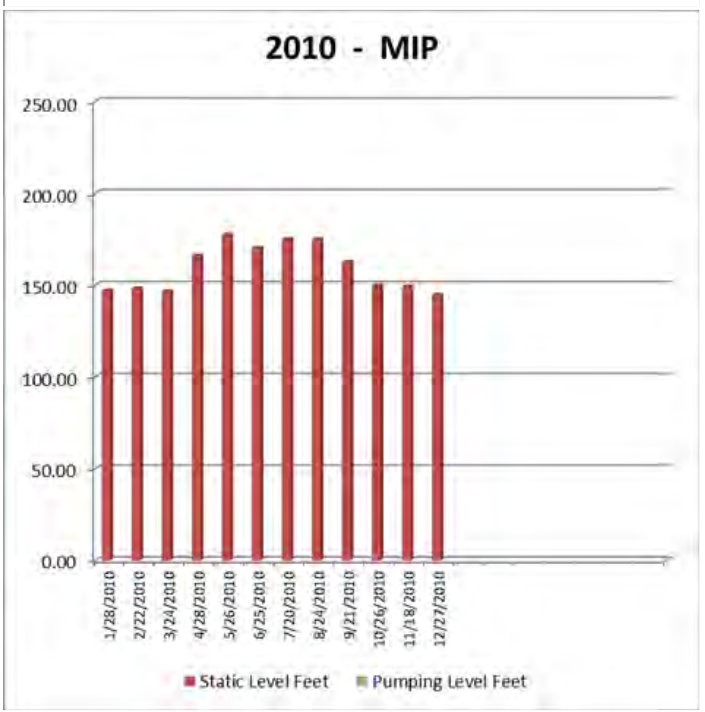

2008 - MIP
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200.00
150.00
100.00
50.00
0.00
1/28/2008
2/26/2008
3/25/2008
4/30/2008
5/30/2008
6/30/2008
7/30/2008
8/26/2008
9/30/2008
10/29/2008
11/26/2008
12/30/2008
Static Level Feet
Pumping Level Feet

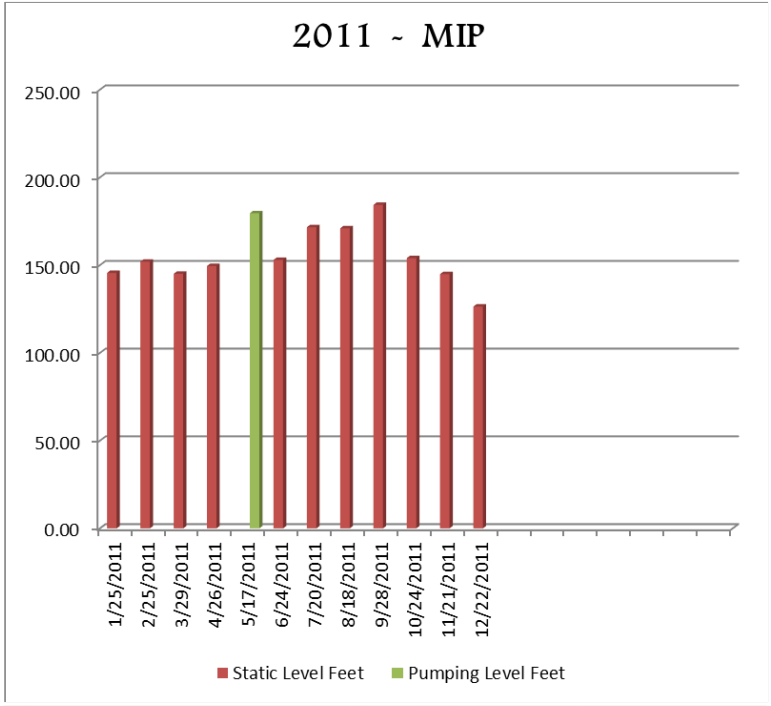

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200.00
150.00
100.00
50.00
0.00
1/27/2009
2/27/2009
3/24/2009
4/16/2009
5/22/2009
6/23/2009
7/29/2009
8/31/2009
9/29/2009
10/26/2009
11/27/2009
12/22/2009
Static Level Feet
Pumping Level Feet

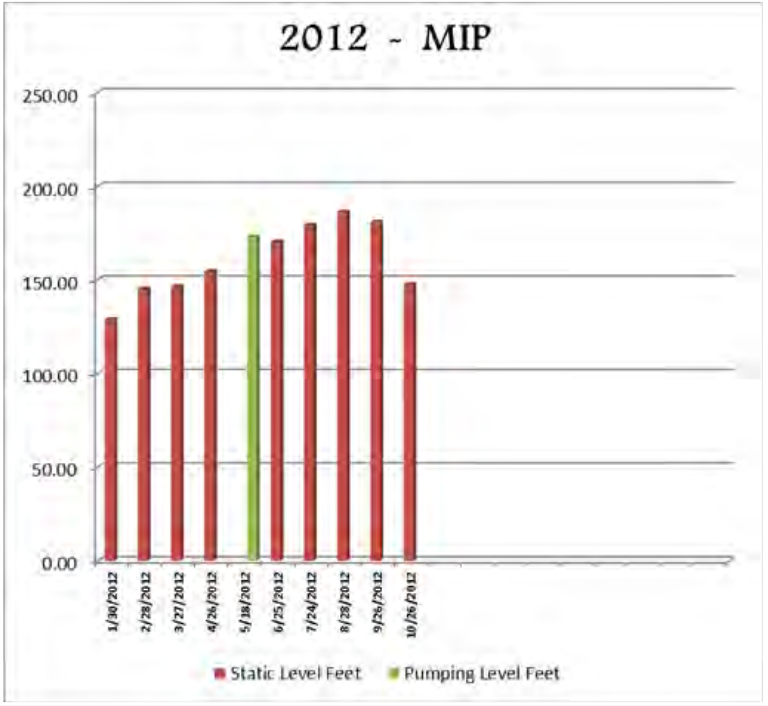

2008 - MIP
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200.00
150.00
100.00
50.00
0.00
1/28/2008
2/26/2008
3/25/2008
4/30/2008
5/30/2008
6/30/2008
7/30/2008
8/26/2008
9/30/2008
10/29/2008
11/26/2008
12/30/2008
Static Level Feet
Pumping Level Feet

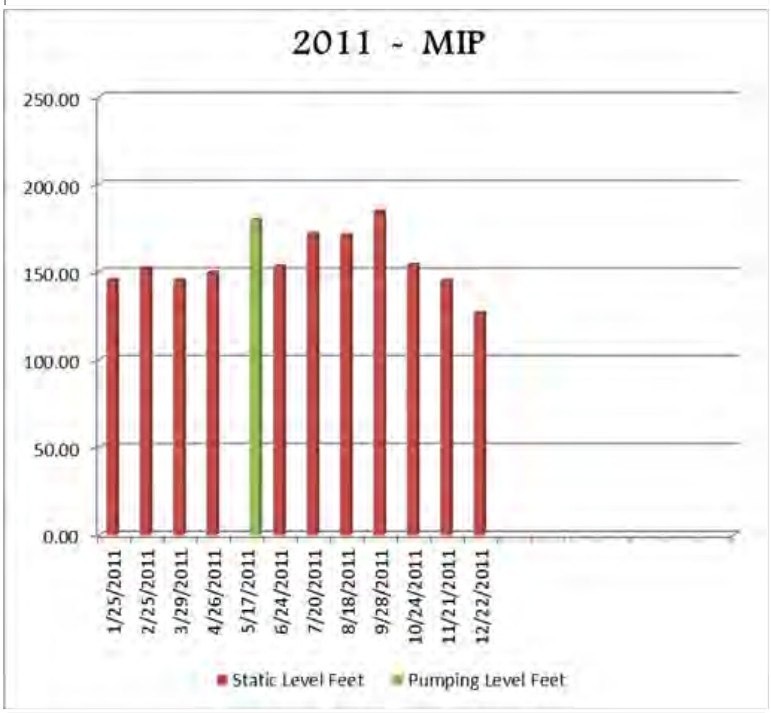

2010 - MIP
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200.00
150.00
100.00
50.00
0.00
1/28/2010
2/22/2010
3/24/2010
4/28/2010
5/26/2010
6/25/2010
7/20/2010
8/24/2010
9/21/2010
10/26/2010
11/18/2010
12/27/2010
Static Level Feet
Pumping Level Feet

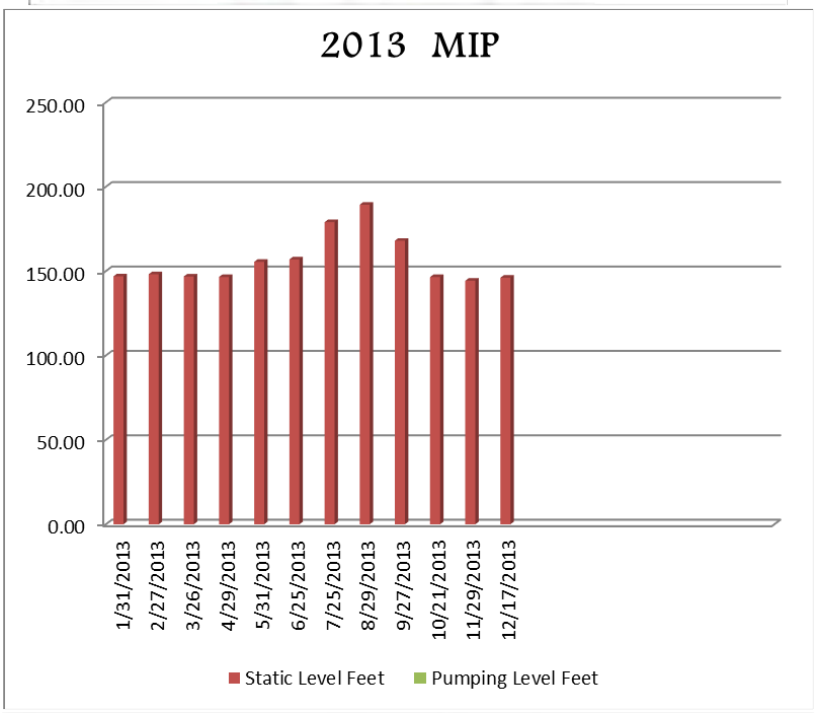

2009 - MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2009
2/27/2009
3/24/2009
4/16/2009
5/22/2009
6/23/2009
7/29/2009
8/31/2009
9/29/2009
10/26/2009
11/27/2009
12/22/2009
Static Level Feet
Pumping Level Feet

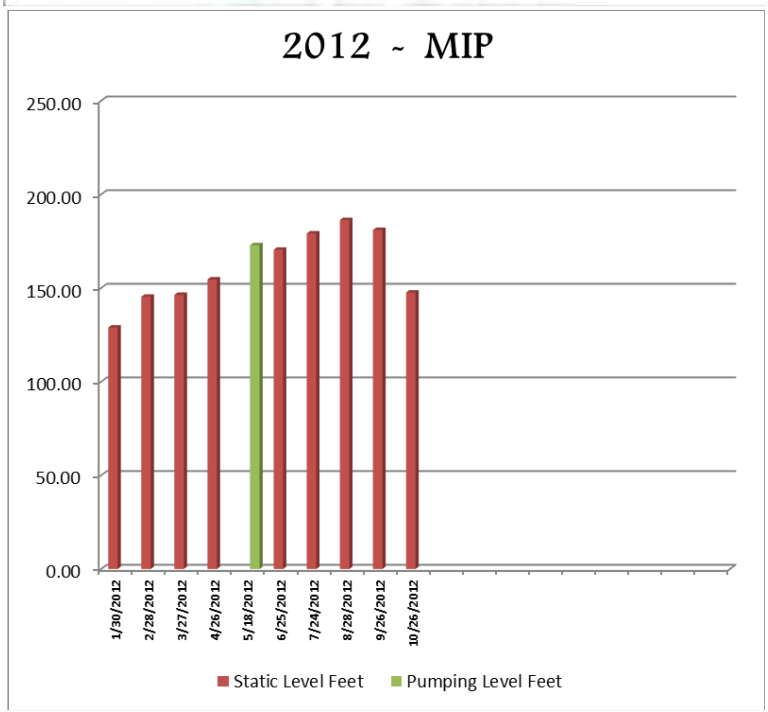

2010 - MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/22/2010
3/24/2010
4/28/2010
5/26/2010
6/25/2010
7/20/2010
8/24/2010
9/21/2010
10/26/2010
11/18/2010
12/27/2010
Static Level Feet
Pumping Level Feet

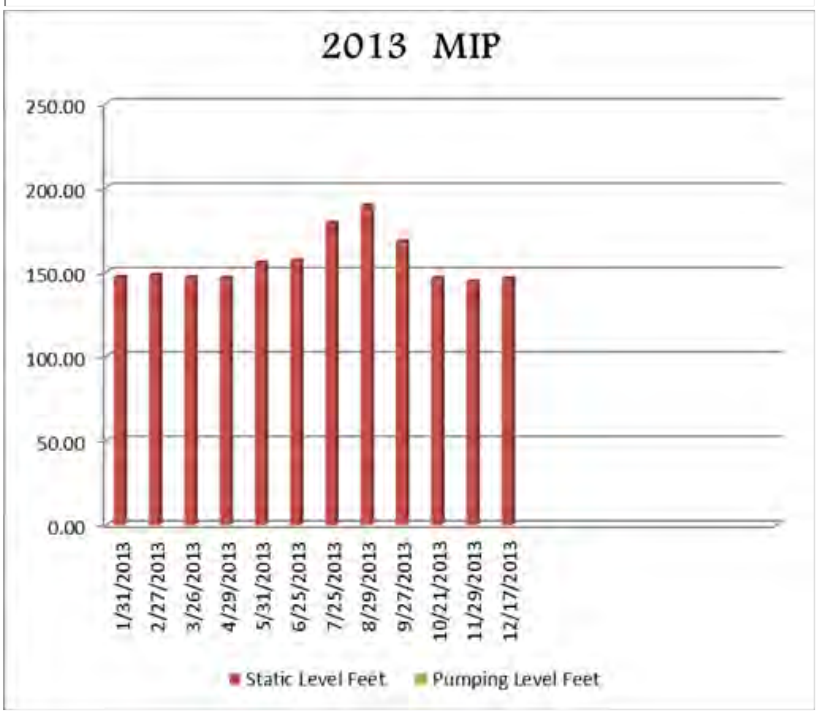

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150.00
100.00
50.00
0.00
1/25/2011
2/25/2011
3/29/2011
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5/17/2011
6/24/2011
7/20/2011
8/18/2011
9/28/2011
10/24/2011
11/21/2011
12/22/2011
Static Level Feet
Pumping Level Feet

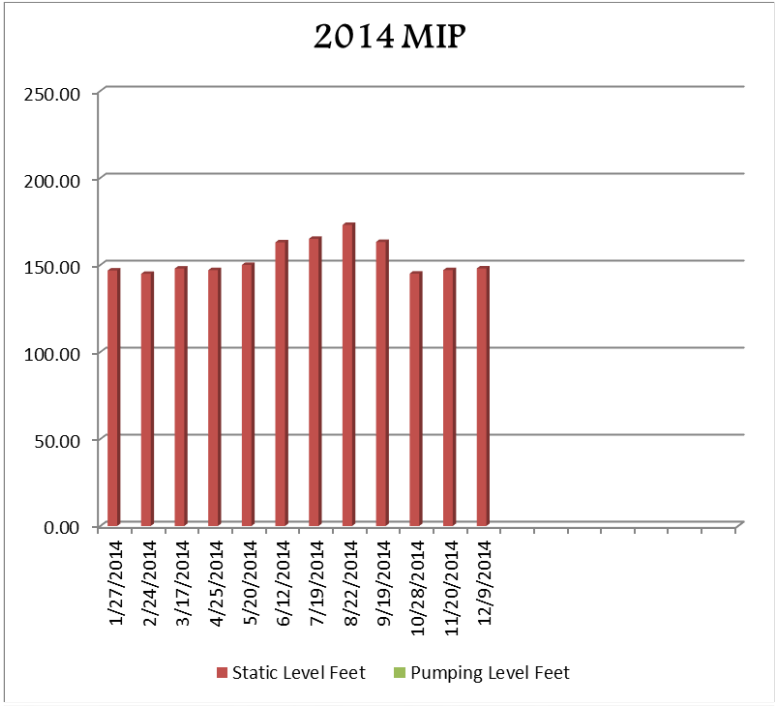

2012 - MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2012
2/28/2012
3/27/2012
4/26/2012
5/18/2012
6/25/2012
7/24/2012
8/28/2012
9/26/2012
10/26/2012
Static Level Feet
Pumping Level Feet

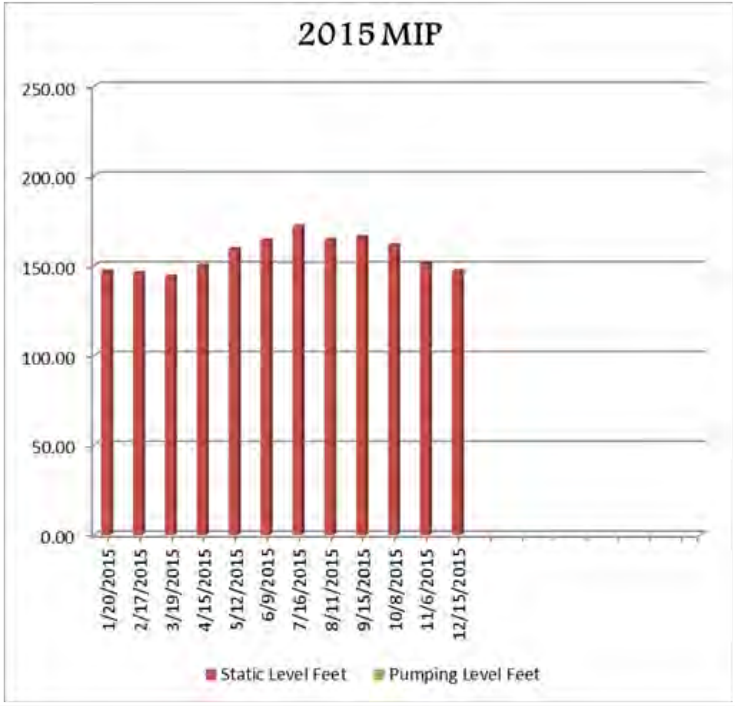

2011 - MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2011
2/25/2011
3/29/2011
4/26/2011
5/17/2011
6/24/2011
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8/18/2011
9/28/2011
10/24/2011
11/21/2011
12/22/2011
Static Level Feet
Pumping Level Feet

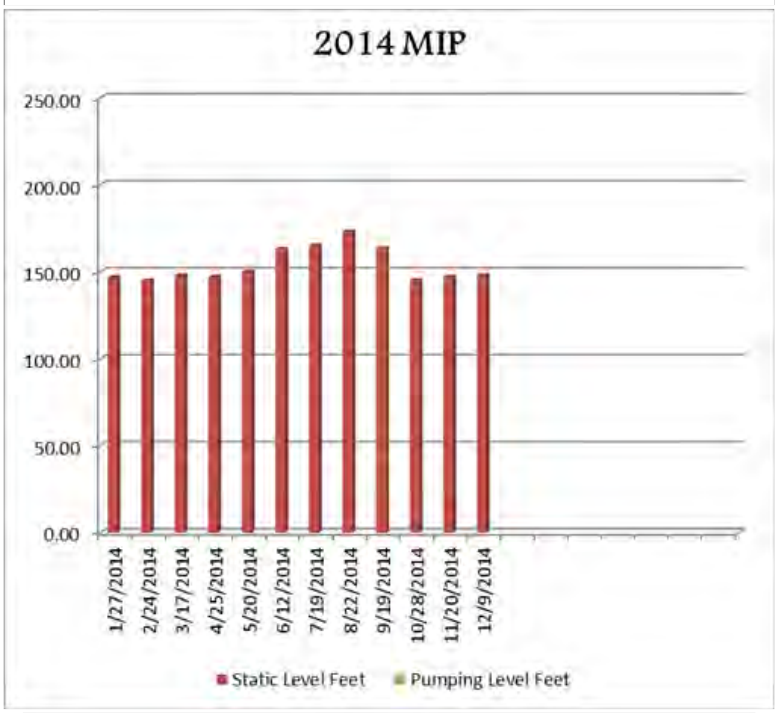

2013 MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2013
2/27/2013
3/26/2013
4/29/2013
5/31/2013
6/25/2013
7/25/2013
8/29/2013
9/27/2013
10/21/2013
11/29/2013
12/17/2013
Static Level Feet
Pumping Level Feet

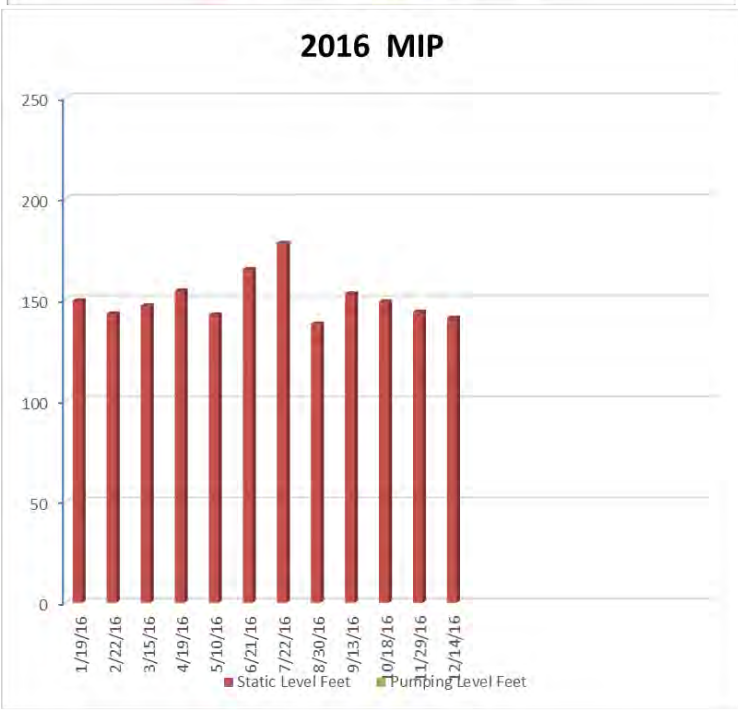

2012 - MIP
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200.00
150.00
100.00
50.00
0.00
1/30/2012
2/28/2012
3/27/2012
4/26/2012
5/18/2012
6/25/2012
7/24/2012
8/28/2012
9/26/2012
10/26/2012
Static Level Feet
Pumping Level Feet

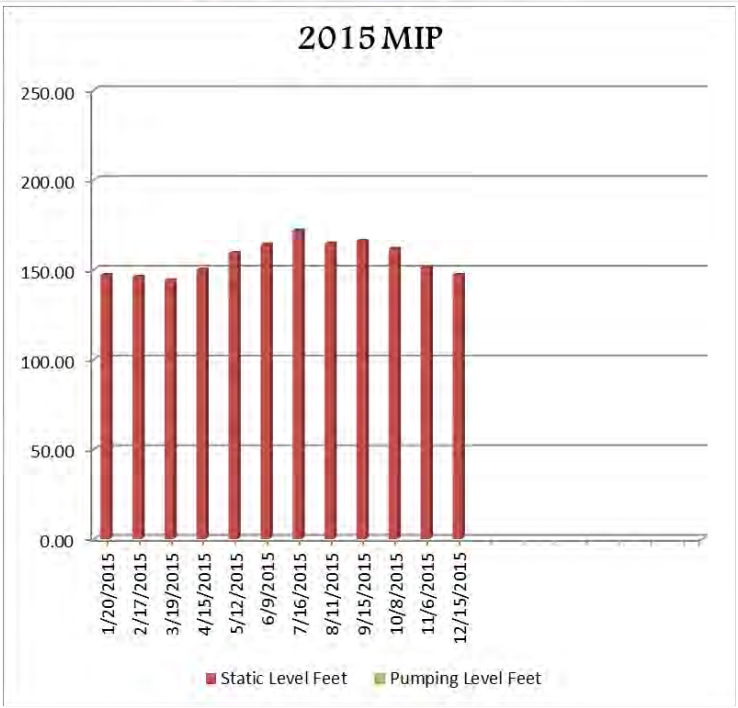

2013 MIP
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150.00
100.00
50.00
0.00
1/31/2013
2/27/2013
3/26/2013
4/29/2013
5/31/2013
6/25/2013
7/25/2013
8/29/2013
9/27/2013
10/21/2013
11/29/2013
12/17/2013
Static Level Feet
Pumping Level Feet

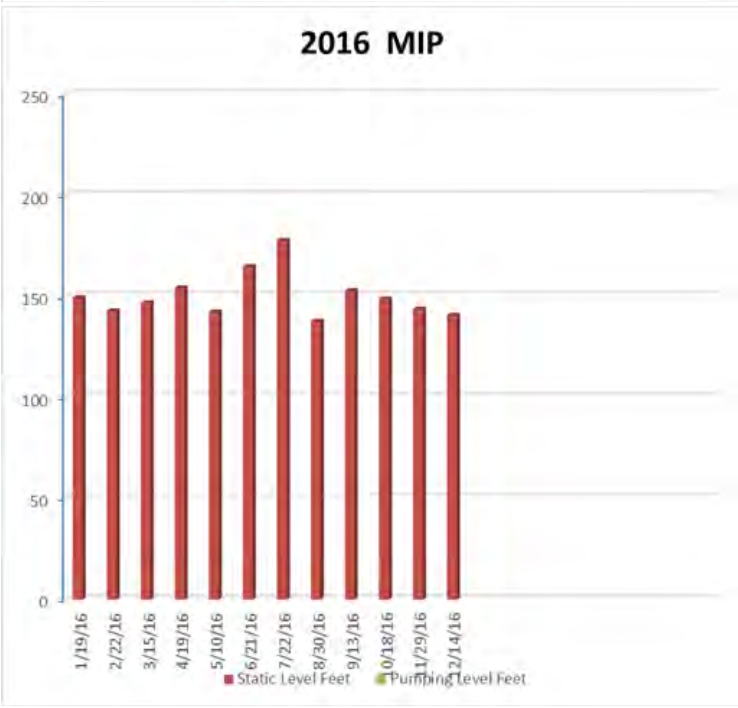

2014 MIP
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150.00
100.00
50.00
0.00
1/27/2014
2/24/2014
3/17/2014
4/25/2014
5/20/2014
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7/19/2014
8/22/2014
9/19/2014
10/28/2014
11/20/2014
12/9/2014
Static Level Feet
Pumping Level Feet

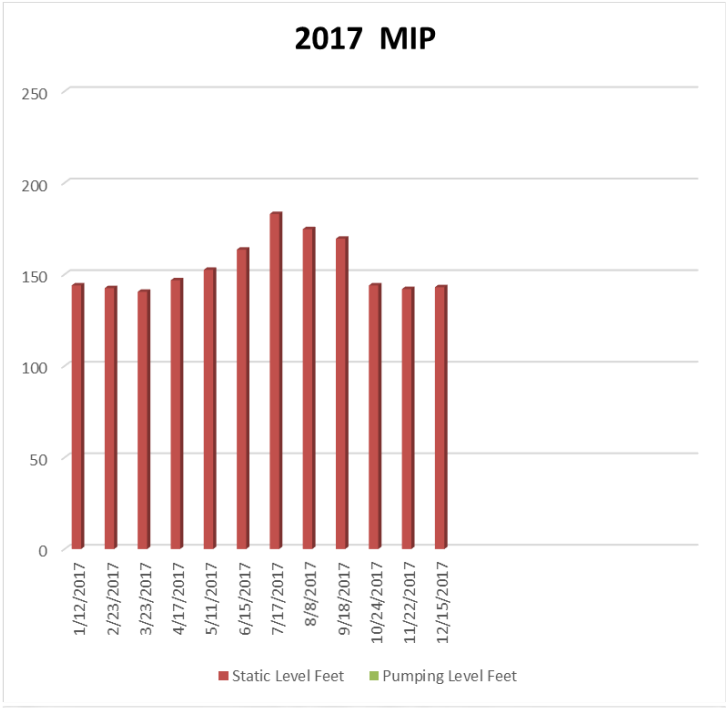

2015 MIP
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150.00
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50.00
0.00
1/20/2015
2/17/2015
3/19/2015
4/15/2015
5/12/2015
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8/11/2015
9/15/2015
10/8/2015
11/6/2015
12/15/2015
Static Level Feet
Pumping Level Feet

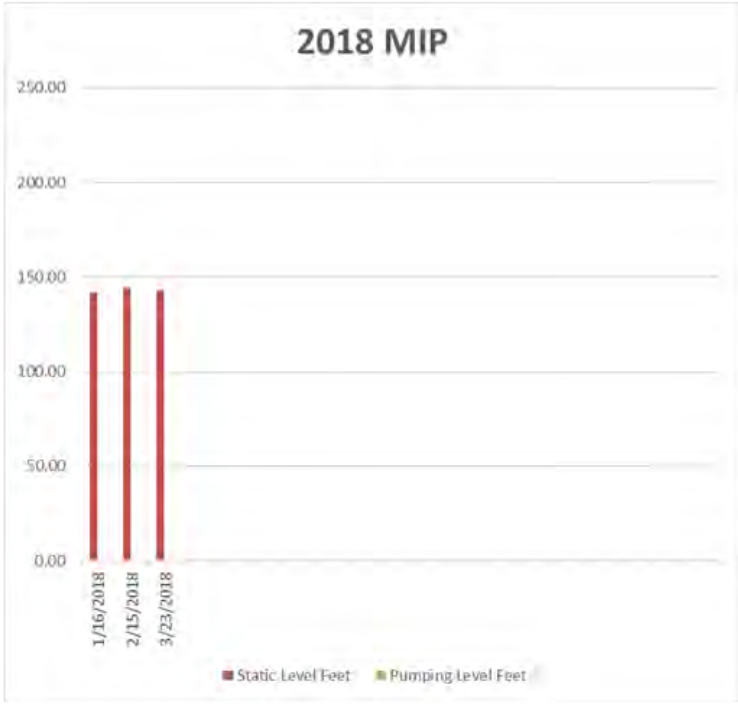

2014 MIP
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150.00
100.00
50.00
0.00
1/27/2014
2/24/2014
3/17/2014
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5/20/2014
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8/22/2014
9/19/2014
10/28/2014
11/20/2014
12/9/2014
Static Level Feet
Pumping Level Feet

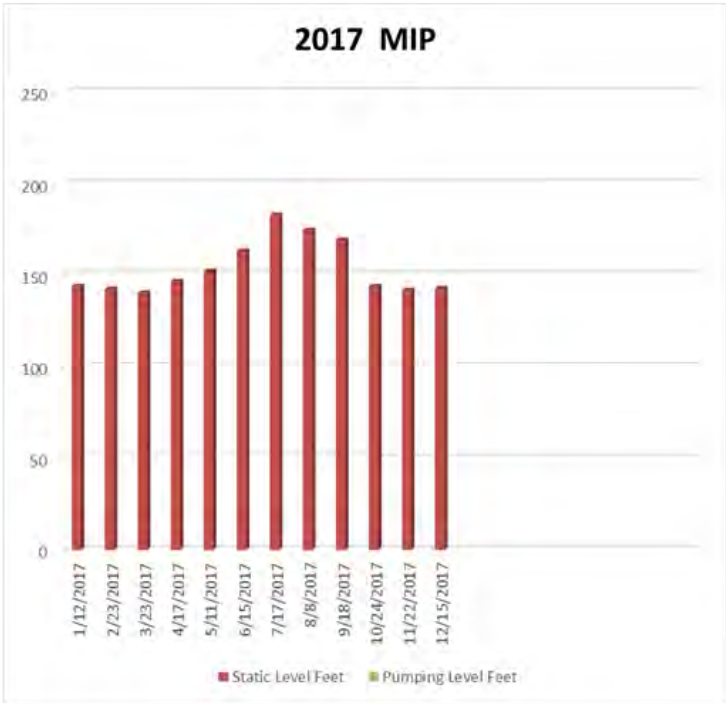

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200
150
100
50
0
1/19/16
2/22/16
3/15/16
4/19/16
5/10/16
6/21/16
7/22/16
8/30/16
9/13/16
10/18/16
11/29/16
12/14/16
Static Level Feet
Pumping Level Feet

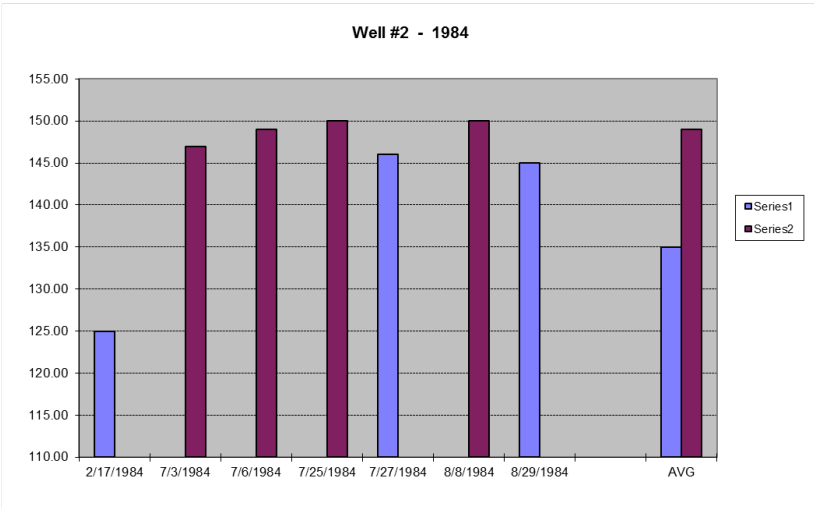

2015 MIP
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200.00
150.00
100.00
50.00
0.00
1/20/2015
2/17/2015
3/19/2015
4/15/2015
5/12/2015
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7/16/2015
8/11/2015
9/15/2015
10/8/2015
11/6/2015
12/15/2015
Static Level Feet
Pumping Level Feet

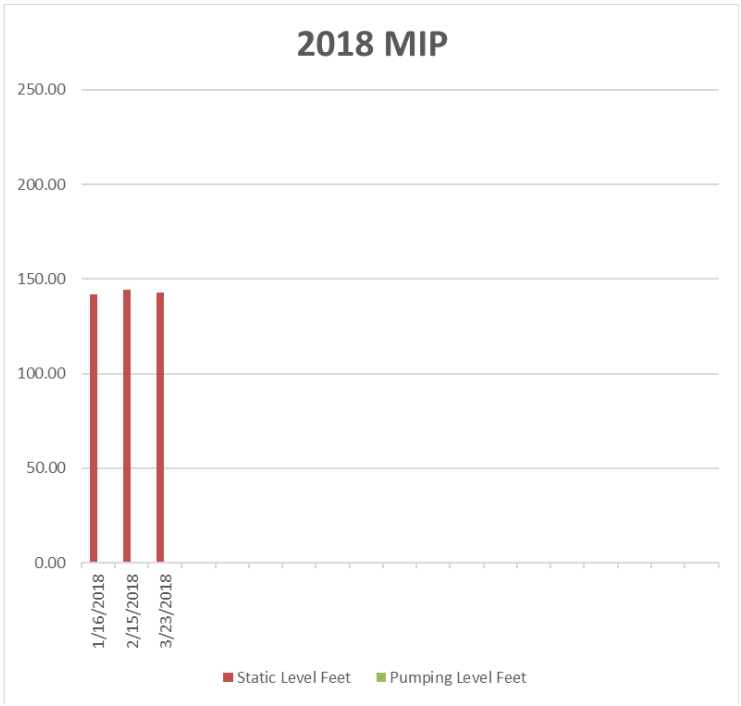

2016 MIP
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150
100
50
0
1/19/16
2/22/16
3/15/16
4/19/16
5/10/16
6/21/16
7/22/16
8/30/16
9/13/16
10/18/16
11/29/16
12/14/16
Static Level Feet
Pumping Level Feet

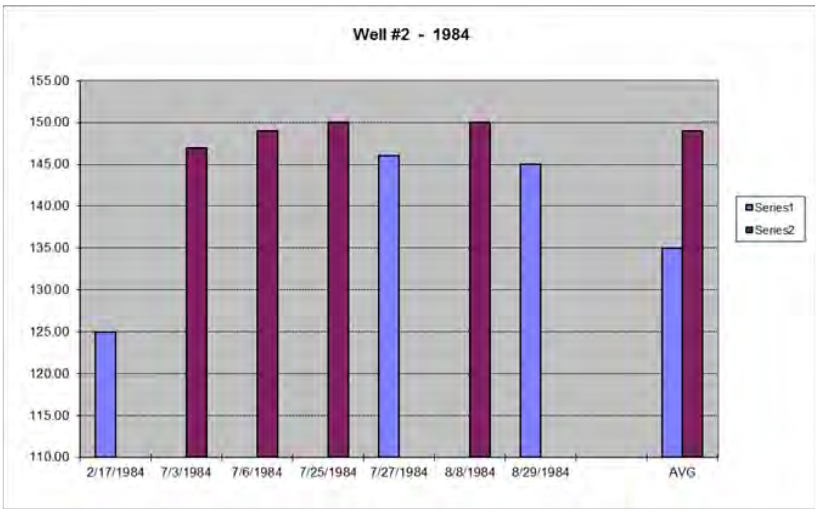

2017 MIP
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200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

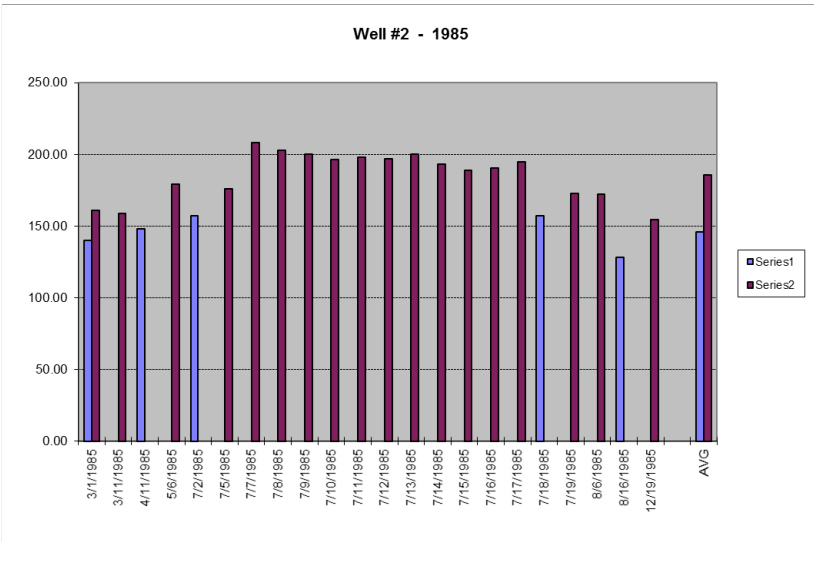

2018 MIP
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

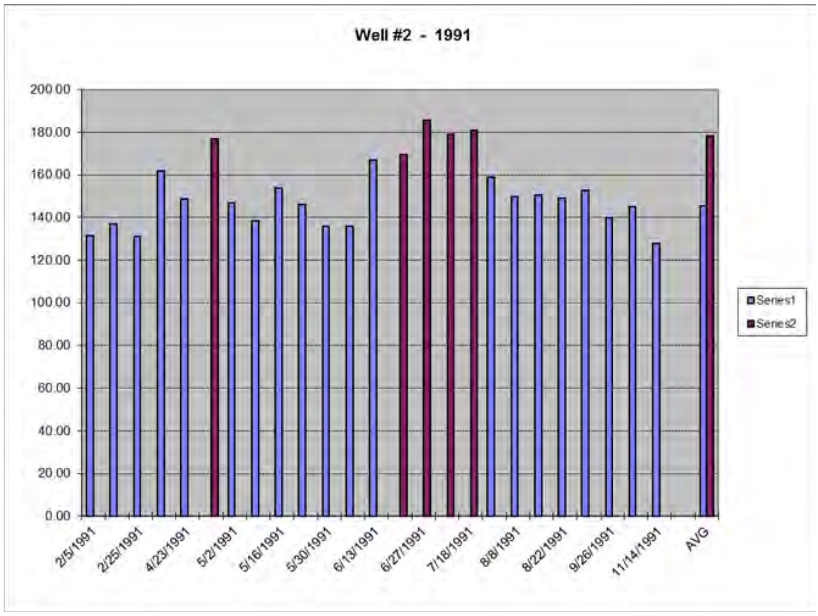

2017 MIP
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

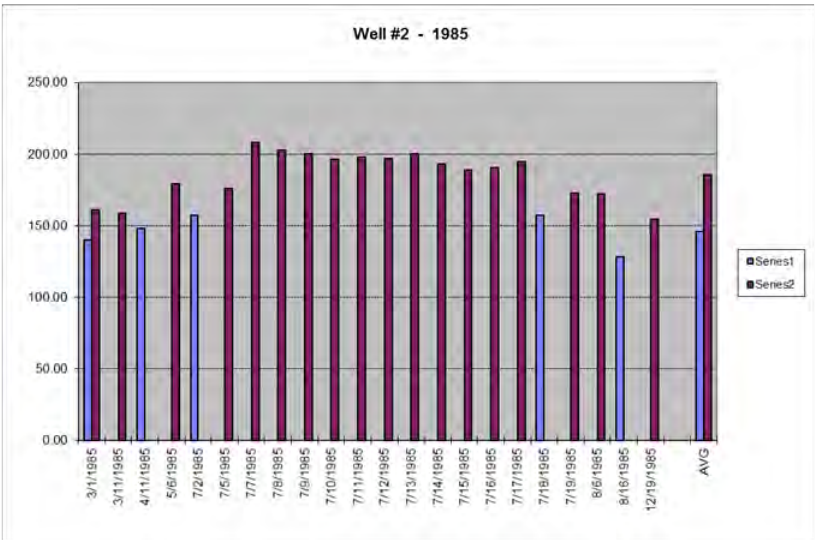

Well #2 - 1984
155.00
150.00
145.00
140.00
135.00
130.00
125.00
120.00
115.00
110.00
2/17/1984
7/3/1984
7/6/1984
7/25/1984
7/27/1984
8/8/1984
8/29/1984
AVG
Series1
Series2

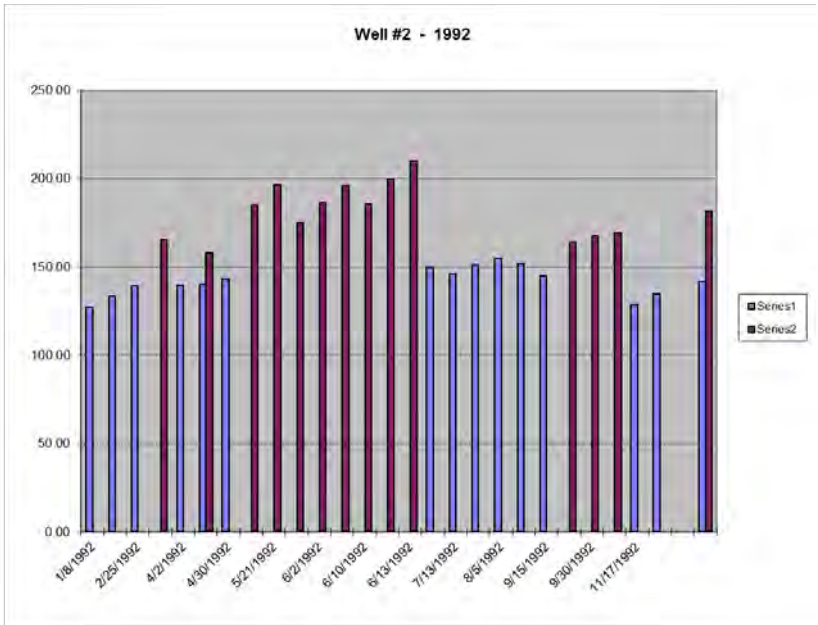

2018 MIP
250.00
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150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

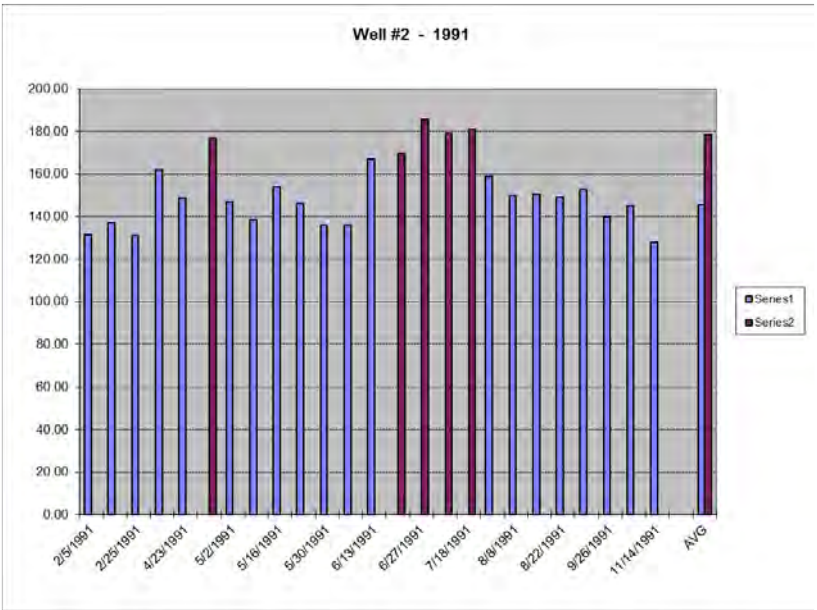

Well #2 - 1984
155.00
150.00
145.00
140.00
135.00
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125.00
120.00
115.00
110.00
2/17/1984
7/3/1984
7/6/1984
7/25/1984
7/27/1984
8/8/1984
8/29/1984
AVG
Series1
Series2

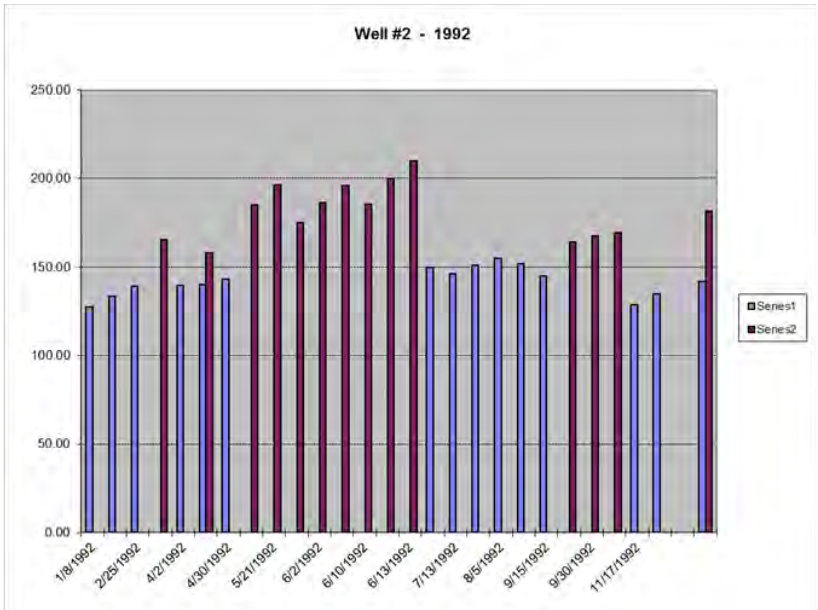

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7/15/1985
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7/19/1985
8/6/1985
8/16/1985
12/19/1985
AVG
Series1
Series2

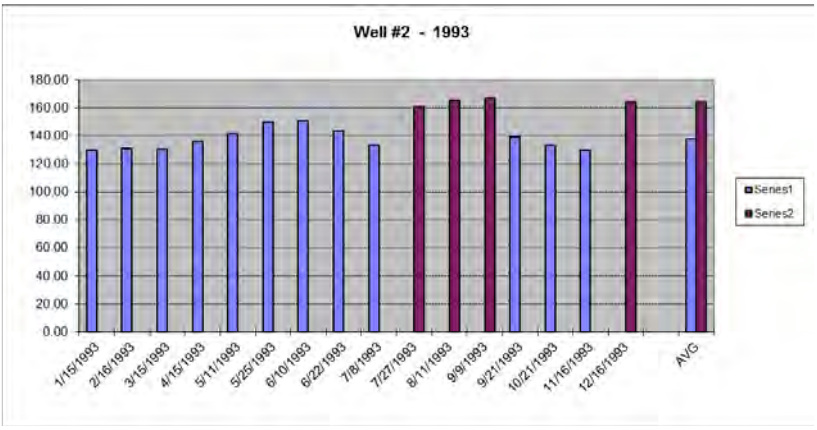

Well #2 - 1991
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160.00
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120.00
100.00
80.00
60.00
40.00
20.00
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2/25/1991
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5/2/1991
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5/30/1991
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6/27/1991
7/18/1991
8/8/1991
8/22/1991
9/26/1991
11/14/1991
AVG
Series1
Series2

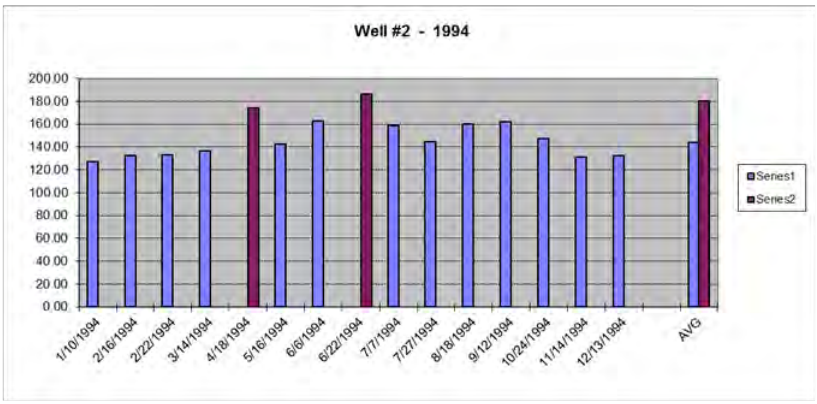

Well #2 - 1985
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8/16/1985
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AVG
Series1
Series2

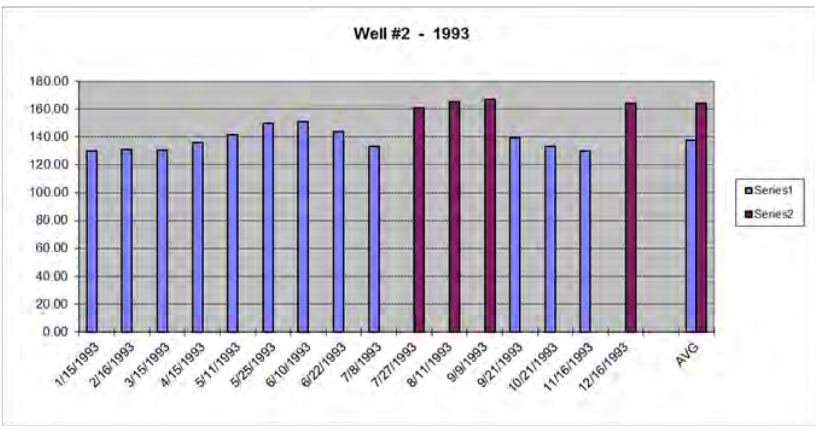

Well #2 - 1992
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50.00
0.00
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4/2/1992
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6/2/1992
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11/17/1992
Series1
Series2

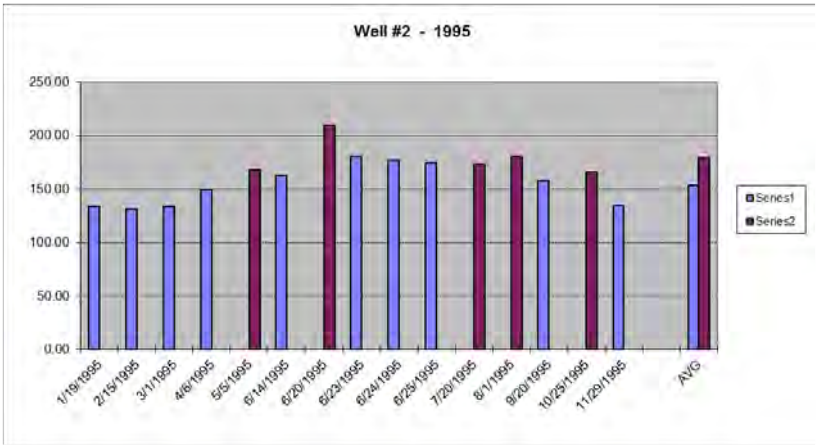

Well #2 - 1991
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60.00
40.00
20.00
0.00
2/5/1991
2/25/1991
4/23/1991
5/2/1991
5/16/1991
5/30/1991
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7/18/1991
8/8/1991
8/22/1991
9/26/1991
11/14/1991
AVG
Series1
Series2

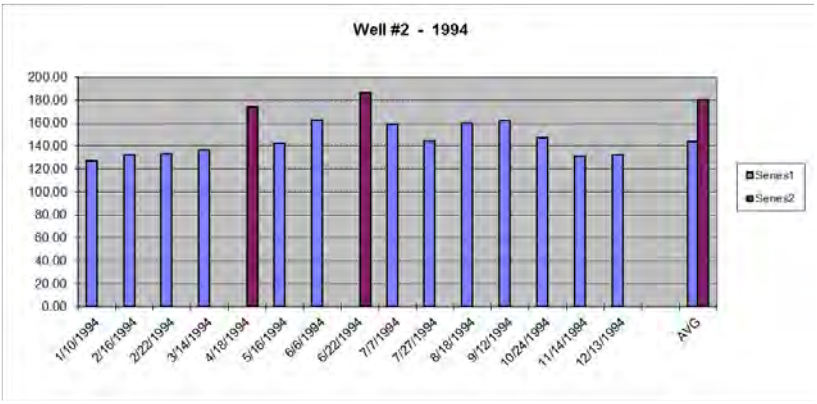

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4/2/1992
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6/2/1992
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8/5/1992
9/15/1992
9/30/1992
11/17/1992
Series1
Series2

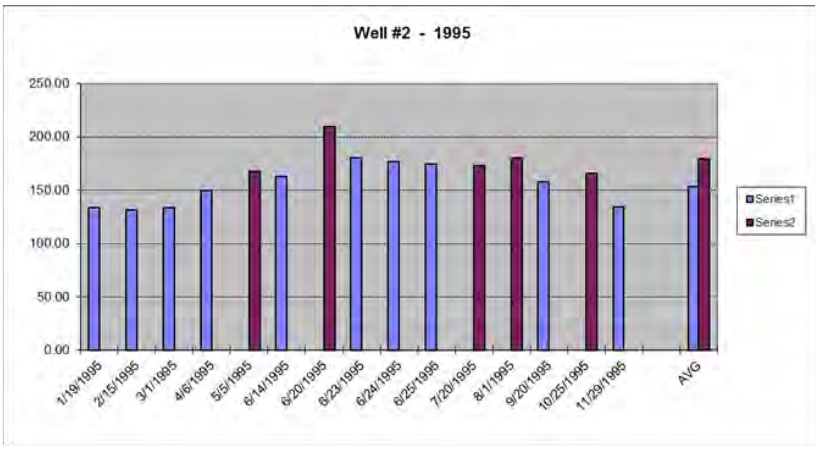

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7/8/1993
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11/16/1993
12/16/1993
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Series1
Series2

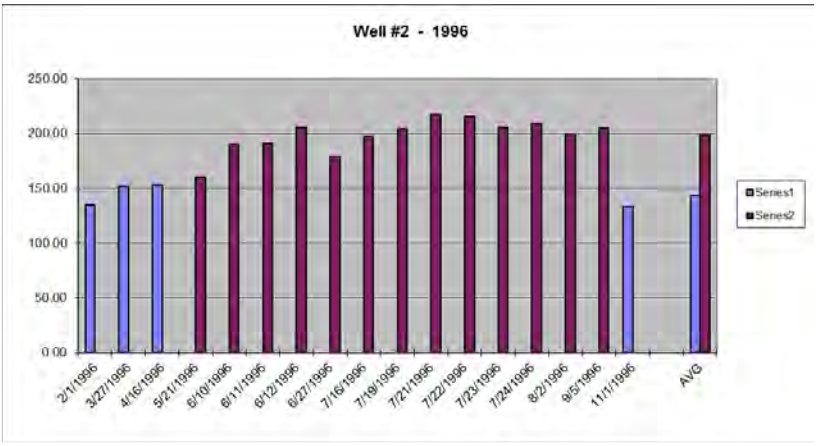

Well #2 - 1994
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AVG
Series1
Series2

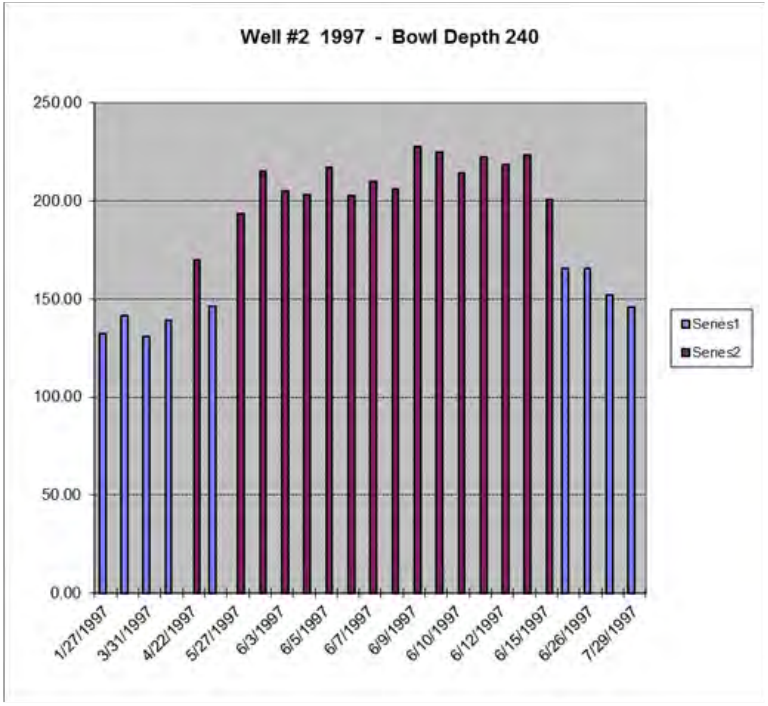

Well #2 - 1993
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Series1
Series2

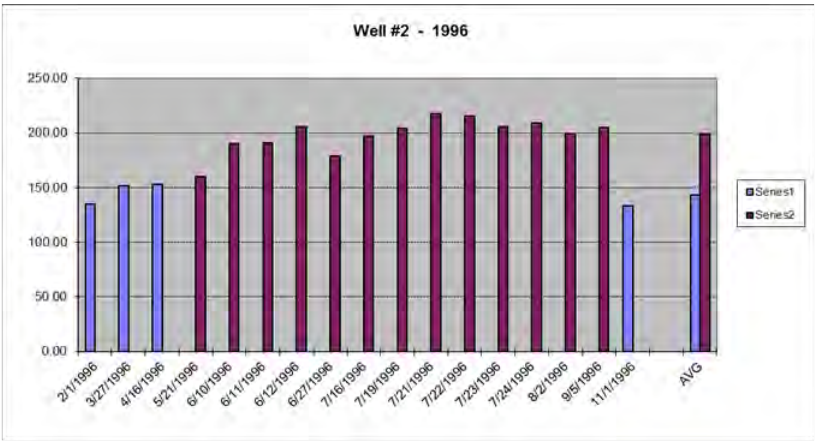

Well #2 - 1995
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AVG
Series1
Series2

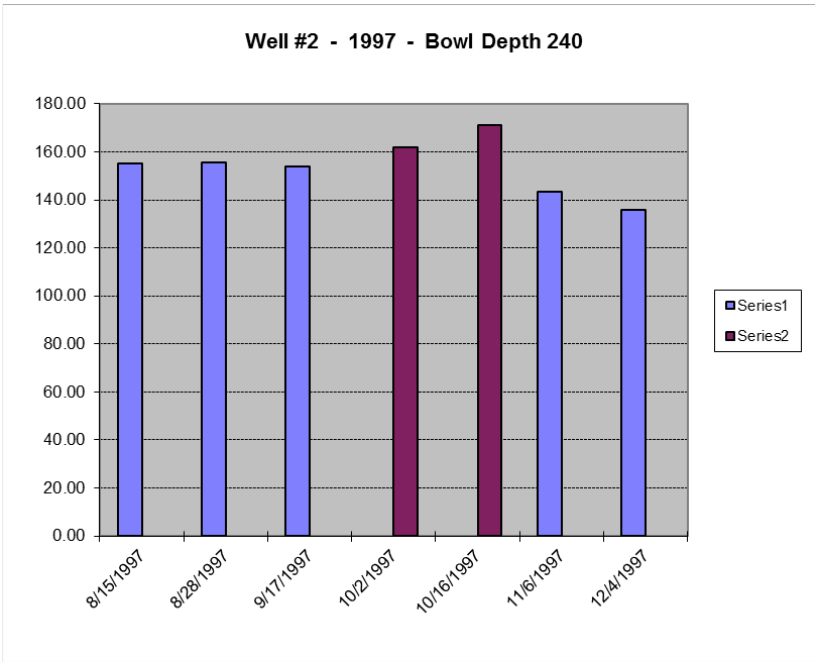

Well #2 - 1994
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20.00
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AVG
Series1
Series2

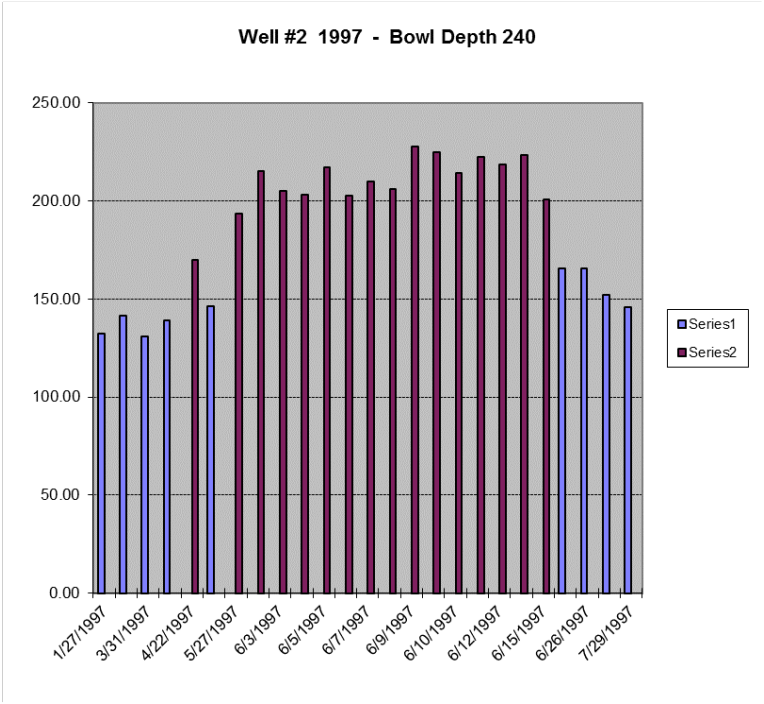

Well #2 - 1995
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AVG
Series1
Series2

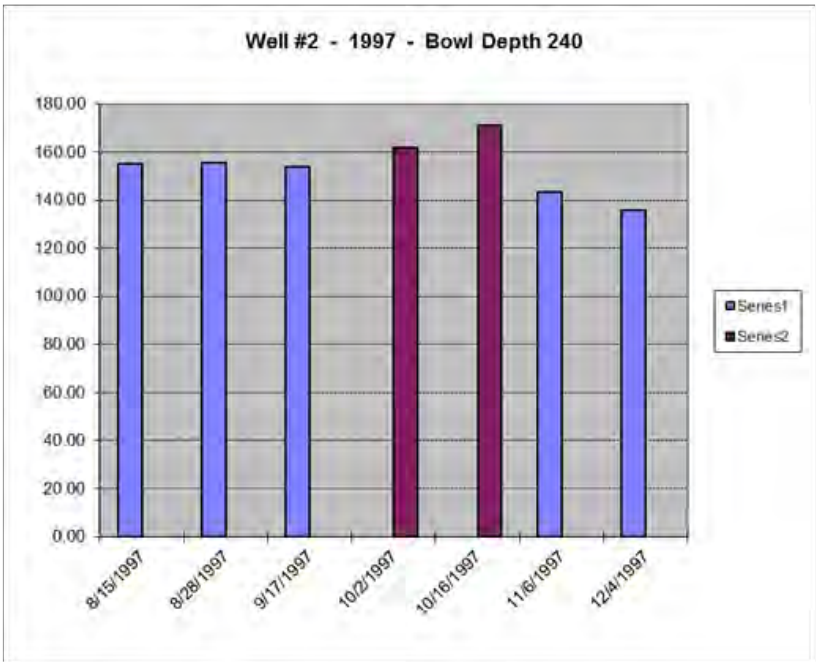

Well #2 - 1996
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3/27/1996
4/16/1996
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9/5/1996
11/1/1996
AVG
Series1
Series2

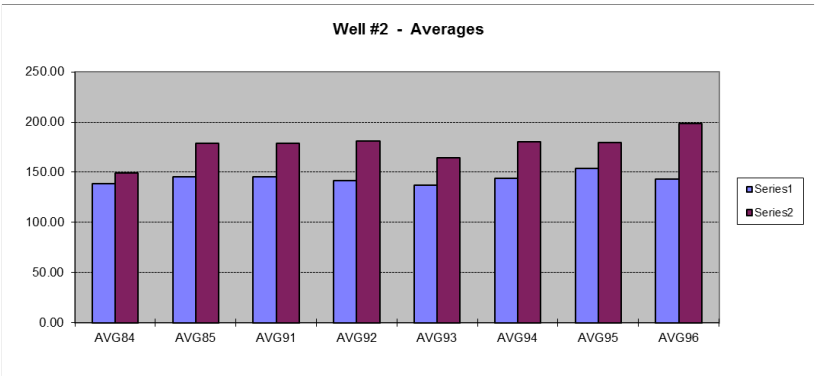

Well #2 1997 - Bowl Depth 240
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150.00
100.00
50.00
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3/31/1997
4/22/1997
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6/5/1997
6/7/1997
6/9/1997
6/10/1997
6/12/1997
6/15/1997
6/26/1997
7/29/1997
Series1
Series2

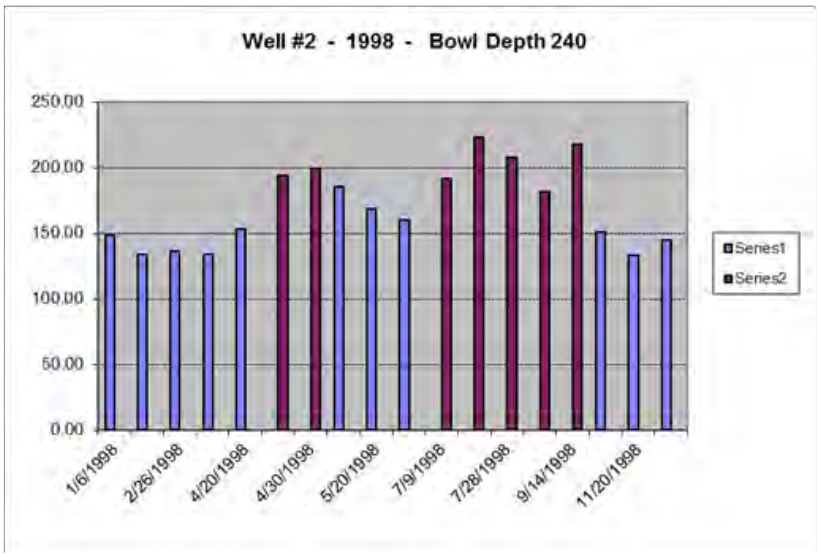

Well #2 - 1996
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150.00
100.00
50.00
0.00
2/1/1996
3/27/1996
4/16/1996
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7/19/1996
7/21/1996
7/22/1996
7/23/1996
7/24/1996
8/2/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

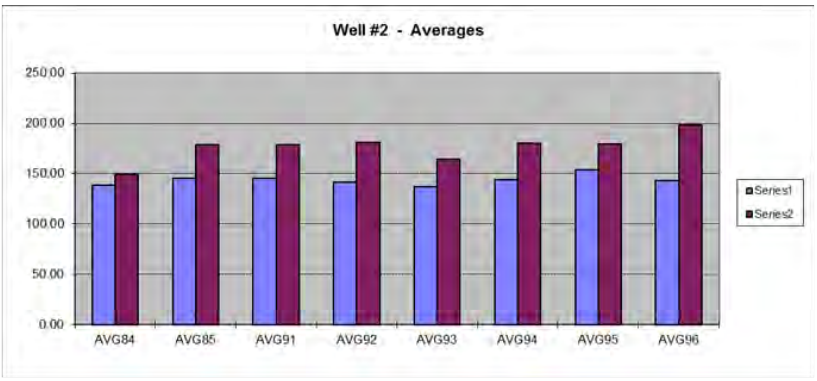

Well #2 - 1997 - Bowl Depth 240
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

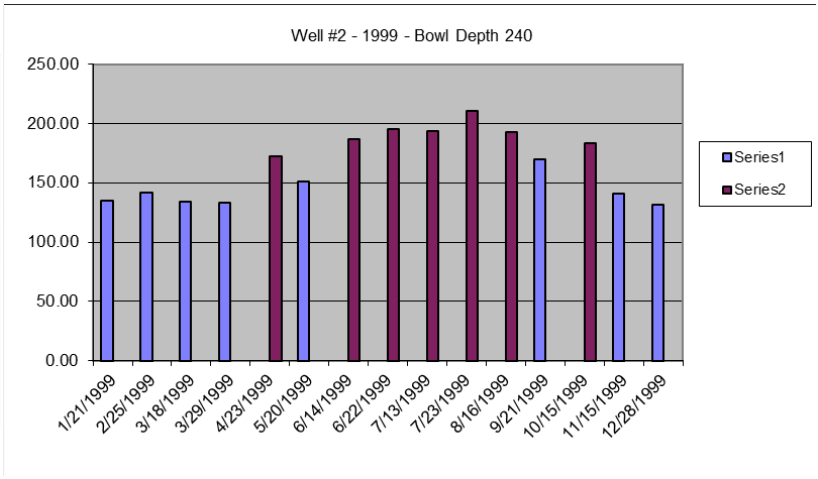

Well #2 1997 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
3/31/1997
4/22/1997
5/27/1997
6/3/1997
6/5/1997
6/7/1997
6/9/1997
6/10/1997
6/12/1997
6/15/1997
6/26/1997
7/29/1997
Series1
Series2

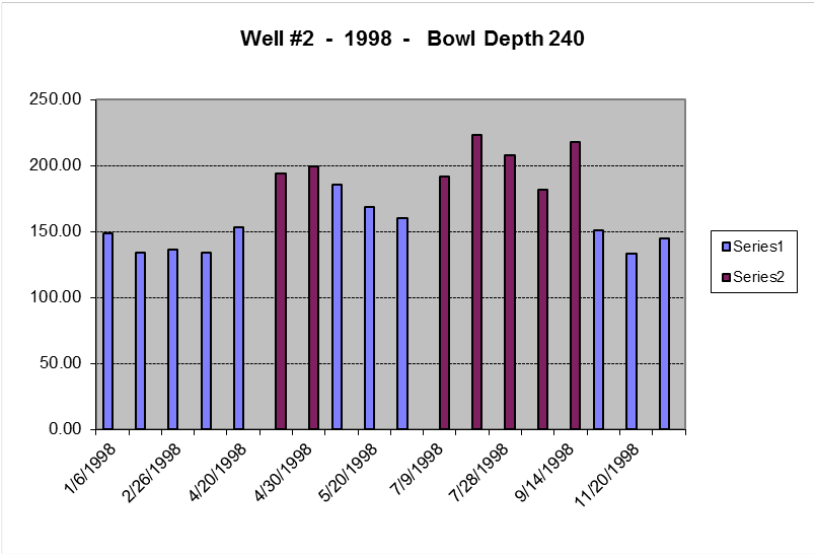

Well #2 - 1997 - Bowl Depth 240
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

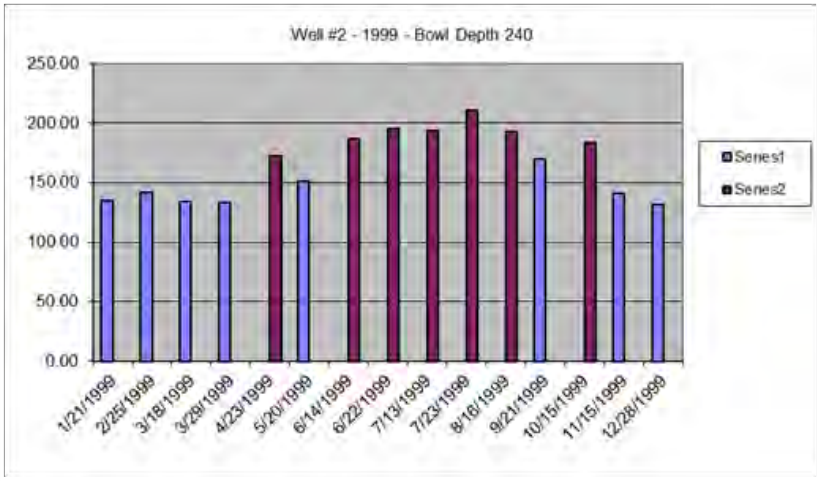

Well #2 - Averages
250.00
200.00
150.00
100.00
50.00
0.00
AVG84
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

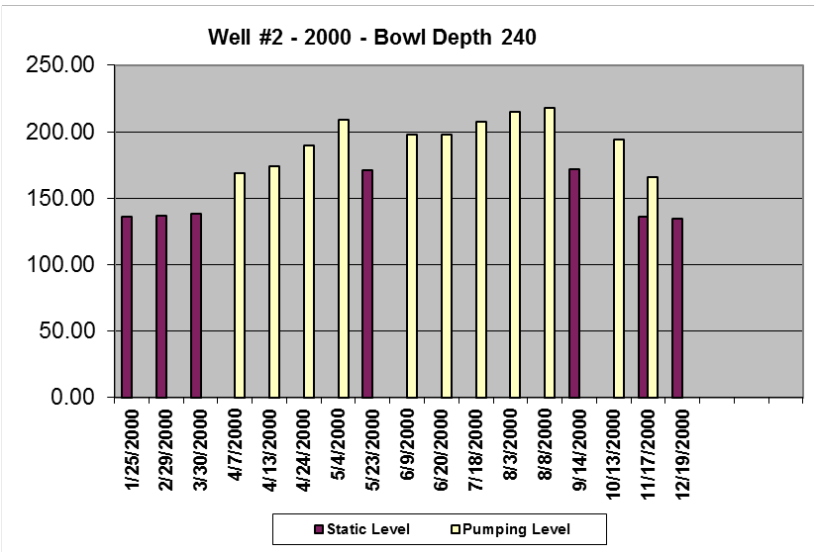

Well #2 - 1998 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/6/1998
2/26/1998
4/20/1998
4/30/1998
5/20/1998
7/9/1998
7/28/1998
9/14/1998
11/20/1998
Series1
Series2

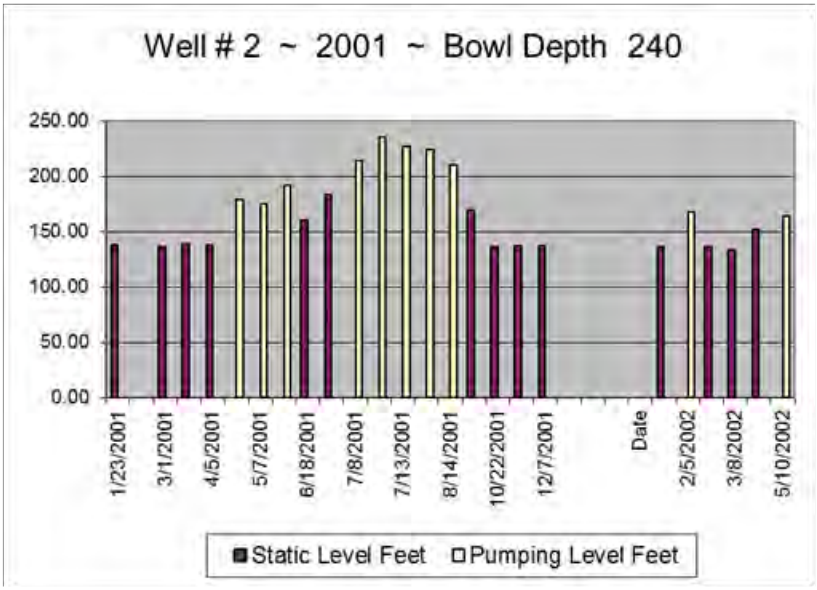

Well #2 - Averages
250.00
200.00
150.00
100.00
50.00
0.00
AVG84
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

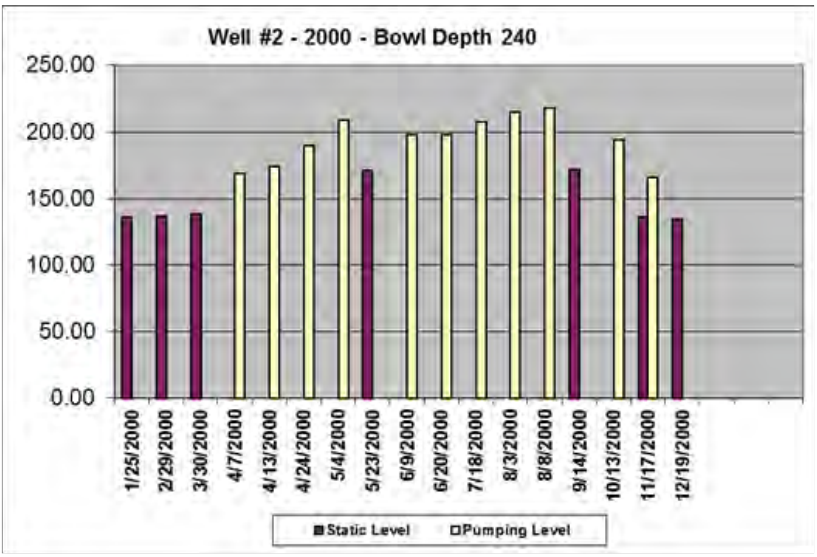

Well #2 - 1999 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
3/29/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
7/23/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/1999
Series1
Series2

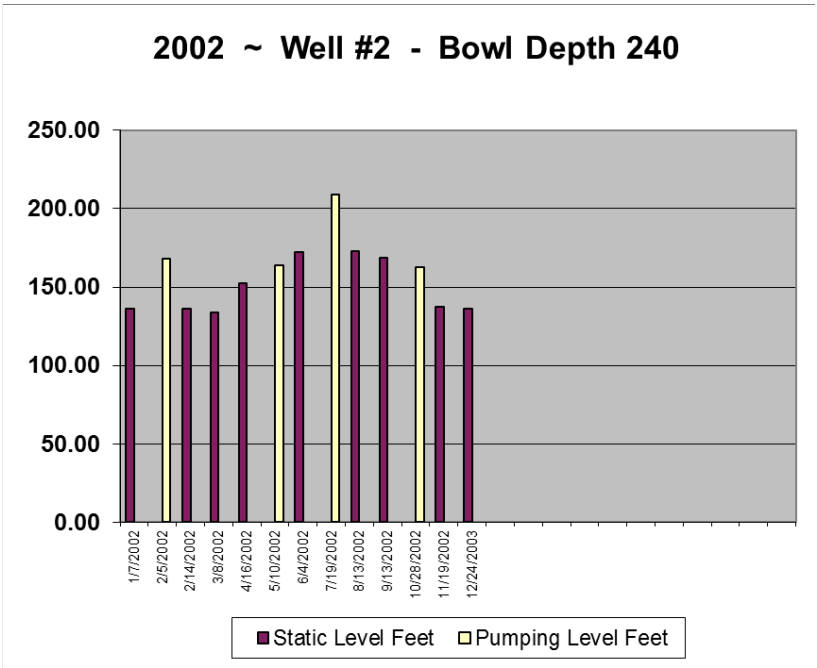

Well #2 - 1998 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/6/1998
2/26/1998
4/20/1998
4/30/1998
5/20/1998
7/9/1998
7/28/1998
9/14/1998
11/20/1998
Series1
Series2

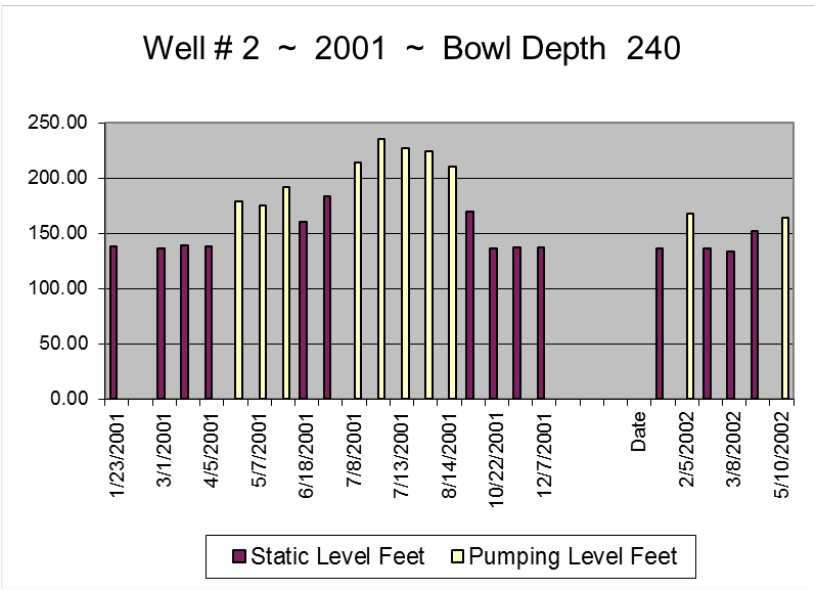

Well #2 - 1999 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
3/29/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
7/23/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/1999
Series1
Series2

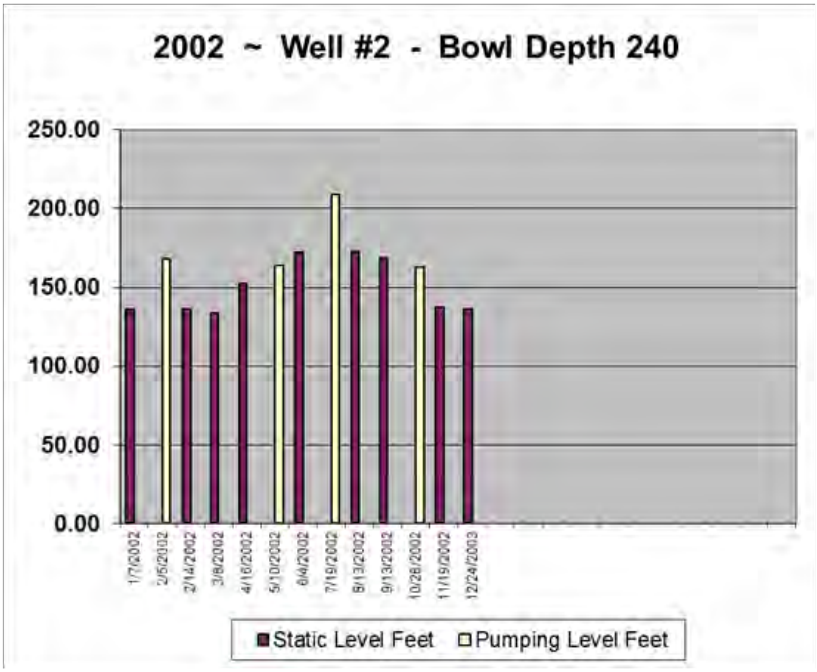

Well #2 - 2000 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/30/2000
4/7/2000
4/13/2000
4/24/2000
5/4/2000
5/23/2000
6/9/2000
6/20/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2000
Static Level
Pumping Level

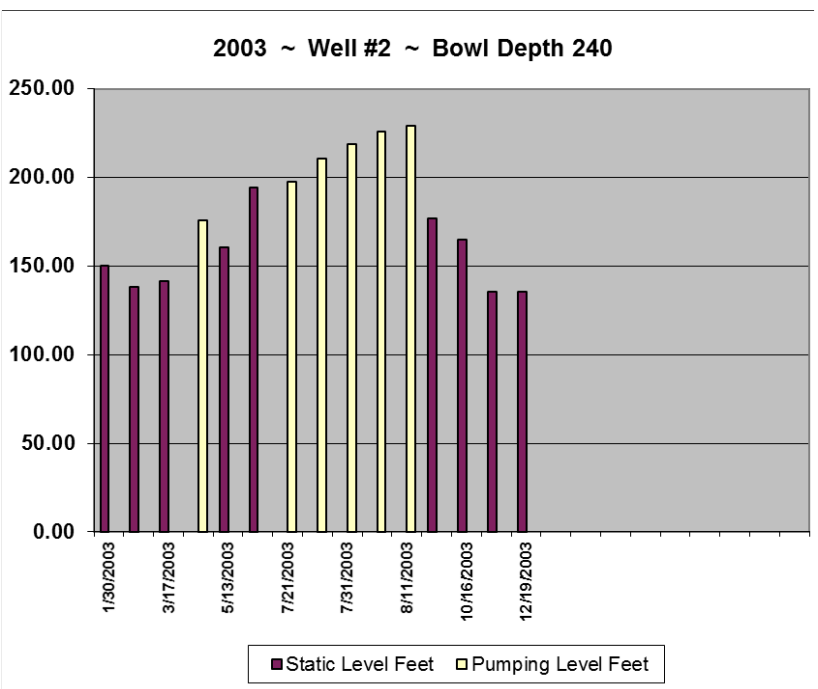

Well # 2 ~ 2001 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
4/5/2001
5/7/2001
6/18/2001
7/8/2001
7/13/2001
8/14/2001
10/22/2001
12/7/2001
Date
2/5/2002
3/8/2002
5/10/2002
Static Level Feet
Pumping Level Feet

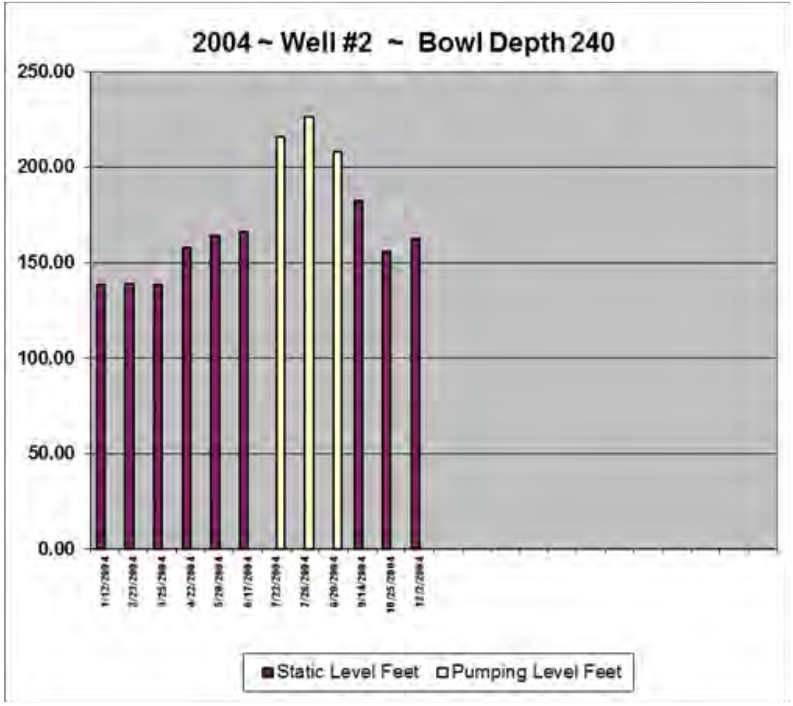

Well #2 - 2000 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/30/2000
4/7/2000
4/13/2000
4/24/2000
5/4/2000
5/23/2000
6/9/2000
6/20/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2000
Static Level
Pumping Level

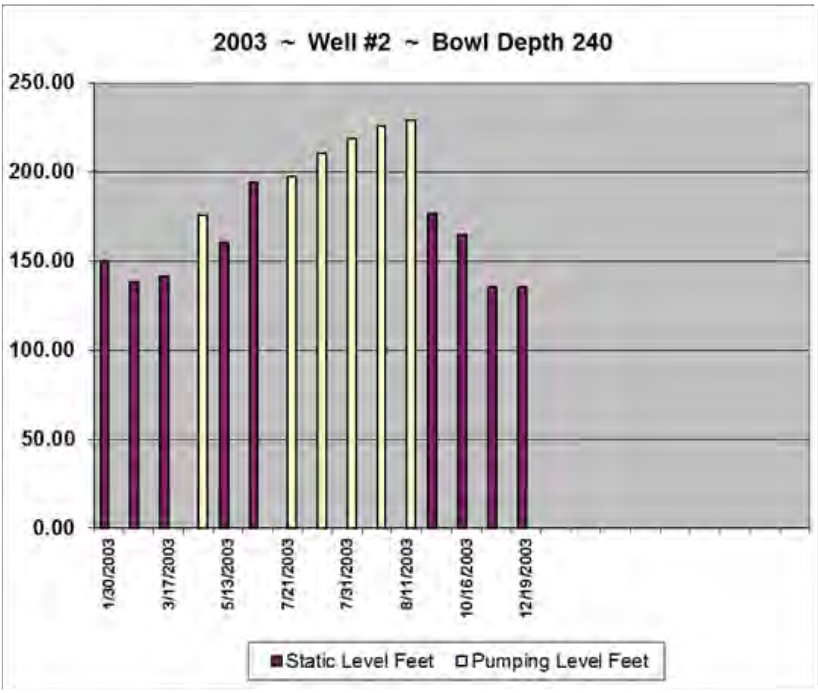

2002 ~ Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
2/5/2002
2/14/2002
3/8/2002
4/16/2002
5/10/2002
6/4/2002
7/19/2002
8/13/2002
9/13/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

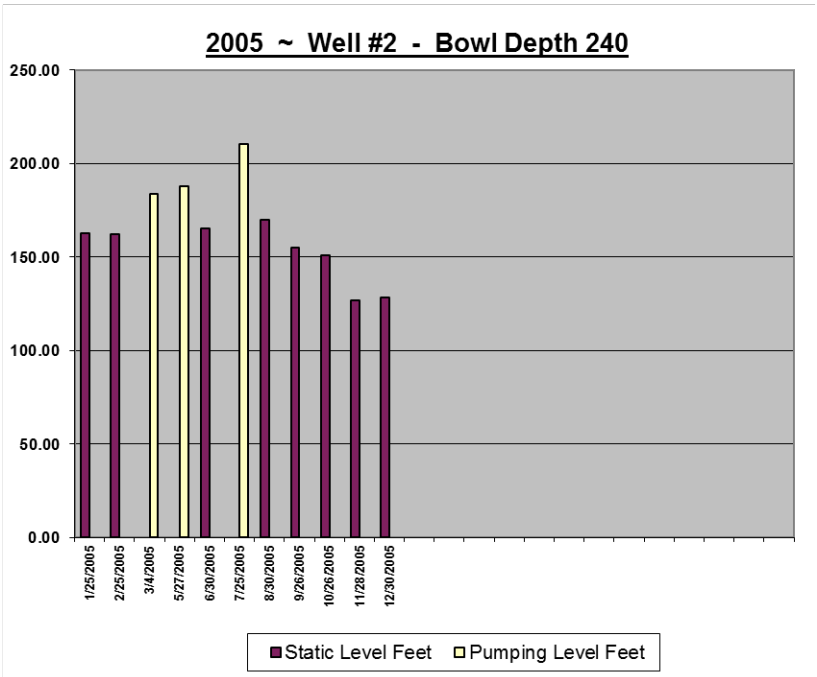

Well # 2 ~ 2001 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
4/5/2001
5/7/2001
6/18/2001
7/8/2001
7/13/2001
8/14/2001
10/22/2001
12/7/2001
Date
2/5/2002
3/8/2002
5/10/2002
Static Level Feet
Pumping Level Feet

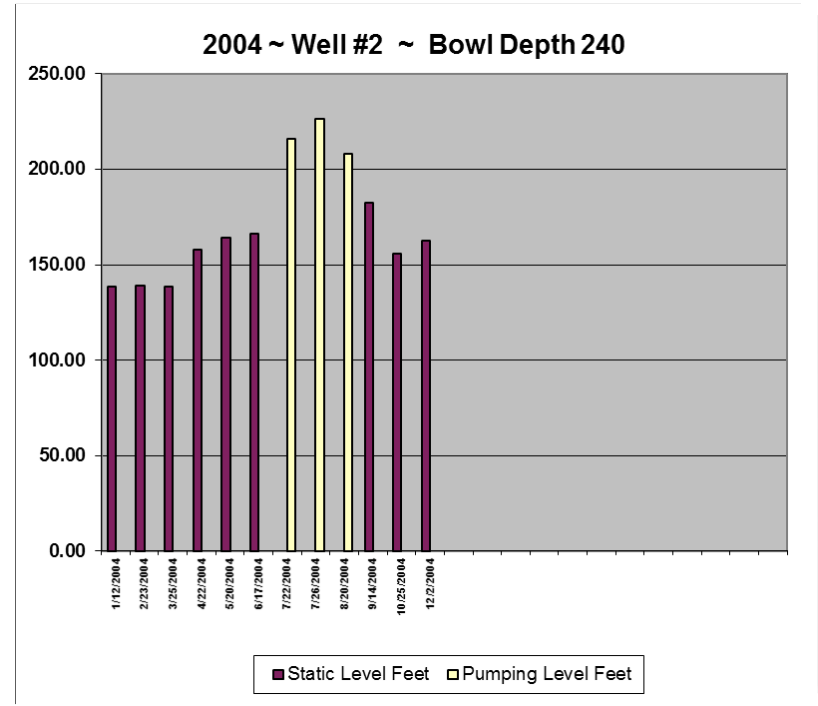

2002 ~ Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
2/5/2002
2/14/2002
3/8/2002
4/16/2002
5/10/2002
6/4/2002
7/19/2002
8/13/2002
9/13/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

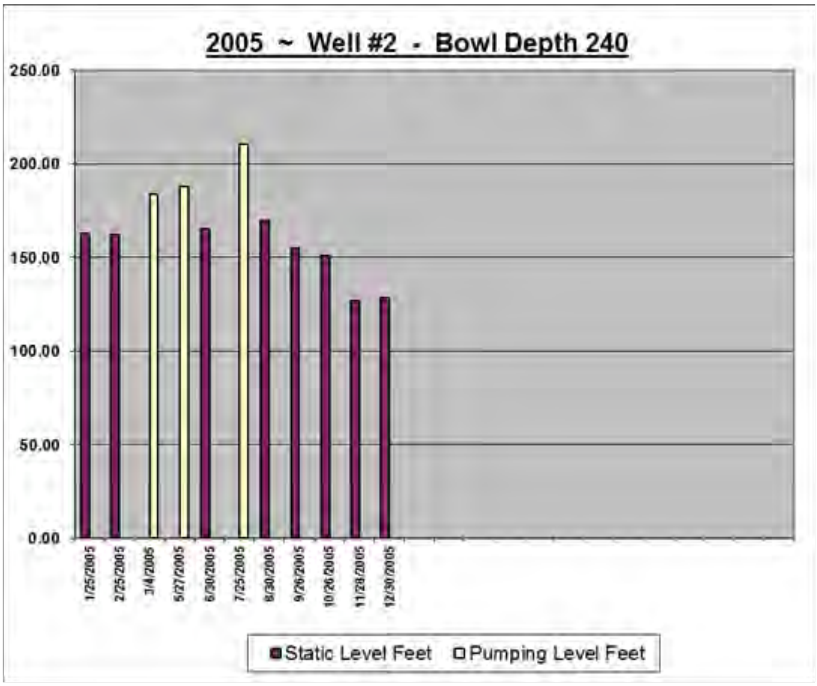

2003 ~ Well #2 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
3/17/2003
5/13/2003
7/21/2003
7/31/2003
8/11/2003
10/16/2003
12/19/2003
Static Level Feet
Pumping Level Feet

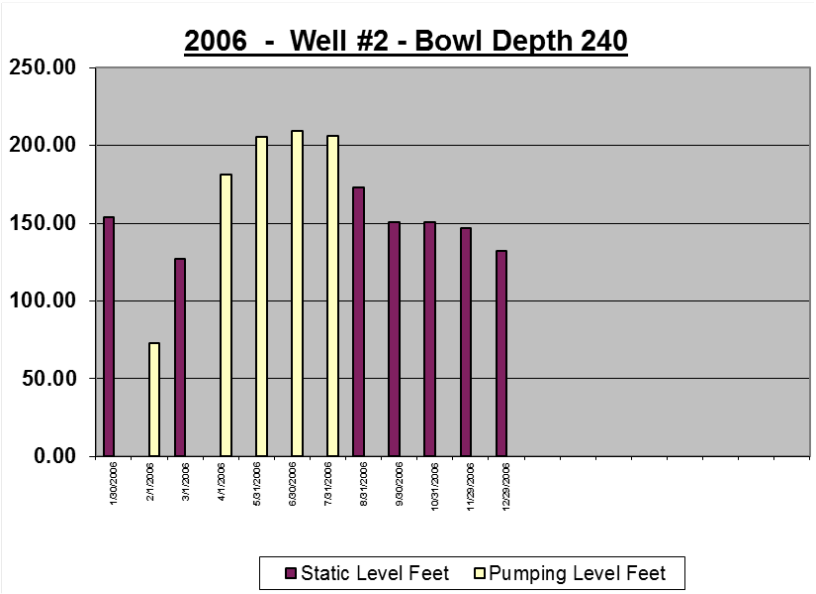

2004 ~ Well #2 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

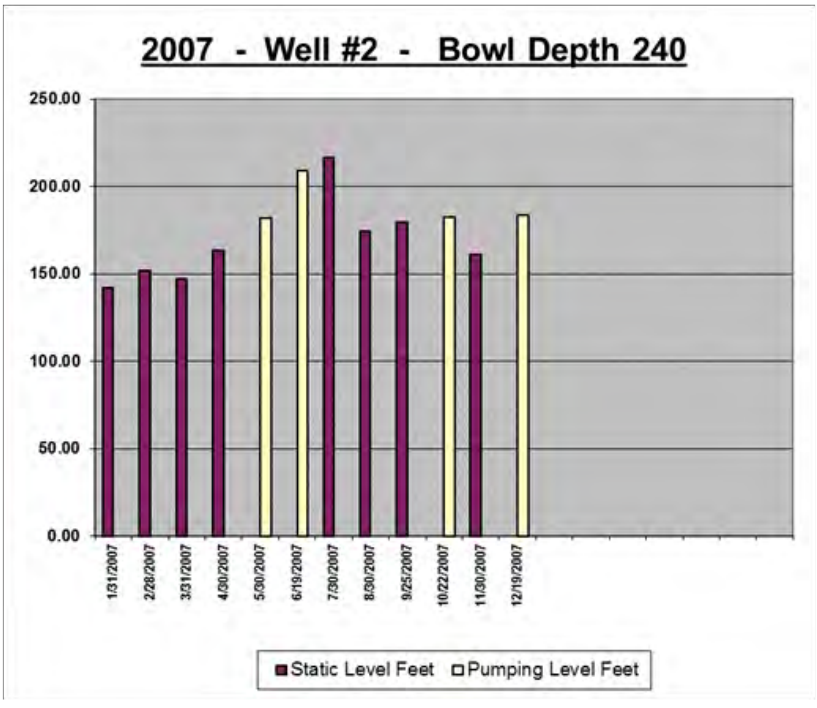

2003 ~ Well #2 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
3/17/2003
5/13/2003
7/21/2003
7/31/2003
8/11/2003
10/16/2003
12/19/2003
Static Level Feet
Pumping Level Feet

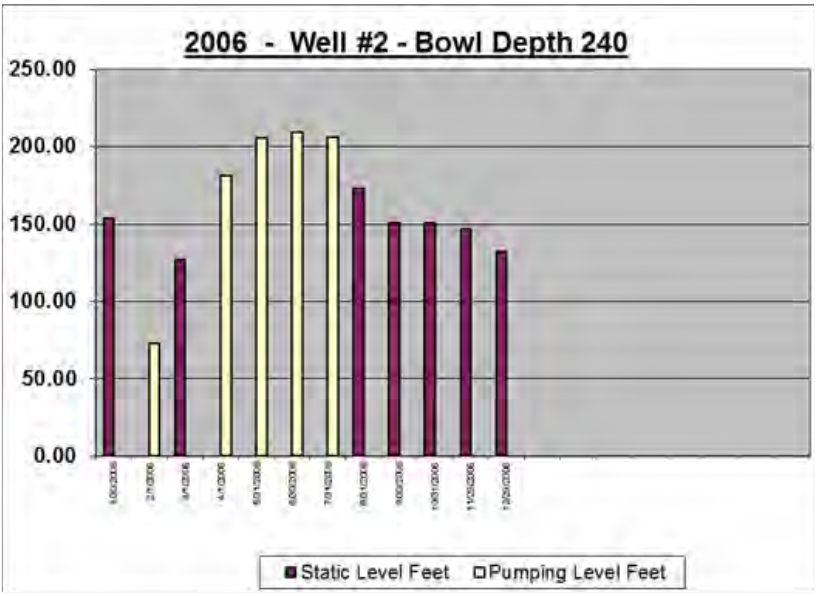

2005 ~ Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

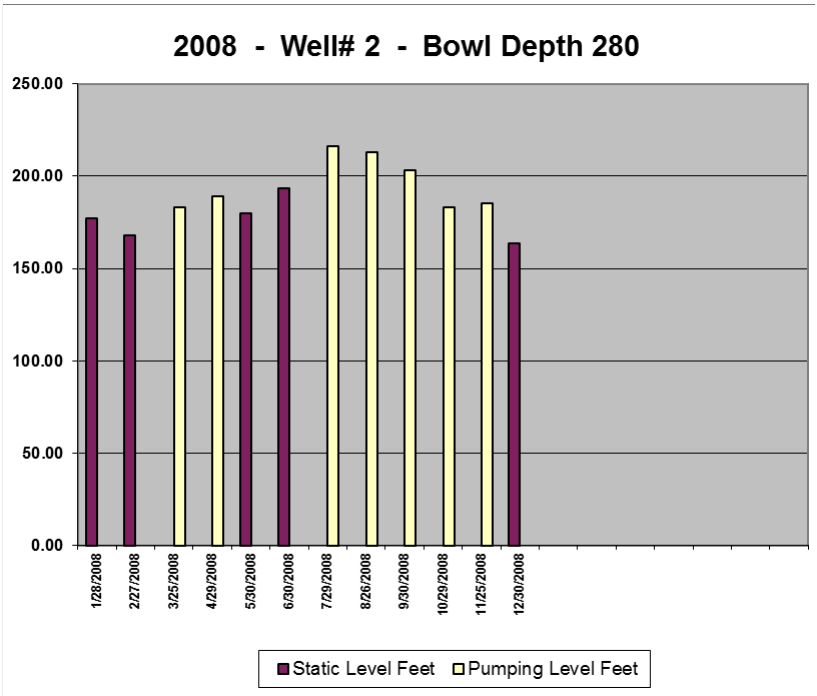

2004 ~ Well #2 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
7/26/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

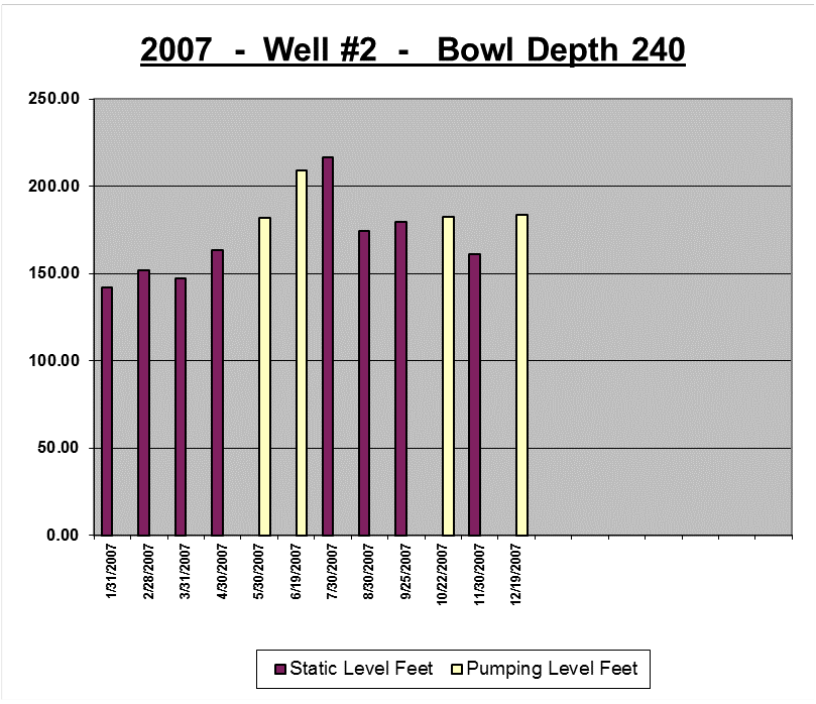

2005 ~ Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

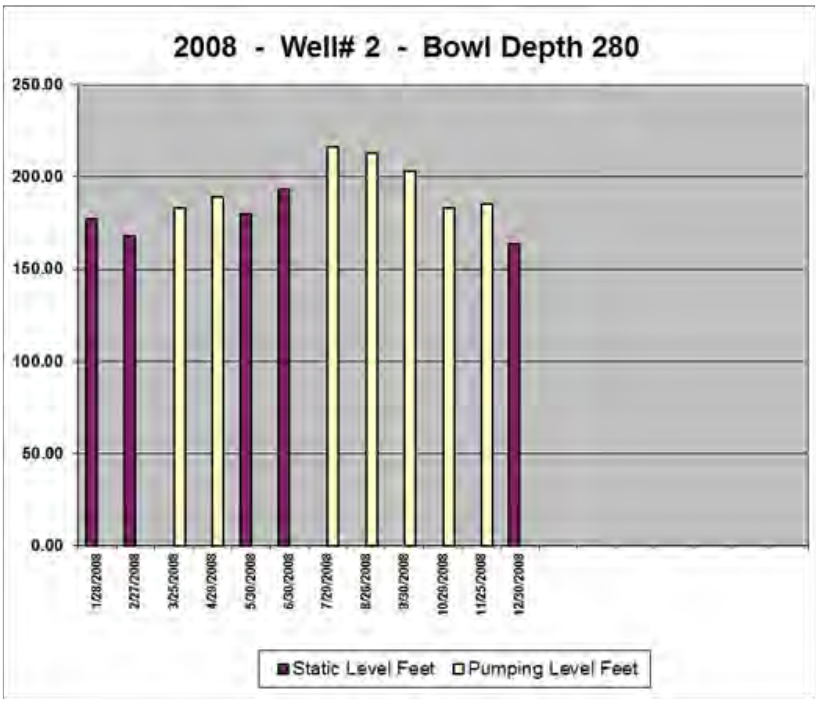

2006 - Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

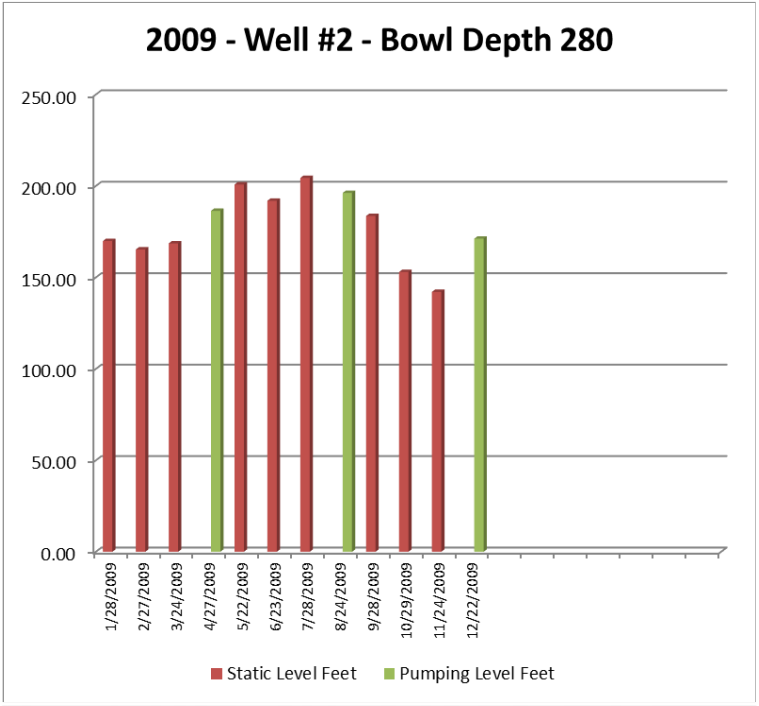

2007 - Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/30/2007
6/19/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

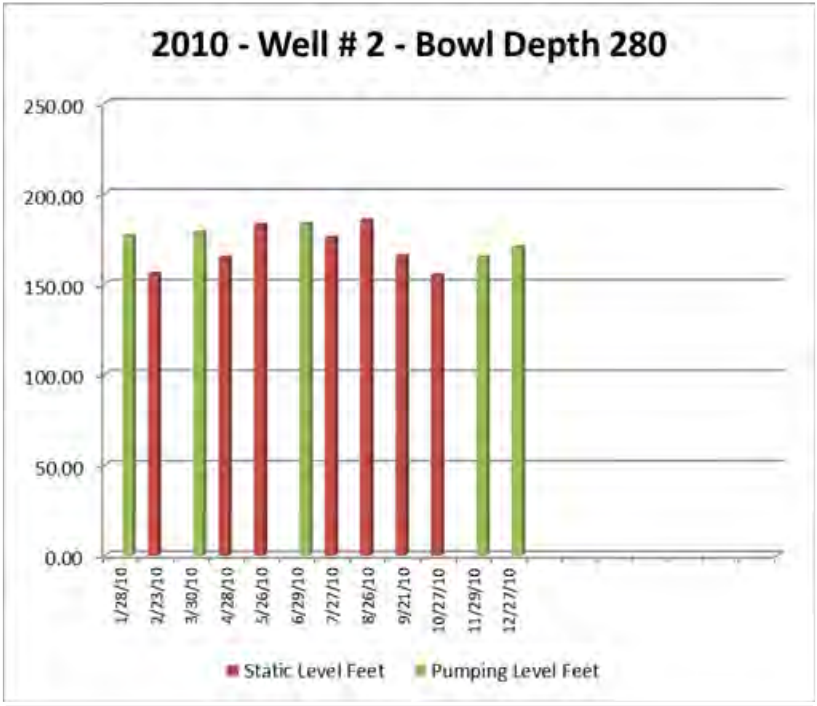

2006 - Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

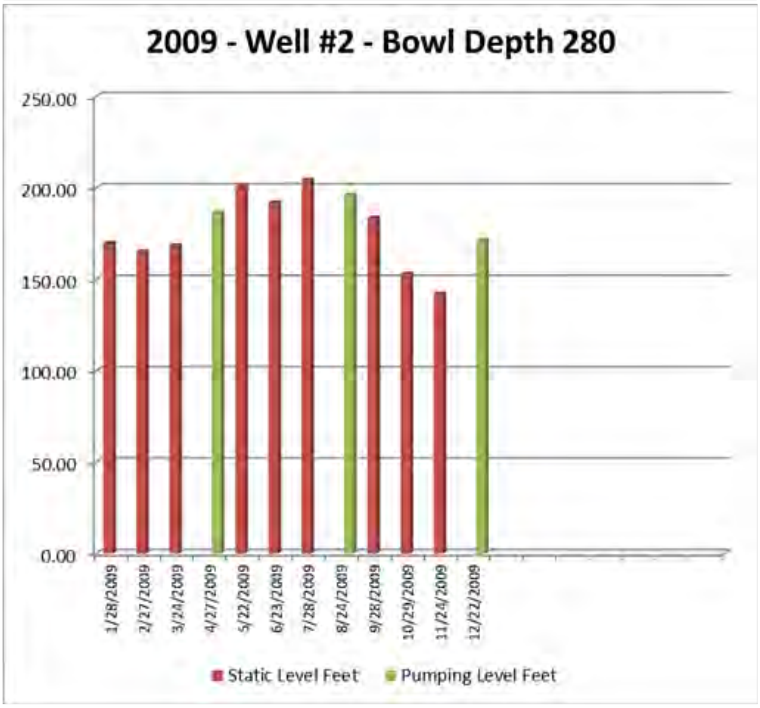

2008 - Well# 2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

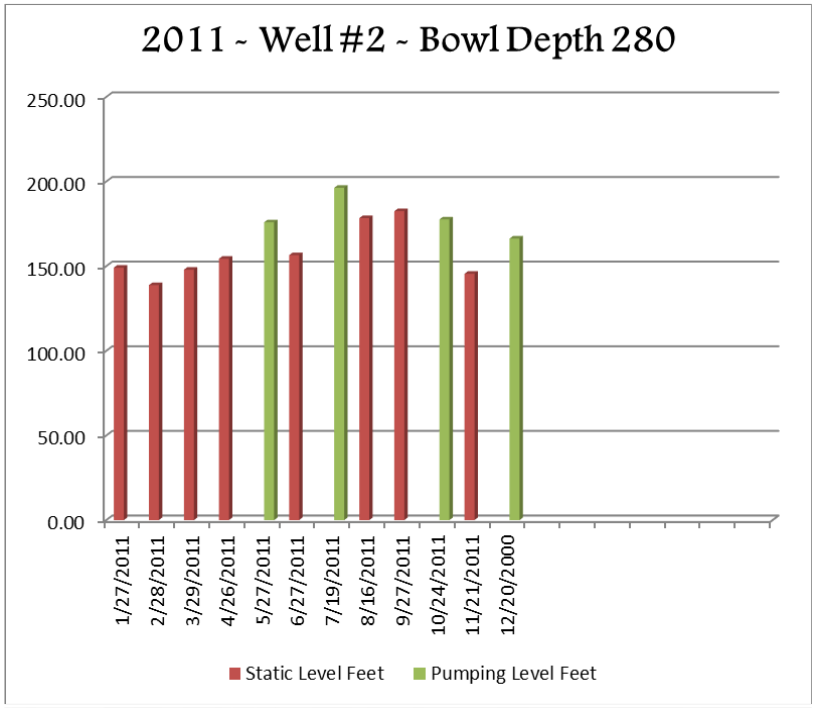

2007 - Well #2 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/30/2007
6/19/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

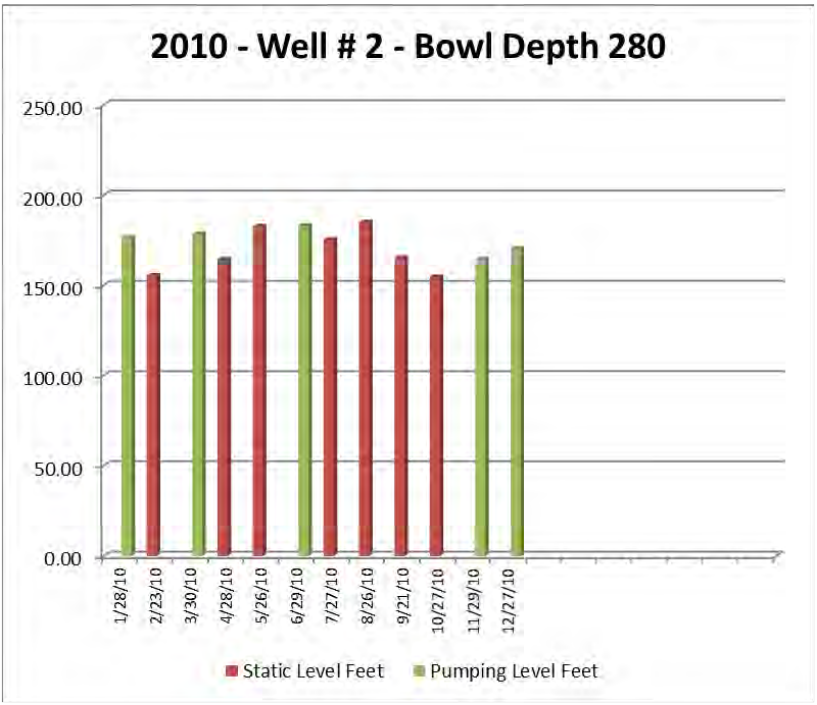

2008 - Well# 2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

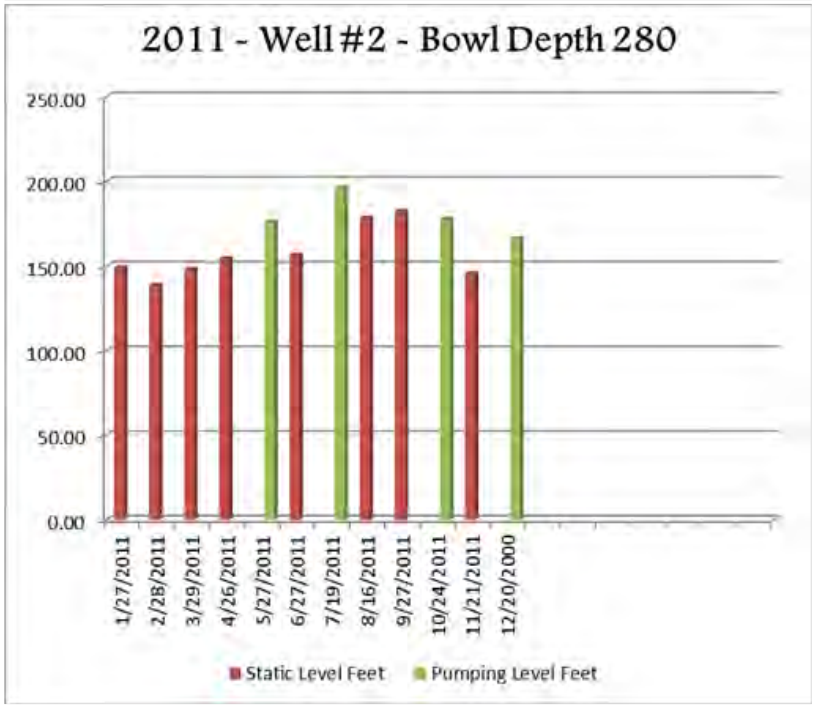

2009 - Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

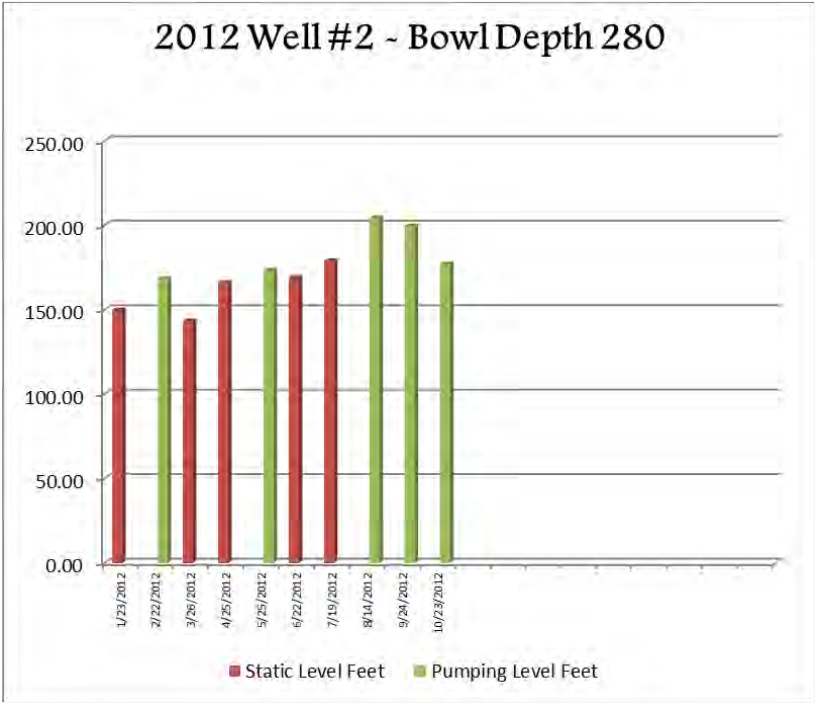

2010 - Well # 2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/10
2/23/10
3/30/10
4/28/10
5/26/10
6/29/10
7/27/10
8/26/10
9/21/10
10/27/10
11/29/10
12/27/10
Static Level Feet
Pumping Level Feet

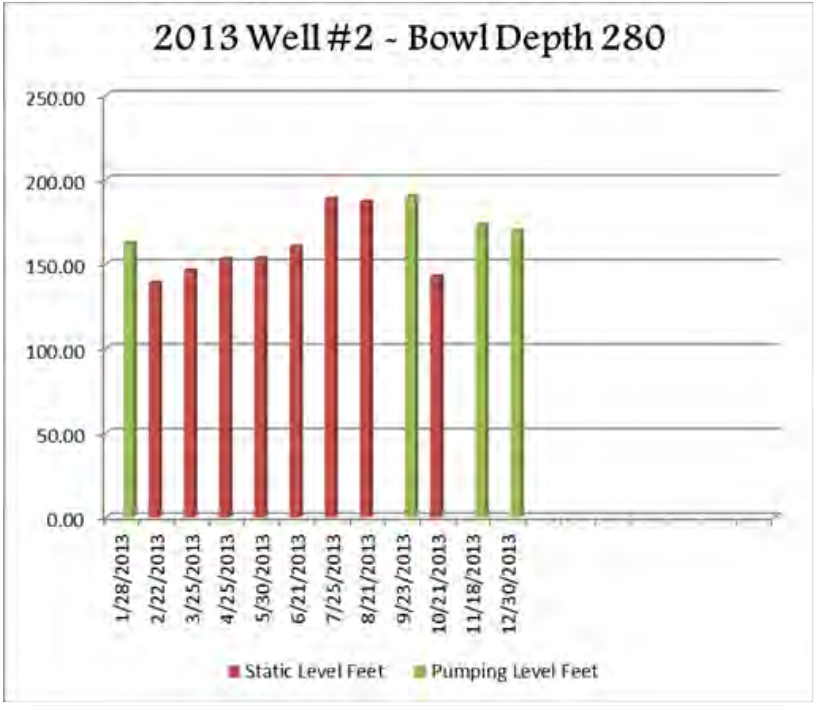

2009 - Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

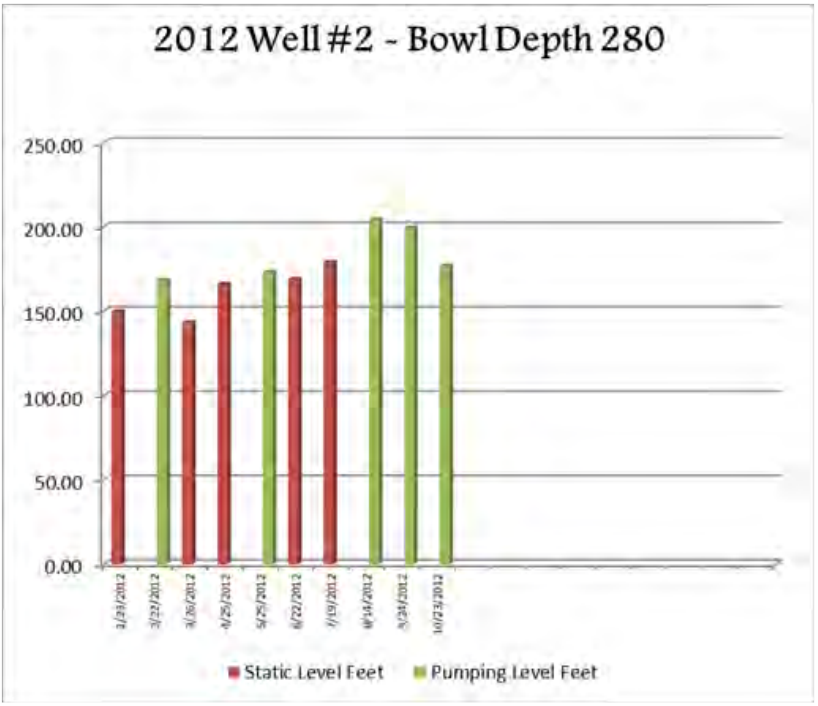

2011 - Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/21/2011
12/20/2000
Static Level Feet
Pumping Level Feet

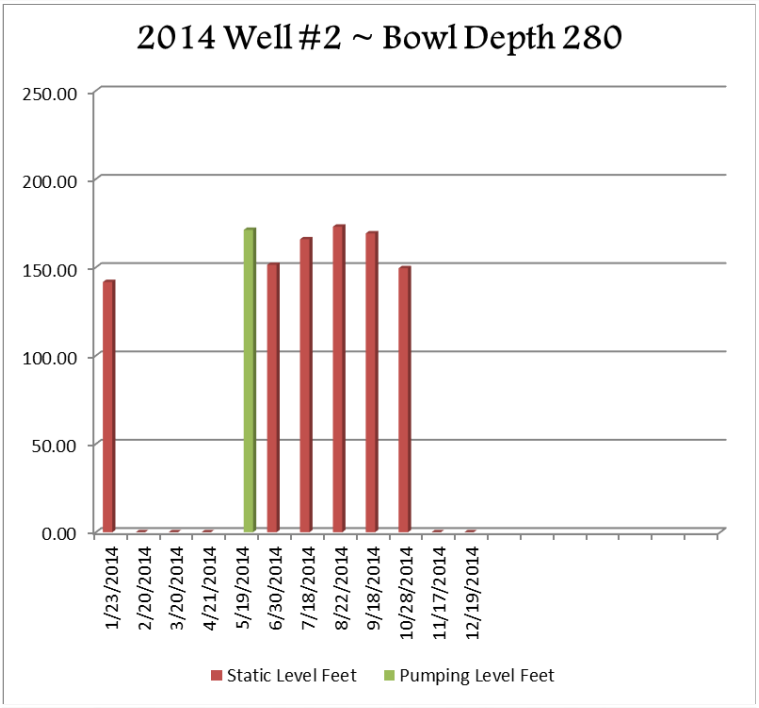

2010 - Well # 2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/10
2/23/10
3/30/10
4/28/10
5/26/10
6/29/10
7/27/10
8/26/10
9/21/10
10/27/10
11/29/10
12/27/10
Static Level Feet
Pumping Level Feet

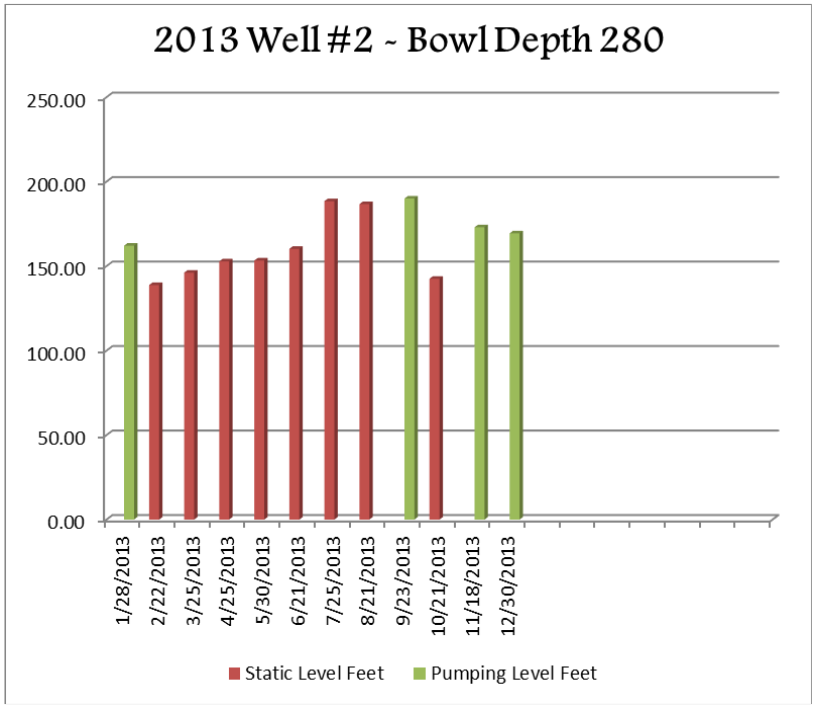

2011 - Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/21/2011
12/20/2000
Static Level Feet
Pumping Level Feet

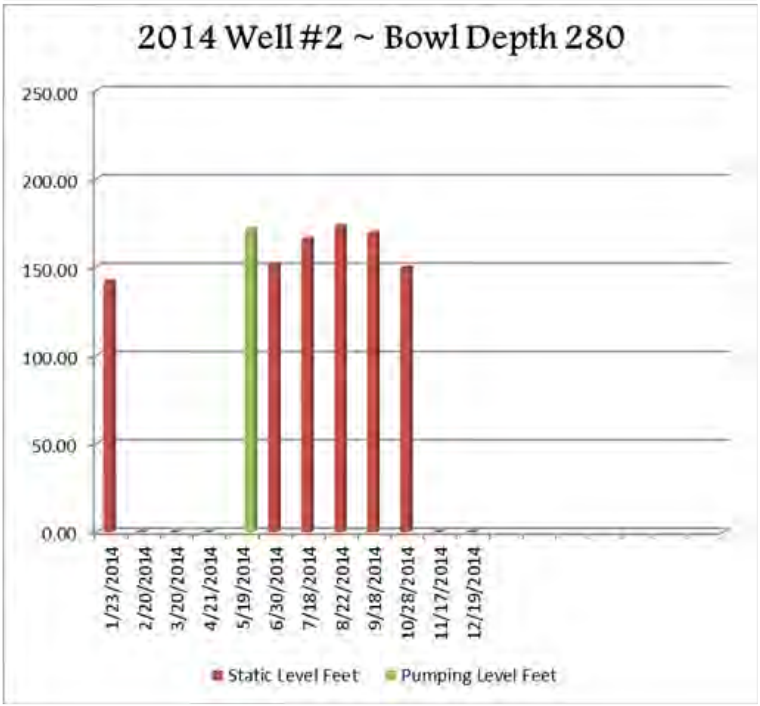

2012 Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/22/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

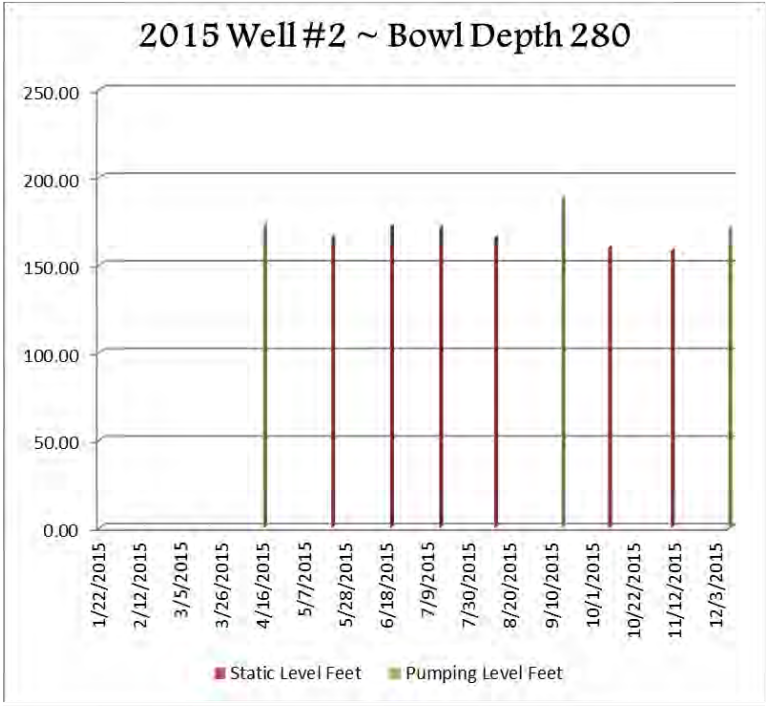

2013 Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

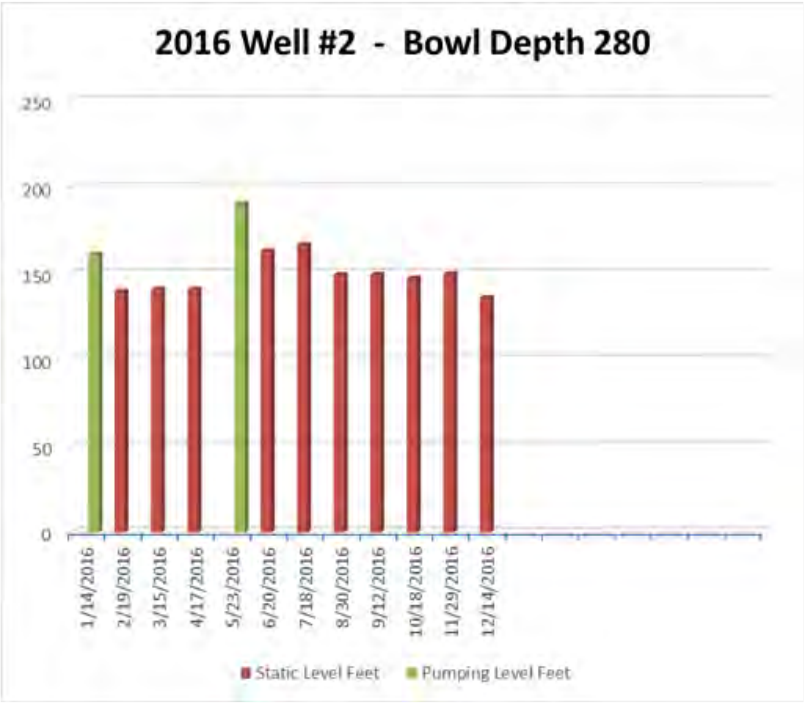

2012 Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

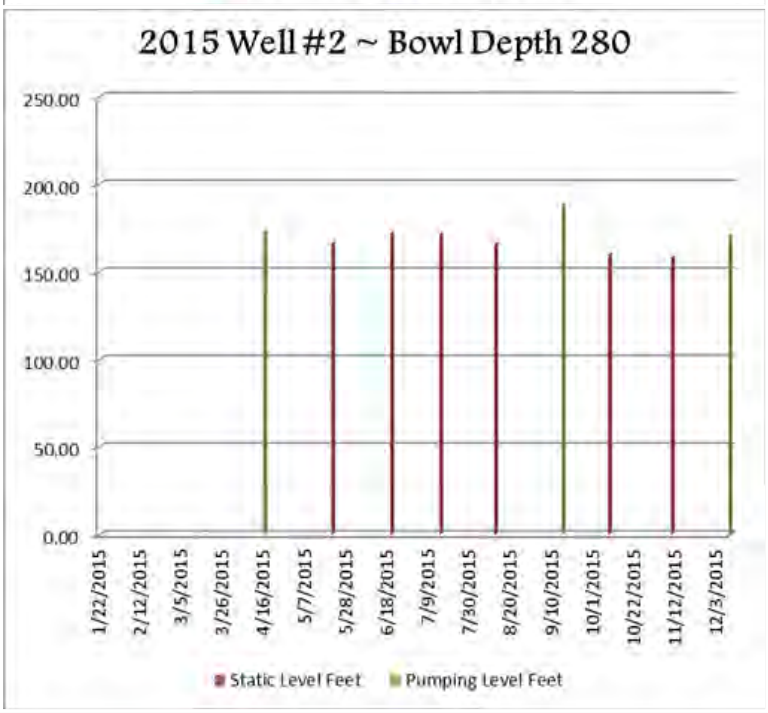

2014 Well #2 ~ Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

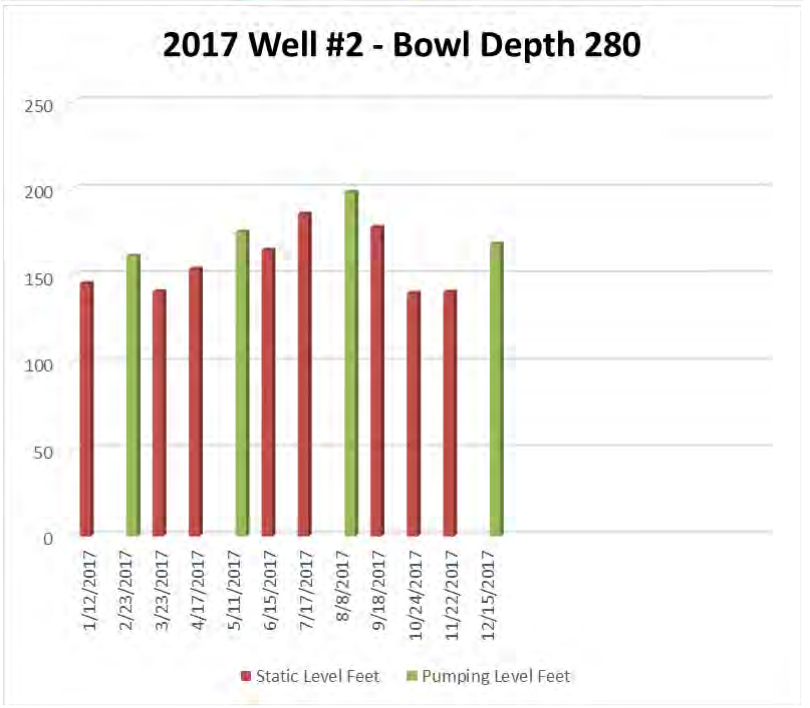

2013 Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

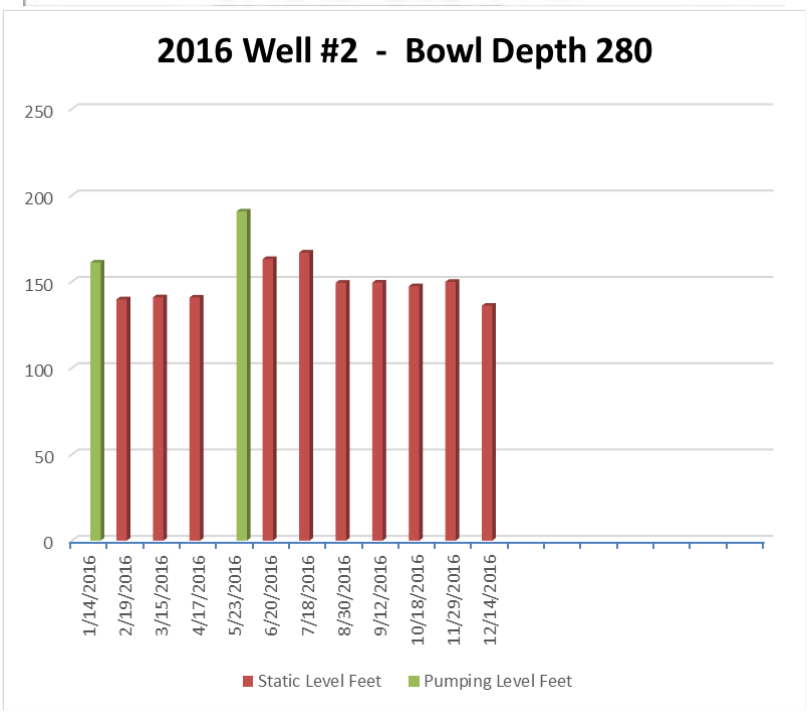

2014 Well #2 ~ Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

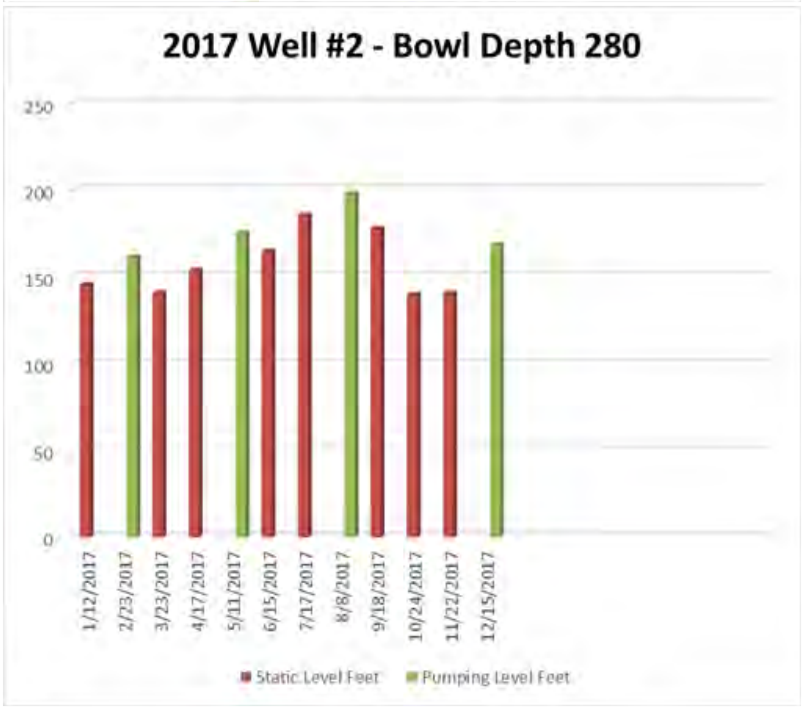

2015 Well #2 ~ Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/5/2015
3/26/2015
4/16/2015
5/7/2015
5/28/2015
6/18/2015
7/9/2015
7/30/2015
8/20/2015
9/10/2015
10/1/2015
10/22/2015
11/12/2015
12/3/2015
Static Level Feet
Pumping Level Feet

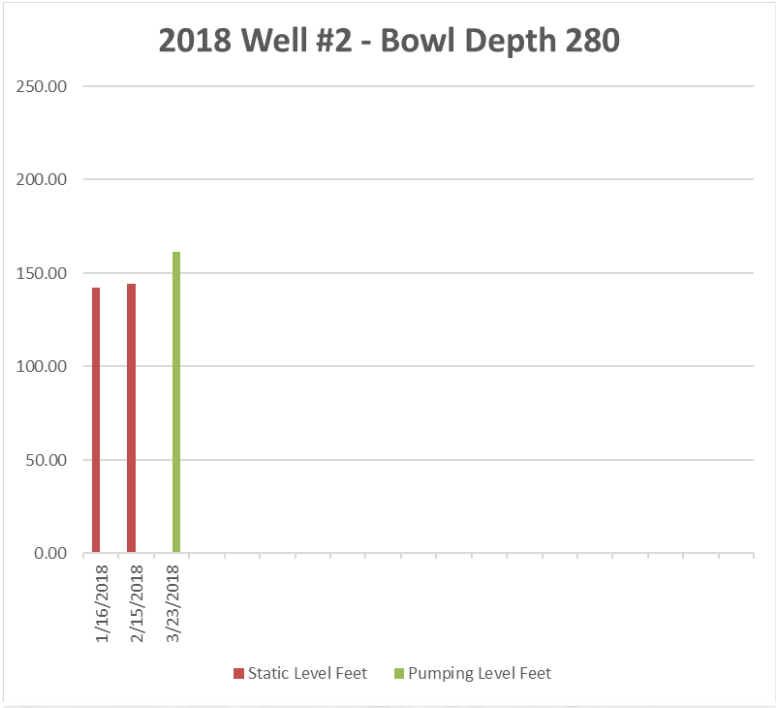

2016 Well #2 - Bowl Depth 280
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

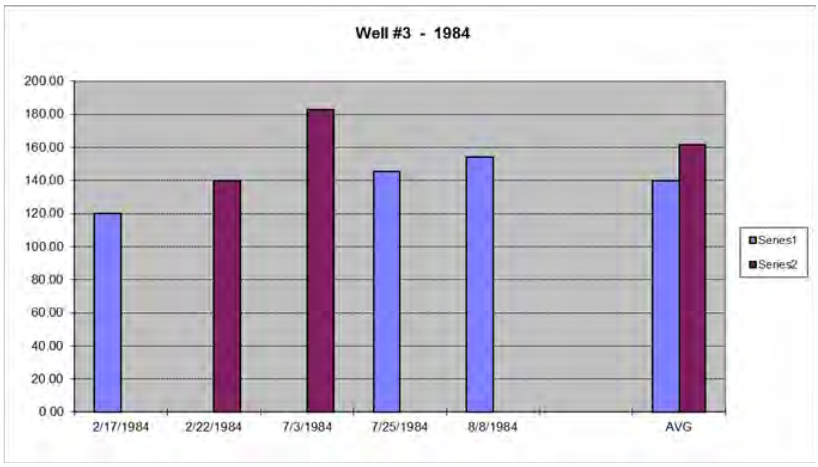

2015 Well #2 ~ Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/5/2015
3/26/2015
4/16/2015
5/7/2015
5/28/2015
6/18/2015
7/9/2015
7/30/2015
8/20/2015
9/10/2015
10/1/2015
10/22/2015
11/12/2015
12/3/2015
Static Level Feet
Pumping Level Feet

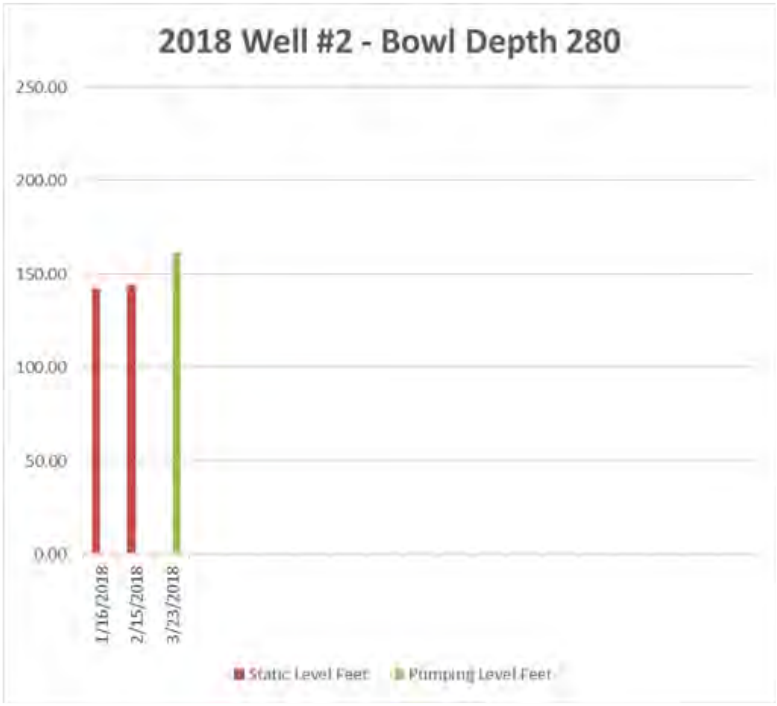

2017 Well #2 - Bowl Depth 280
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

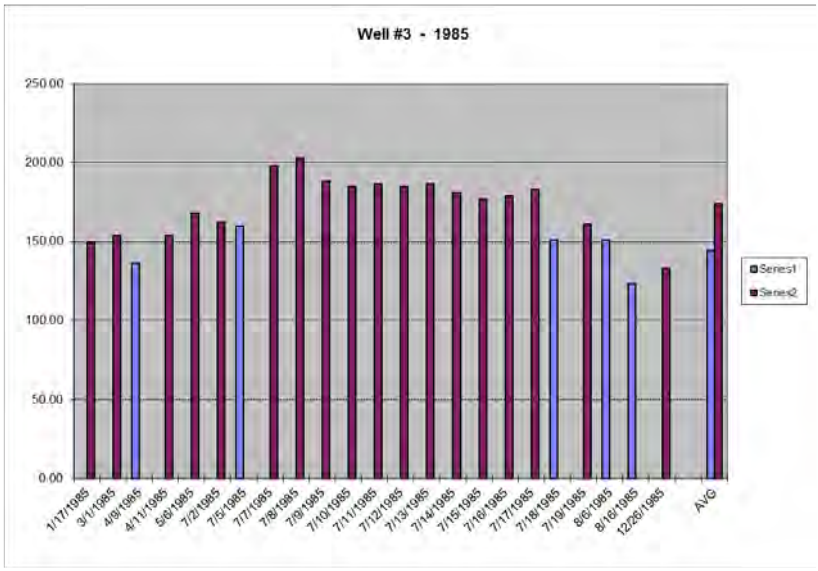

2016 Well #2 - Bowl Depth 280
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

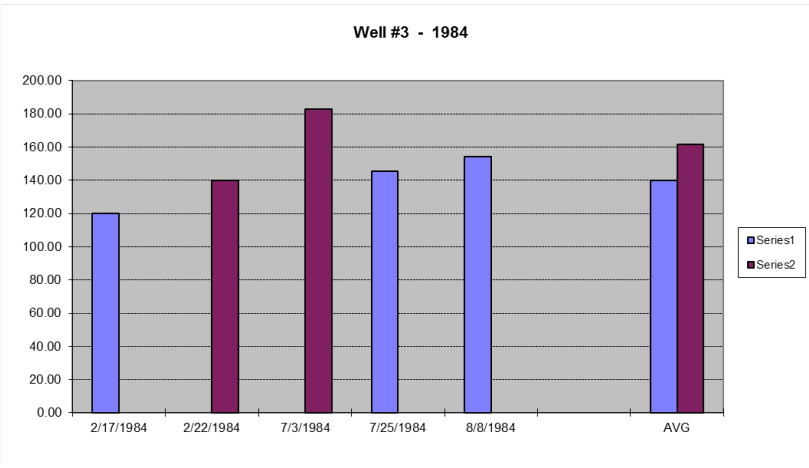

2017 Well #2 - Bowl Depth 280
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

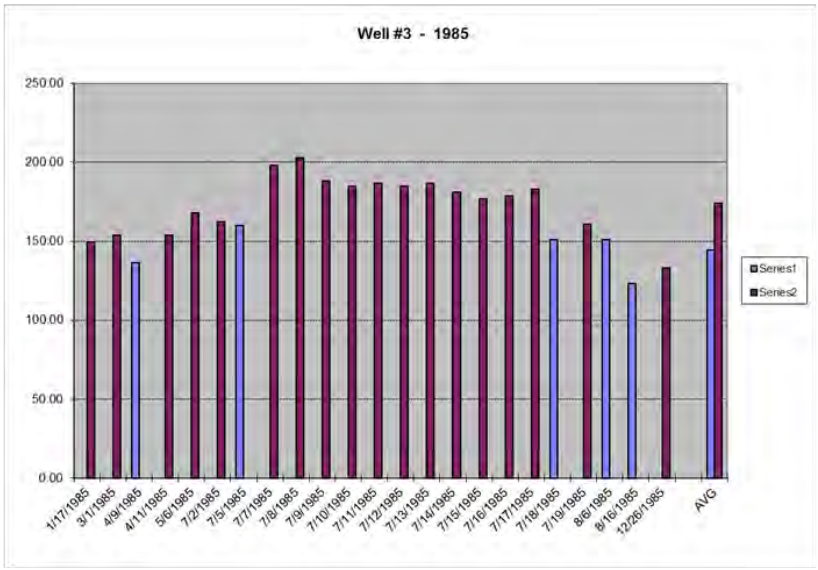

2018 Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

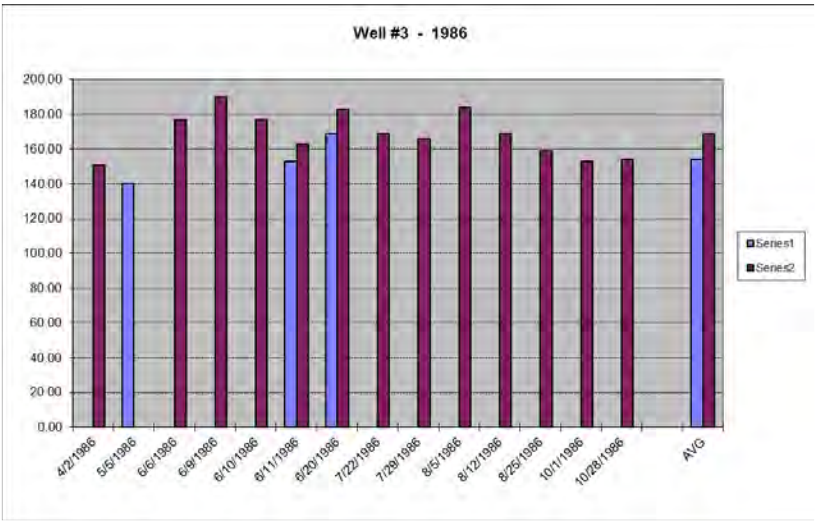

Well #3 - 1984
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/17/1984
2/22/1984
7/3/1984
7/25/1984
8/8/1984
AVG
Series1
Series2

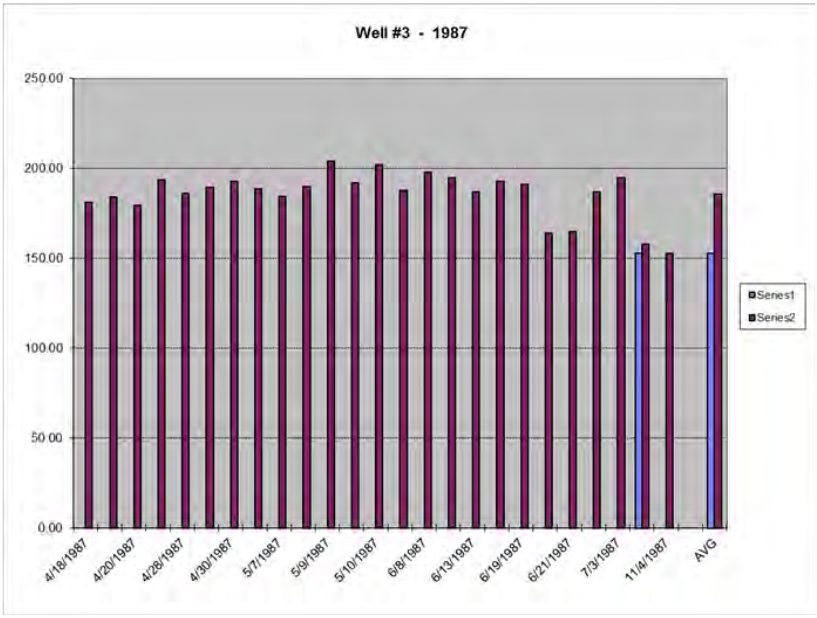

2018 Well #2 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

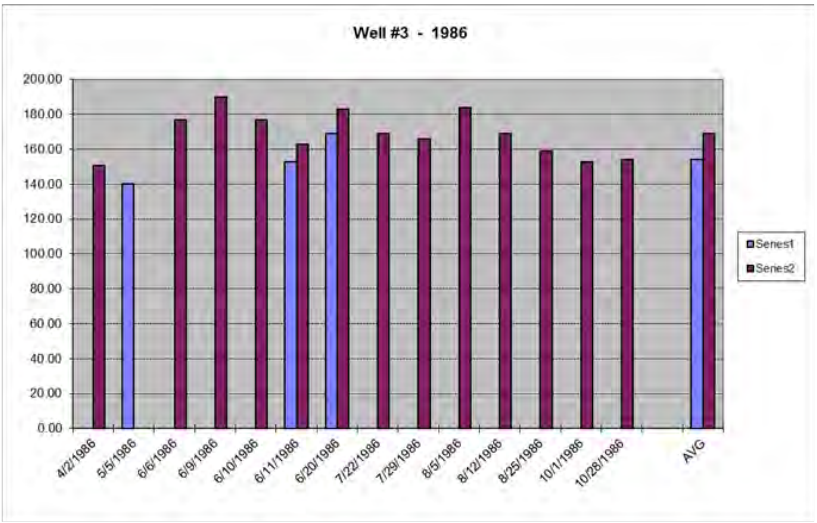

Well #3 - 1985
250.00
200.00
150.00
100.00
50.00
0.00
1/17/1985
3/1/1985
4/9/1985
4/11/1985
5/6/1985
7/2/1985
7/5/1985
7/7/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/13/1985
7/14/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
12/26/1985
AVG
Series1
Series2

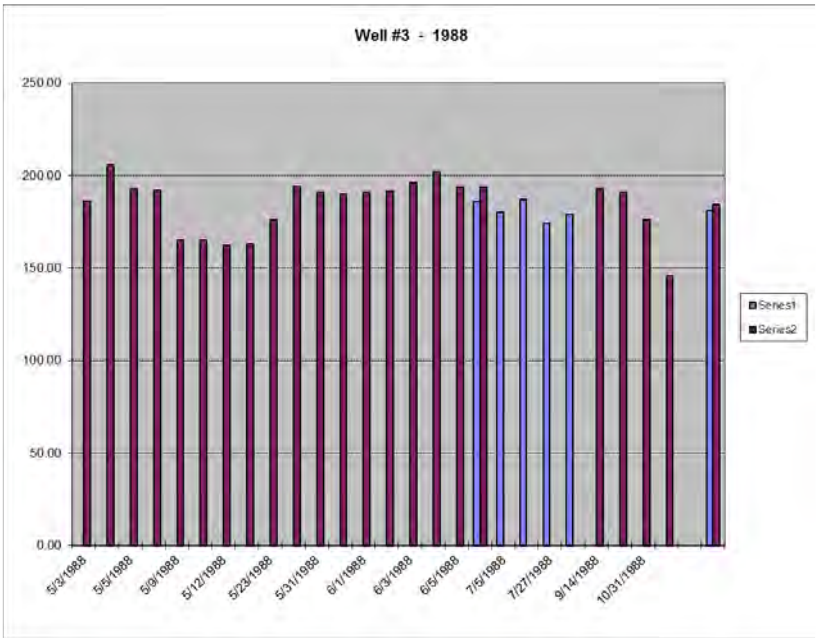

Well #3 - 1984
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/17/1984
2/22/1984
7/3/1984
7/25/1984
8/8/1984
AVG
Series1
Series2

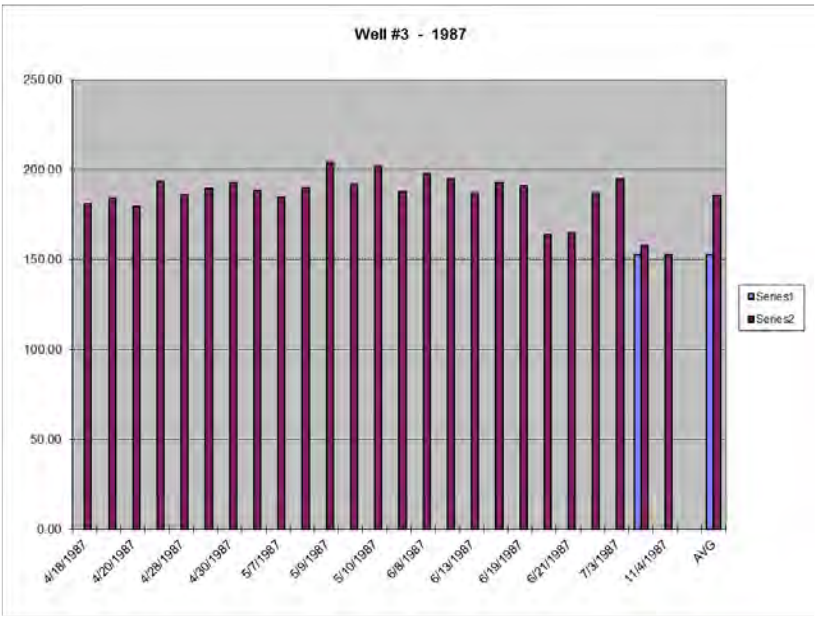

Well #3 - 1985
250.00
200.00
150.00
100.00
50.00
0.00
1/17/1985
3/1/1985
4/9/1985
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5/6/1985
7/2/1985
7/5/1985
7/7/1985
7/8/1985
7/9/1985
7/10/1985
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7/13/1985
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7/15/1985
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7/18/1985
7/19/1985
8/6/1985
8/16/1985
12/26/1985
AVG
Series1
Series2

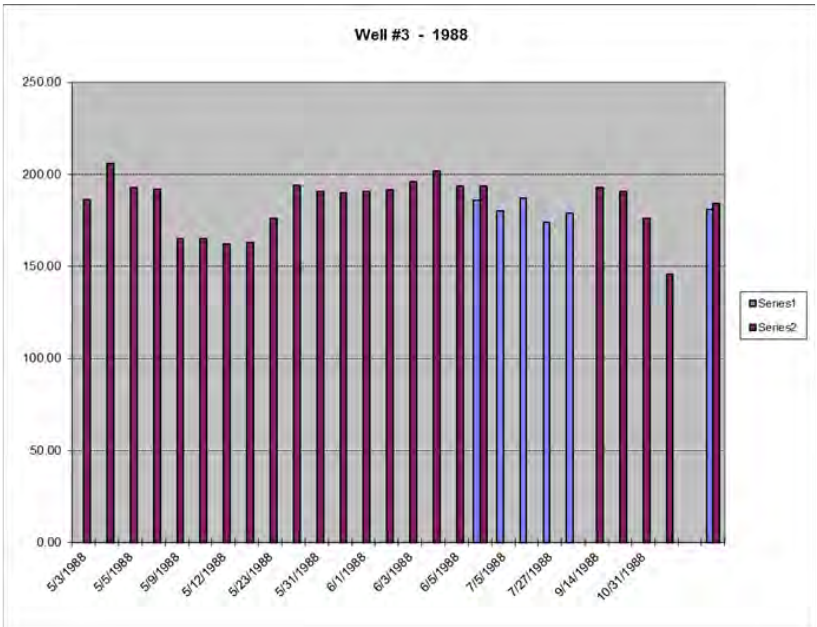

Well #3 - 1986
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/2/1986
5/5/1986
6/6/1986
6/9/1986
6/10/1986
6/11/1986
6/20/1986
7/22/1986
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8/5/1986
8/12/1986
8/25/1986
10/1/1986
10/28/1986
AVG
Series1
Series2

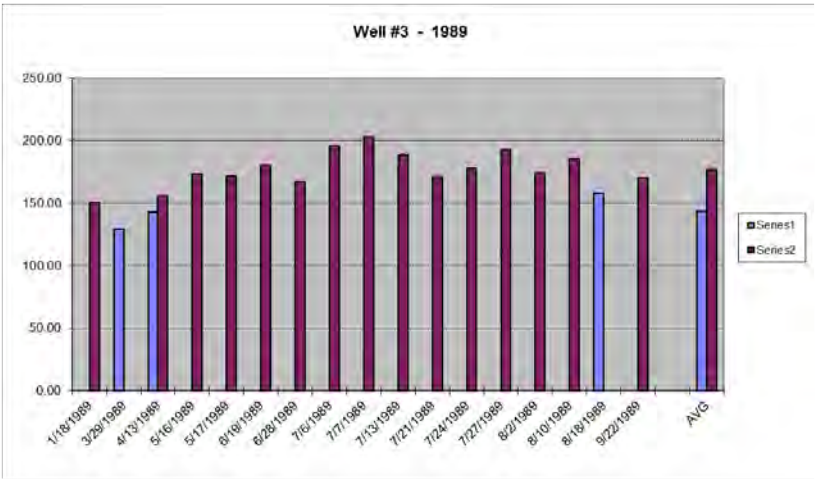

Well #3 - 1987
250.00
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150.00
100.00
50.00
0.00
4/18/1987
4/20/1987
4/28/1987
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5/7/1987
5/9/1987
5/10/1987
6/8/1987
6/13/1987
6/19/1987
6/21/1987
7/3/1987
11/4/1987
AVG
Series1
Series2

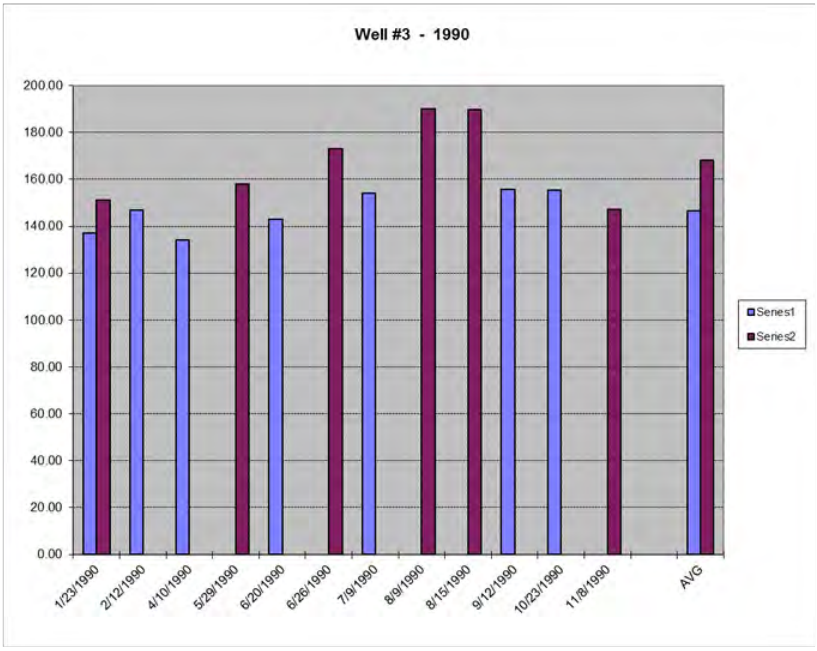

Well #3 - 1986
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/2/1986
5/5/1986
6/6/1986
6/9/1986
6/10/1986
6/11/1986
6/20/1986
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8/5/1986
8/12/1986
8/25/1986
10/1/1986
10/28/1986
AVG
Series1
Series2

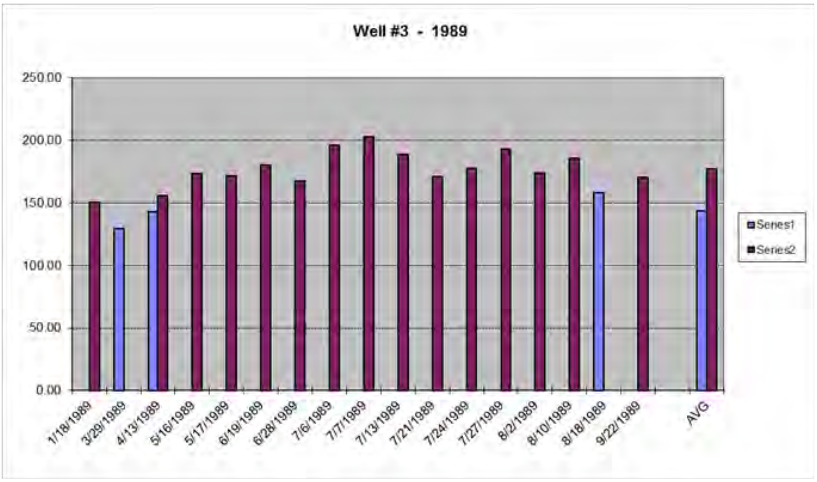

Well #3 - 1988
250.00
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150.00
100.00
50.00
0.00
5/3/1988
5/5/1988
5/9/1988
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5/23/1988
5/31/1988
6/1/1988
6/3/1988
6/5/1988
7/5/1988
7/27/1988
9/14/1988
10/31/1988
Series1
Series2

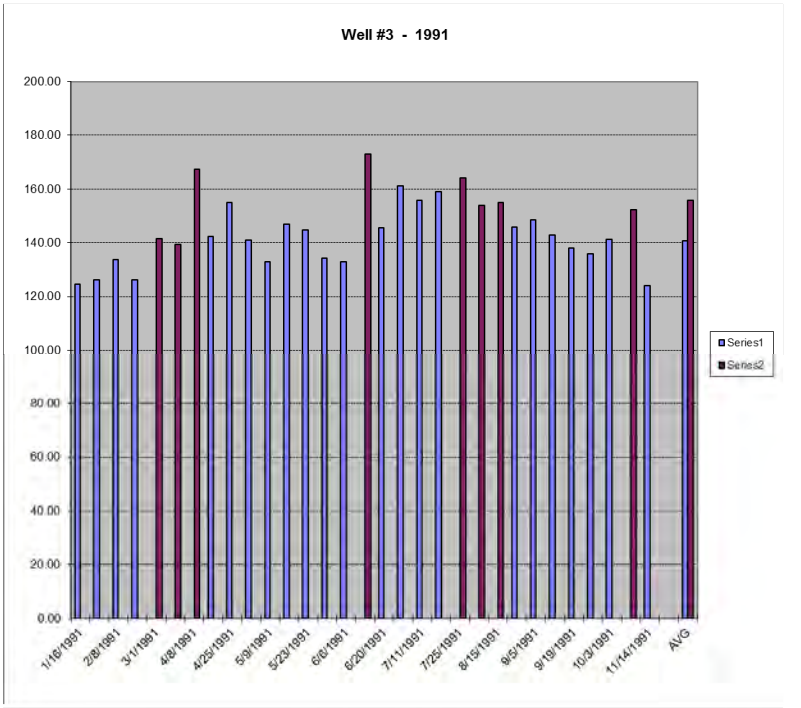

Well #3 - 1987
250.00
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150.00
100.00
50.00
0.00
4/18/1987
4/20/1987
4/28/1987
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5/7/1987
5/9/1987
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6/13/1987
6/19/1987
6/21/1987
7/3/1987
11/4/1987
AVG
Series1
Series2

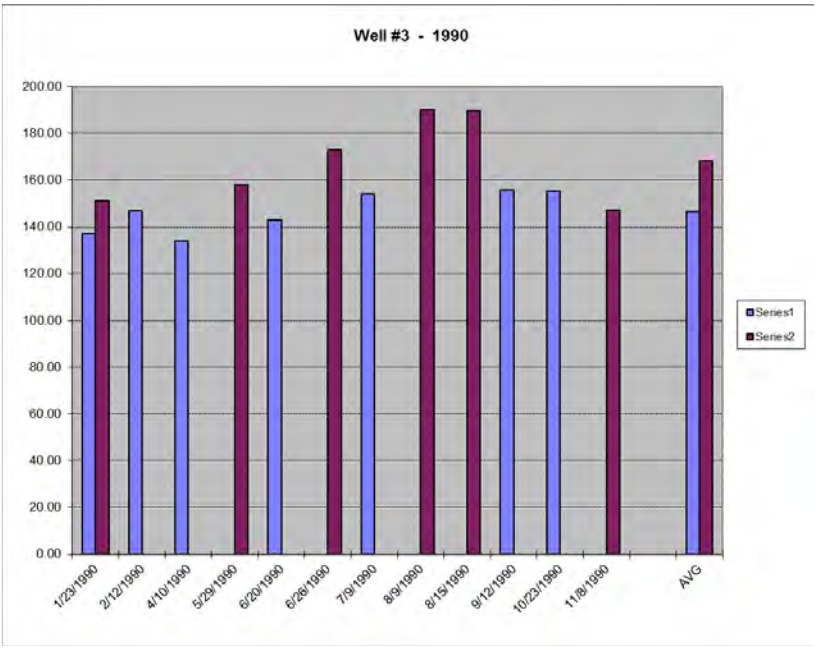

Well #3 - 1988
250.00
200.00
150.00
100.00
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5/3/1988
5/5/1988
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5/23/1988
5/31/1988
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6/3/1988
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7/5/1988
7/27/1988
9/14/1988
10/31/1988
Series1
Series2

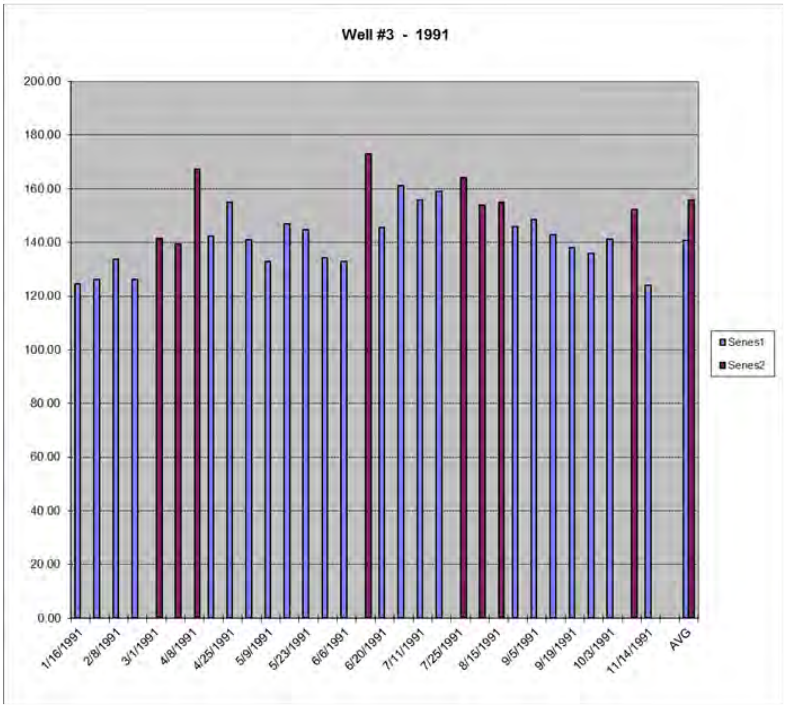

Well #3 - 1989
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100.00
50.00
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3/29/1989
4/13/1989
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5/17/1989
6/19/1989
6/28/1989
7/6/1989
7/7/1989
7/13/1989
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7/27/1989
8/2/1989
8/10/1989
8/18/1989
9/22/1989
AVG
Series1
Series2

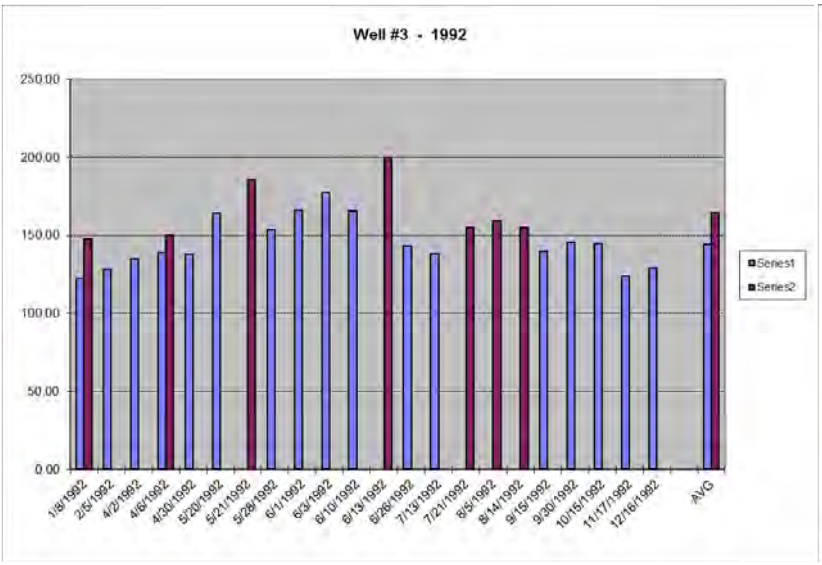

Well #3 - 1990
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40.00
20.00
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1/23/1990
2/12/1990
4/10/1990
5/29/1990
6/20/1990
6/26/1990
7/9/1990
8/9/1990
8/15/1990
9/12/1990
10/23/1990
11/8/1990
AVG
Series1
Series2

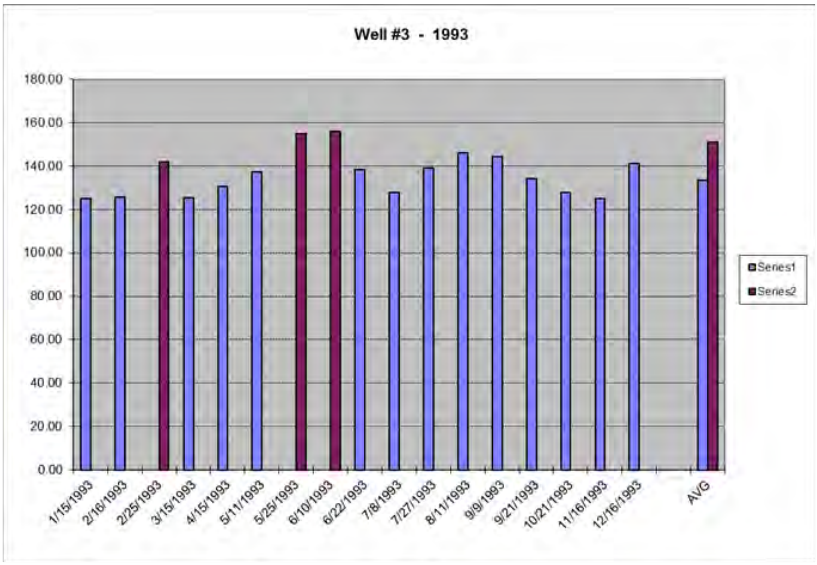

Well #3 - 1989
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150.00
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1/18/1989
3/29/1989
4/13/1989
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5/17/1989
6/19/1989
6/28/1989
7/6/1989
7/7/1989
7/13/1989
7/21/1989
7/24/1989
7/27/1989
8/2/1989
8/10/1989
8/18/1989
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Series1
Series2

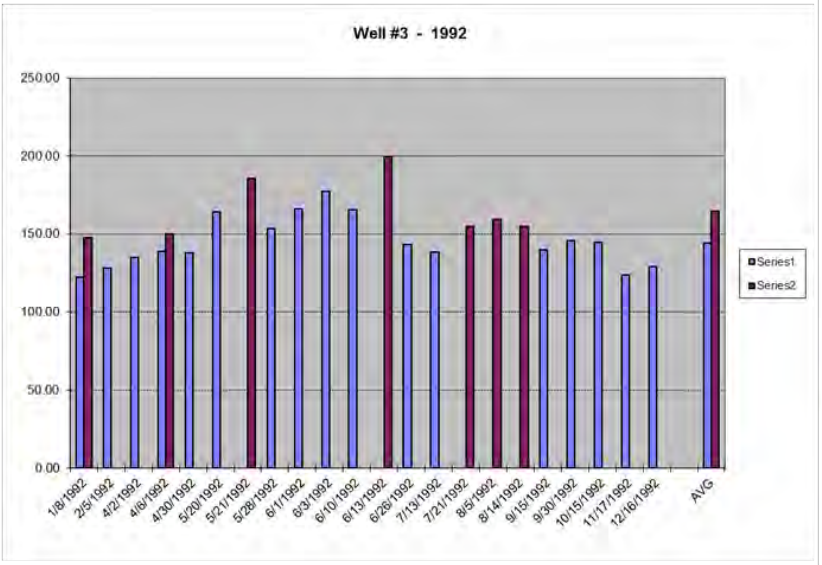

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Series1
Series2

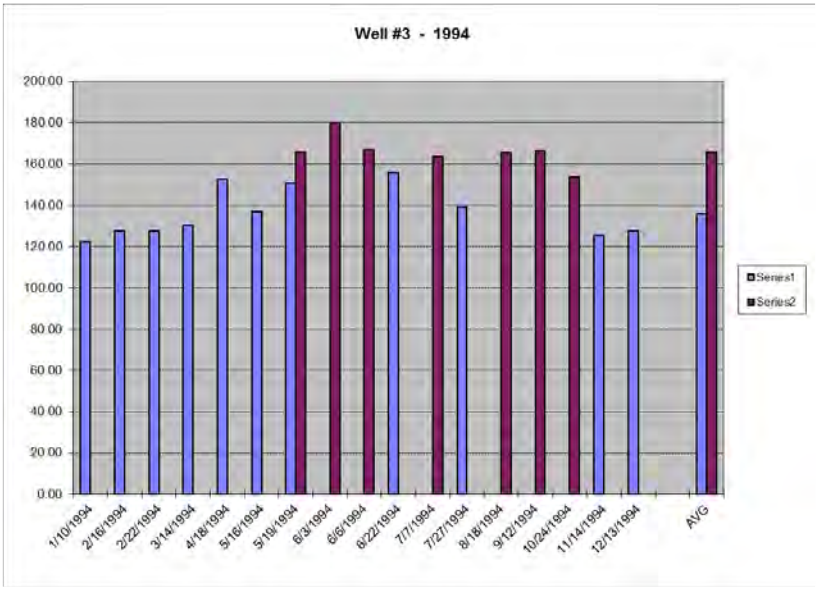

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Series2

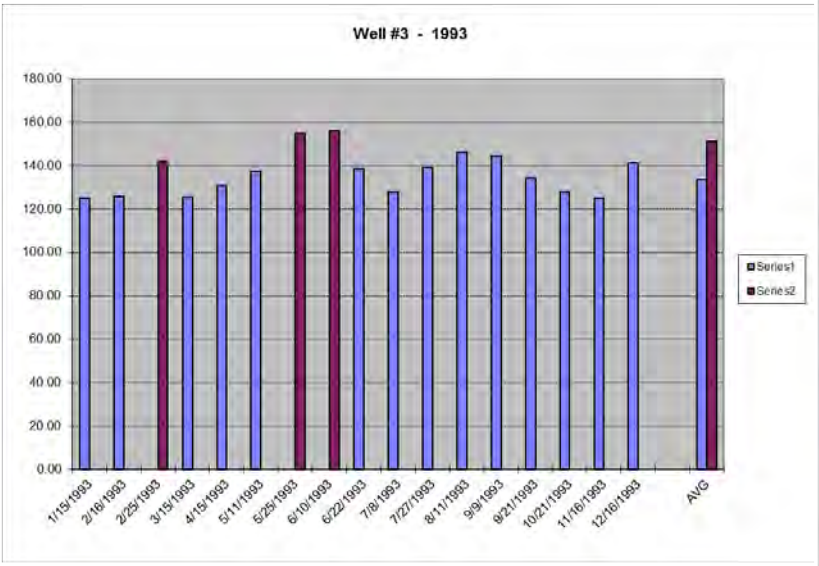

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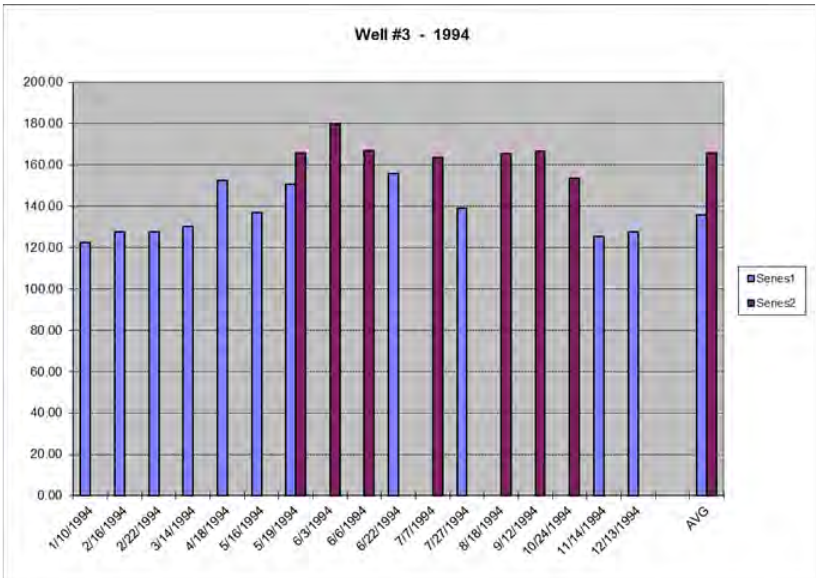

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Series2

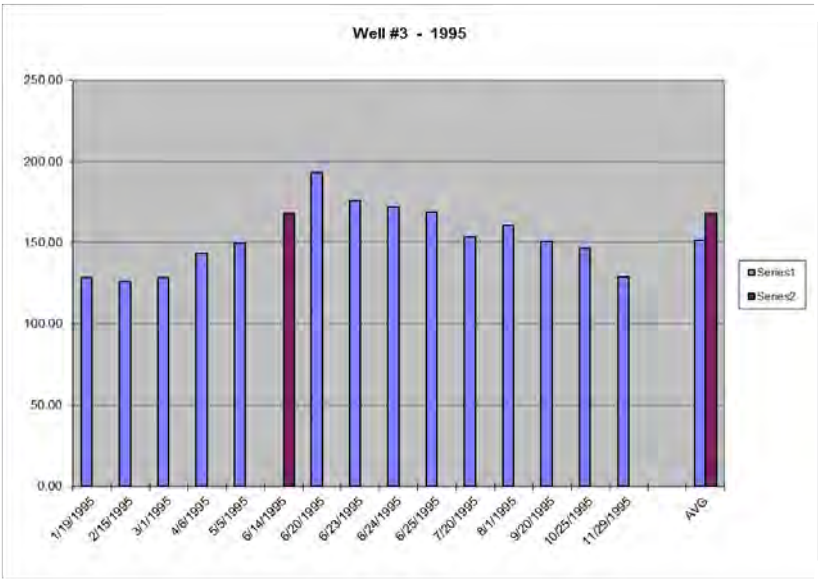

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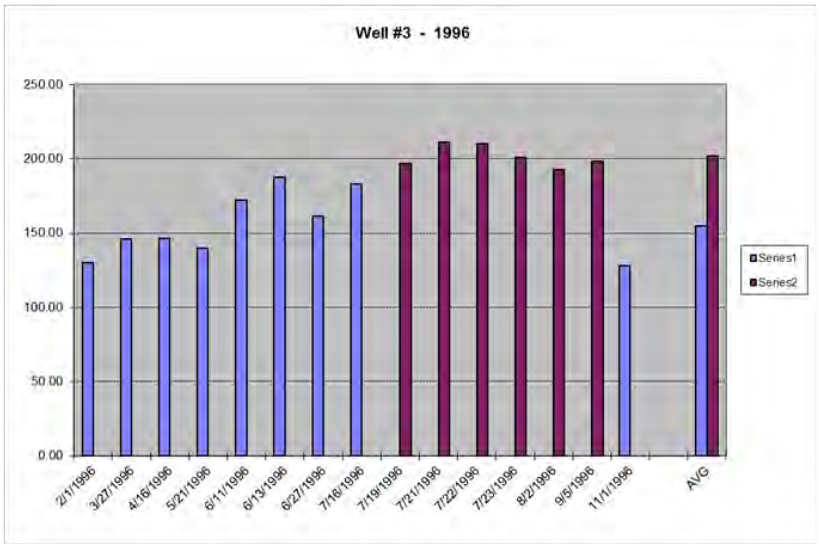

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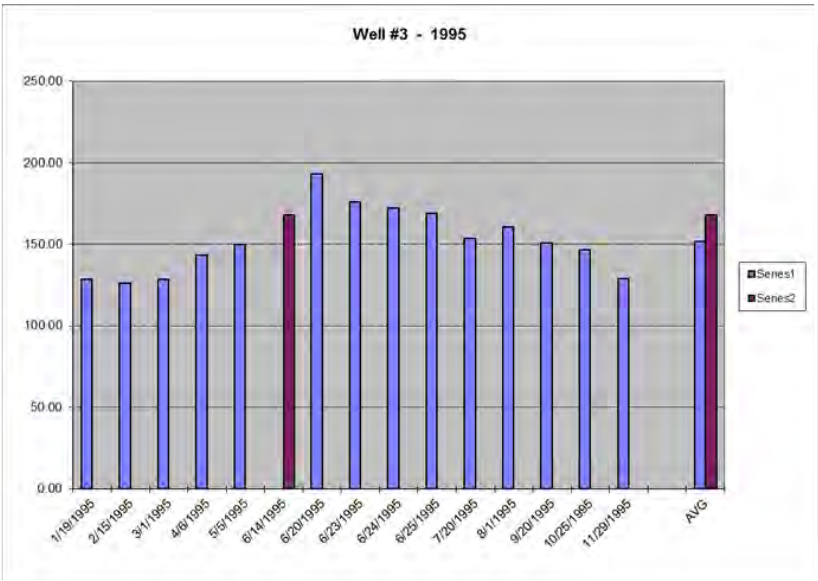

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Series1
Series2

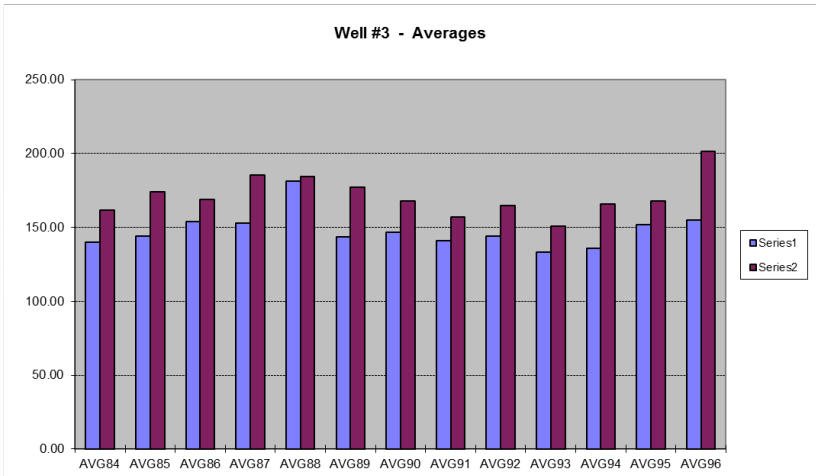

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Series2

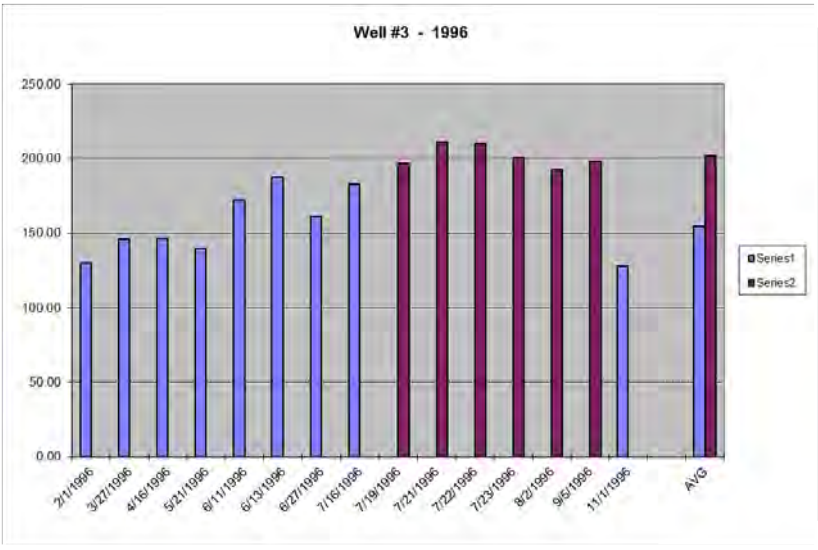

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Series1
Series2

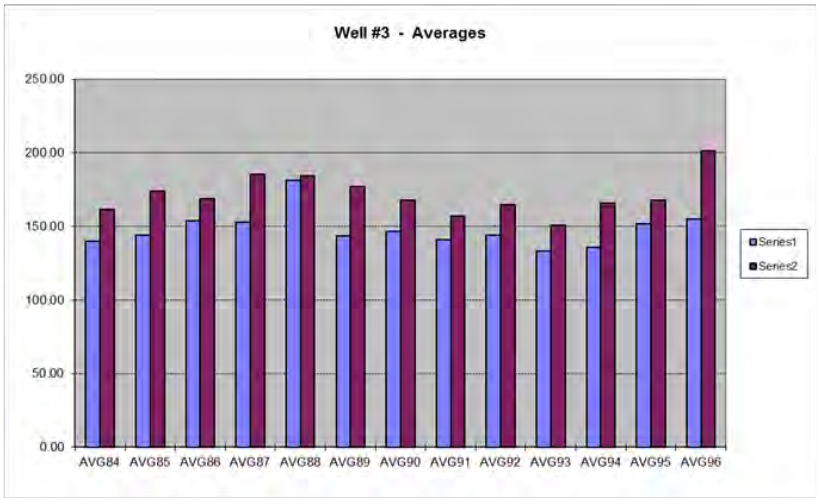

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Series2

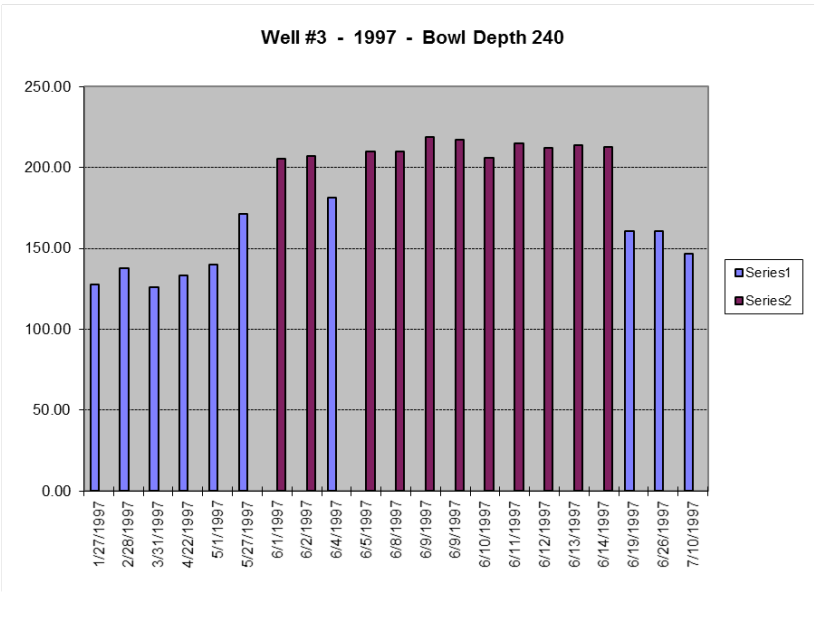

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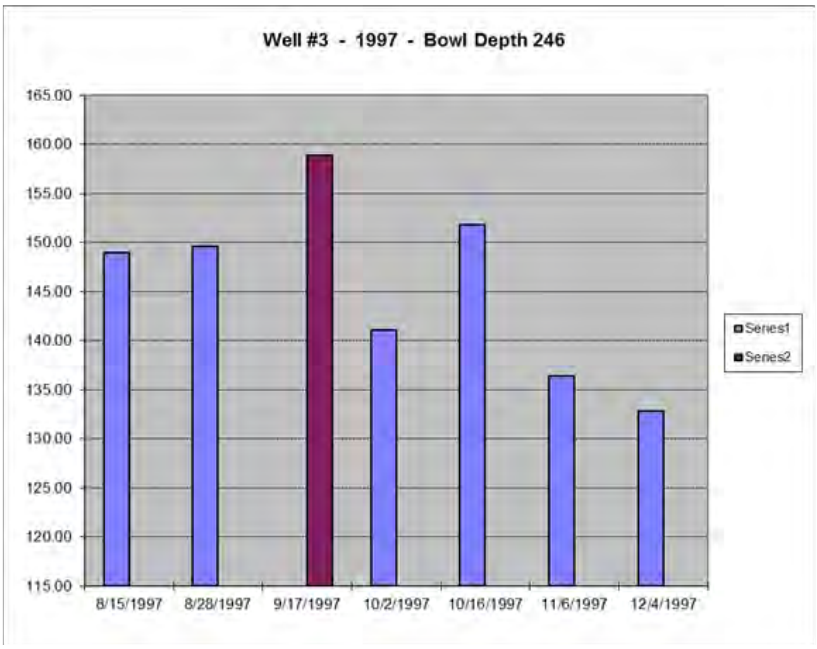

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Series1
Series2

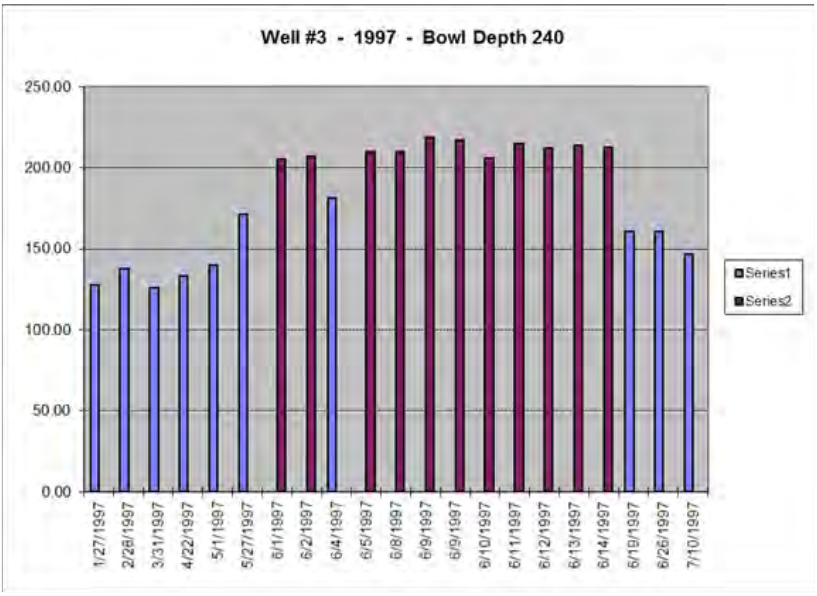

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AVG85
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AVG95
AVG96
Series1
Series2

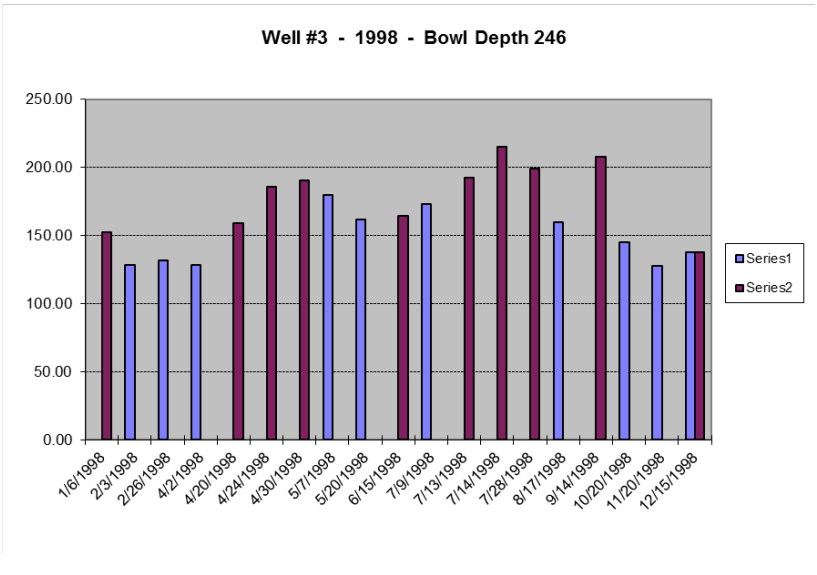

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Series1
Series2

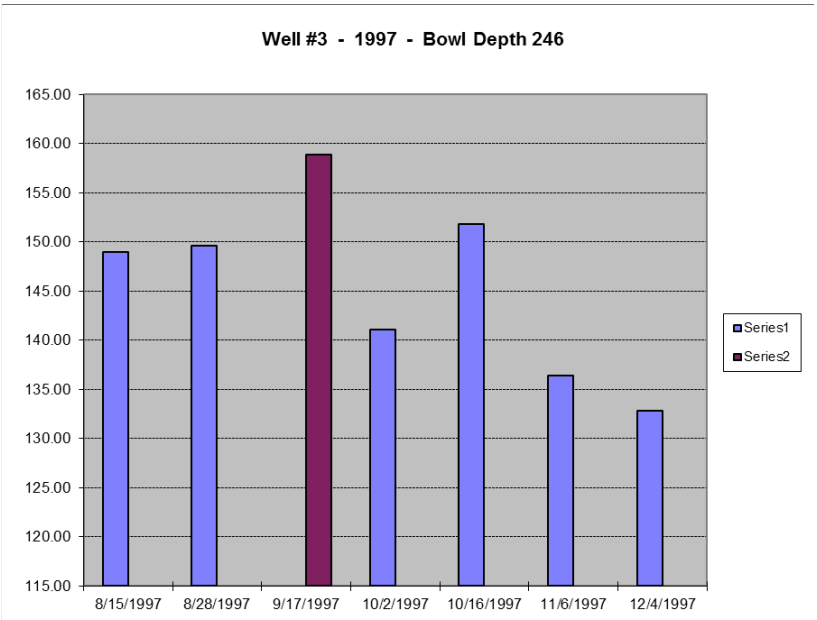

Well #3 - Averages
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AVG85
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Series1
Series2

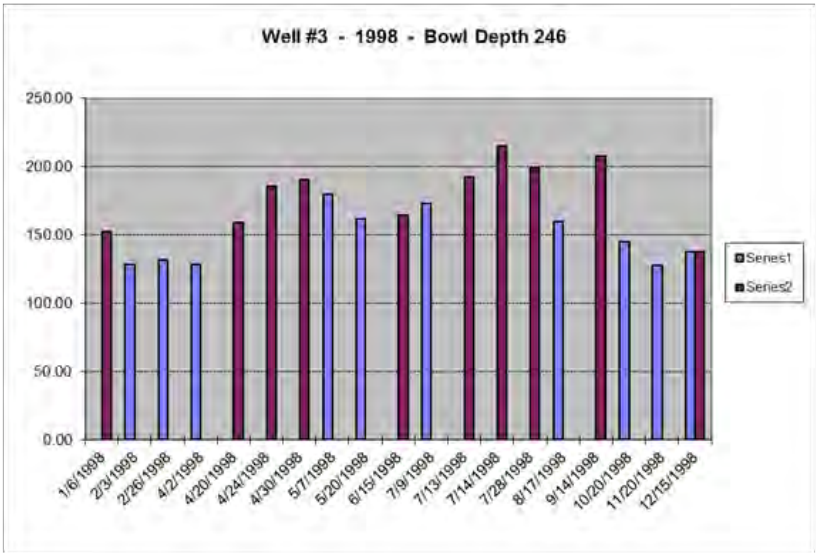

Well #3 - 1997 - Bowl Depth 240
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100.00
50.00
0.00
1/27/1997
2/28/1997
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6/5/1997
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6/9/1997
6/10/1997
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6/19/1997
6/26/1997
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Series2

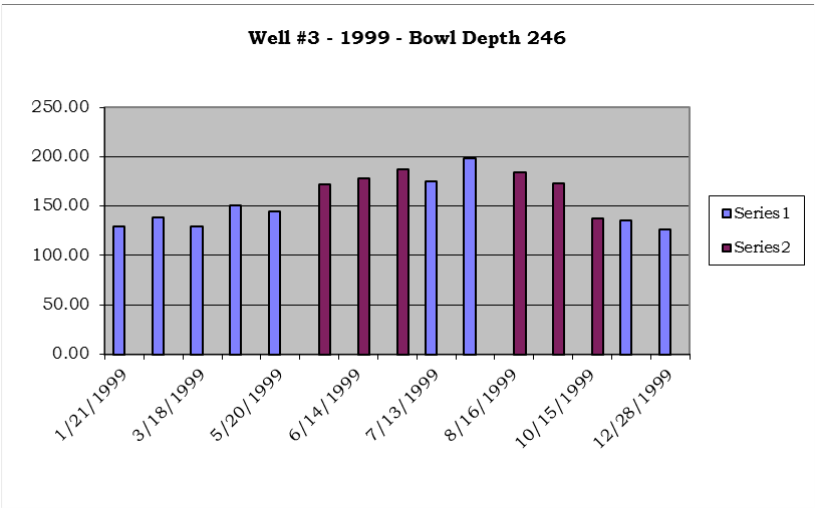

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155.00
150.00
145.00
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120.00
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12/4/1997
Series1
Series2

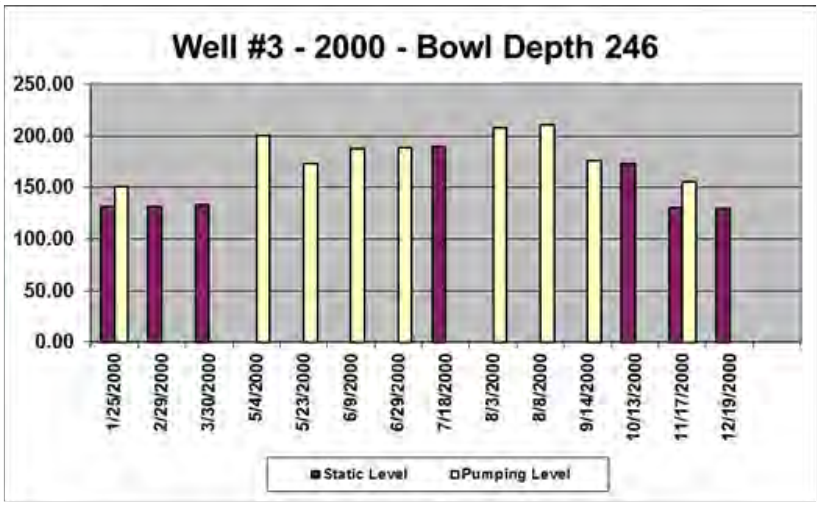

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7/10/1997
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Series2

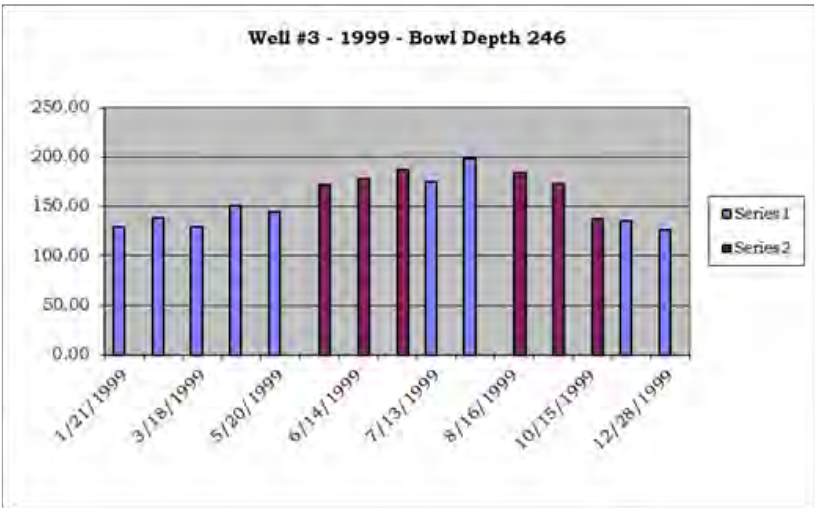

Well #3 - 1998 - Bowl Depth 246
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2/3/1998
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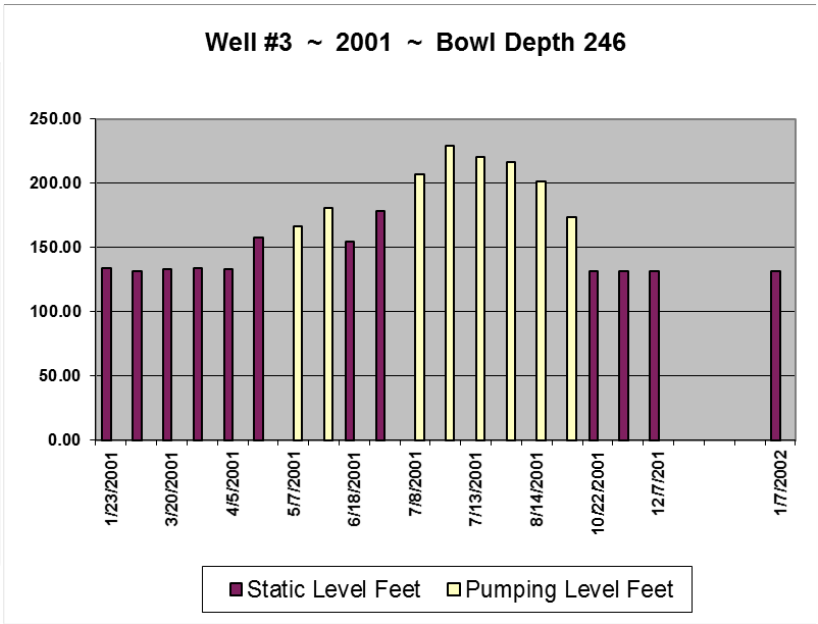

Well #3 - 1997 - Bowl Depth 246
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Series1
Series2

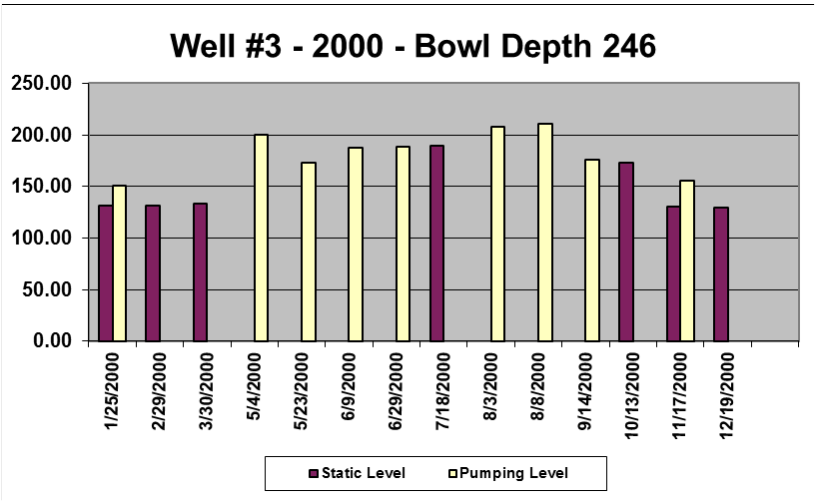

Well #3 - 1998 - Bowl Depth 246
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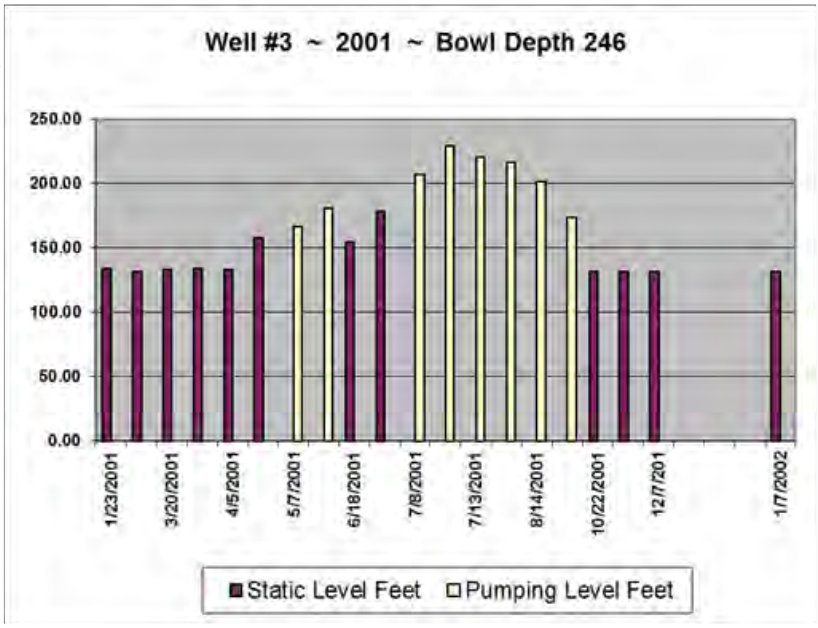

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Series1
Series2

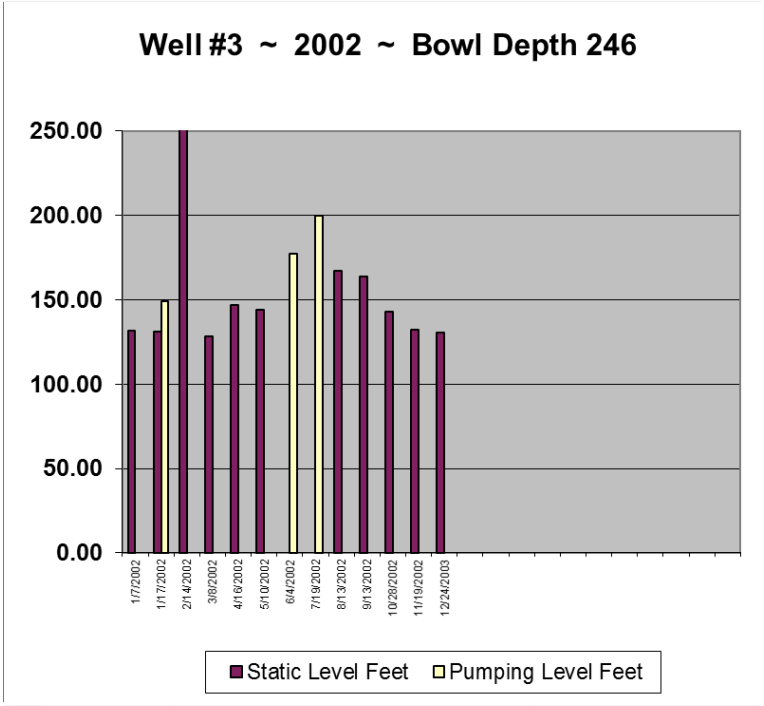

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50.00
0.00
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2/29/2000
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6/29/2000
7/18/2000
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8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2000
Static Level
Pumping Level

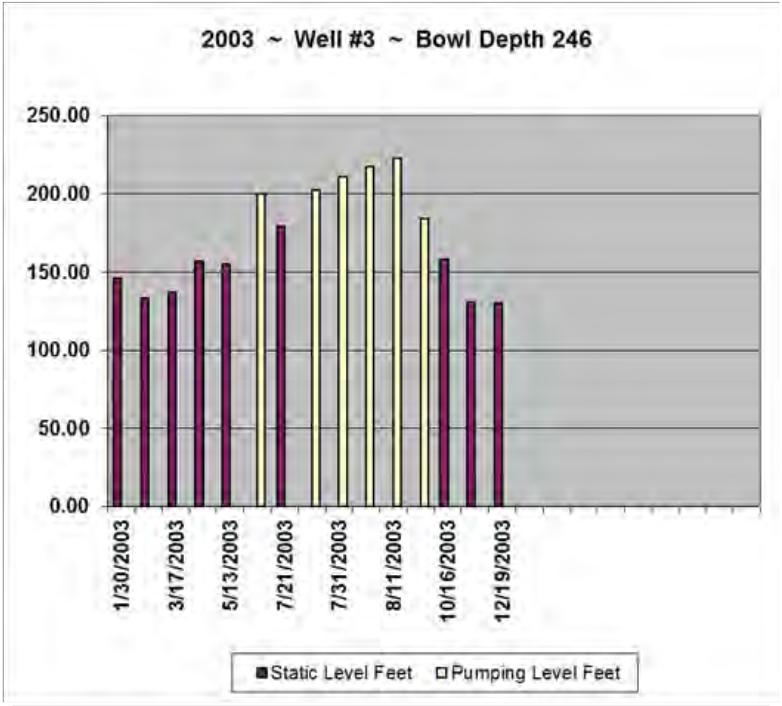

Well #3 - 1999 - Bowl Depth 246
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12/28/1999
Series1
Series2

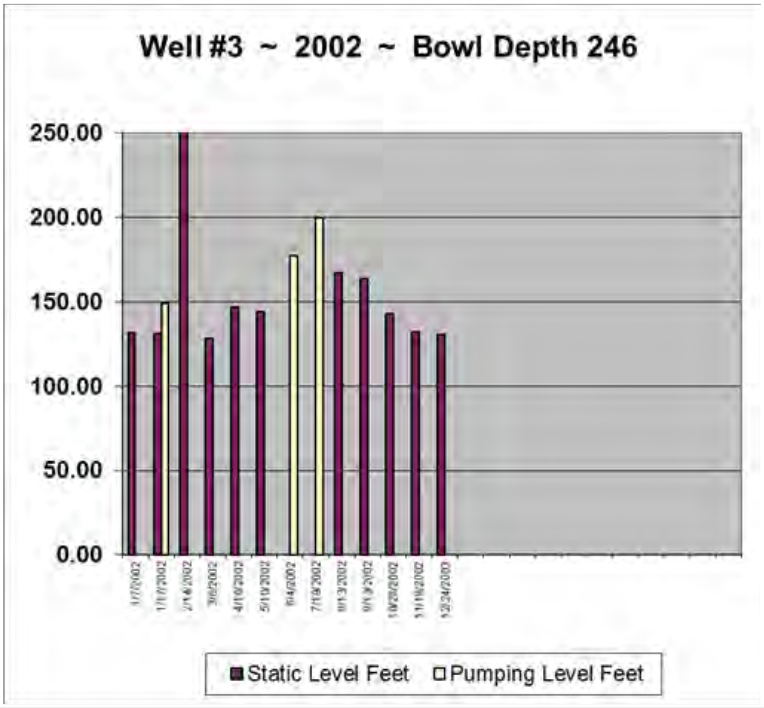

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50.00
0.00
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7/13/2001
8/14/2001
10/22/2001
12/7/201
1/7/2002
Static Level Feet
Pumping Level Feet

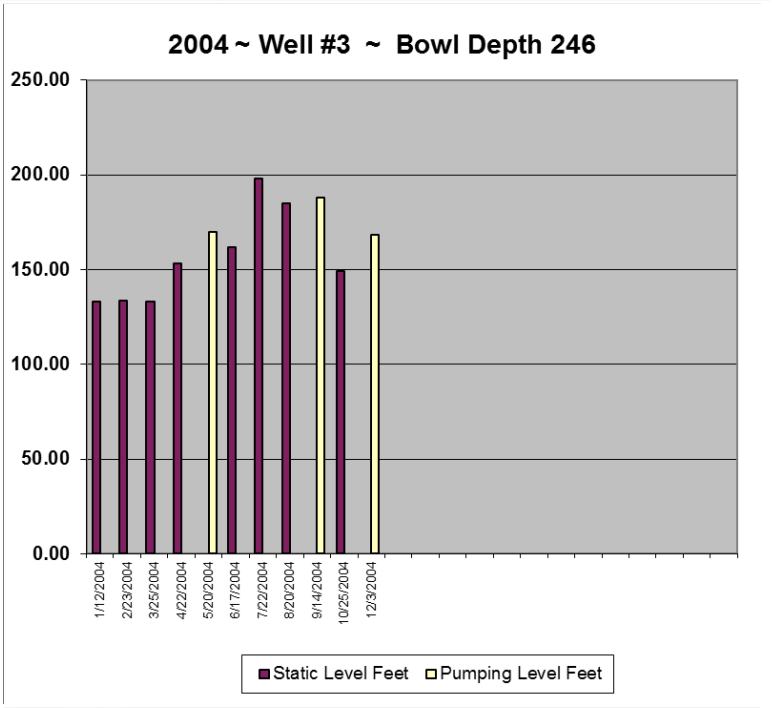

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1/25/2000
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6/29/2000
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8/8/2000
9/14/2000
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11/17/2000
12/19/2000
Static Level
Pumping Level

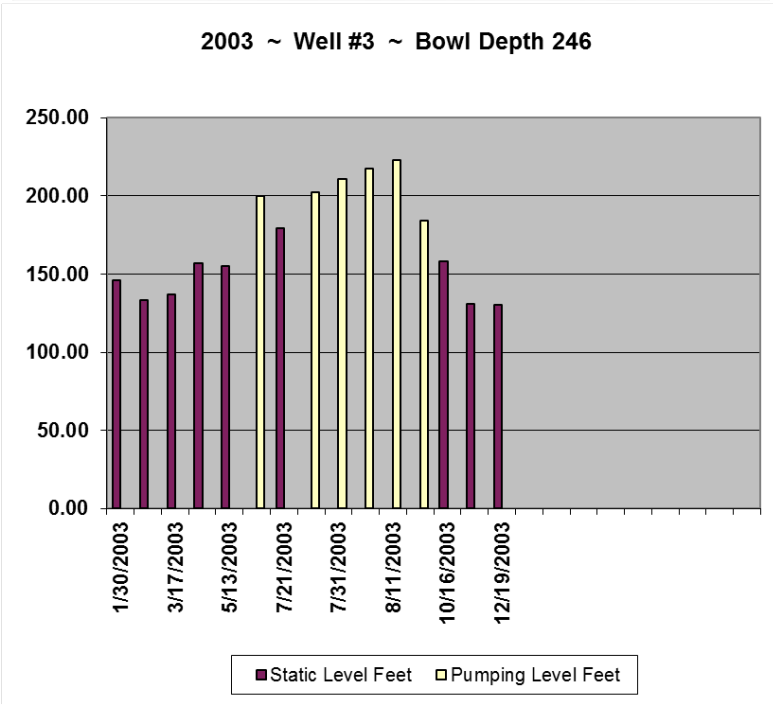

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50.00
0.00
1/23/2001
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6/18/2001
7/8/2001
7/13/2001
8/14/2001
10/22/2001
12/7/201
1/7/2002
Static Level Feet
Pumping Level Feet

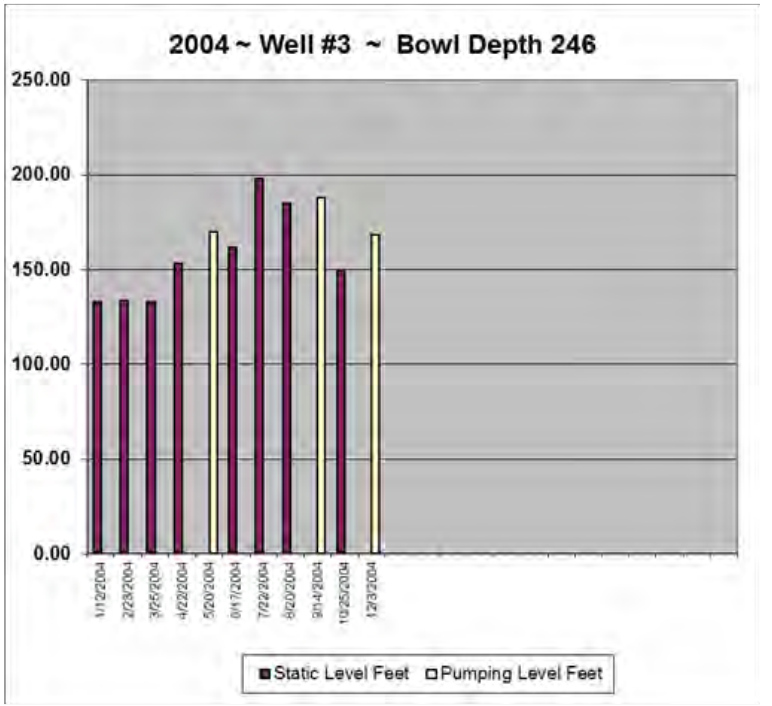

Well #3 ~ 2002 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
1/17/2002
2/14/2002
3/8/2002
4/16/2002
5/10/2002
6/4/2002
7/19/2002
8/13/2002
9/13/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

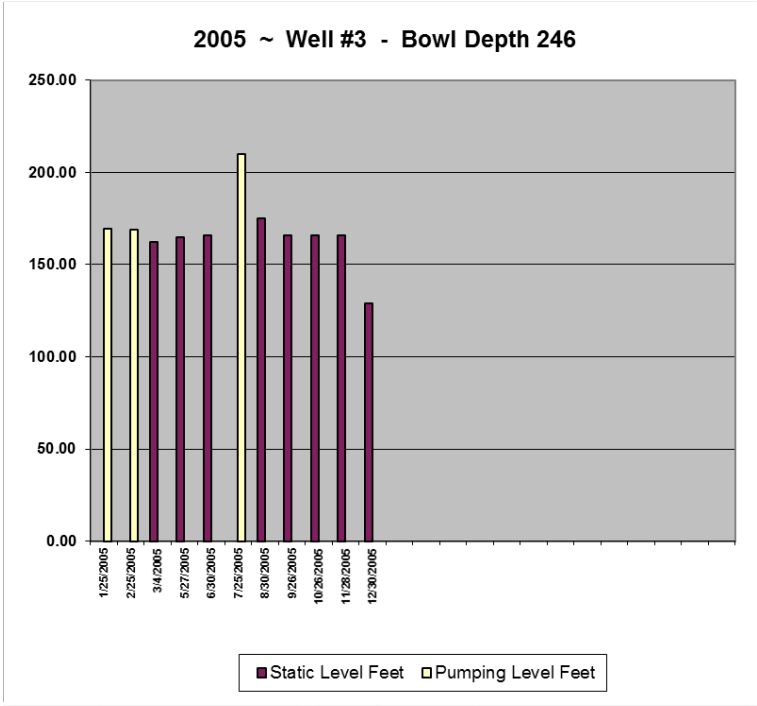

2003 ~ Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
3/17/2003
5/13/2003
7/21/2003
7/31/2003
8/11/2003
10/16/2003
12/19/2003
Static Level Feet
Pumping Level Feet

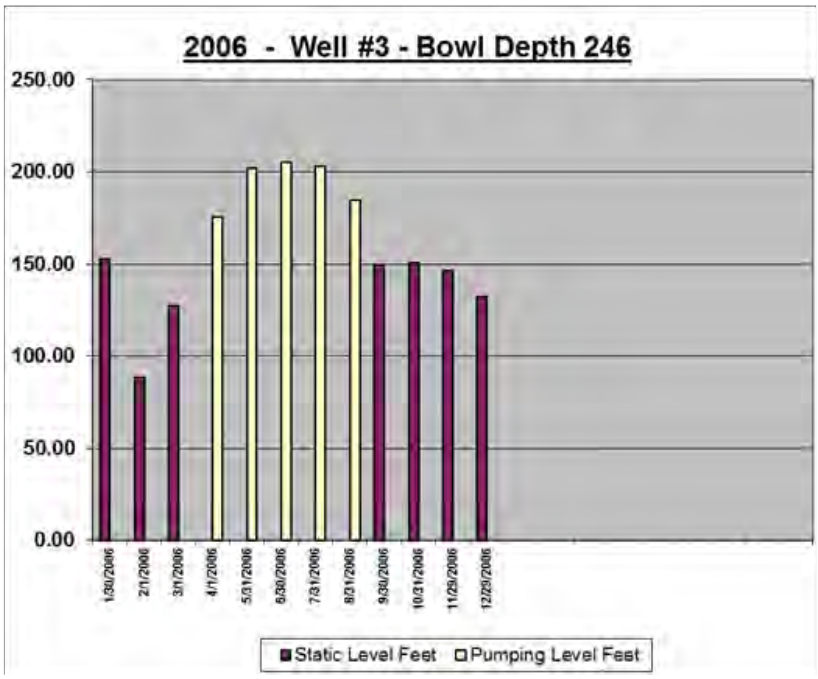

Well #3 ~ 2002 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

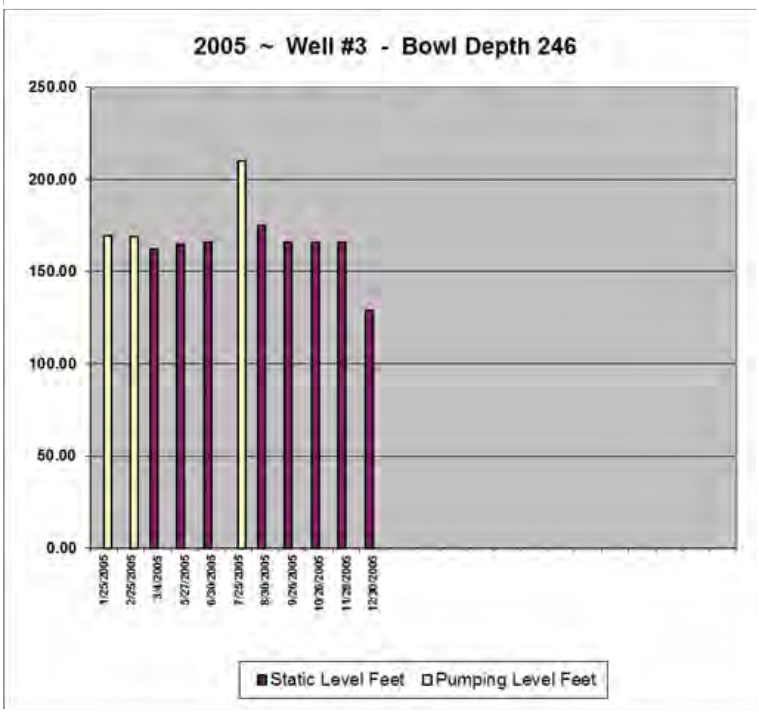

2004 ~ Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
8/20/2004
9/14/2004
10/25/2004
12/3/2004
Static Level Feet
Pumping Level Feet

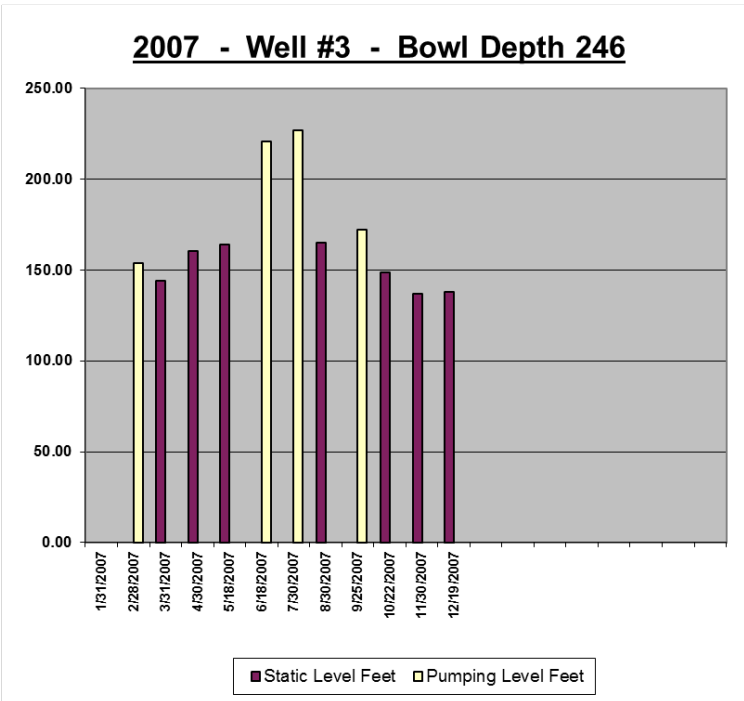

2003 ~ Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
3/17/2003
5/13/2003
7/21/2003
7/31/2003
8/11/2003
10/16/2003
12/19/2003
Static Level Feet
Pumping Level Feet

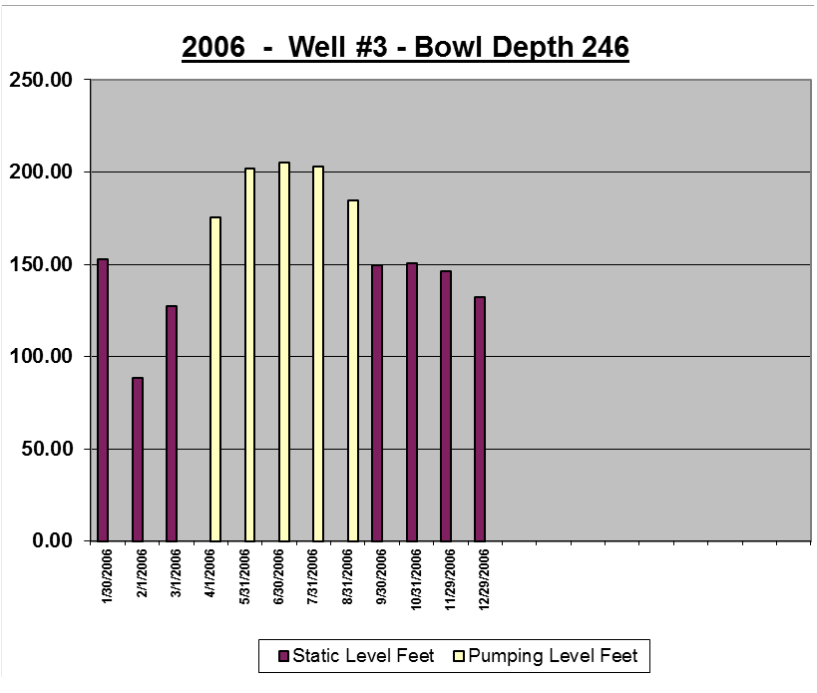

2004 ~ Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
8/20/2004
9/14/2004
10/25/2004
12/3/2004
Static Level Feet
Pumping Level Feet

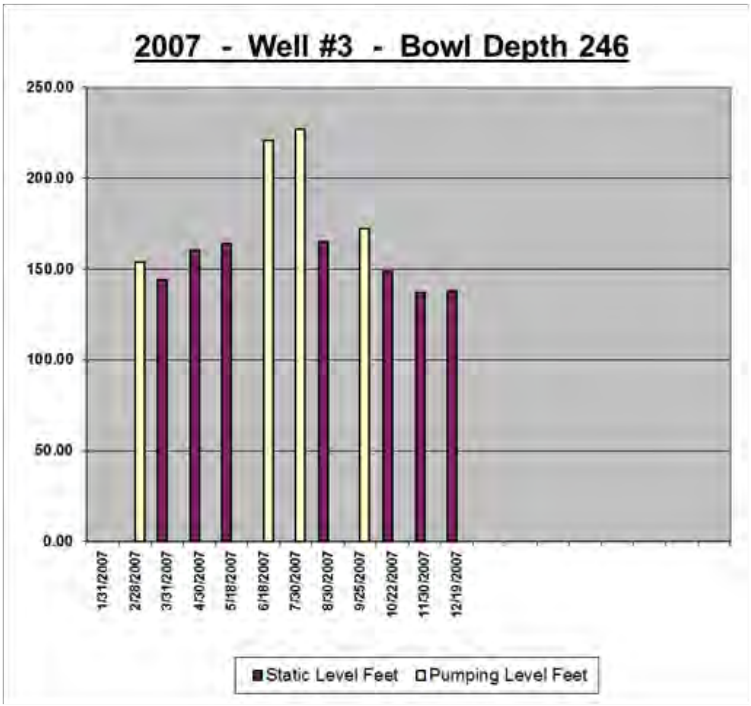

2005 ~ Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

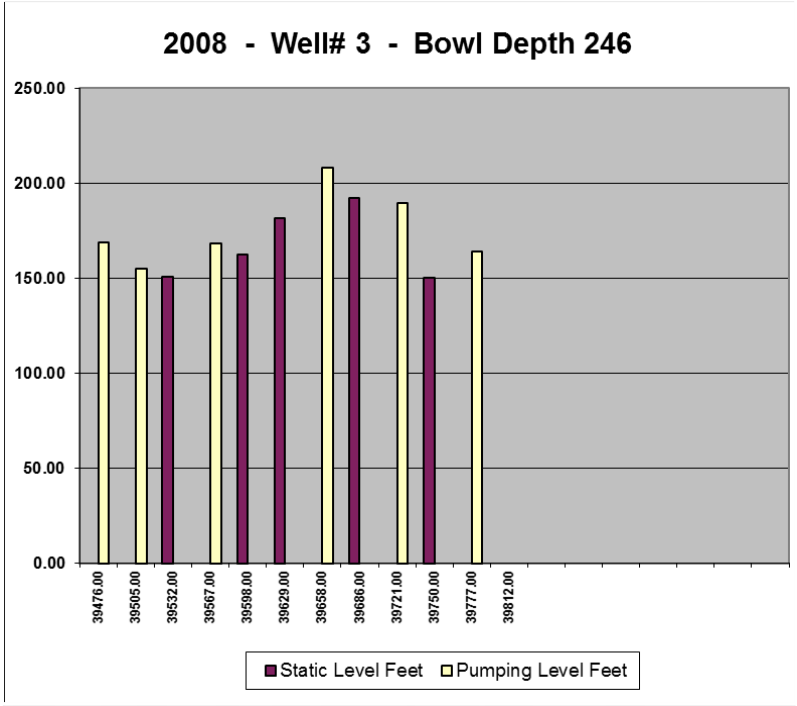

2006 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

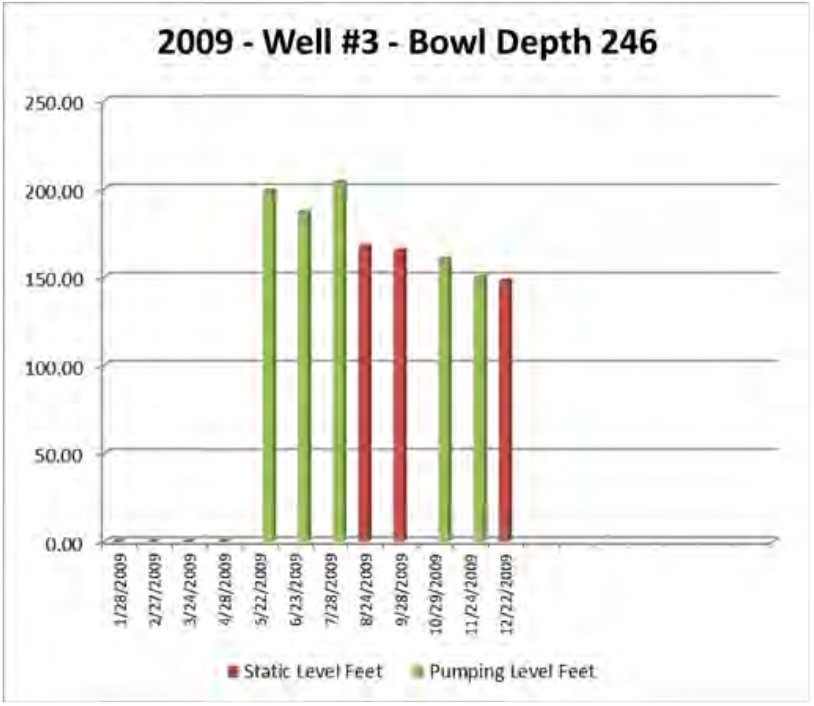

2005 ~ Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

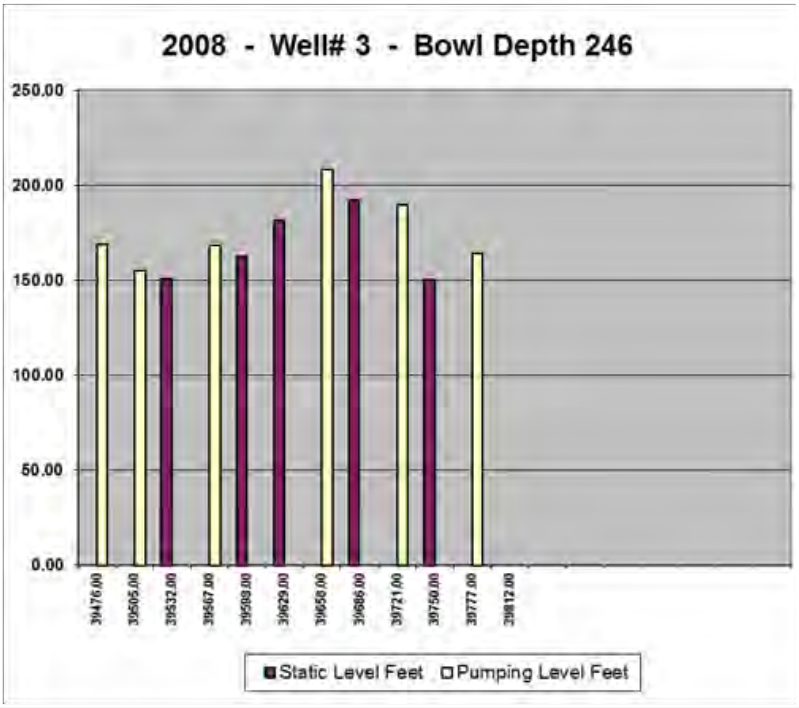

2007 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

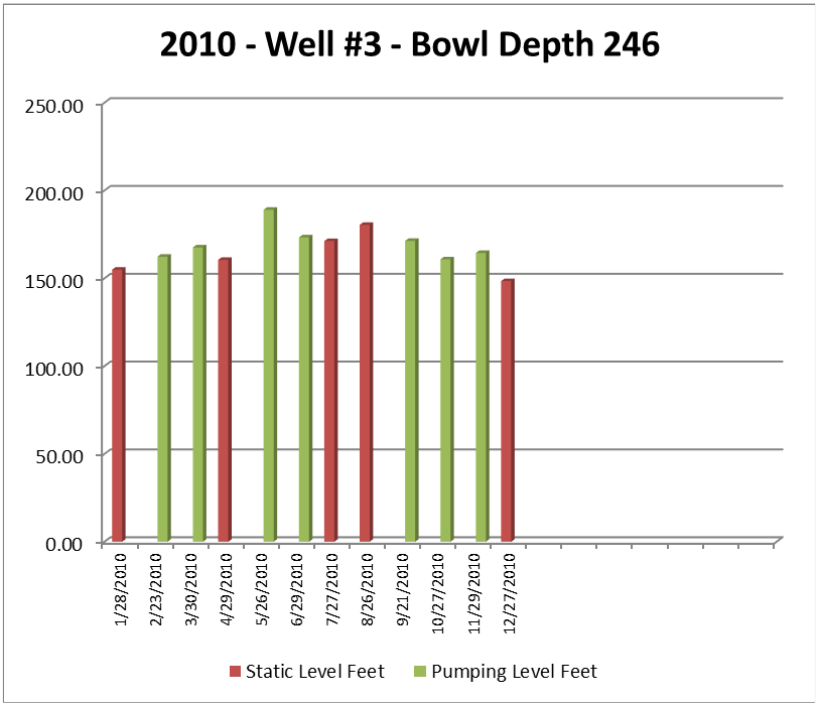

2006 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

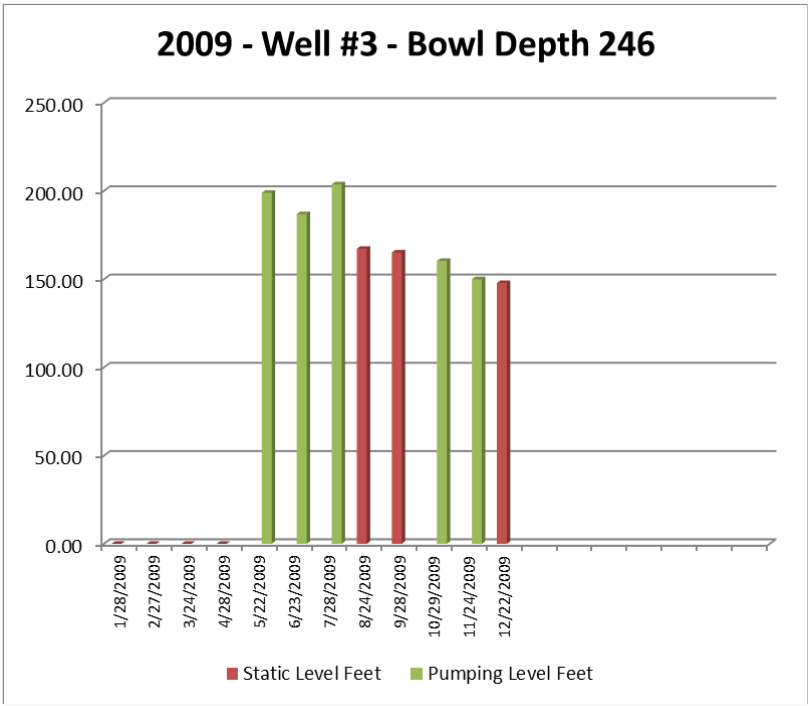

2007 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

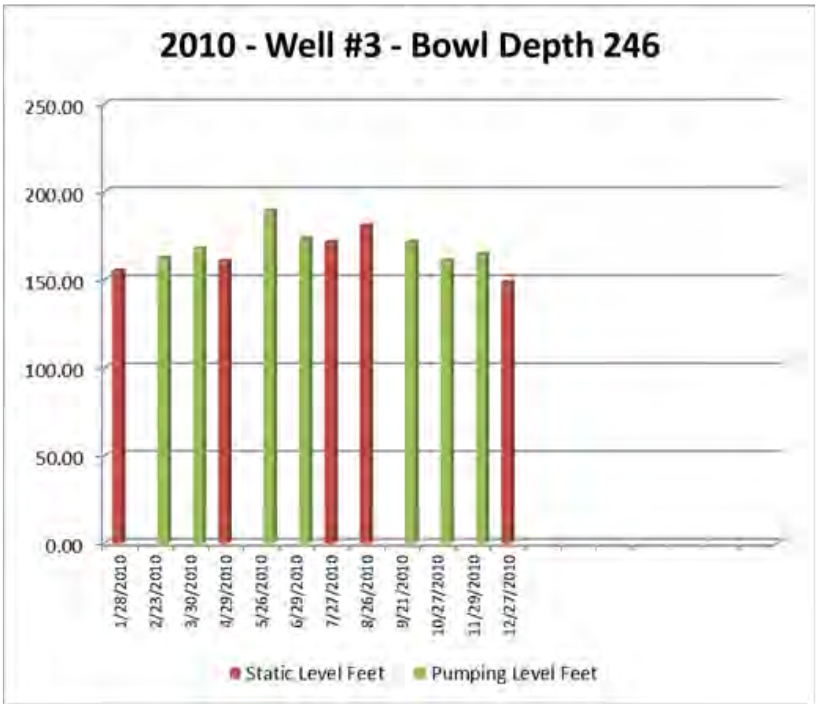

2008 - Well# 3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
39476.00
39505.00
39532.00
39567.00
39598.00
39629.00
39658.00
39686.00
39721.00
39750.00
39777.00
39812.00
Static Level Feet
Pumping Level Feet

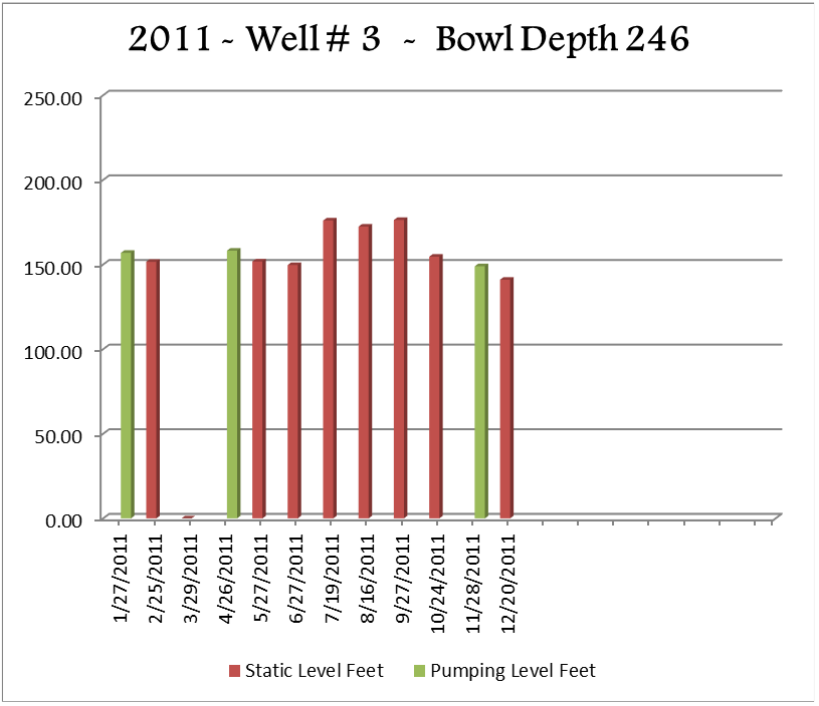

2009 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/28/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

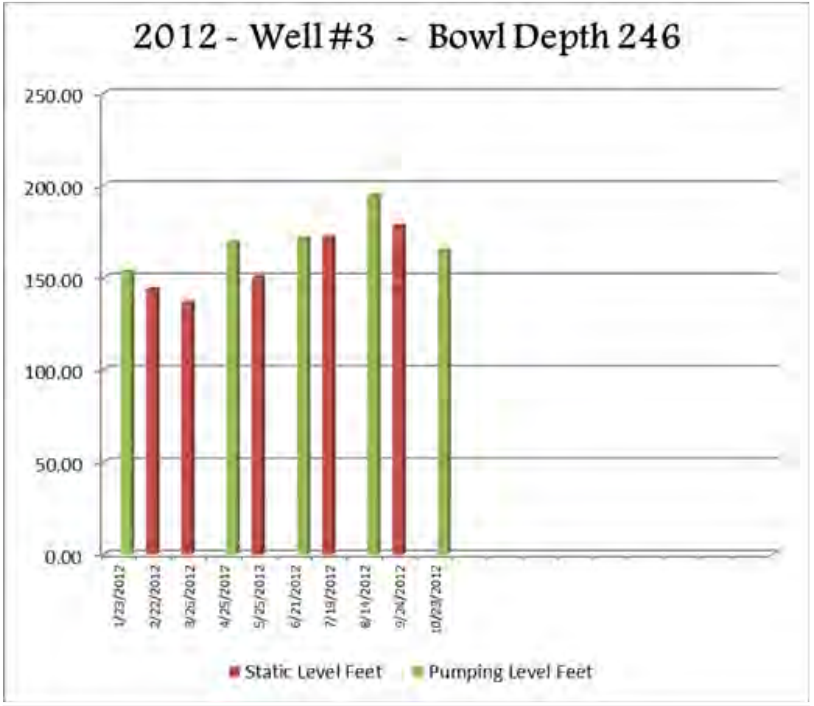

2008 - Well# 3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
39476.00
39505.00
39532.00
39567.00
39598.00
39629.00
39658.00
39686.00
39721.00
39750.00
39777.00
39812.00
Static Level Feet
Pumping Level Feet

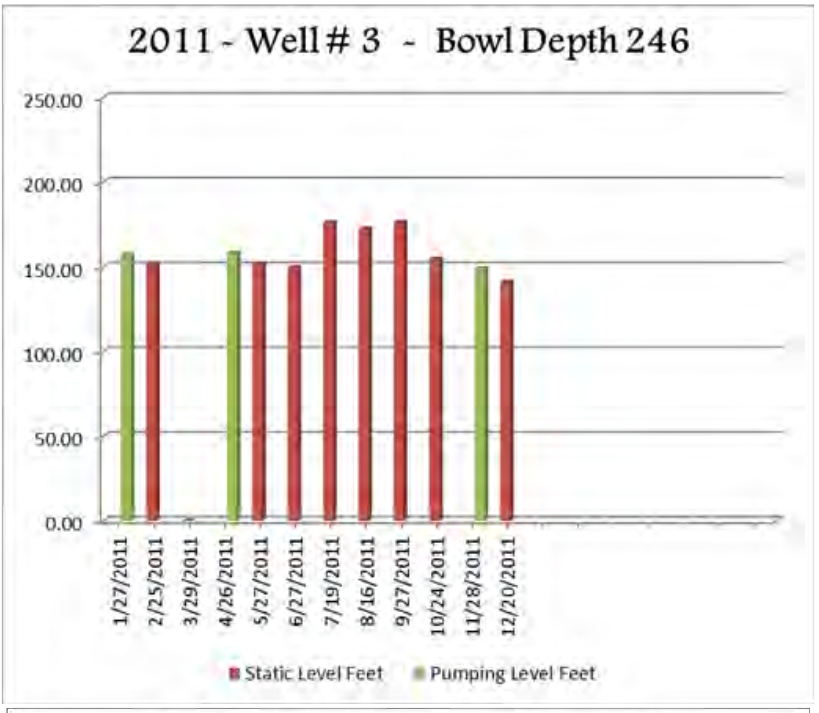

2010 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

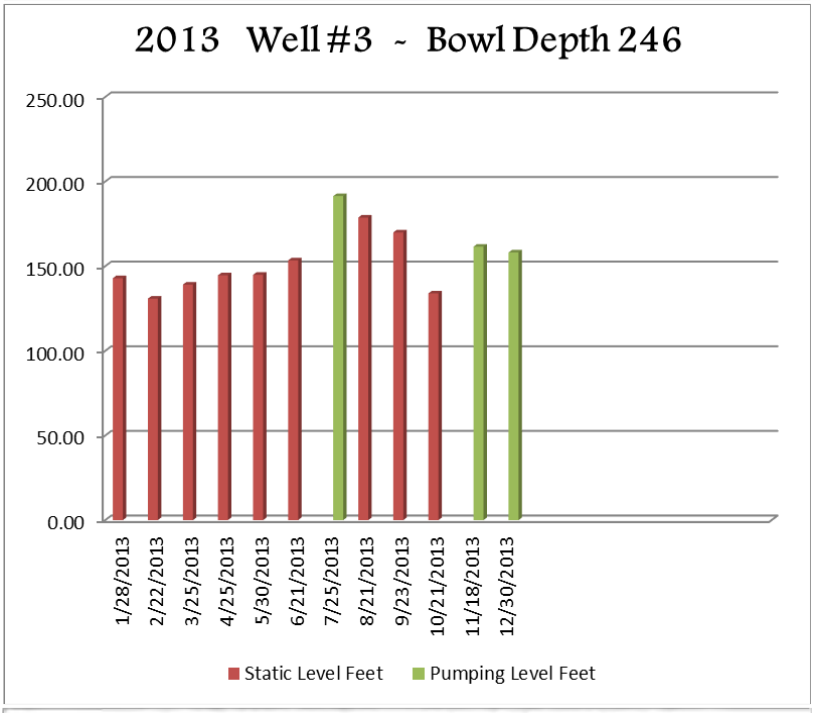

2009 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/28/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

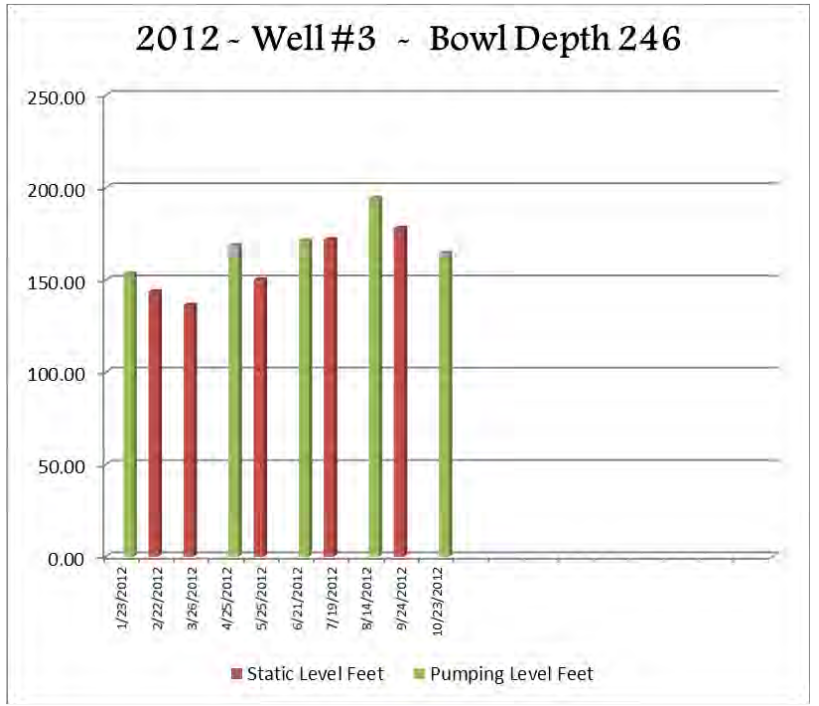

2010 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

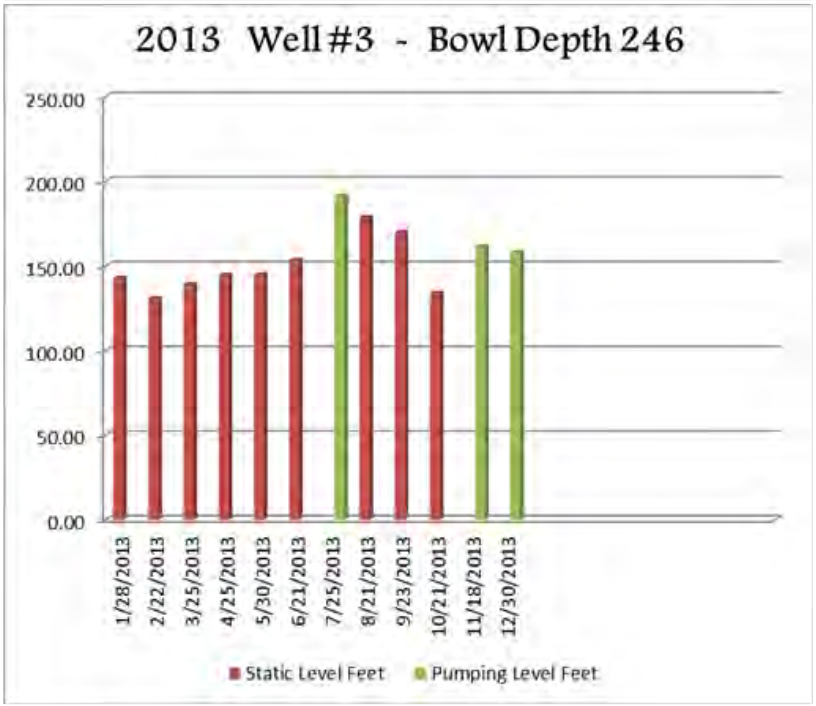

2011 - Well # 3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/25/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

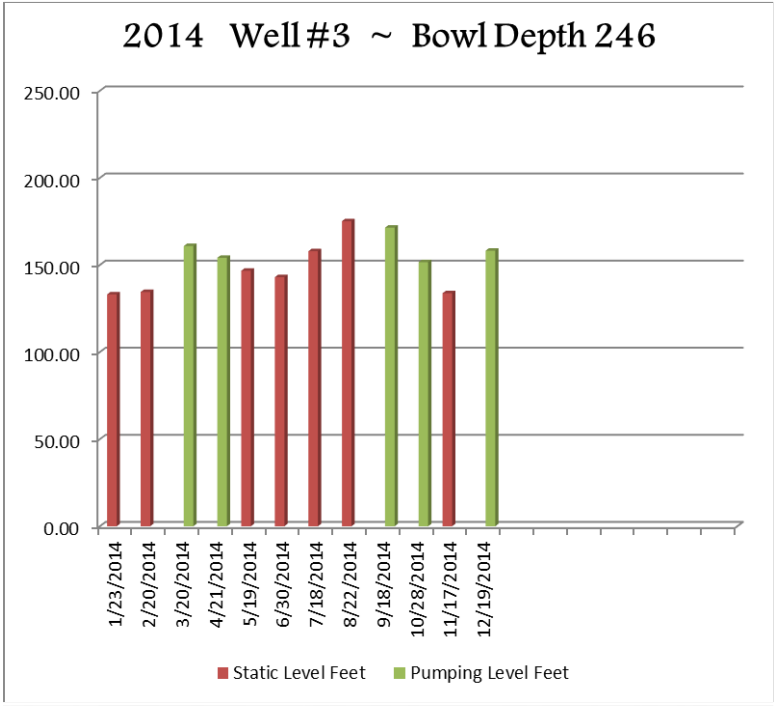

2012 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

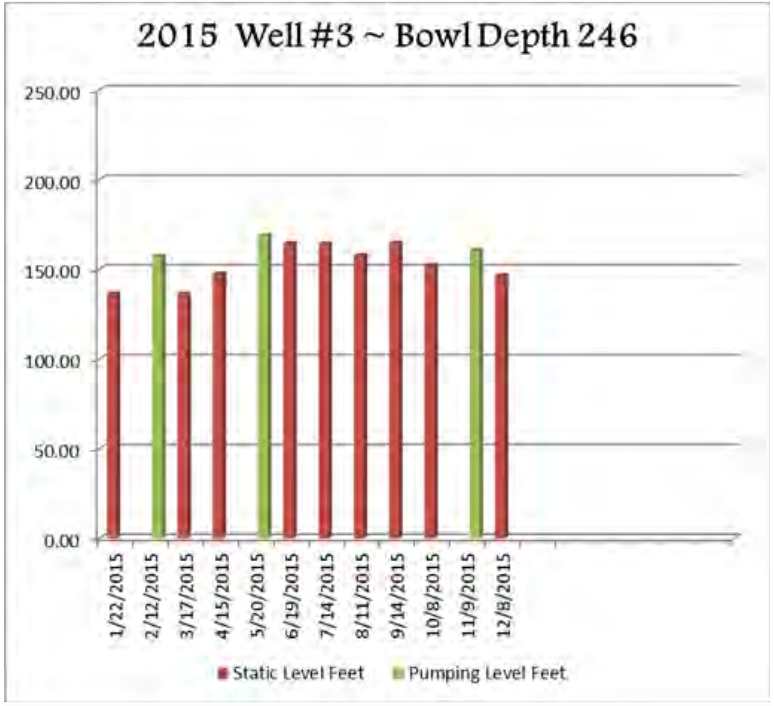

2011 - Well # 3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/25/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

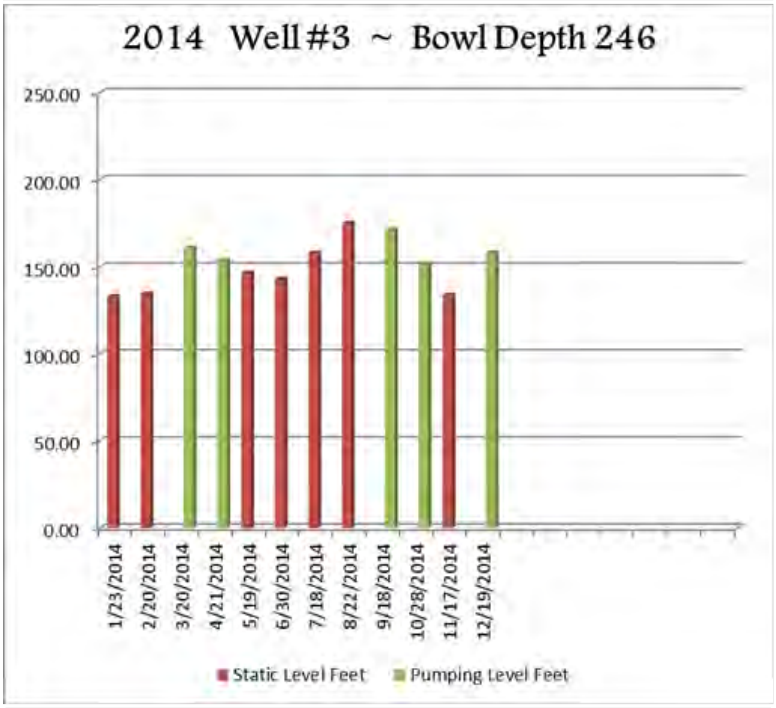

2013 Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

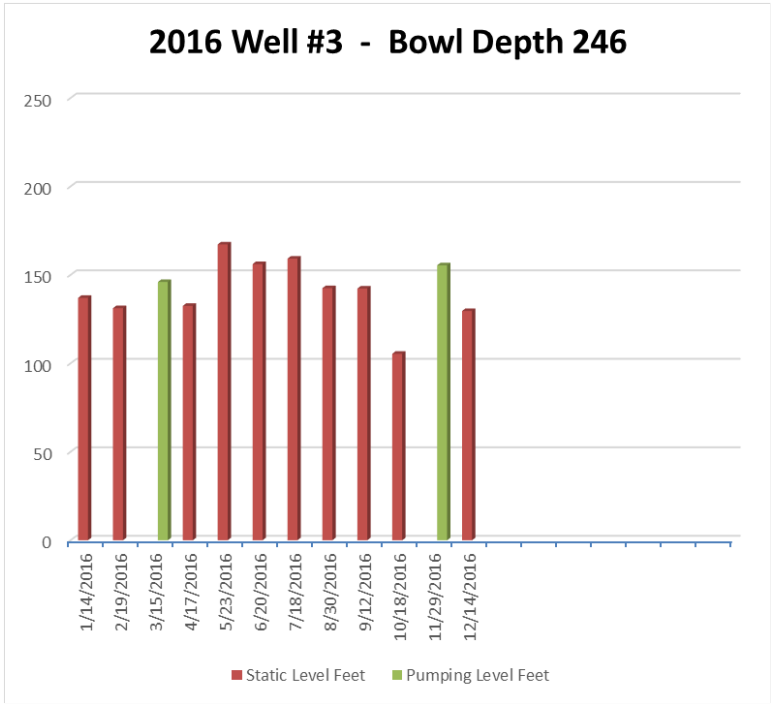

2012 - Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

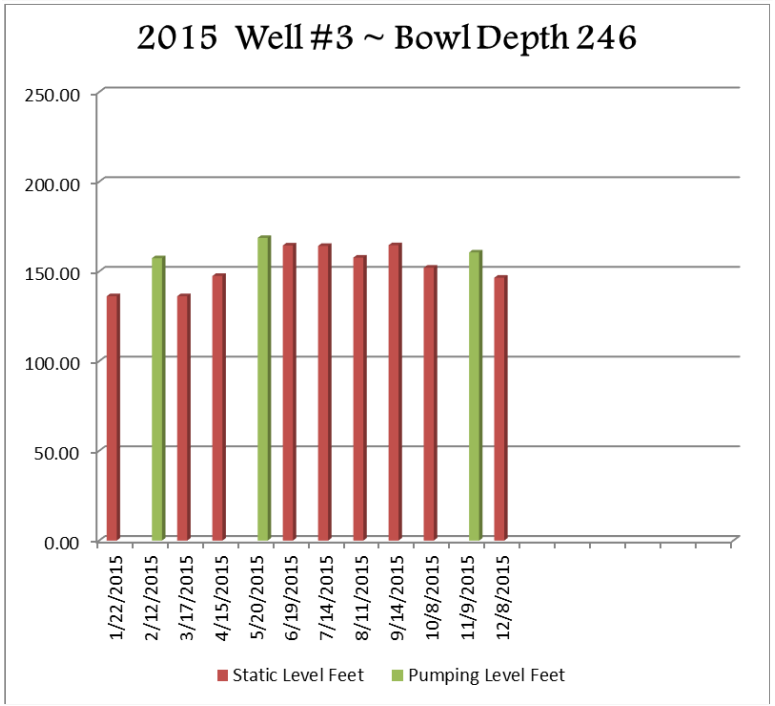

2013 Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

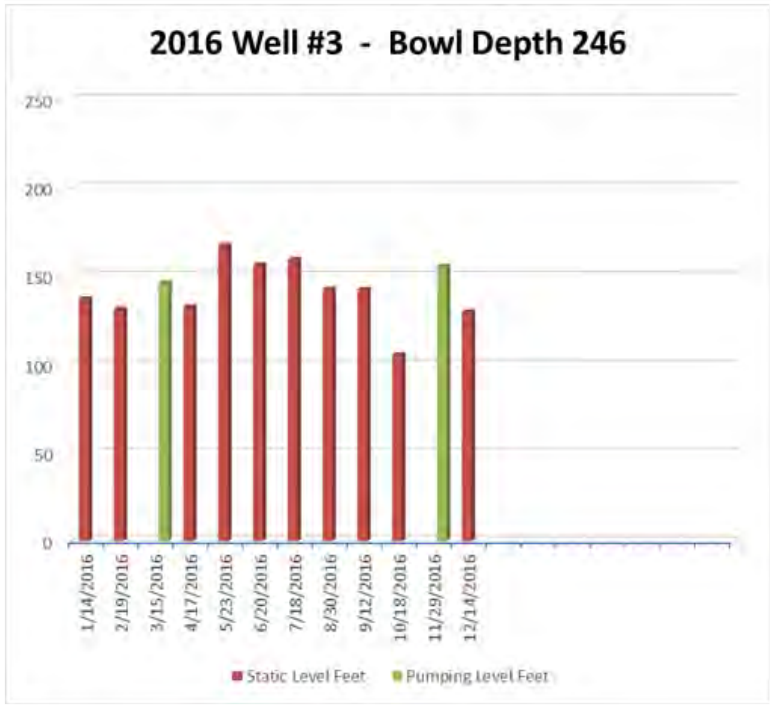

2014 Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

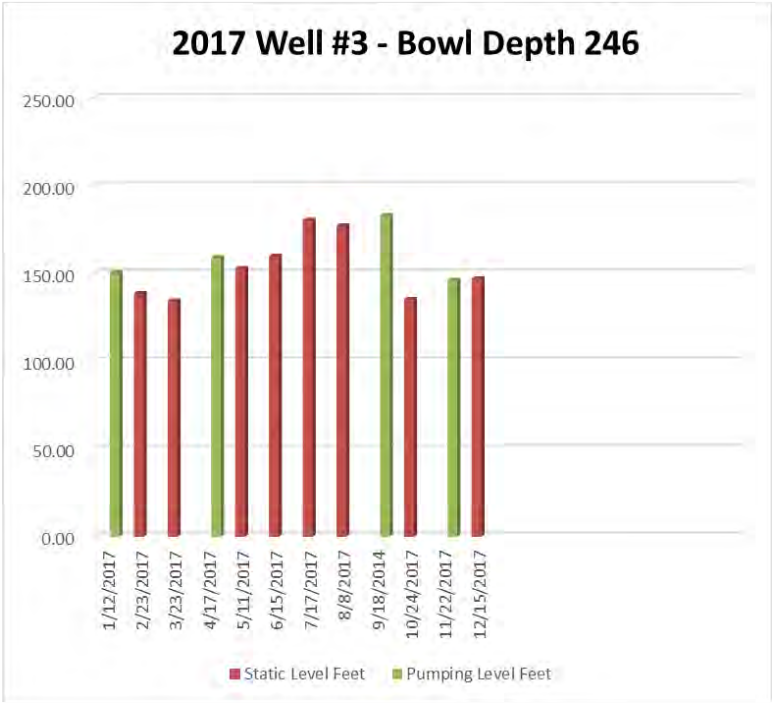

2015 Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

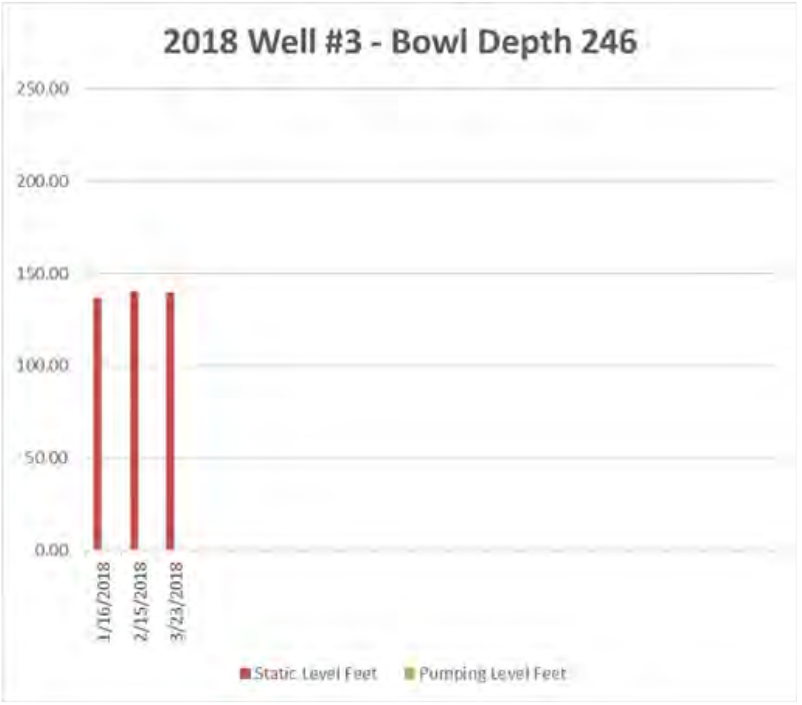

2014 Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

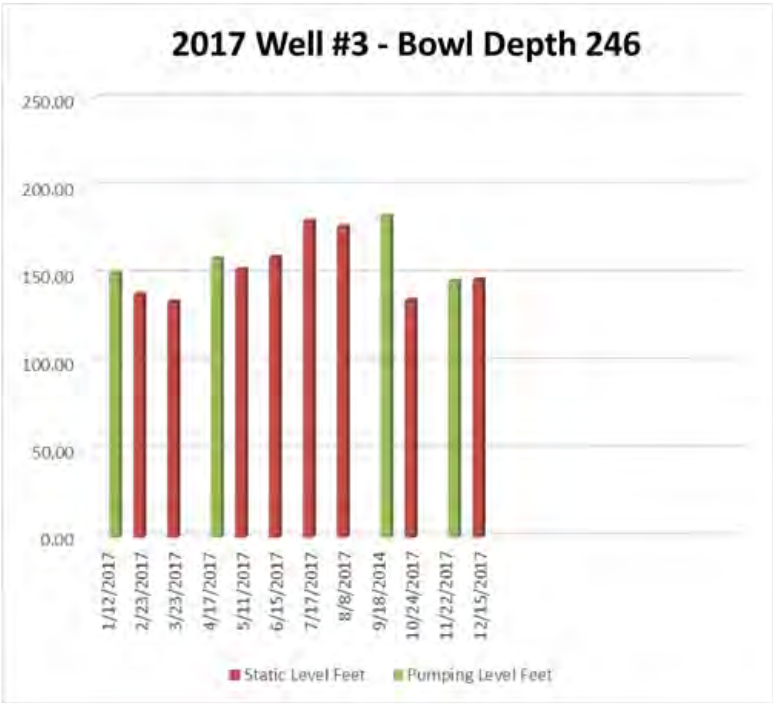

2016 Well #3 - Bowl Depth 246
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

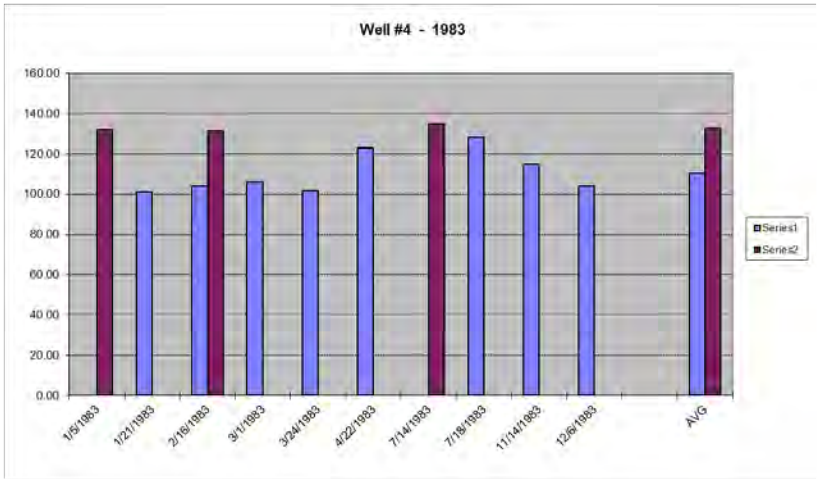

2015 Well #3 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

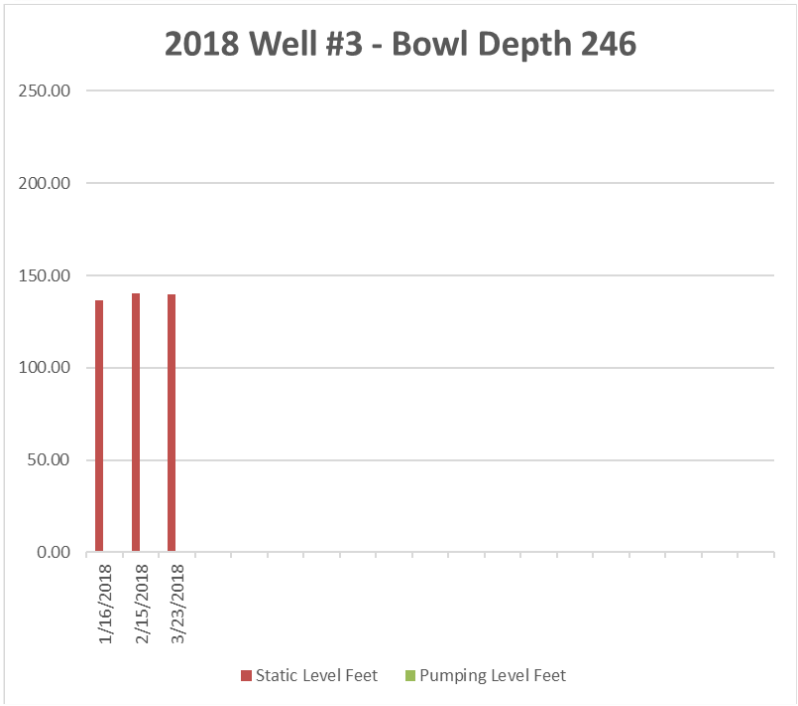

2016 Well #3 - Bowl Depth 246
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

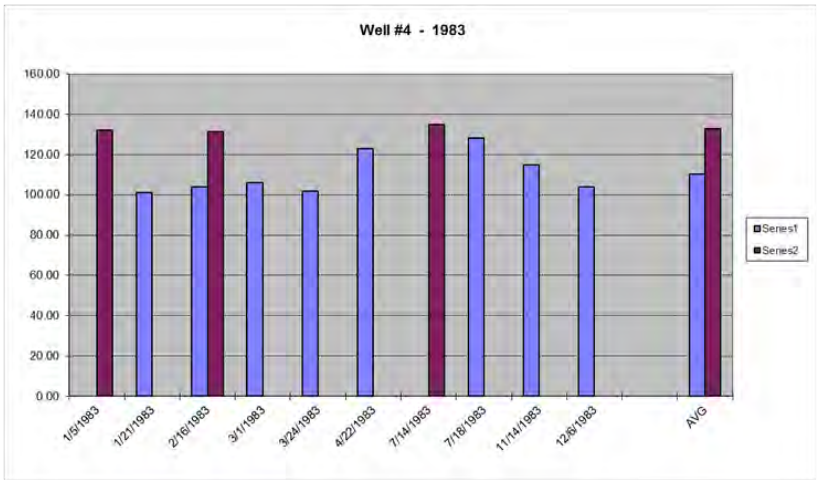

2017 Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2014
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

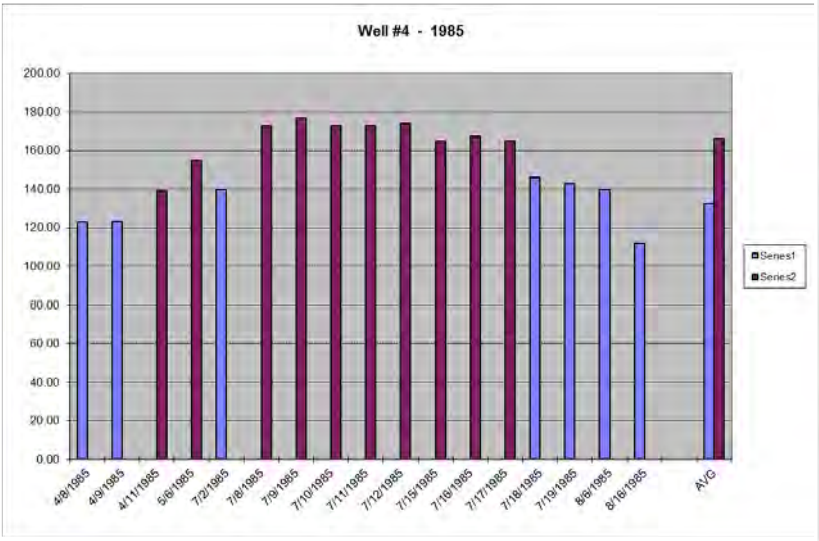

2018 Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

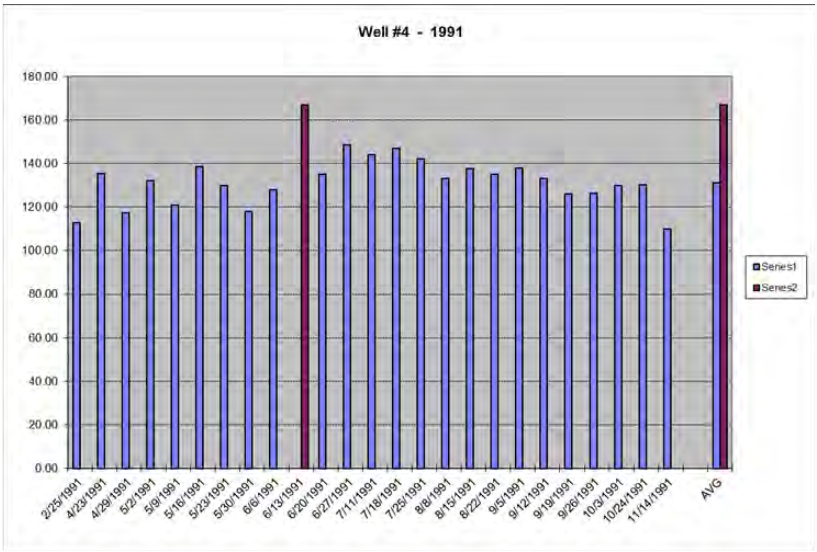

2017 Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2014
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

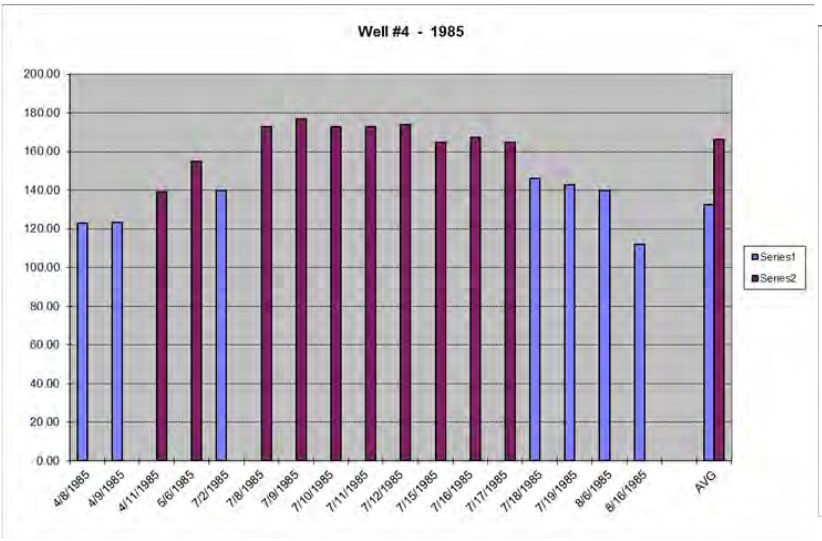

Well #4 - 1983
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/5/1983
1/21/1983
2/16/1983
3/1/1983
3/24/1983
4/22/1983
7/14/1983
7/18/1983
11/14/1983
12/6/1983
AVG
Series1
Series2

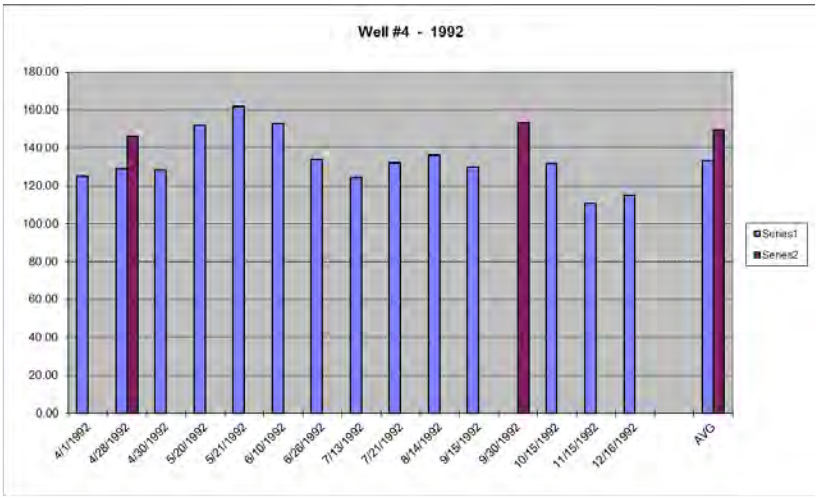

2018 Well #3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

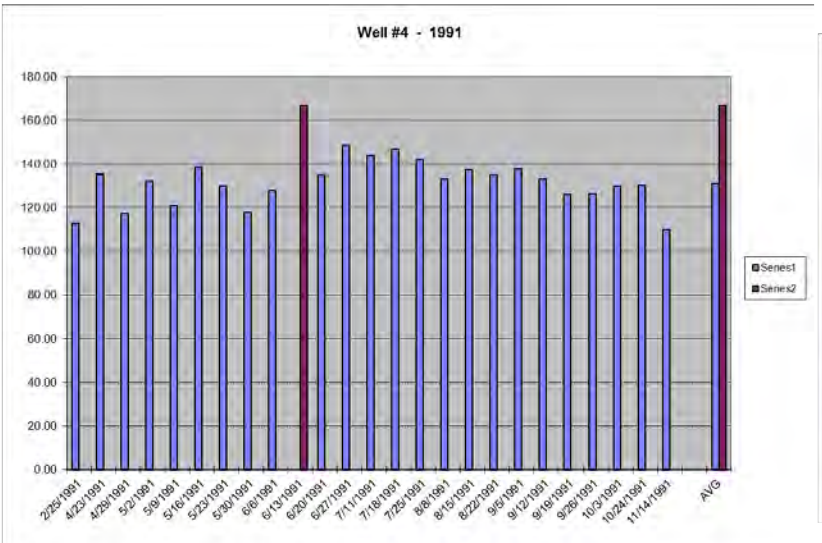

Well #4 - 1983
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/5/1983
1/21/1983
2/16/1983
3/1/1983
3/24/1983
4/22/1983
7/14/1983
7/18/1983
11/14/1983
12/6/1983
AVG
Series1
Series2

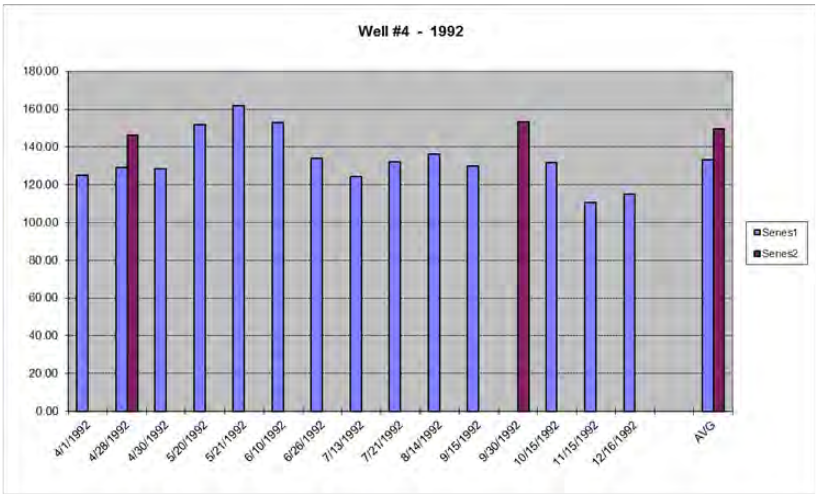

Well #4 - 1985
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/8/1985
4/9/1985
4/11/1985
5/6/1985
7/2/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
AVG
Series1
Series2

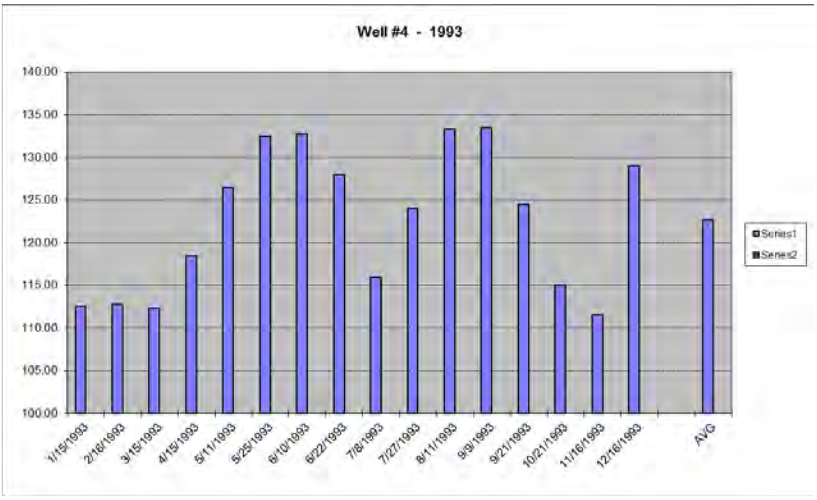

Well #4 - 1991
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/25/1991
4/23/1991
4/29/1991
5/2/1991
5/9/1991
5/16/1991
5/23/1991
5/30/1991
6/6/1991
6/13/1991
6/20/1991
6/27/1991
7/11/1991
7/18/1991
7/25/1991
8/8/1991
8/15/1991
8/22/1991
9/5/1991
9/12/1991
9/19/1991
9/26/1991
10/3/1991
10/24/1991
11/14/1991
AVG
Series1
Series2

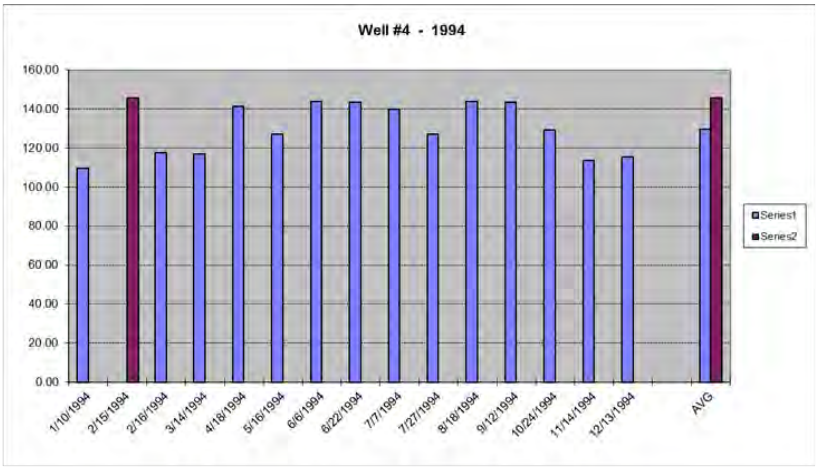

Well #4 - 1985
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/8/1985
4/9/1985
4/11/1985
5/6/1985
7/2/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/15/1985
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7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
AVG
Series1
Series2

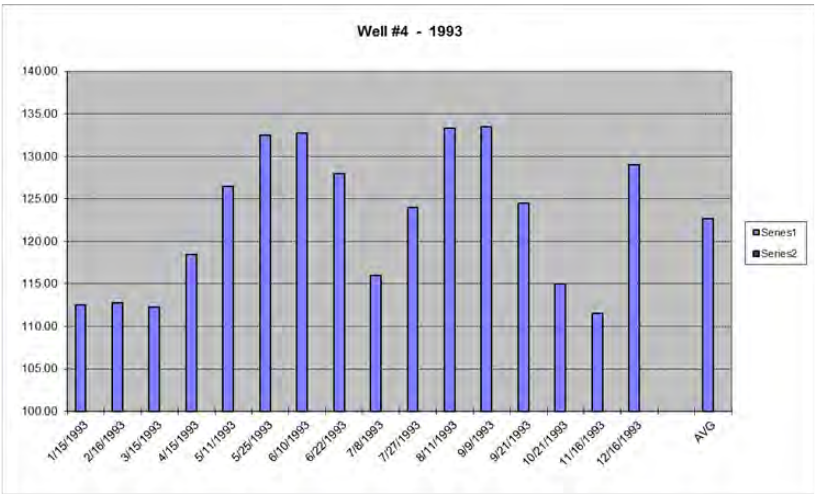

Well #4 - 1992
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
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4/30/1992
5/20/1992
5/21/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/15/1992
12/16/1992
AVG
Series1
Series2

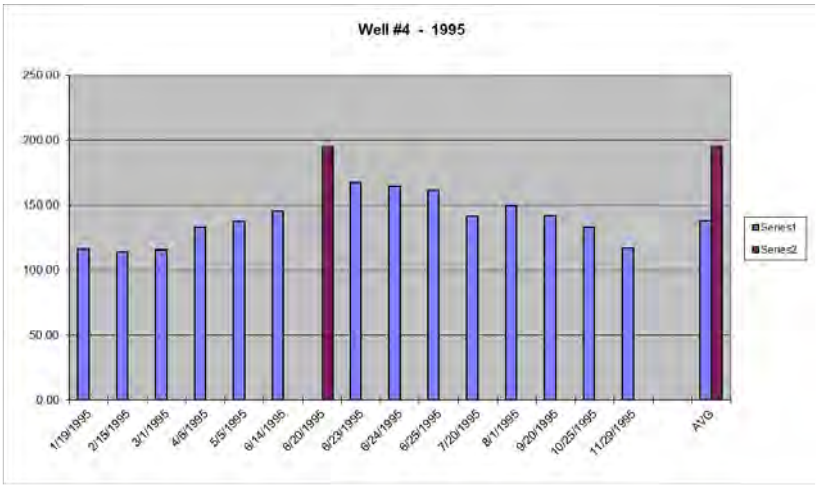

Well #4 - 1991
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/25/1991
4/23/1991
4/29/1991
5/2/1991
5/9/1991
5/16/1991
5/23/1991
5/30/1991
6/6/1991
6/13/1991
6/20/1991
6/27/1991
7/11/1991
7/18/1991
7/25/1991
8/8/1991
8/15/1991
8/22/1991
9/5/1991
9/12/1991
9/19/1991
9/26/1991
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10/24/1991
11/14/1991
AVG
Series1
Series2

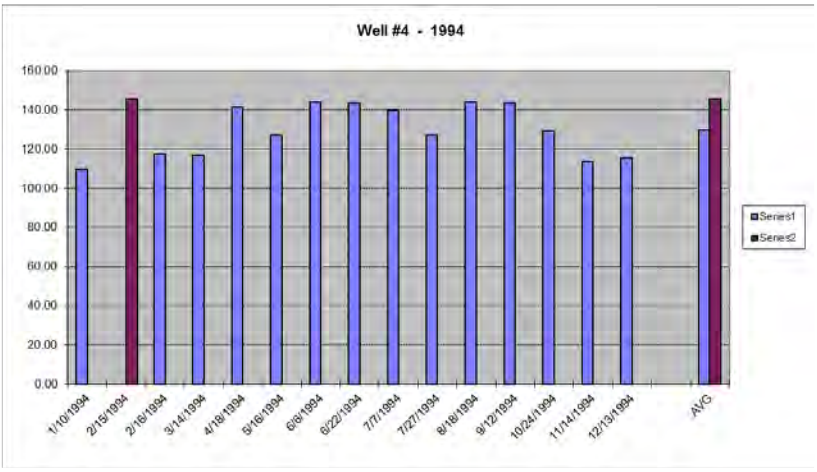

Well #4 - 1992
180.00
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
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5/20/1992
5/21/1992
6/10/1992
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7/13/1992
7/21/1992
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9/30/1992
10/15/1992
11/15/1992
12/16/1992
AVG
Series1
Series2

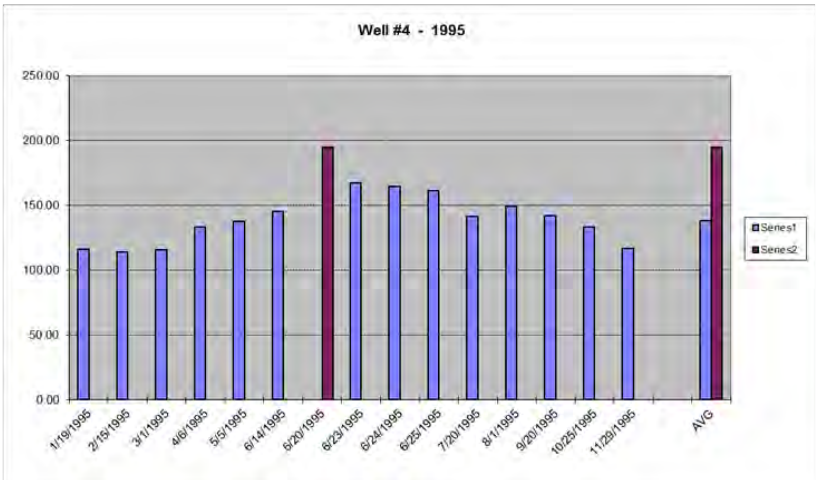

Well #4 - 1993
140.00
135.00
130.00
125.00
120.00
115.00
110.00
105.00
100.00
1/15/1993
2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

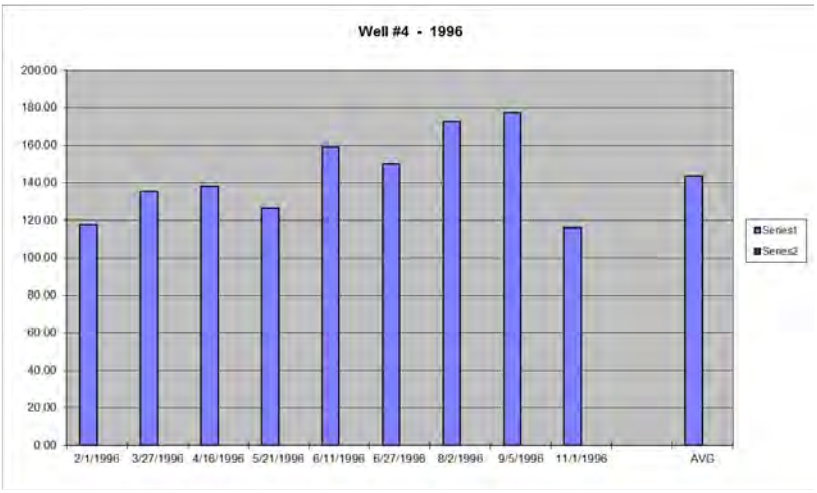

Well #4 - 1994
160.00
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
2/15/1994
2/16/1994
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6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

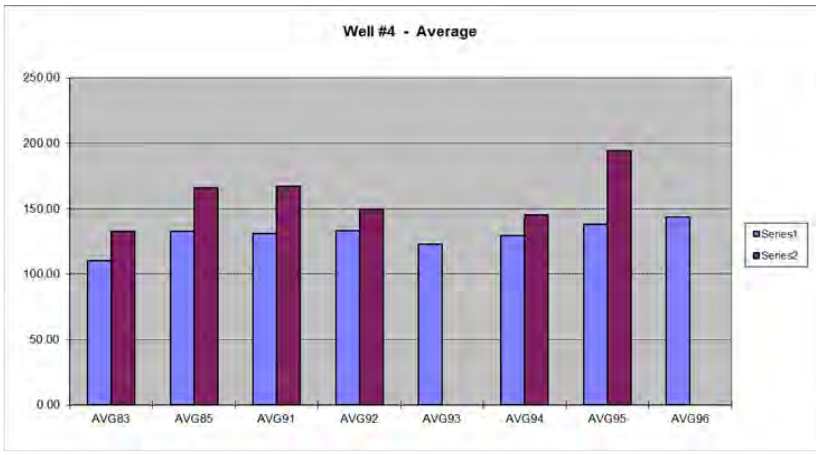

Well #4 - 1993
140.00
135.00
130.00
125.00
120.00
115.00
110.00
105.00
100.00
1/15/1993
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4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

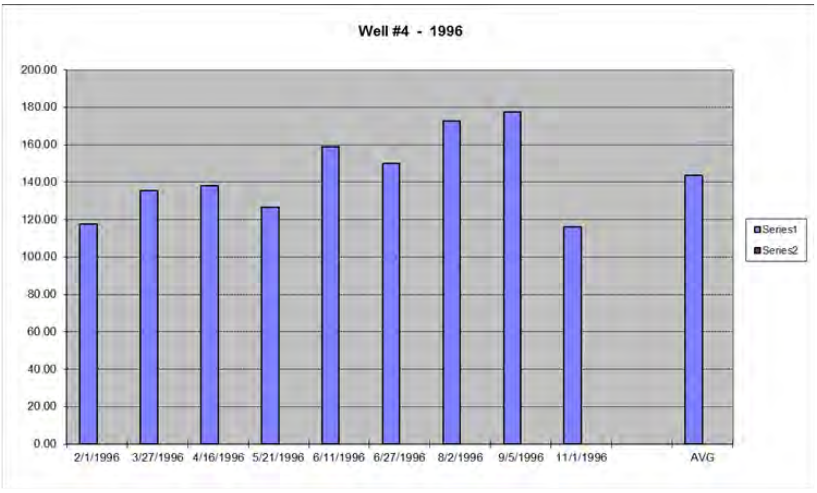

Well #4 - 1995
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150.00
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50.00
0.00
1/19/1995
2/15/1995
3/1/1995
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6/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

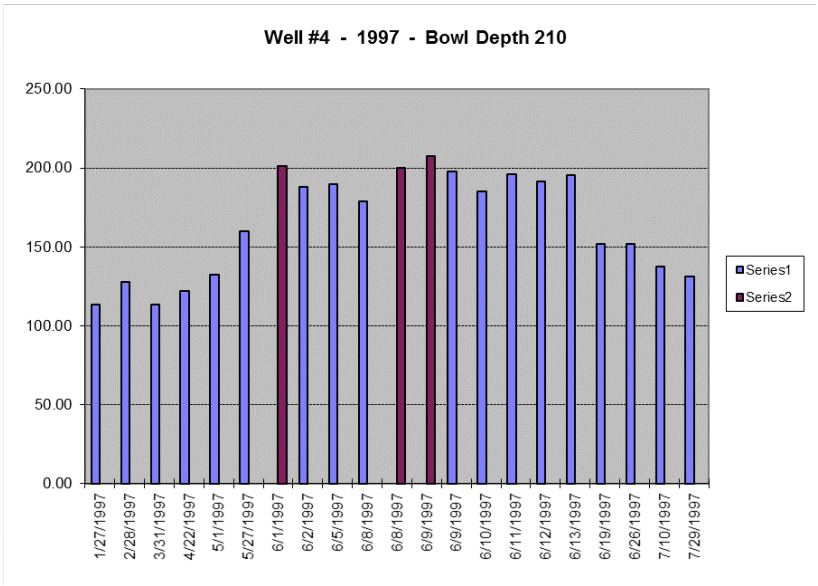

Well #4 - 1994
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
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2/16/1994
3/14/1994
4/18/1994
5/16/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

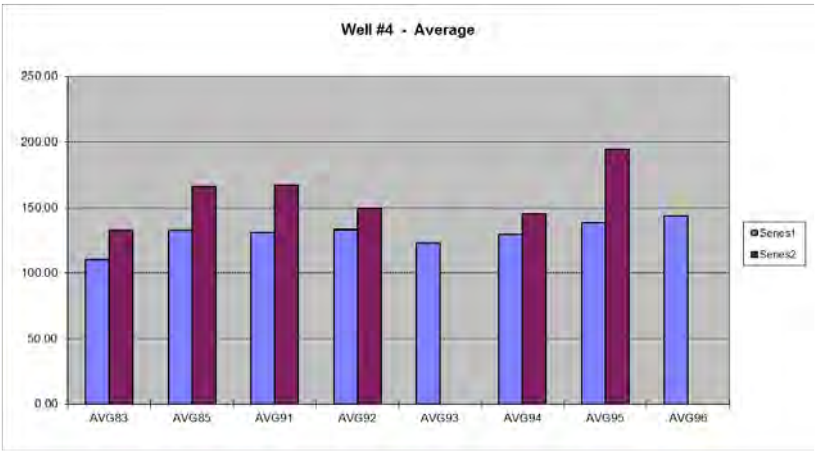

Well #4 - 1995
250.00
200.00
150.00
100.00
50.00
0.00
1/19/1995
2/15/1995
3/1/1995
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6/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

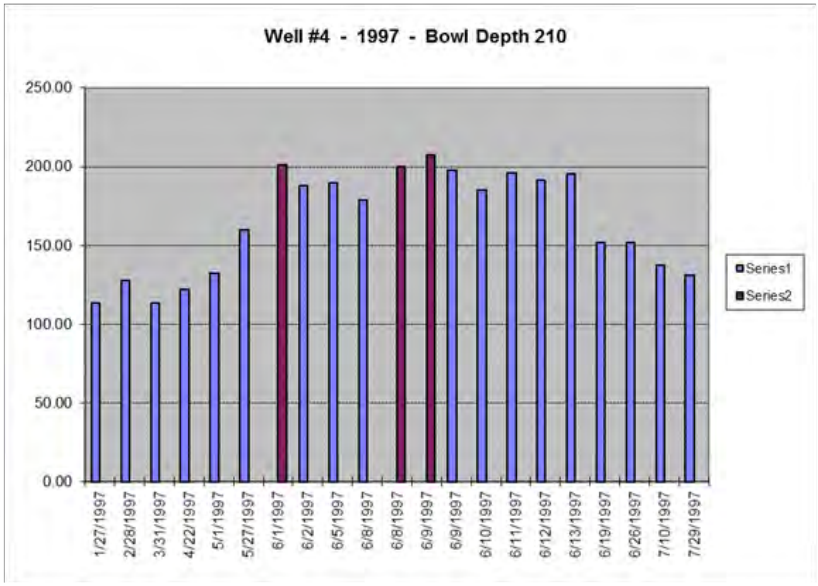

Well #4 - 1996
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/1/1996
3/27/1996
4/16/1996
5/21/1996
6/11/1996
6/27/1996
8/2/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

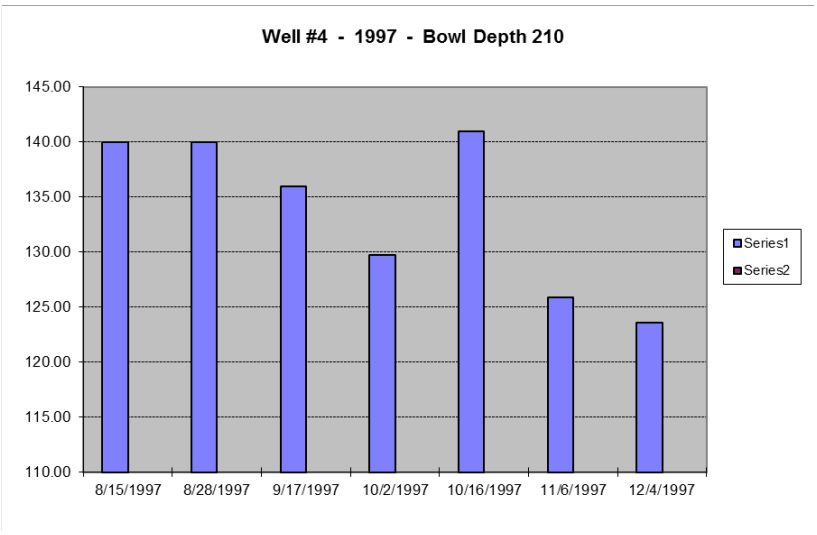

Well #4 - Average
250.00
200.00
150.00
100.00
50.00
0.00
AVG83
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

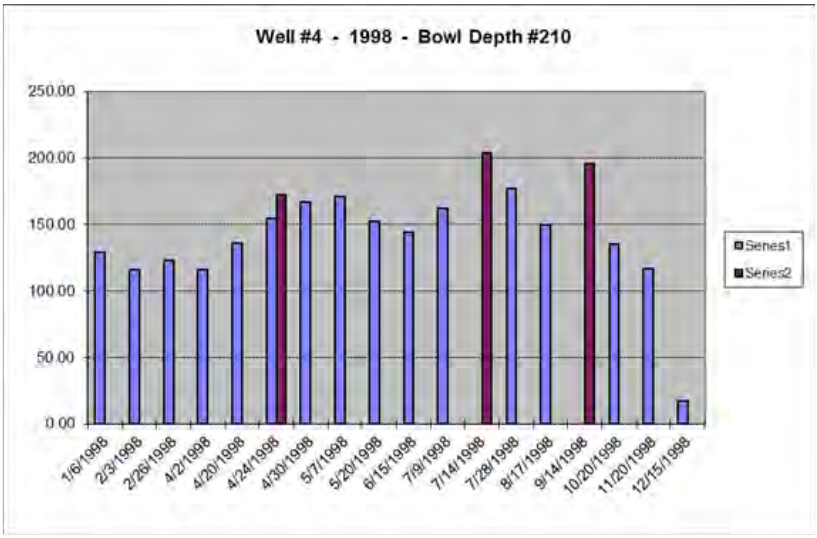

Well #4 - 1996
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/1/1996
3/27/1996
4/16/1996
5/21/1996
6/11/1996
6/27/1996
8/2/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

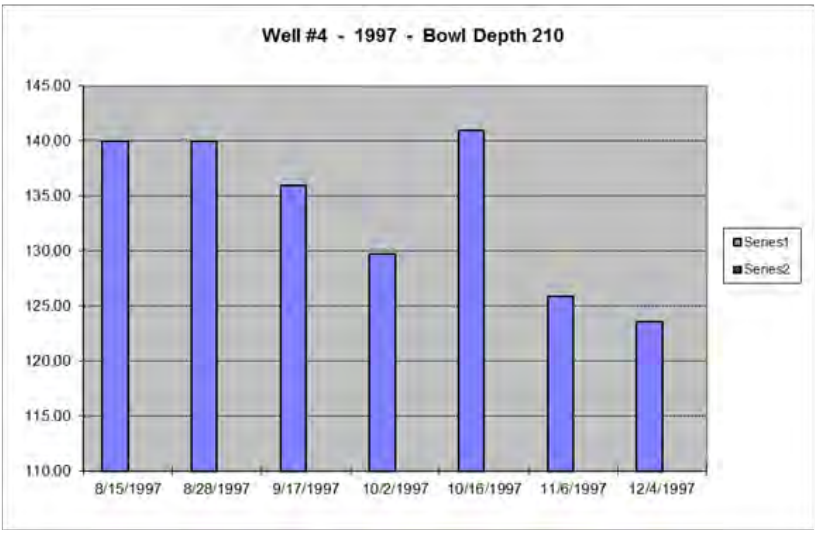

Well #4 - 1997 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
2/28/1997
3/31/1997
4/22/1997
5/1/1997
5/27/1997
6/1/1997
6/2/1997
6/5/1997
6/8/1997
6/8/1997
6/9/1997
6/9/1997
6/10/1997
6/11/1997
6/12/1997
6/13/1997
6/19/1997
6/26/1997
7/10/1997
7/29/1997
Series1
Series2

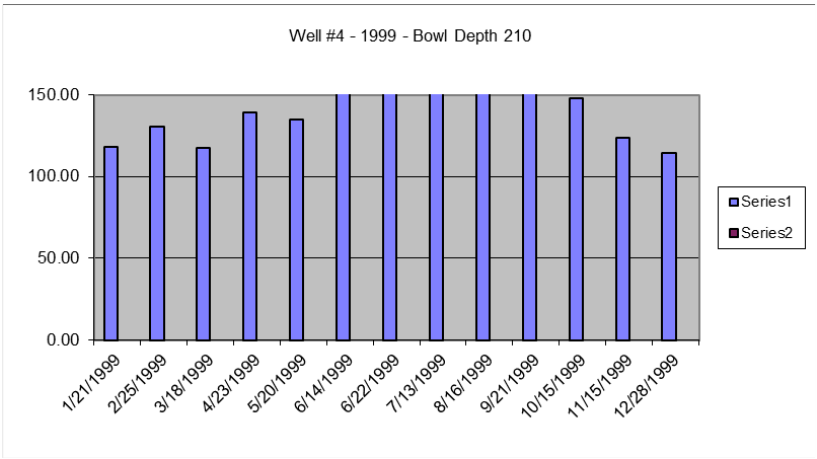

Well #4 - Average
250.00
200.00
150.00
100.00
50.00
0.00
AVG83
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

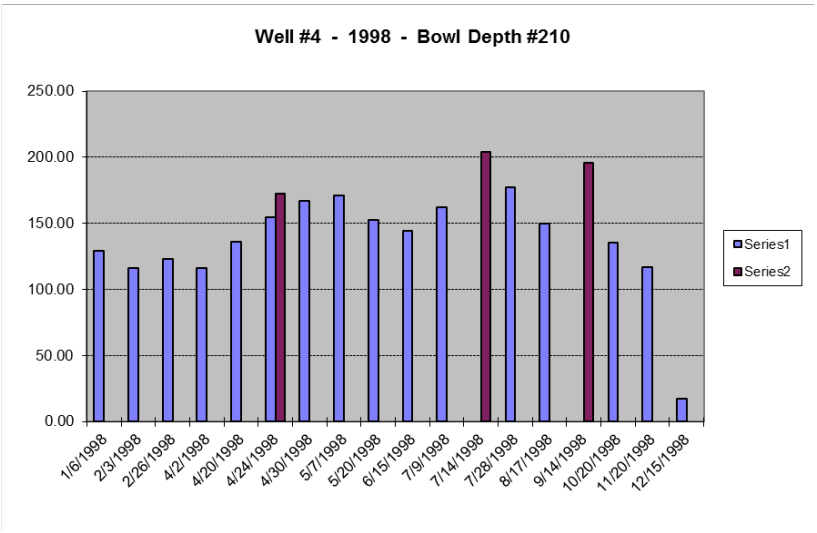

Well #4 - 1997 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
2/28/1997
3/31/1997
4/22/1997
5/1/1997
5/27/1997
6/1/1997
6/2/1997
6/5/1997
6/8/1997
6/8/1997
6/9/1997
6/9/1997
6/10/1997
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6/12/1997
6/13/1997
6/19/1997
6/26/1997
7/10/1997
7/29/1997
Series1
Series2

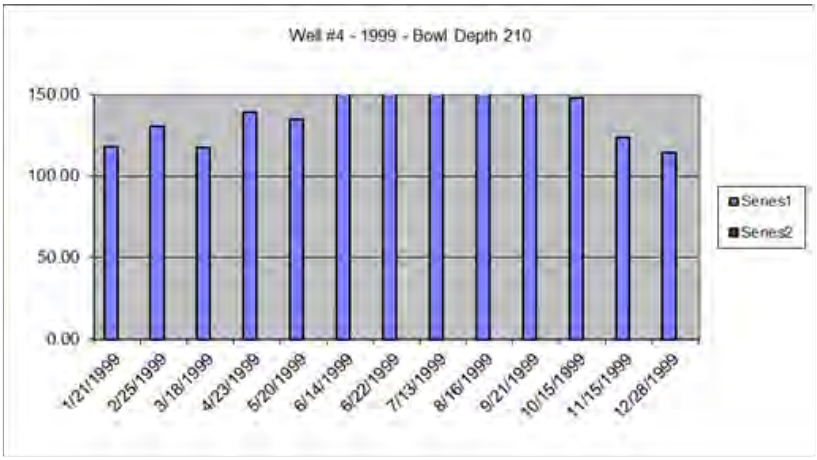

Well #4 - 1997 - Bowl Depth 210
145.00
140.00
135.00
130.00
125.00
120.00
115.00
110.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

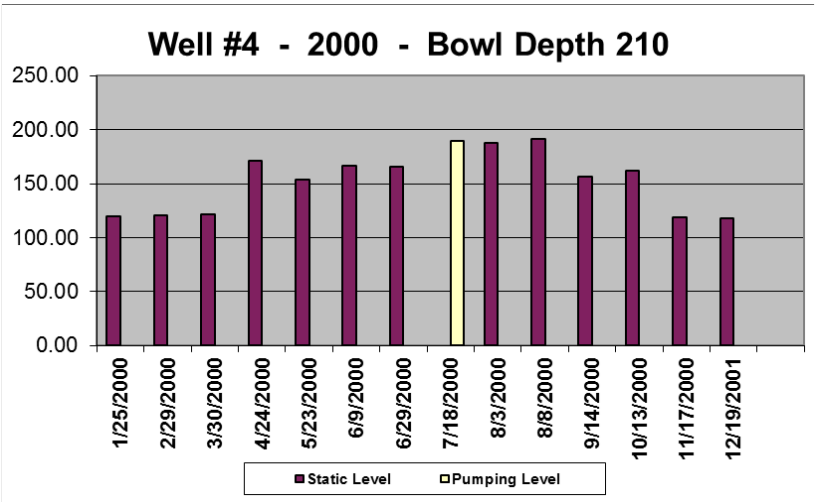

Well #4 - 1998 - Bowl Depth #210
250.00
200.00
150.00
100.00
50.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/24/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

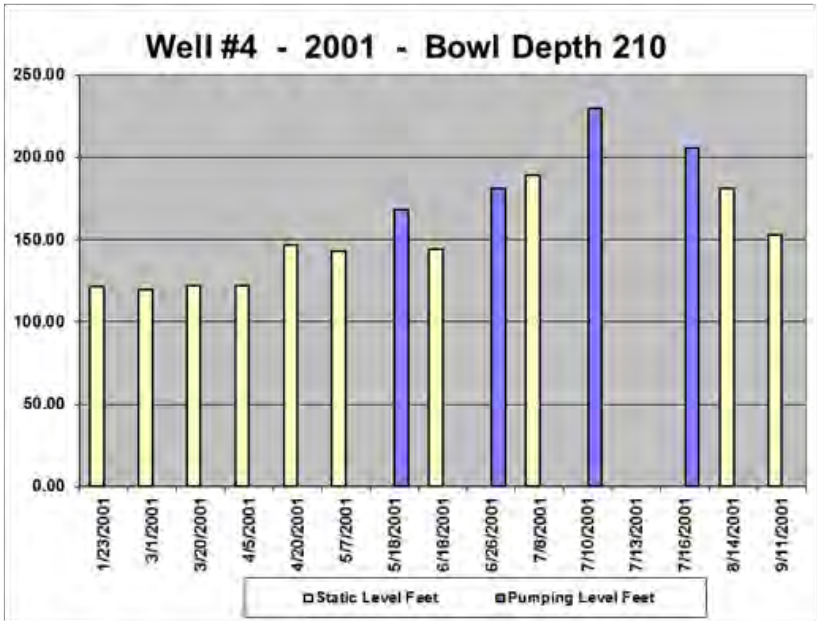

Well #4 - 1997 - Bowl Depth 210
145.00
140.00
135.00
130.00
125.00
120.00
115.00
110.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

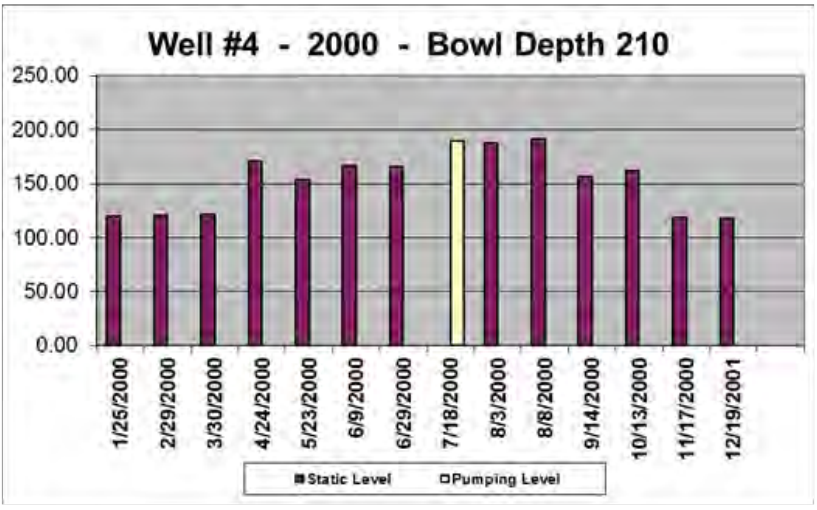

Well #4 - 1999 - Bowl Depth 210
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/1999
Series1
Series2

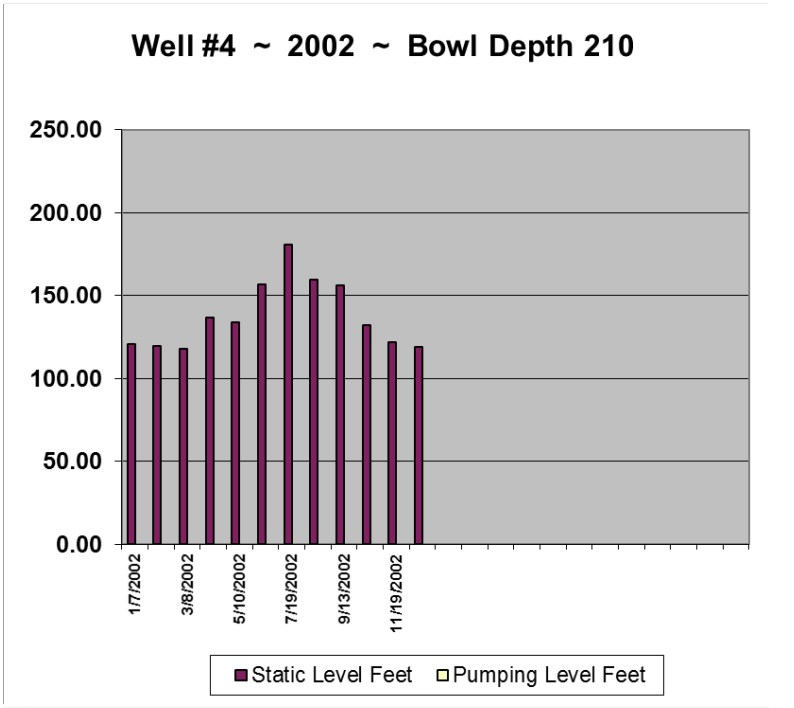

Well #4 - 1998 - Bowl Depth #210
250.00
200.00
150.00
100.00
50.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/24/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

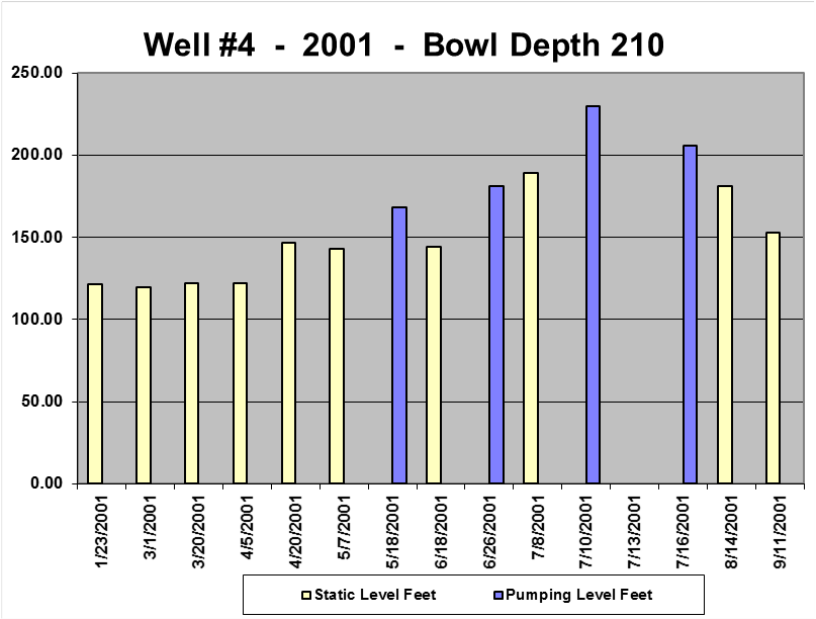

Well #4 - 1999 - Bowl Depth 210
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/1999
Series1
Series2

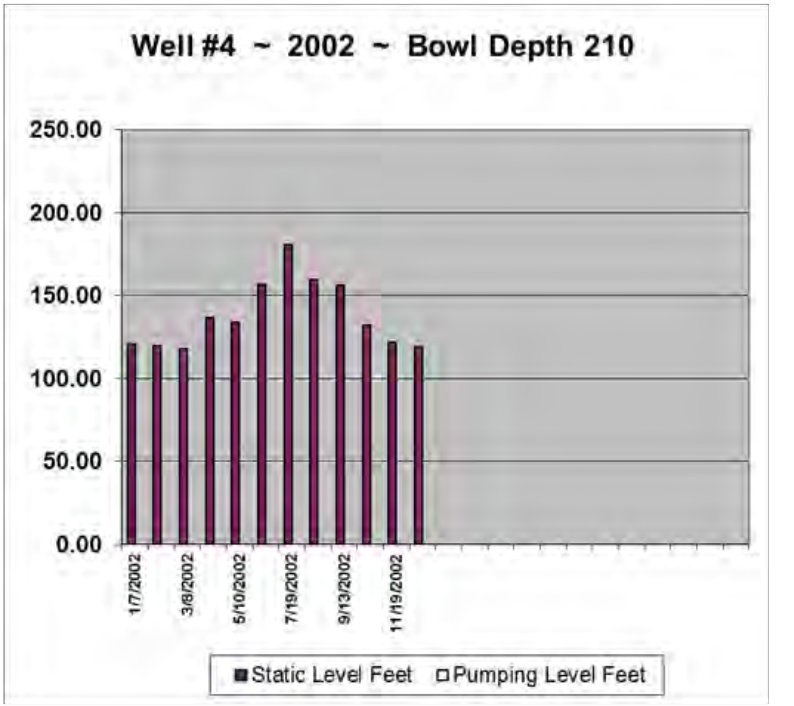

Well #4 - 2000 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/30/2000
4/24/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

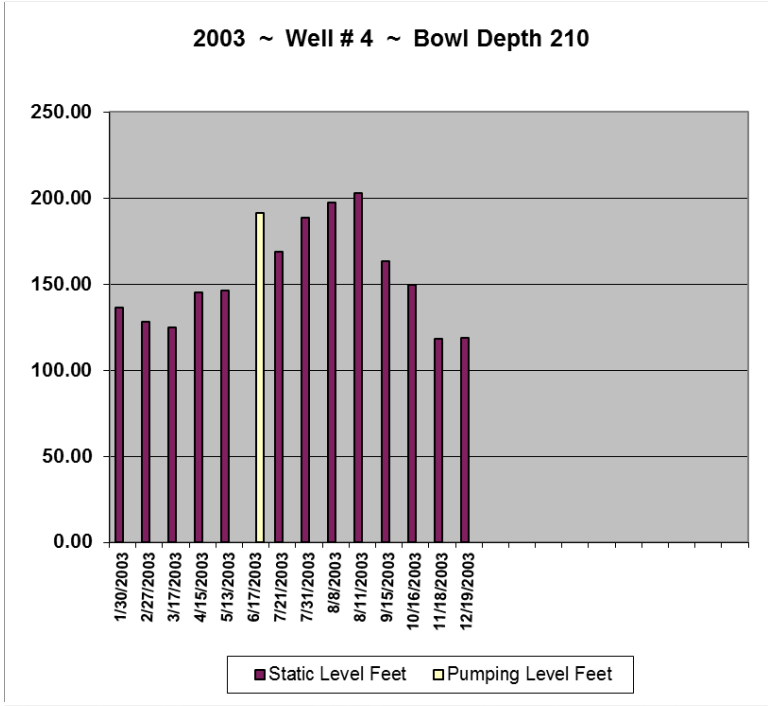

Well #4 - 2001 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
3/20/2001
4/5/2001
4/20/2001
5/7/2001
5/18/2001
6/18/2001
6/26/2001
7/8/2001
7/10/2001
7/13/2001
7/16/2001
8/14/2001
9/11/2001
Static Level Feet
Pumping Level Feet

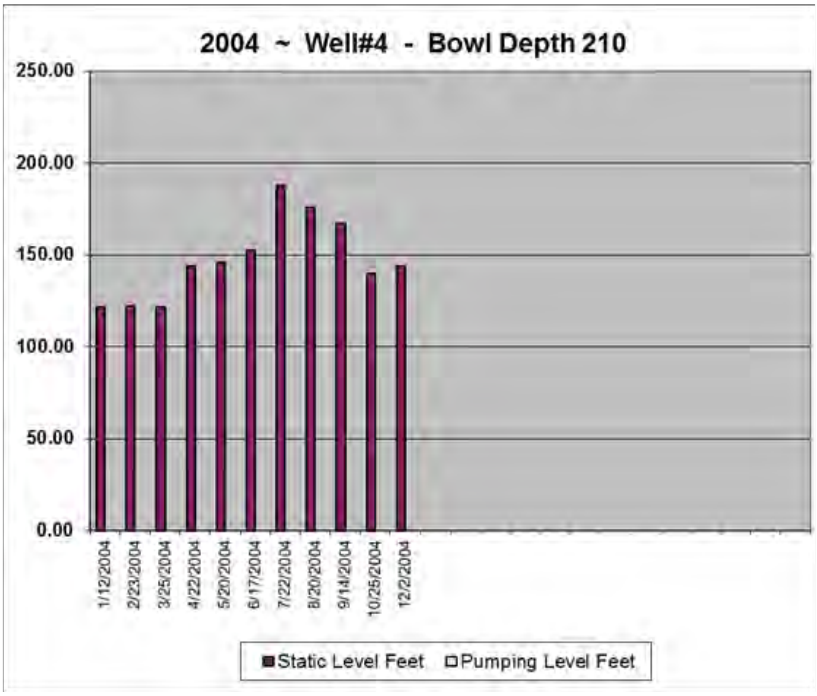

Well #4 - 2000 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/30/2000
4/24/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

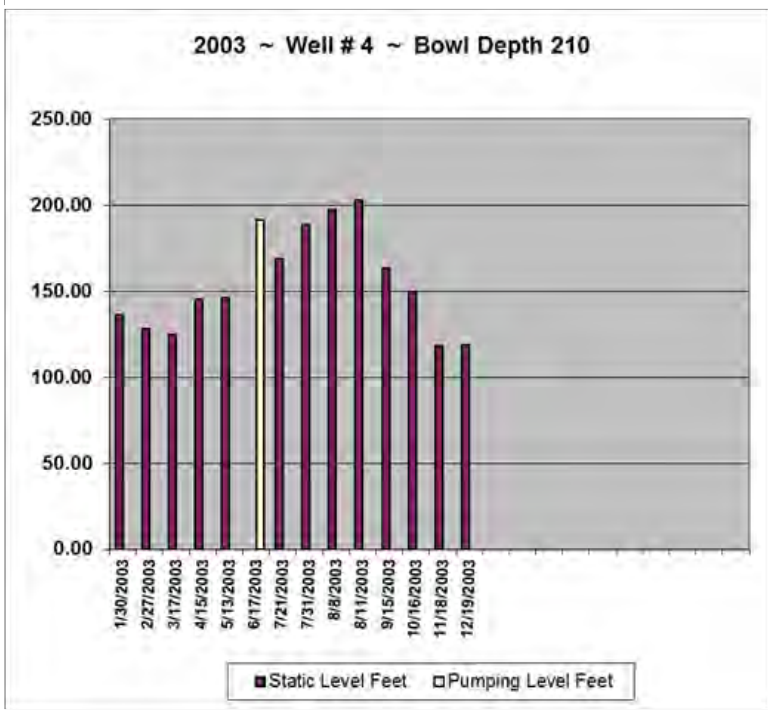

Well #4 ~ 2002 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
3/8/2002
5/10/2002
7/19/2002
9/13/2002
11/19/2002
Static Level Feet
Pumping Level Feet

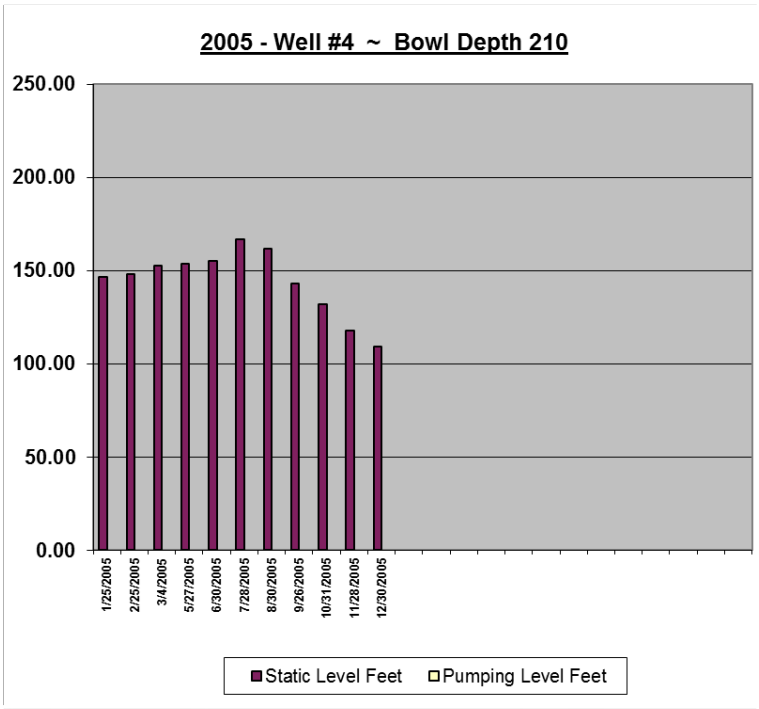

Well #4 - 2001 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
3/20/2001
4/5/2001
4/20/2001
5/7/2001
5/18/2001
6/18/2001
6/26/2001
7/8/2001
7/10/2001
7/13/2001
7/16/2001
8/14/2001
9/11/2001
Static Level Feet
Pumping Level Feet

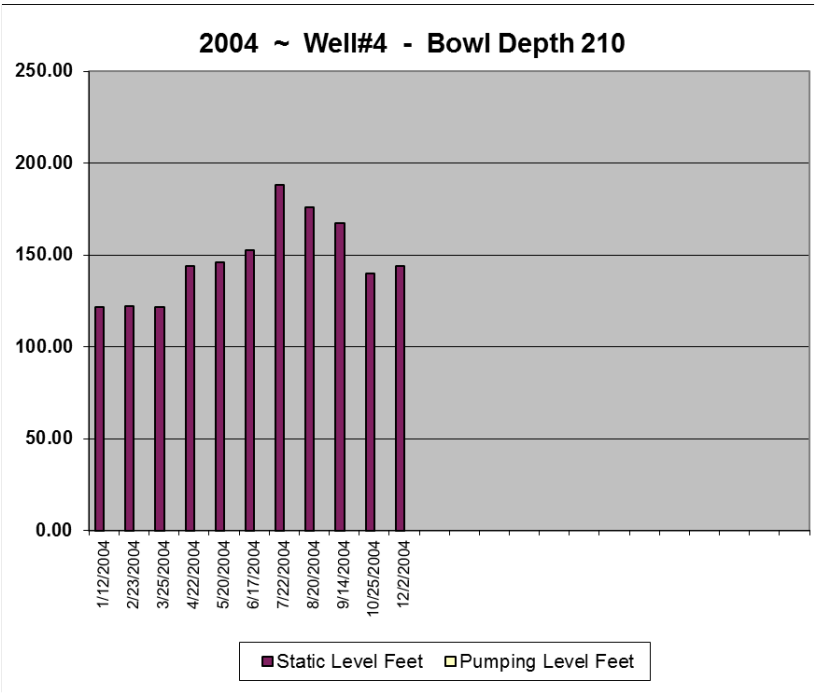

Well #4 ~ 2002 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
3/8/2002
5/10/2002
7/19/2002
9/13/2002
11/19/2002
Static Level Feet
Pumping Level Feet

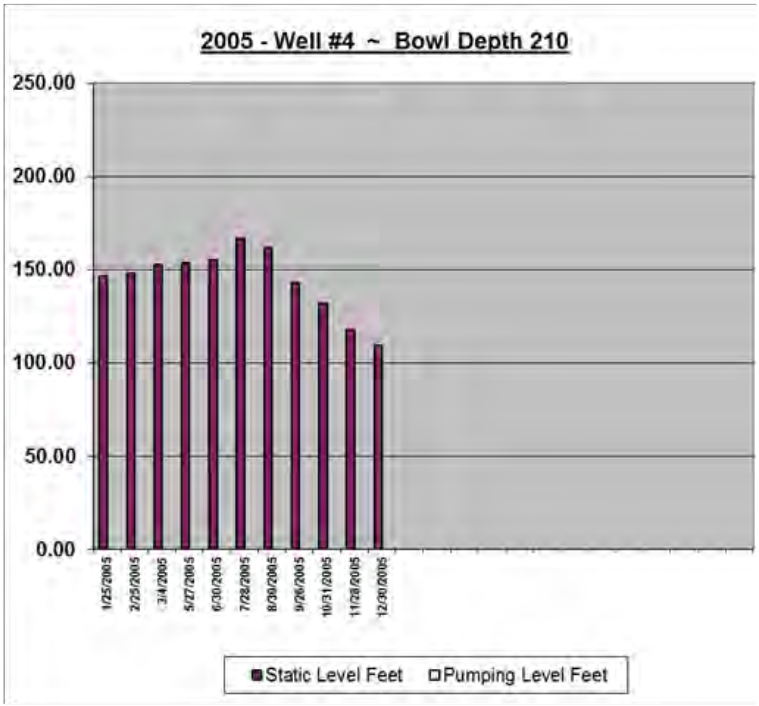

2003 ~ Well # 4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
2/27/2003
3/17/2003
4/15/2003
5/13/2003
6/17/2003
7/21/2003
7/31/2003
8/8/2003
8/11/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet


2004 ~ Well#4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

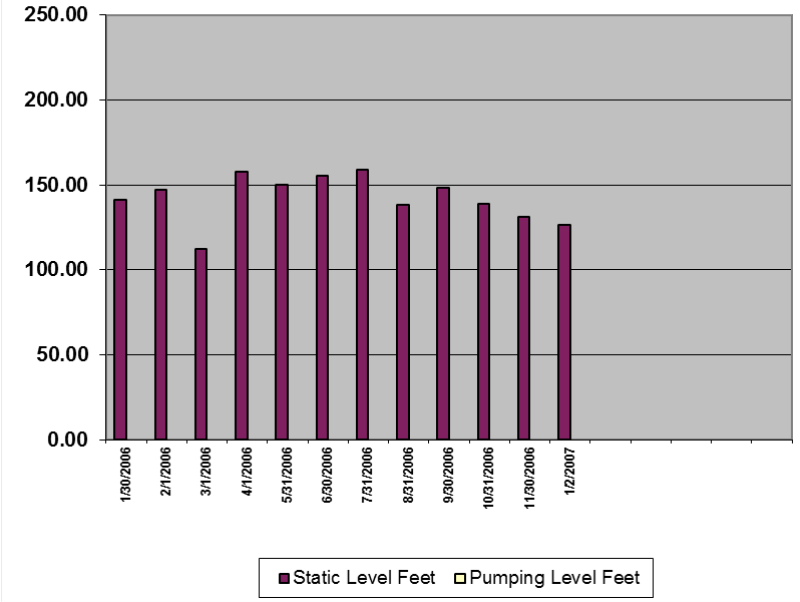

2003 ~ Well # 4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
2/27/2003
3/17/2003
4/15/2003
5/13/2003
6/17/2003
7/21/2003
7/31/2003
8/8/2003
8/11/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet


2005 - Well #4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/28/2005
8/30/2005
9/26/2005
10/31/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

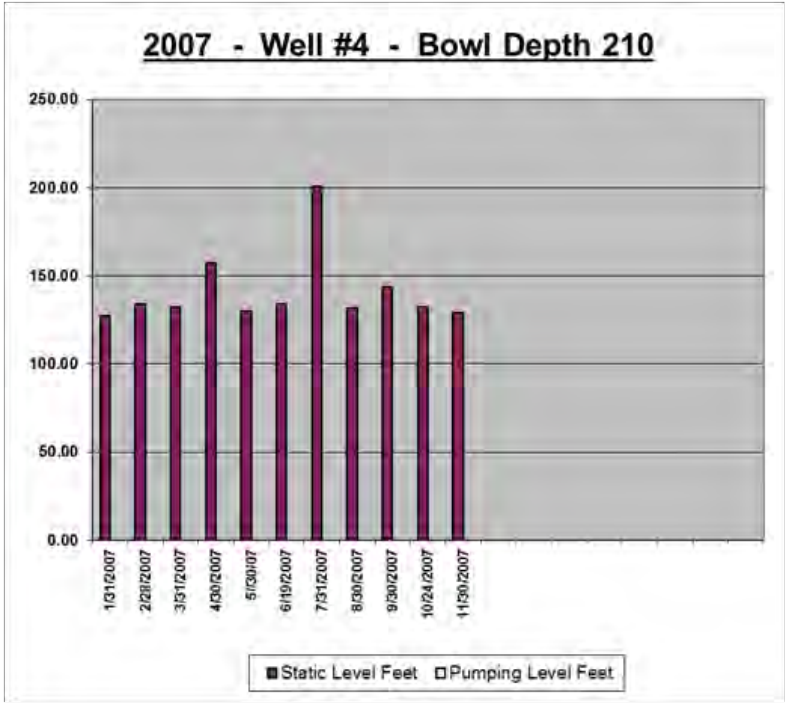

2004 ~ Well#4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet


2005 - Well #4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/28/2005
8/30/2005
9/26/2005
10/31/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

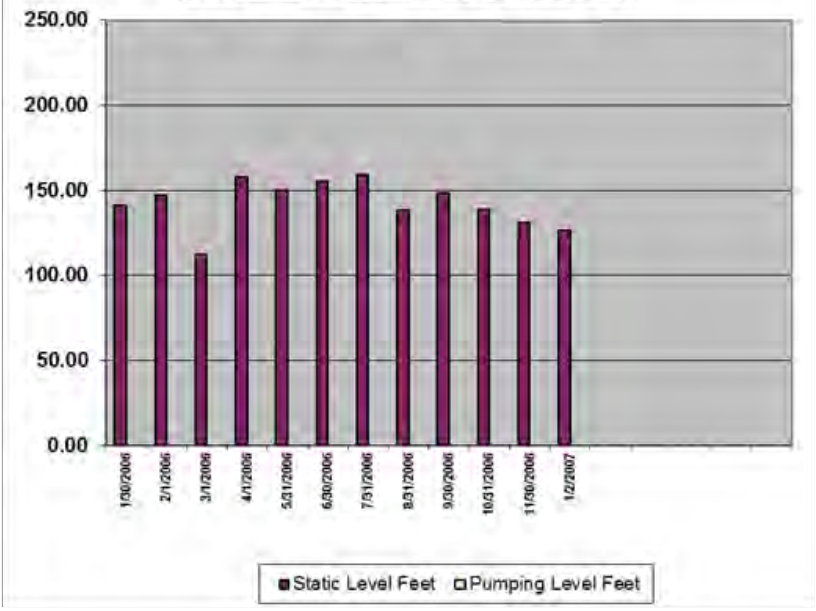
## 2006 - Well #4 - Bowl Depth 210



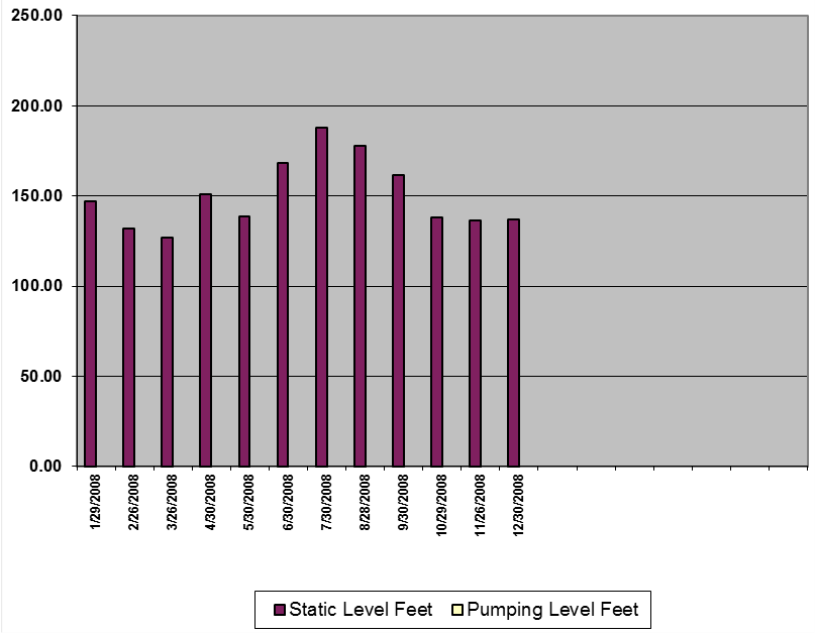

## 2007 - Well #4 - Bowl Depth 210



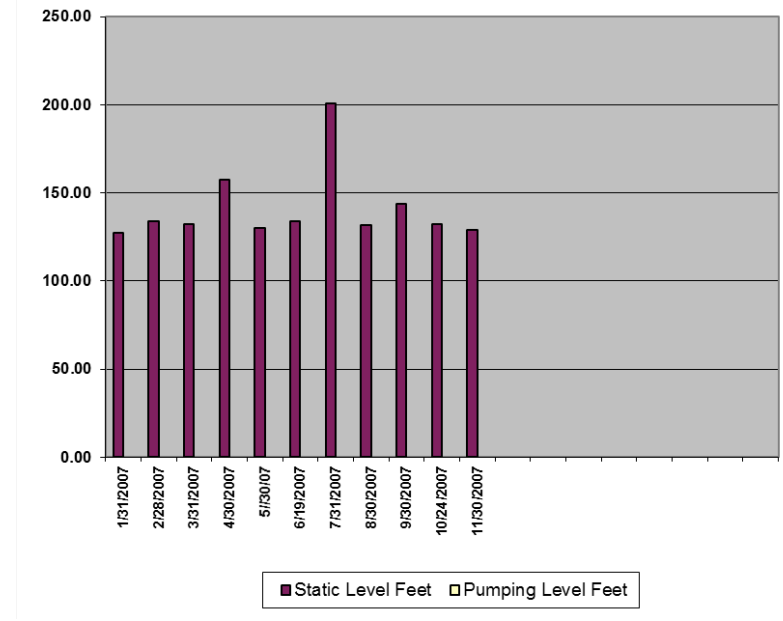

## 2006 - Well #4 - Bowl Depth 210



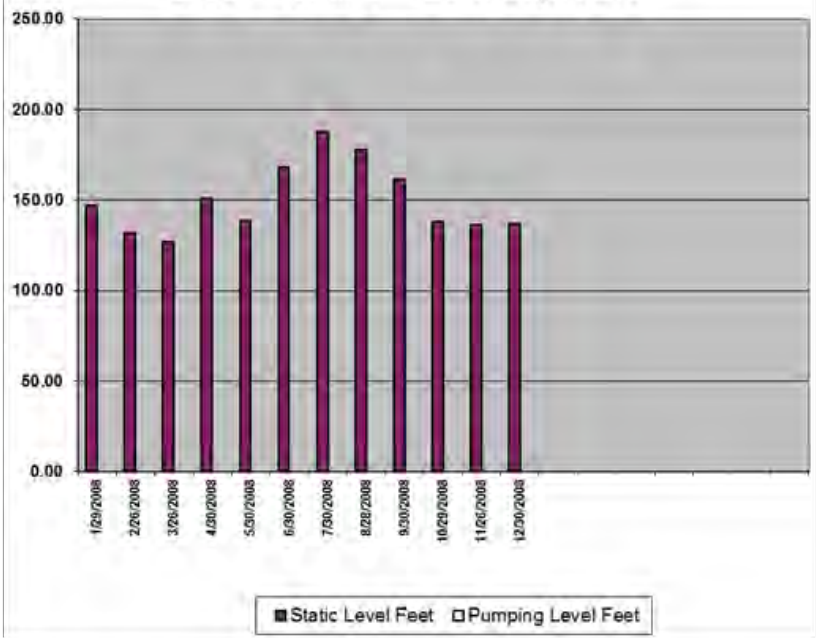

## 2008 - Well# 4 - Bowl Depth 210

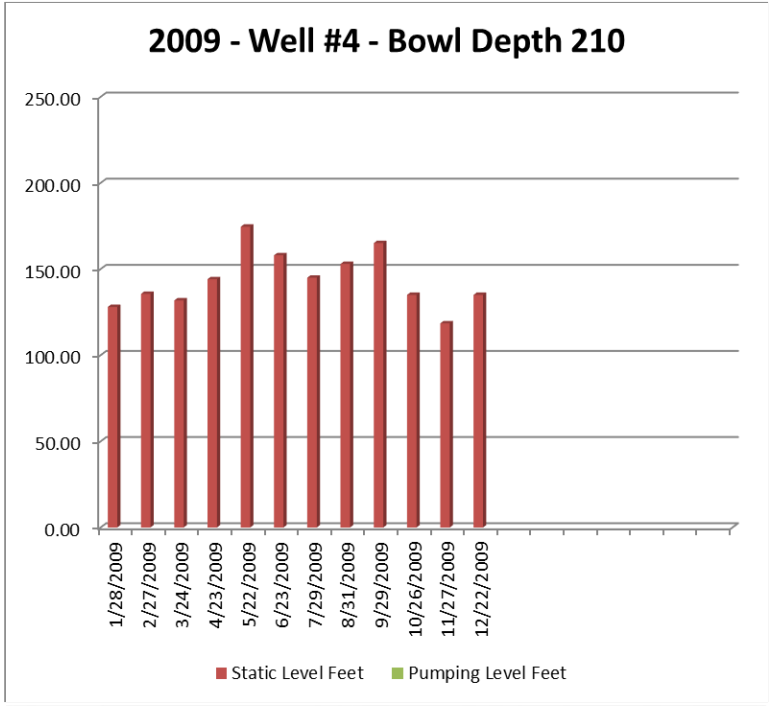


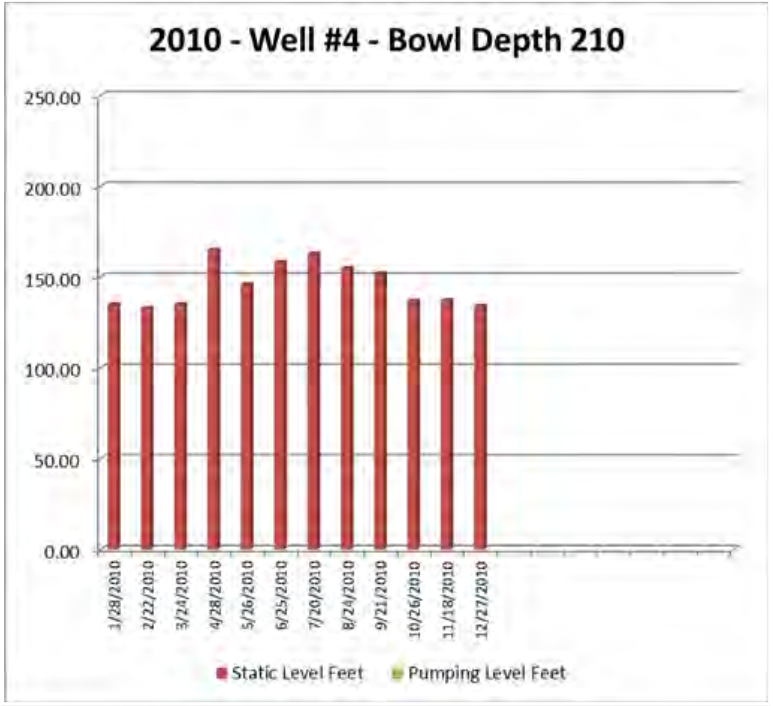

## 2007 - Well #4 - Bowl Depth 210

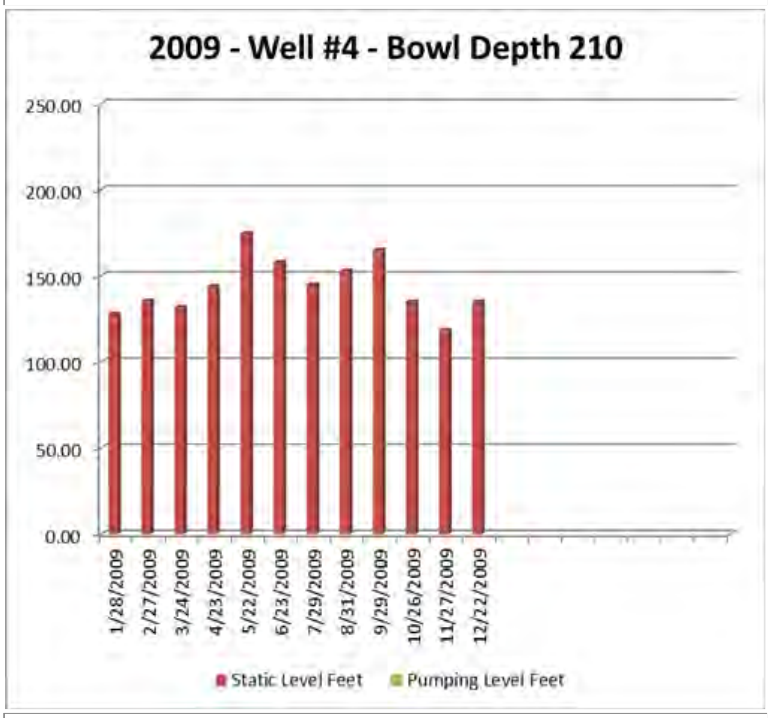


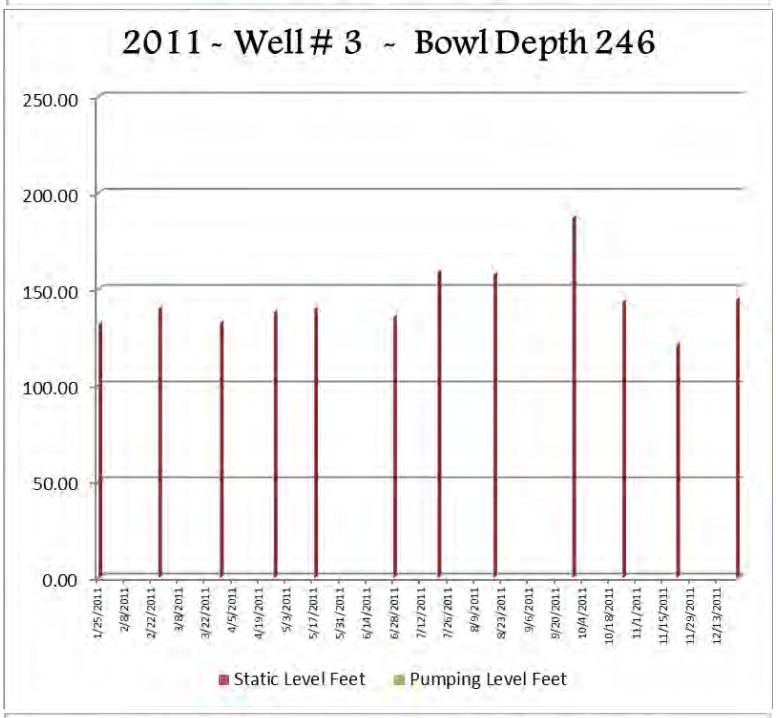

## 2008 - Well# 4 - Bowl Depth 210

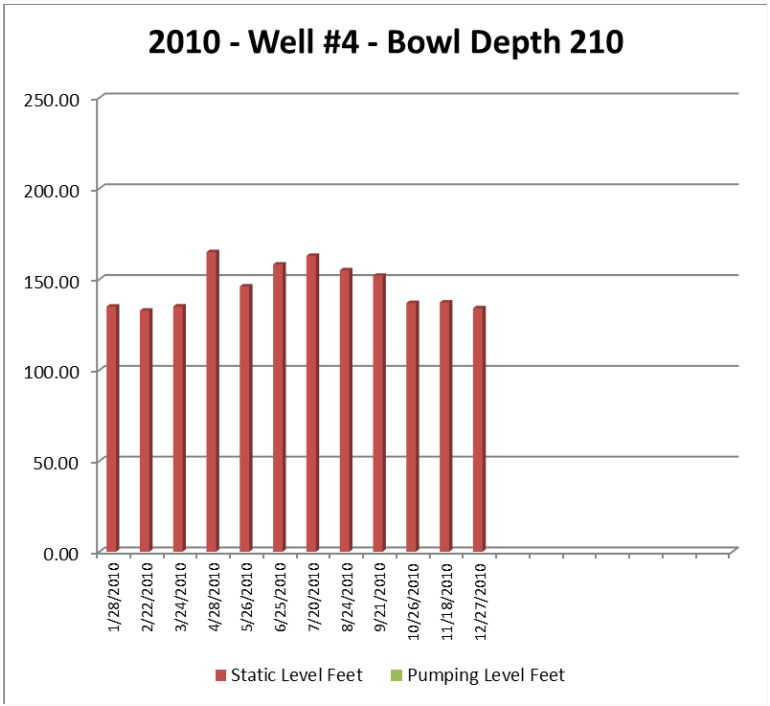


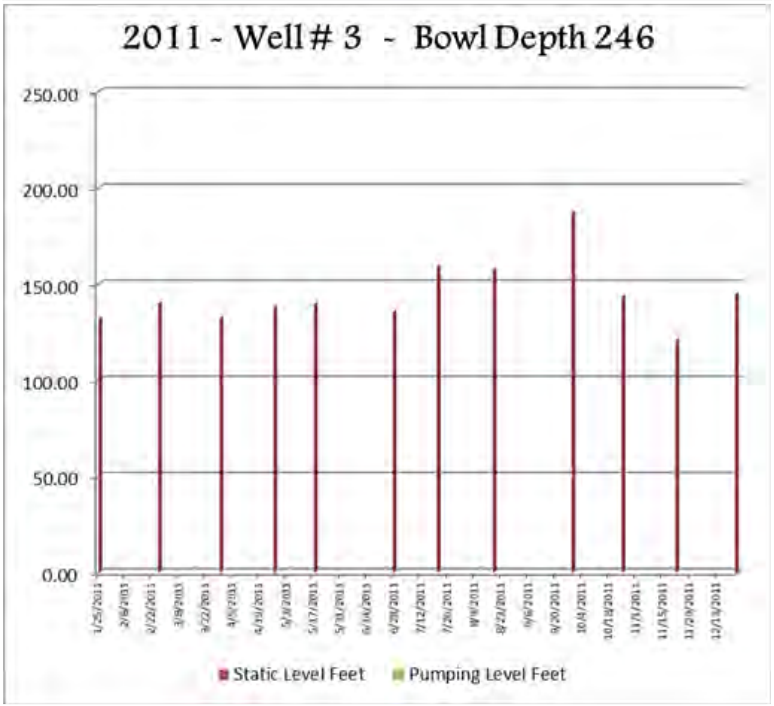

2009 - Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/23/2009
5/22/2009
6/23/2009
7/29/2009
8/31/2009
9/29/2009
10/26/2009
11/27/2009
12/22/2009
Static Level Feet
Pumping Level Feet

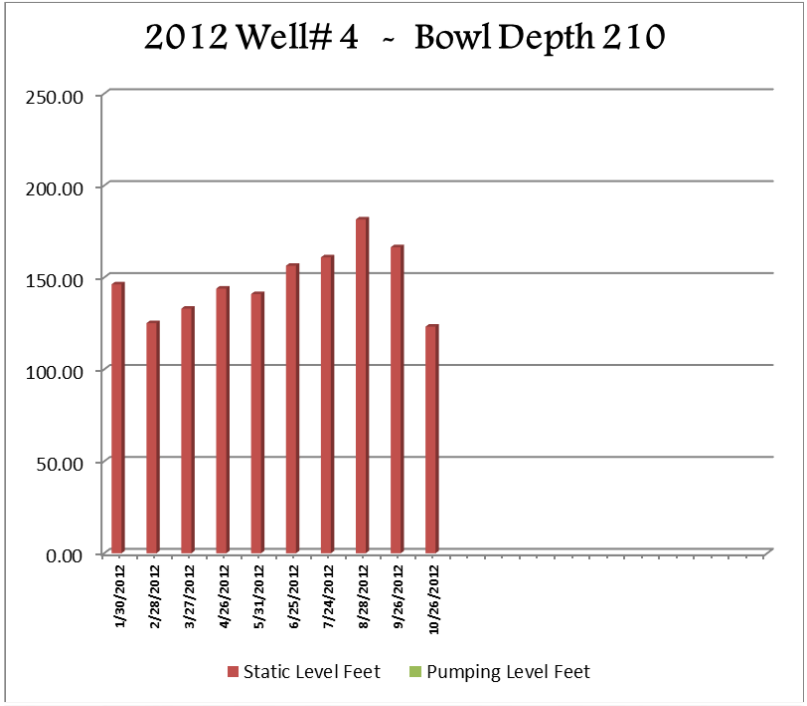

2010 - Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/22/2010
3/24/2010
4/28/2010
5/26/2010
6/25/2010
7/20/2010
8/24/2010
9/21/2010
10/26/2010
11/18/2010
12/27/2010
Static Level Feet
Pumping Level Feet

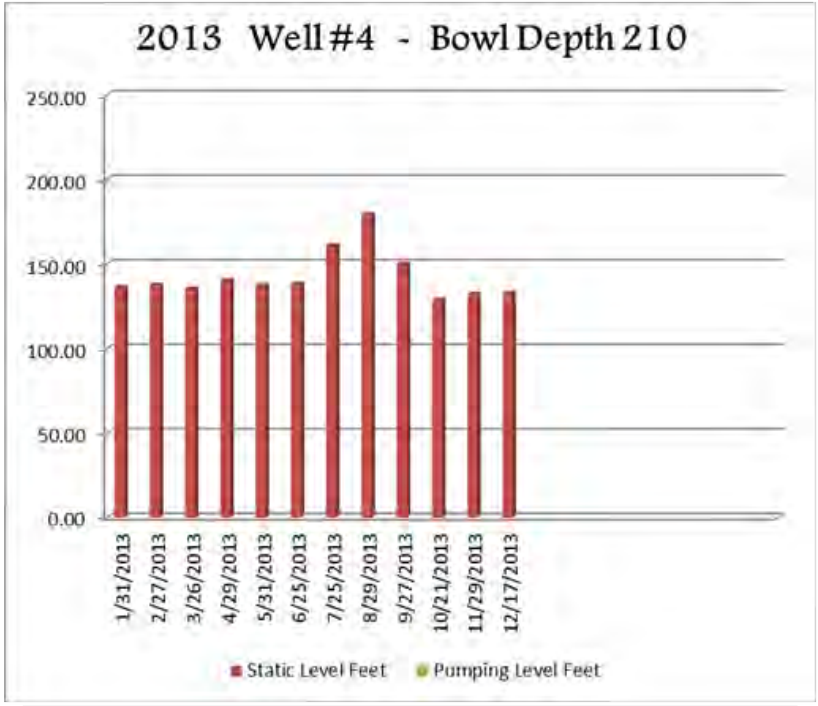

2009 - Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/23/2009
5/22/2009
6/23/2009
7/29/2009
8/31/2009
9/29/2009
10/26/2009
11/27/2009
12/22/2009
Static Level Feet
Pumping Level Feet

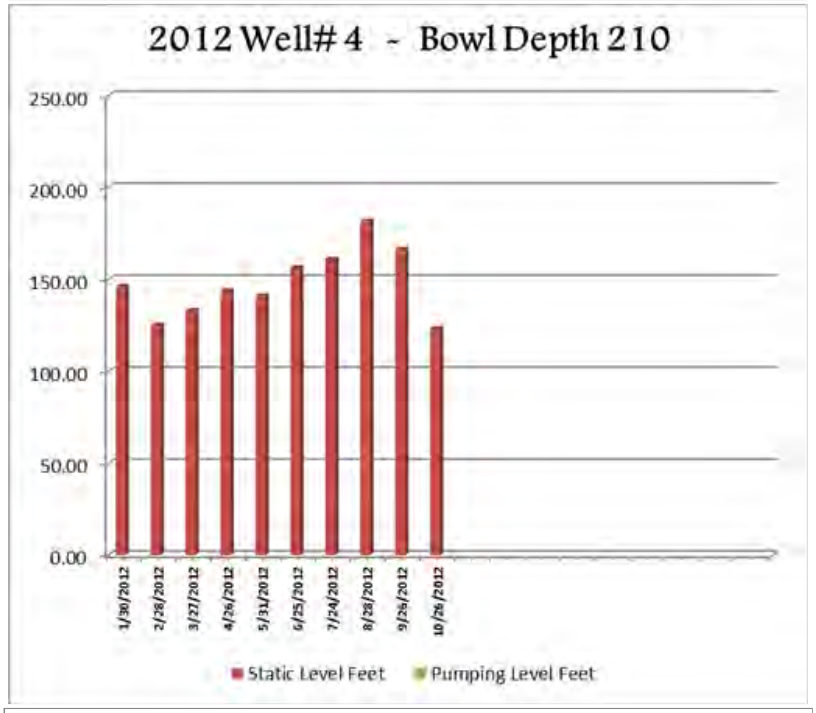

2011 - Well # 3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

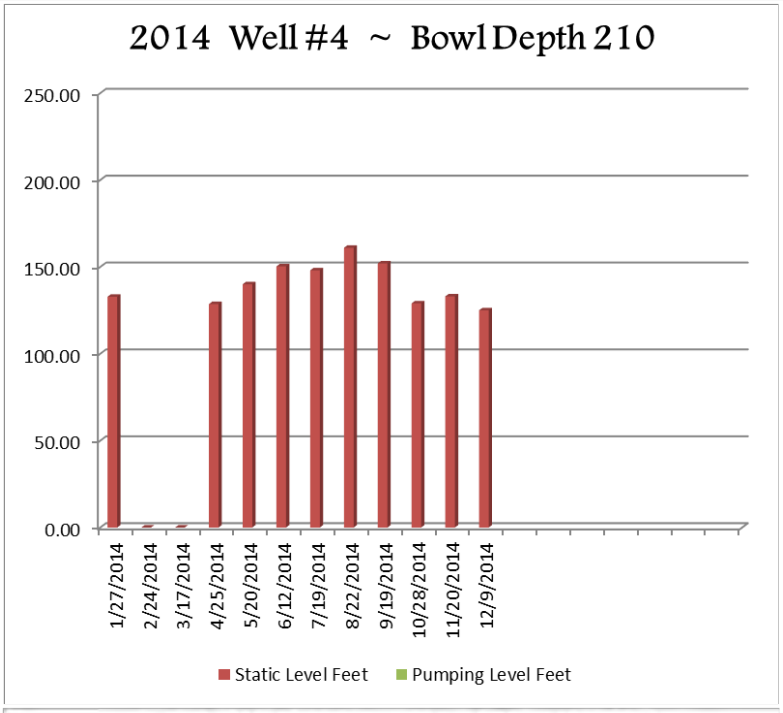

2010 - Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/22/2010
3/24/2010
4/28/2010
5/26/2010
6/25/2010
7/20/2010
8/24/2010
9/21/2010
10/26/2010
11/18/2010
12/27/2010
Static Level Feet
Pumping Level Feet

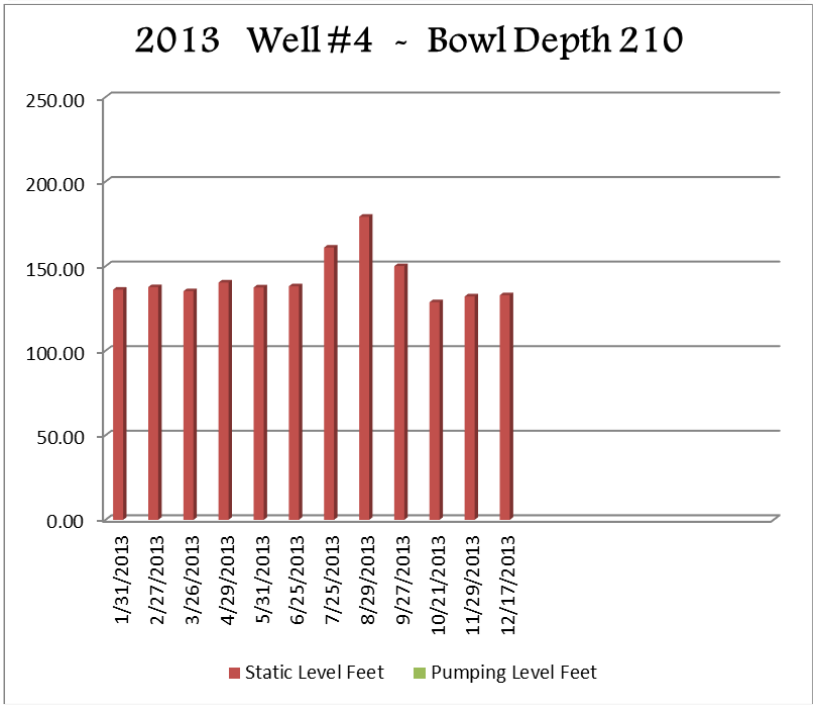

2011 - Well # 3 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

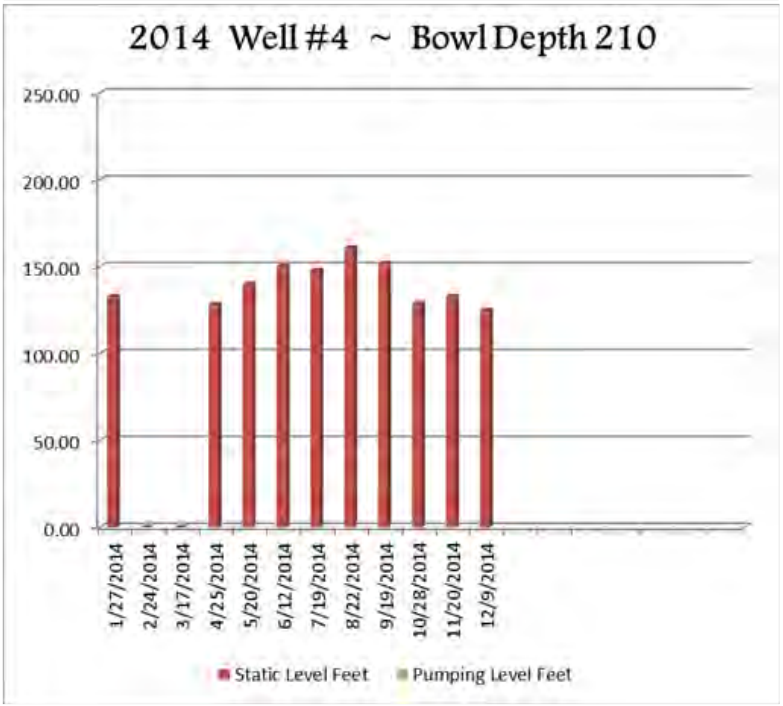

2012 Well# 4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2012
2/28/2012
3/27/2012
4/26/2012
5/31/2012
6/25/2012
7/24/2012
8/28/2012
9/26/2012
10/26/2012
Static Level Feet
Pumping Level Feet

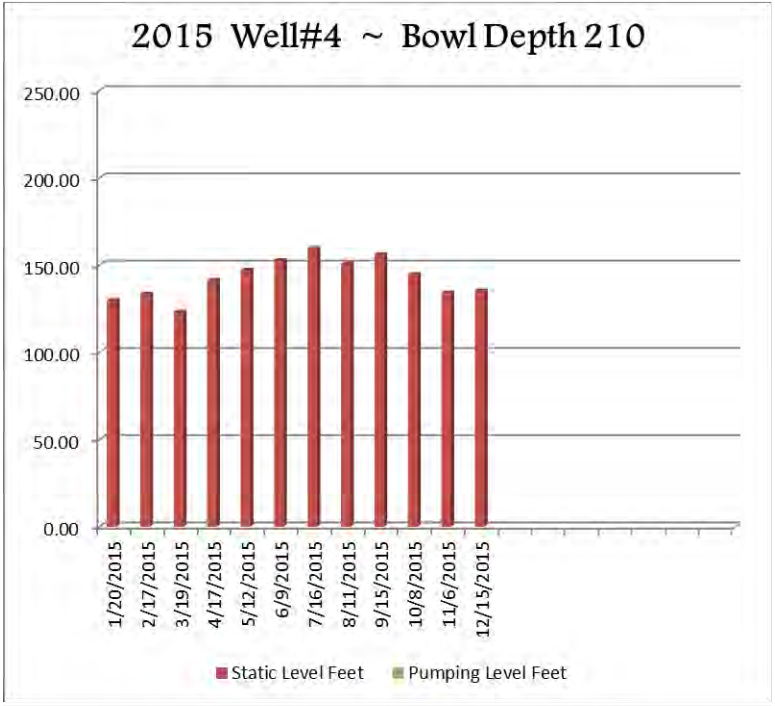

2013 Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2013
2/27/2013
3/26/2013
4/29/2013
5/31/2013
6/25/2013
7/25/2013
8/29/2013
9/27/2013
10/21/2013
11/29/2013
12/17/2013
Static Level Feet
Pumping Level Feet

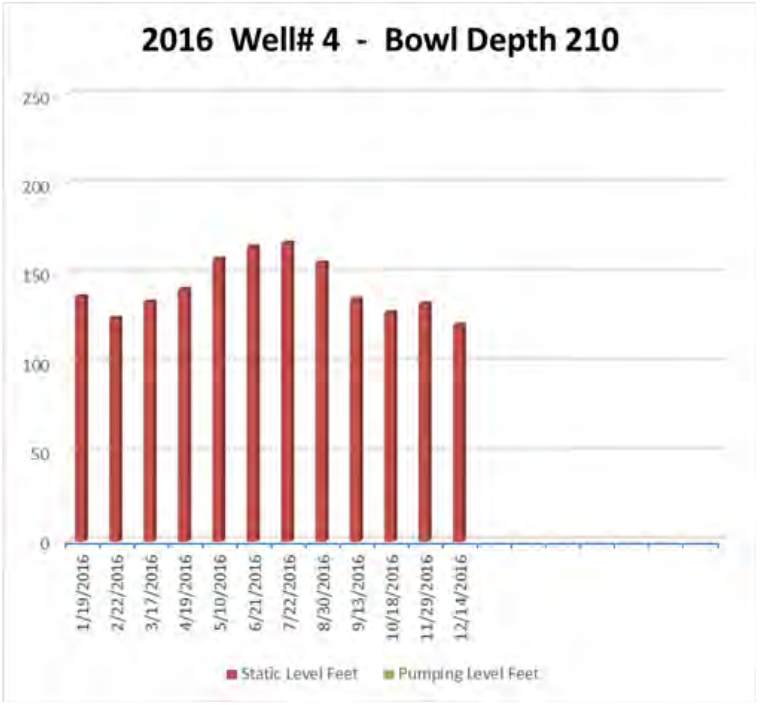

2012 Well# 4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2012
2/28/2012
3/27/2012
4/26/2012
5/31/2012
6/25/2012
7/24/2012
8/28/2012
9/26/2012
10/26/2012
Static Level Feet
Pumping Level Feet

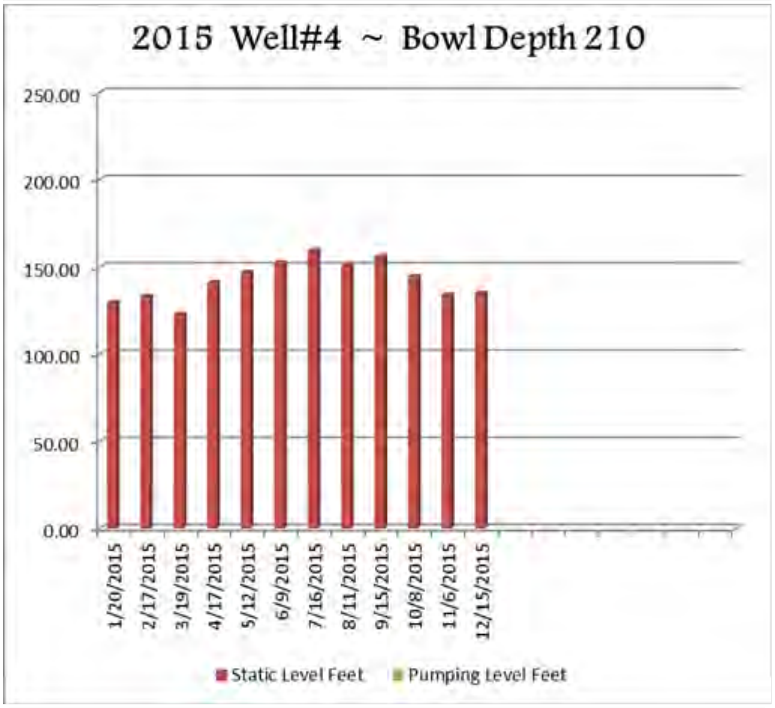

2014 Well #4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2014
2/24/2014
3/17/2014
4/25/2014
5/20/2014
6/12/2014
7/19/2014
8/22/2014
9/19/2014
10/28/2014
11/20/2014
12/9/2014
Static Level Feet
Pumping Level Feet

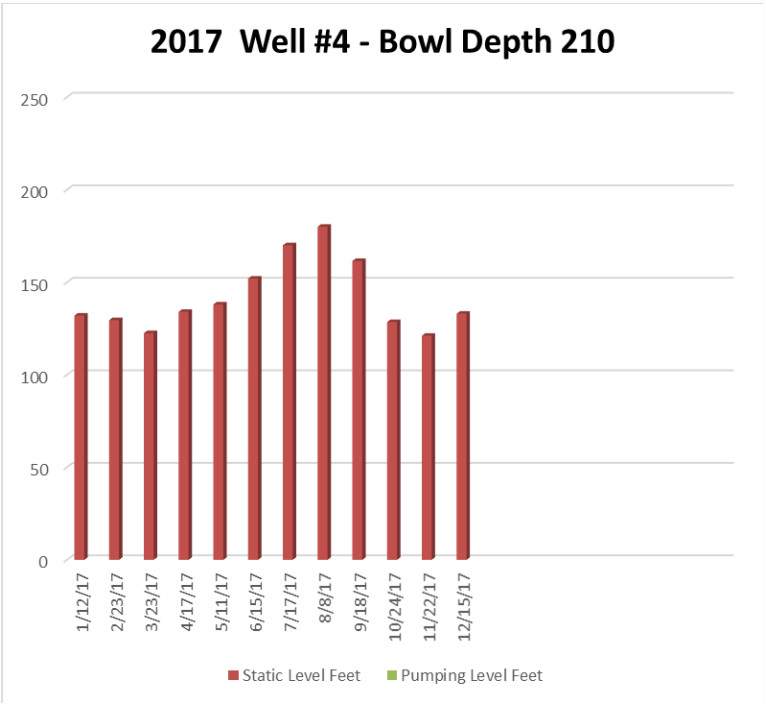

2013 Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2013
2/27/2013
3/26/2013
4/29/2013
5/31/2013
6/25/2013
7/25/2013
8/29/2013
9/27/2013
10/21/2013
11/29/2013
12/17/2013
Static Level Feet
Pumping Level Feet

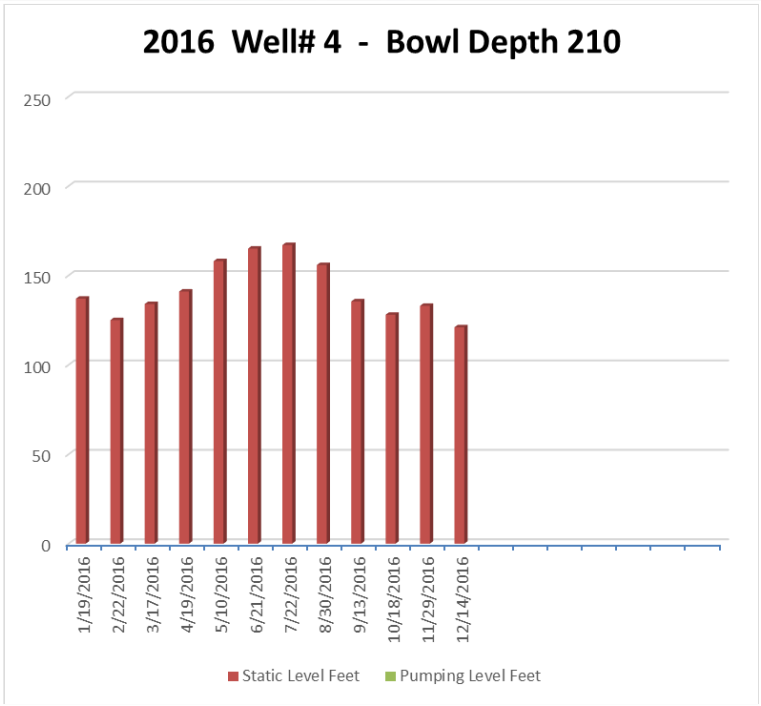

2014 Well #4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2014
2/24/2014
3/17/2014
4/25/2014
5/20/2014
6/12/2014
7/19/2014
8/22/2014
9/19/2014
10/28/2014
11/20/2014
12/9/2014
Static Level Feet
Pumping Level Feet

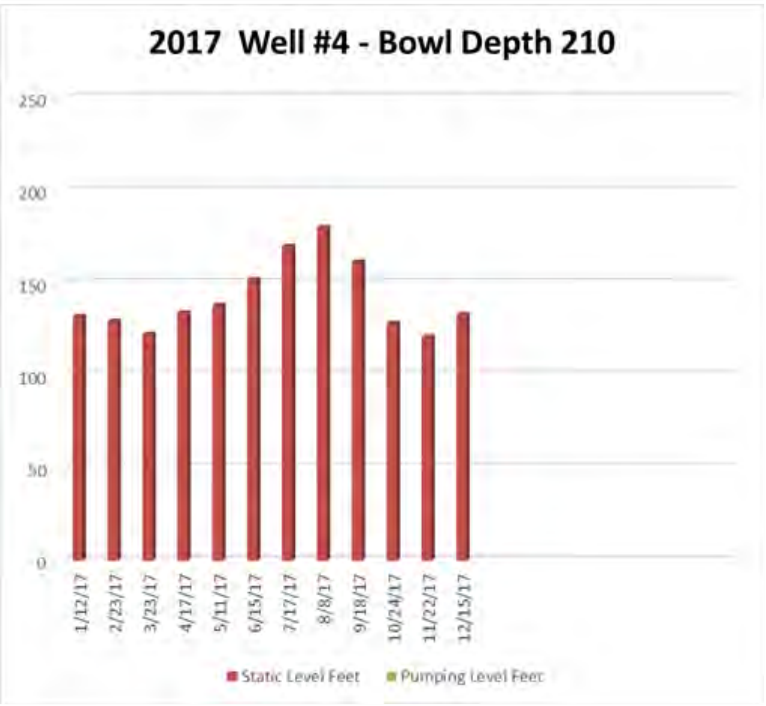

2015 Well#4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/20/2015
2/17/2015
3/19/2015
4/17/2015
5/12/2015
6/9/2015
7/16/2015
8/11/2015
9/15/2015
10/8/2015
11/6/2015
12/15/2015
Static Level Feet
Pumping Level Feet

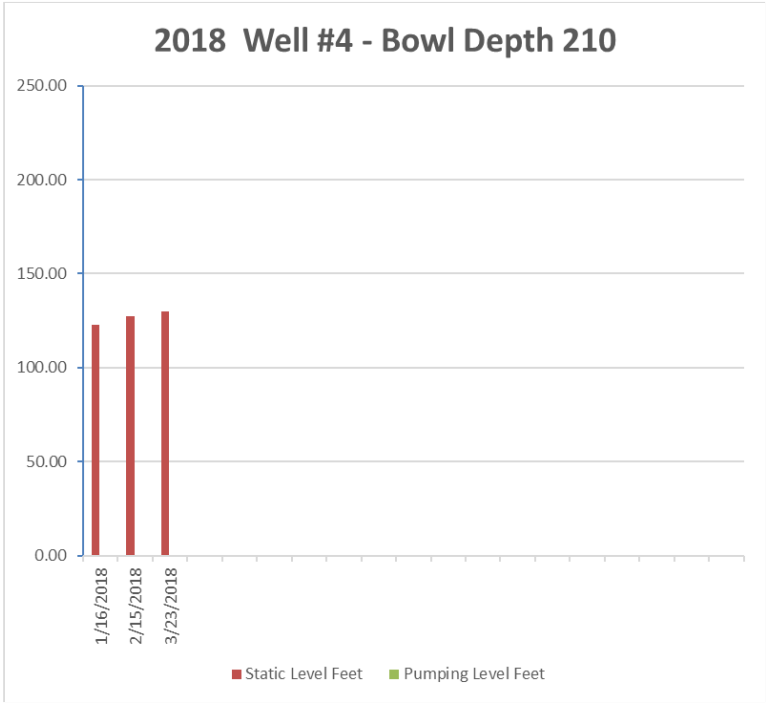

2016 Well# 4 - Bowl Depth 210
250
200
150
100
50
0
1/19/2016
2/22/2016
3/17/2016
4/19/2016
5/10/2016
6/21/2016
7/22/2016
8/30/2016
9/13/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

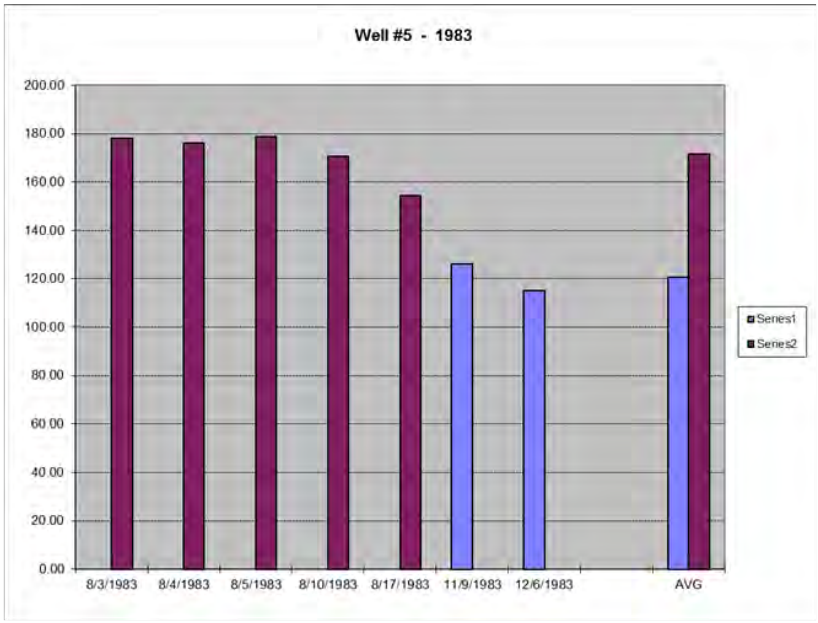

2015 Well#4 ~ Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/20/2015
2/17/2015
3/19/2015
4/17/2015
5/12/2015
6/9/2015
7/16/2015
8/11/2015
9/15/2015
10/8/2015
11/6/2015
12/15/2015
Static Level Feet
Pumping Level Feet

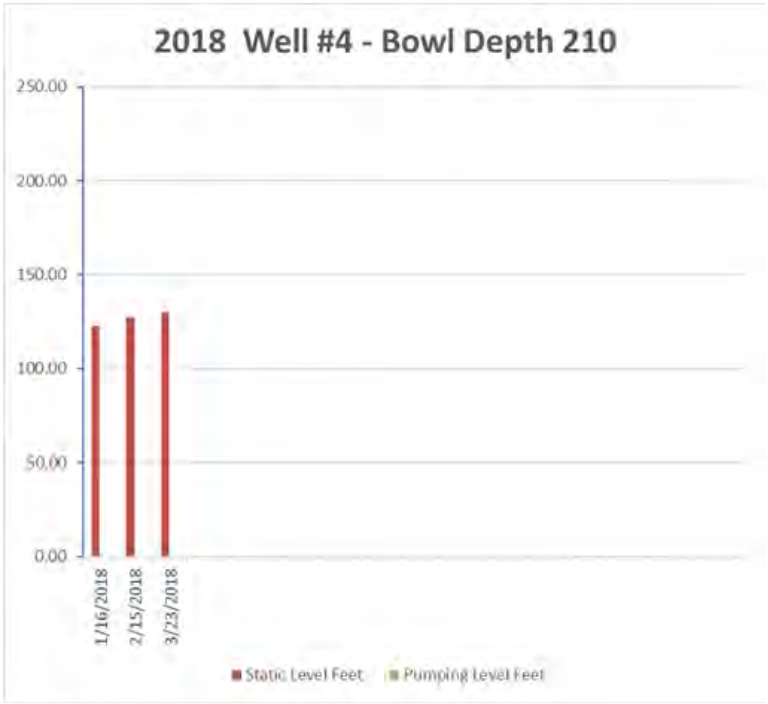

2017 Well #4 - Bowl Depth 210
250
200
150
100
50
0
1/12/17
2/23/17
3/23/17
4/17/17
5/11/17
6/15/17
7/17/17
8/8/17
9/18/17
10/24/17
11/22/17
12/15/17
Static Level Feet
Pumping Level Feet

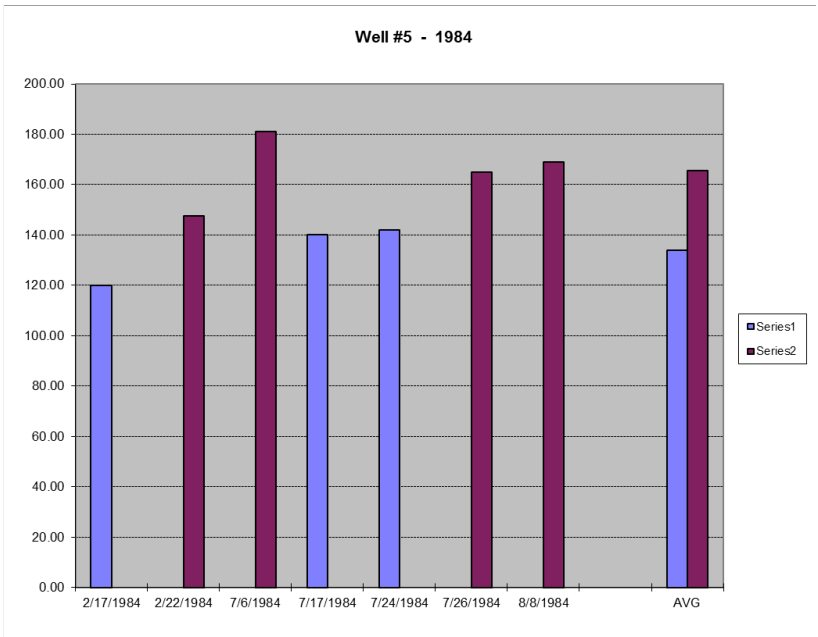

2016 Well# 4 - Bowl Depth 210
250
200
150
100
50
0
1/19/2016
2/22/2016
3/17/2016
4/19/2016
5/10/2016
6/21/2016
7/22/2016
8/30/2016
9/13/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

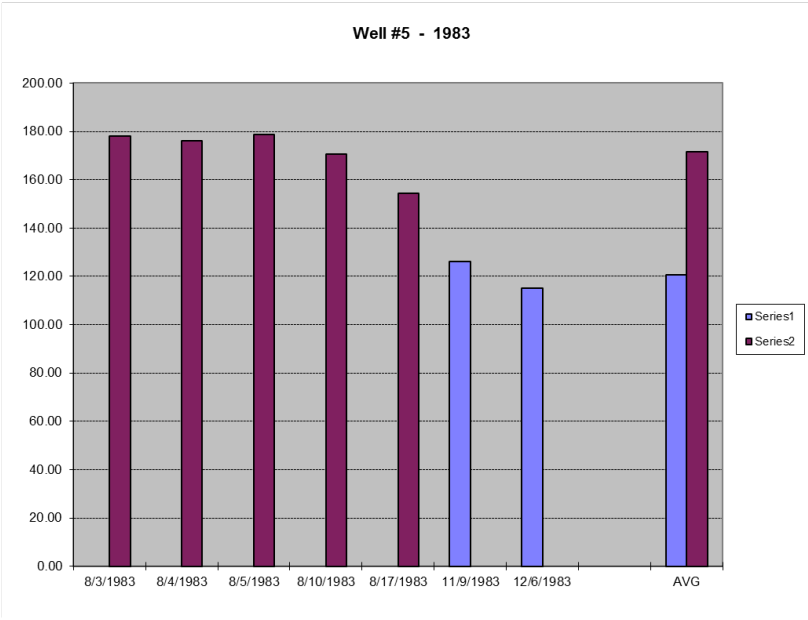

2017 Well #4 - Bowl Depth 210
250
200
150
100
50
0
1/12/17
2/23/17
3/23/17
4/17/17
5/11/17
6/15/17
7/17/17
8/8/17
9/18/17
10/24/17
11/22/17
12/15/17
Static Level Feet
Pumping Level Feet

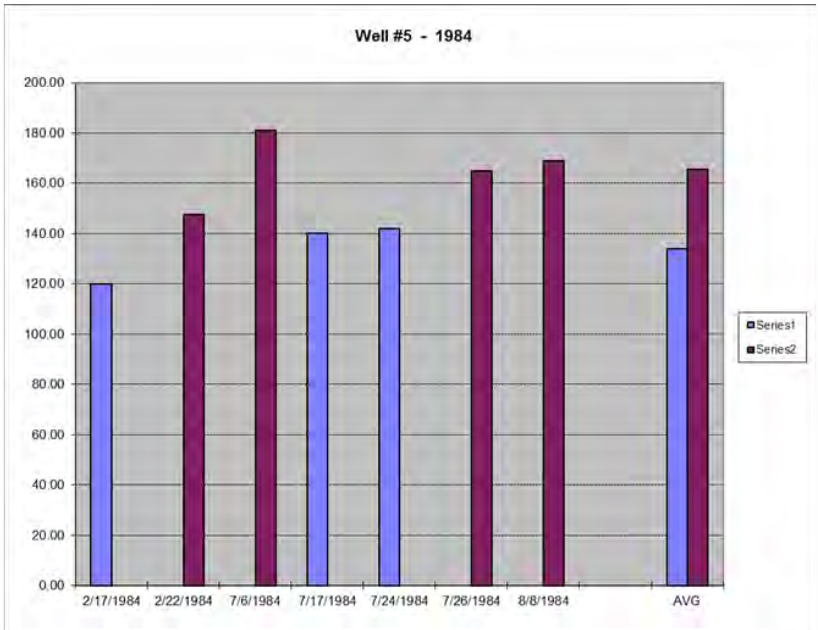

2018 Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

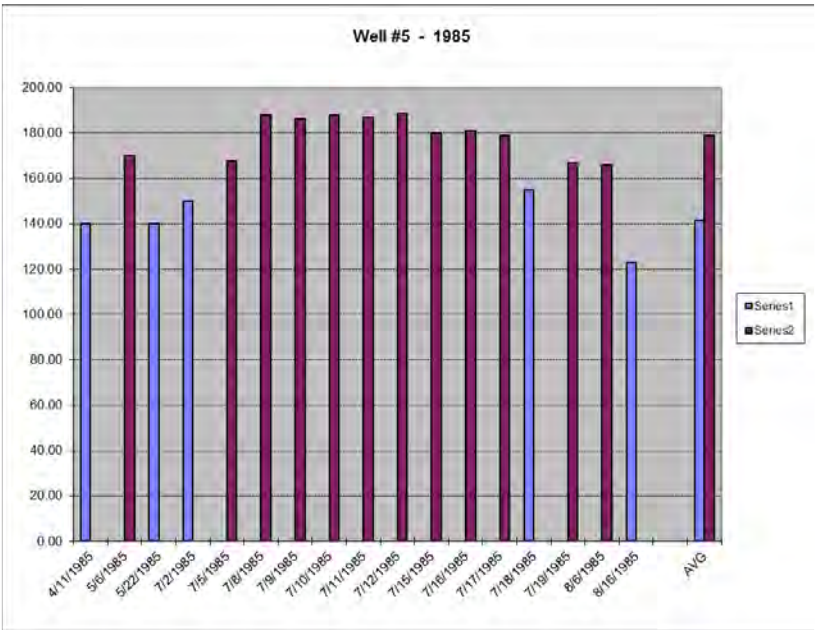

Well #5 - 1983
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/3/1983
8/4/1983
8/5/1983
8/10/1983
8/17/1983
11/9/1983
12/6/1983
AVG
Series1
Series2

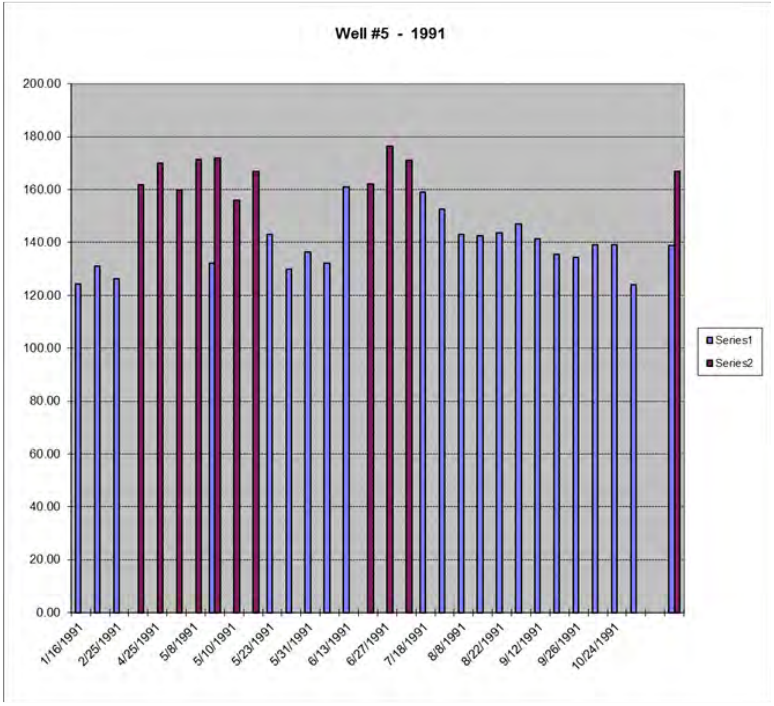

2018 Well #4 - Bowl Depth 210
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

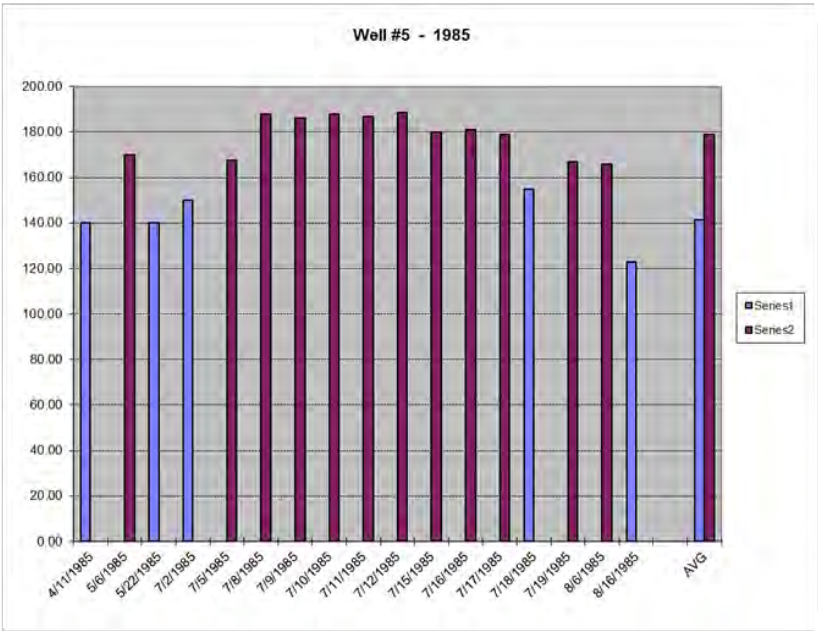

Well #5 - 1984
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/17/1984
2/22/1984
7/6/1984
7/17/1984
7/24/1984
7/26/1984
8/8/1984
AVG
Series1
Series2

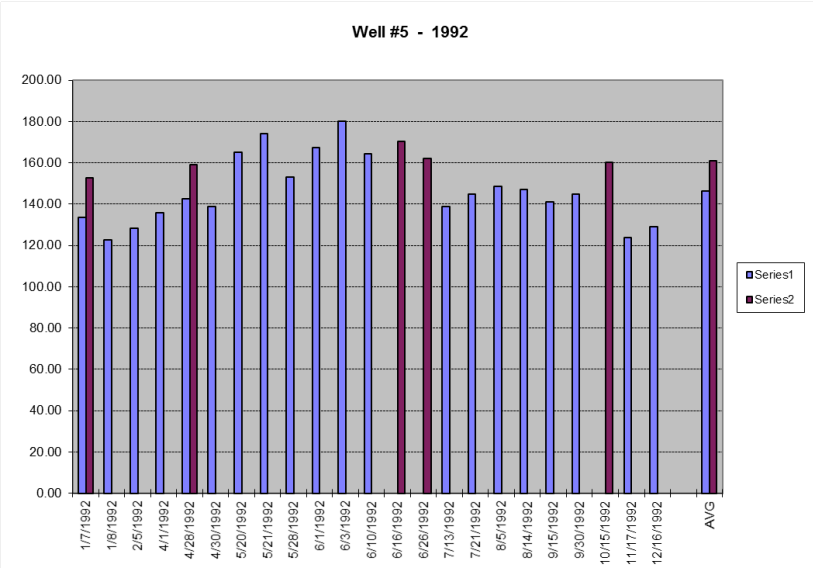

Well #5 - 1983
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/3/1983
8/4/1983
8/5/1983
8/10/1983
8/17/1983
11/9/1983
12/6/1983
AVG
Series1
Series2

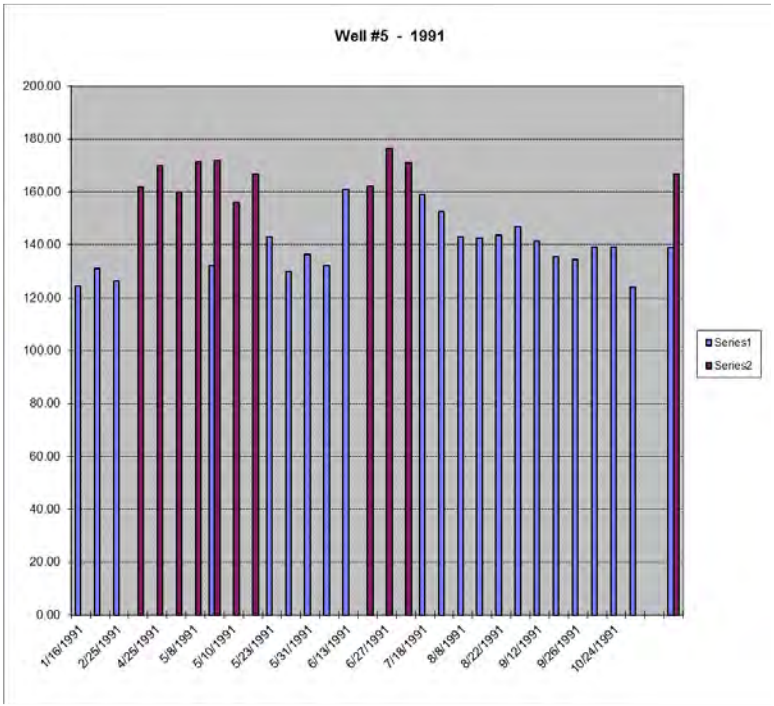

Well #5 - 1984
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/17/1984
2/22/1984
7/6/1984
7/17/1984
7/24/1984
7/26/1984
8/8/1984
AVG
Series1
Series2

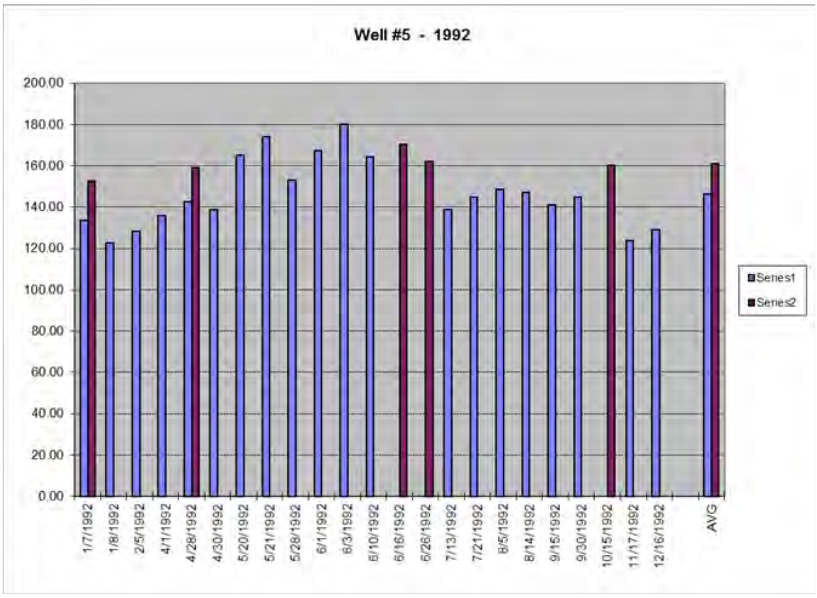

Well #5 - 1985
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/11/1985
5/6/1985
5/22/1985
7/2/1985
7/5/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
AVG
Series1
Series2

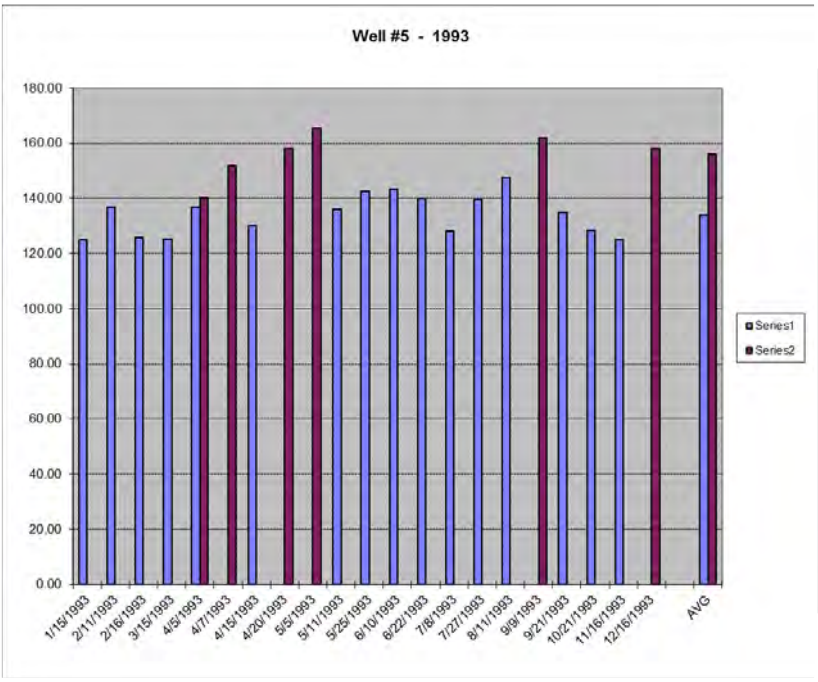

Well #5 - 1991
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/16/1991
2/25/1991
4/25/1991
5/8/1991
5/10/1991
5/23/1991
5/31/1991
6/13/1991
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10/24/1991
Series1
Series2

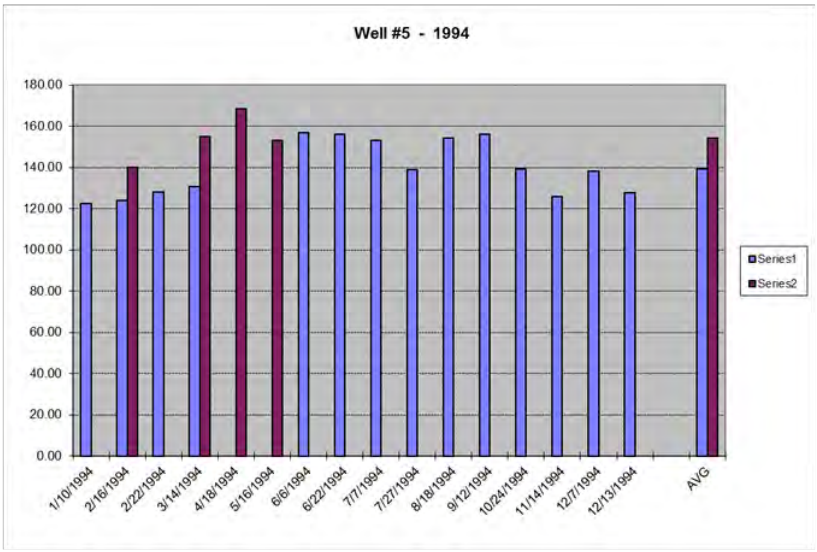

Well #5 - 1985
200.00
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160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/11/1985
5/6/1985
5/22/1985
7/2/1985
7/5/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
AVG
Series1
Series2

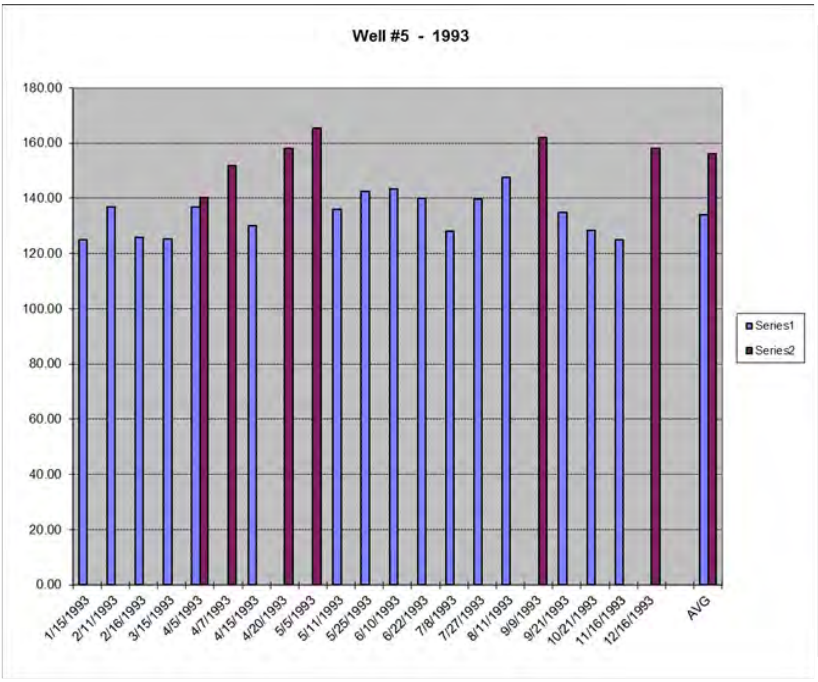

Well #5 - 1992
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/7/1992
1/8/1992
2/5/1992
4/1/1992
4/28/1992
4/30/1992
5/20/1992
5/21/1992
5/28/1992
6/1/1992
6/3/1992
6/10/1992
6/16/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

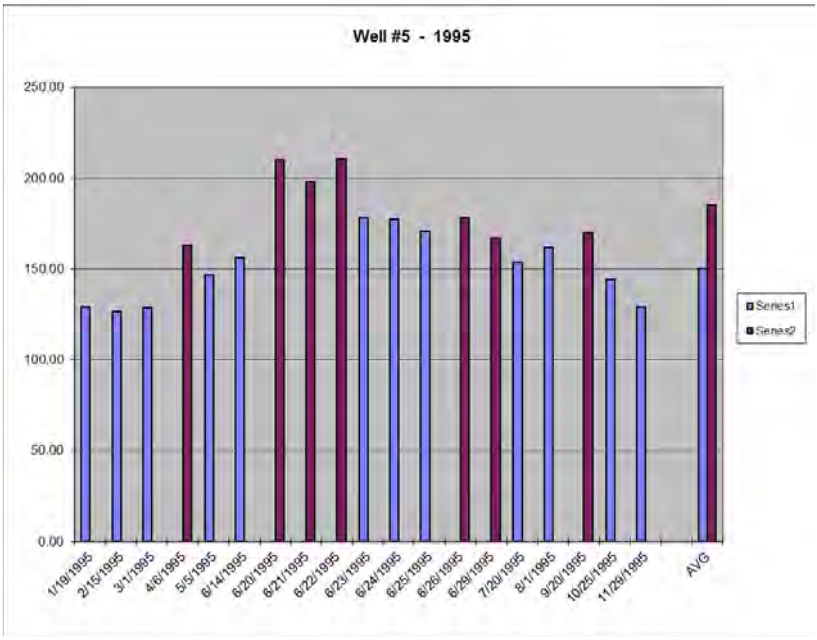

Well #5 - 1991
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/16/1991
2/25/1991
4/25/1991
5/8/1991
5/10/1991
5/23/1991
5/31/1991
6/13/1991
6/27/1991
7/18/1991
8/8/1991
8/22/1991
9/12/1991
9/26/1991
10/24/1991
Series1
Series2

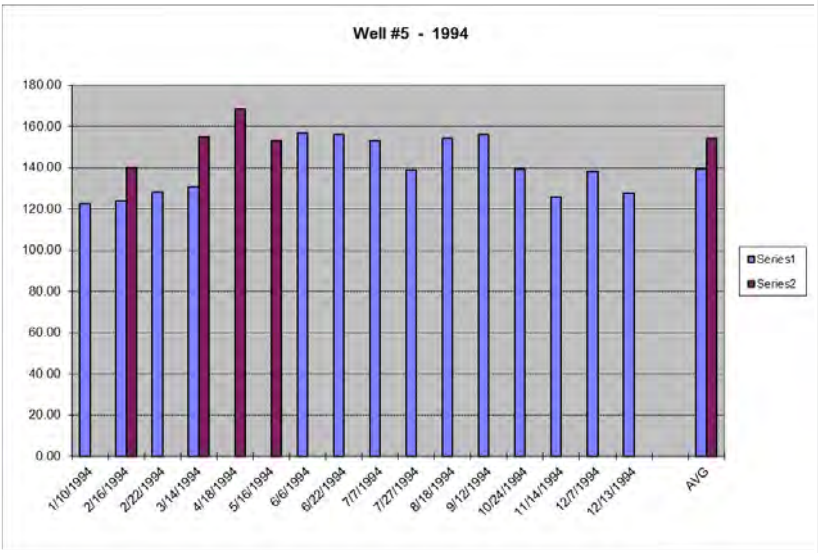

Well #5 - 1992
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160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/7/1992
1/8/1992
2/5/1992
4/1/1992
4/28/1992
4/30/1992
5/20/1992
5/21/1992
5/28/1992
6/1/1992
6/3/1992
6/10/1992
6/16/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

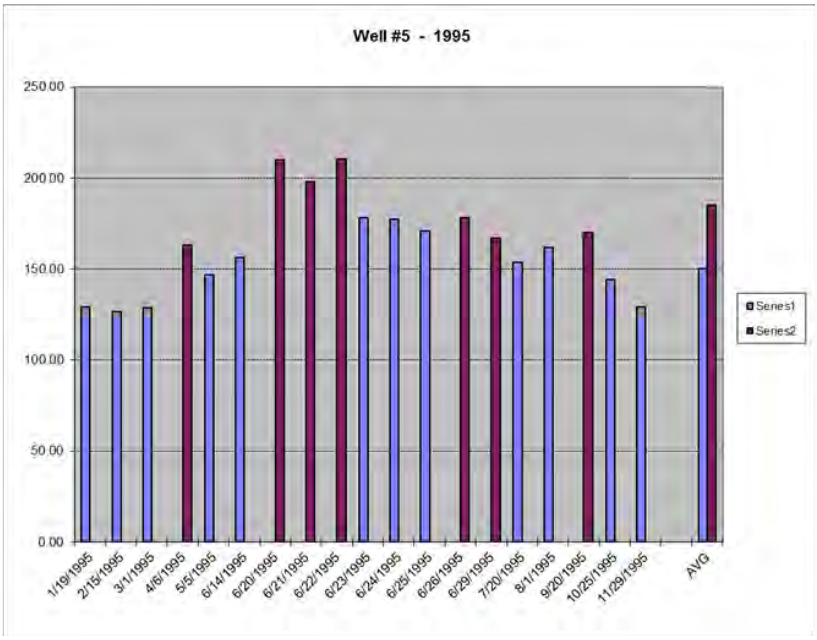

Well #5 - 1993
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/15/1993
2/11/1993
2/16/1993
3/15/1993
4/5/1993
4/7/1993
4/15/1993
4/20/1993
5/5/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
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8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG

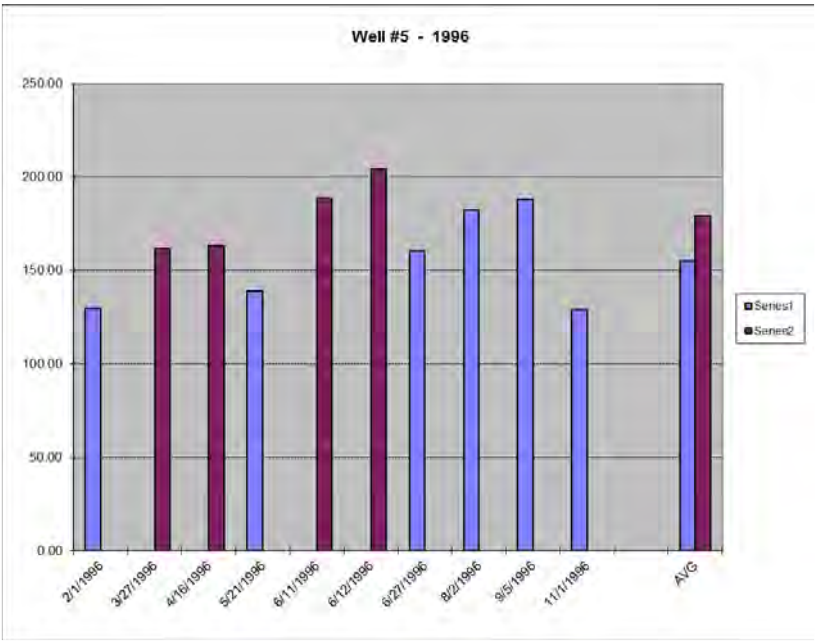

Well #5 - 1994
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/10/1994
2/16/1994
2/22/1994
3/14/1994
4/18/1994
5/16/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
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11/14/1994
12/7/1994
12/13/1994
AVG

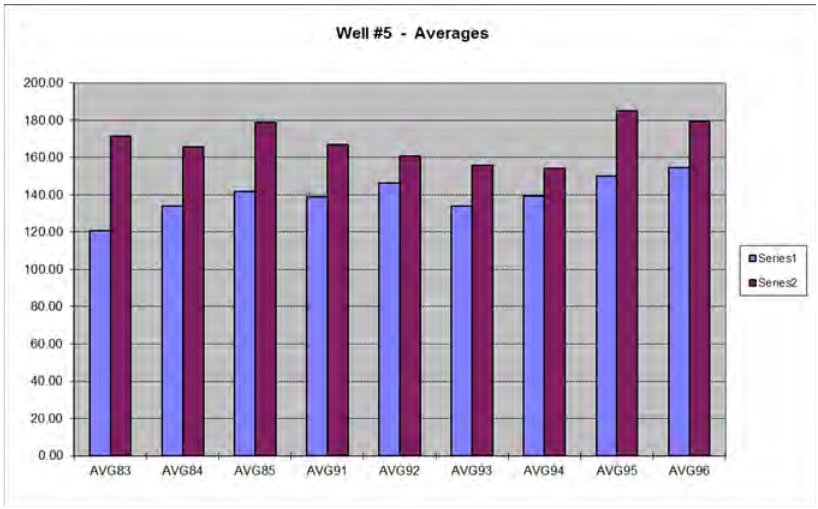

Well #5 - 1993
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160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/15/1993
2/11/1993
2/16/1993
3/15/1993
4/5/1993
4/7/1993
4/15/1993
4/20/1993
5/5/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
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8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG

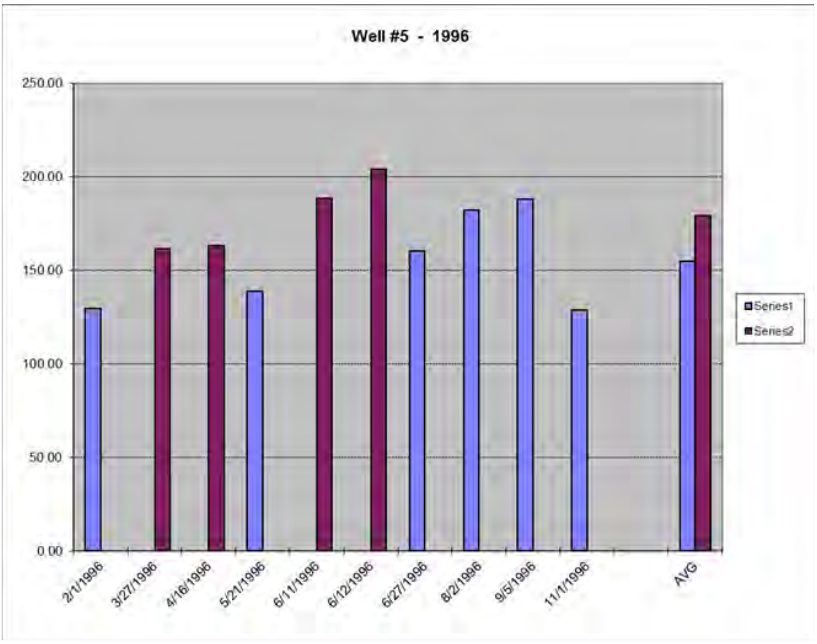

Well #5 - 1995
250.00
200.00
150.00
100.00
50.00
0.00
Series1
Series2
1/19/1995
2/15/1995
3/1/1995
4/6/1995
5/5/1995
6/14/1995
6/20/1995
6/21/1995
6/22/1995
6/23/1995
6/24/1995
6/25/1995
6/26/1995
6/29/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG

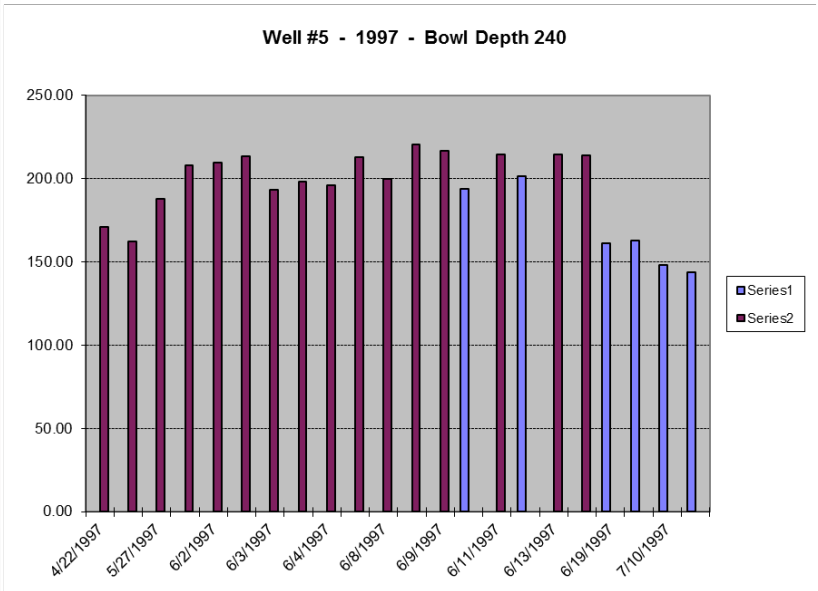

Well #5 - 1994
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/10/1994
2/16/1994
2/22/1994
3/14/1994
4/18/1994
5/16/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/7/1994
12/13/1994
AVG

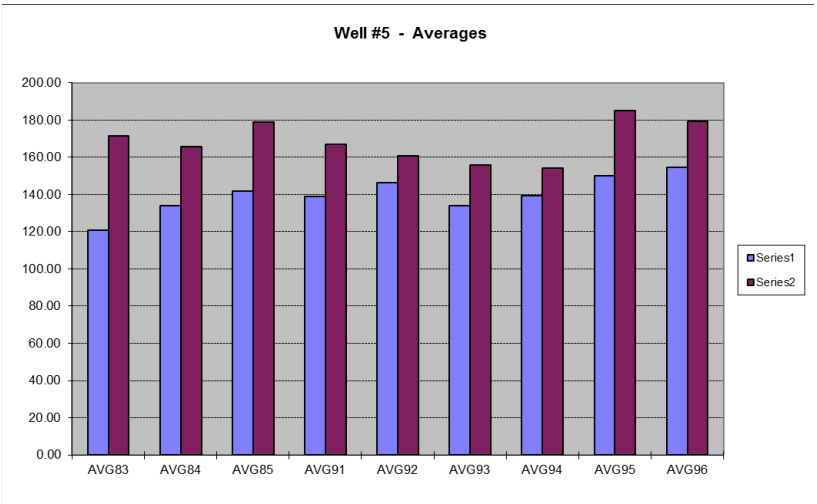

Well #5 - 1995
250.00
200.00
150.00
100.00
50.00
0.00
Series1
Series2
1/19/1995
2/15/1995
3/1/1995
4/6/1995
5/5/1995
6/14/1995
6/20/1995
6/21/1995
6/22/1995
6/23/1995
6/24/1995
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6/29/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG

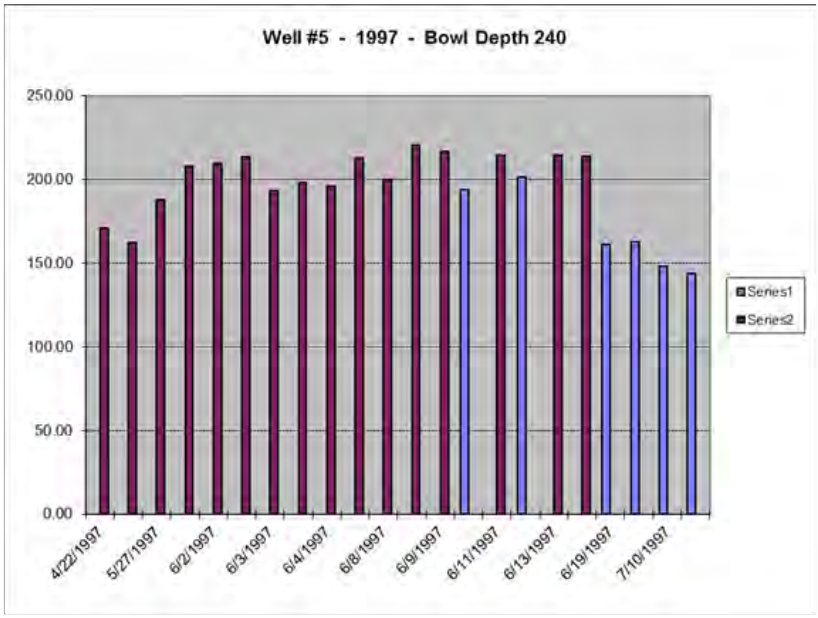

Well #5 - 1996
250.00
200.00
150.00
100.00
50.00
0.00
2/1/1996
3/27/1996
4/16/1996
5/21/1996
6/11/1996
6/12/1996
6/27/1996
8/2/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

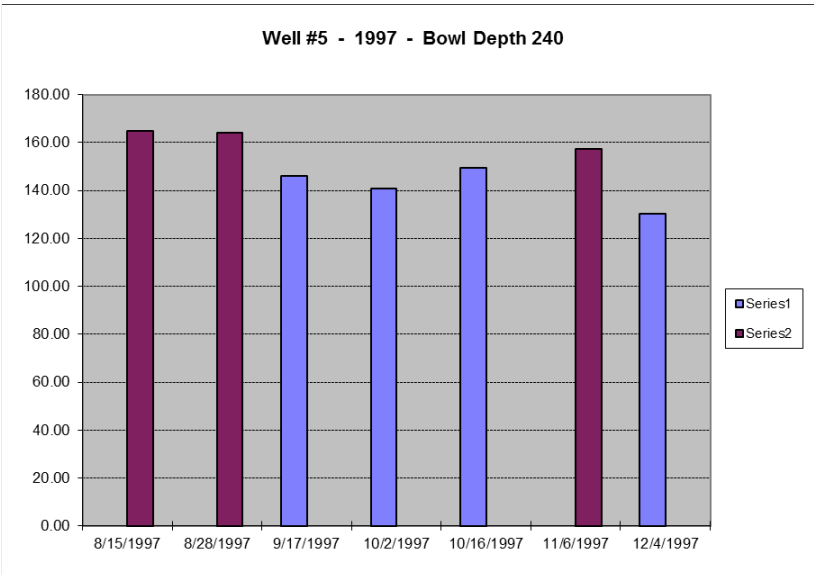

Well #5 - Averages
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG83
AVG84
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

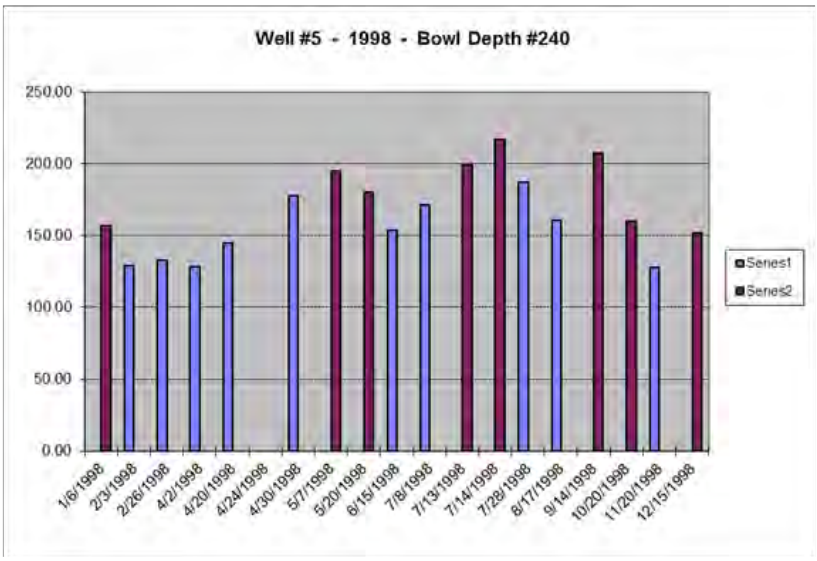

Well #5 - 1996
250.00
200.00
150.00
100.00
50.00
0.00
2/1/1996
3/27/1996
4/16/1996
5/21/1996
6/11/1996
6/12/1996
6/27/1996
8/2/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

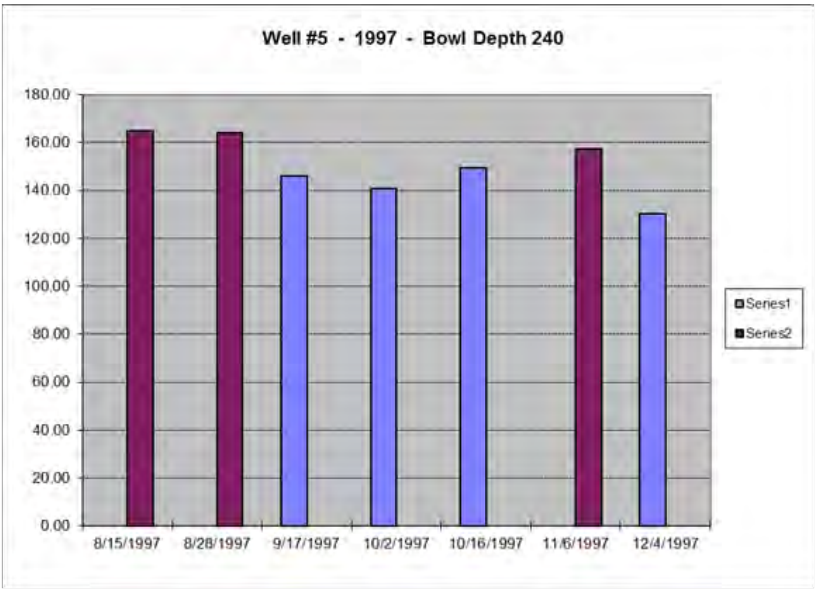

Well #5 - 1997 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
4/22/1997
5/27/1997
6/2/1997
6/3/1997
6/4/1997
6/8/1997
6/9/1997
6/11/1997
6/13/1997
6/19/1997
7/10/1997
Series1
Series2

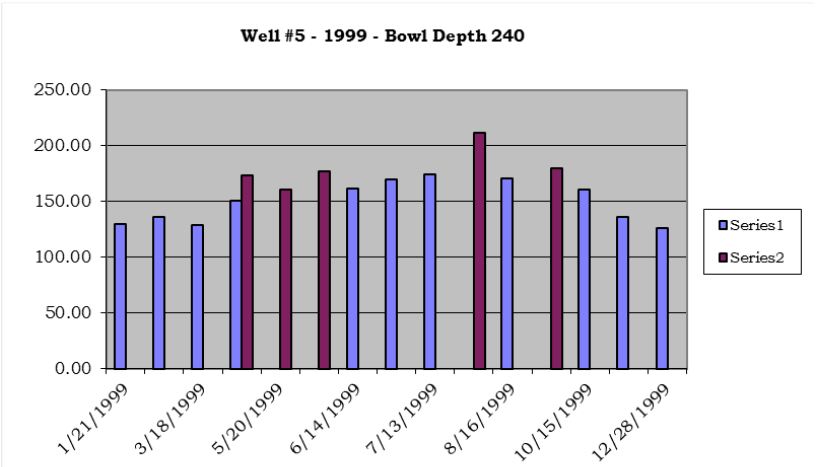

Well #5 - Averages
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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AVG83
AVG84
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

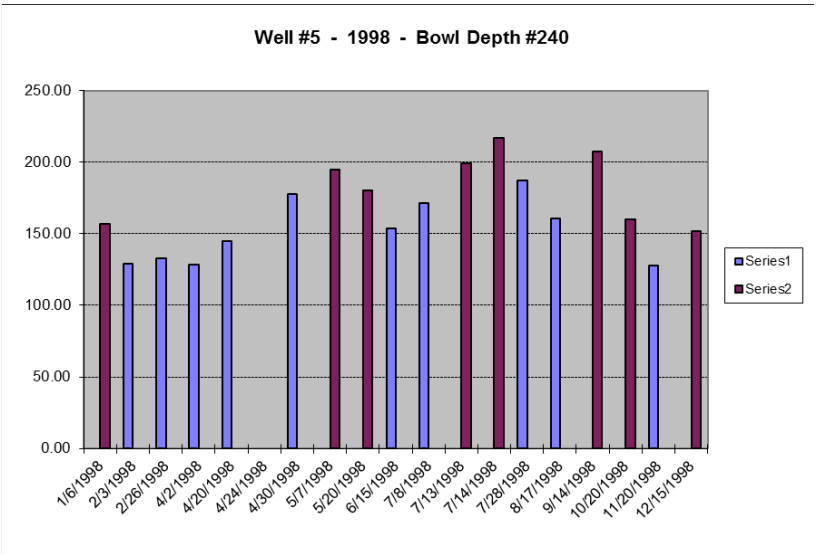

Well #5 - 1997 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
4/22/1997
5/27/1997
6/2/1997
6/3/1997
6/4/1997
6/8/1997
6/9/1997
6/11/1997
6/13/1997
6/19/1997
7/10/1997
Series1
Series2

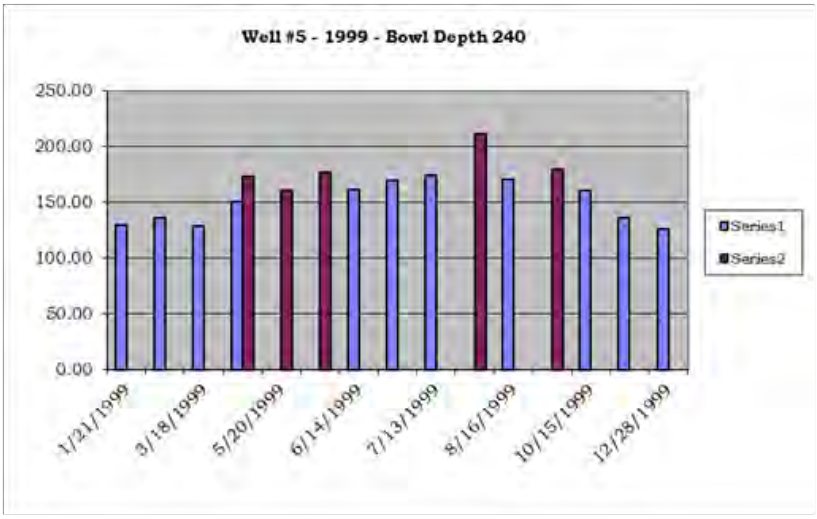

Well #5 - 1997 - Bowl Depth 240
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120.00
100.00
80.00
60.00
40.00
20.00
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8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

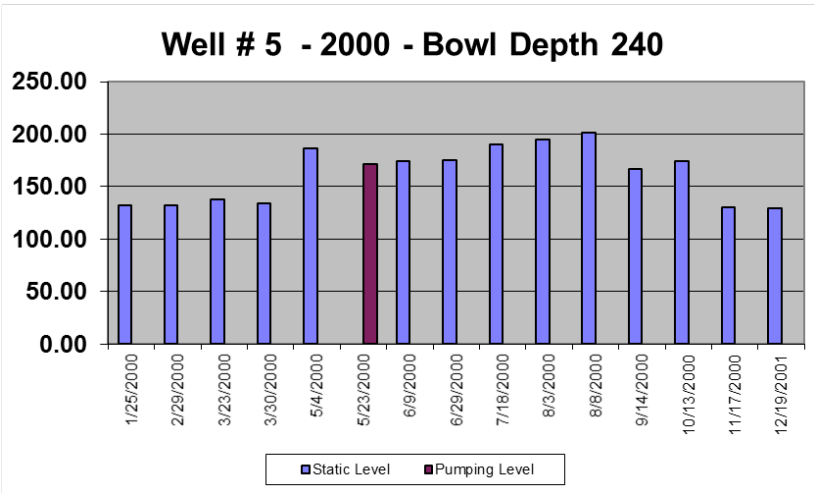

Well #5 - 1998 - Bowl Depth #240
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150.00
100.00
50.00
0.00
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2/3/1998
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4/2/1998
4/20/1998
4/24/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/8/1998
7/13/1998
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10/20/1998
11/20/1998
12/15/1998
Series1
Series2

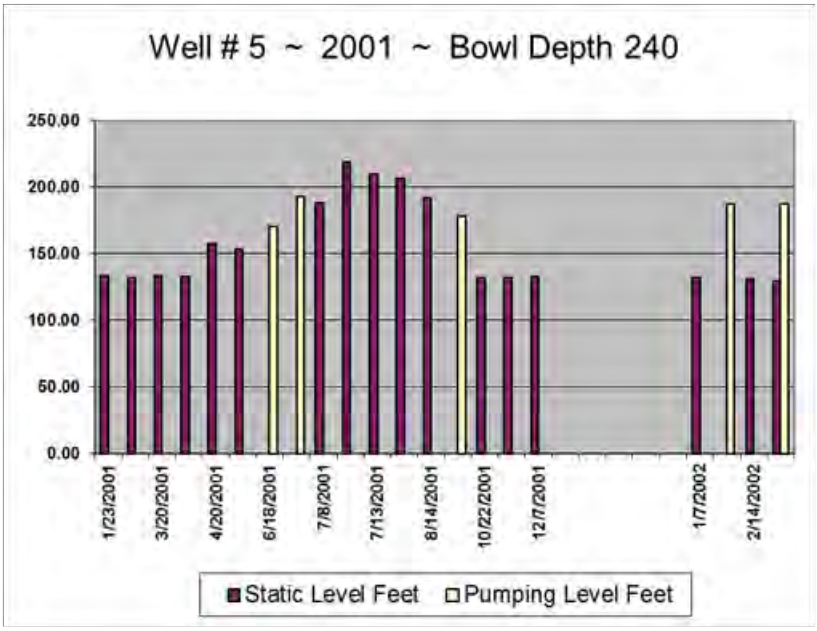

Well #5 - 1997 - Bowl Depth 240
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140.00
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100.00
80.00
60.00
40.00
20.00
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8/15/1997
8/28/1997
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12/4/1997
Series1
Series2

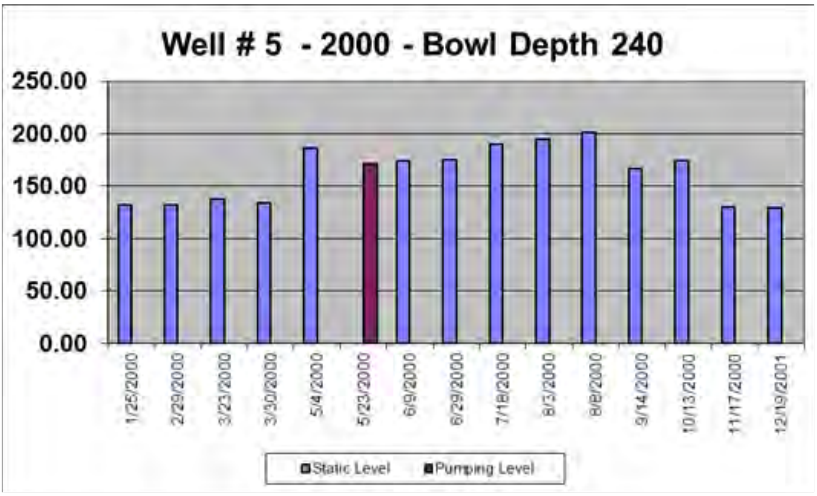

Well #5 - 1999 - Bowl Depth 240
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150.00
100.00
50.00
0.00
1/21/1999
3/18/1999
5/20/1999
6/14/1999
7/13/1999
8/16/1999
10/15/1999
12/28/1999
Series1
Series2

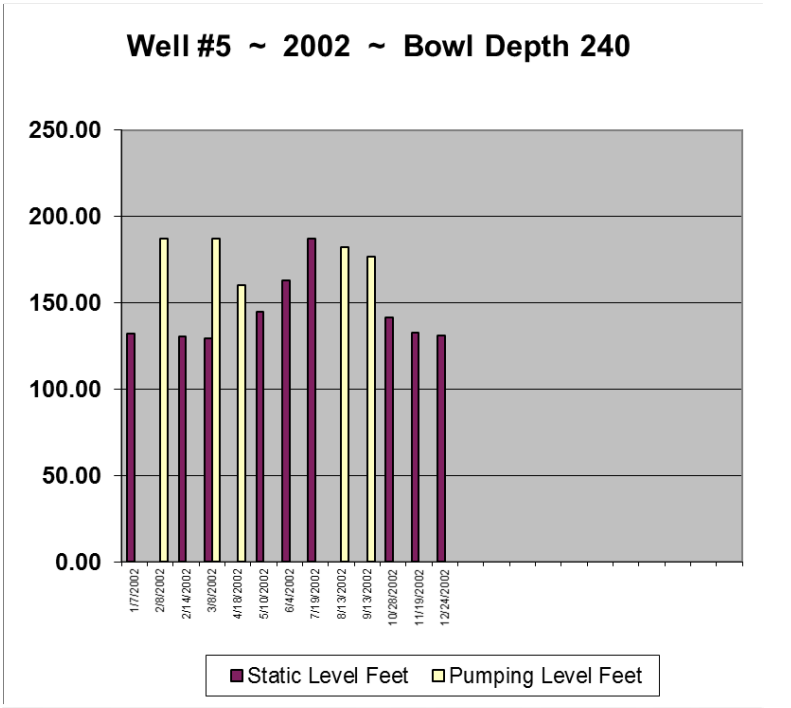

Well #5 - 1998 - Bowl Depth #240
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150.00
100.00
50.00
0.00
1/6/1998
2/3/1998
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4/2/1998
4/20/1998
4/24/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/8/1998
7/13/1998
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11/20/1998
12/15/1998
Series1
Series2

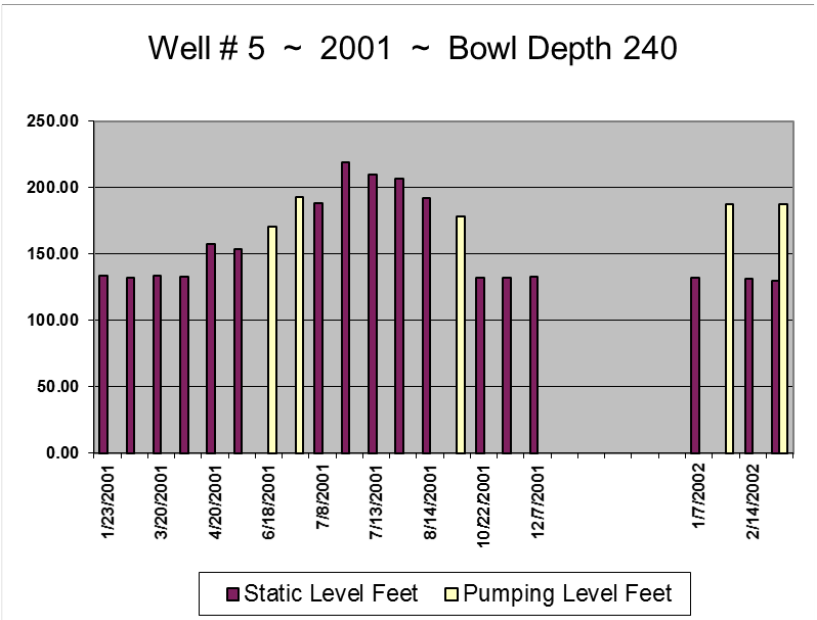

Well #5 - 1999 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/21/1999
3/18/1999
5/20/1999
6/14/1999
7/13/1999
8/16/1999
10/15/1999
12/28/1999
Series1
Series2

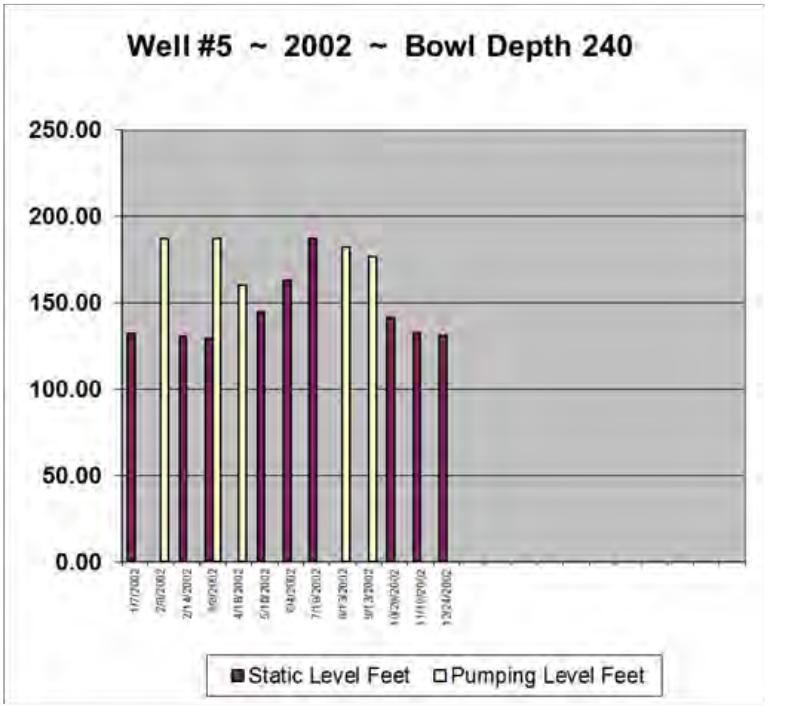

Well # 5 - 2000 - Bowl Depth 240
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150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/23/2000
3/30/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

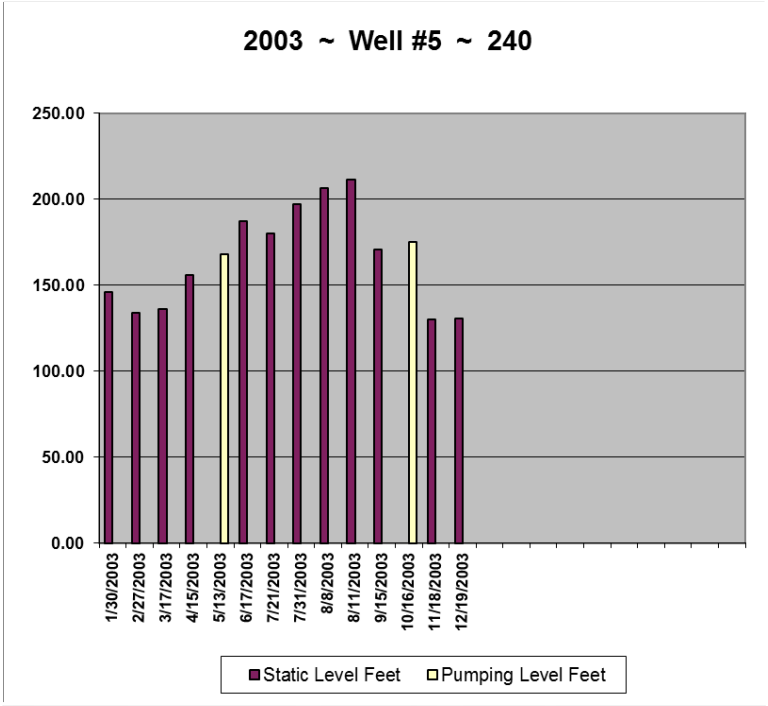

Well # 5 ~ 2001 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/20/2001
4/20/2001
6/18/2001
7/8/2001
7/13/2001
8/14/2001
10/22/2001
12/7/2001
1/7/2002
2/14/2002
Static Level Feet
Pumping Level Feet

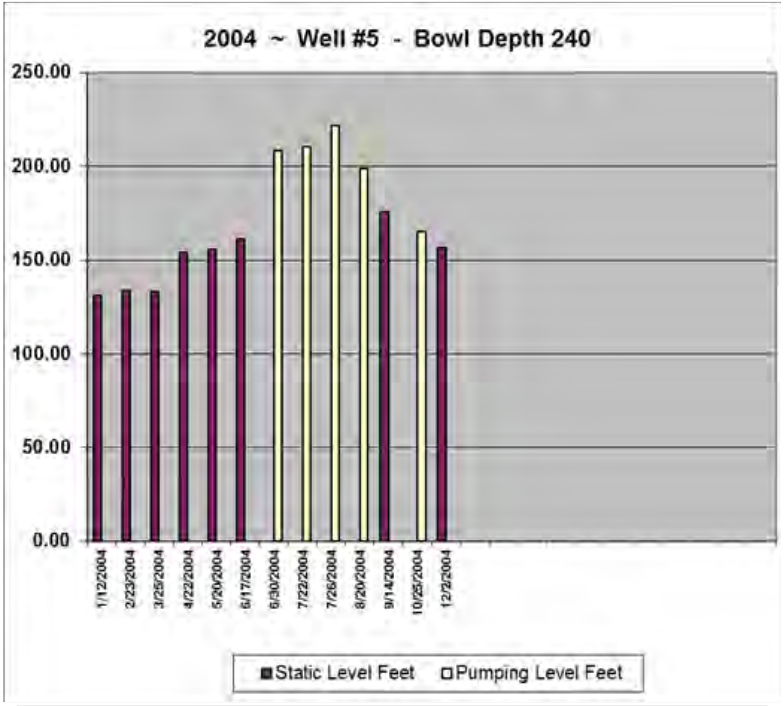

Well # 5 - 2000 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/23/2000
3/30/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

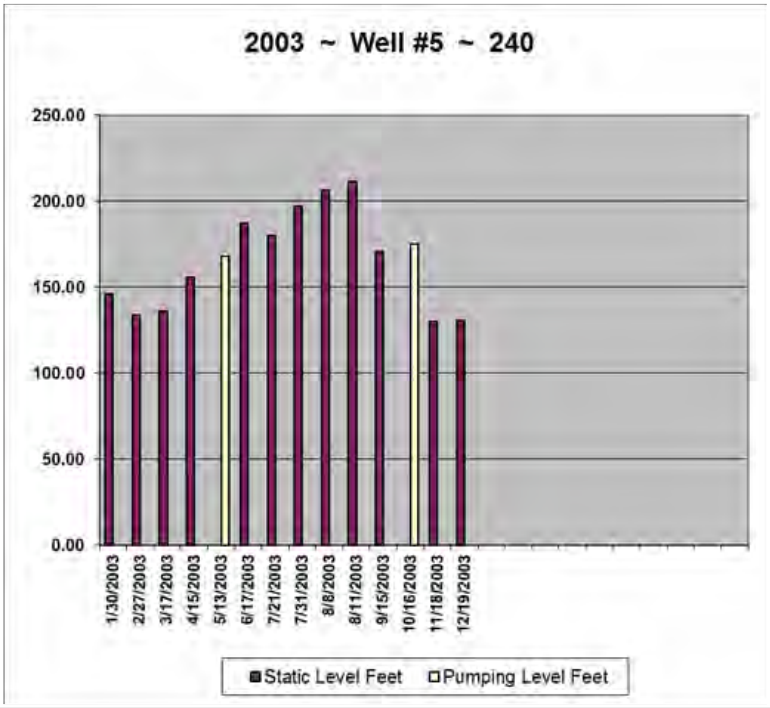

Well #5 ~ 2002 ~ Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/7/2002
2/8/2002
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3/8/2002
4/18/2002
5/19/2002
6/4/2002
7/19/2002
8/13/2002
9/13/2002
10/28/2002
11/19/2002
12/24/2002
Static Level Feet
Pumping Level Feet

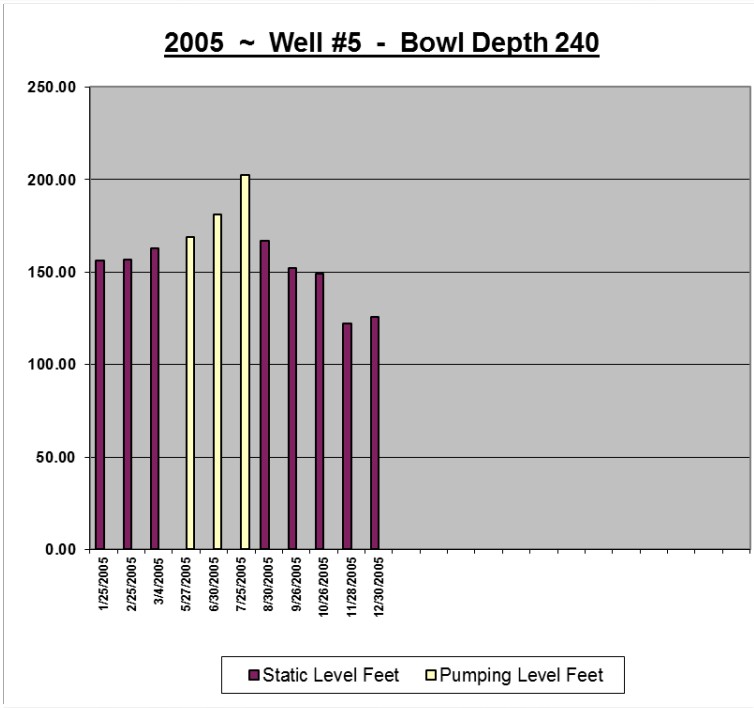

Well # 5 ~ 2001 ~ Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/23/2001
3/20/2001
4/20/2001
6/18/2001
7/8/2001
7/13/2001
8/14/2001
10/22/2001
12/7/2001
1/7/2002
2/14/2002
Static Level Feet
Pumping Level Feet

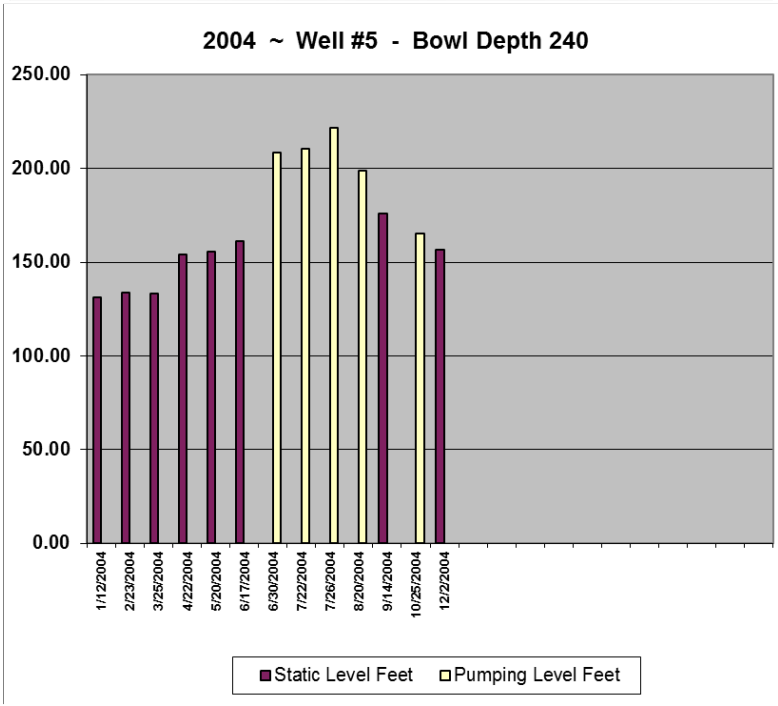

Well #5 ~ 2002 ~ Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

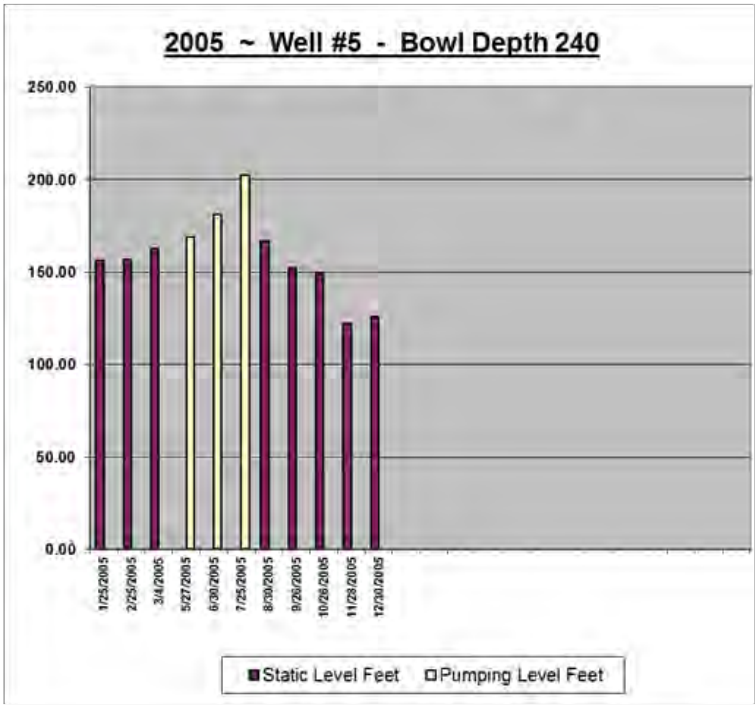

2003 ~ Well #5 ~ 240
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200.00
150.00
100.00
50.00
0.00
1/30/2003
2/27/2003
3/17/2003
4/15/2003
5/13/2003
6/17/2003
7/21/2003
7/31/2003
8/8/2003
8/11/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet

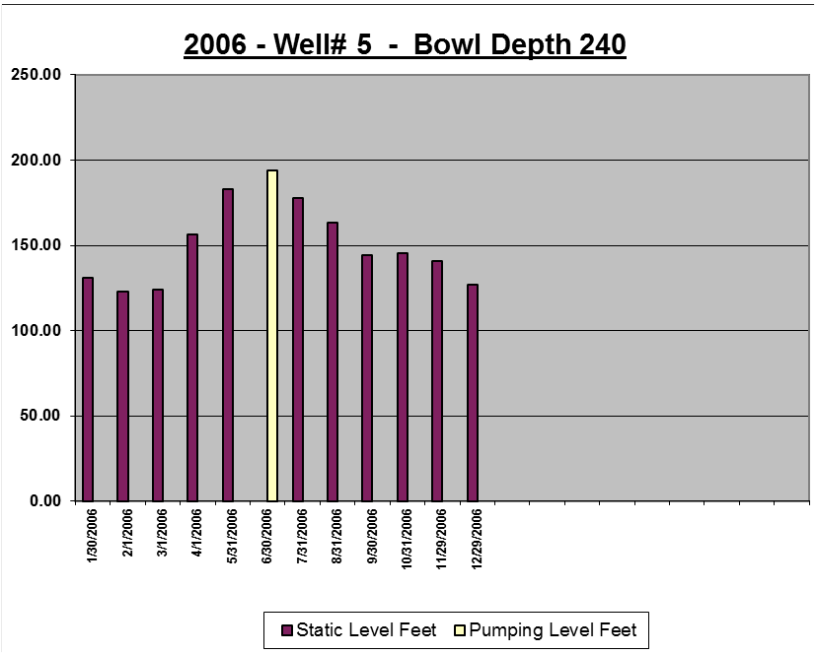

2004 ~ Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
6/30/2004
7/22/2004
7/26/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

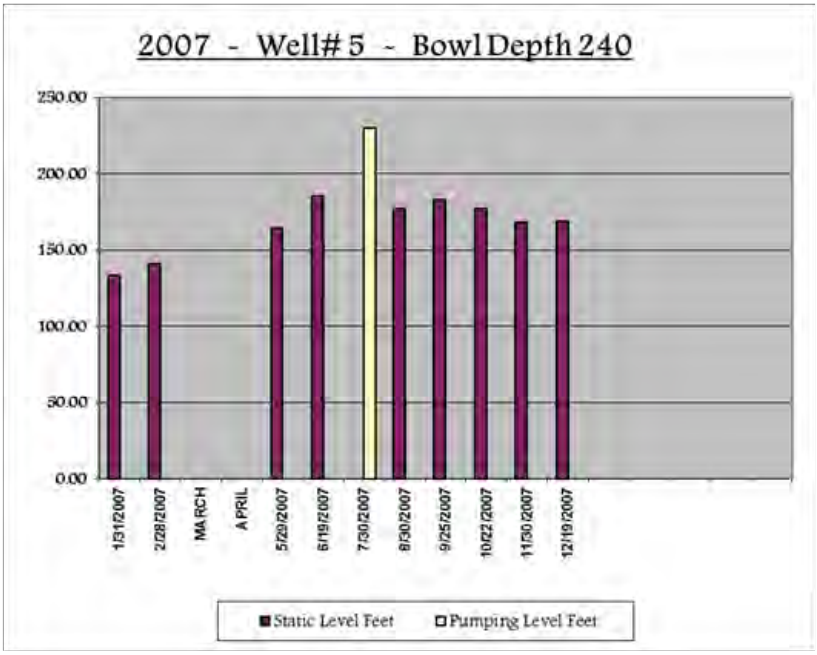

2003 ~ Well #5 ~ 240
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200.00
150.00
100.00
50.00
0.00
1/30/2003
2/27/2003
3/17/2003
4/15/2003
5/13/2003
6/17/2003
7/21/2003
7/31/2003
8/8/2003
8/11/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet

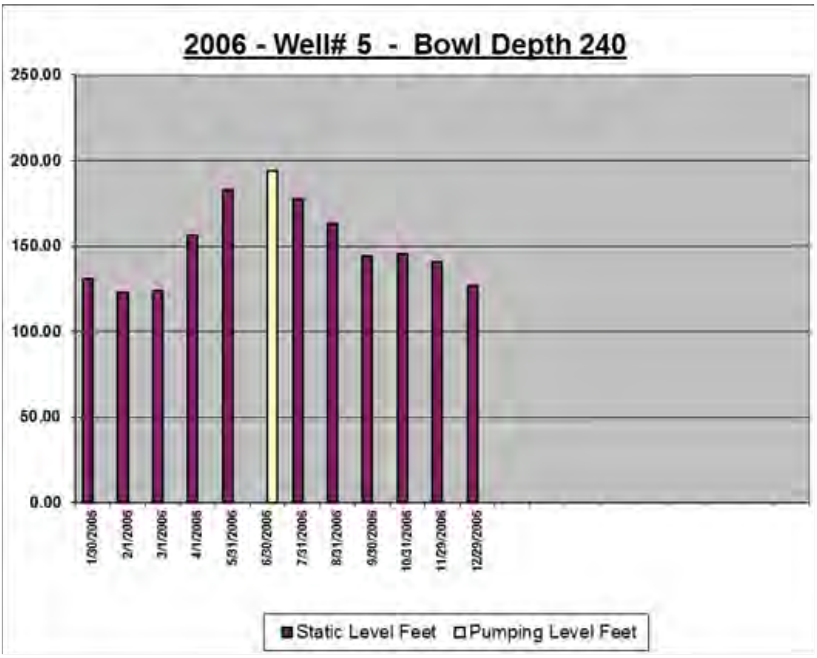

2005 ~ Well #5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

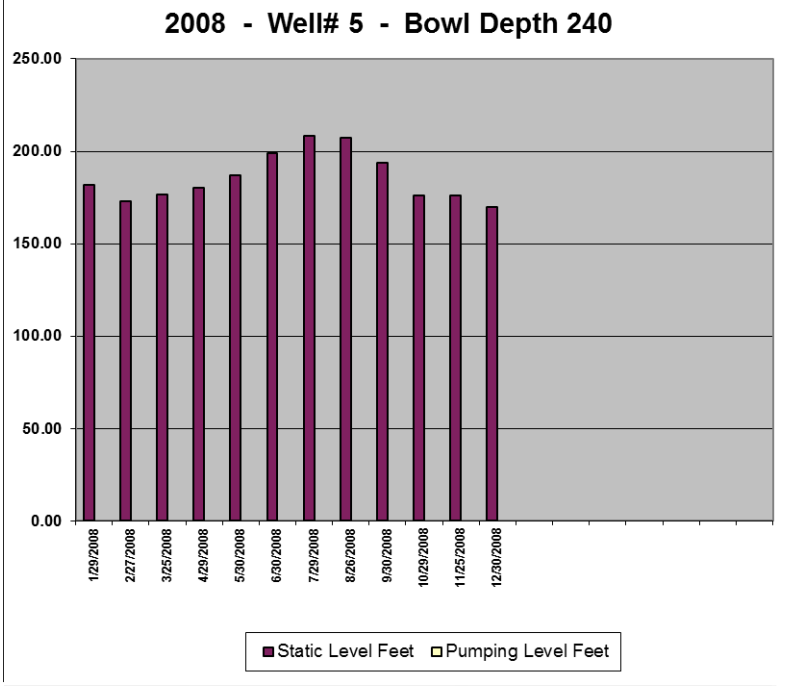

2004 ~ Well #5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
6/30/2004
7/22/2004
7/26/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

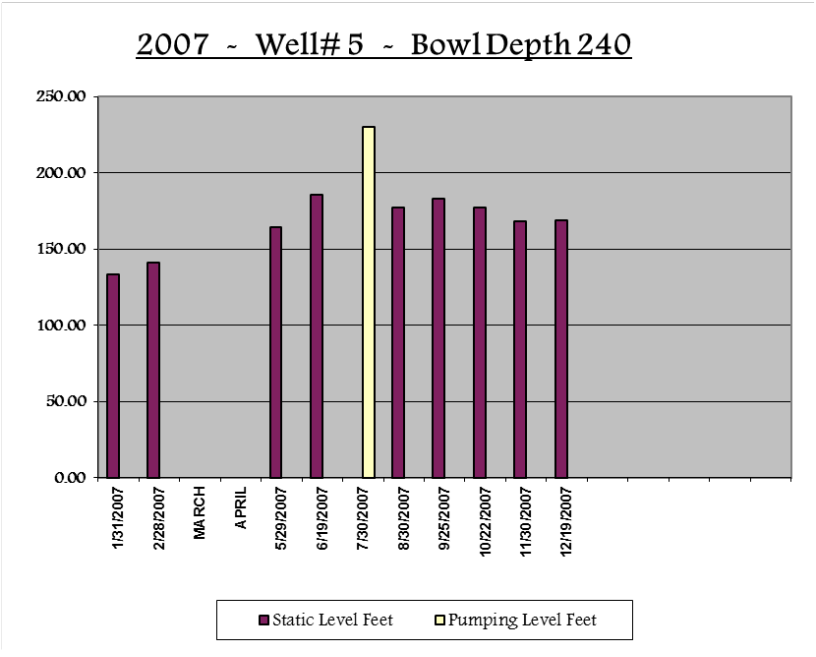

2005 ~ Well #5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

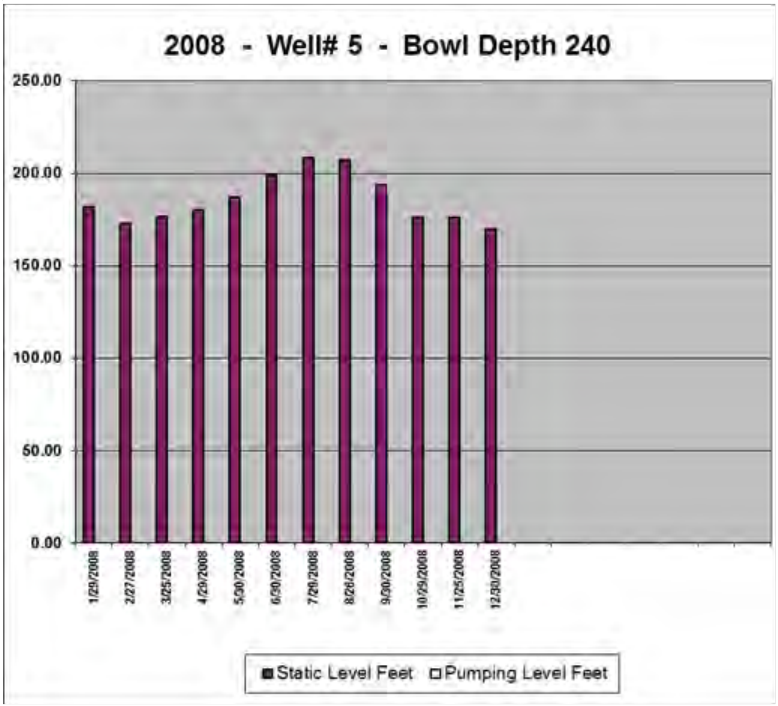

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200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

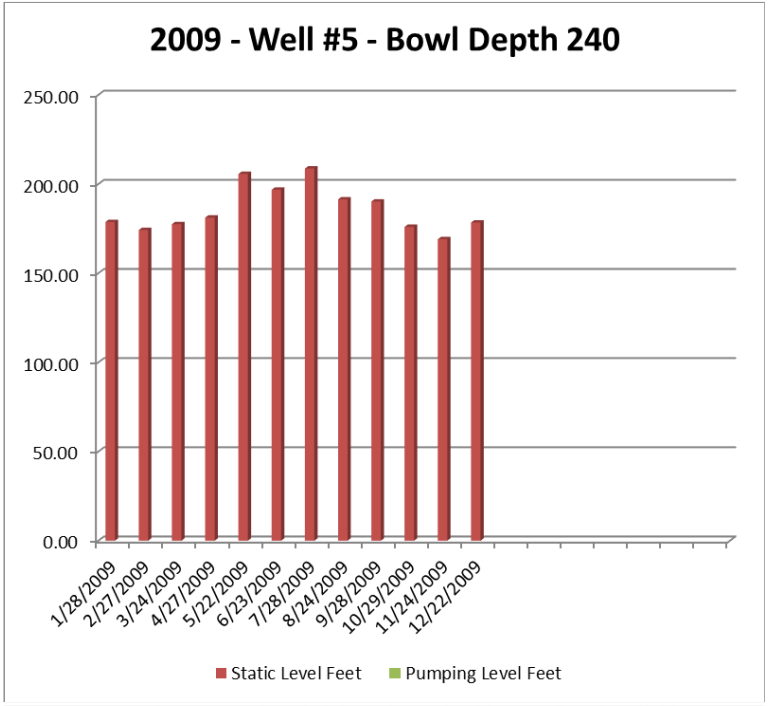

2007 - Well# 5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
MARCH
APRIL
5/29/2007
6/19/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

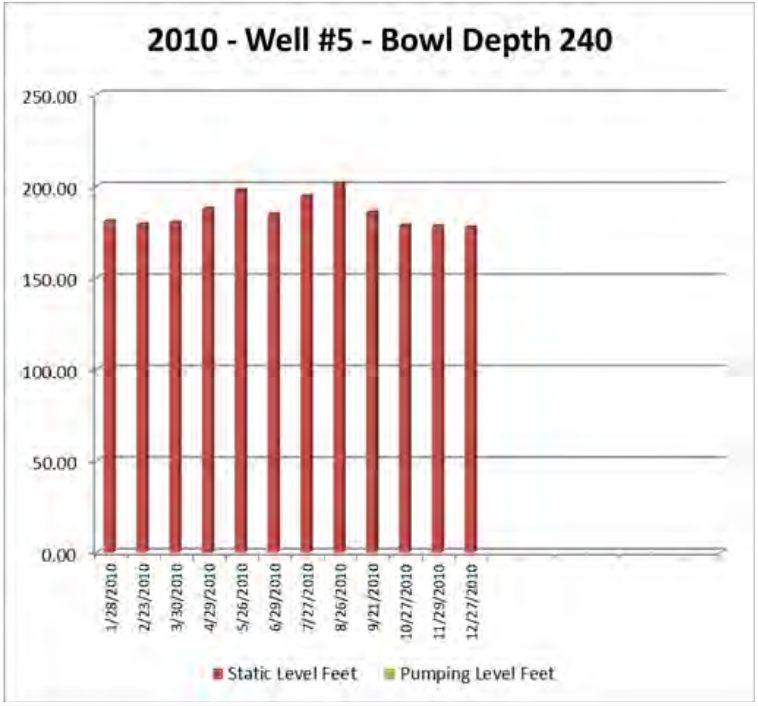

2006 - Well# 5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

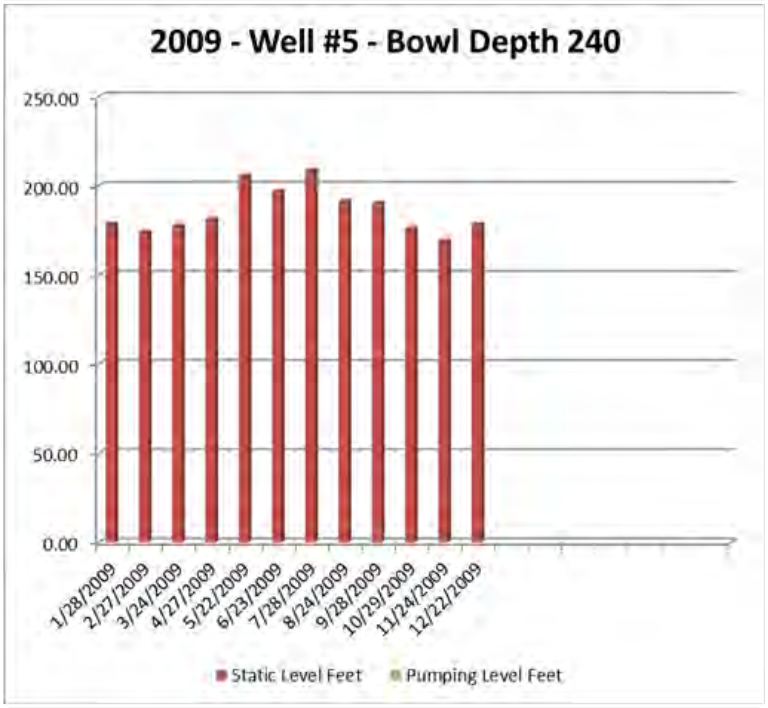

2008 - Well# 5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
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4/29/2008
5/30/2008
6/30/2008
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8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

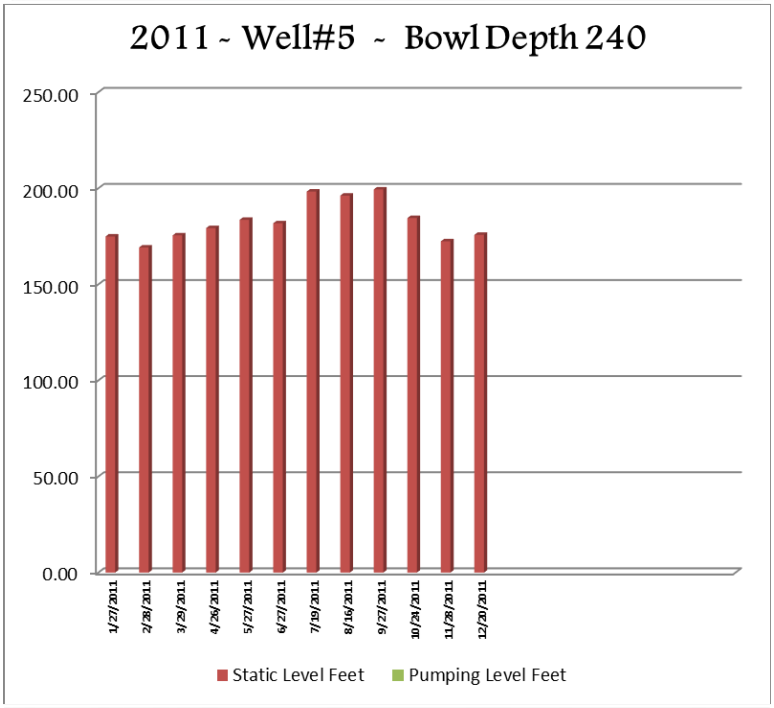

2007 - Well# 5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
MARCH
APRIL
5/29/2007
6/19/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

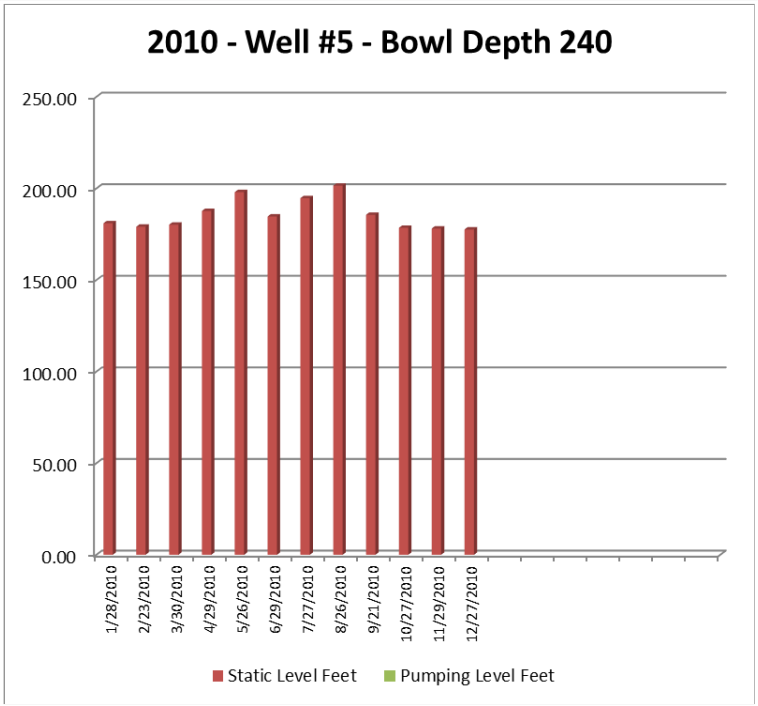

2008 - Well# 5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
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4/29/2008
5/30/2008
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7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

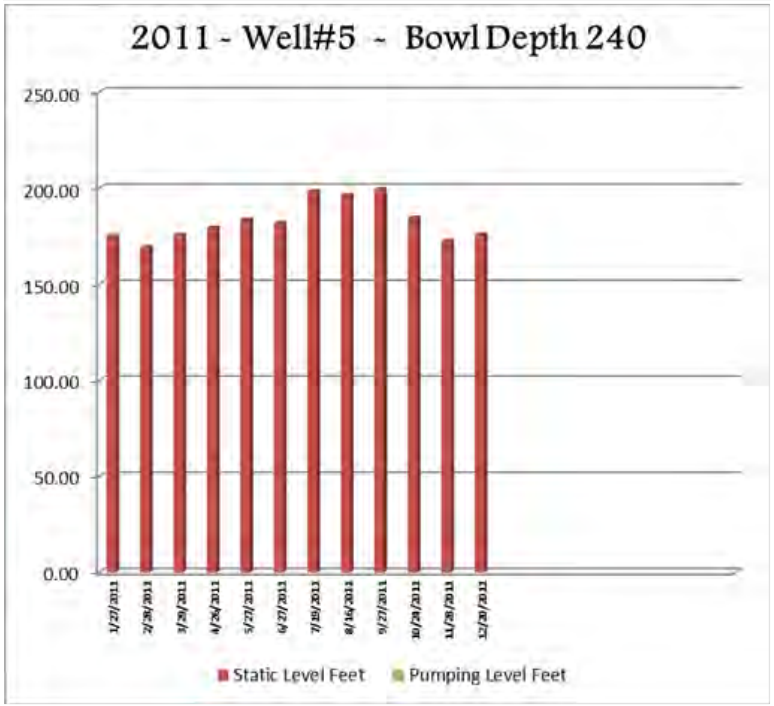

2009 - Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
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4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

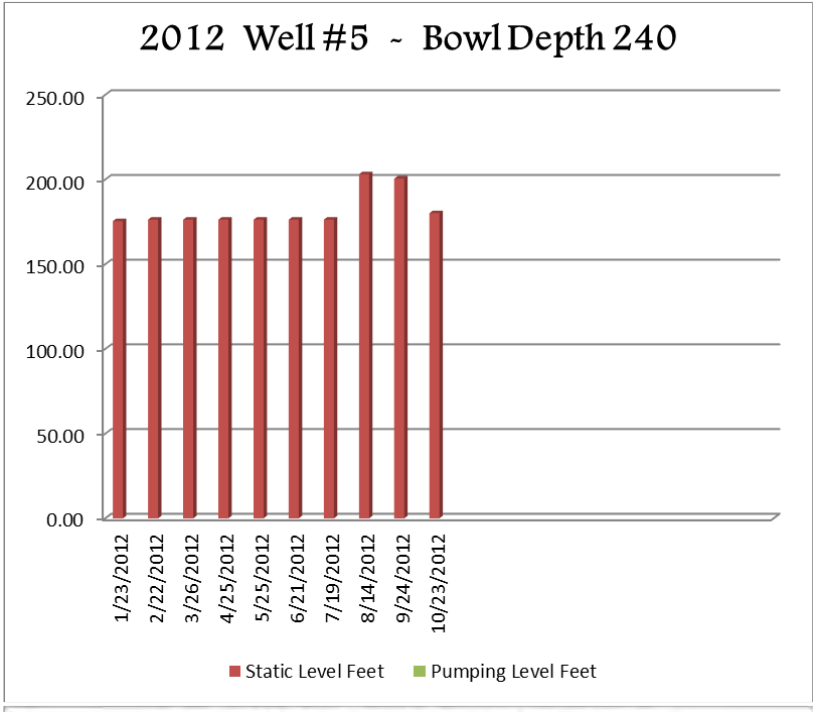

2010 - Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

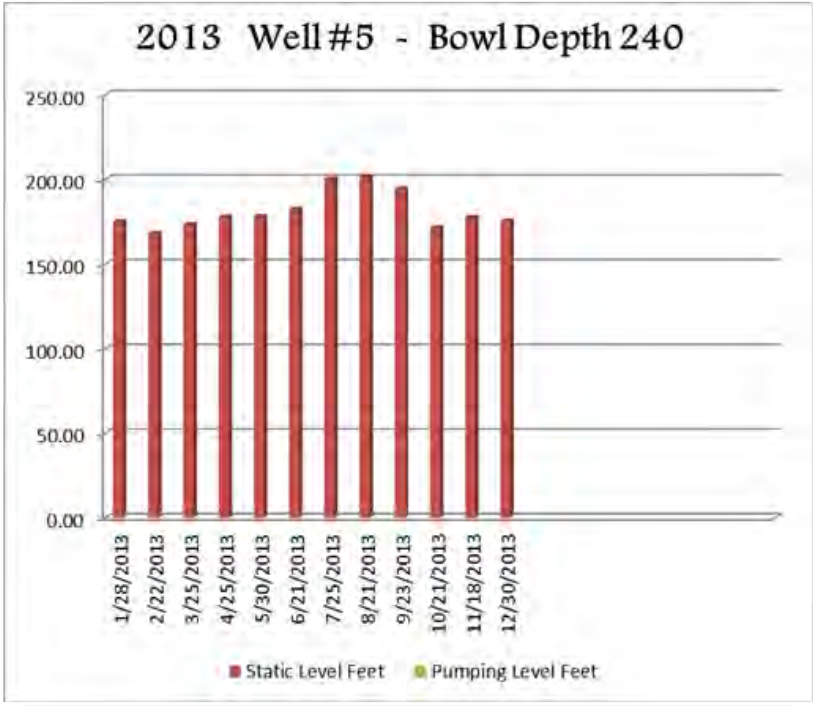

2009 - Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

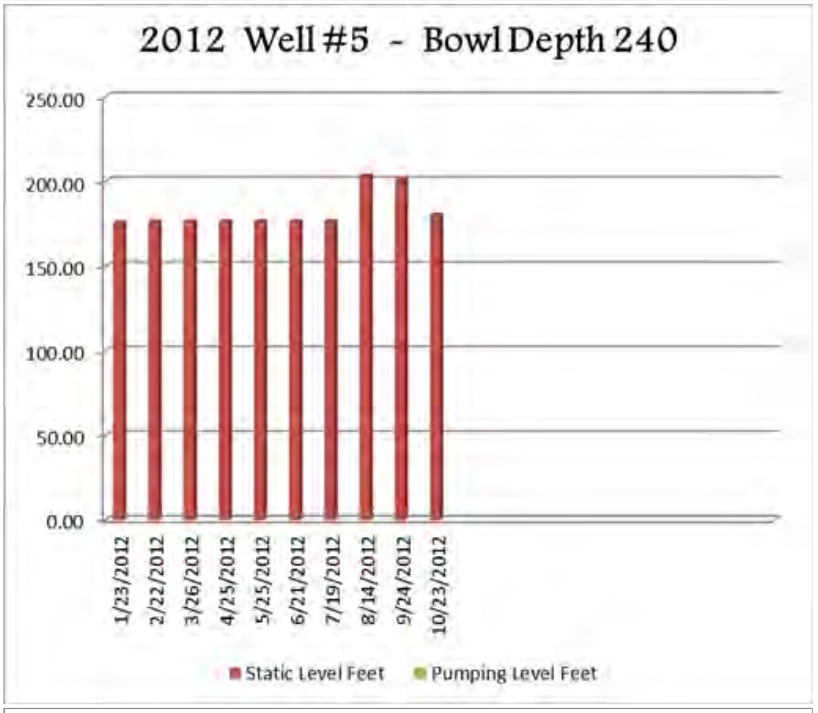

2011 - Well#5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

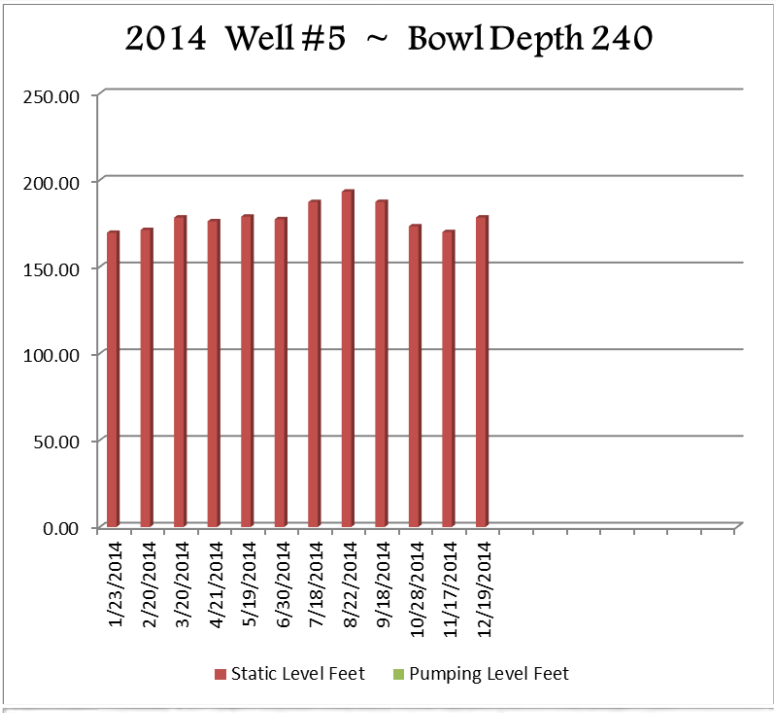

2010 - Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

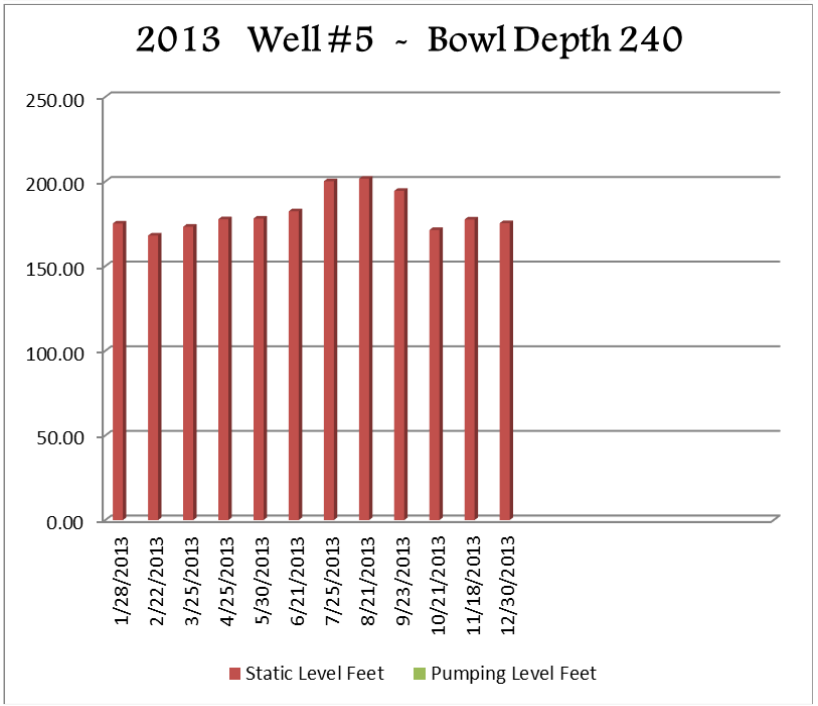

2011 - Well#5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

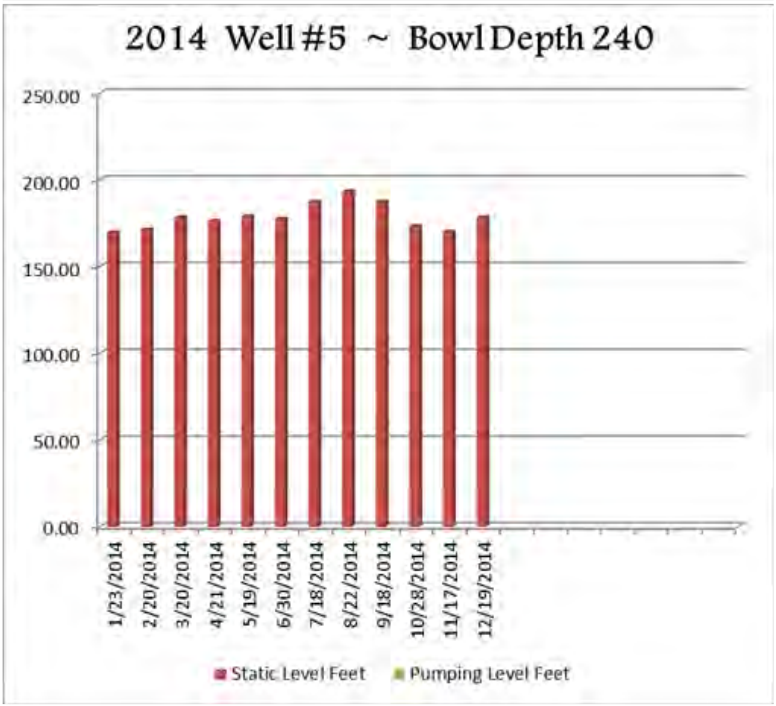

2012 Well #5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

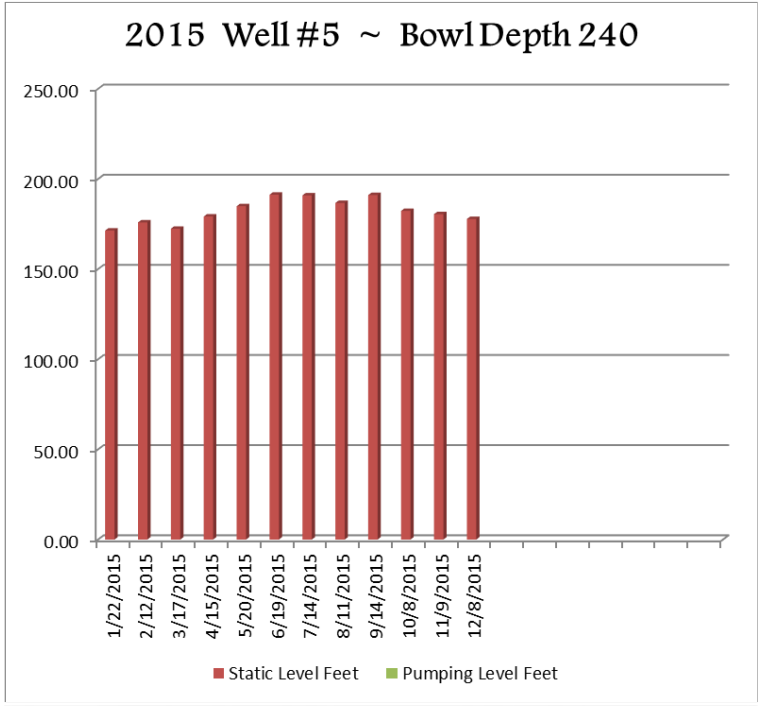

2013 Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

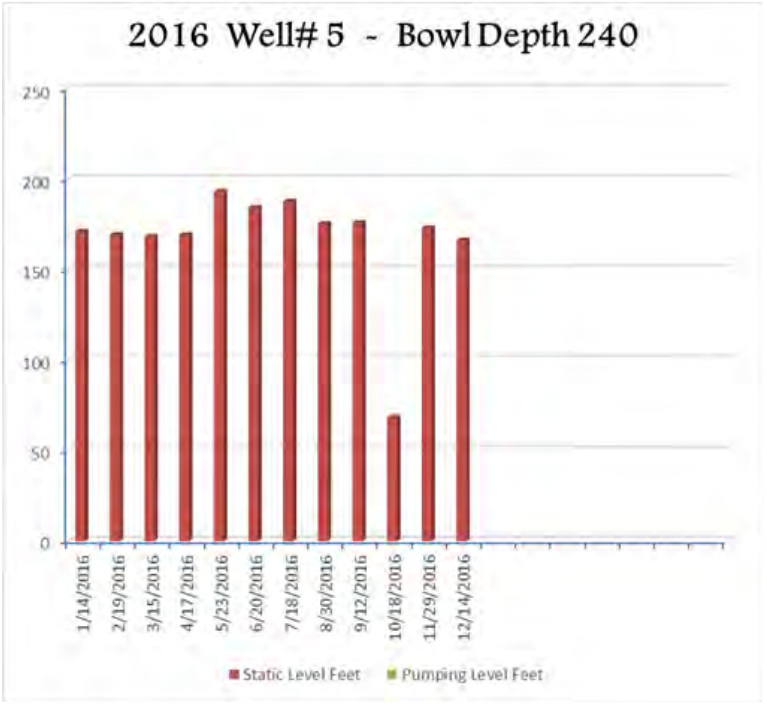

2012 Well #5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

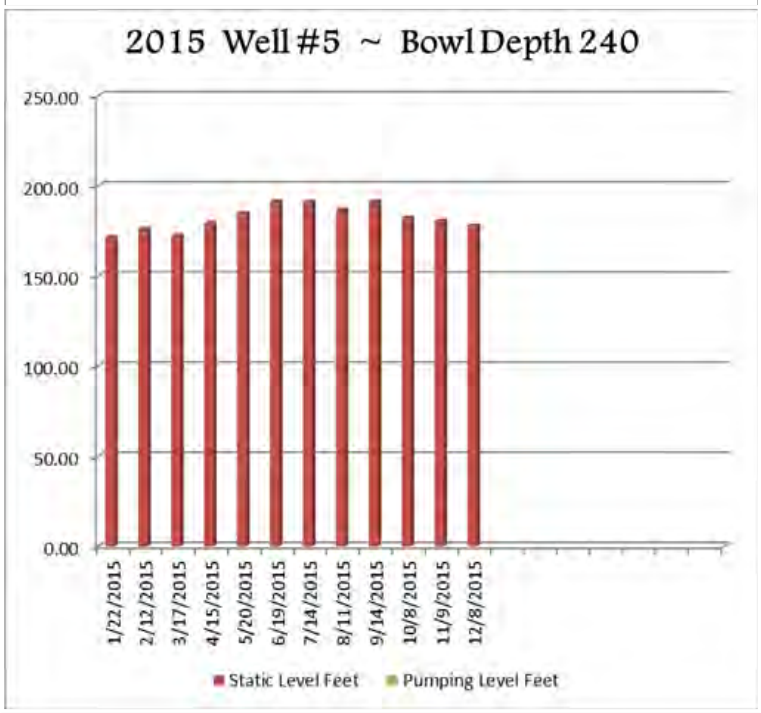

2014 Well #5 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

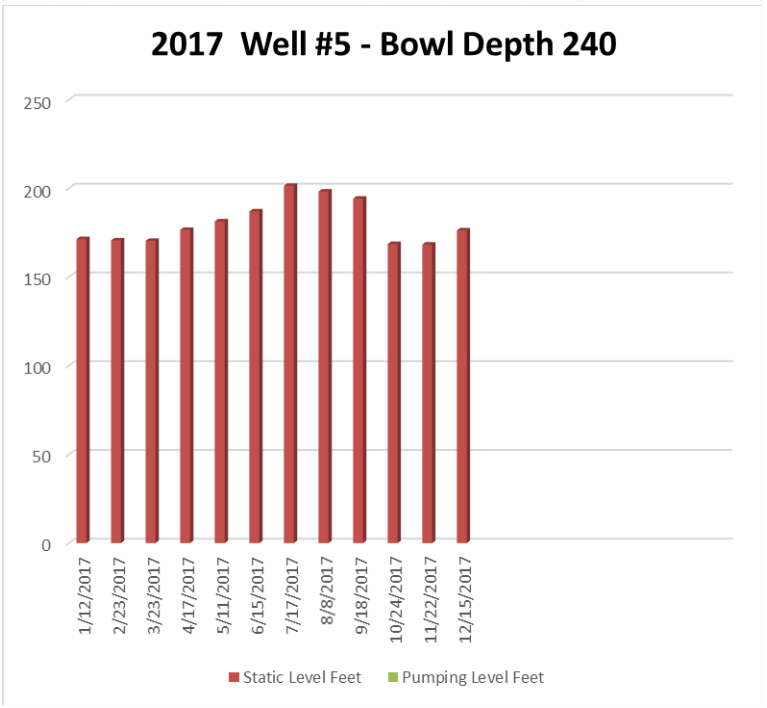

2013 Well #5 - Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

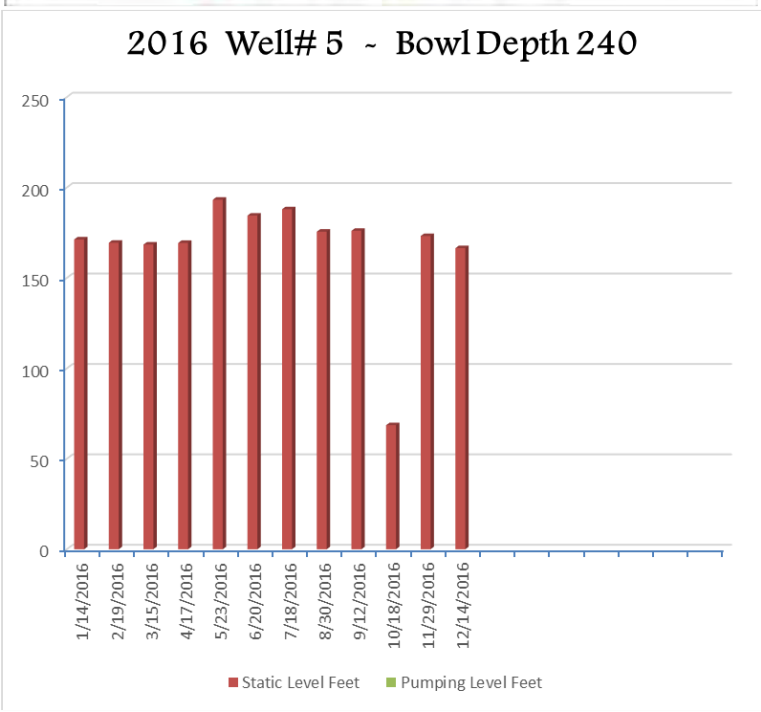

2014 Well #5 ~ Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

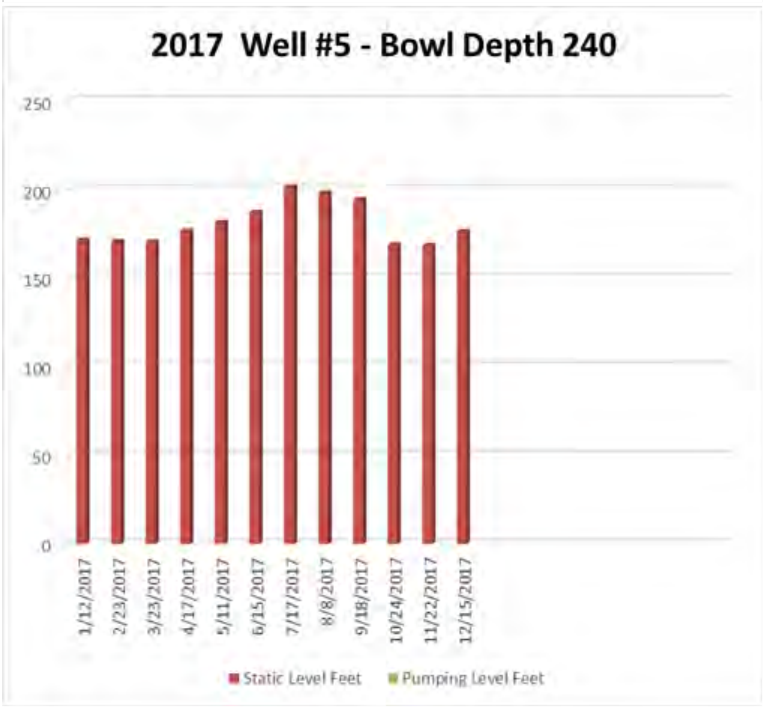

2015 Well #5 ~ Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

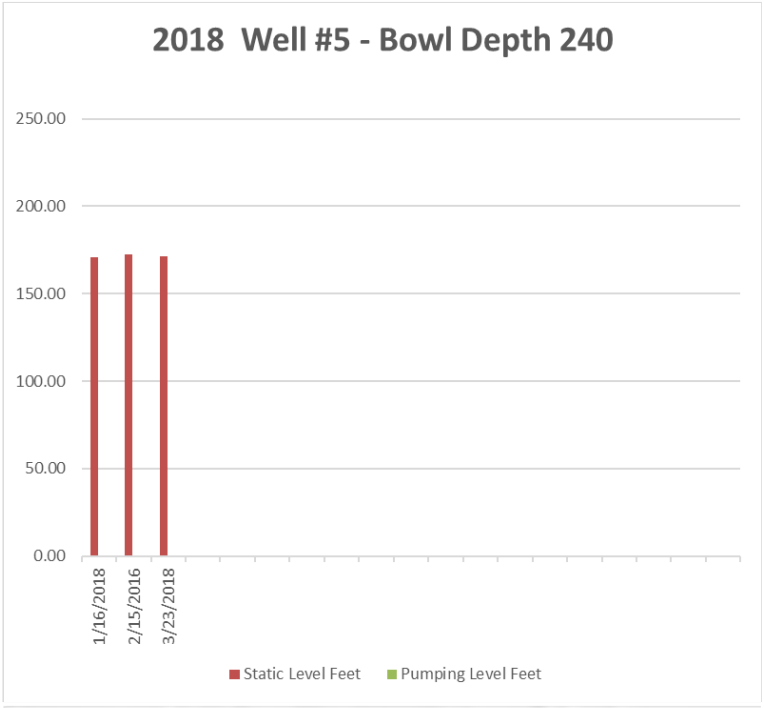

2016 Well# 5 - Bowl Depth 240
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200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

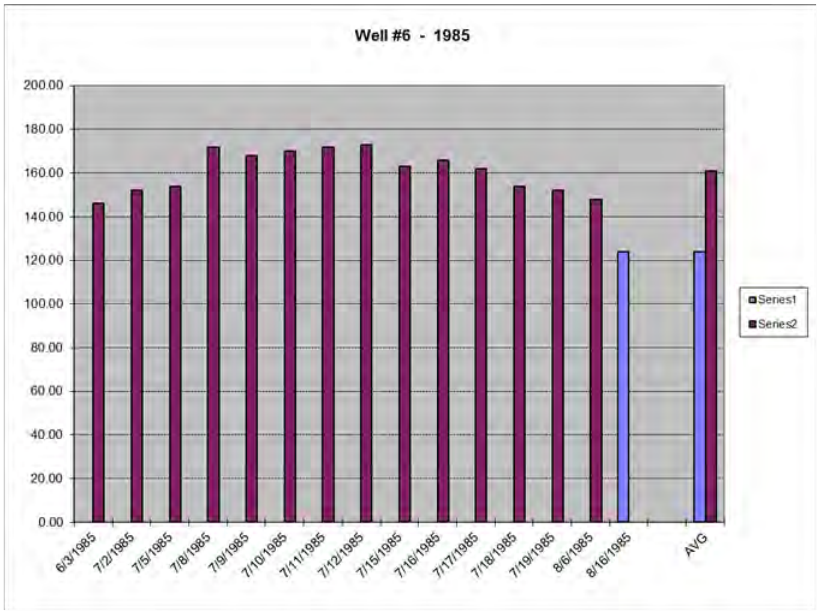

2015 Well #5 ~ Bowl Depth 240
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200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

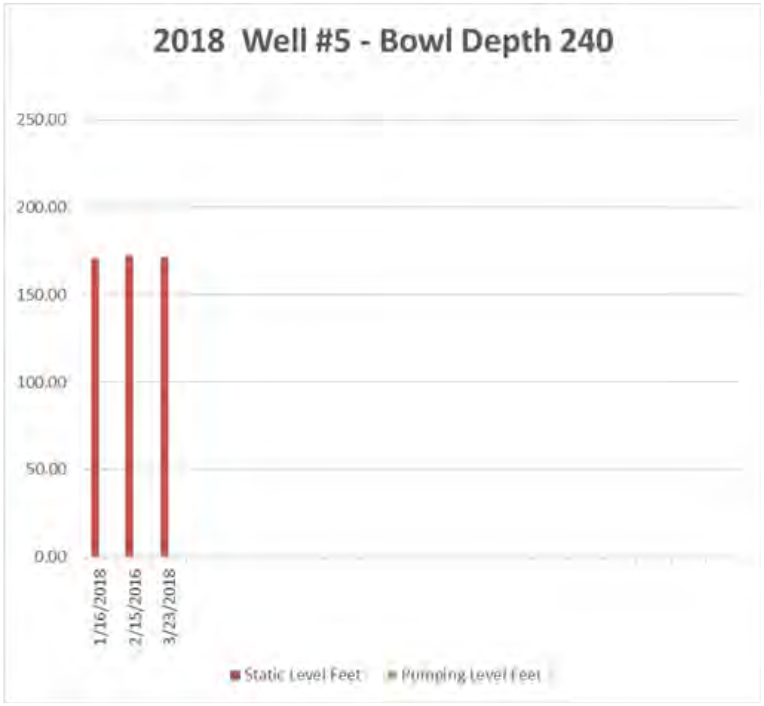

2017 Well #5 - Bowl Depth 240
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

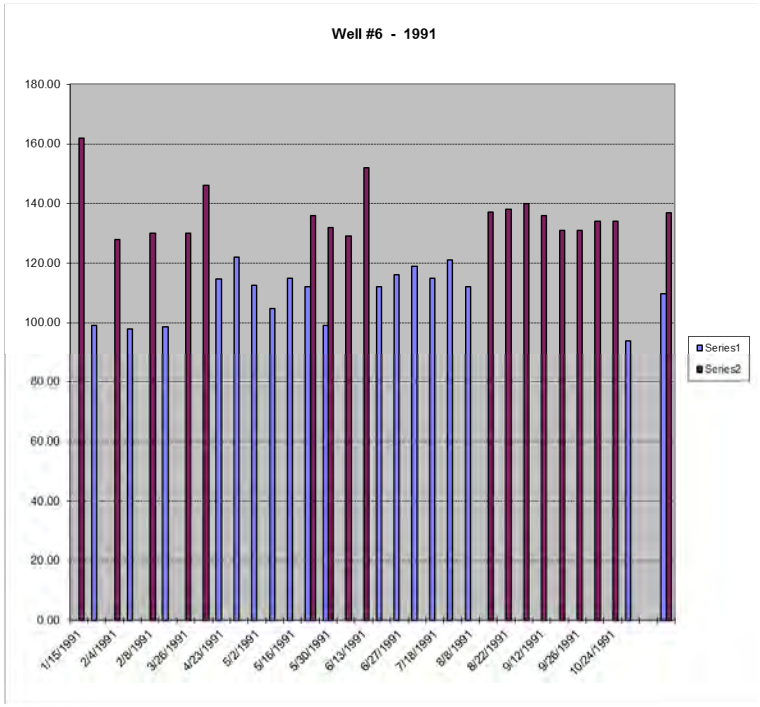

2016 Well# 5 ~ Bowl Depth 240
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

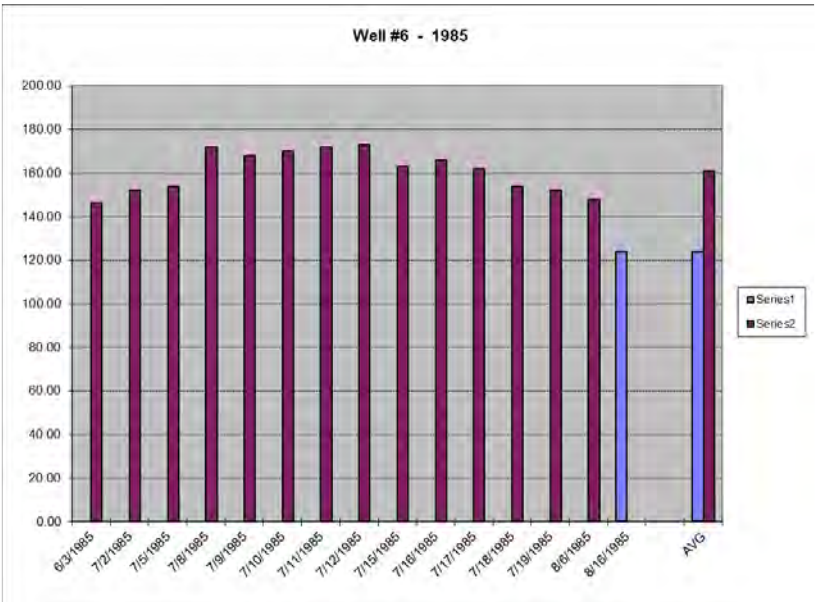

2017 Well #5 - Bowl Depth 240
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

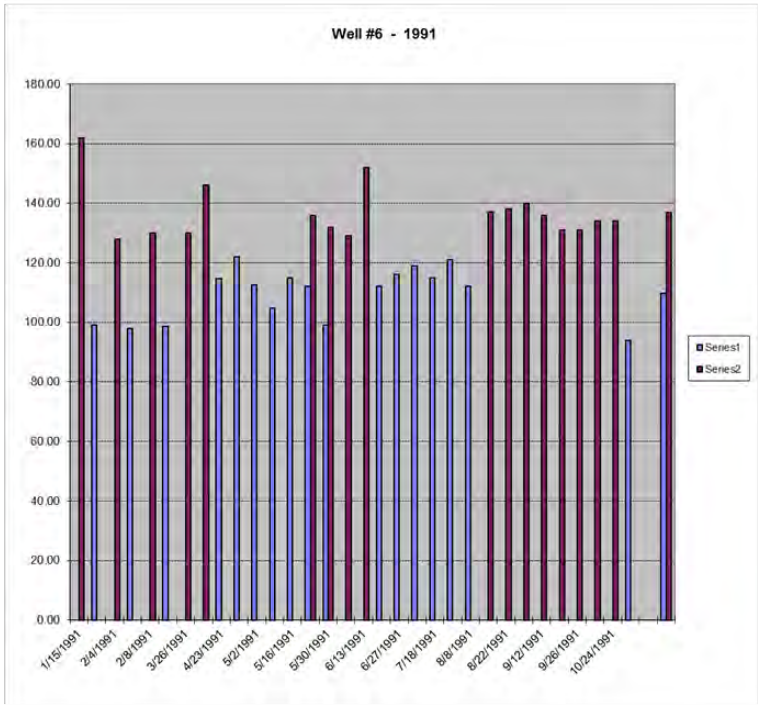

2018 Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2016
3/23/2018
Static Level Feet
Pumping Level Feet

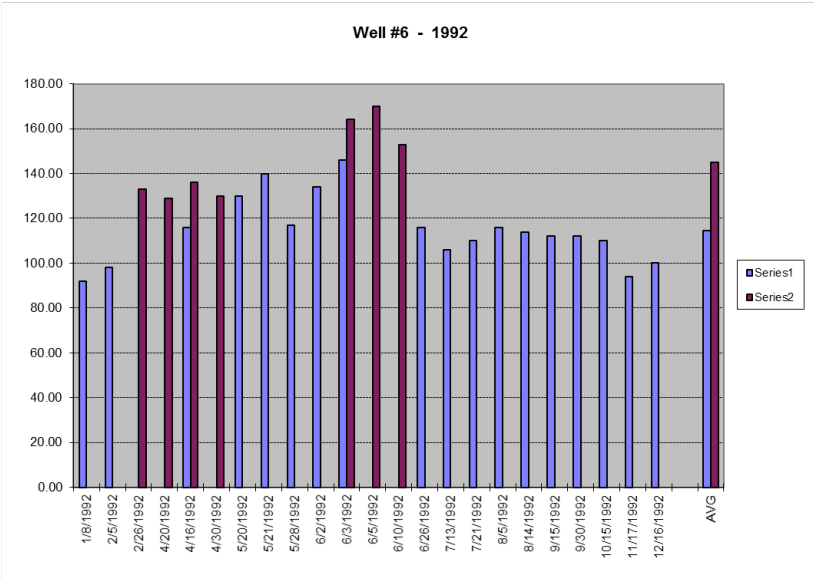

Well #6 - 1985
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
6/3/1985
7/2/1985
7/5/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
AVG
Series1
Series2

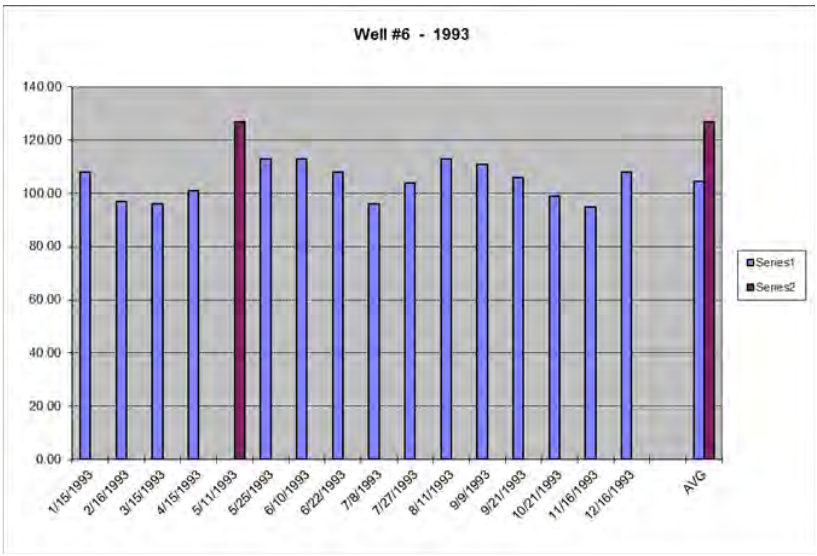

2018 Well #5 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2016
3/23/2018
Static Level Feet
Pumping Level Feet

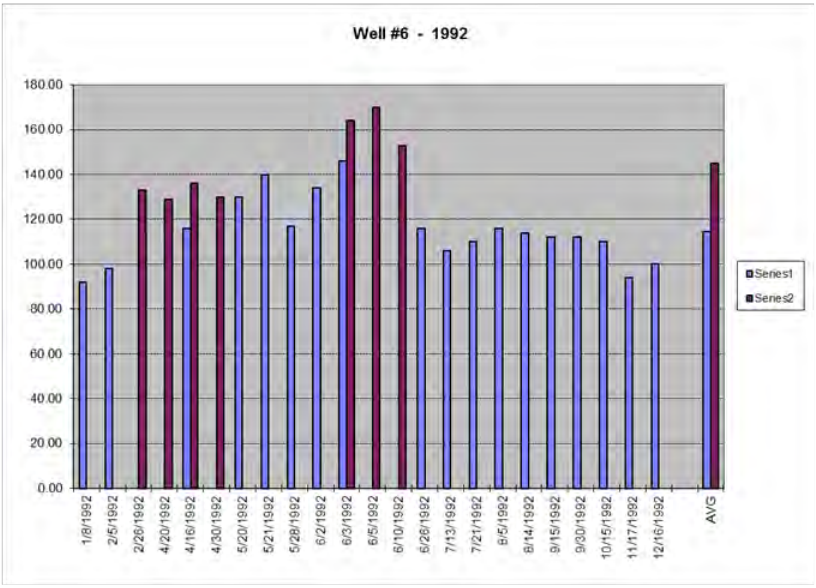

Well #6 - 1991
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1991
2/4/1991
2/8/1991
3/26/1991
4/23/1991
5/2/1991
5/16/1991
5/30/1991
6/13/1991
6/27/1991
7/18/1991
8/6/1991
8/22/1991
9/12/1991
9/26/1991
10/24/1991
Series1
Series2

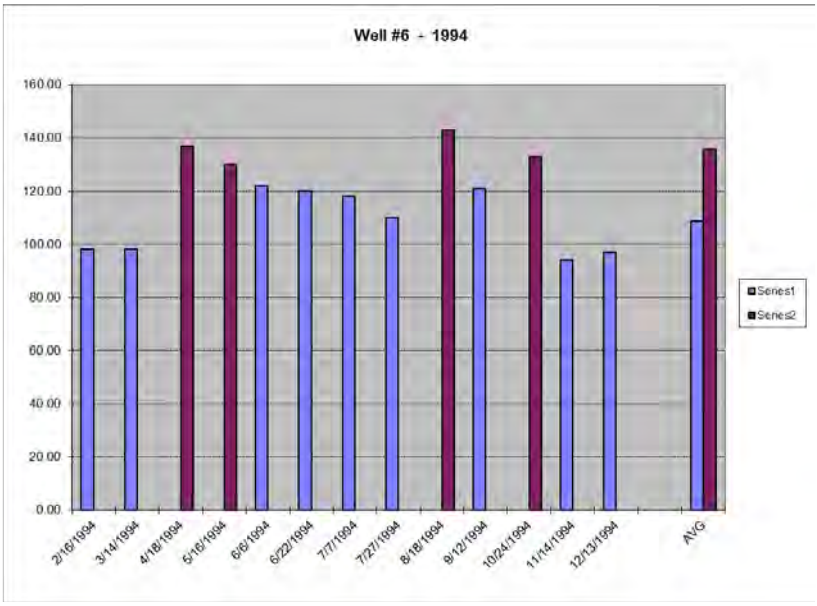

Well #6 - 1985
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
6/3/1985
7/2/1985
7/5/1985
7/8/1985
7/9/1985
7/10/1985
7/11/1985
7/12/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
8/6/1985
8/16/1985
AVG
Series1
Series2

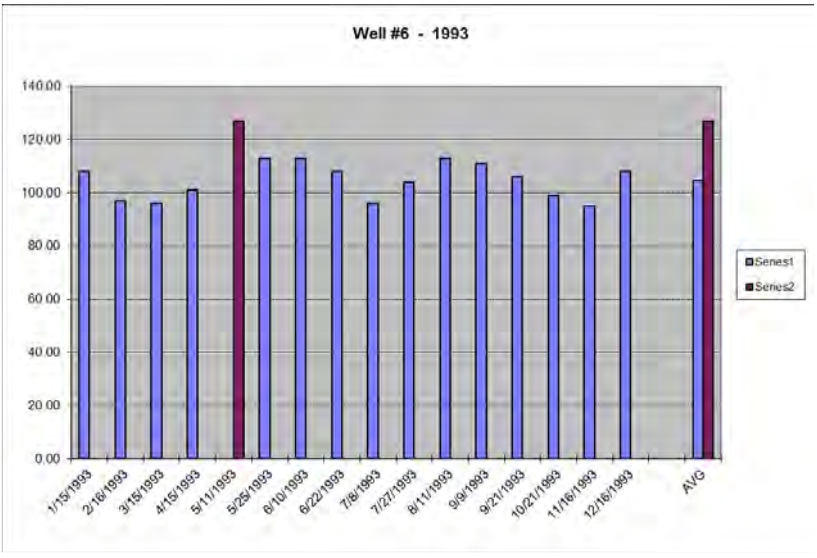

Well #6 - 1991
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1991
2/4/1991
2/8/1991
3/26/1991
4/23/1991
5/2/1991
5/16/1991
5/30/1991
6/13/1991
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10/24/1991
Series1
Series2

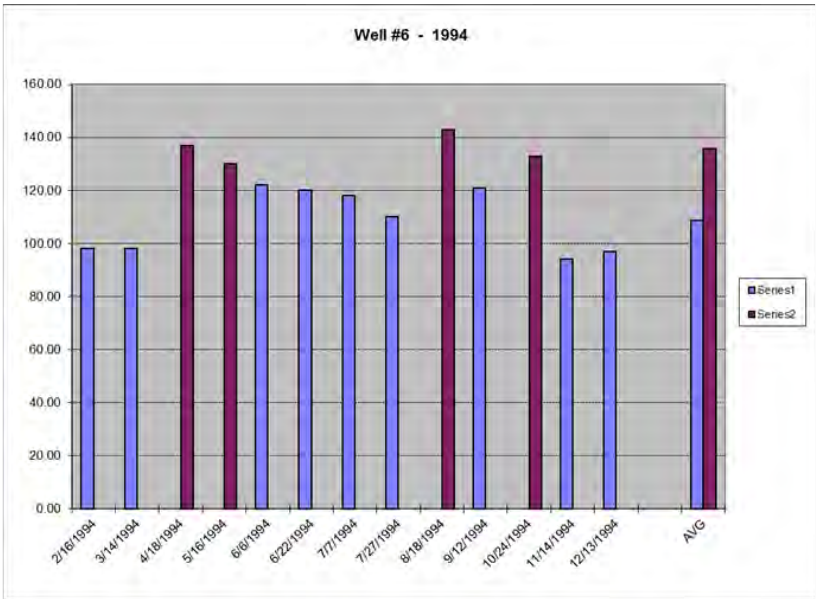

Well #6 - 1992
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/8/1992
2/5/1992
2/26/1992
4/20/1992
4/16/1992
4/30/1992
5/20/1992
5/21/1992
5/28/1992
6/2/1992
6/3/1992
6/5/1992
6/10/1992
6/26/1992
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7/21/1992
8/5/1992
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9/15/1992
9/30/1992
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11/17/1992
12/16/1992
AVG
Series1
Series2

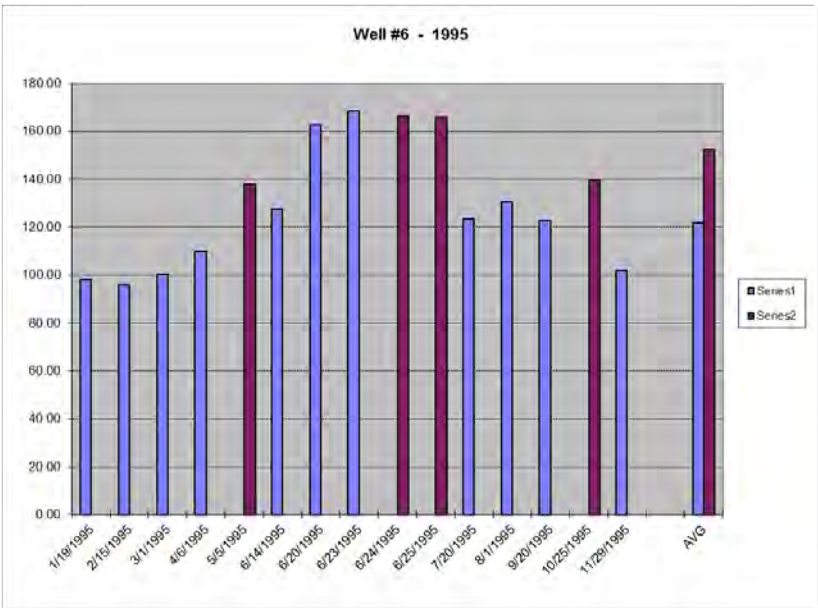

Well #6 - 1993
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100.00
80.00
60.00
40.00
20.00
0.00
1/15/1993
2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
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9/21/1993
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12/16/1993
AVG
Series1
Series2

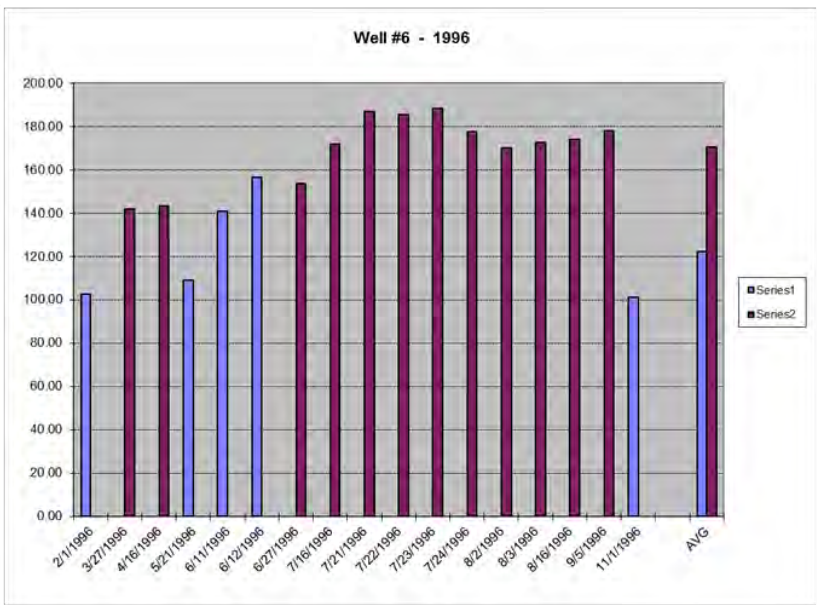

Well #6 - 1992
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120.00
100.00
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60.00
40.00
20.00
0.00
1/8/1992
2/5/1992
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4/30/1992
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5/21/1992
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12/16/1992
AVG
Series1
Series2

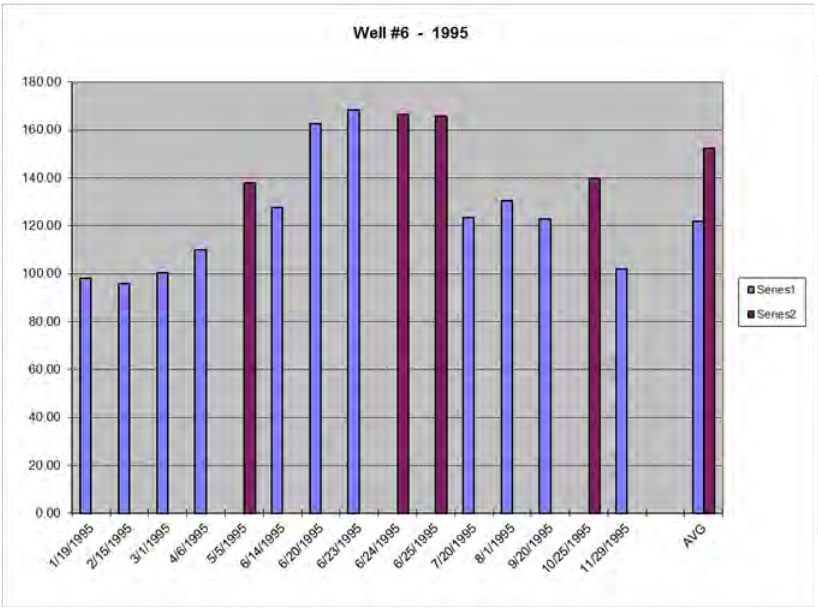

Well #6 - 1994
160.00
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100.00
80.00
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20.00
0.00
2/16/1994
3/14/1994
4/18/1994
5/16/1994
6/6/1994
6/22/1994
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10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

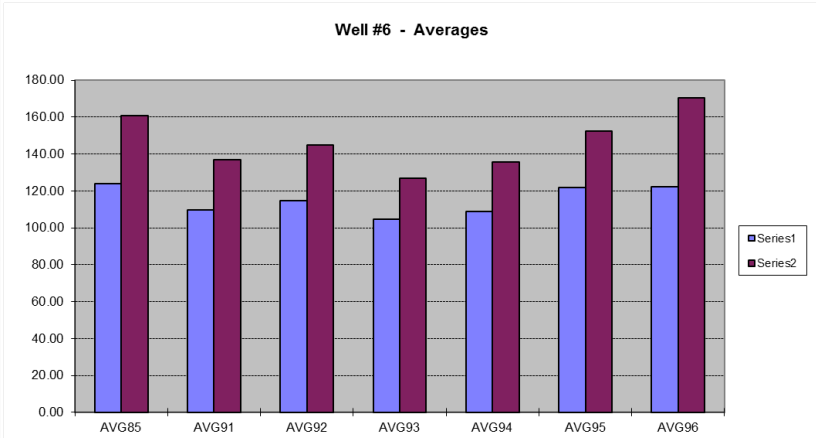

Well #6 - 1993
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40.00
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5/25/1993
6/10/1993
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11/16/1993
12/16/1993
AVG
Series1
Series2

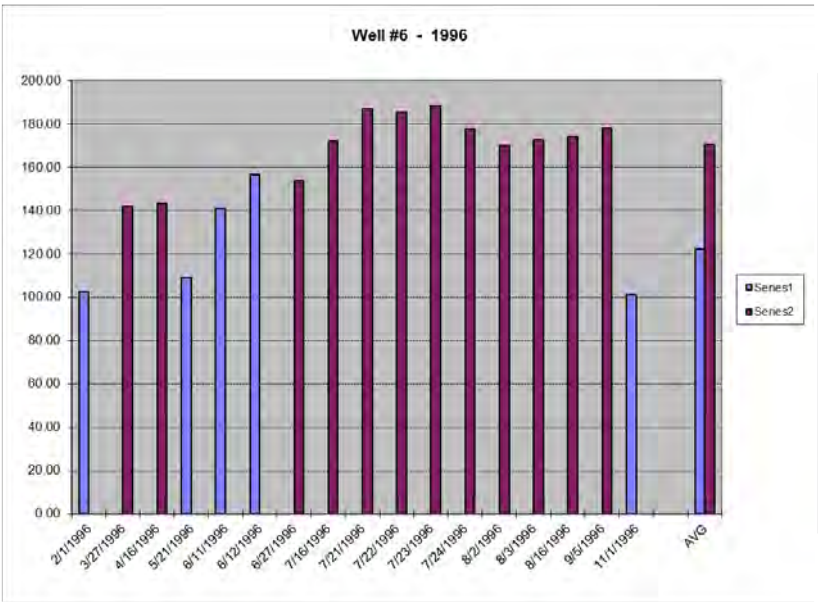

Well #6 - 1994
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12/13/1994
AVG
Series1
Series2

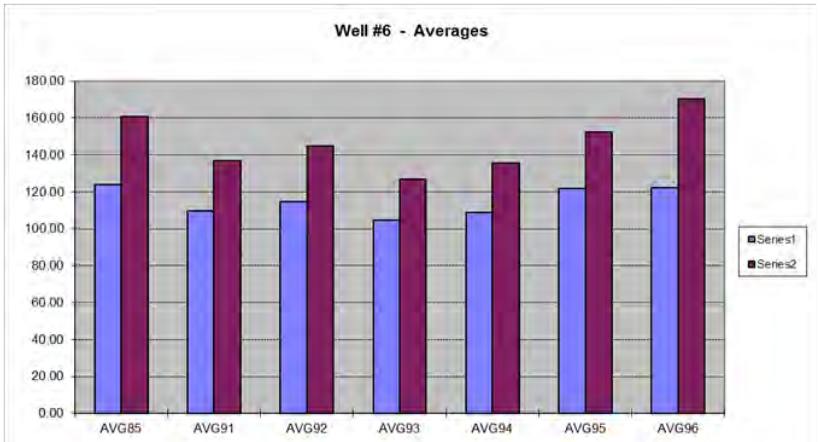

Well #6 - 1995
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6/23/1995
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11/29/1995
AVG
Series1
Series2

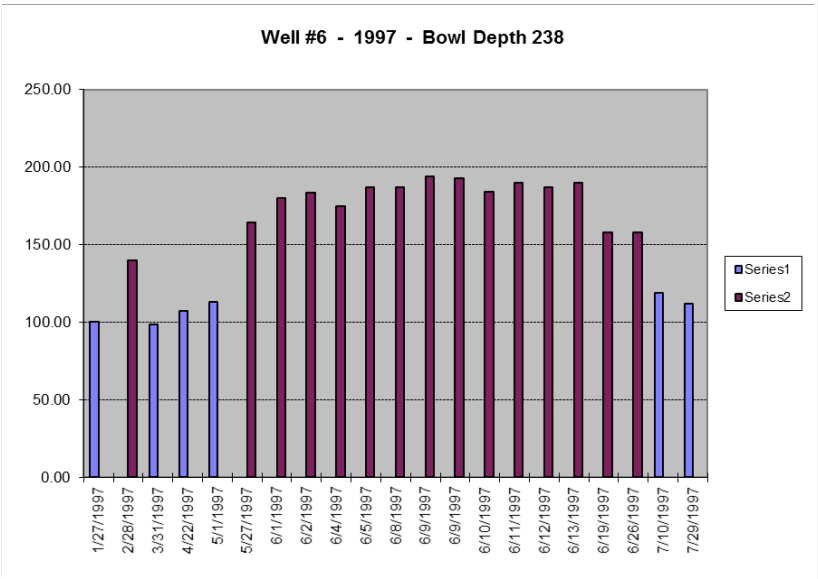

Well #6 - 1996
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7/22/1996
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8/3/1996
8/16/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

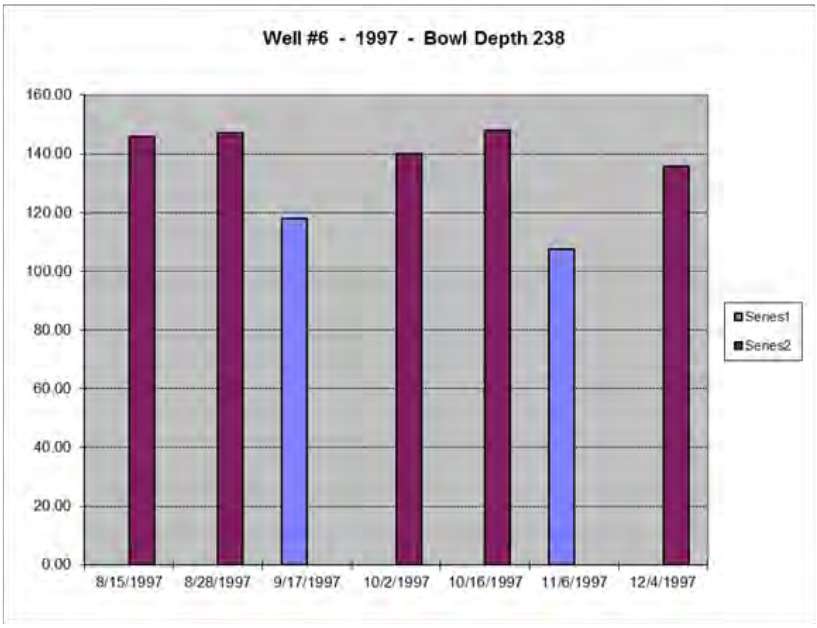

Well #6 - 1995
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120.00
100.00
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0.00
1/19/1995
2/15/1995
3/1/1995
4/6/1995
5/5/1995
6/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

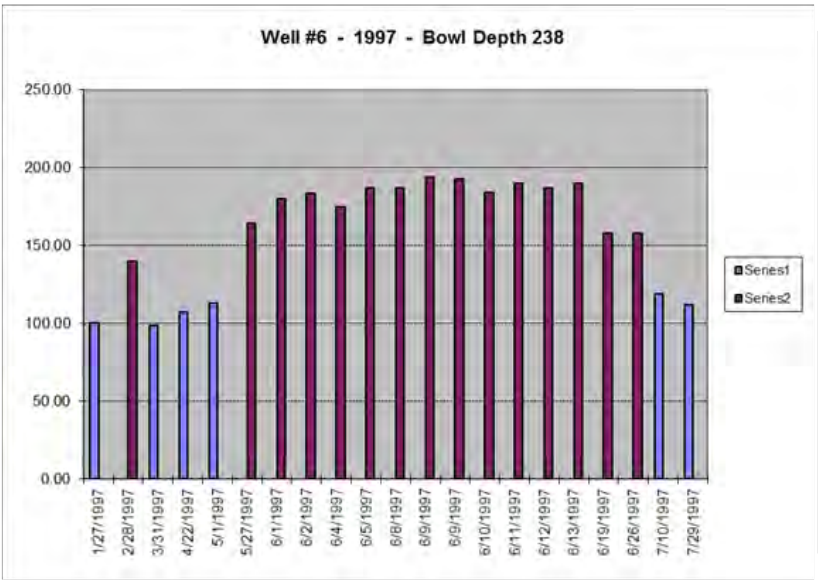

Well #6 - Averages
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

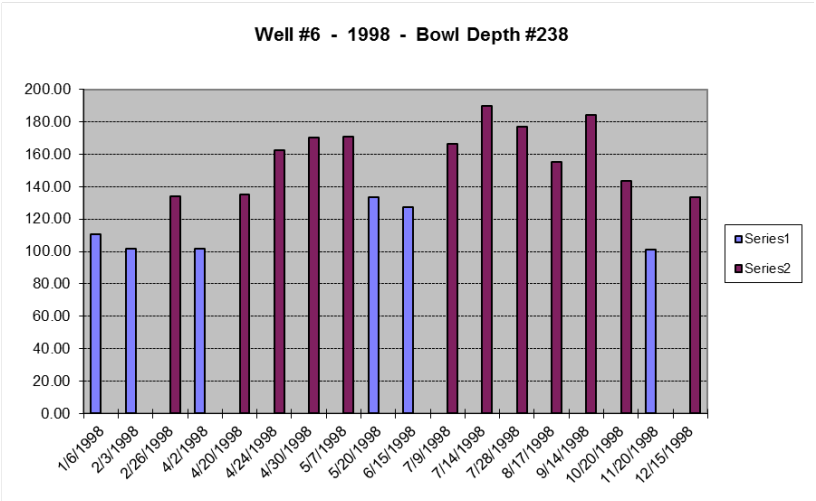

Well #6 - 1996
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180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/1/1996
3/27/1996
4/16/1996
5/21/1996
6/11/1996
6/12/1996
6/27/1996
7/16/1996
7/21/1996
7/22/1996
7/23/1996
7/24/1996
8/2/1996
8/3/1996
8/16/1996
9/5/1996
11/1/1996
AVG
Series1
Series2

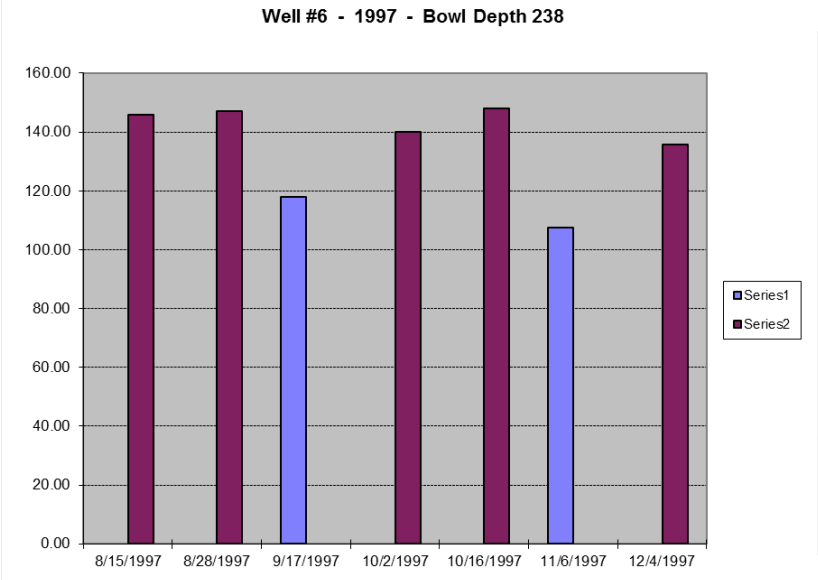

Well #6 - Averages
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

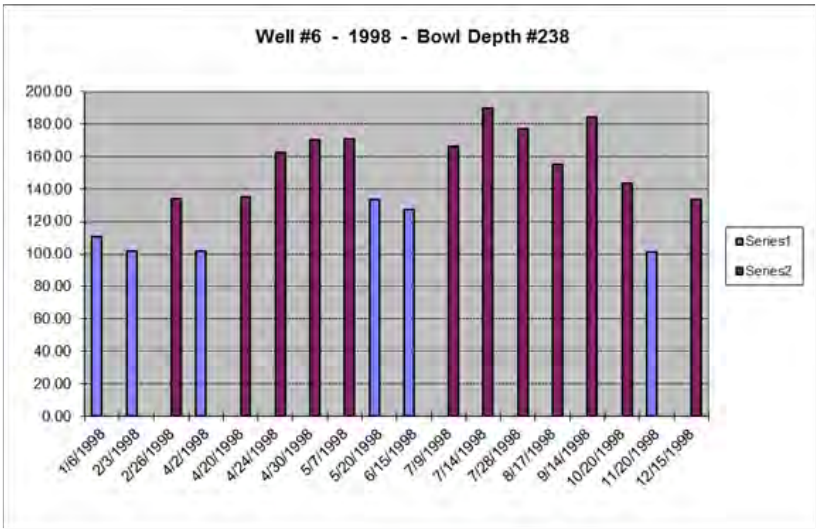

Well #6 - 1997 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
2/28/1997
3/31/1997
4/22/1997
5/1/1997
5/27/1997
6/1/1997
6/2/1997
6/4/1997
6/5/1997
6/8/1997
6/9/1997
6/9/1997
6/10/1997
6/11/1997
6/12/1997
6/13/1997
6/19/1997
6/26/1997
7/10/1997
7/29/1997
Series1
Series2

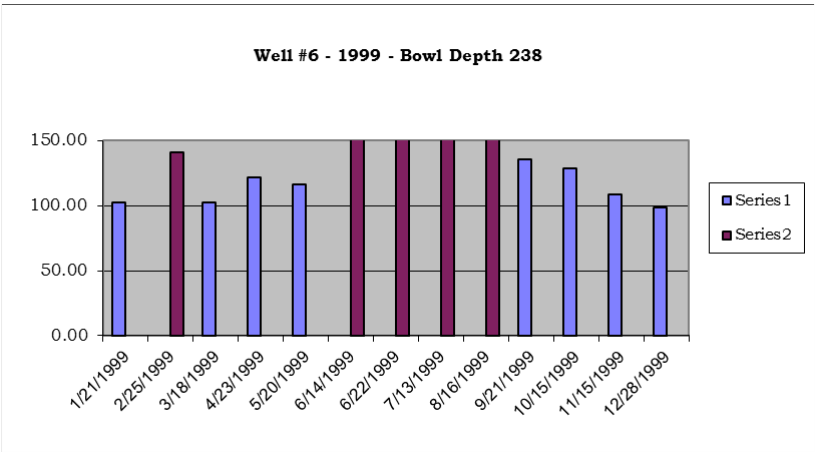

Well #6 - 1997 - Bowl Depth 238
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

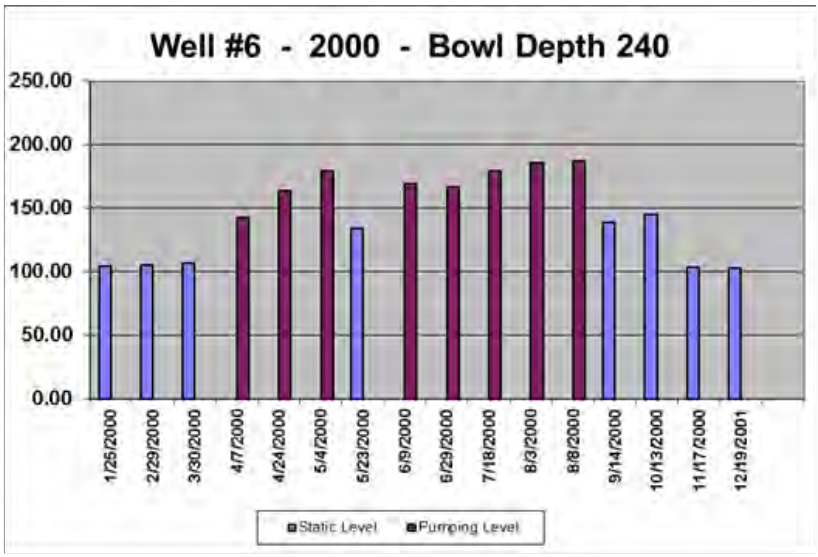

Well #6 - 1997 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
2/28/1997
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4/22/1997
5/1/1997
5/27/1997
6/1/1997
6/2/1997
6/4/1997
6/5/1997
6/8/1997
6/9/1997
6/9/1997
6/10/1997
6/11/1997
6/12/1997
6/13/1997
6/19/1997
6/26/1997
7/10/1997
7/29/1997
Series1
Series2

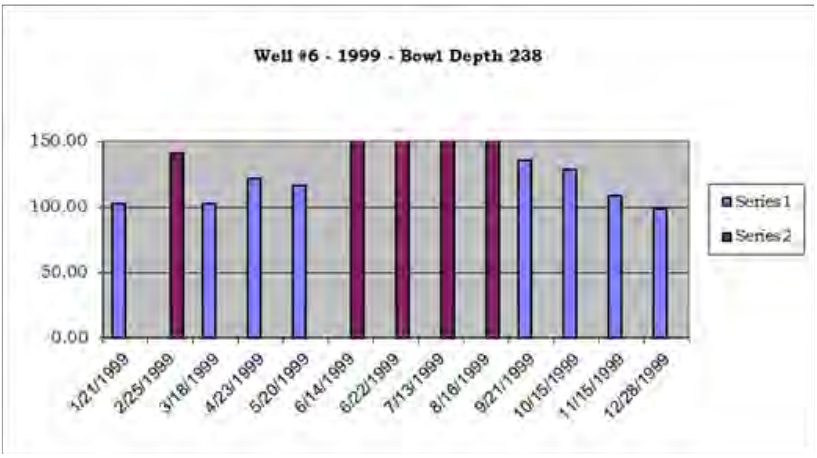

Well #6 - 1998 - Bowl Depth #238
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/24/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

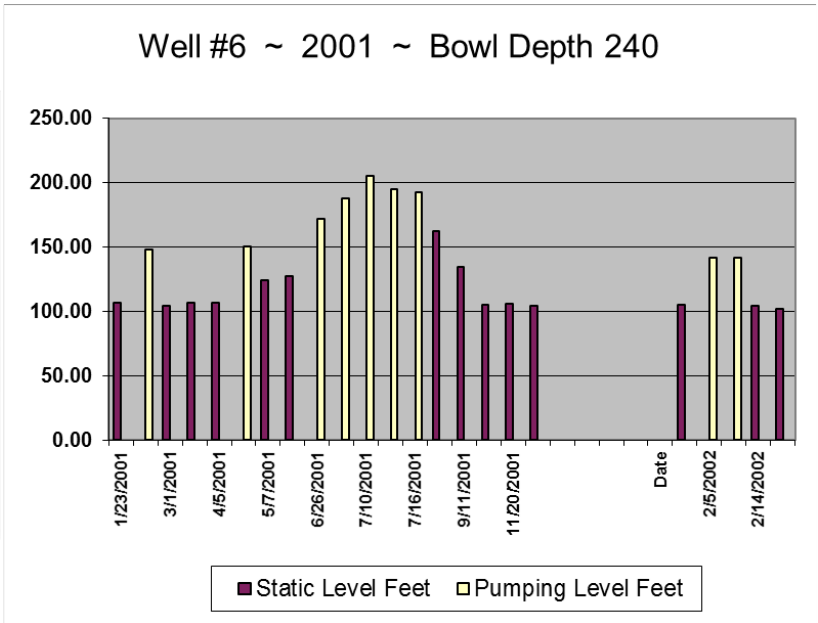

Well #6 - 1997 - Bowl Depth 238
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

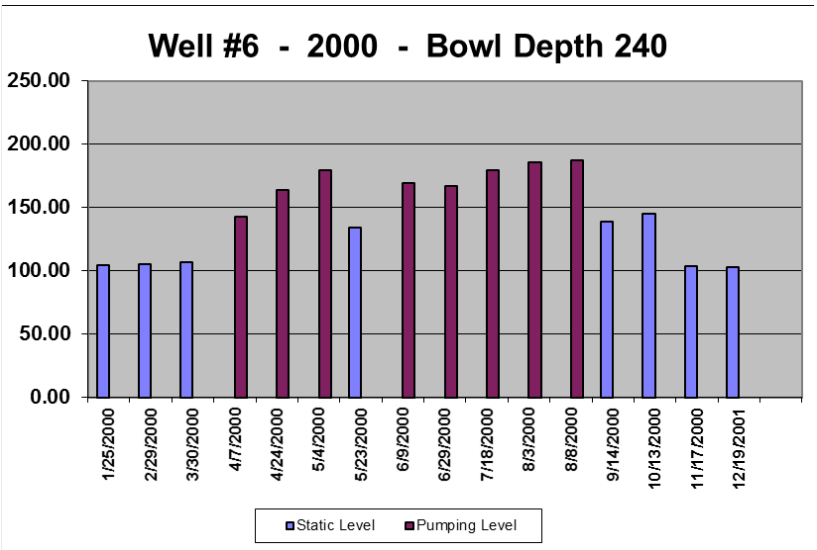

Well #6 - 1998 - Bowl Depth #238
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/24/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

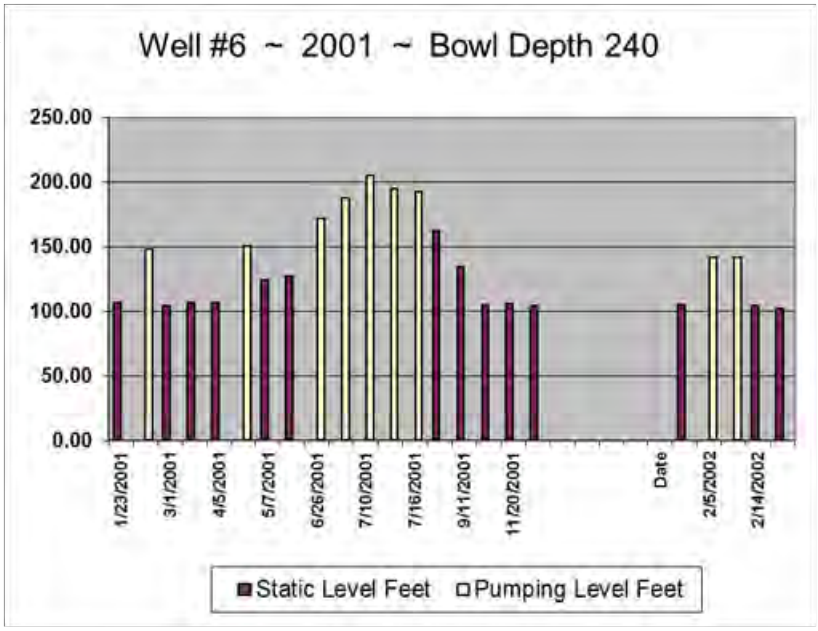

Well #6 - 1999 - Bowl Depth 238
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/1999
Series1
Series2


Well #6 - 2000 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/30/2000
4/7/2000
4/24/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

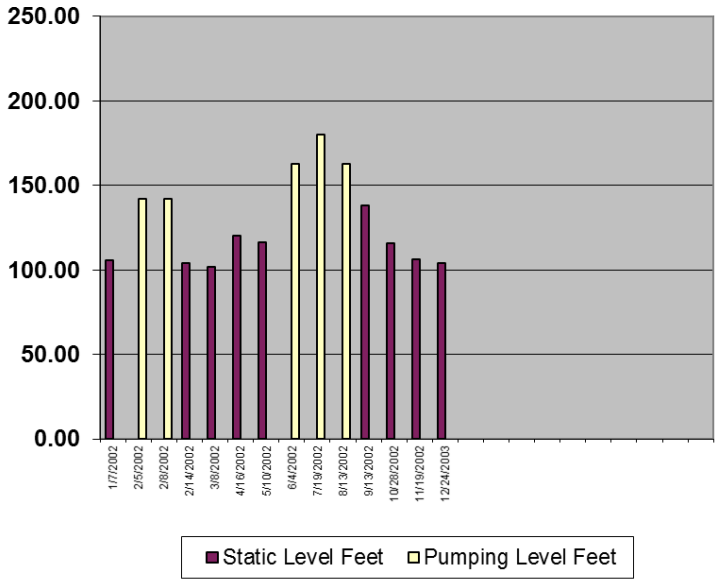

Well #6 - 1999 - Bowl Depth 238
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/1999
Series1
Series2


Well #6 ~ 2001 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
4/5/2001
5/7/2001
6/26/2001
7/10/2001
7/16/2001
9/11/2001
11/20/2001
Date
2/5/2002
2/14/2002
Static Level Feet
Pumping Level Feet

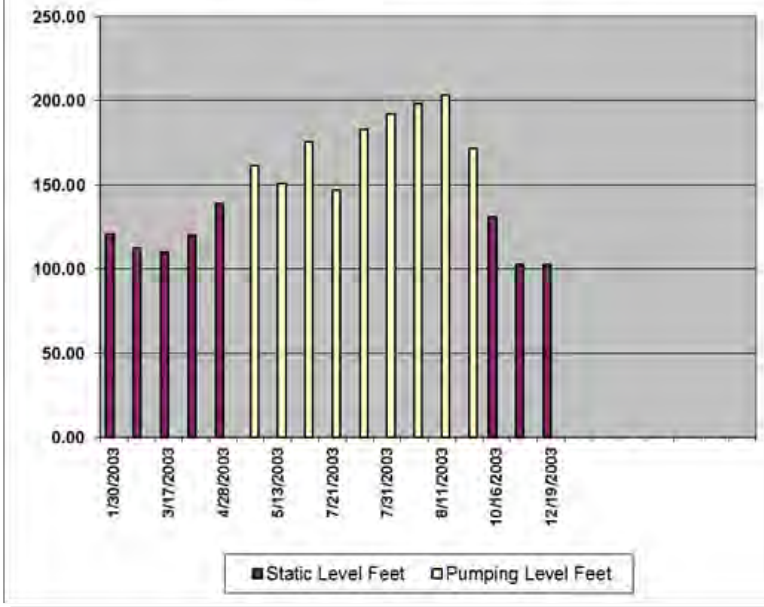

Well #6 - 2000 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/30/2000
4/7/2000
4/24/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level


Well #6 ~ 2001 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
4/5/2001
5/7/2001
6/26/2001
7/10/2001
7/16/2001
9/11/2001
11/20/2001
Date
2/5/2002
2/14/2002
Static Level Feet
Pumping Level Feet

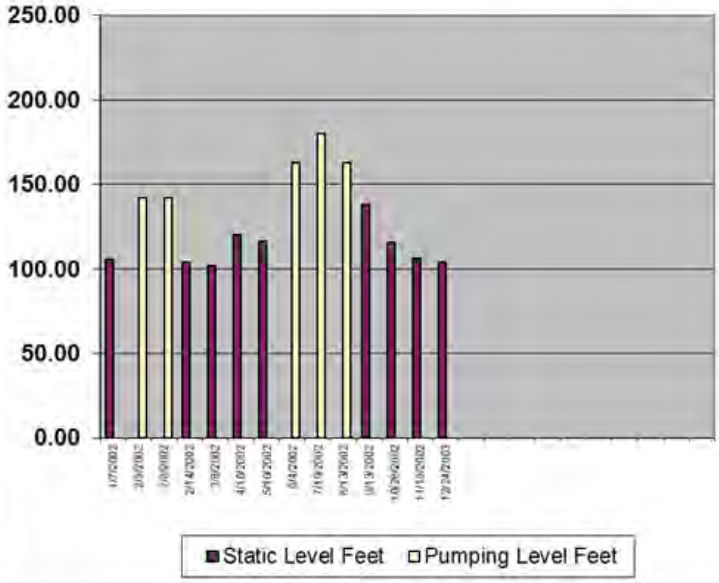
## Well #6 ~ 2002 ~ Bowl Depth 240



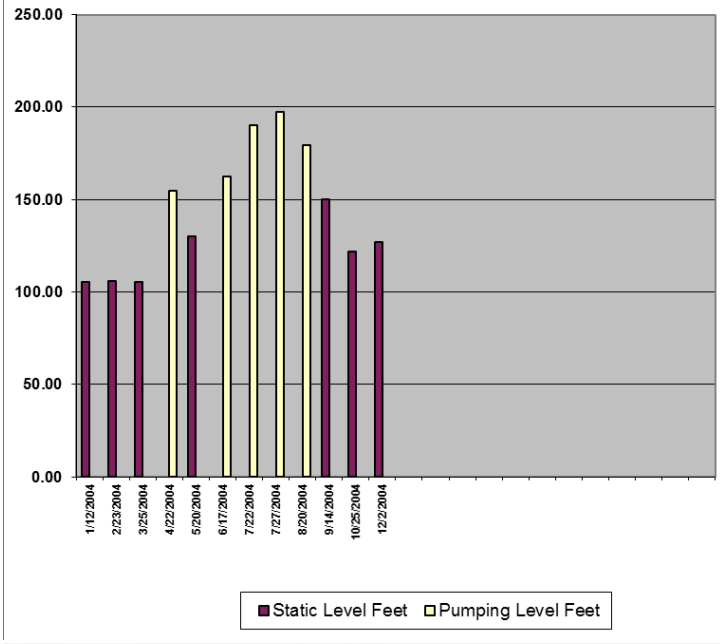

## 2003 ~ Well #6 ~ Bowl Depth 240



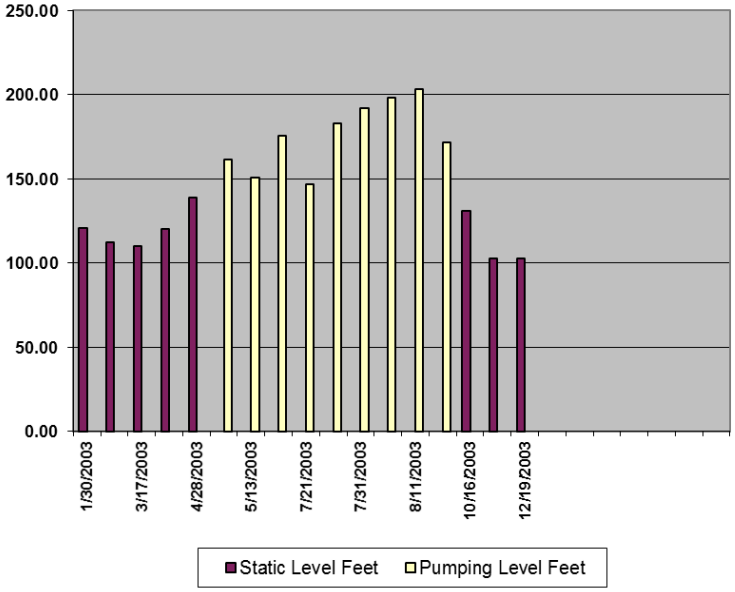

## Well #6 ~ 2002 ~ Bowl Depth 240



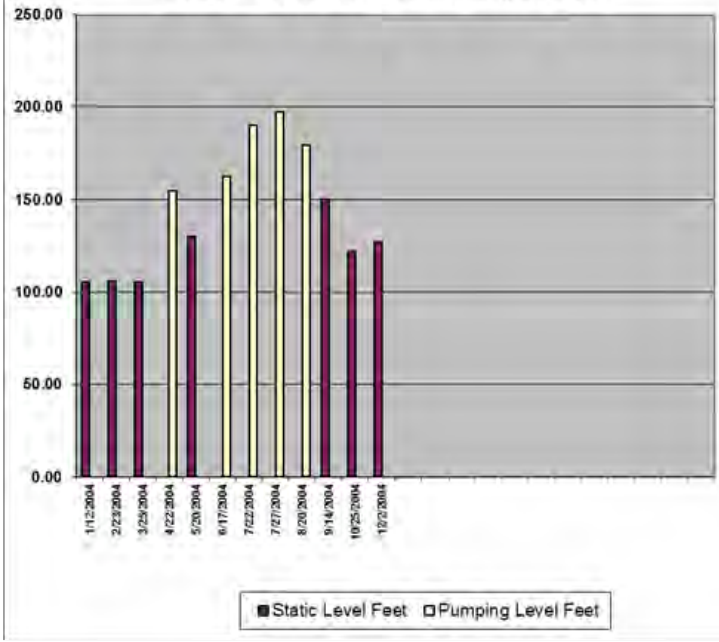

## 2004 ~ Well #6 - Bowl Depth 240

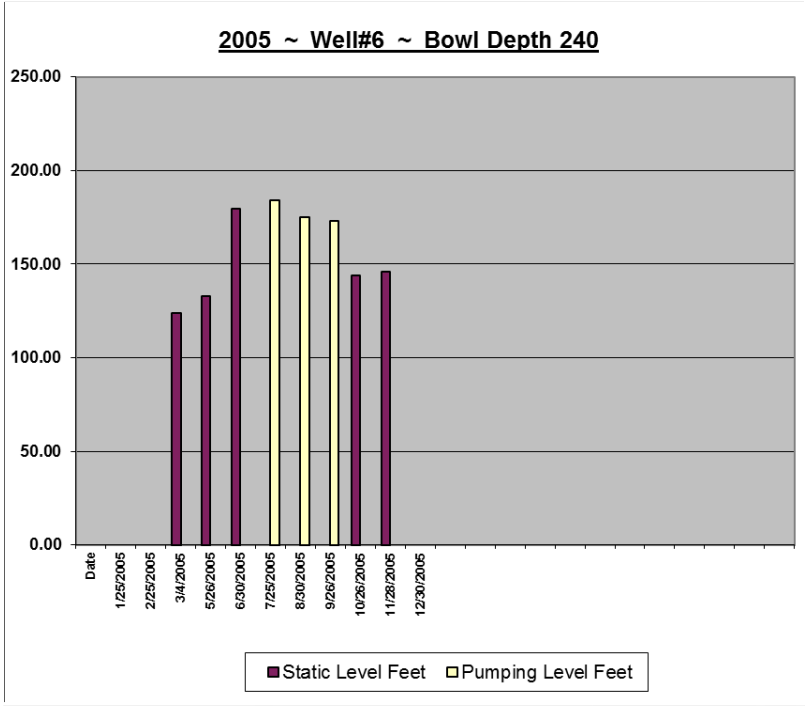


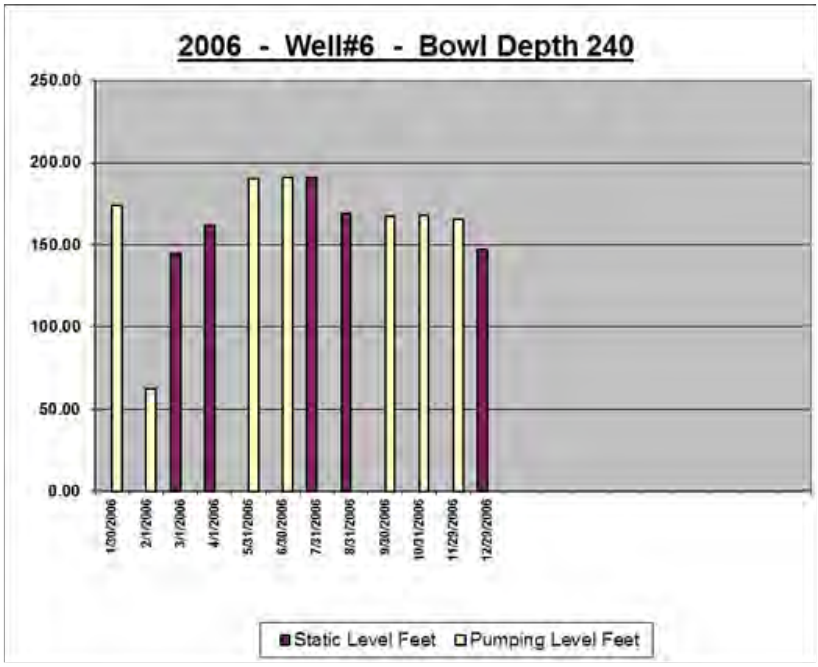

## 2003 ~ Well #6 ~ Bowl Depth 240

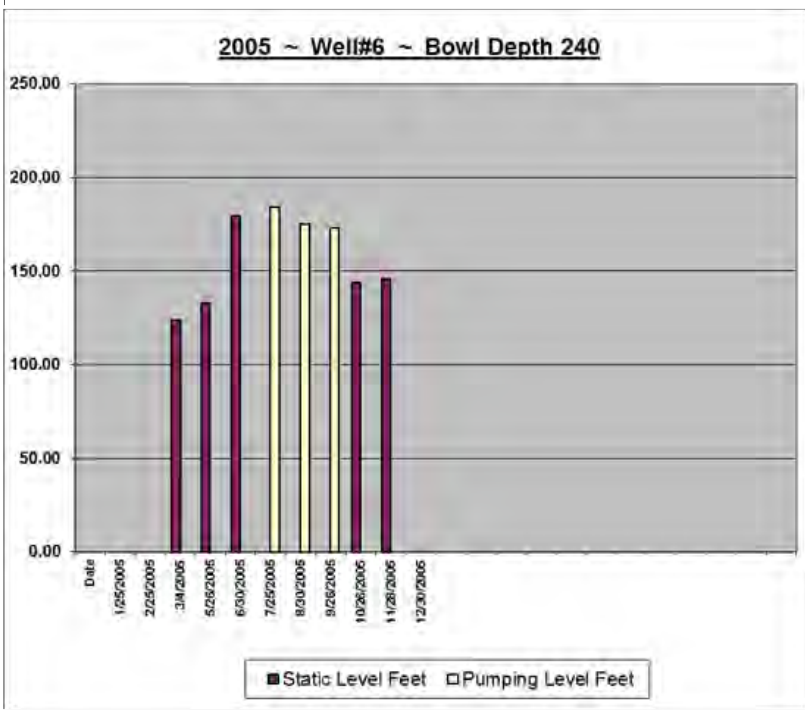


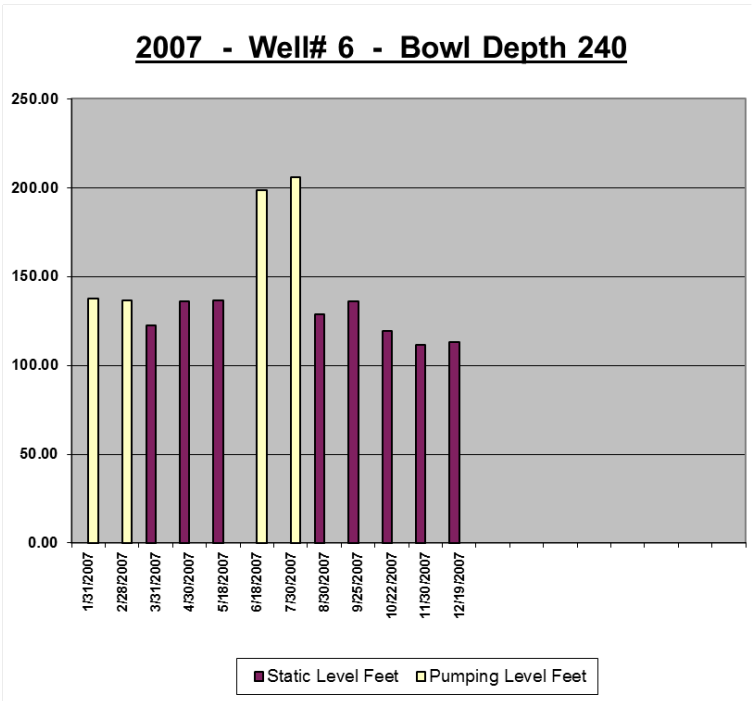

## 2004 ~ Well #6 - Bowl Depth 240

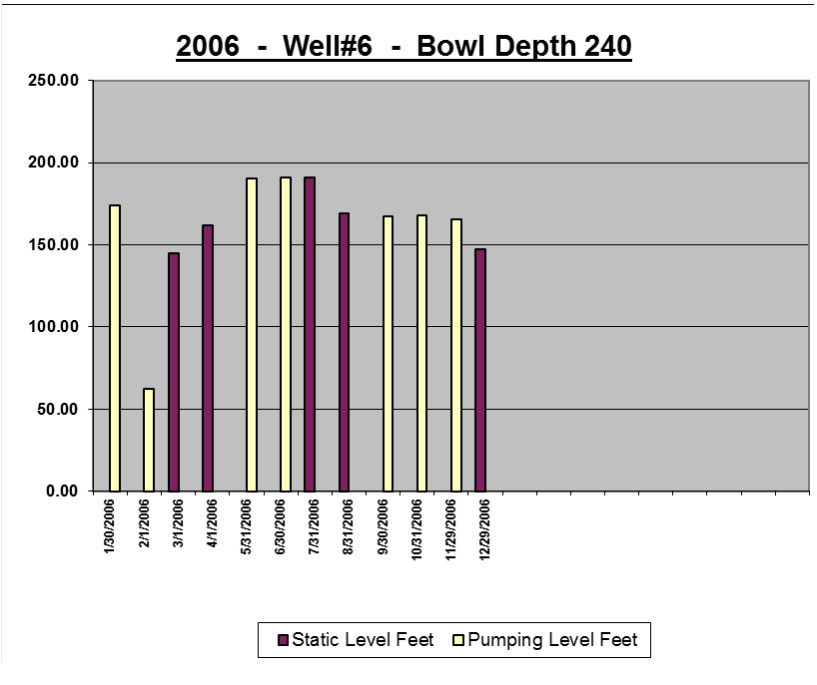


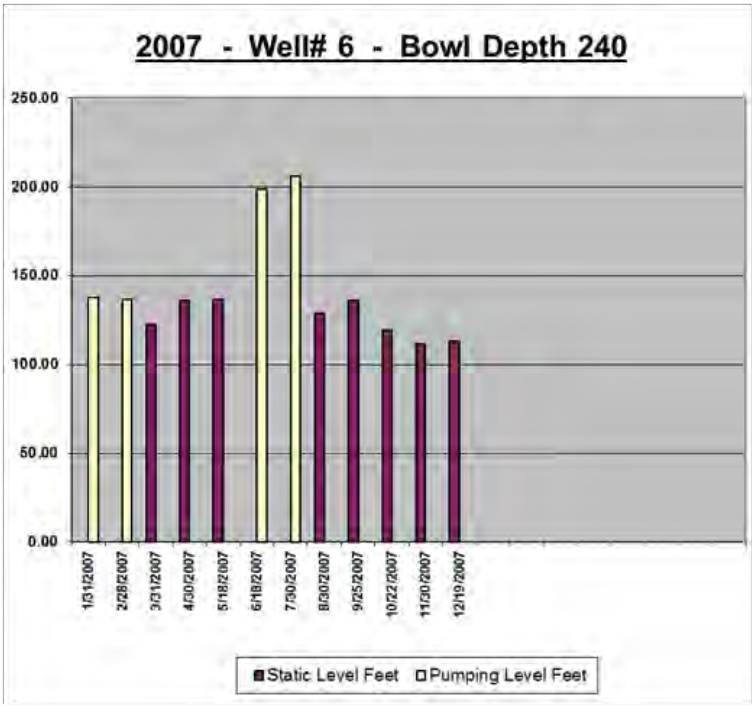

2005 ~ Well#6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
Date
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

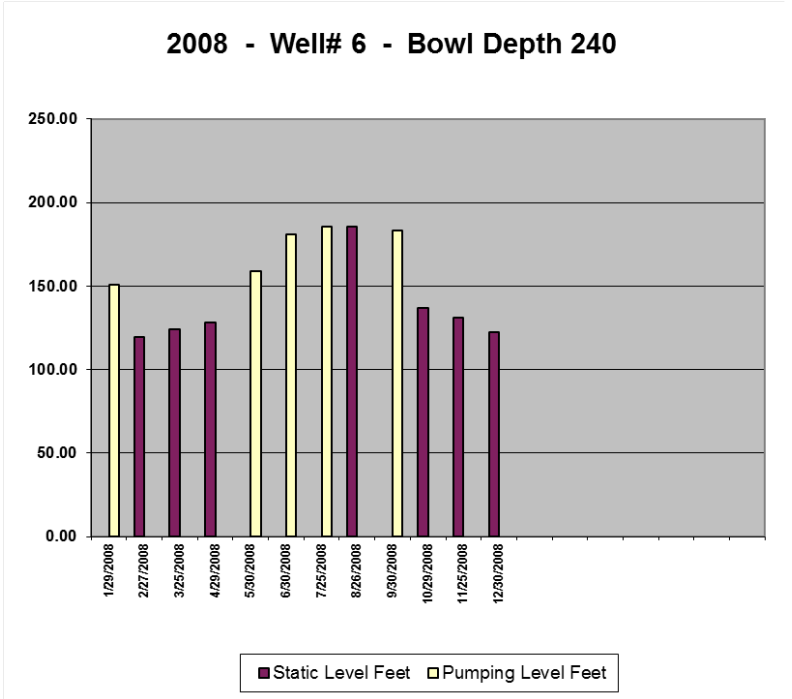

2006 - Well#6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

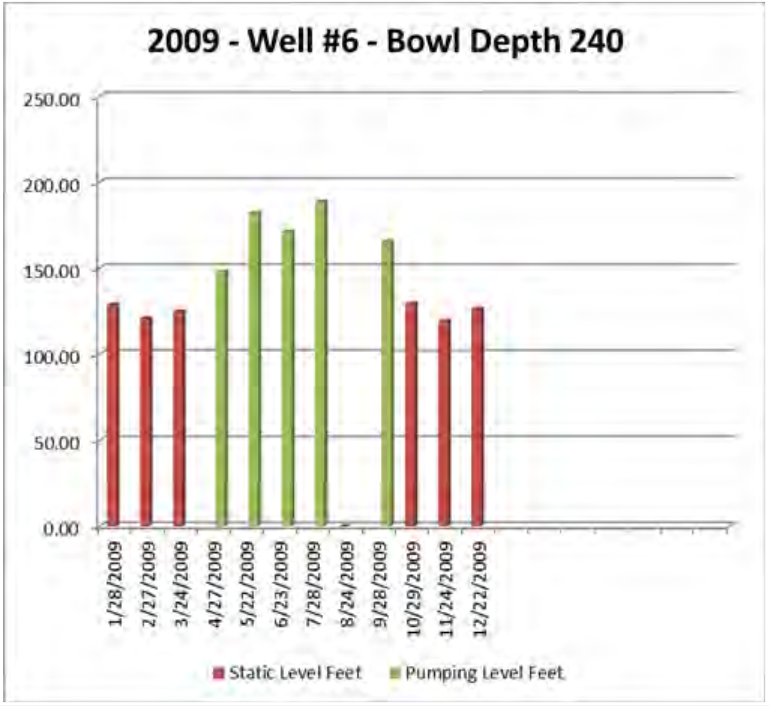

2005 ~ Well#6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
Date
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

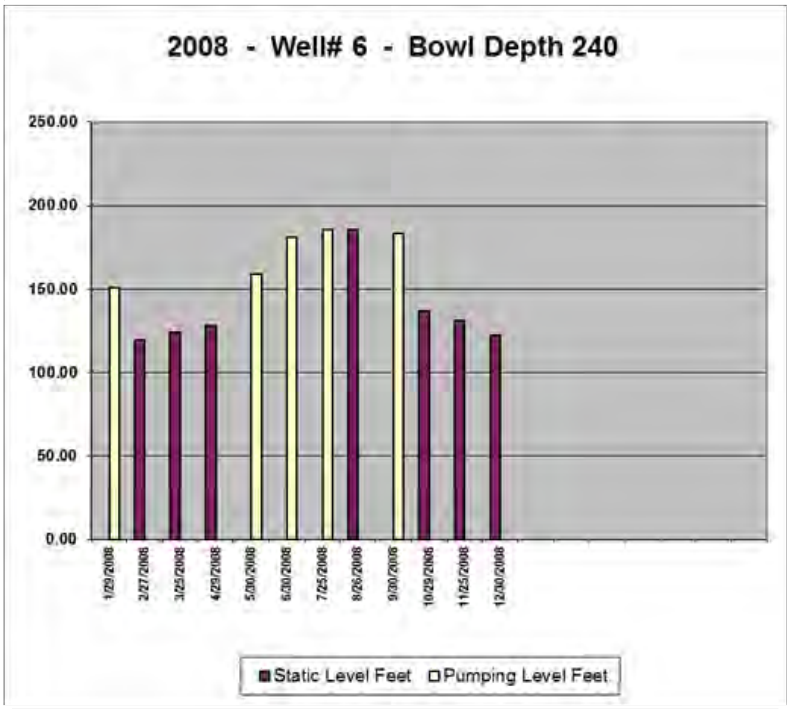

2007 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

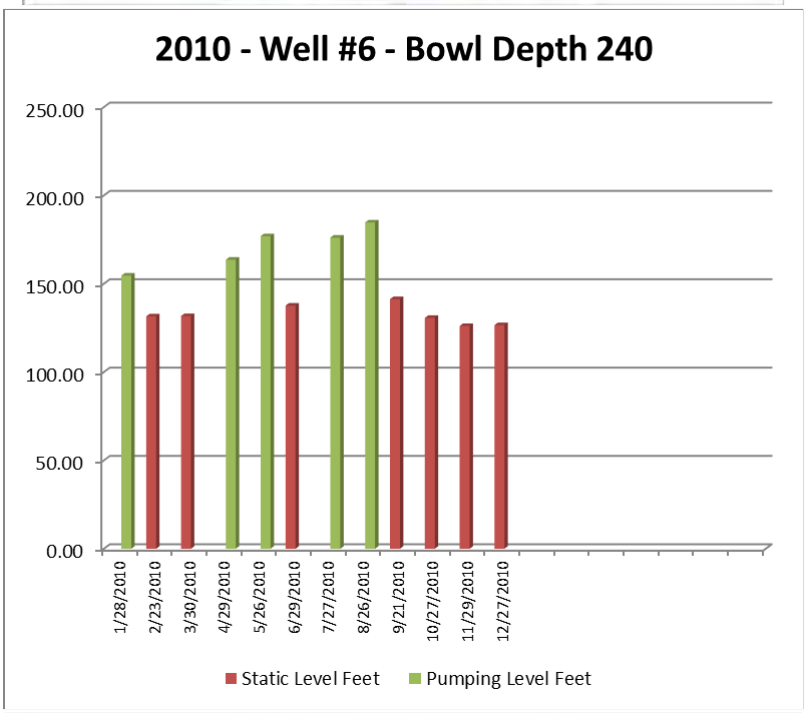

2006 - Well#6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

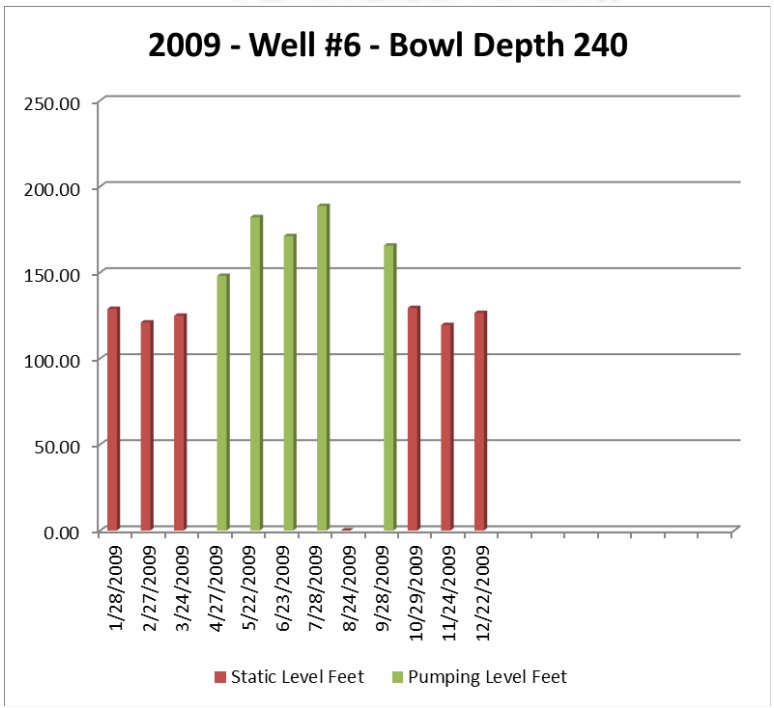

2007 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

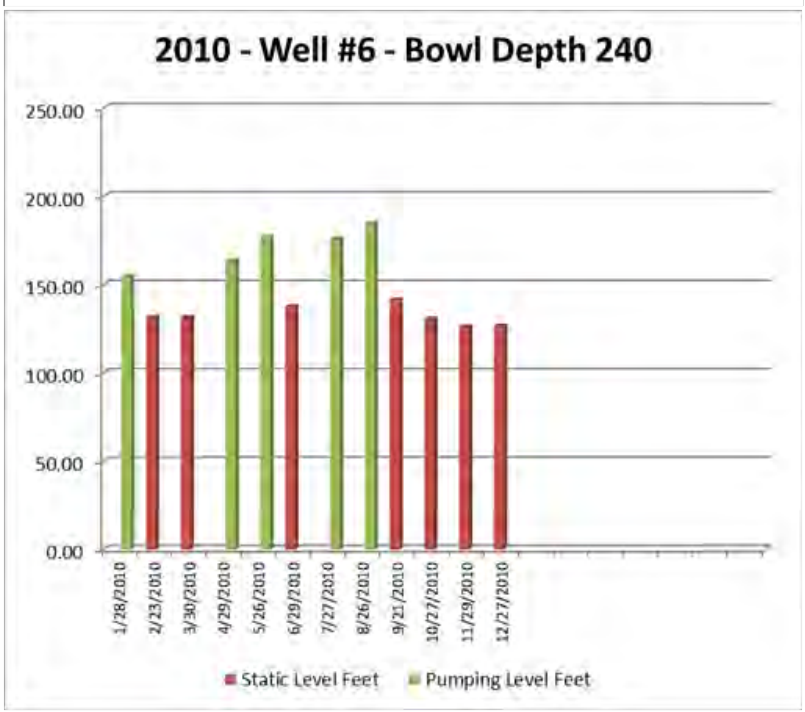

2008 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/25/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

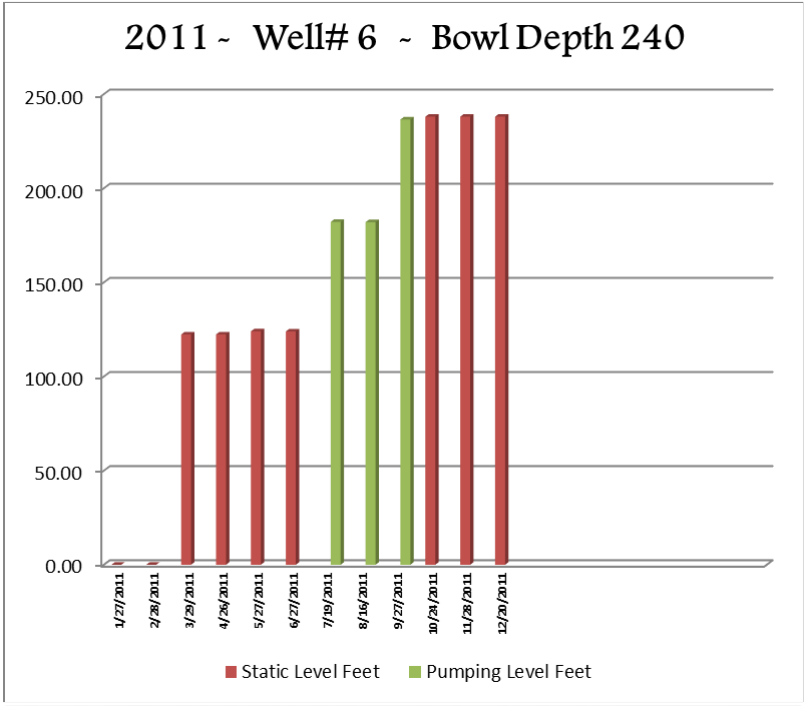

2009 - Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

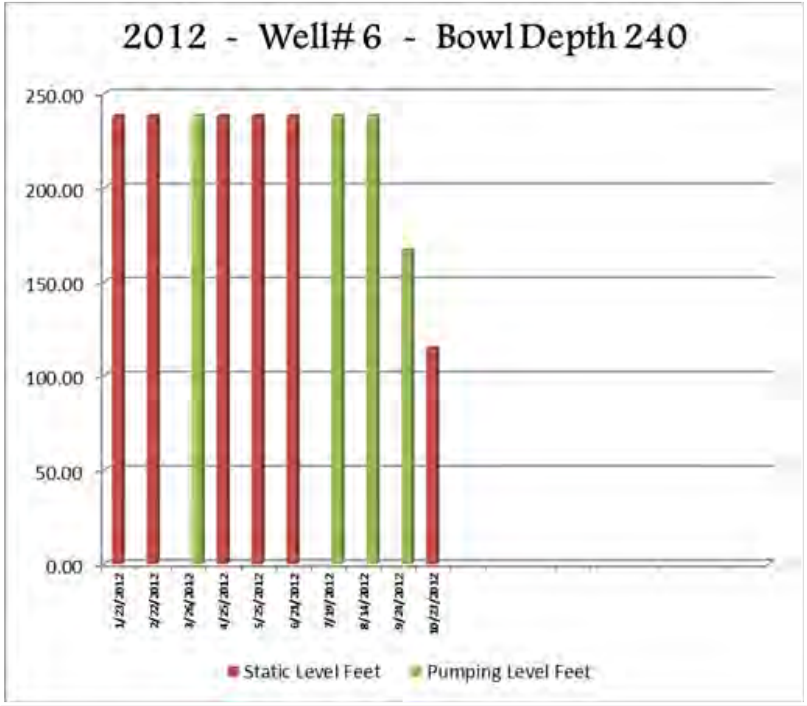

2008 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/25/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

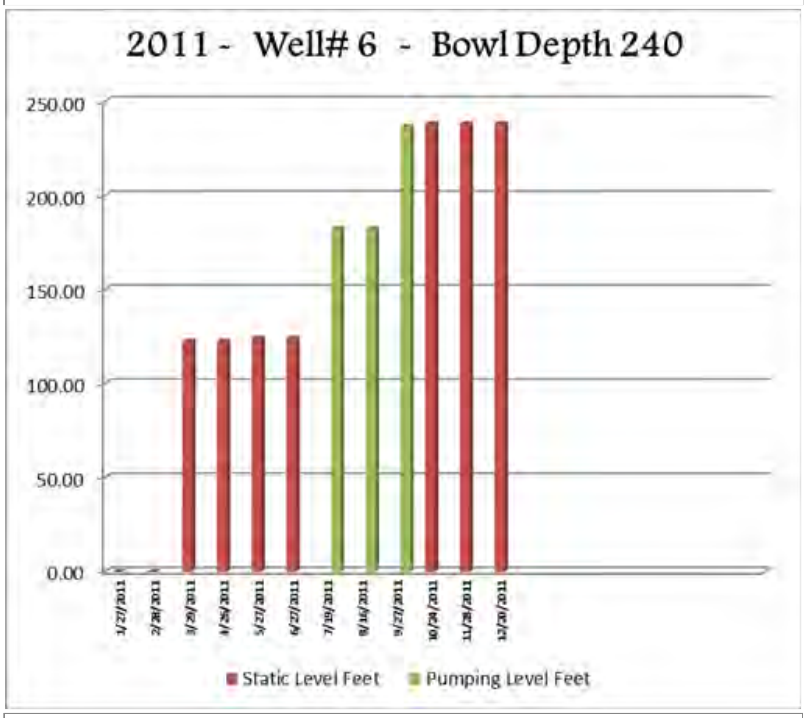

2010 - Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

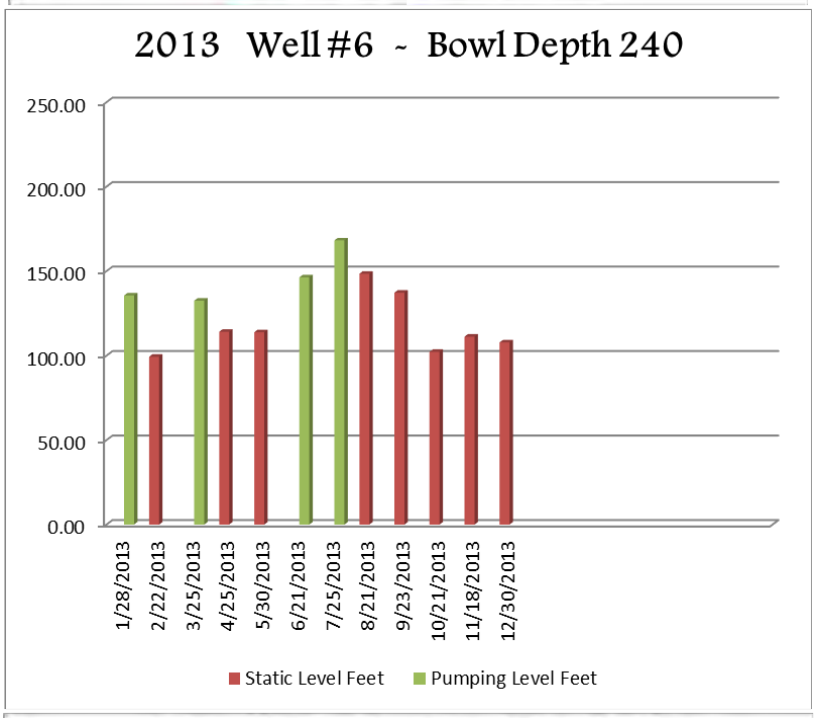

2009 - Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

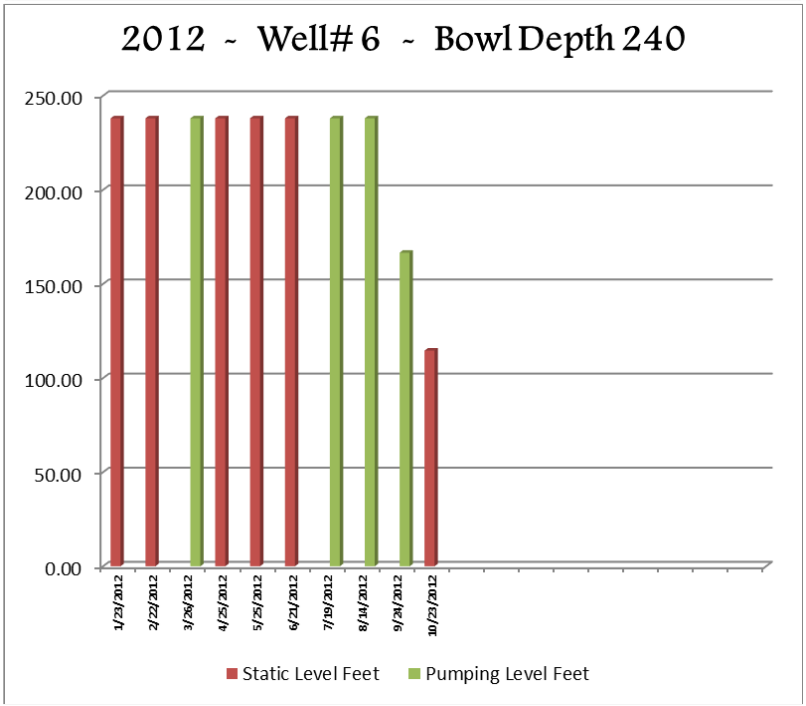

2010 - Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

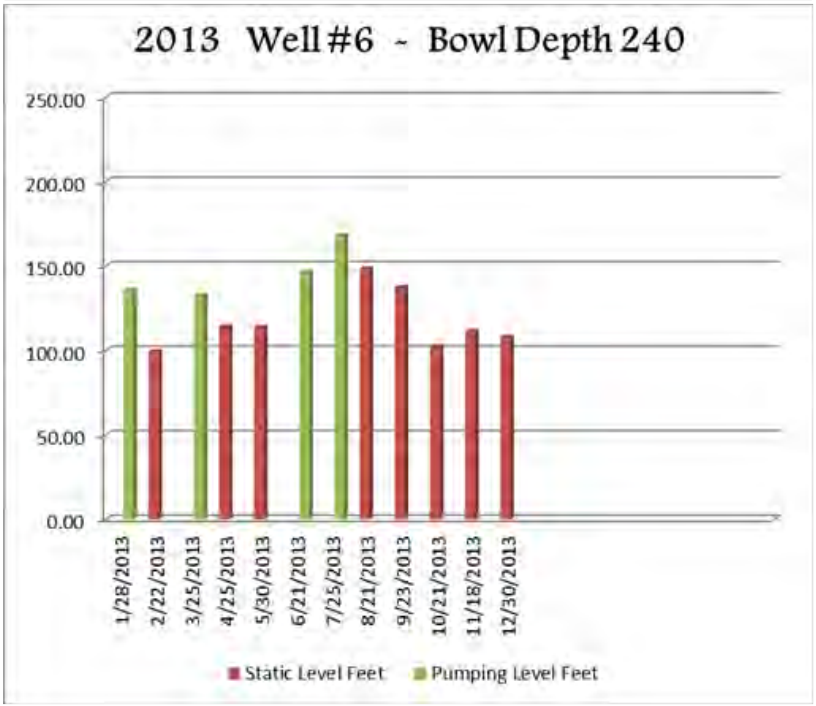

2011 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

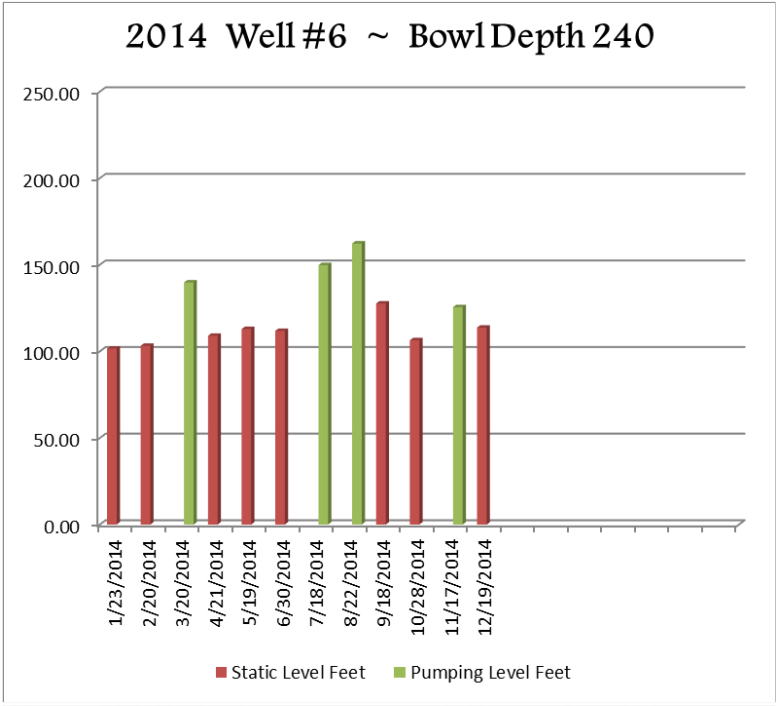

2012 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

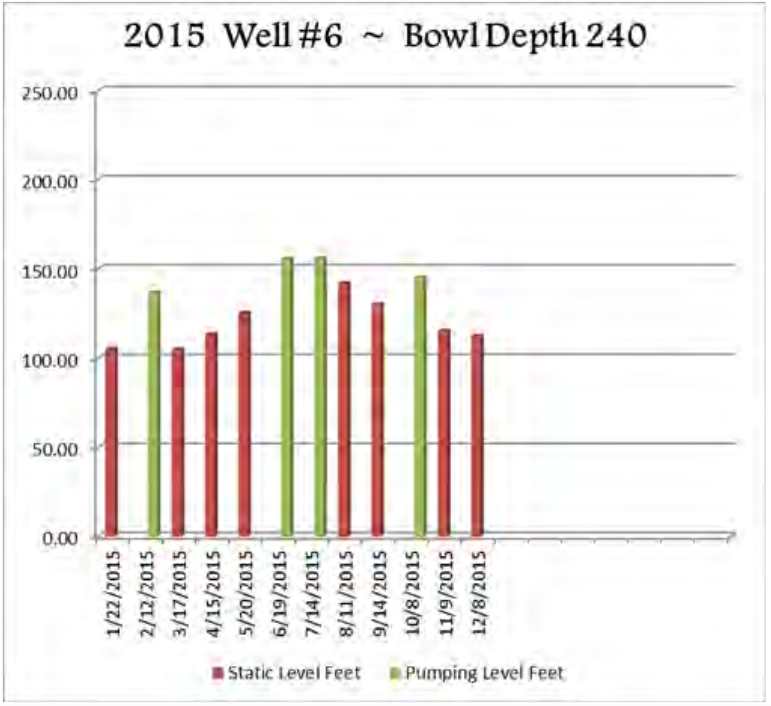

2011 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

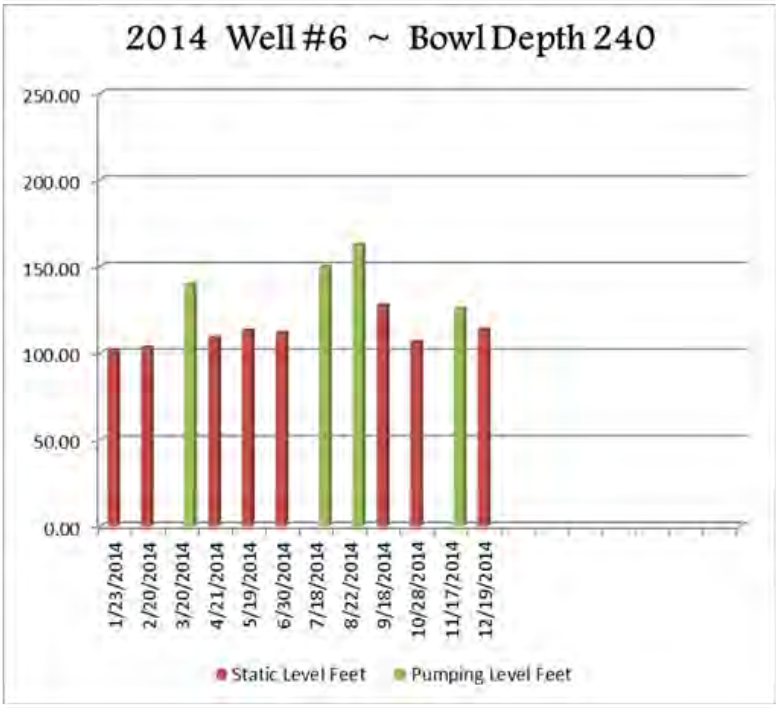

2013 Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

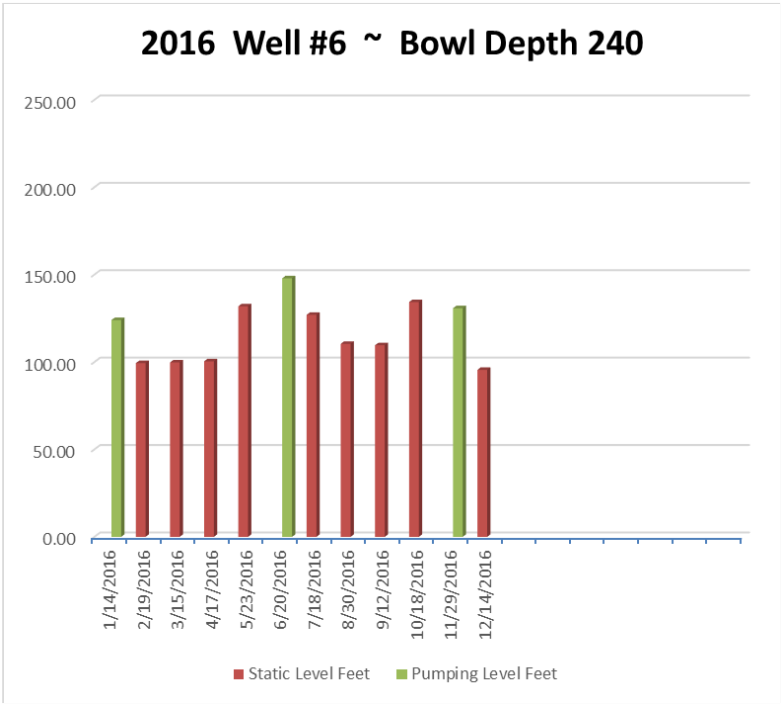

2012 - Well# 6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

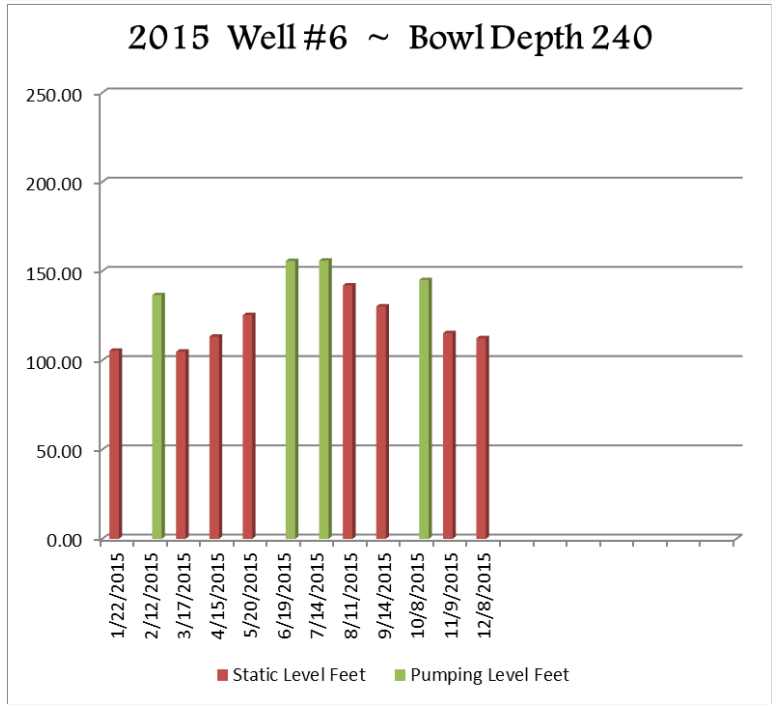

2013 Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

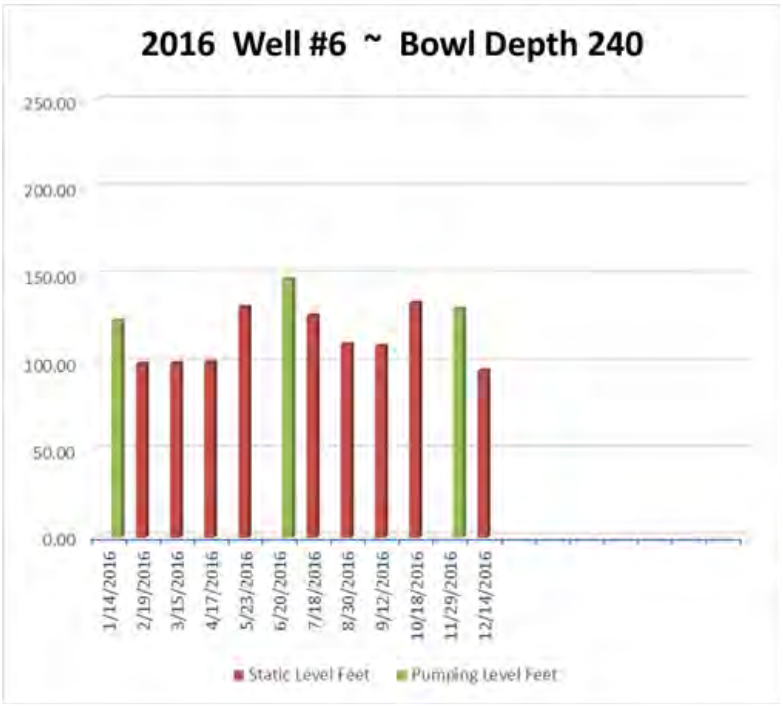

2014 Well #6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

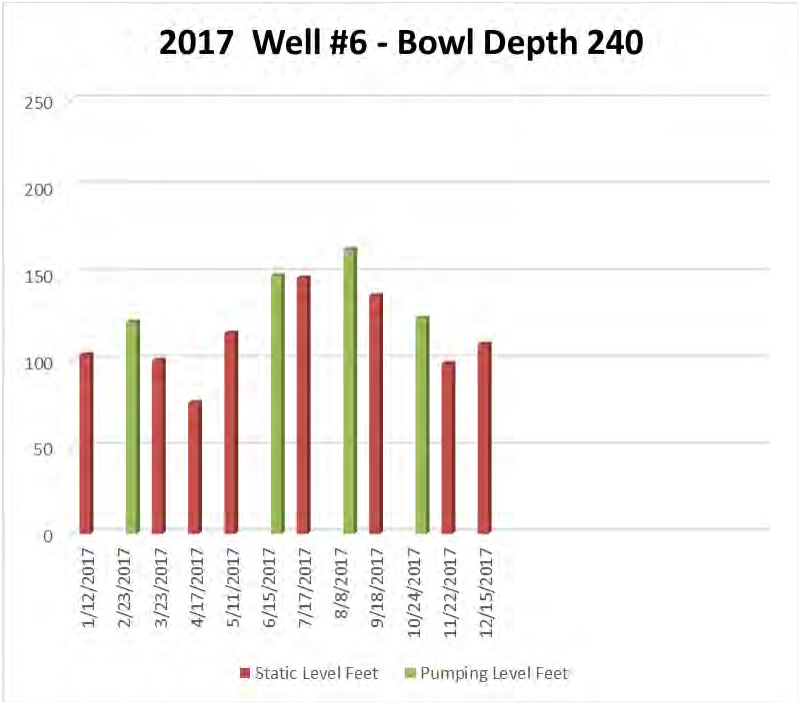

2015 Well #6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

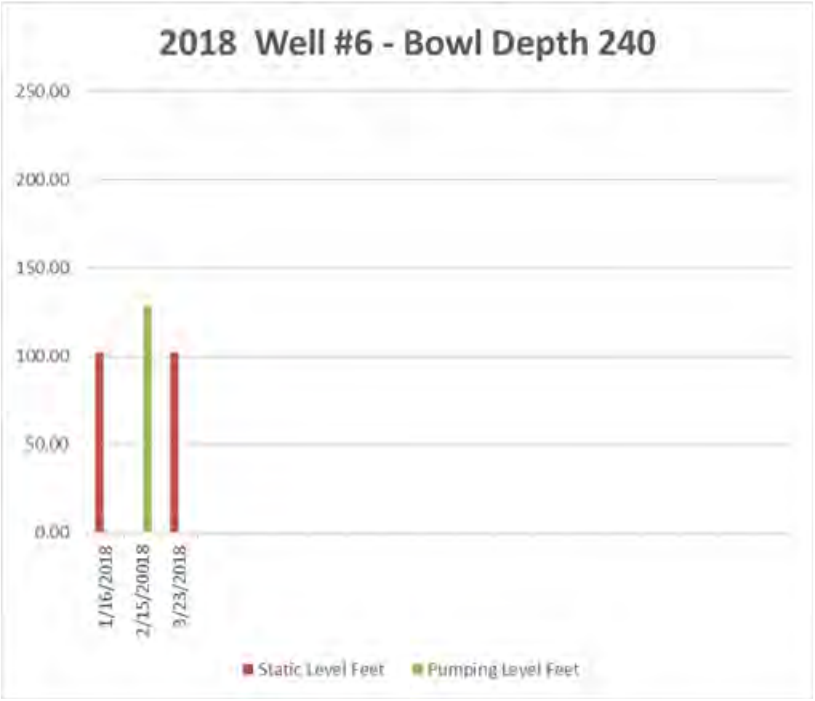

2014 Well #6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

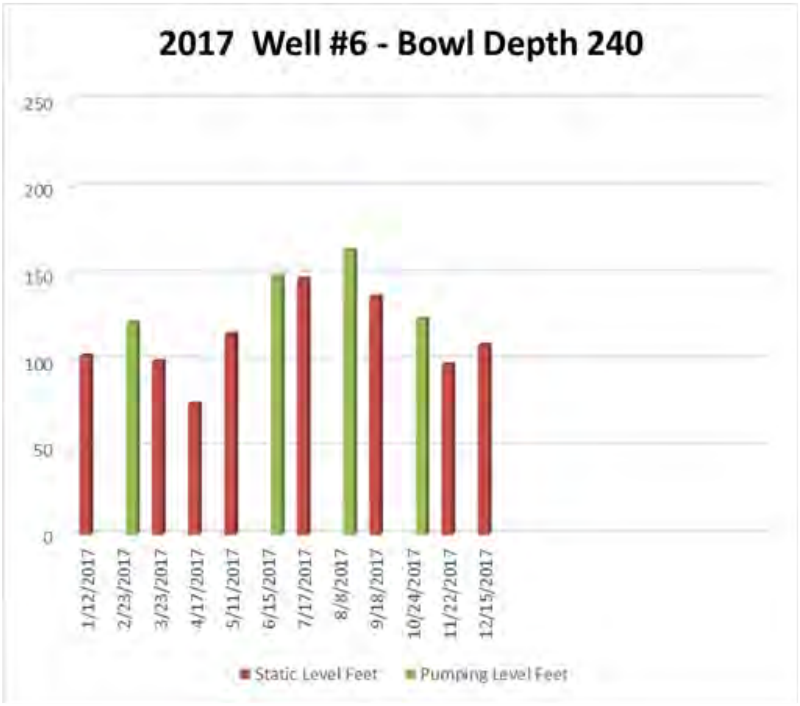

2016 Well #6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

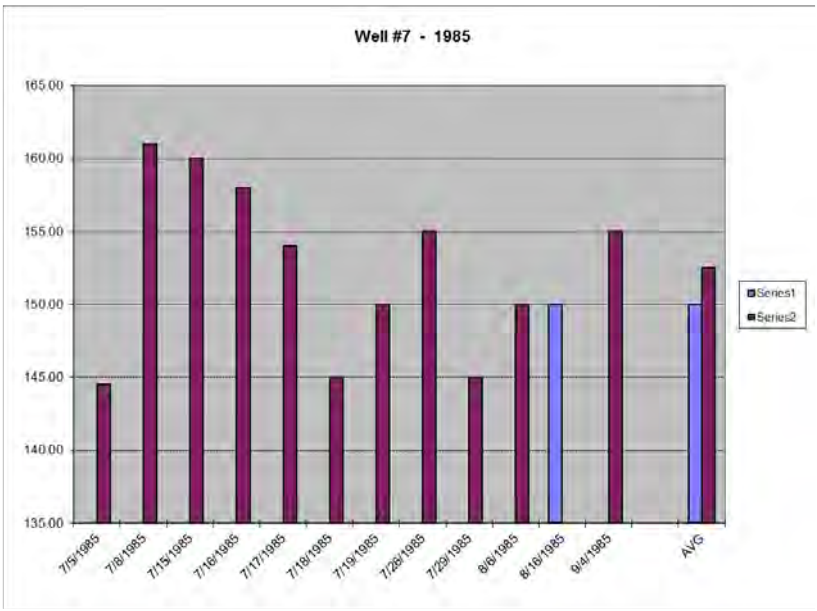

2015 Well #6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

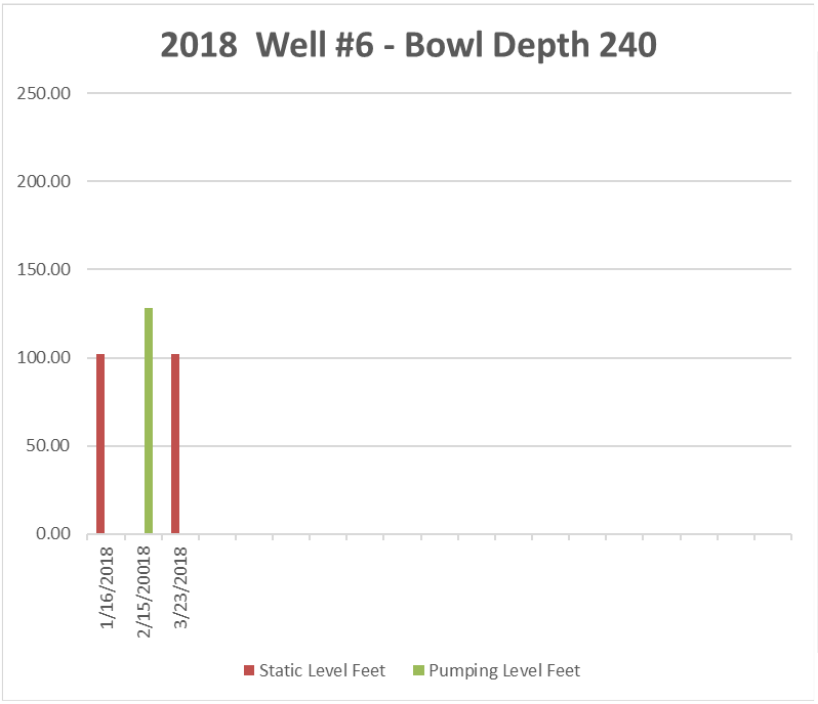

2016 Well #6 ~ Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

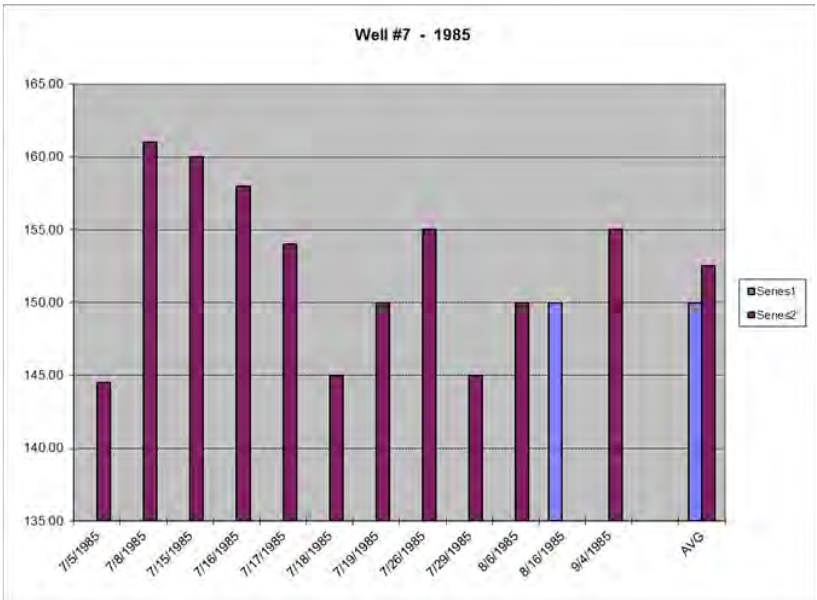

2017 Well #6 - Bowl Depth 240
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

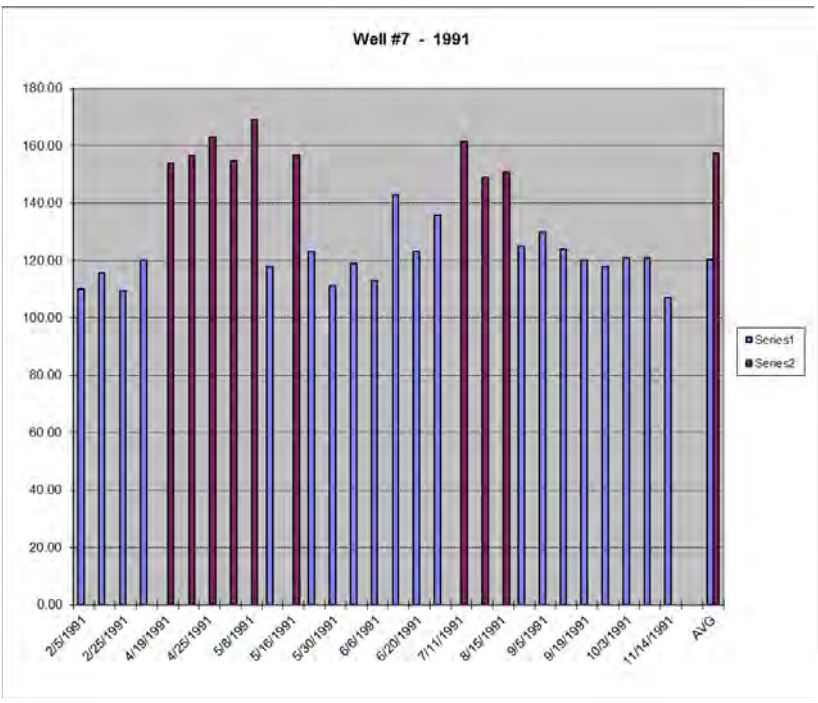

2018 Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/20018
3/23/2018
Static Level Feet
Pumping Level Feet

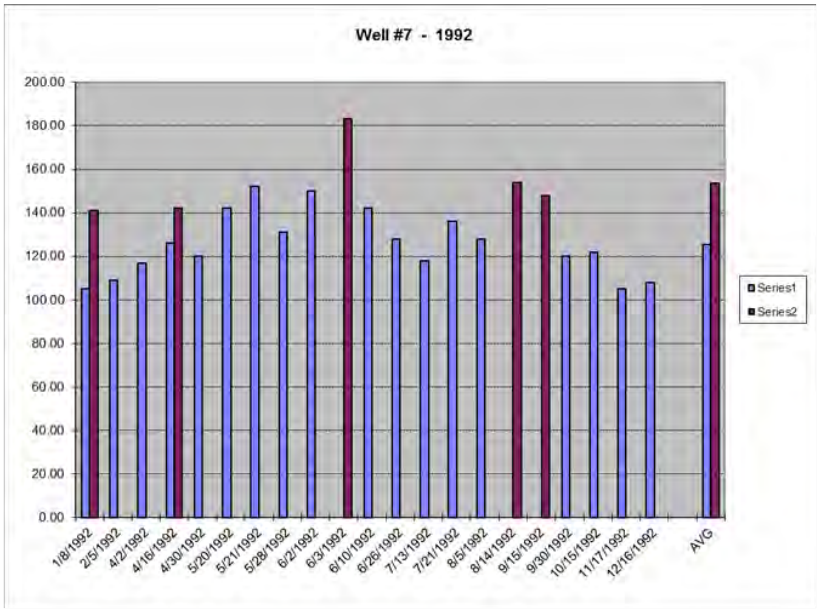

2017 Well #6 - Bowl Depth 240
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

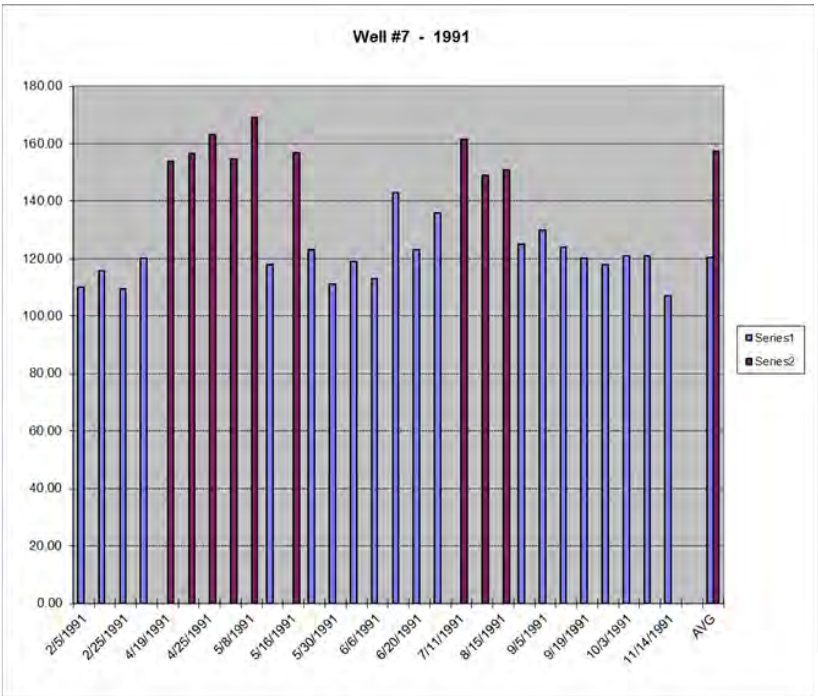

Well #7 - 1985
165.00
160.00
155.00
150.00
145.00
140.00
135.00
7/5/1985
7/8/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
7/26/1985
7/29/1985
8/6/1985
8/16/1985
9/4/1985
AVG
Series1
Series2

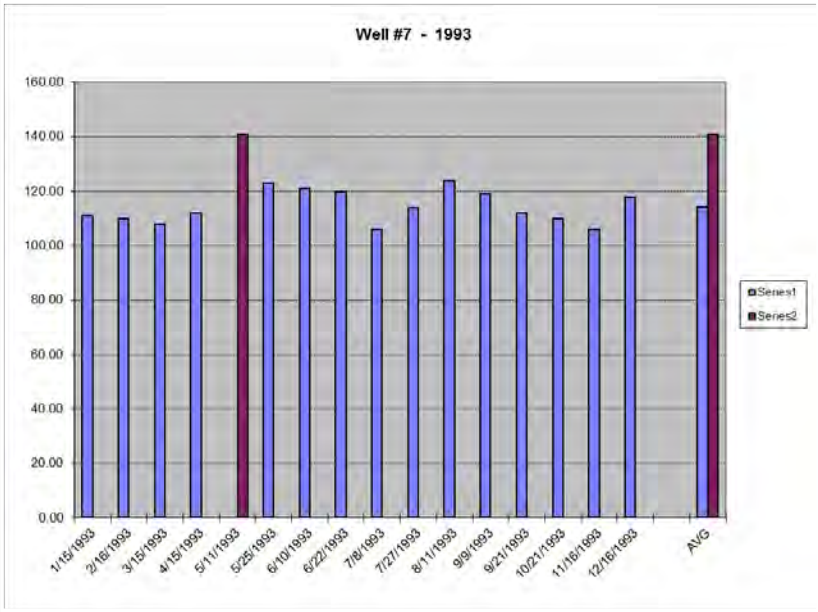

2018 Well #6 - Bowl Depth 240
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/20018
3/23/2018
Static Level Feet
Pumping Level Feet

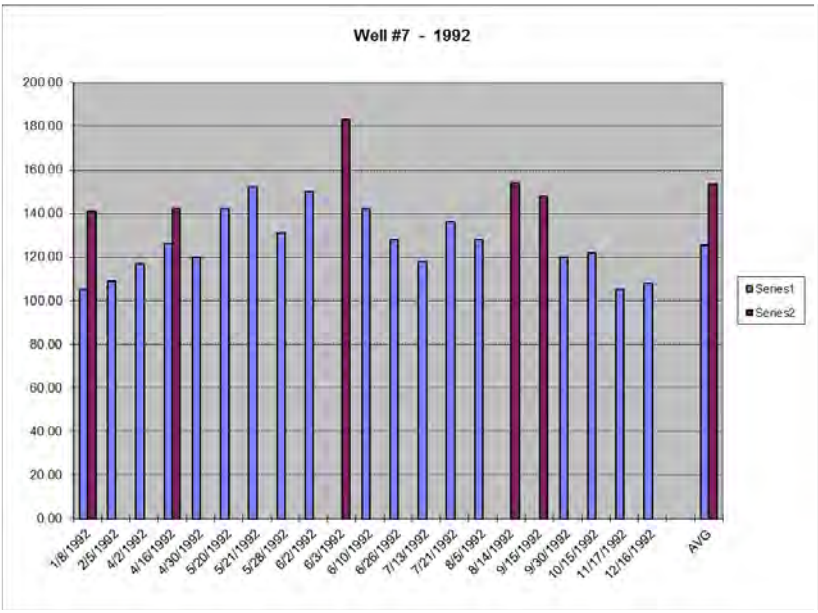

Well #7 - 1985
165.00
160.00
155.00
150.00
145.00
140.00
135.00
7/5/1985
7/8/1985
7/15/1985
7/16/1985
7/17/1985
7/18/1985
7/19/1985
7/26/1985
7/29/1985
8/6/1985
8/16/1985
9/4/1985
AVG
Series1
Series2

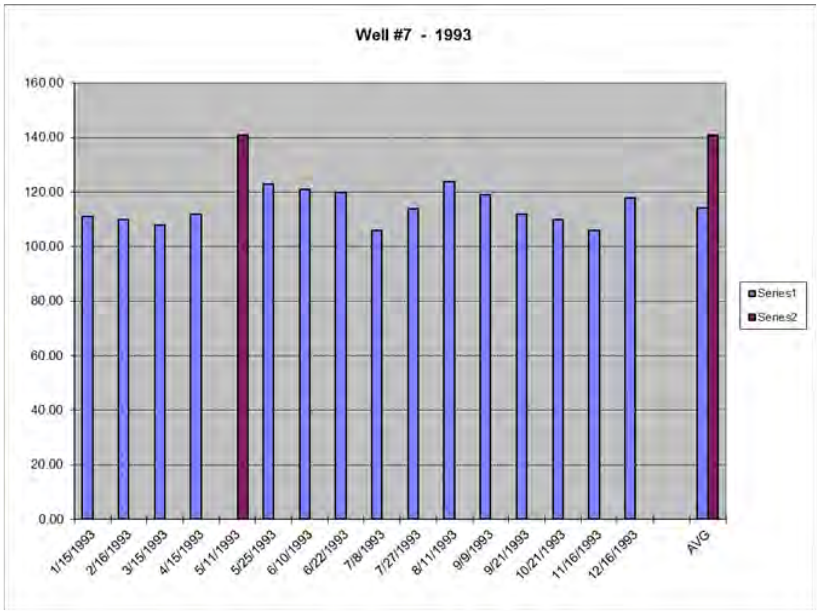

Well #7 - 1991
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/5/1991
2/25/1991
4/19/1991
4/25/1991
5/8/1991
5/16/1991
5/30/1991
6/6/1991
6/20/1991
7/11/1991
8/15/1991
9/5/1991
9/19/1991
10/3/1991
11/14/1991
AVG
Series1
Series2

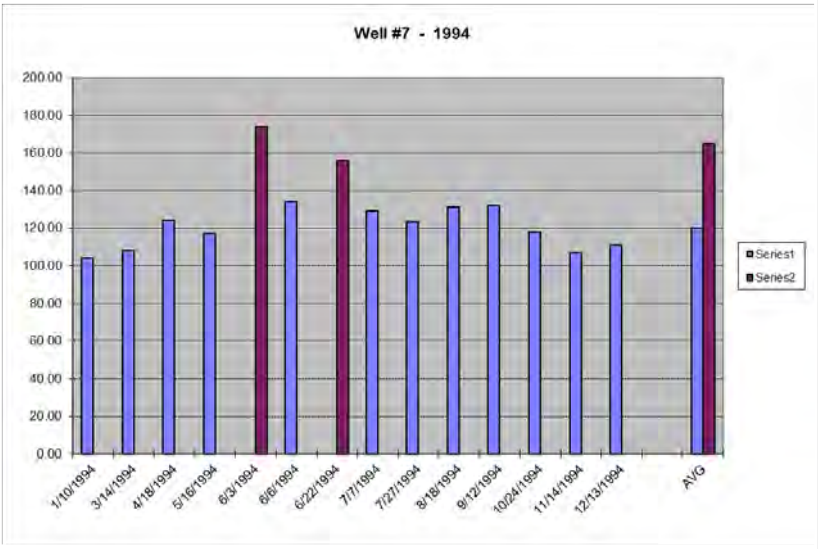

Well #7 - 1992
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/8/1992
2/5/1992
4/2/1992
4/16/1992
4/30/1992
5/20/1992
5/21/1992
5/28/1992
6/2/1992
6/3/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

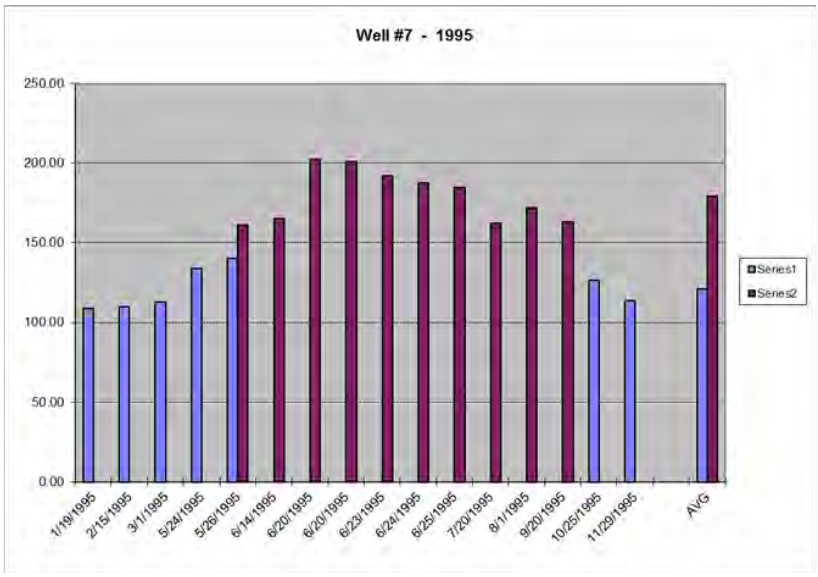

Well #7 - 1991
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/5/1991
2/25/1991
4/19/1991
4/25/1991
5/8/1991
5/16/1991
5/30/1991
6/6/1991
6/20/1991
7/11/1991
8/15/1991
9/5/1991
9/19/1991
10/3/1991
11/14/1991
AVG
Series1
Series2

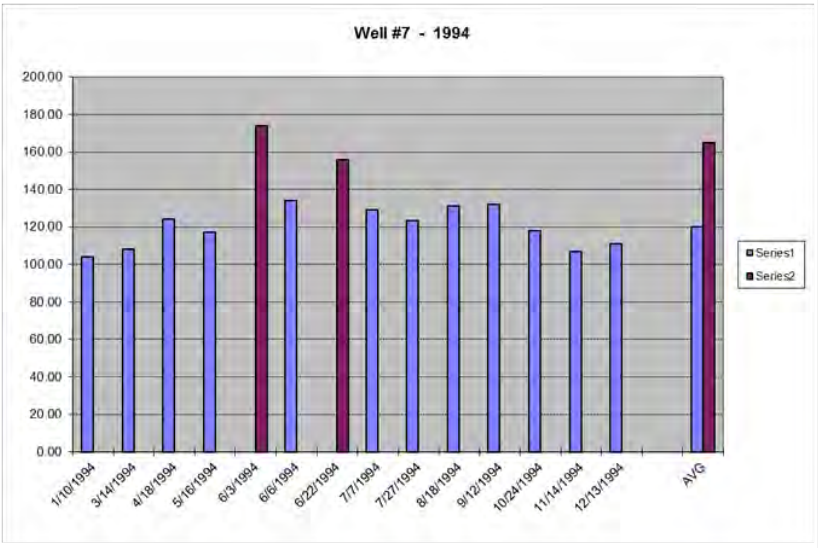

Well #7 - 1993
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1993
2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

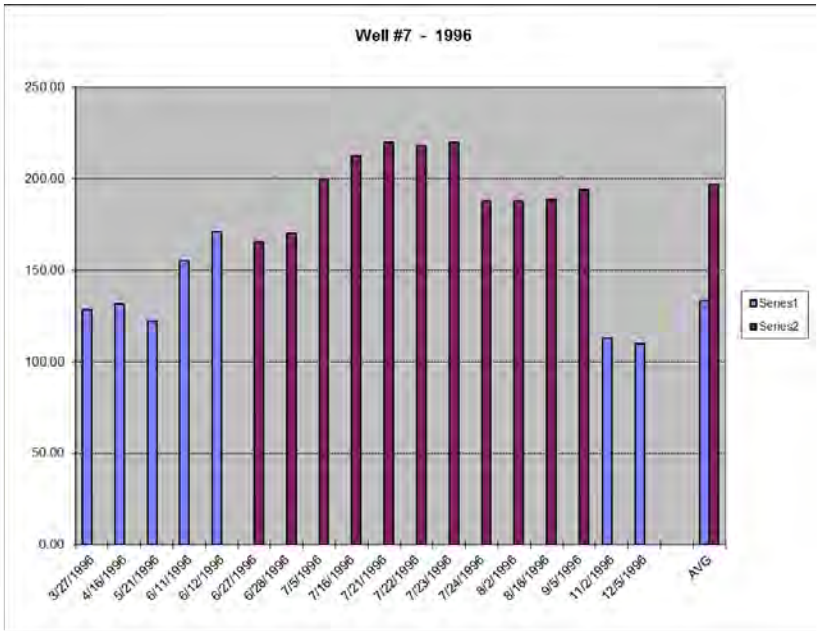

Well #7 - 1992
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/8/1992
2/5/1992
4/2/1992
4/16/1992
4/30/1992
5/20/1992
5/21/1992
5/28/1992
6/2/1992
6/3/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

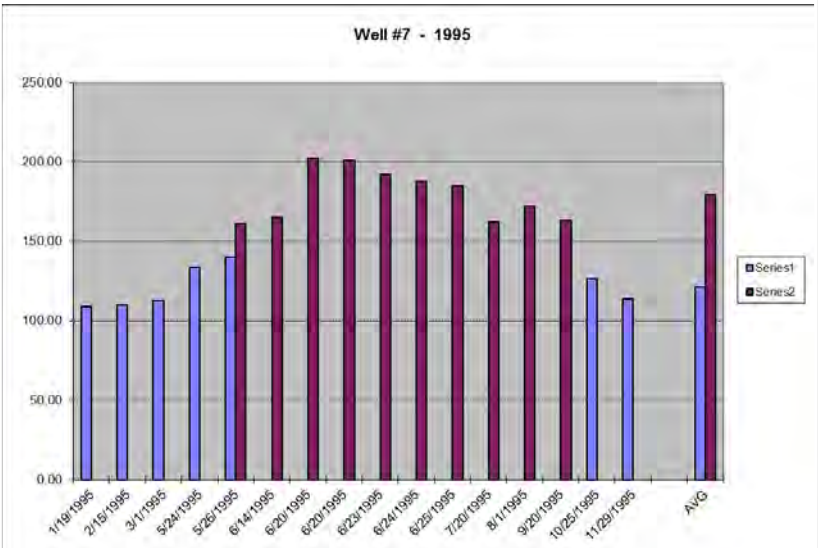

Well #7 - 1993
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1993
2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

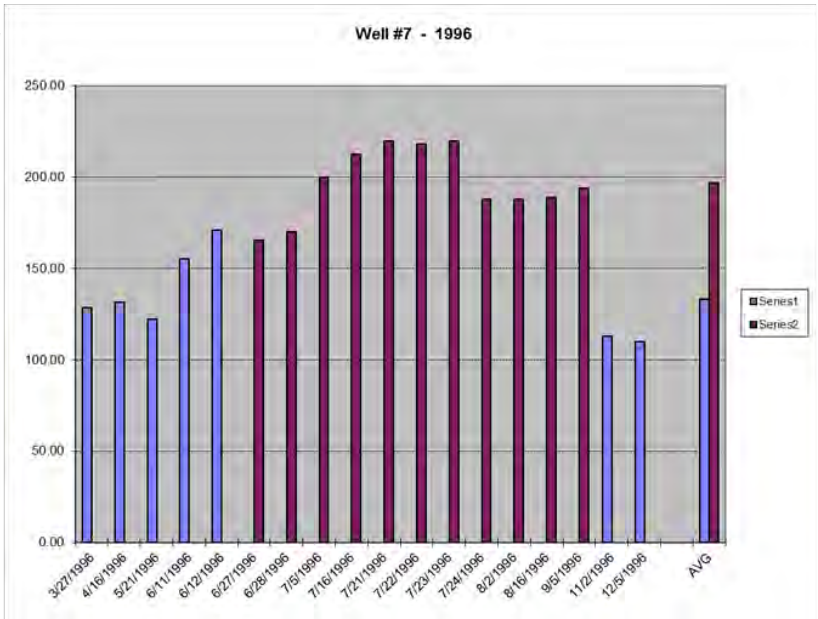

Well #7 - 1994
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
3/14/1994
4/18/1994
5/16/1994
6/3/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

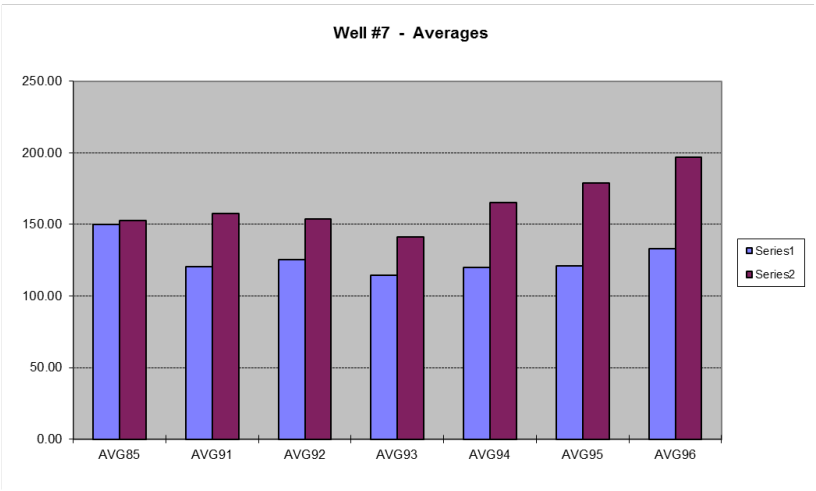

Well #7 - 1995
250.00
200.00
150.00
100.00
50.00
0.00
1/19/1995
2/15/1995
3/1/1995
5/24/1995
5/26/1995
6/14/1995
6/20/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

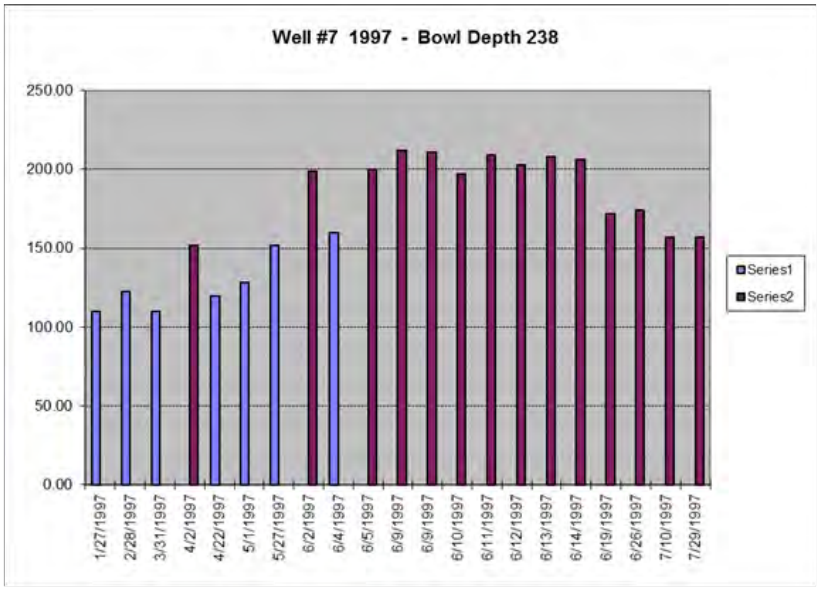

Well #7 - 1994
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
3/14/1994
4/18/1994
5/16/1994
6/3/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

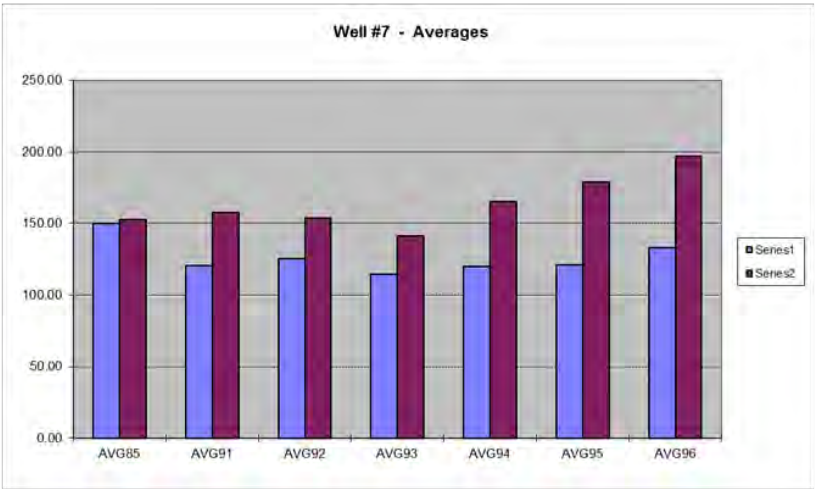

Well #7 - 1996
250.00
200.00
150.00
100.00
50.00
0.00
3/27/1996
4/16/1996
5/21/1996
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6/27/1996
6/28/1996
7/5/1996
7/16/1996
7/21/1996
7/22/1996
7/23/1996
7/24/1996
8/2/1996
8/16/1996
9/5/1996
11/2/1996
12/5/1996
AVG
Series1
Series2

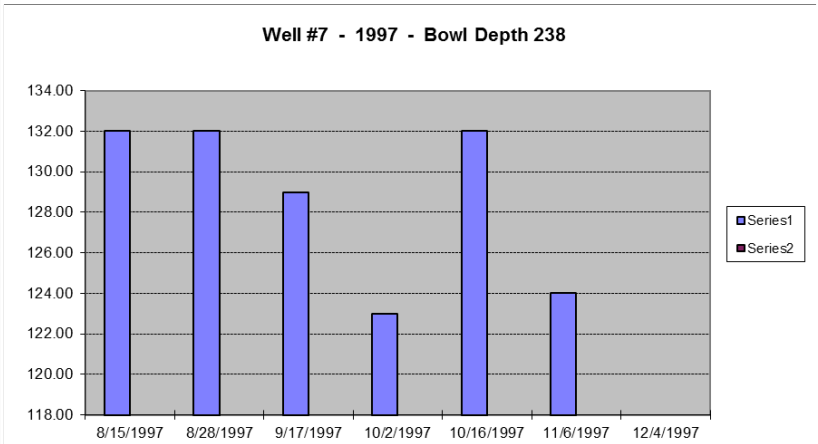

Well #7 - 1995
250.00
200.00
150.00
100.00
50.00
0.00
1/19/1995
2/15/1995
3/1/1995
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5/26/1995
6/14/1995
6/20/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

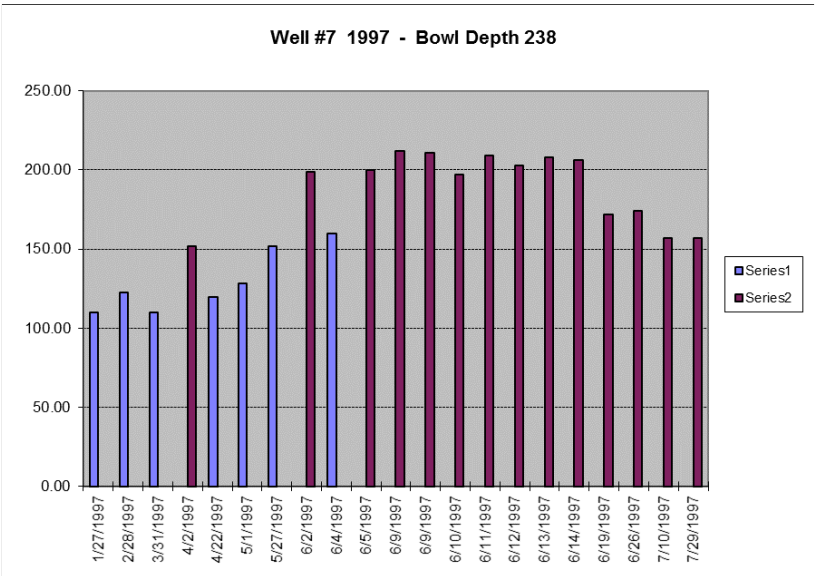

Well #7 - 1996
250.00
200.00
150.00
100.00
50.00
0.00
3/27/1996
4/16/1996
5/21/1996
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6/12/1996
6/27/1996
6/28/1996
7/5/1996
7/16/1996
7/21/1996
7/22/1996
7/23/1996
7/24/1996
8/2/1996
8/16/1996
9/5/1996
11/2/1996
12/5/1996
AVG
Series1
Series2

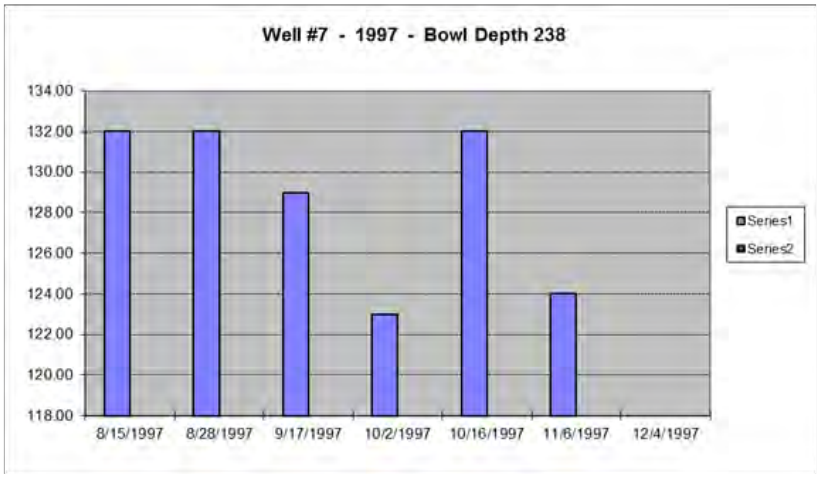

Well #7 - Averages
250.00
200.00
150.00
100.00
50.00
0.00
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

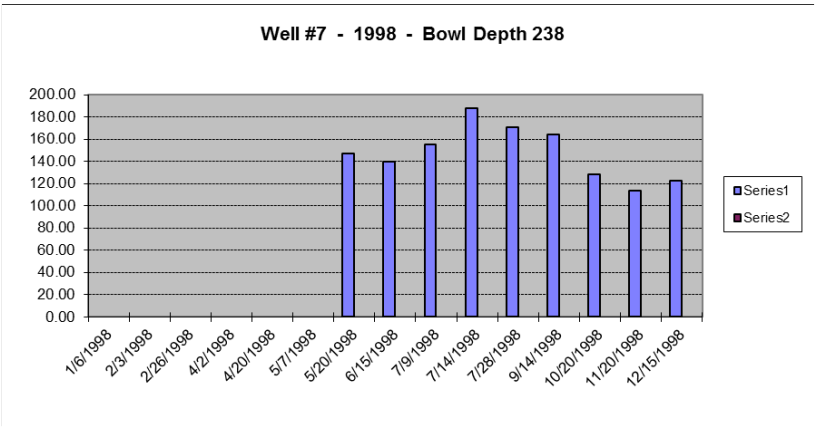

Well #7 1997 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
2/28/1997
3/31/1997
4/2/1997
4/22/1997
5/1/1997
5/27/1997
6/2/1997
6/4/1997
6/5/1997
6/9/1997
6/9/1997
6/10/1997
6/11/1997
6/12/1997
6/13/1997
6/14/1997
6/19/1997
6/26/1997
7/10/1997
7/29/1997
Series1
Series2

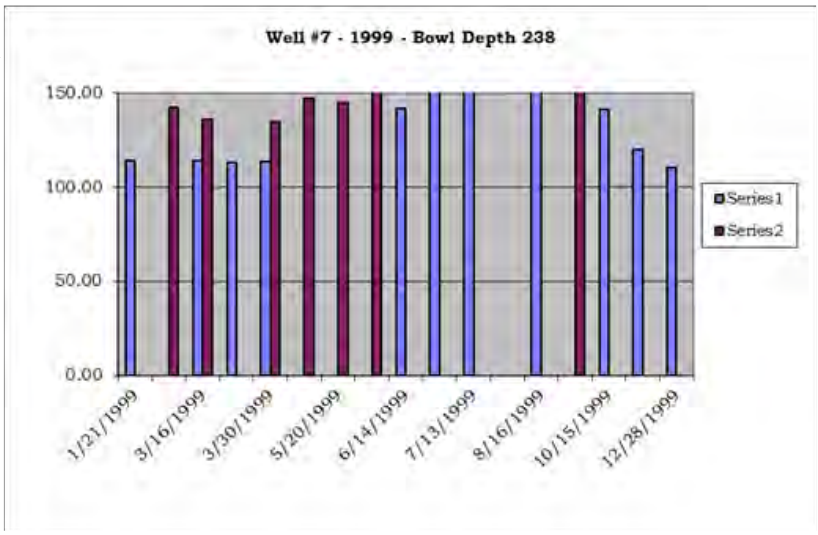

Well #7 - Averages
250.00
200.00
150.00
100.00
50.00
0.00
AVG85
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

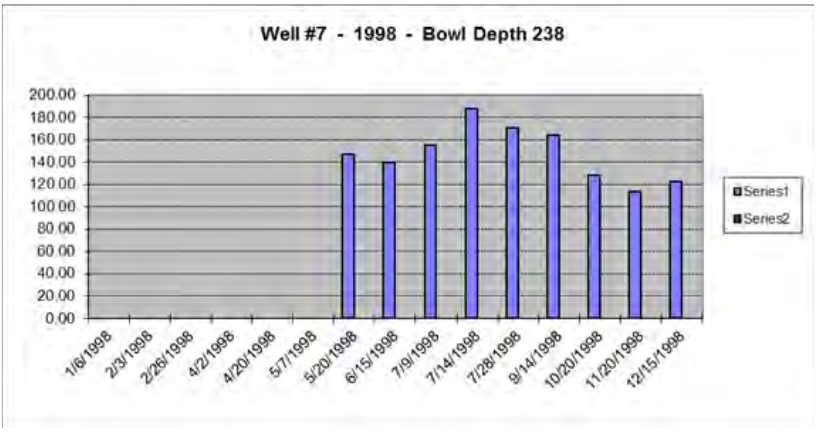

Well #7 - 1997 - Bowl Depth 238
134.00
132.00
130.00
128.00
126.00
124.00
122.00
120.00
118.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

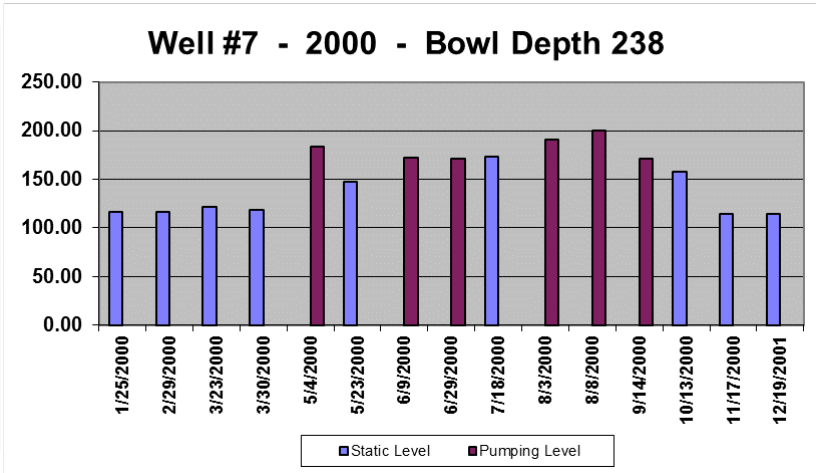

Well #7 1997 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
2/28/1997
3/31/1997
4/2/1997
4/22/1997
5/1/1997
5/27/1997
6/2/1997
6/4/1997
6/5/1997
6/9/1997
6/9/1997
6/10/1997
6/11/1997
6/12/1997
6/13/1997
6/14/1997
6/19/1997
6/26/1997
7/10/1997
7/29/1997
Series1
Series2

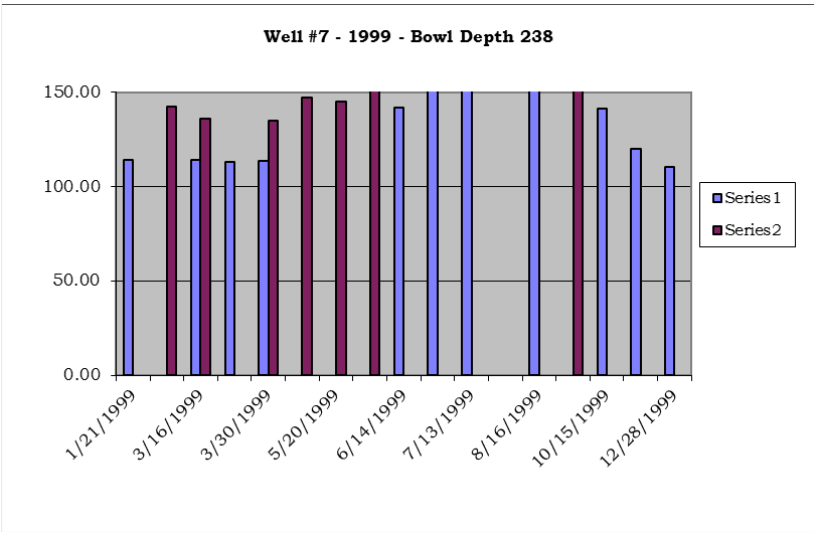

Well #7 - 1997 - Bowl Depth 238
134.00
132.00
130.00
128.00
126.00
124.00
122.00
120.00
118.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

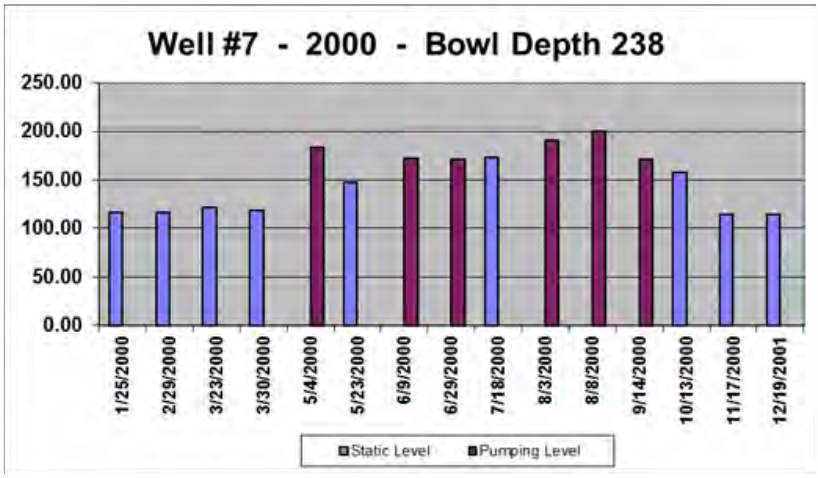

Well #7 - 1998 - Bowl Depth 238
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/14/1998
7/28/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

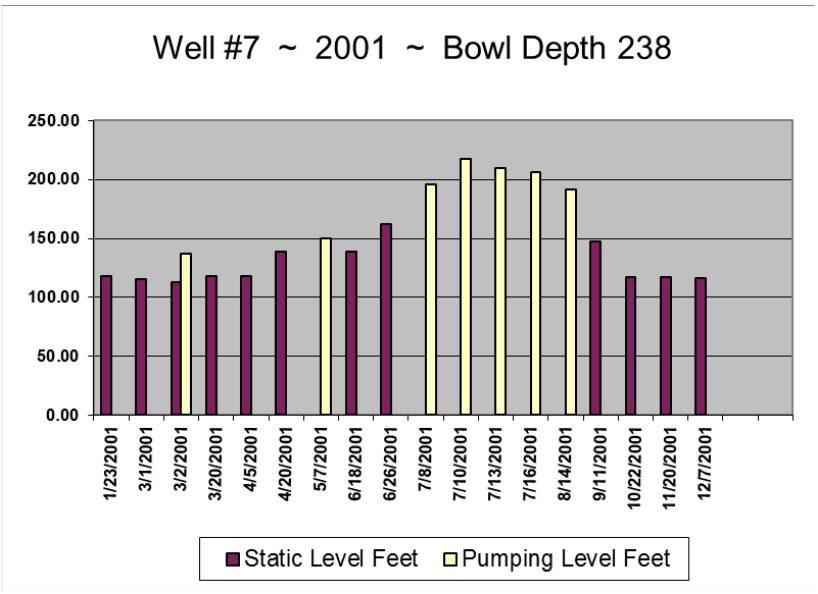

Well #7 - 1999 - Bowl Depth 238
150.00
100.00
50.00
0.00
1/21/1999
3/16/1999
3/30/1999
5/20/1999
6/14/1999
7/13/1999
8/16/1999
10/15/1999
12/28/1999
Series1
Series2

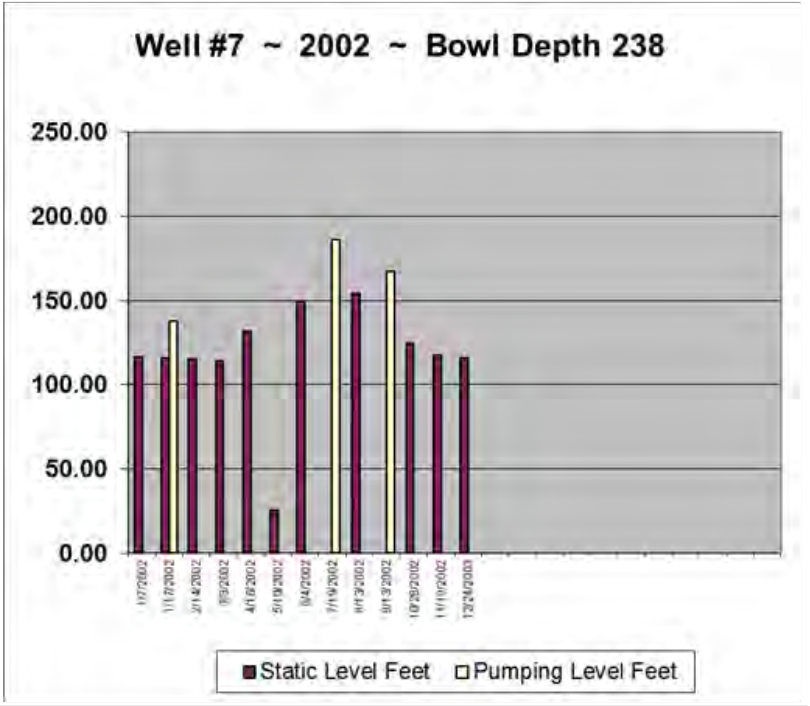

Well #7 - 1998 - Bowl Depth 238
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/14/1998
7/28/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

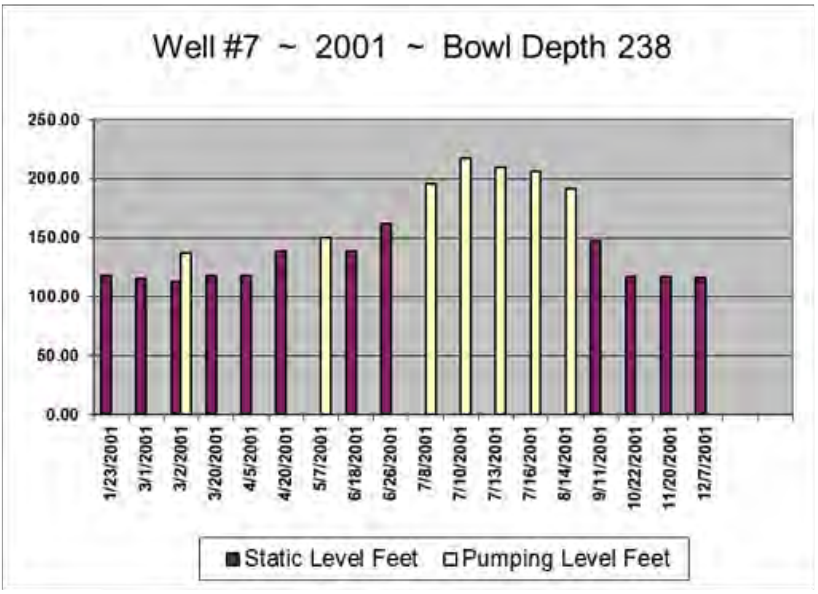

Well #7 - 2000 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/23/2000
3/30/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

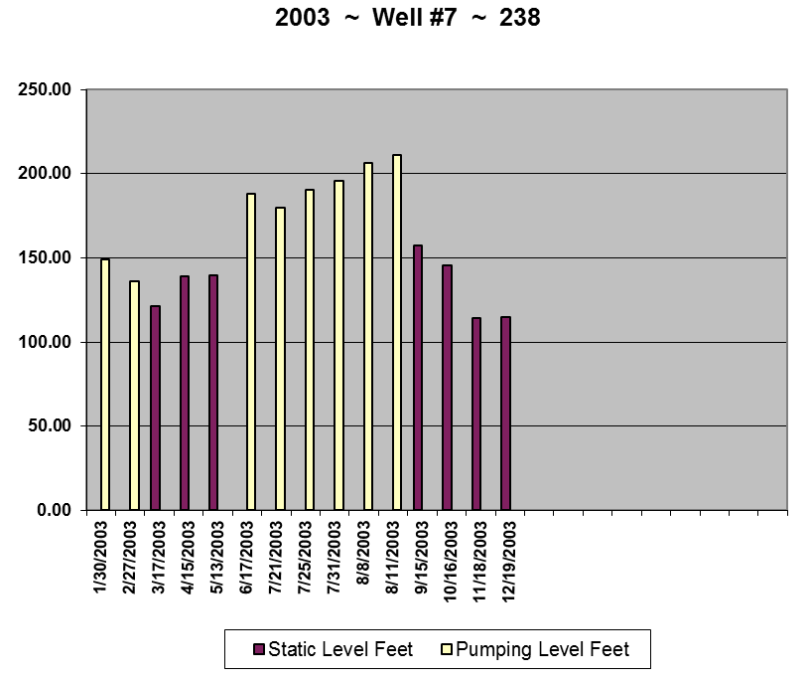

Well #7 - 1999 - Bowl Depth 238
150.00
100.00
50.00
0.00
1/21/1999
3/16/1999
3/30/1999
5/20/1999
6/14/1999
7/13/1999
8/16/1999
10/15/1999
12/28/1999
Series1
Series2

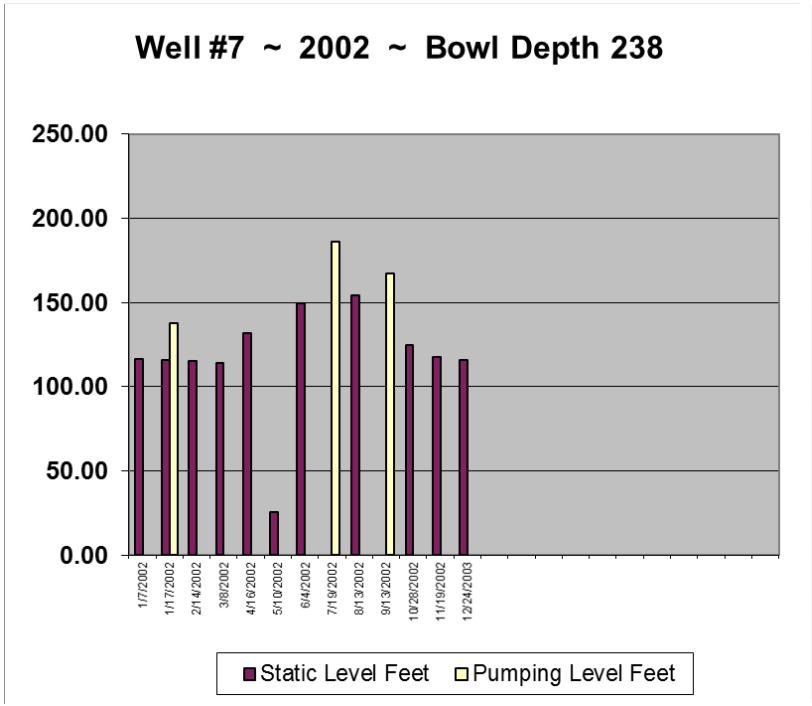

Well #7 - 2000 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/29/2000
3/23/2000
3/30/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

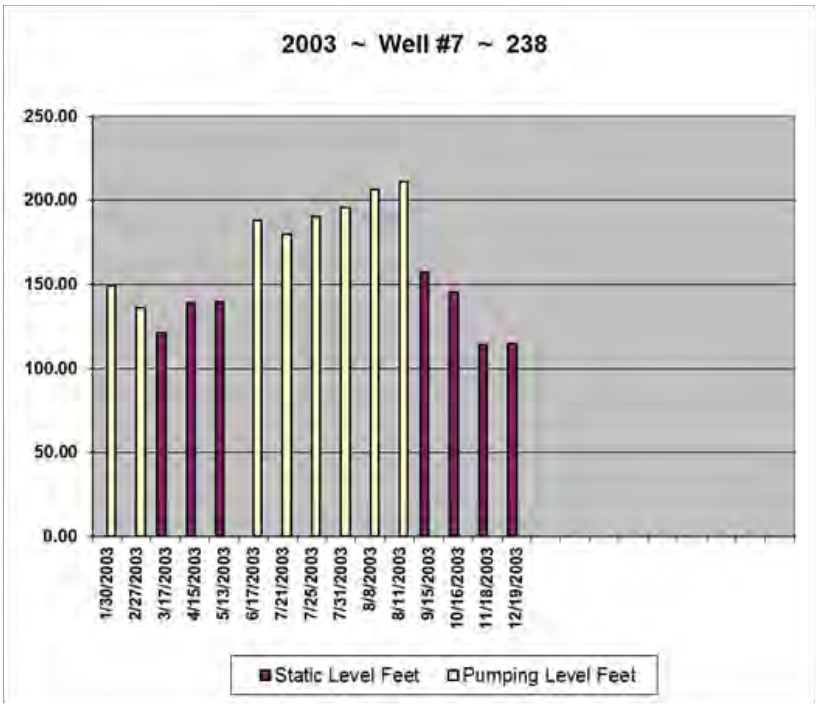

Well #7 ~ 2001 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
3/2/2001
3/20/2001
4/5/2001
4/20/2001
5/7/2001
6/18/2001
6/26/2001
7/8/2001
7/10/2001
7/13/2001
7/16/2001
8/14/2001
9/11/2001
10/22/2001
11/20/2001
12/7/2001
Static Level Feet
Pumping Level Feet

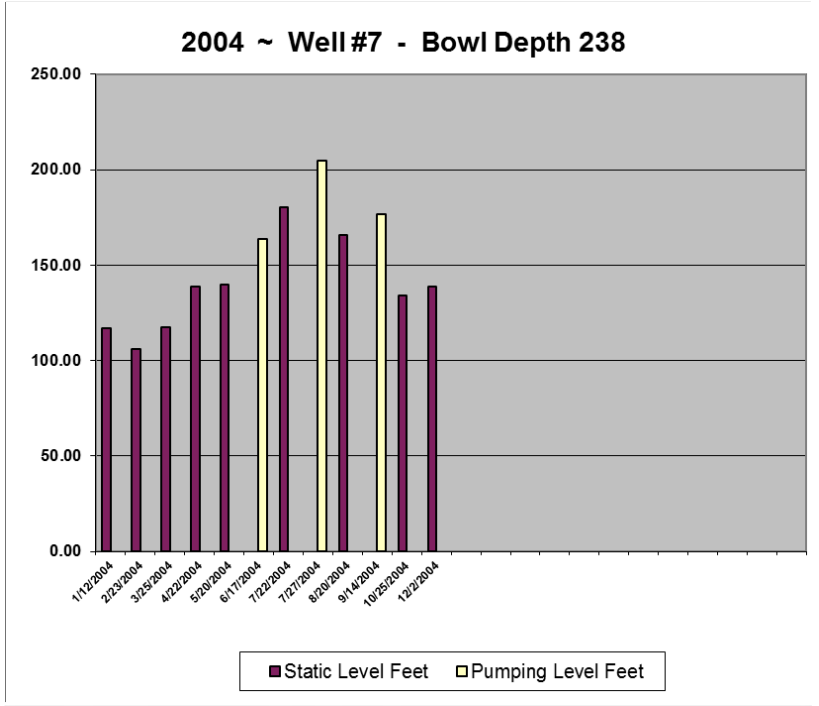

Well #7 ~ 2002 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

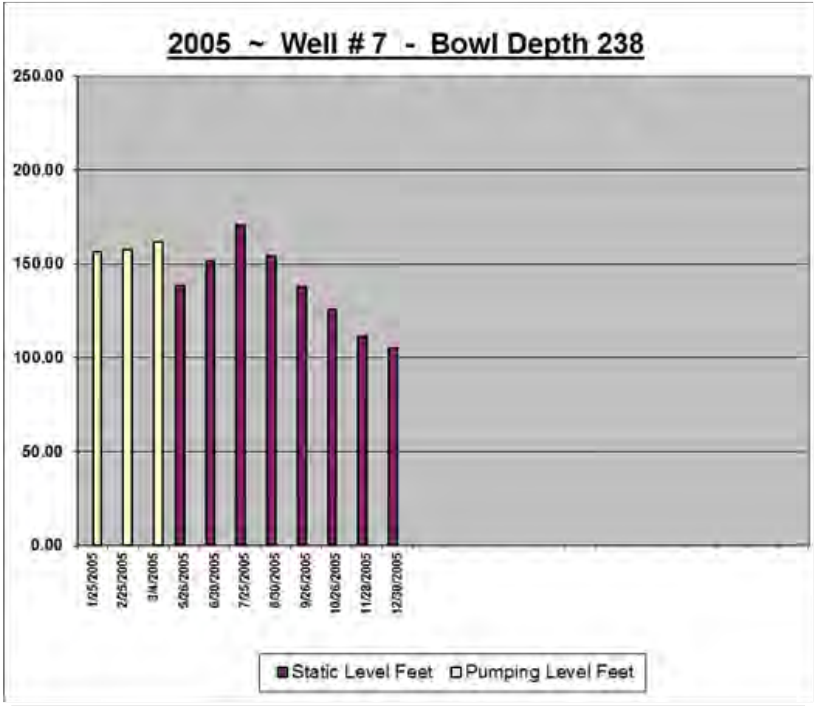

Well #7 ~ 2001 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
3/2/2001
3/20/2001
4/5/2001
4/20/2001
5/7/2001
6/18/2001
6/26/2001
7/8/2001
7/10/2001
7/13/2001
7/16/2001
8/14/2001
9/11/2001
10/22/2001
11/20/2001
12/7/2001
Static Level Feet
Pumping Level Feet

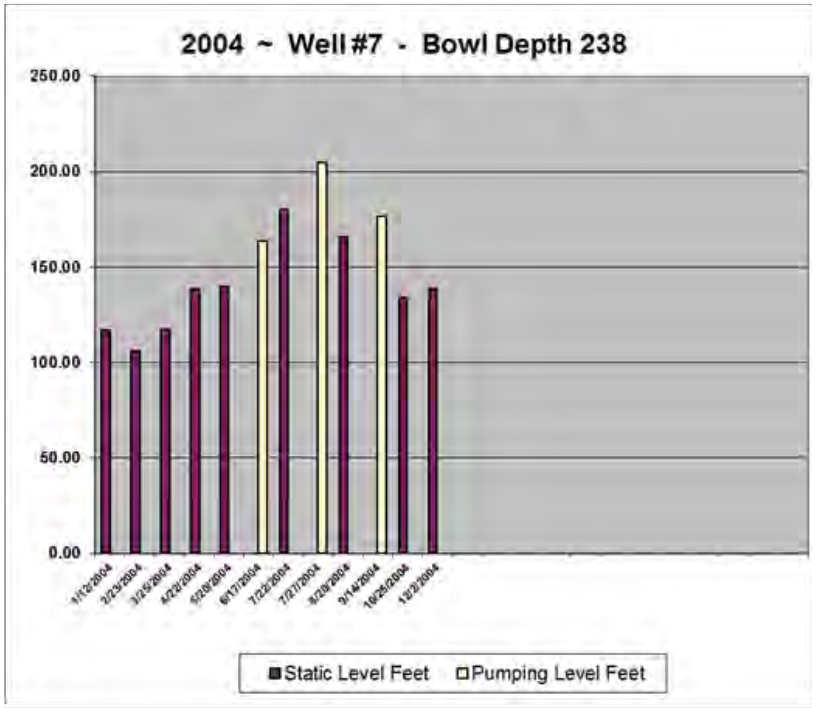

2003 ~ Well #7 ~ 238
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
2/27/2003
3/17/2003
4/15/2003
5/13/2003
6/17/2003
7/21/2003
7/25/2003
7/31/2003
8/8/2003
8/11/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet

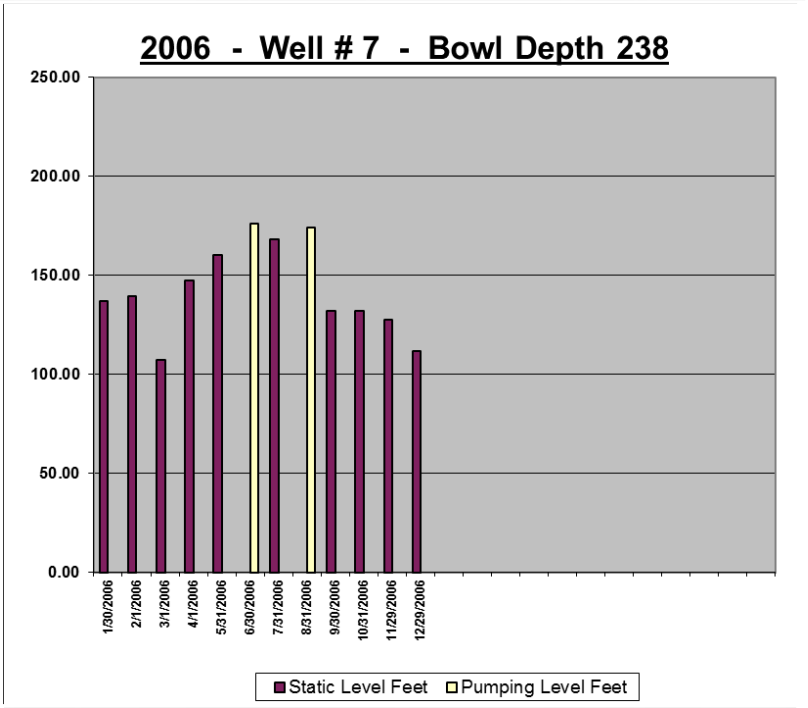

Well #7 ~ 2002 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
1/17/2002
2/14/2002
3/8/2002
4/18/2002
5/10/2002
6/4/2002
7/19/2002
8/13/2002
9/13/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

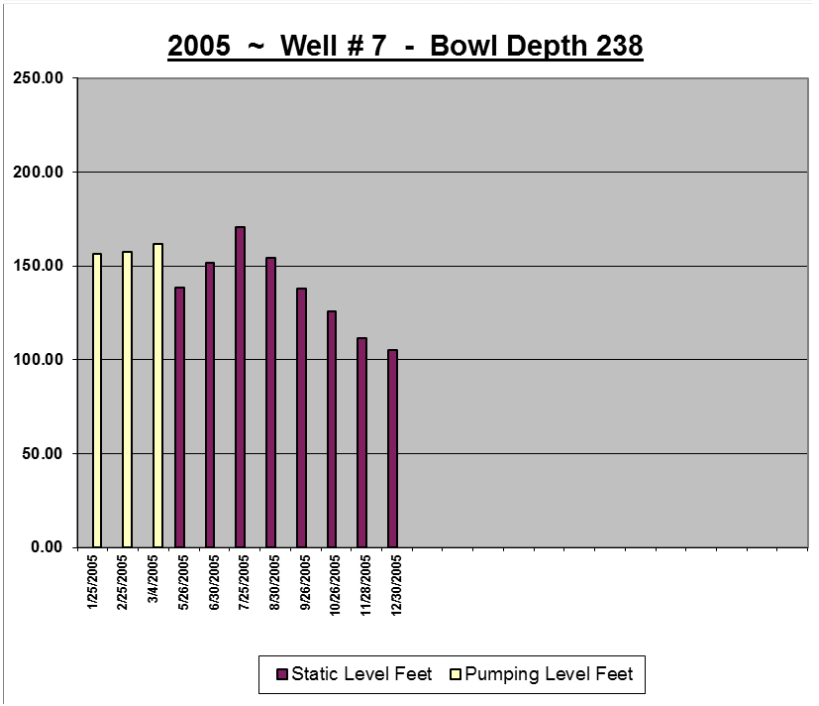

2003 ~ Well #7 ~ 238
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
2/27/2003
3/17/2003
4/15/2003
5/13/2003
6/17/2003
7/21/2003
7/25/2003
7/31/2003
8/8/2003
8/11/2003
9/15/2003
10/16/2003
11/18/2003
12/19/2003
Static Level Feet
Pumping Level Feet

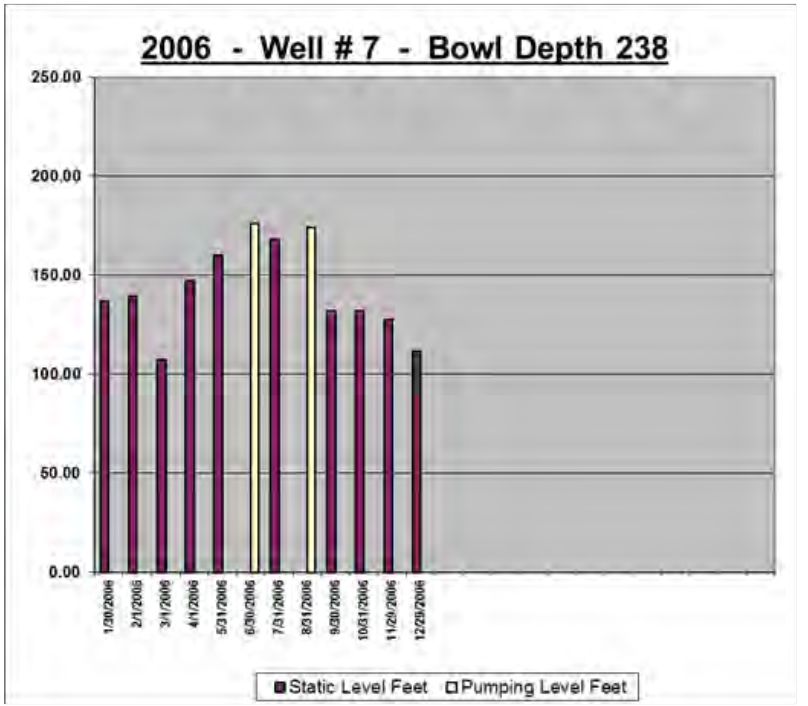

2004 ~ Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
7/27/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

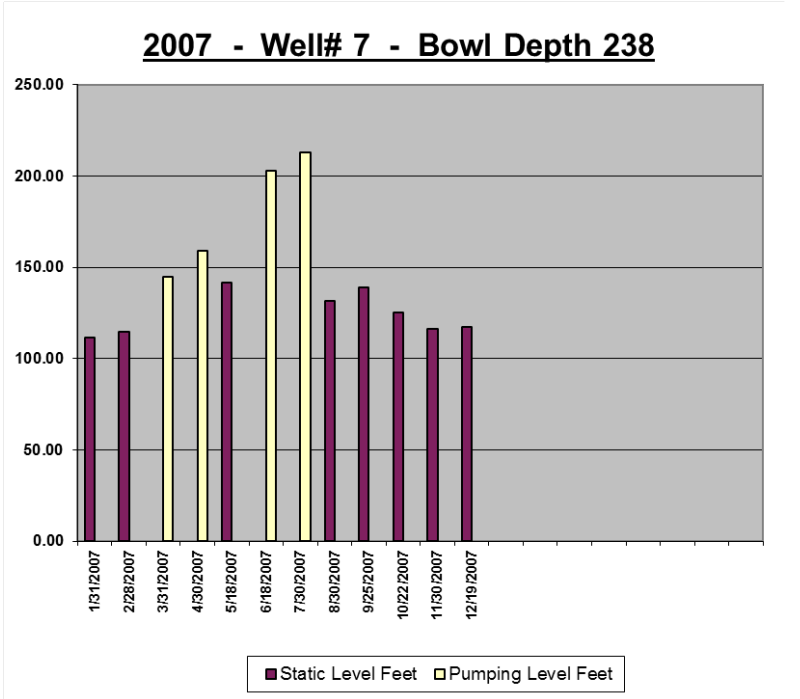

2005 ~ Well # 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

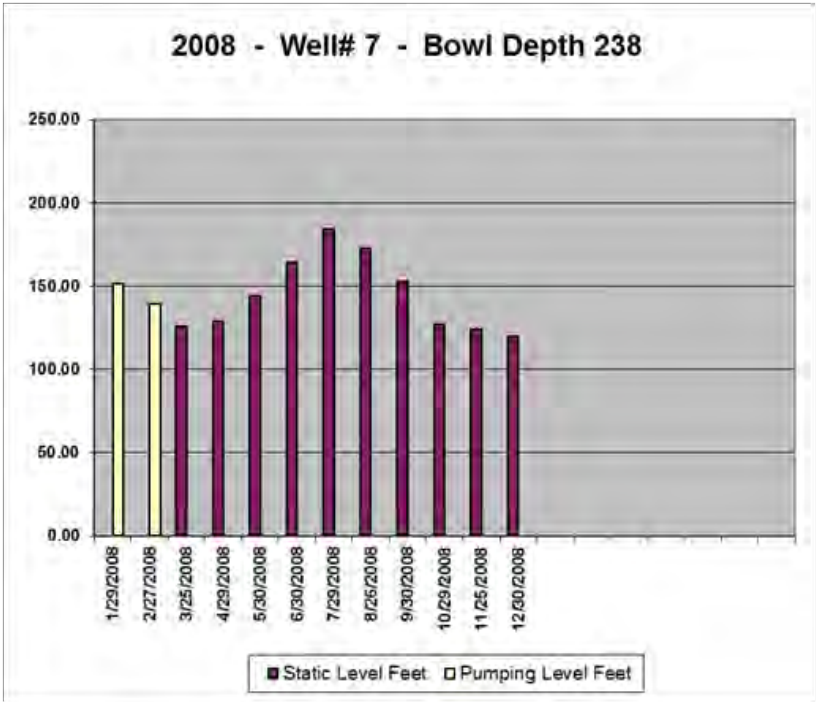

2004 ~ Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
7/27/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

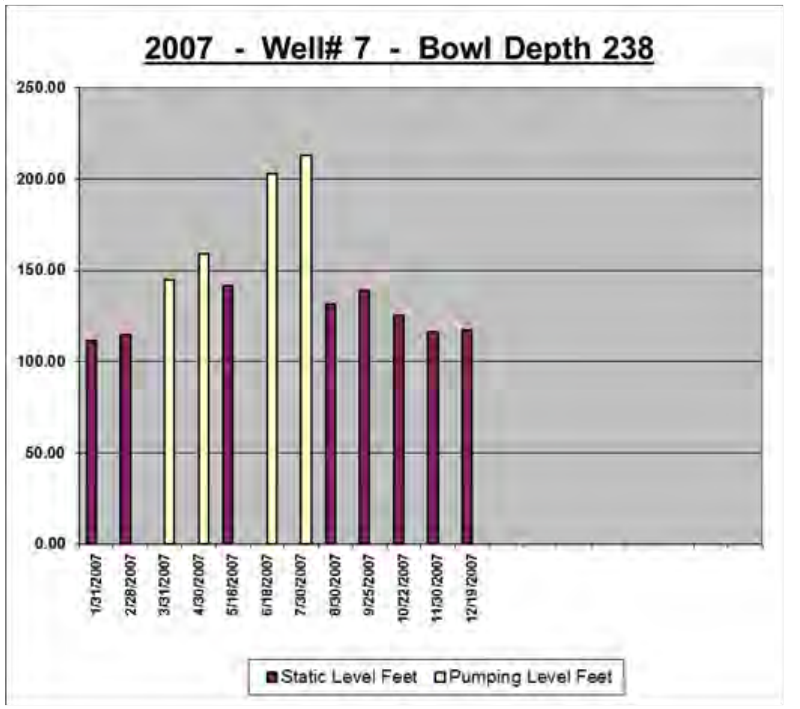

2006 - Well # 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

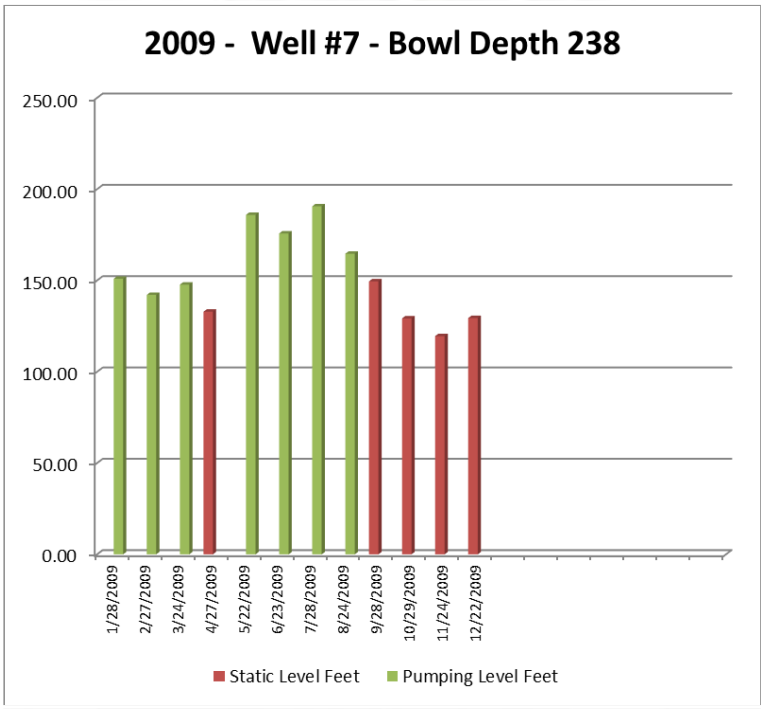

2005 ~ Well # 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

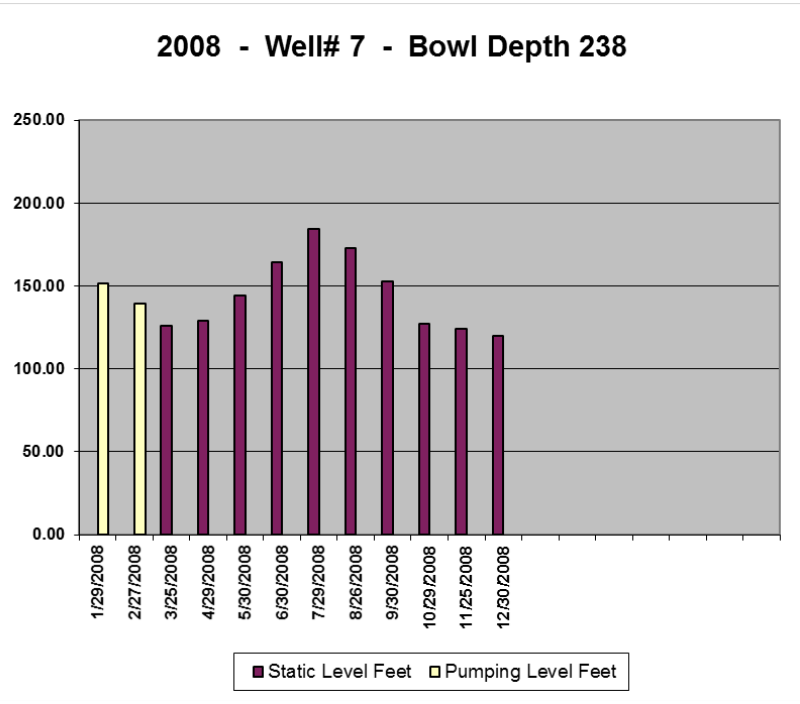

2006 - Well # 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

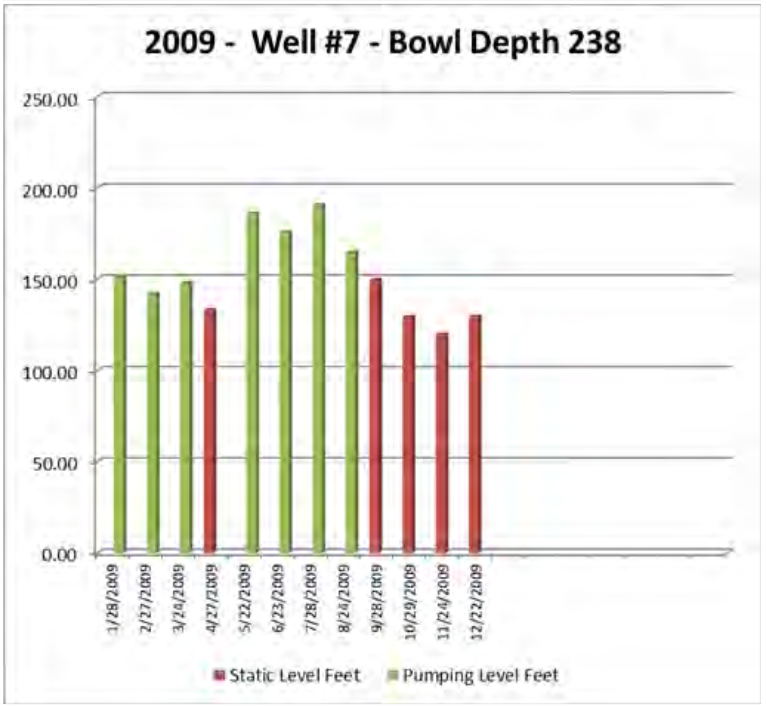

2007 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/16/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

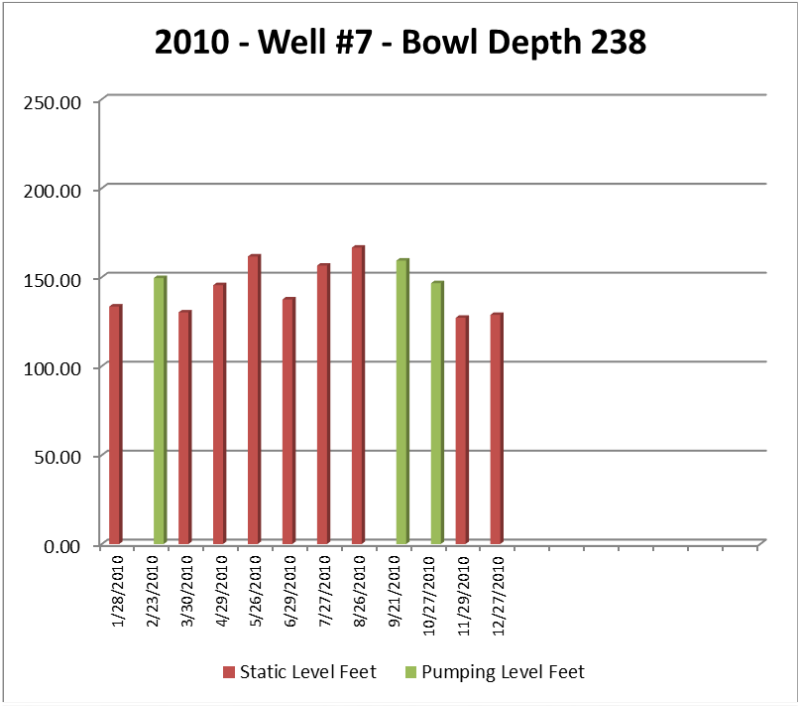

2008 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/25/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

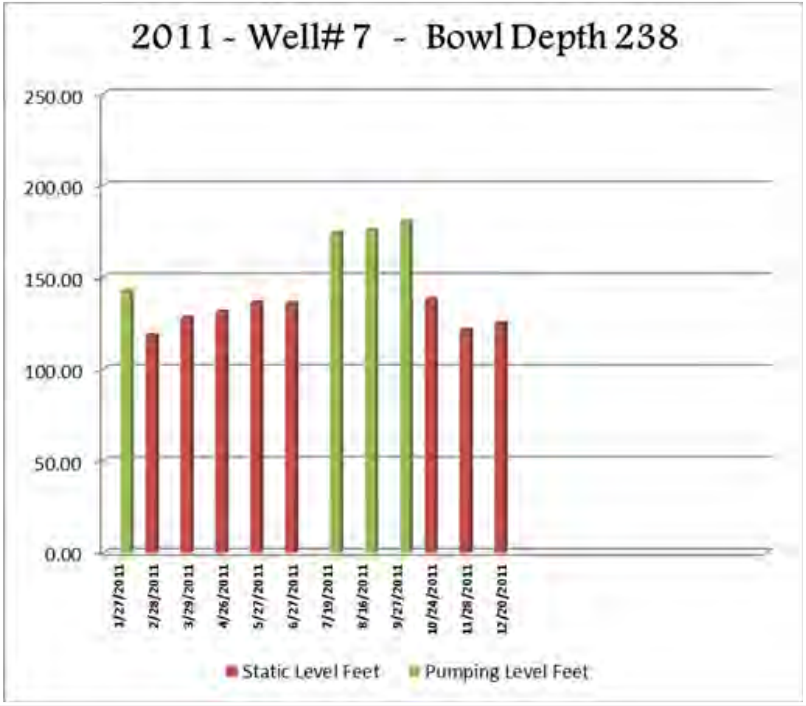

2007 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/16/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

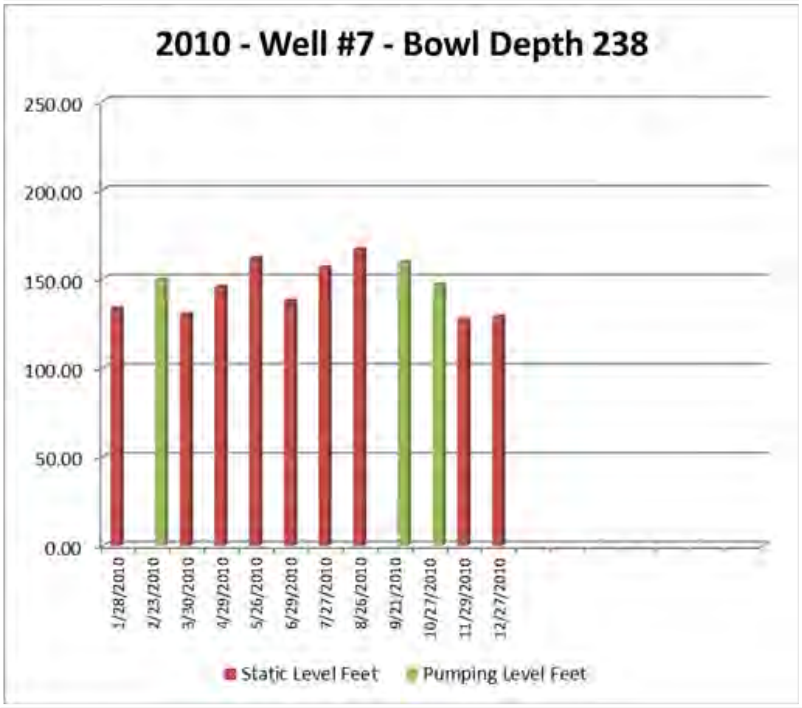

2009 - Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

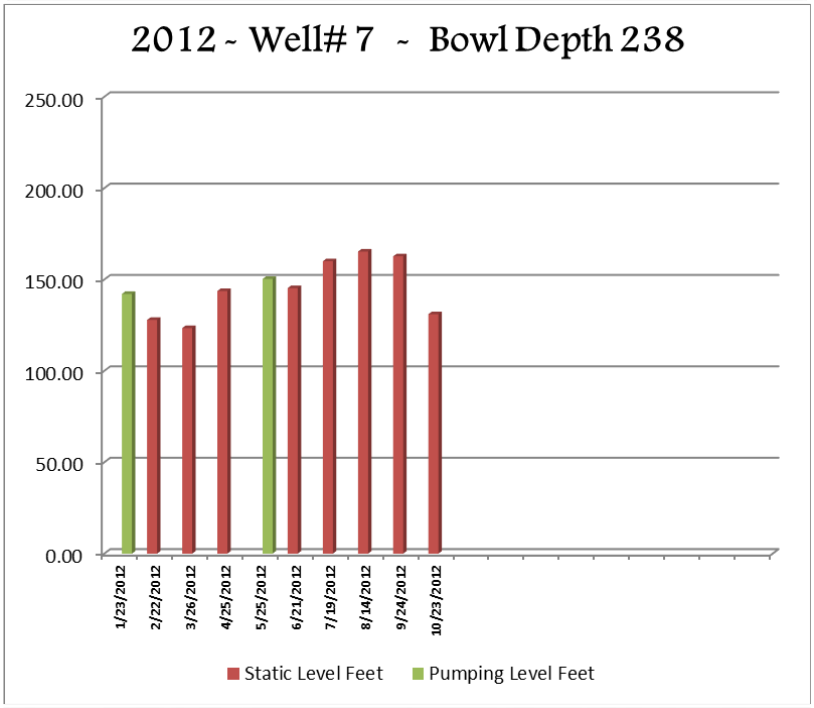

2008 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

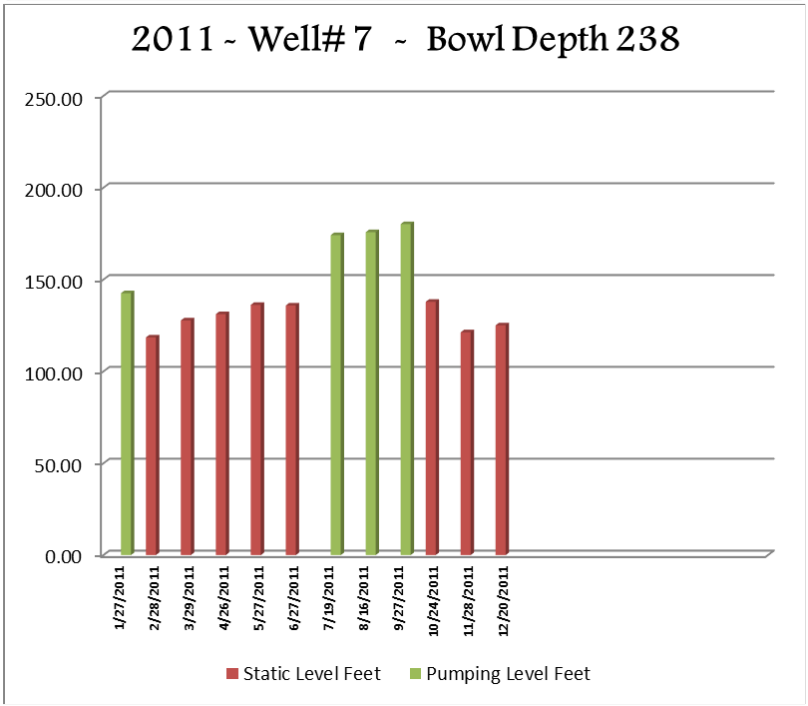

2009 - Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

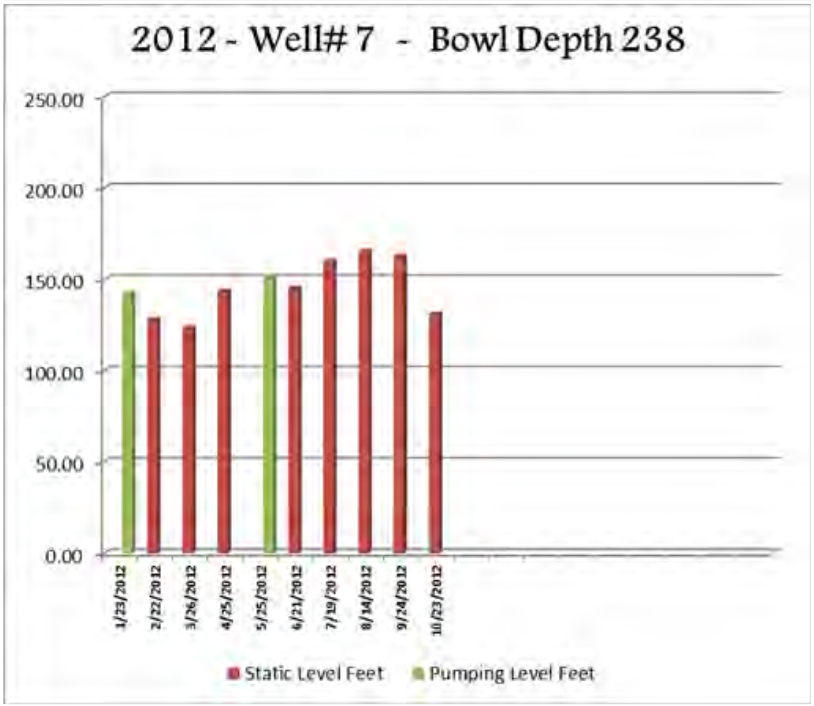

2010 - Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

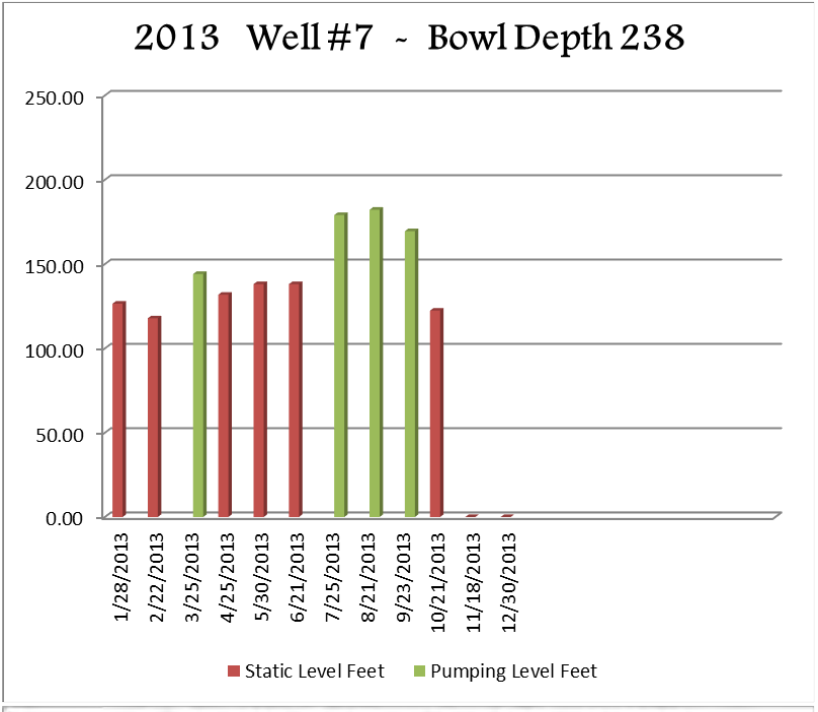

2011 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

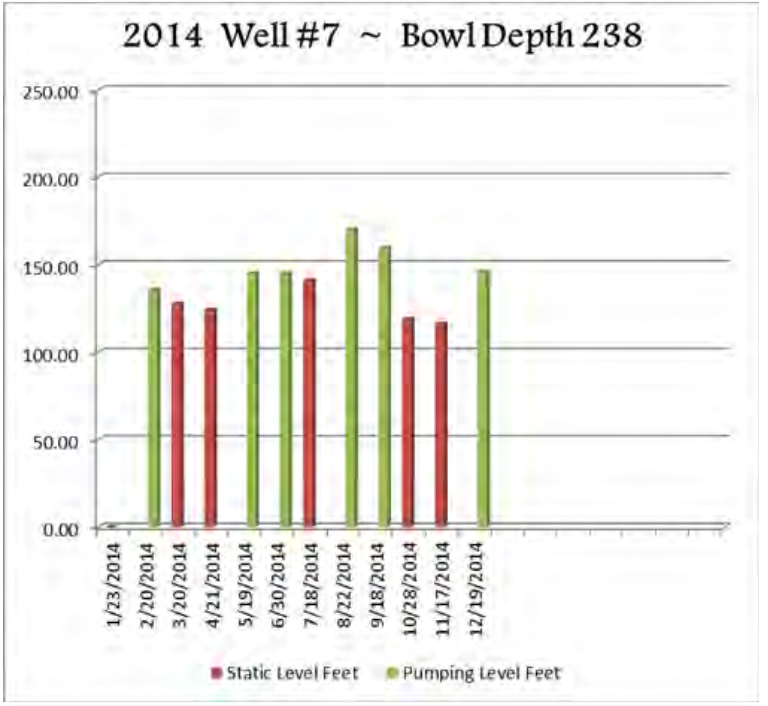

2010 - Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

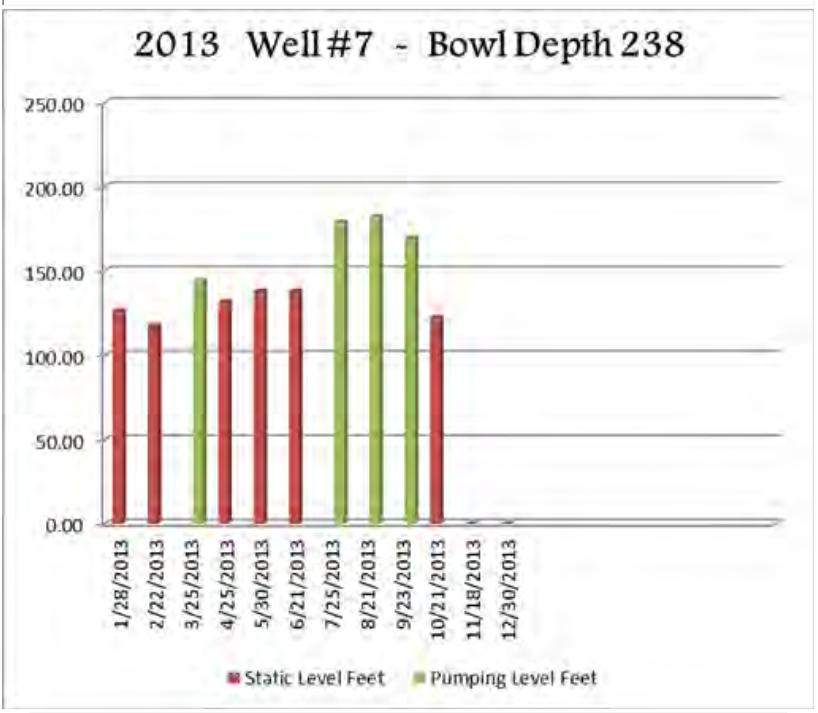

2012 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

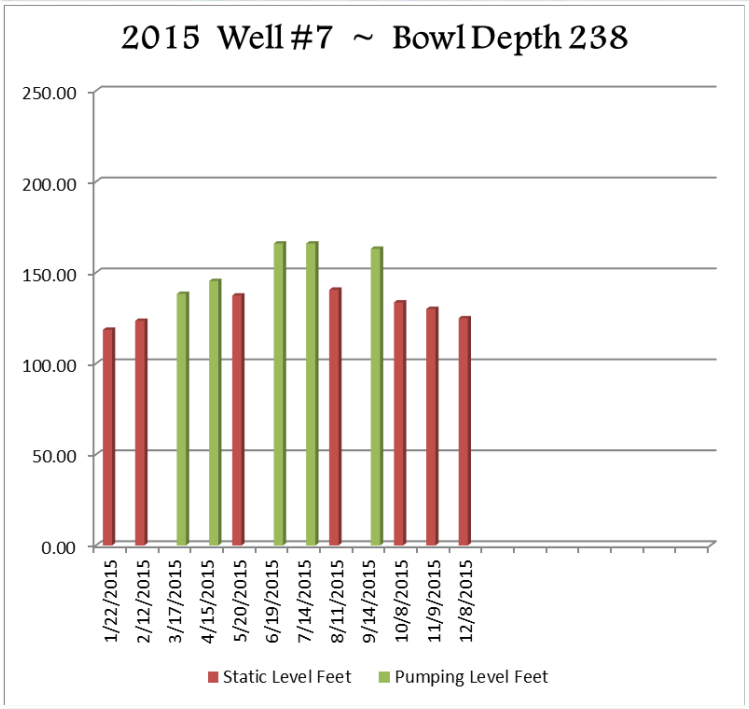

2011 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

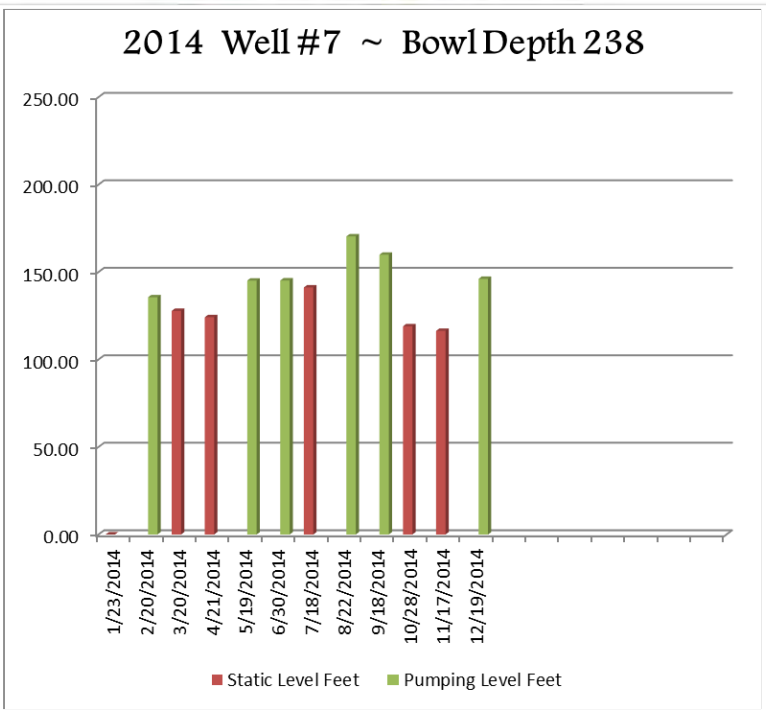

2012 - Well# 7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

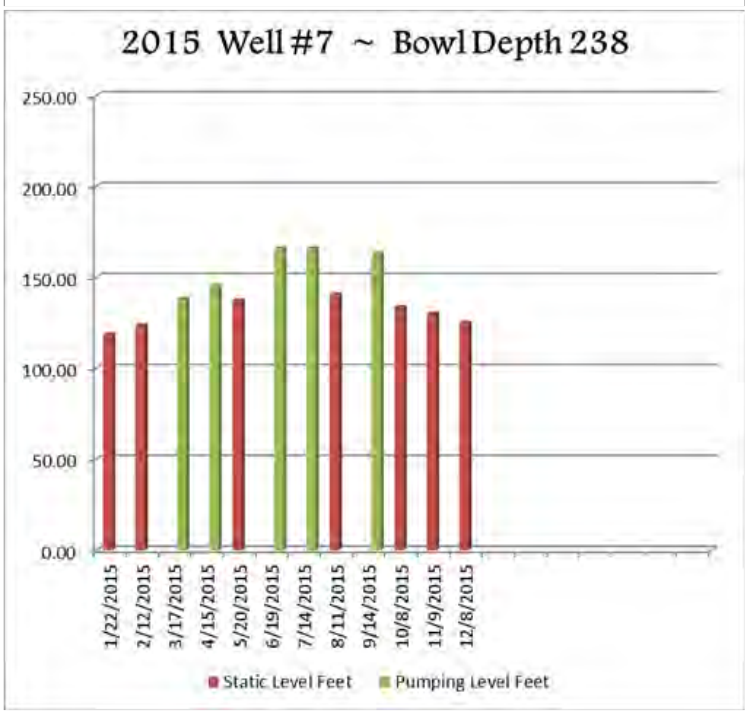

2013 Well #7 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

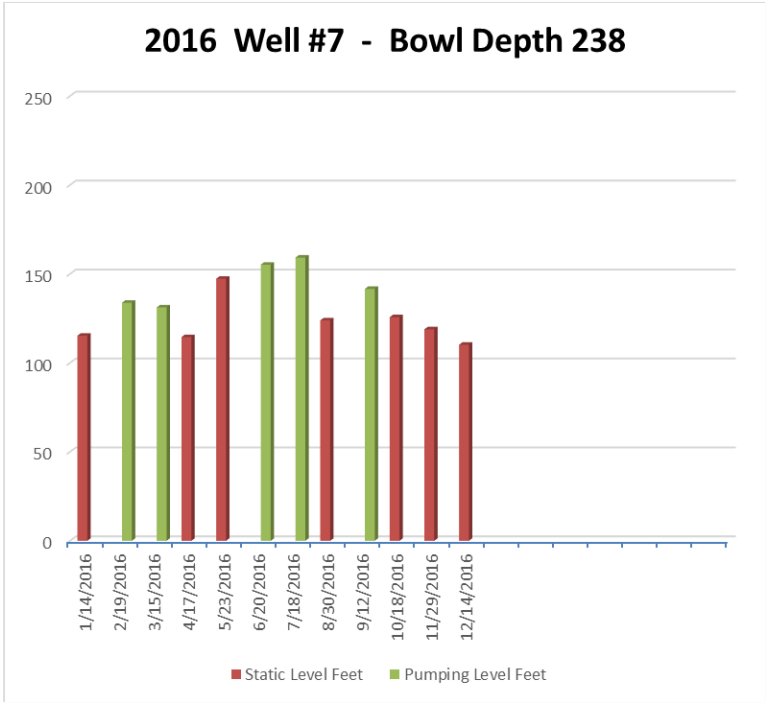

2014 Well #7 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

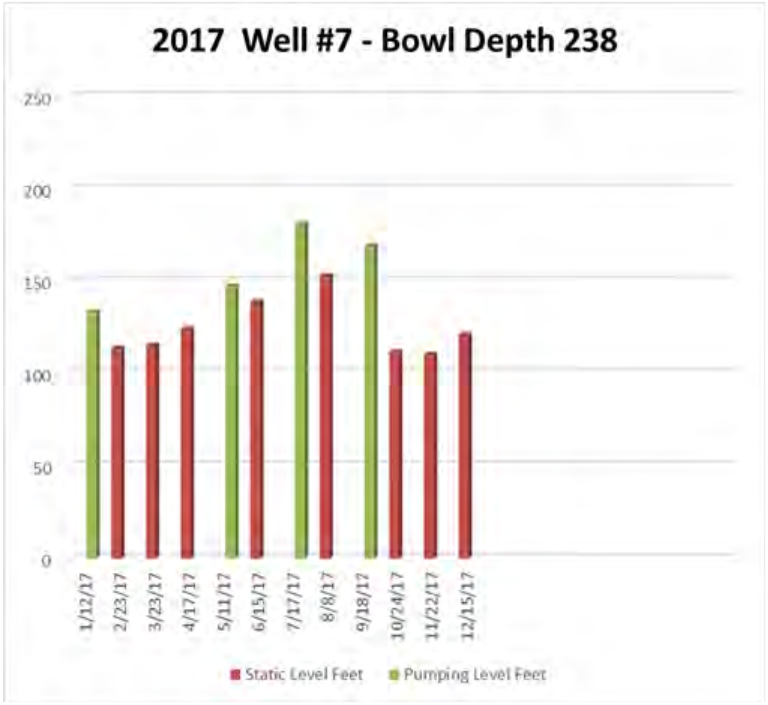

2013 Well #7 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

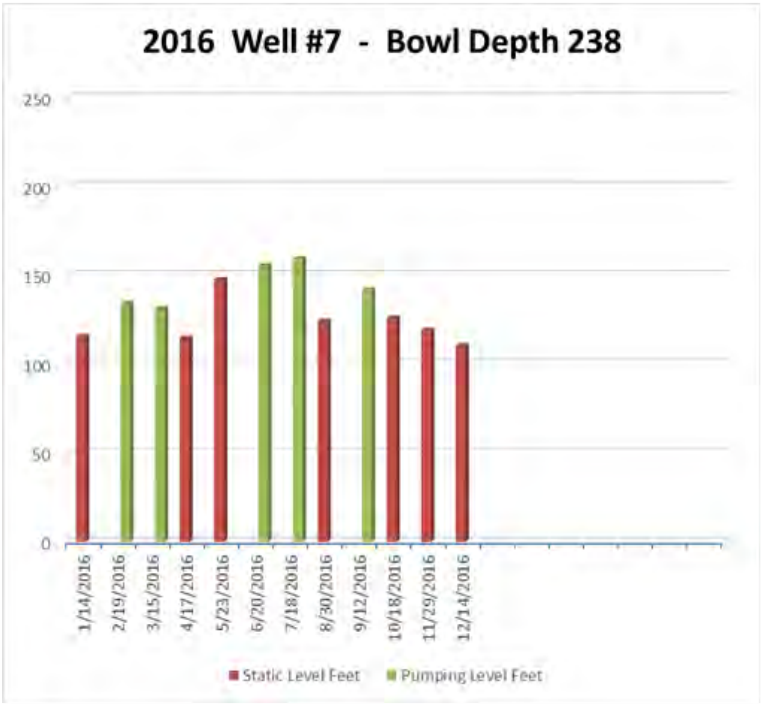

2015 Well #7 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

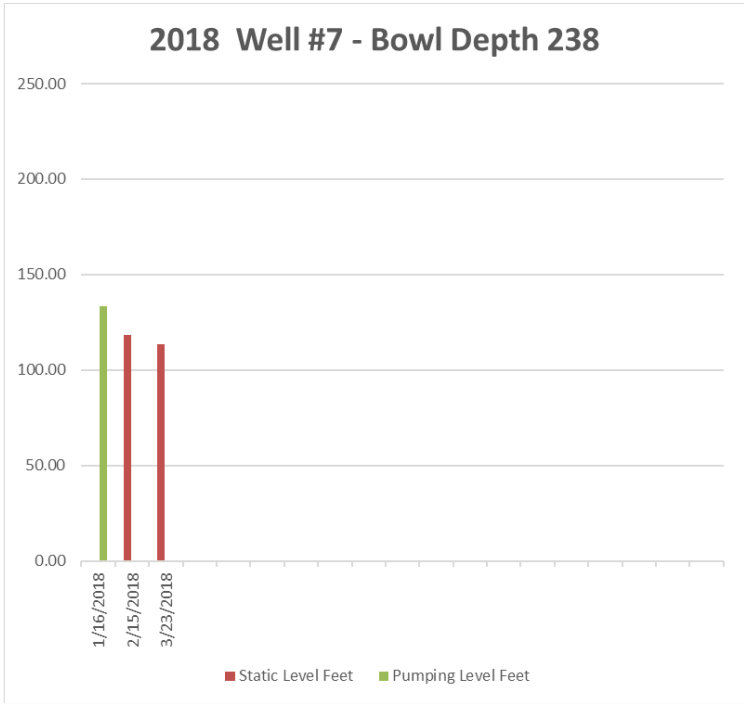

2014 Well #7 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

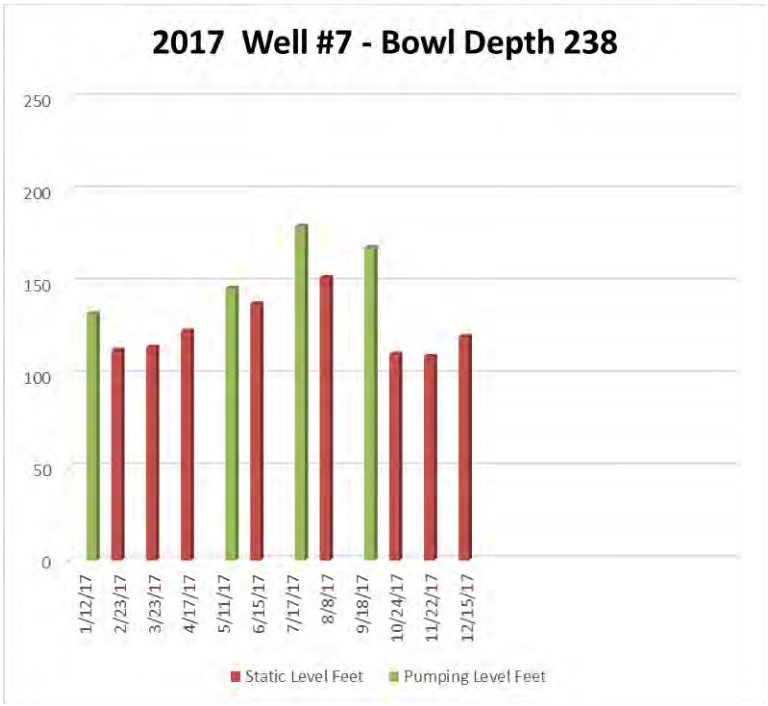

2015 Well #7 ~ Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

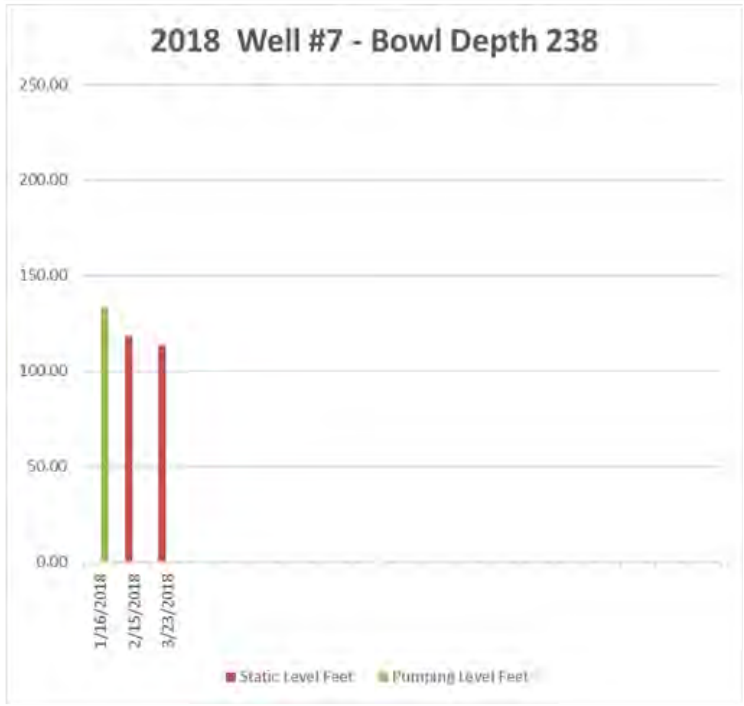

2016 Well #7 - Bowl Depth 238
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

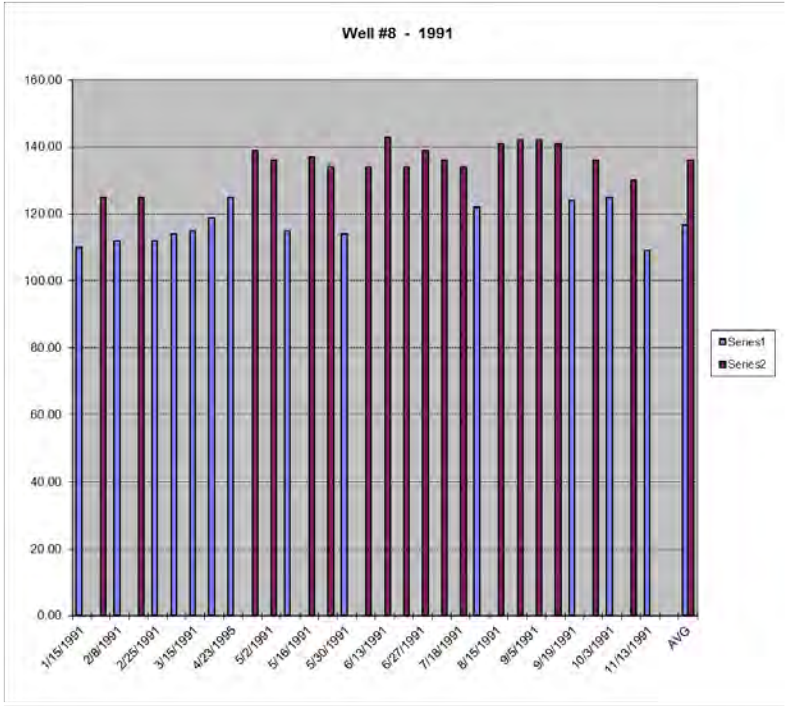

2017 Well #7 - Bowl Depth 238
250
200
150
100
50
0
1/12/17
2/23/17
3/23/17
4/17/17
5/11/17
6/15/17
7/17/17
8/8/17
9/18/12
10/24/17
11/22/17
12/15/17
Static Level Feet
Pumping Level Feet

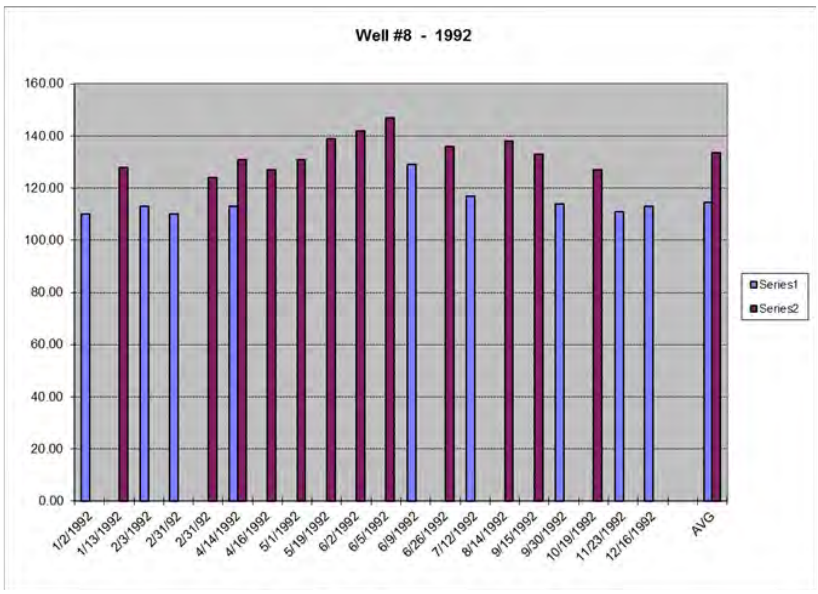

2016 Well #7 - Bowl Depth 238
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

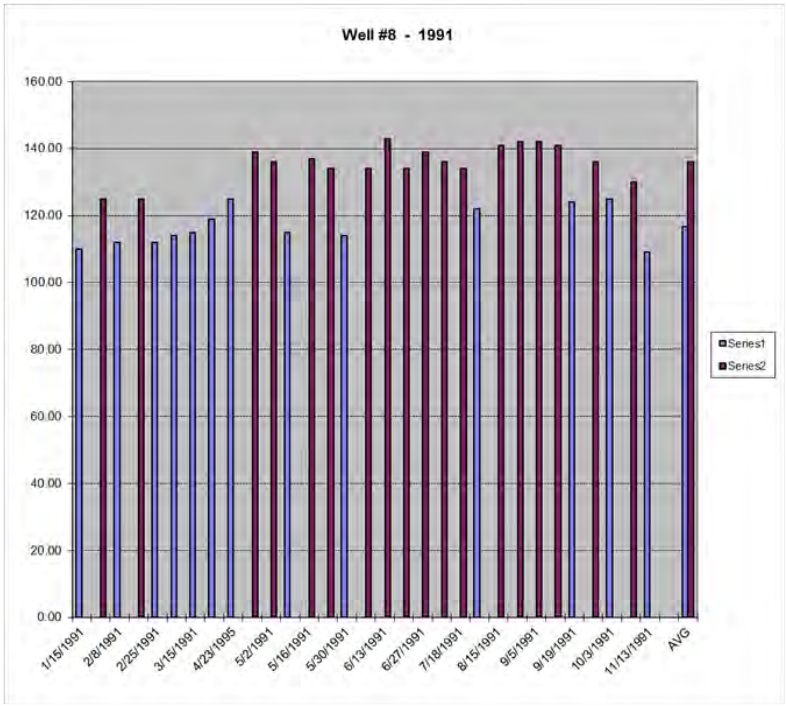

2018 Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

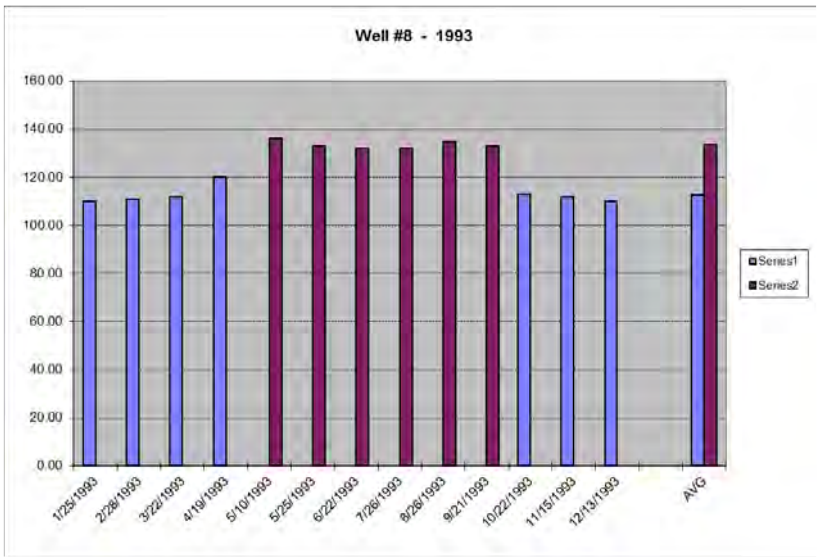

2017 Well #7 - Bowl Depth 238
250
200
150
100
50
0
1/12/17
2/23/17
3/23/17
4/17/17
5/11/17
6/15/17
7/17/17
8/8/17
9/18/17
10/24/17
11/22/17
12/15/17
Static Level Feet
Pumping Level Feet

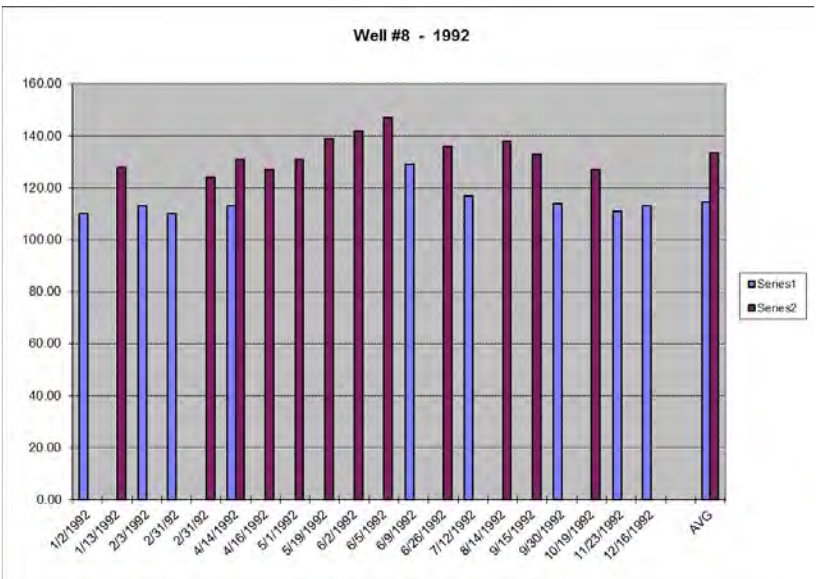

2018 Well #7 - Bowl Depth 238
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

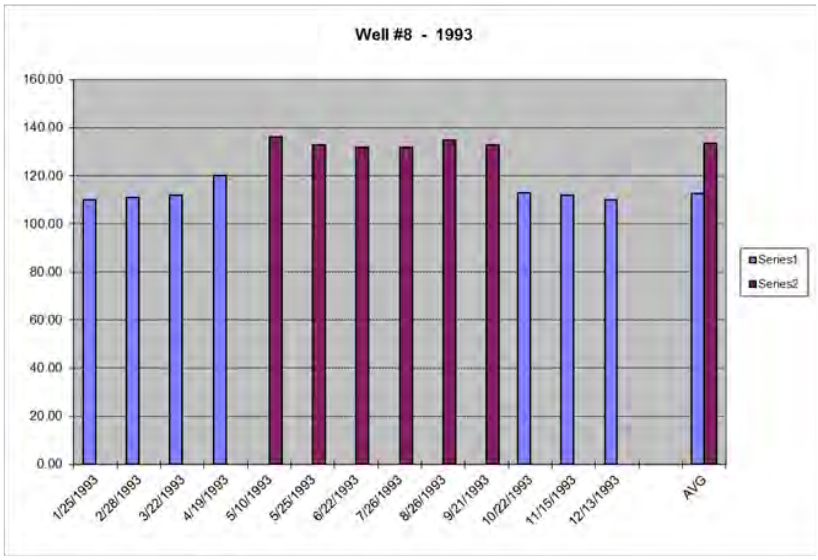

Well #8 - 1991
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/15/1991
2/8/1991
2/25/1991
3/15/1991
4/23/1995
5/2/1991
5/16/1991
5/30/1991
6/13/1991
6/27/1991
7/18/1991
8/15/1991
9/5/1991
9/19/1991
10/3/1991
11/13/1991
AVG

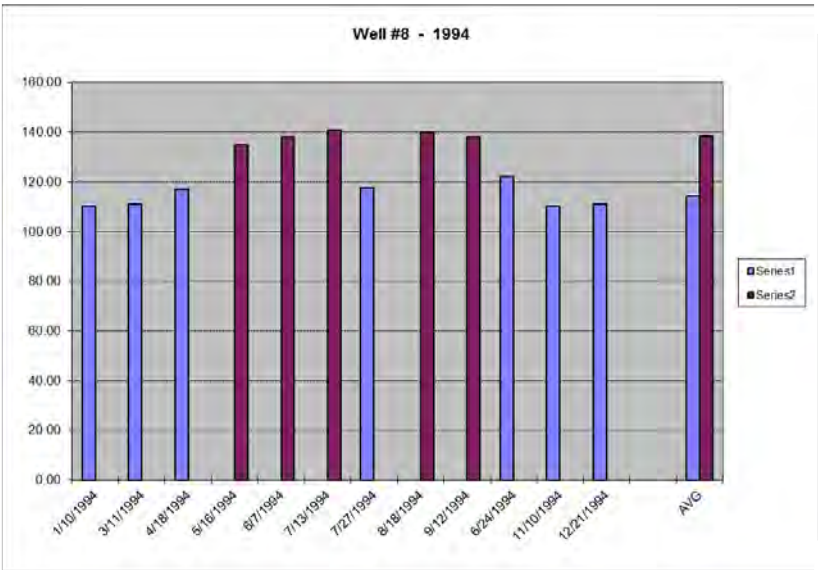

Well #8 - 1992
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/2/1992
1/13/1992
2/3/1992
2/31/92
2/31/92
4/14/1992
4/16/1992
5/1/1992
5/19/1992
6/2/1992
6/5/1992
6/9/1992
6/26/1992
7/12/1992
8/14/1992
9/15/1992
9/30/1992
10/19/1992
11/23/1992
12/16/1992
AVG

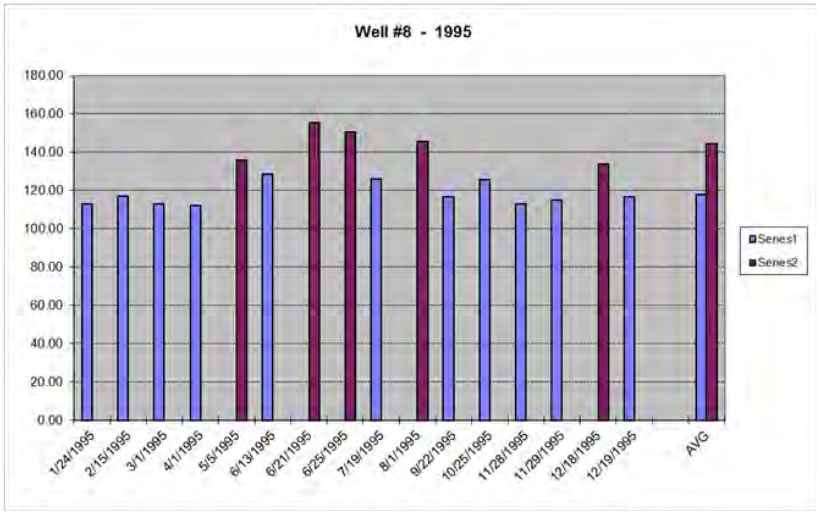

Well #8 - 1991
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/15/1991
2/8/1991
2/25/1991
3/15/1991
4/23/1995
5/2/1991
5/16/1991
5/30/1991
6/13/1991
6/27/1991
7/18/1991
8/15/1991
9/5/1991
9/19/1991
10/3/1991
11/13/1991
AVG

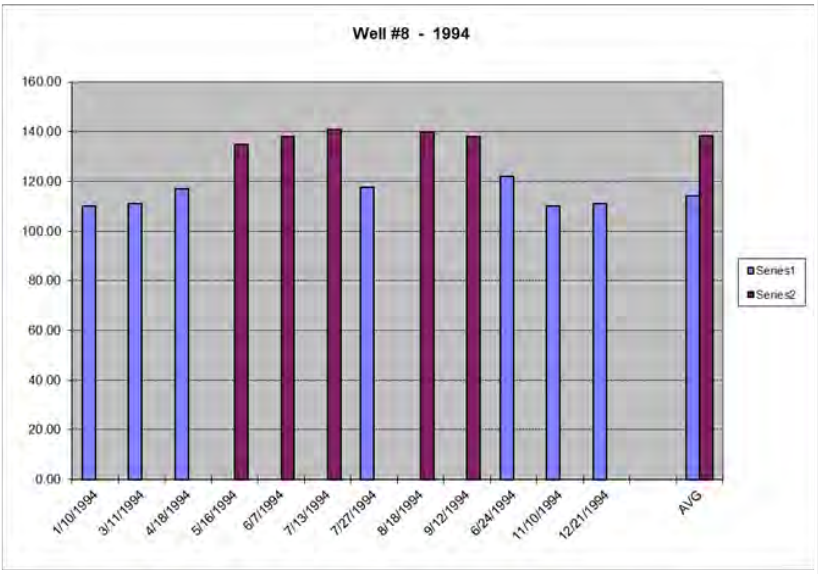

Well #8 - 1993
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/25/1993
2/28/1993
3/22/1993
4/19/1993
5/10/1993
5/25/1993
6/22/1993
7/26/1993
8/26/1993
9/21/1993
10/22/1993
11/15/1993
12/13/1993
AVG

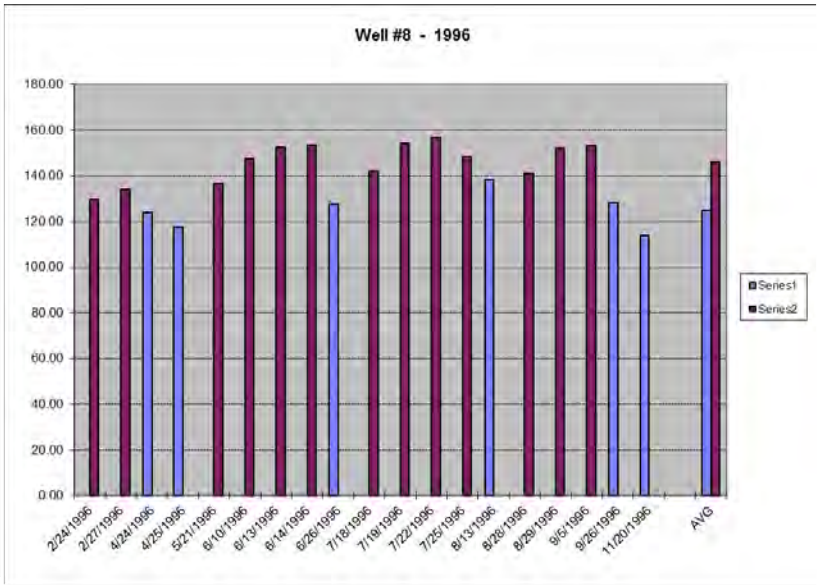

Well #8 - 1992
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/2/1992
1/13/1992
2/3/1992
2/31/92
2/31/92
4/14/1992
4/16/1992
5/1/1992
5/19/1992
6/2/1992
6/5/1992
6/9/1992
6/26/1992
7/12/1992
8/14/1992
9/15/1992
9/30/1992
10/19/1992
11/23/1992
12/16/1992
AVG

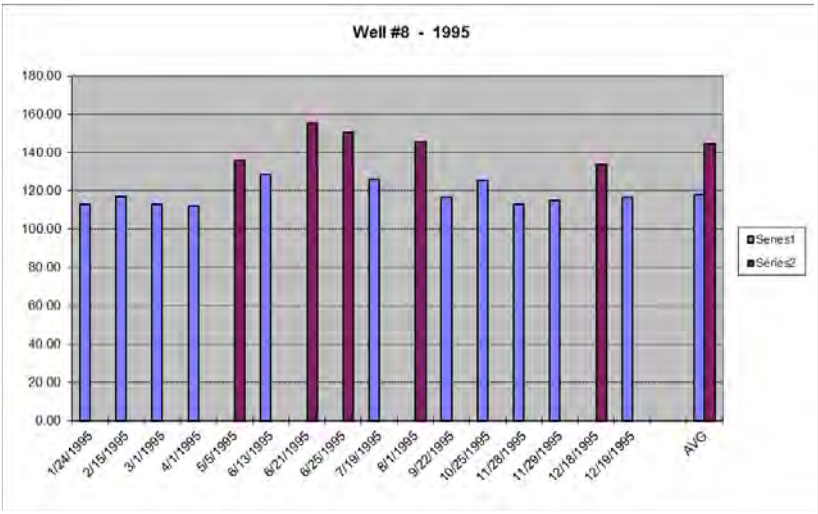

Well #8 - 1993
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Series1
Series2
1/25/1993
2/28/1993
3/22/1993
4/19/1993
5/10/1993
5/25/1993
6/22/1993
7/26/1993
8/26/1993
9/21/1993
10/22/1993
11/15/1993
12/13/1993
AVG

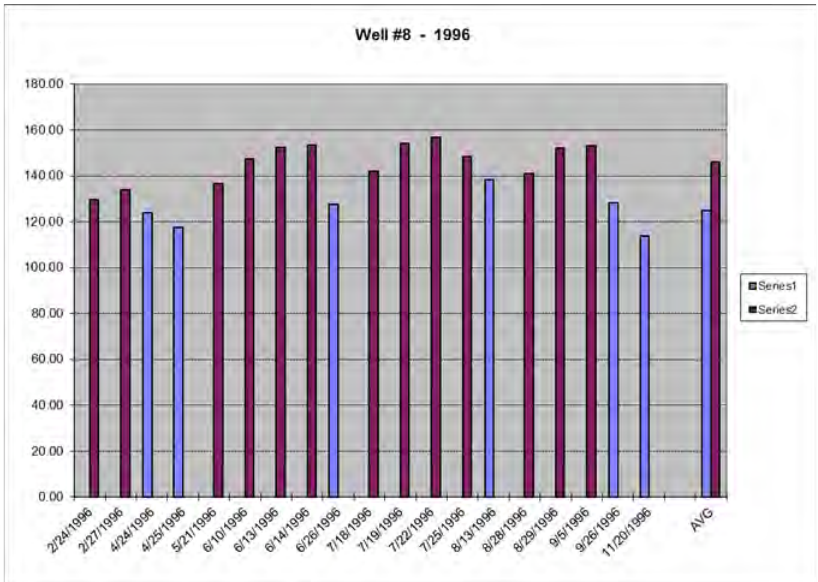

Well #8 - 1994
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
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5/16/1994
6/7/1994
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6/24/1994
11/10/1994
12/21/1994
AVG
Series1
Series2

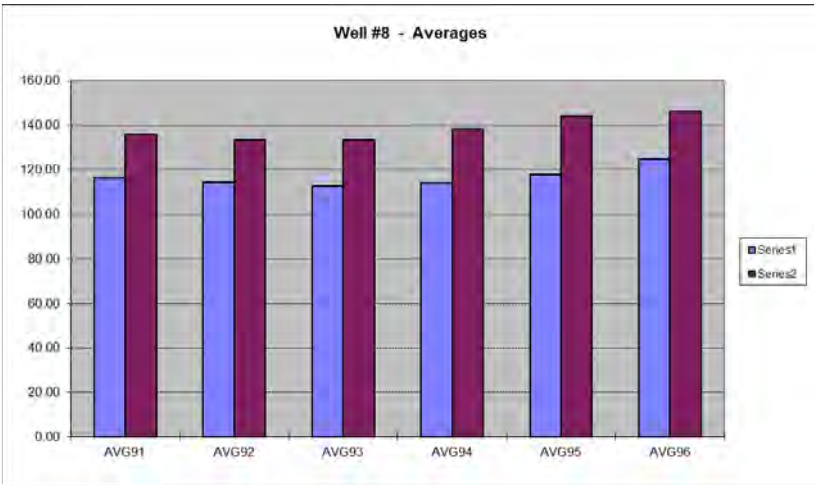

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120.00
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20.00
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6/25/1995
7/19/1995
8/1/1995
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11/29/1995
12/18/1995
12/19/1995
AVG
Series1
Series2

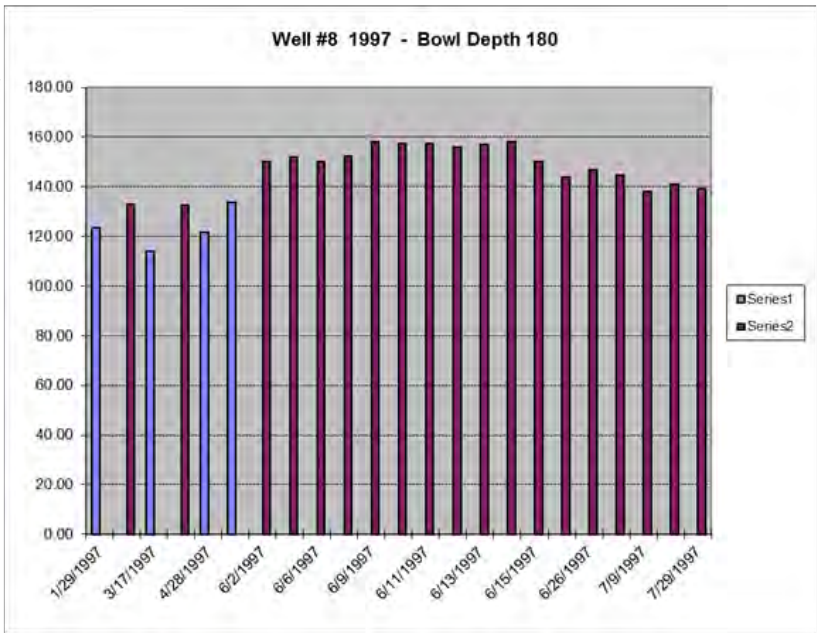

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Series1
Series2

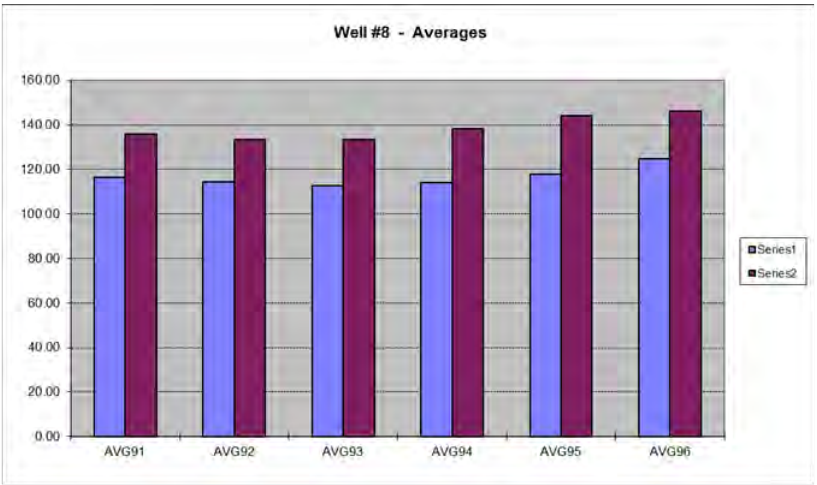

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AVG
Series1
Series2

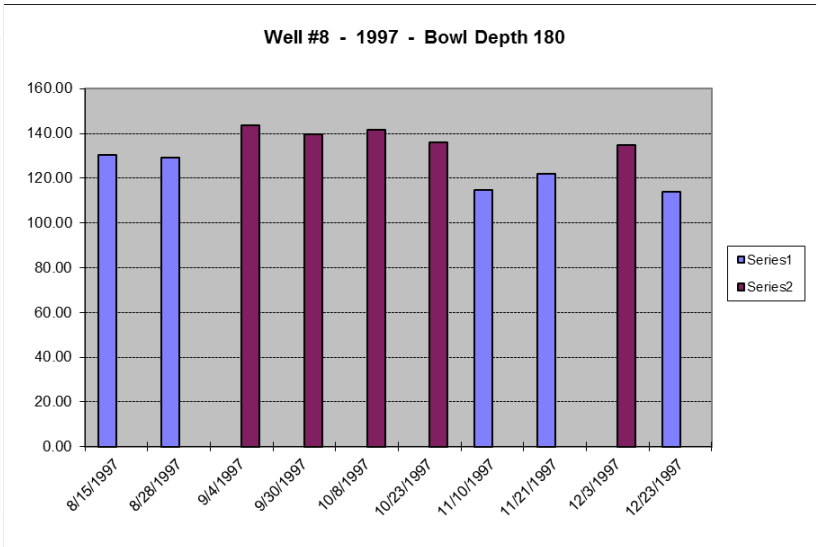

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Series1
Series2

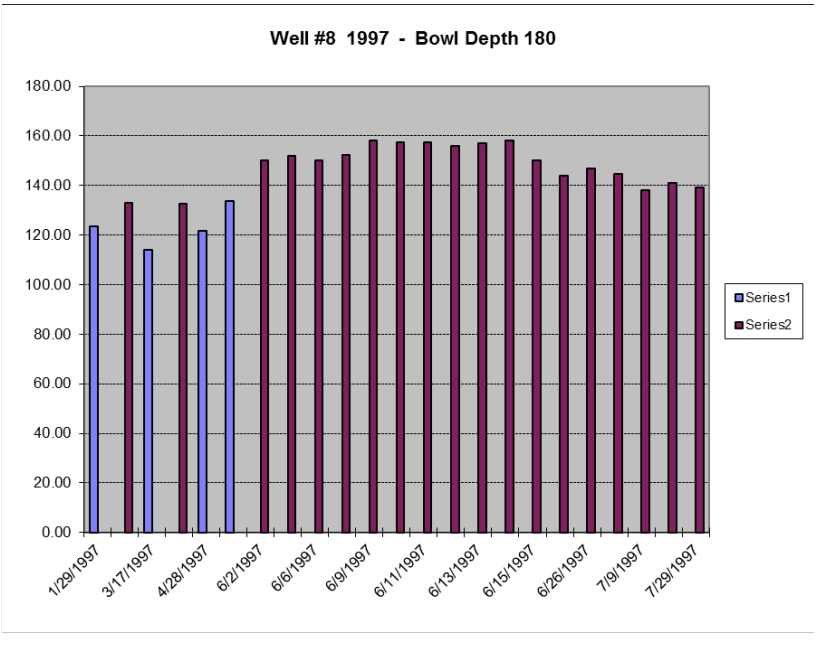

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9/26/1996
11/20/1996
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Series1
Series2

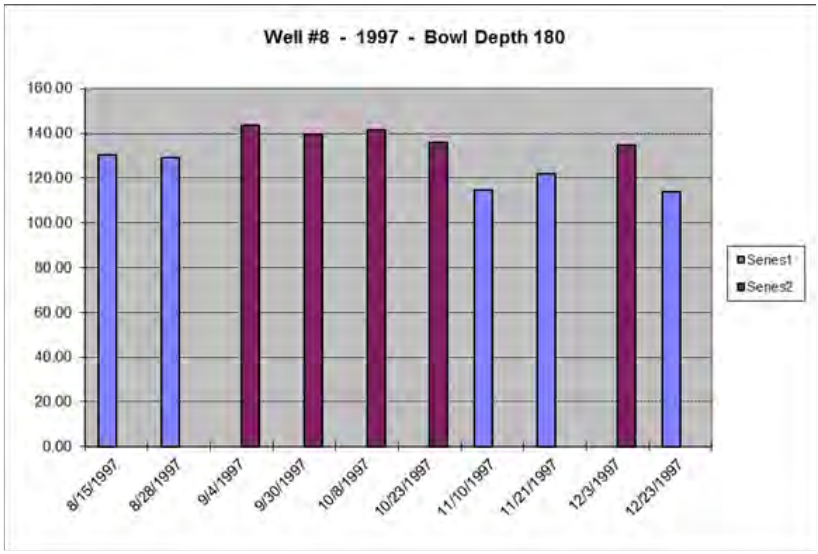

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120.00
100.00
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20.00
0.00
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

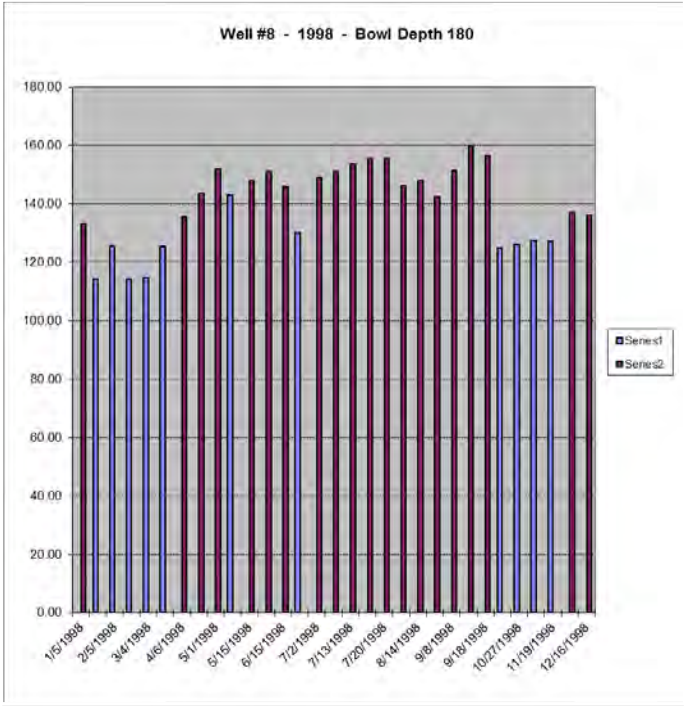

Well #8 1997 - Bowl Depth 180
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/29/1997
3/17/1997
4/28/1997
6/2/1997
6/6/1997
6/9/1997
6/11/1997
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6/26/1997
7/9/1997
7/29/1997
Series1
Series2

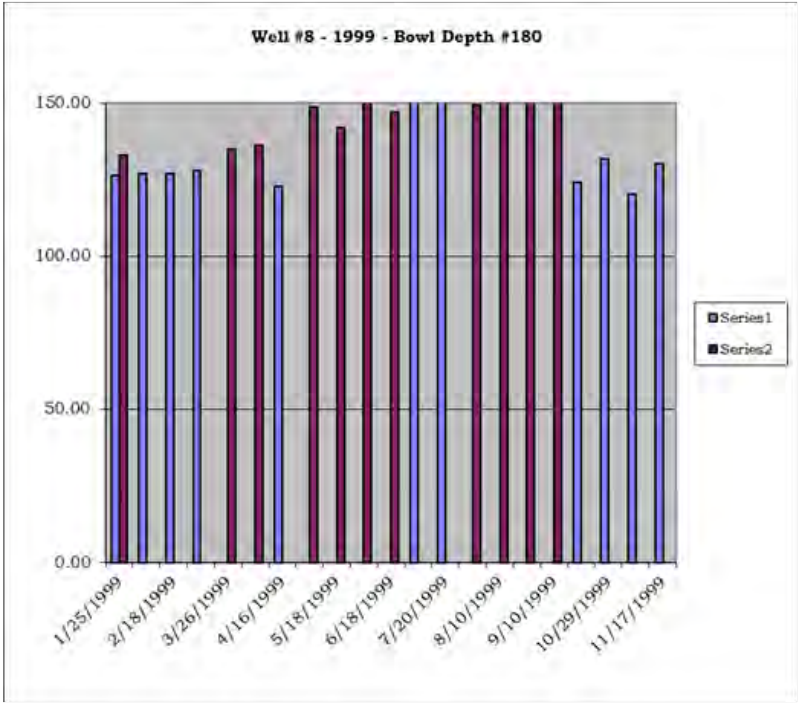

Well #8 - Averages
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120.00
100.00
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AVG96
Series1
Series2

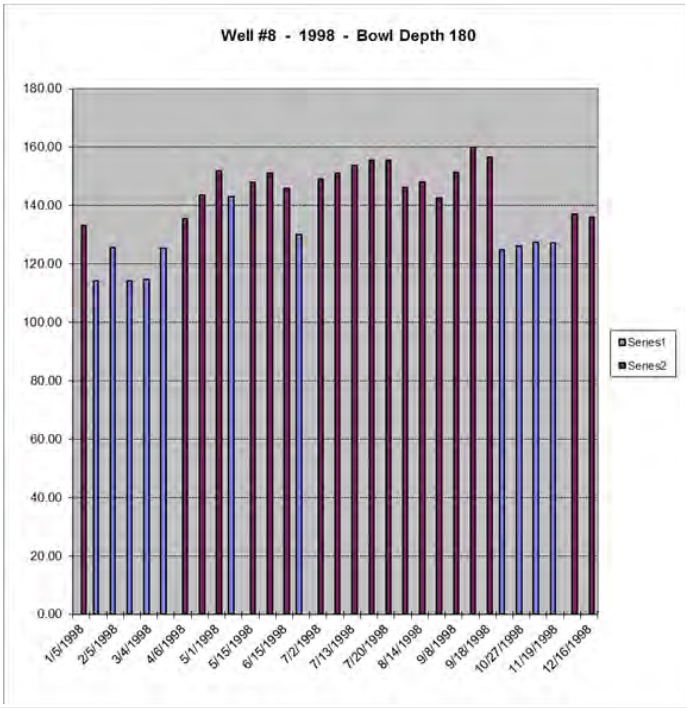

Well #8 - 1997 - Bowl Depth 180
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140.00
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100.00
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60.00
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20.00
0.00
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8/28/1997
9/4/1997
9/30/1997
10/8/1997
10/23/1997
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12/3/1997
12/23/1997
Series1
Series2

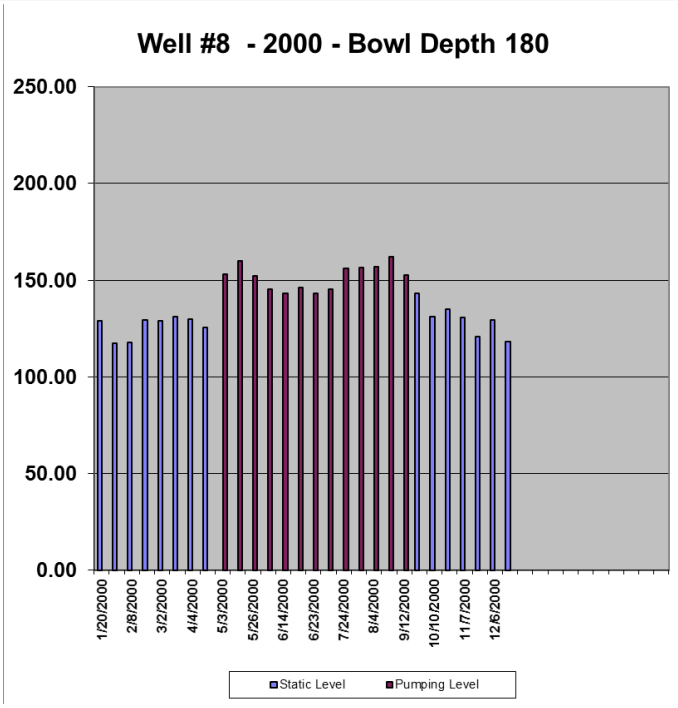

Well #8 1997 - Bowl Depth 180
180.00
160.00
140.00
120.00
100.00
80.00
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40.00
20.00
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1/29/1997
3/17/1997
4/28/1997
6/2/1997
6/6/1997
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6/11/1997
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6/26/1997
7/9/1997
7/29/1997
Series1
Series2

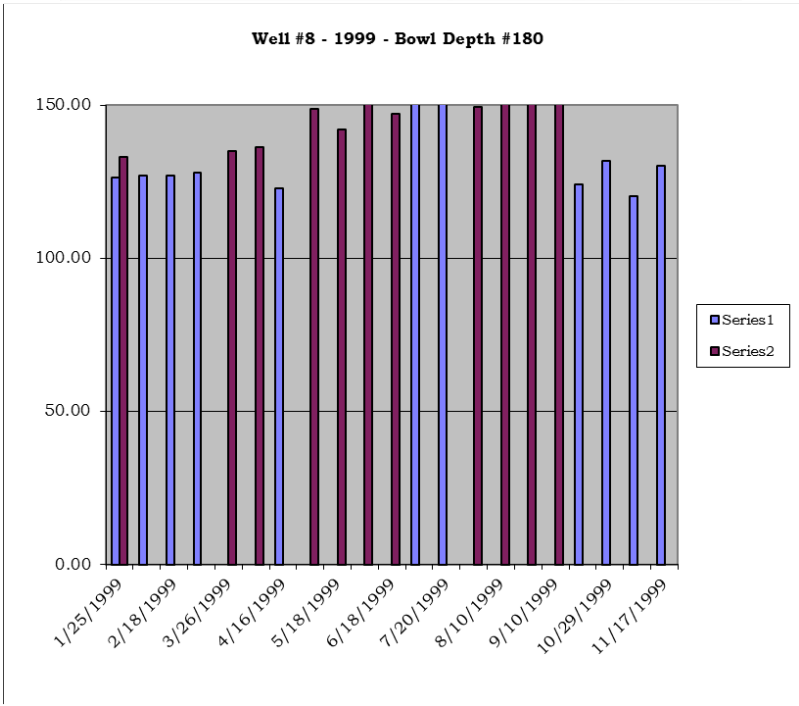

Well #8 - 1997 - Bowl Depth 180
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20.00
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8/28/1997
9/4/1997
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12/3/1997
12/23/1997
Series1
Series2

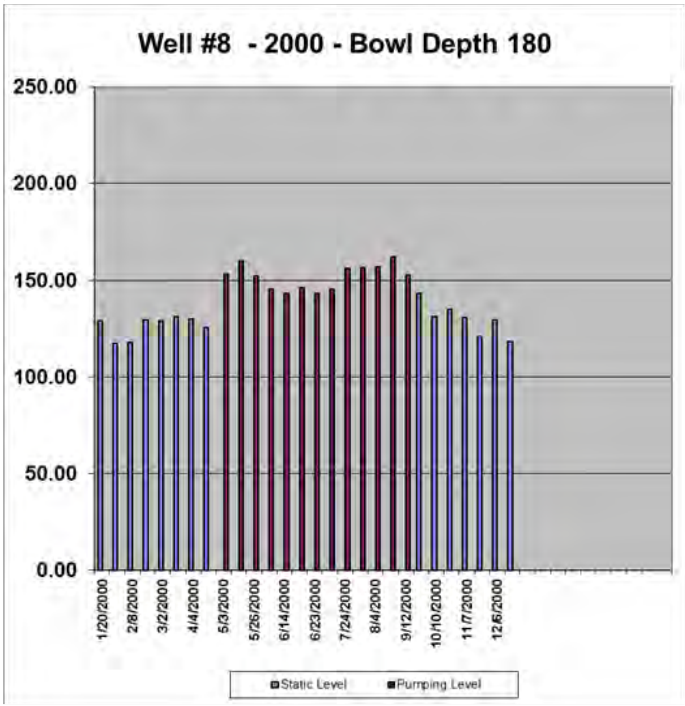

Well #8 - 1998 - Bowl Depth 180
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/5/1998
2/5/1998
3/4/1998
4/6/1998
5/1/1998
5/15/1998
6/15/1998
7/2/1998
7/13/1998
7/20/1998
8/14/1998
9/8/1998
9/18/1998
10/27/1998
11/19/1998
12/16/1998
Series1
Series2

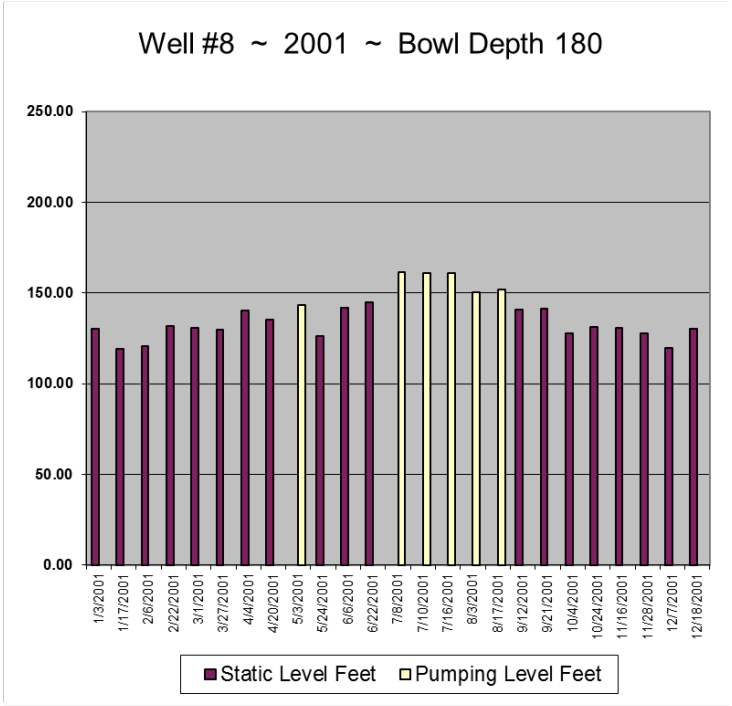

Well #8 - 1999 - Bowl Depth #180
150.00
100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
5/18/1999
6/18/1999
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8/10/1999
9/10/1999
10/29/1999
11/17/1999
Series1
Series2

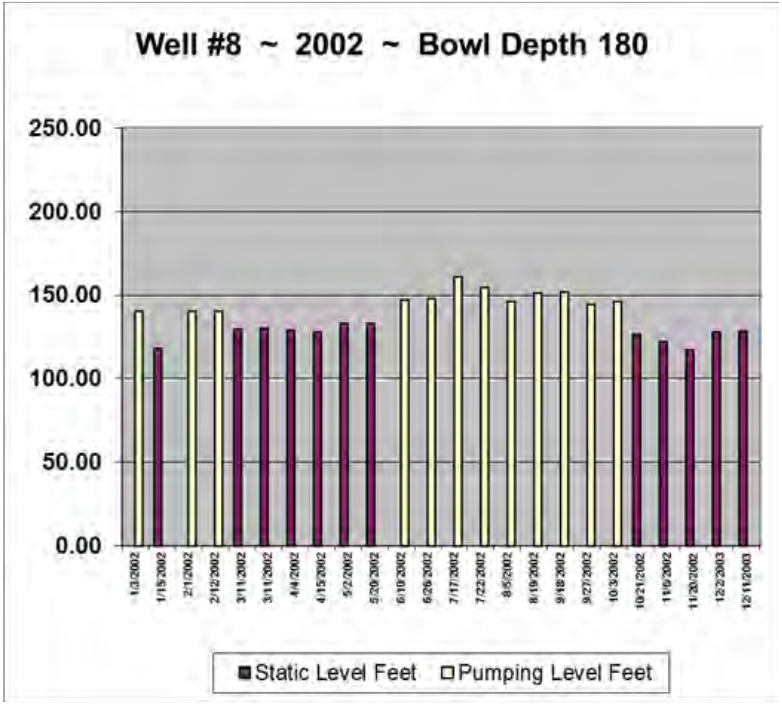

Well #8 - 1998 - Bowl Depth 180
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160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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2/5/1998
3/4/1998
4/6/1998
5/1/1998
5/15/1998
6/15/1998
7/2/1998
7/13/1998
7/20/1998
8/14/1998
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9/18/1998
10/27/1998
11/19/1998
12/16/1998
Series1
Series2

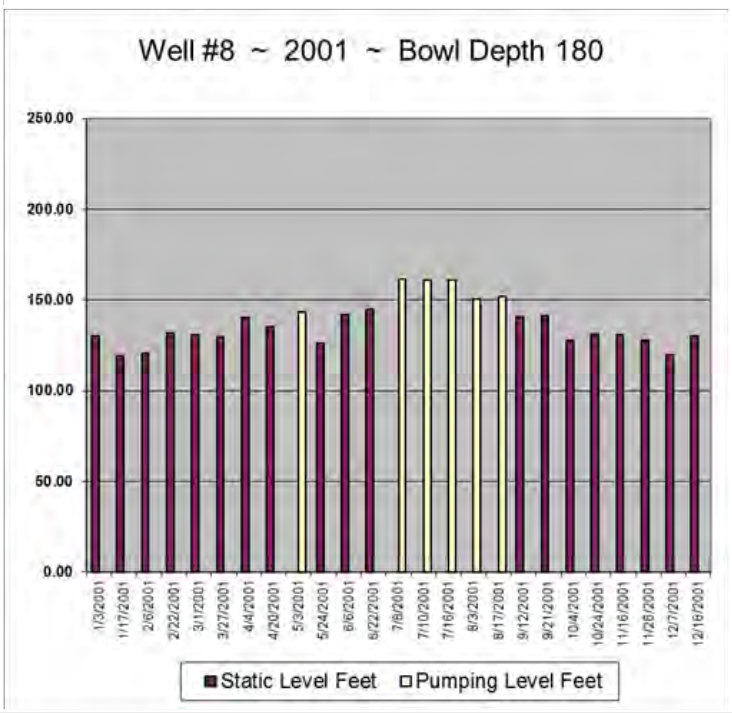

Well #8 - 2000 - Bowl Depth 180
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200.00
150.00
100.00
50.00
0.00
1/20/2000
2/8/2000
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4/4/2000
5/3/2000
5/26/2000
6/14/2000
6/23/2000
7/24/2000
8/4/2000
9/12/2000
10/10/2000
11/7/2000
12/6/2000
Static Level
Pumping Level

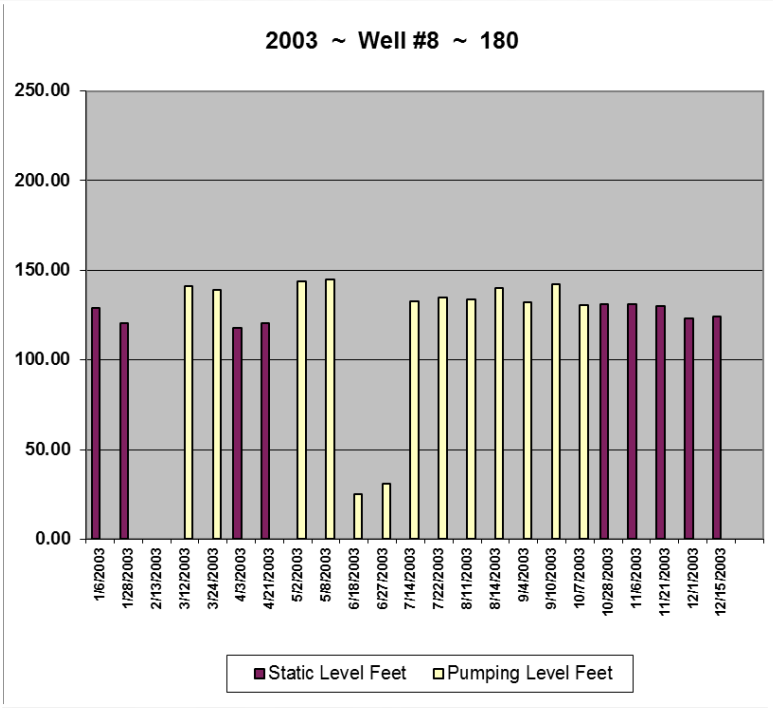

Well #8 - 1999 - Bowl Depth #180
150.00
100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
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8/10/1999
9/10/1999
10/29/1999
11/17/1999
Series1
Series2

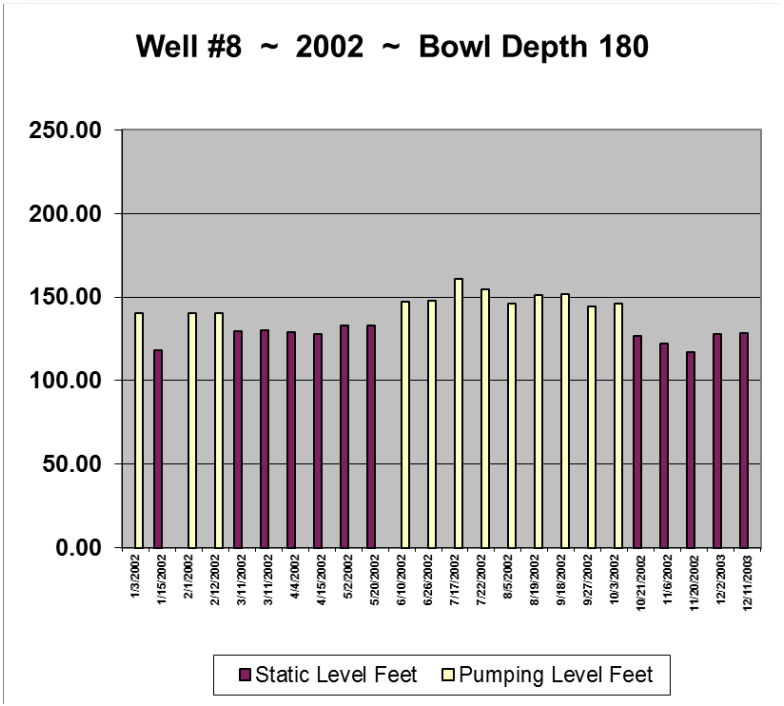

Well #8 - 2000 - Bowl Depth 180
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150.00
100.00
50.00
0.00
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2/8/2000
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5/26/2000
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11/7/2000
12/6/2000
Static Level
Pumping Level

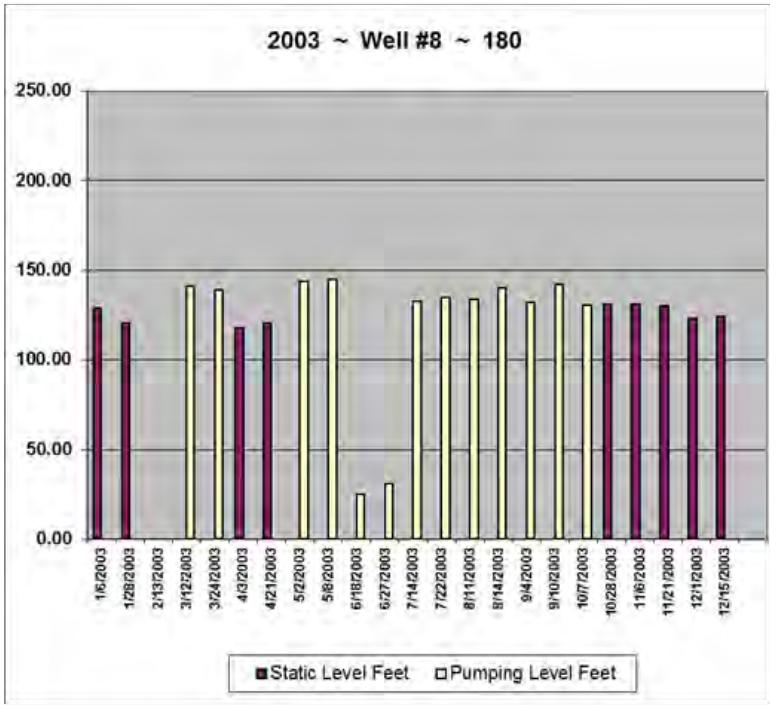

Well #8 ~ 2001 ~ Bowl Depth 180
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200.00
150.00
100.00
50.00
0.00
1/3/2001
1/17/2001
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3/1/2001
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4/20/2001
5/3/2001
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8/17/2001
9/12/2001
9/21/2001
10/4/2001
10/24/2001
11/16/2001
11/28/2001
12/7/2001
12/18/2001
Static Level Feet
Pumping Level Feet


Well #8 ~ 2002 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2002
1/15/2002
2/1/2002
2/12/2002
3/11/2002
3/11/2002
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12/11/2003
Static Level Feet
Pumping Level Feet

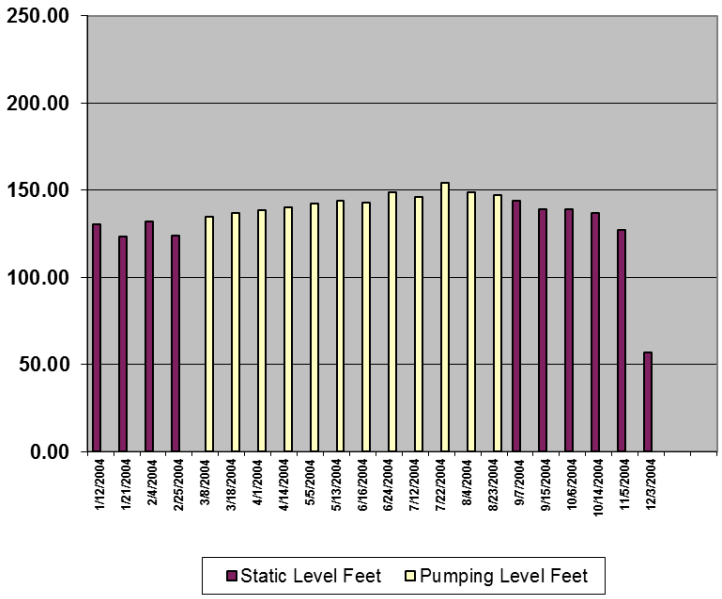

Well #8 ~ 2001 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2001
1/17/2001
2/6/2001
2/22/2001
3/1/2001
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4/4/2001
4/20/2001
5/3/2001
5/24/2001
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9/21/2001
10/4/2001
10/24/2001
11/16/2001
11/28/2001
12/7/2001
12/18/2001
Static Level Feet
Pumping Level Feet


2003 ~ Well #8 ~ 180
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
1/28/2003
2/13/2003
3/12/2003
3/24/2003
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12/1/2003
12/15/2003
Static Level Feet
Pumping Level Feet

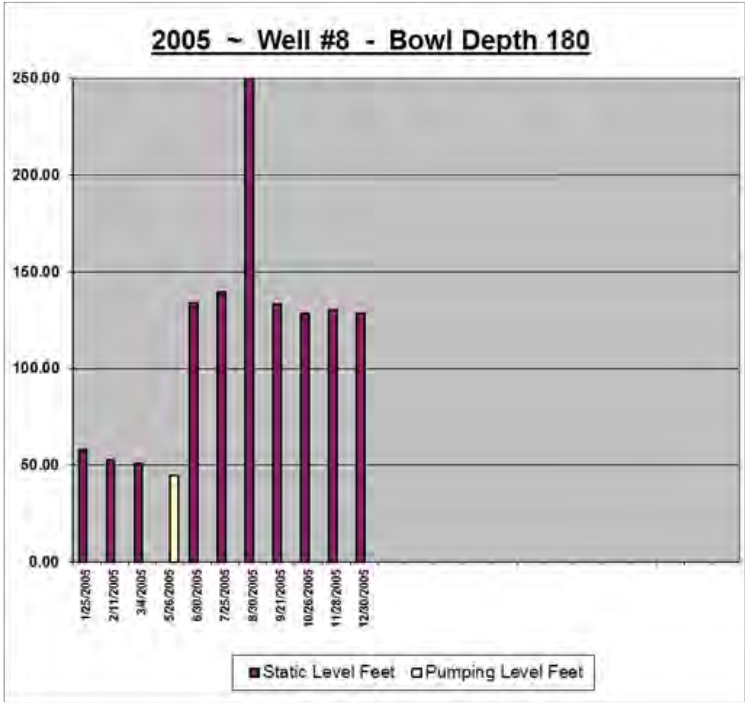

Well #8 ~ 2002 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2002
1/15/2002
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3/11/2002
4/4/2002
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8/19/2002
9/18/2002
9/27/2002
10/3/2002
10/21/2002
11/6/2002
11/20/2002
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet


2003 ~ Well #8 ~ 180
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
1/28/2003
2/13/2003
3/12/2003
3/24/2003
4/3/2003
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12/15/2003
Static Level Feet
Pumping Level Feet

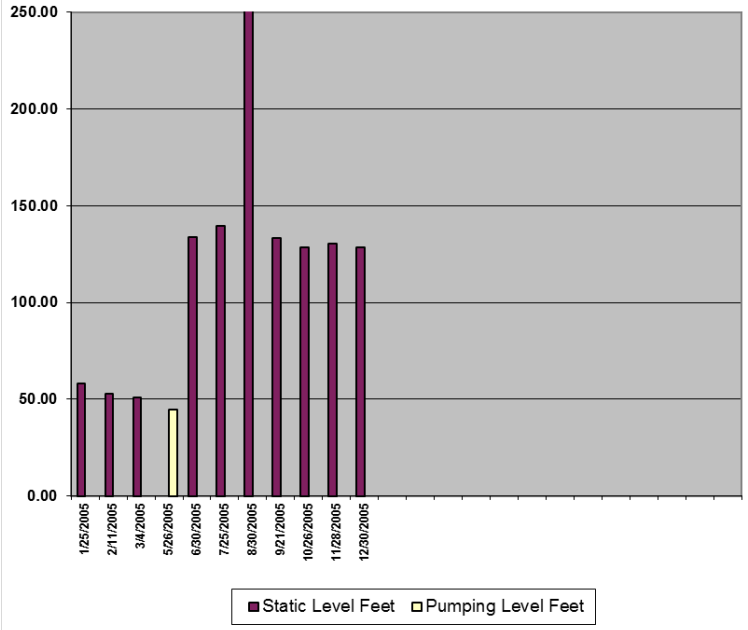
## 2004 ~ Well #8 - Bowl Depth 180



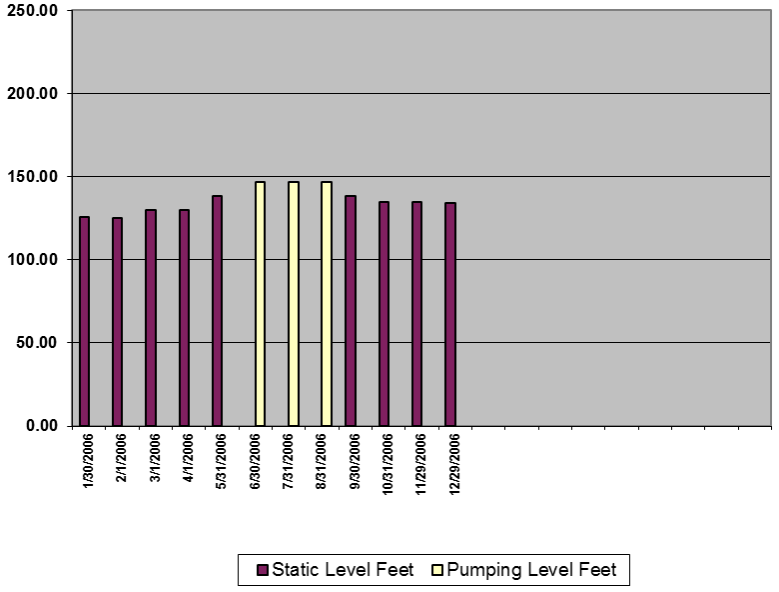

## 2005 ~ Well #8 - Bowl Depth 180



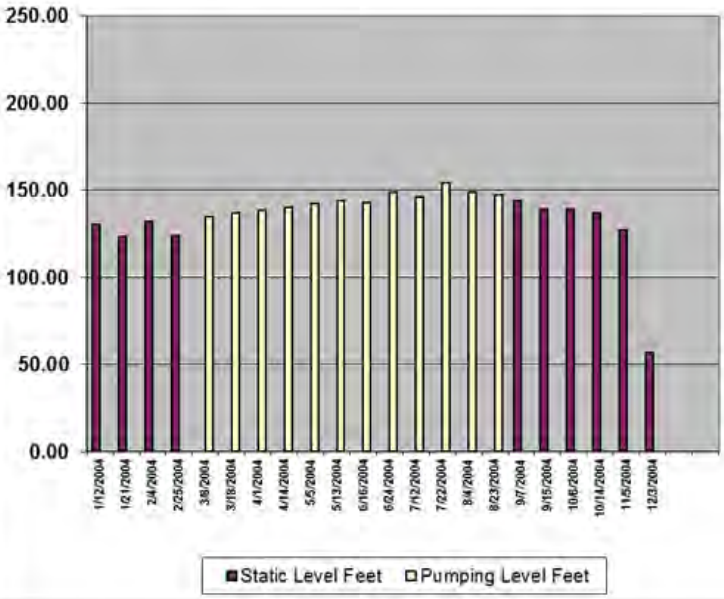

## 2005 ~ Well #8 - Bowl Depth 180



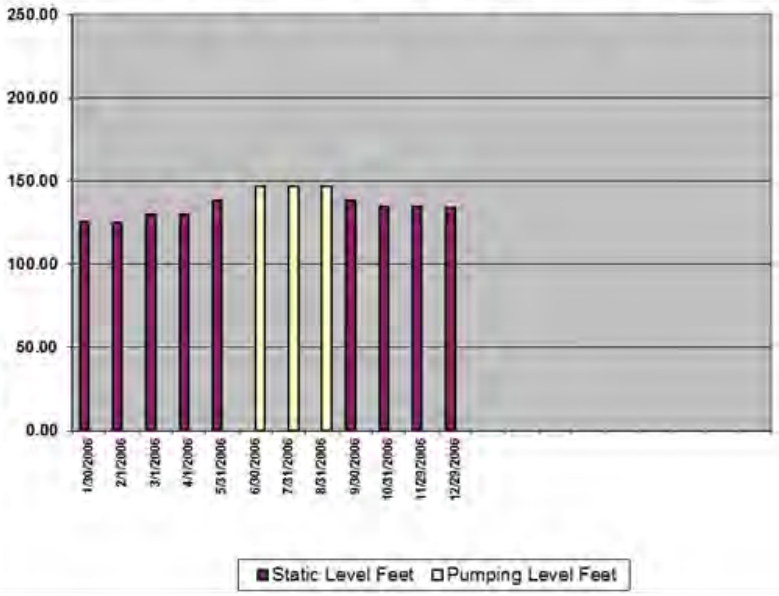

## 2006 - Well# 8 - Bowl Depth 180

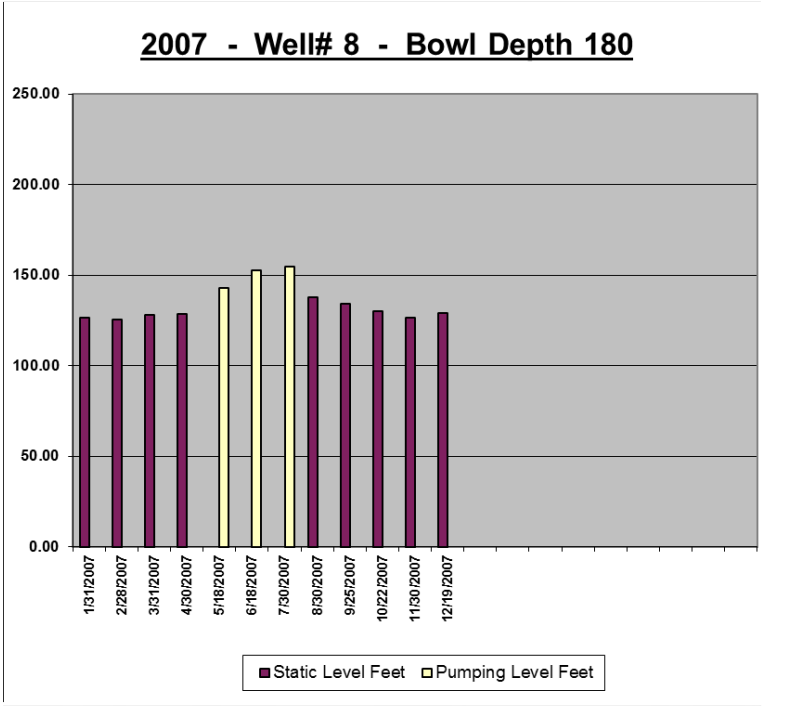


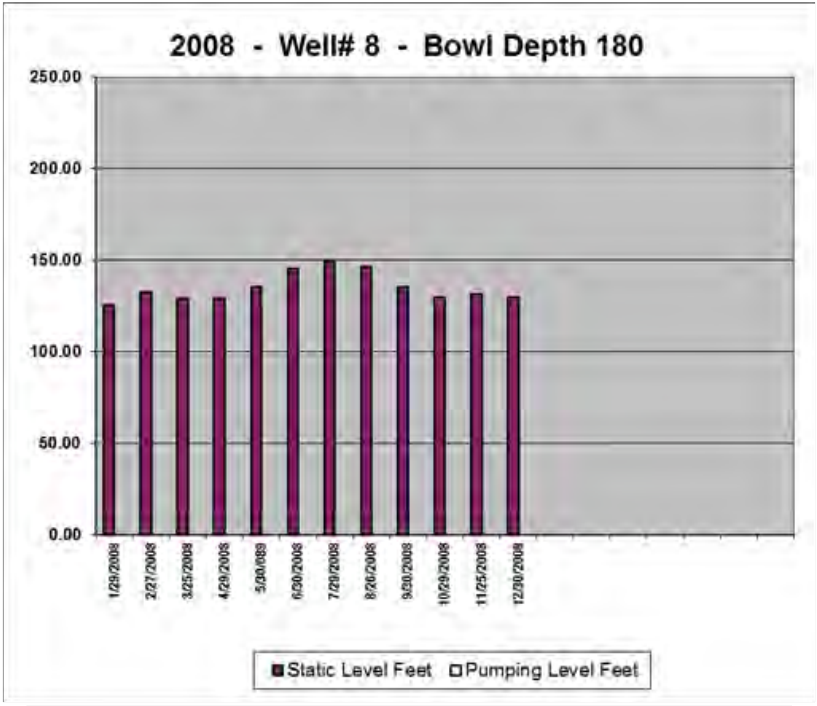

## 2004 ~ Well #8 - Bowl Depth 180

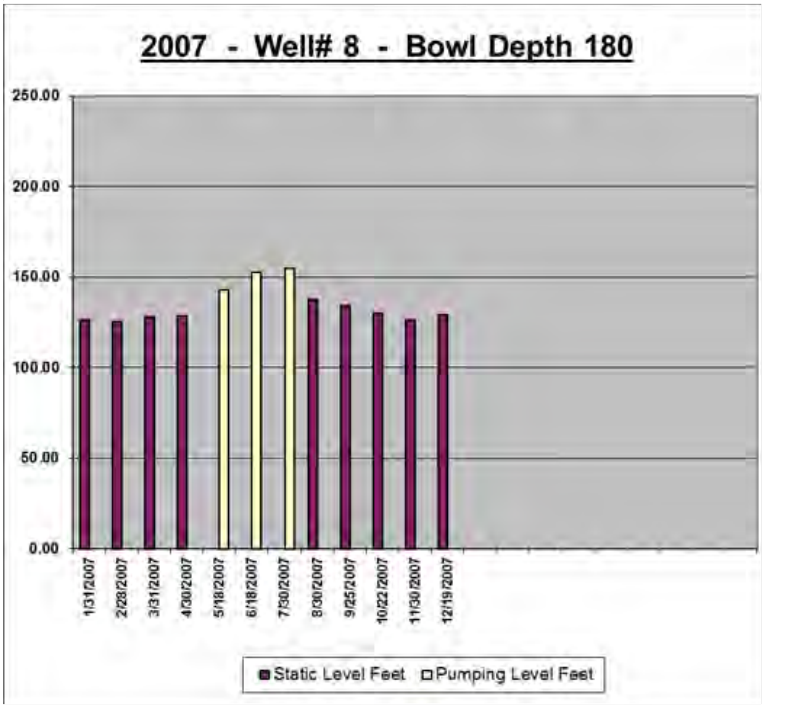


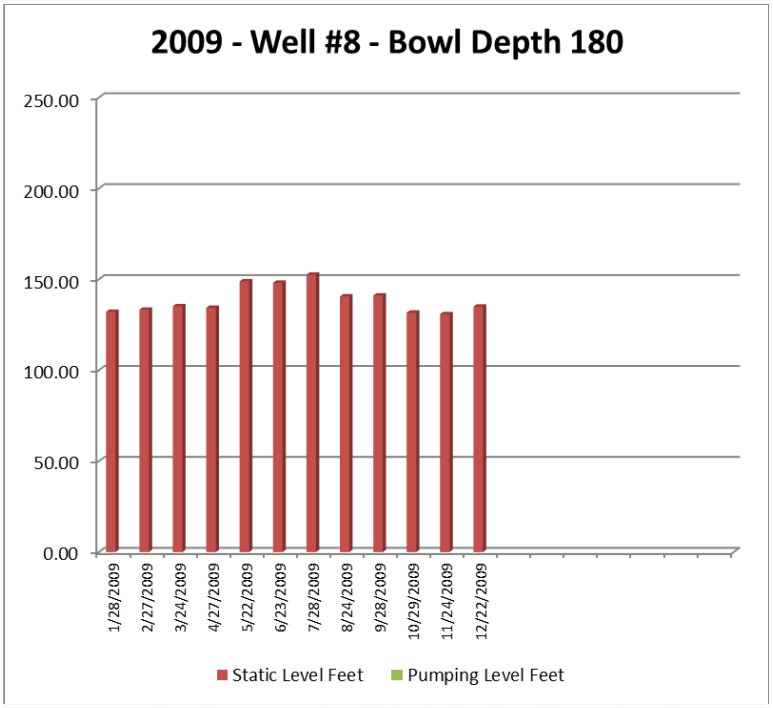

## 2006 - Well# 8 - Bowl Depth 180

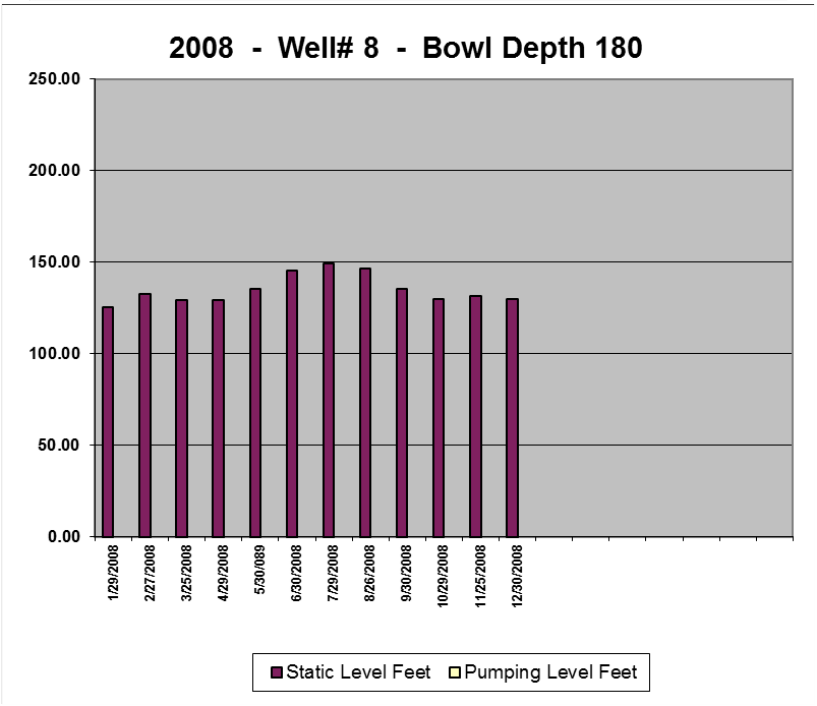


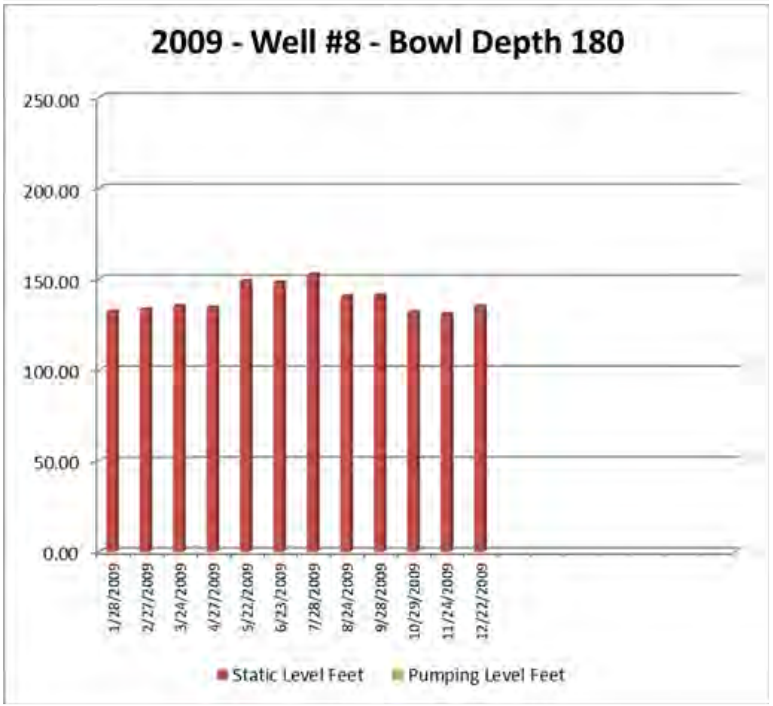

2007 - Well# 8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

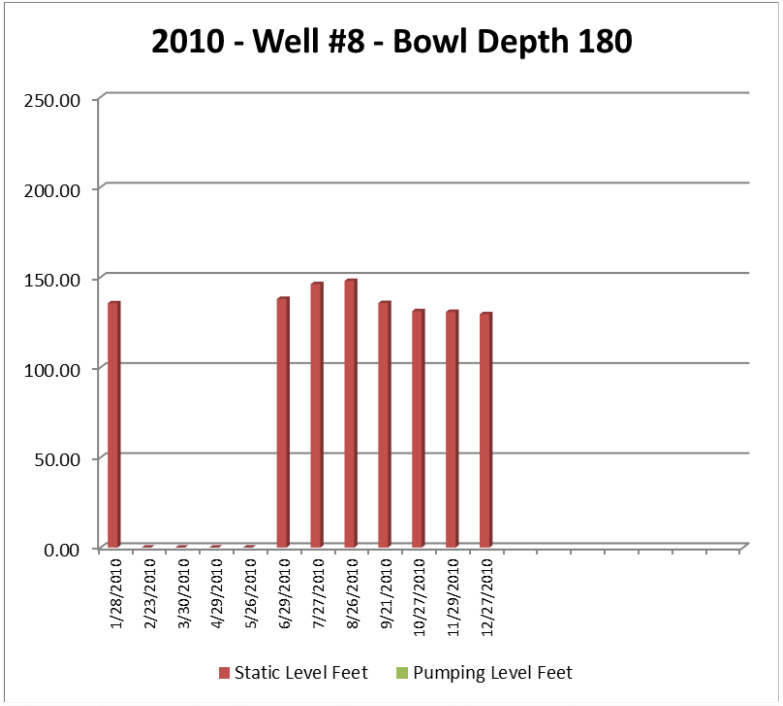

2008 - Well# 8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/089
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

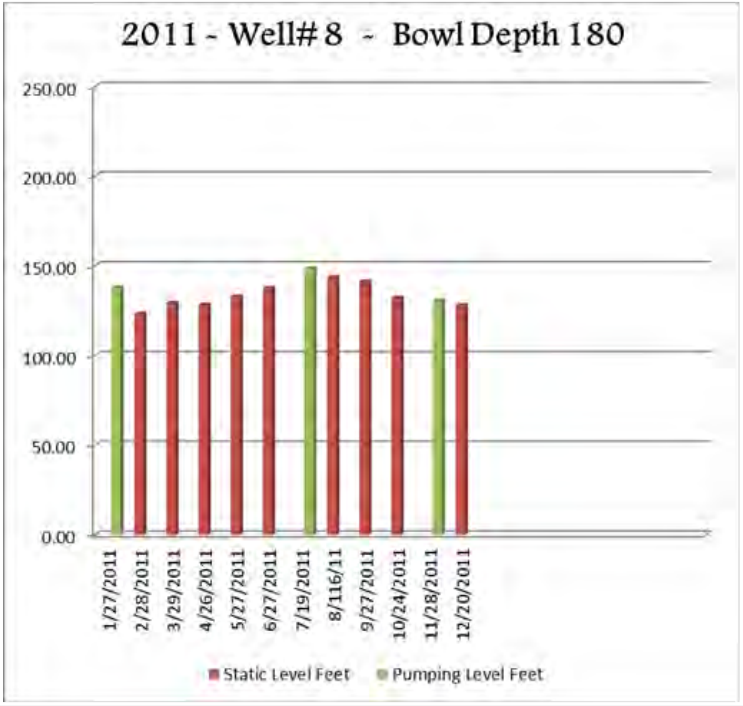

2007 - Well# 8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

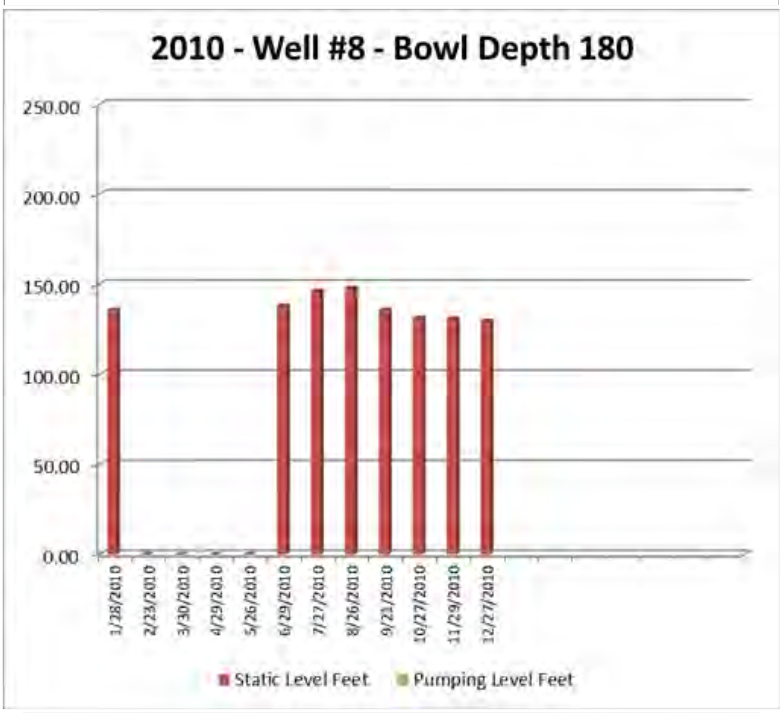

2009 - Well #8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

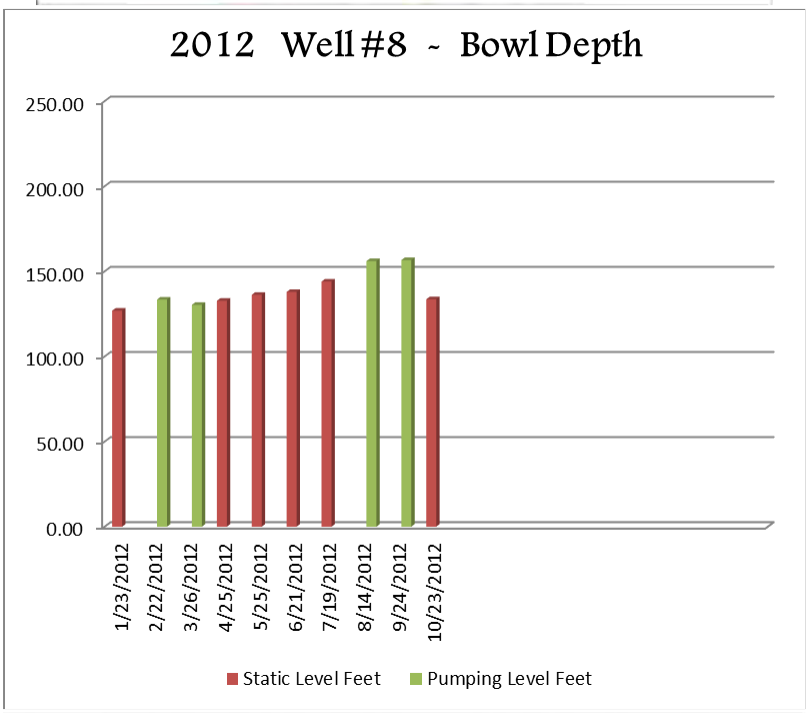

2008 - Well# 8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/089
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

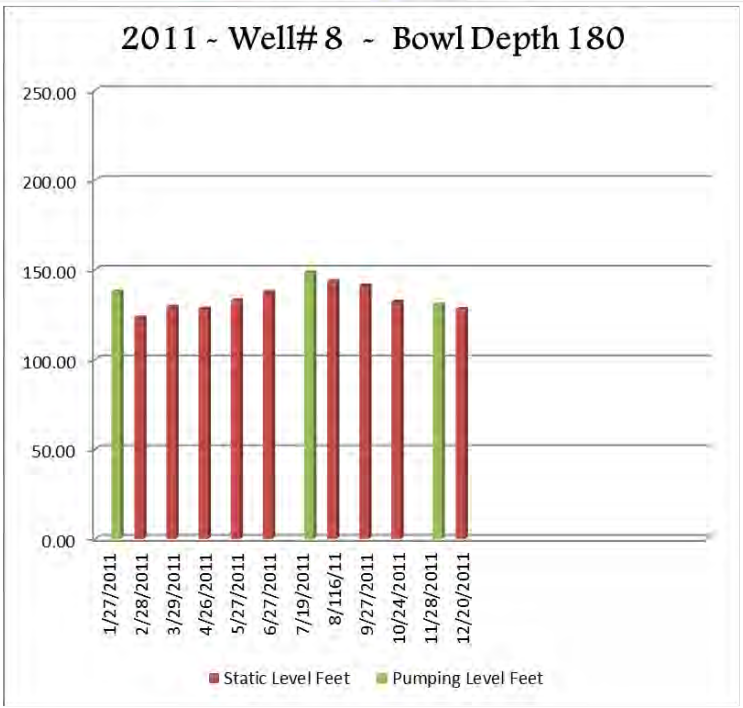

2009 - Well #8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

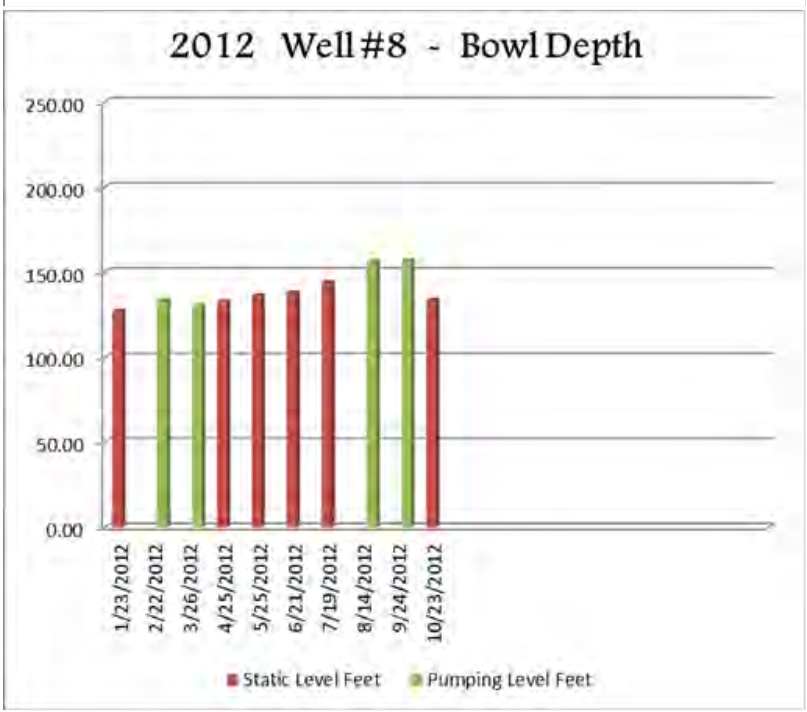

2010 - Well #8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

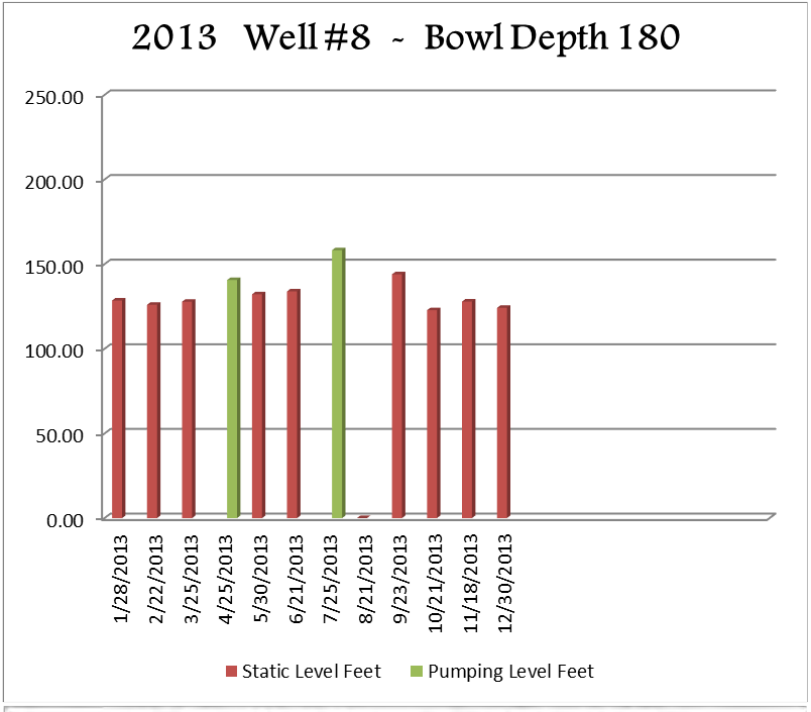

2011 - Well# 8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/116/11
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

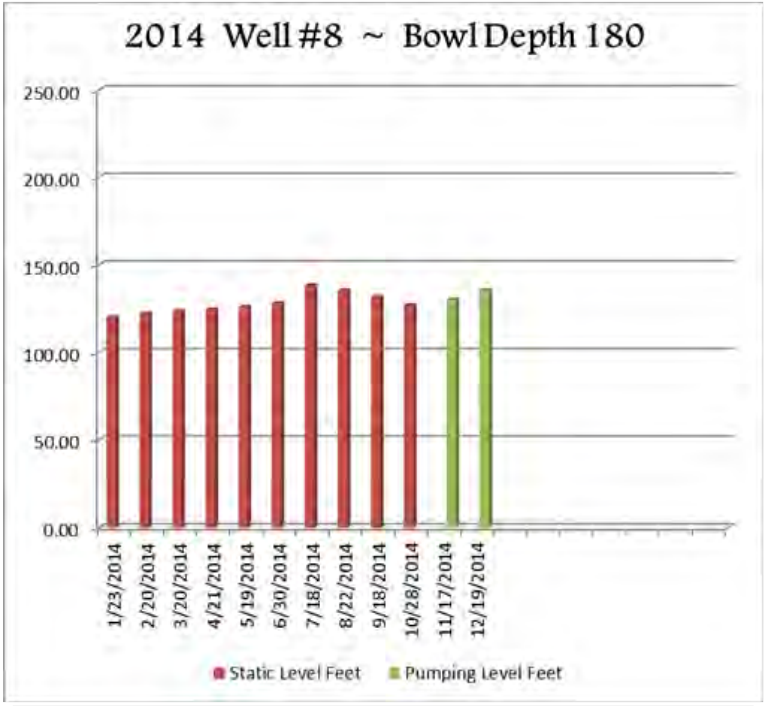

2010 - Well #8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

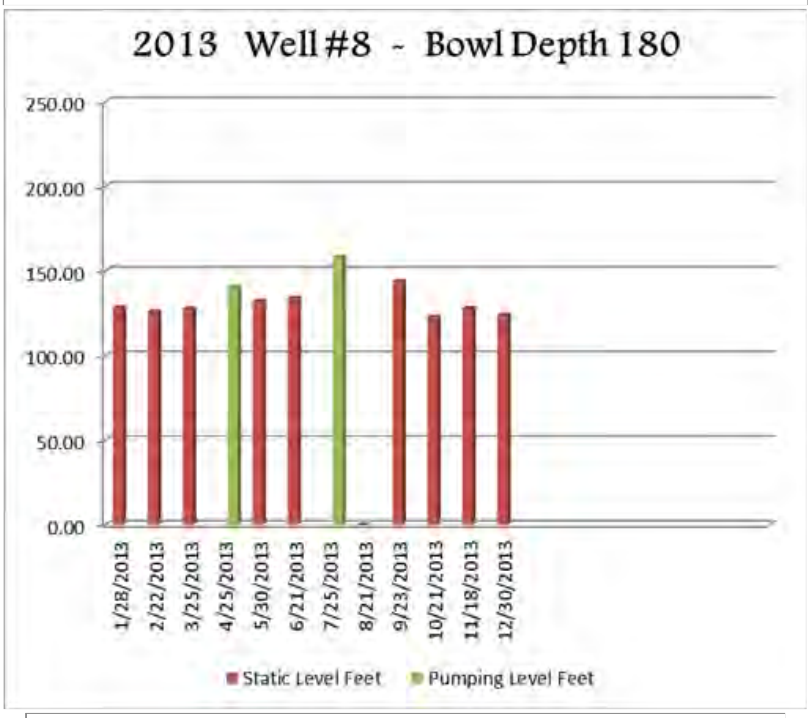

2012 Well #8 - Bowl Depth
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

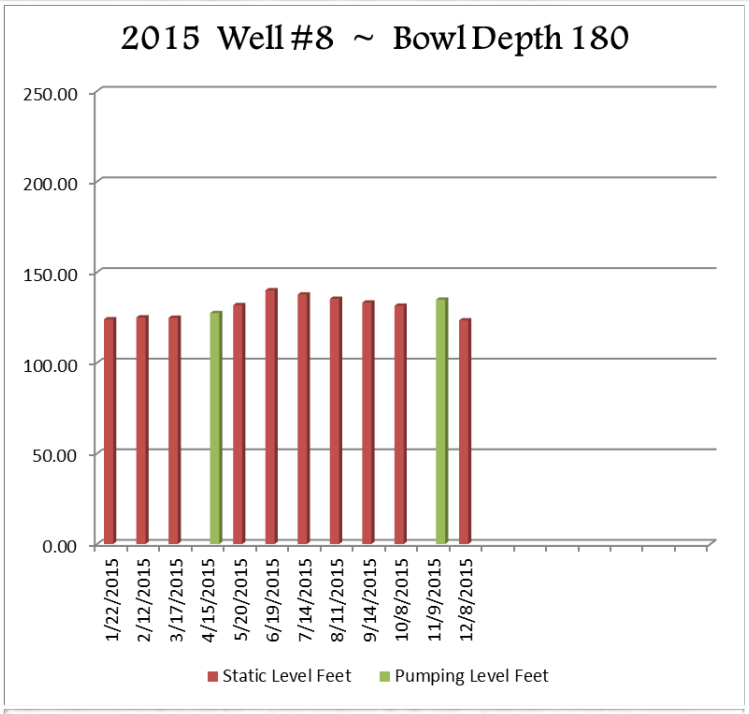

2011 - Well# 8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/116/11
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

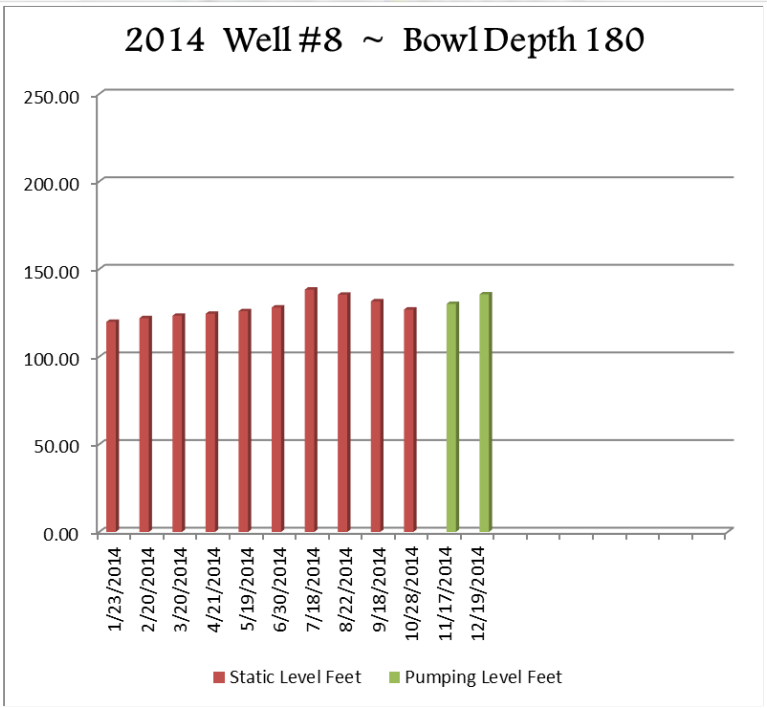

2012 Well #8 - Bowl Depth
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

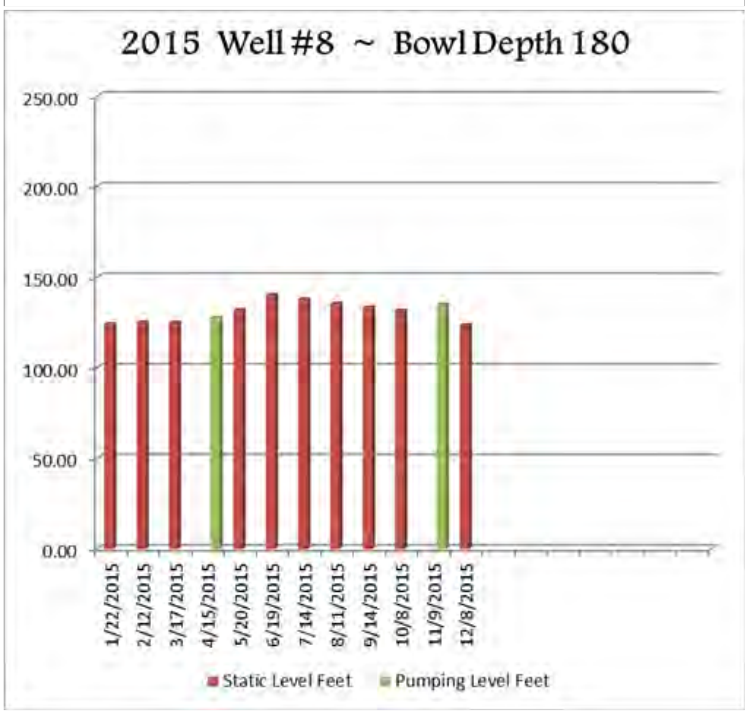

2013 Well #8 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

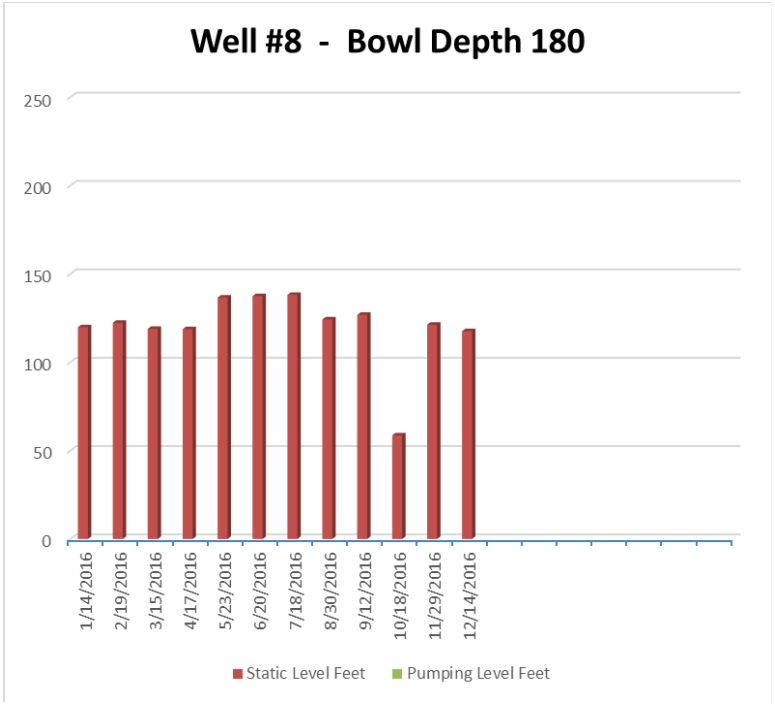

2014 Well #8 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

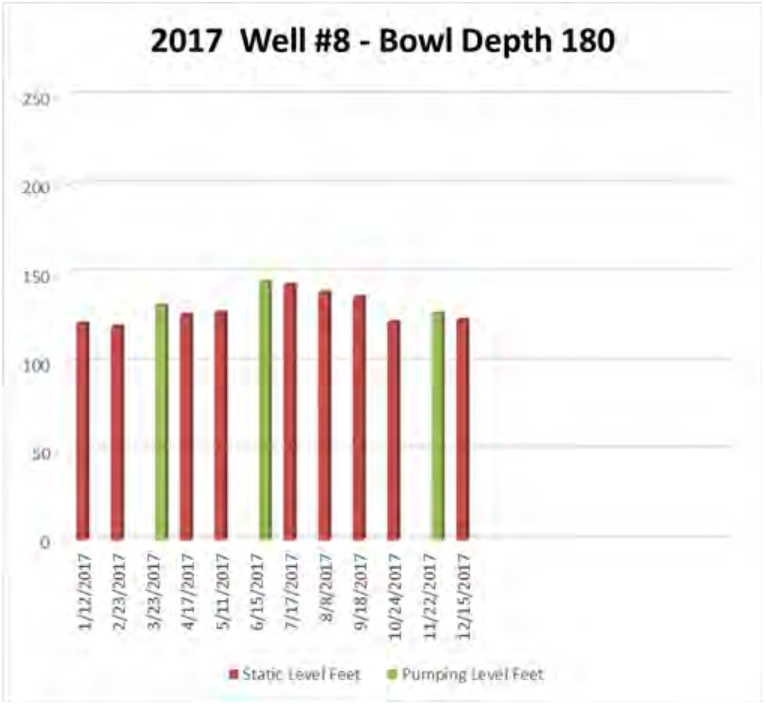

2013 Well #8 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

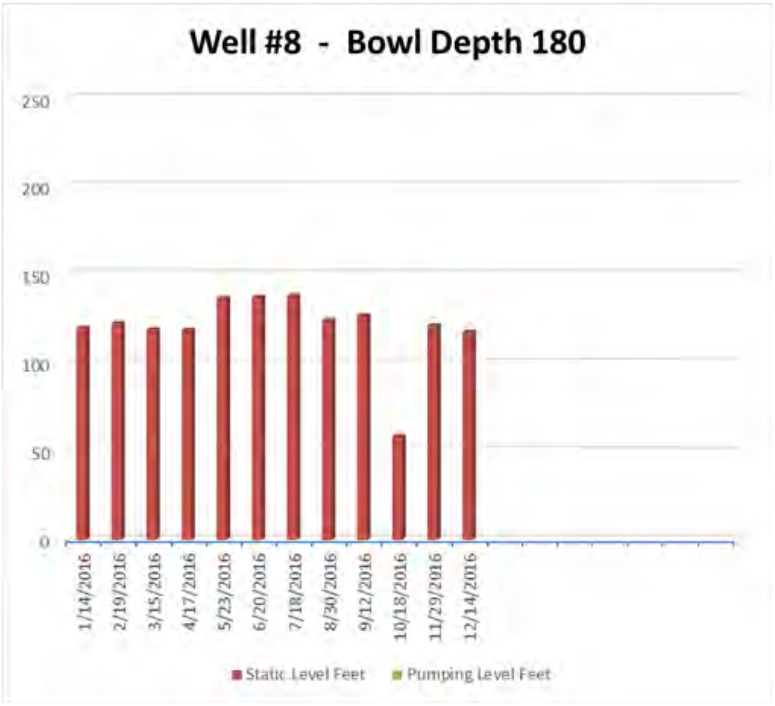

2015 Well #8 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

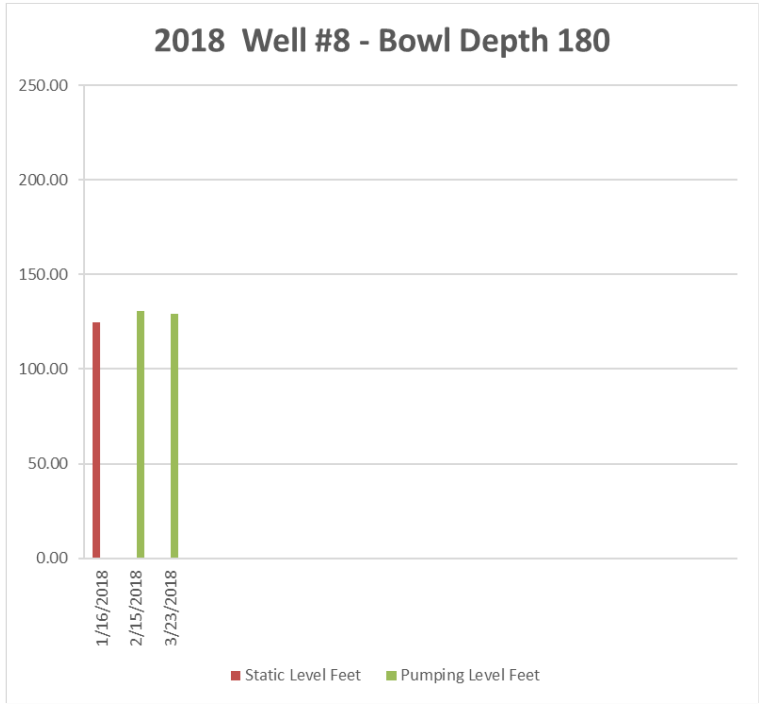

2014 Well #8 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

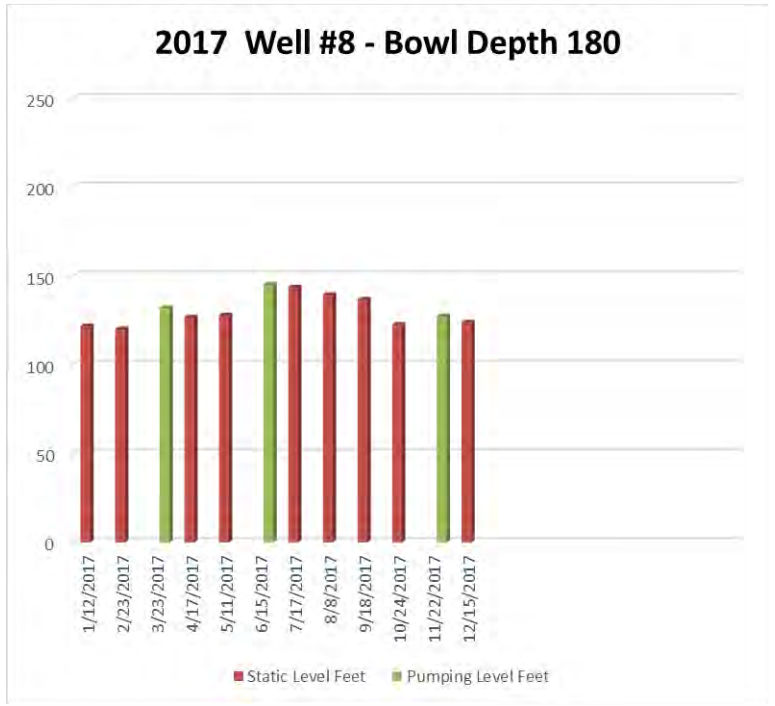

2015 Well #8 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

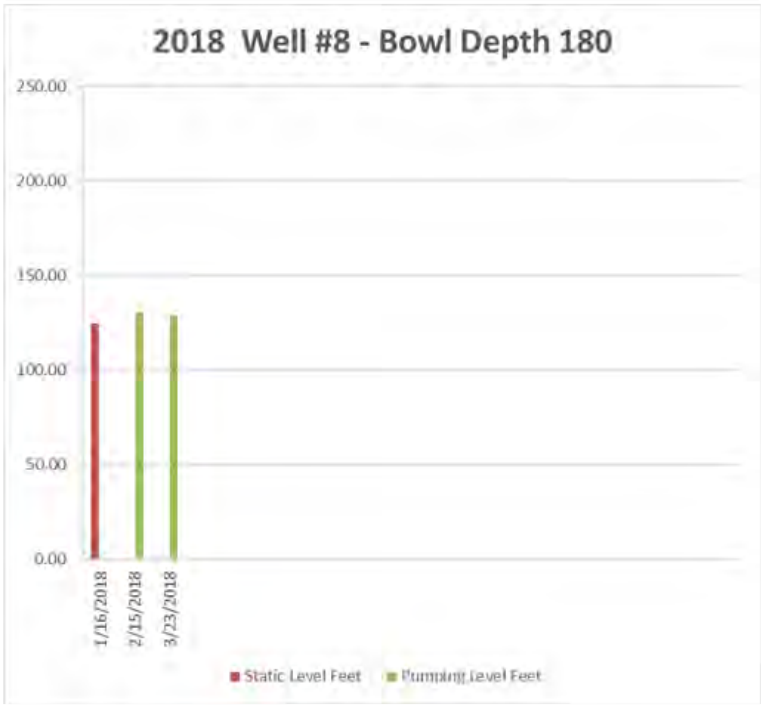

Well #8 - Bowl Depth 180
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

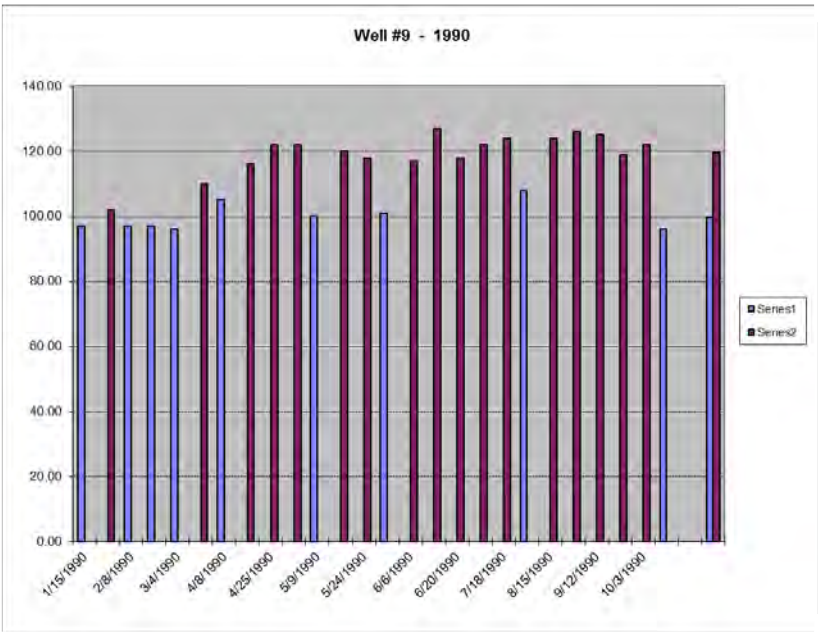

2017 Well #8 - Bowl Depth 180
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

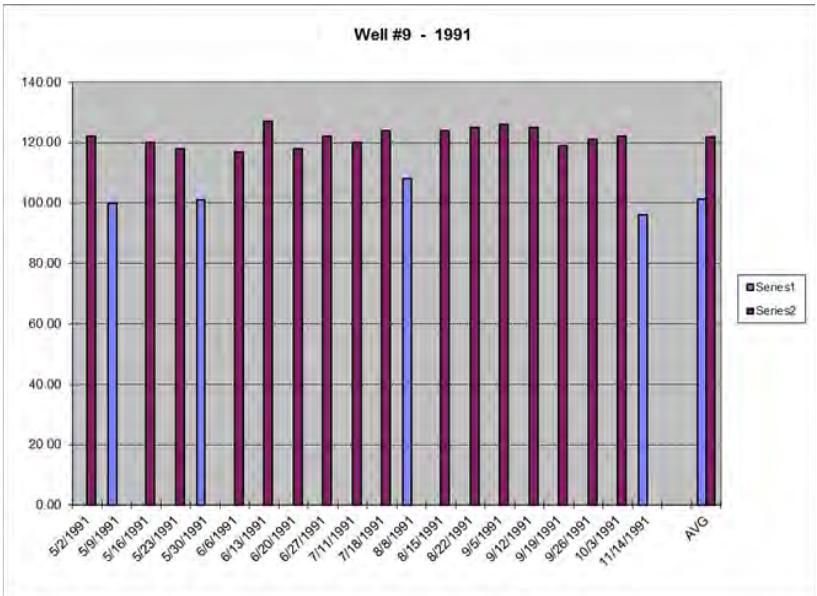

Well #8 - Bowl Depth 180
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

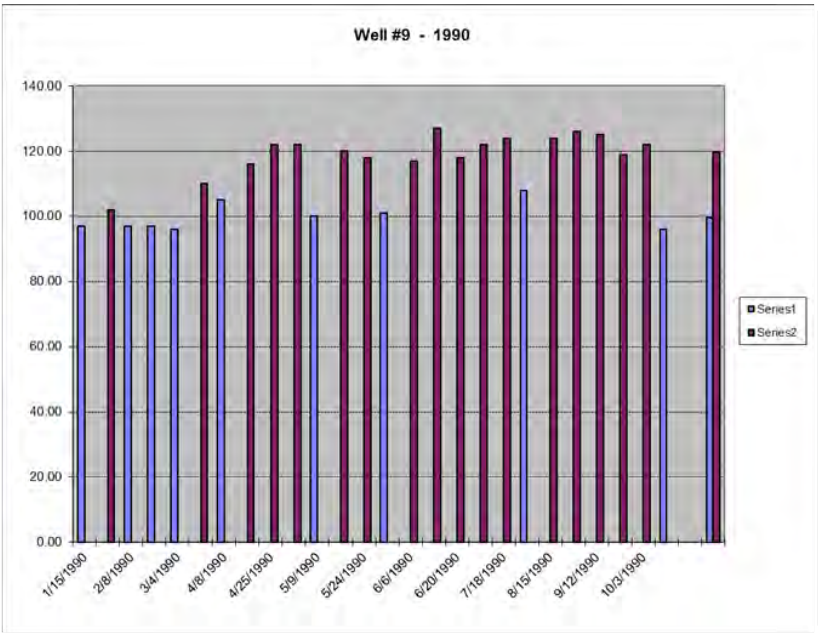

2018 Well #8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

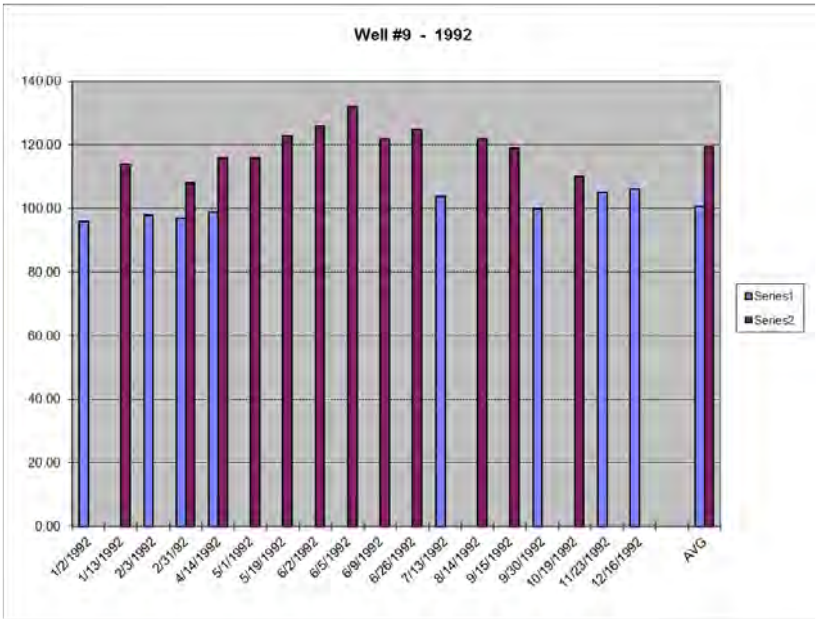

2017 Well #8 - Bowl Depth 180
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

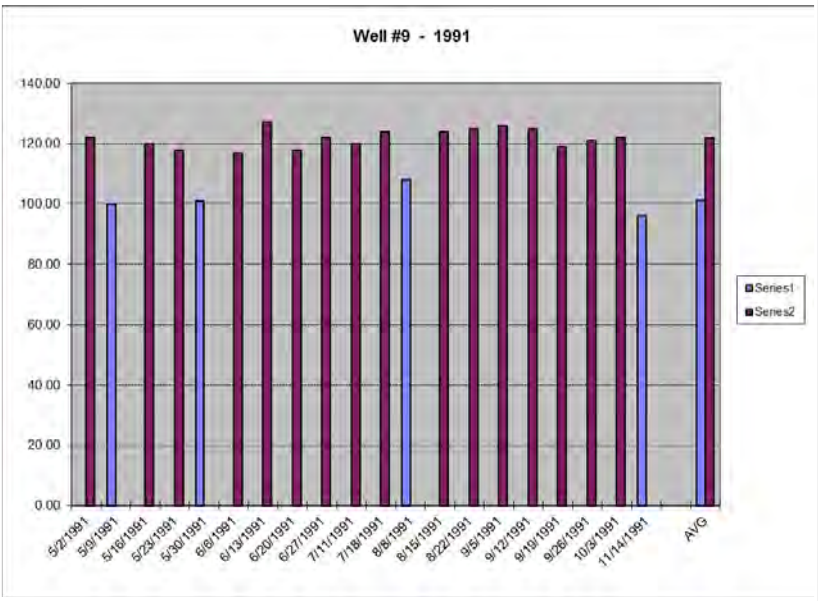

2018 Well #8 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

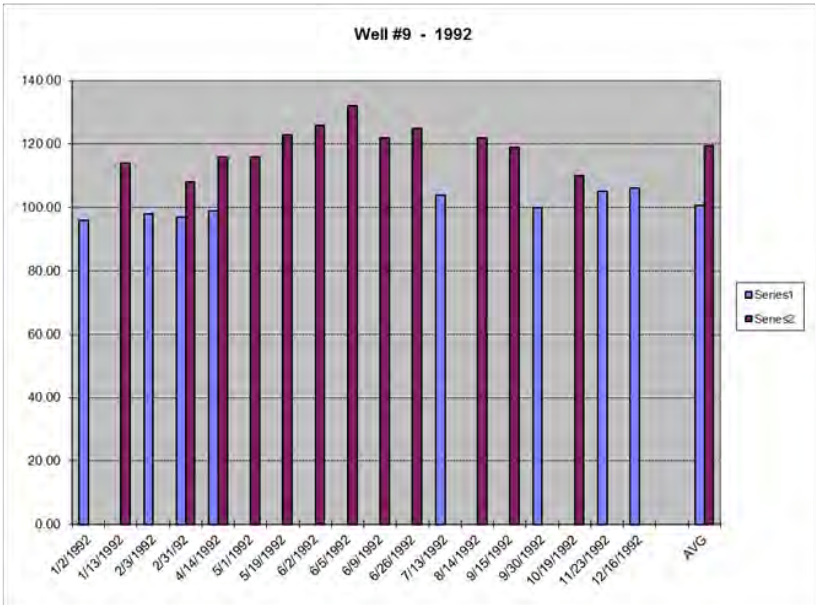

Well #9 - 1990
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1990
2/8/1990
3/4/1990
4/8/1990
4/25/1990
5/9/1990
5/24/1990
6/6/1990
6/20/1990
7/18/1990
8/15/1990
9/12/1990
10/3/1990
Series1
Series2

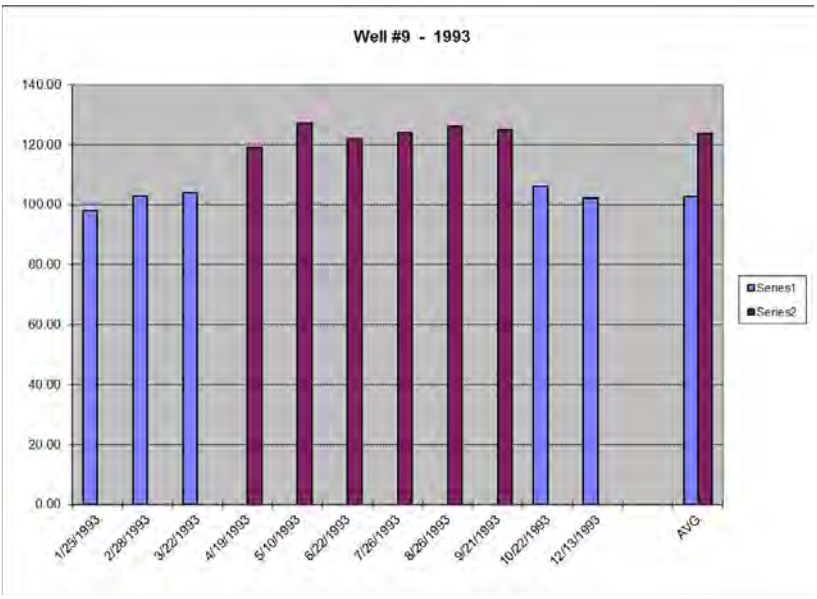

Well #9 - 1991
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
5/2/1991
5/9/1991
5/16/1991
5/23/1991
5/30/1991
6/6/1991
6/13/1991
6/20/1991
6/27/1991
7/11/1991
7/18/1991
8/8/1991
8/15/1991
8/22/1991
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9/12/1991
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9/26/1991
10/3/1991
11/14/1991
AVG
Series1
Series2

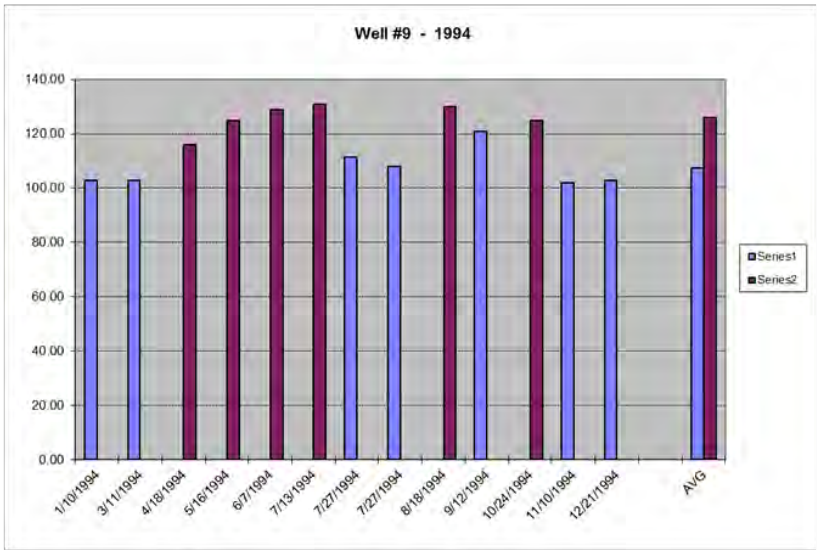

Well #9 - 1990
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1990
2/8/1990
3/4/1990
4/8/1990
4/25/1990
5/9/1990
5/24/1990
6/6/1990
6/20/1990
7/18/1990
8/15/1990
9/12/1990
10/3/1990
Series1
Series2

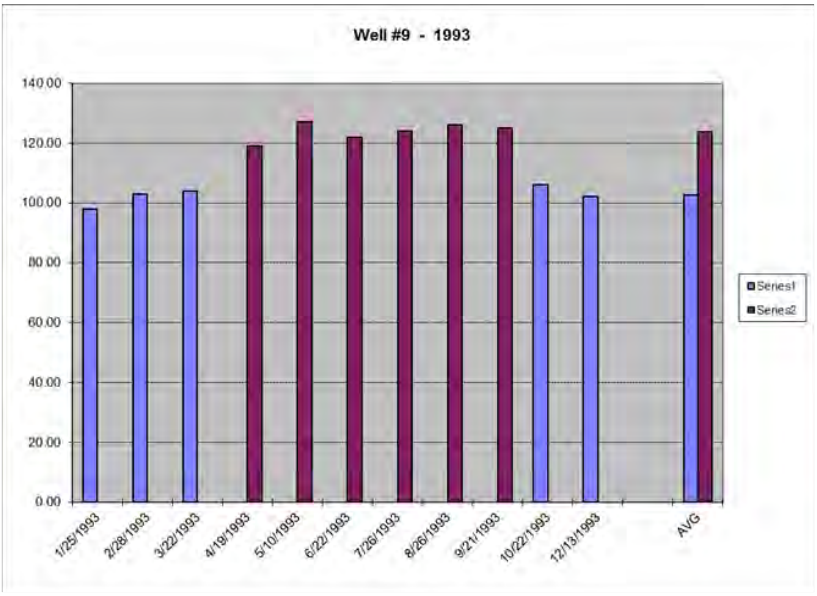

Well #9 - 1992
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/2/1992
1/13/1992
2/3/1992
2/31/92
4/14/1992
5/1/1992
5/19/1992
6/2/1992
6/5/1992
6/9/1992
6/26/1992
7/13/1992
8/14/1992
9/15/1992
9/30/1992
10/19/1992
11/23/1992
12/16/1992
AVG
Series1
Series2

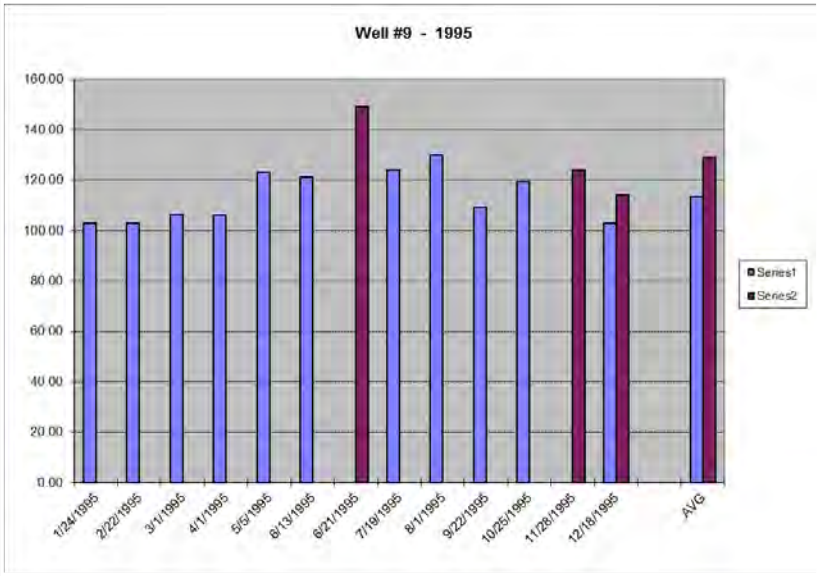

Well #9 - 1991
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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5/2/1991
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8/8/1991
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9/26/1991
10/3/1991
11/14/1991
AVG
Series1
Series2

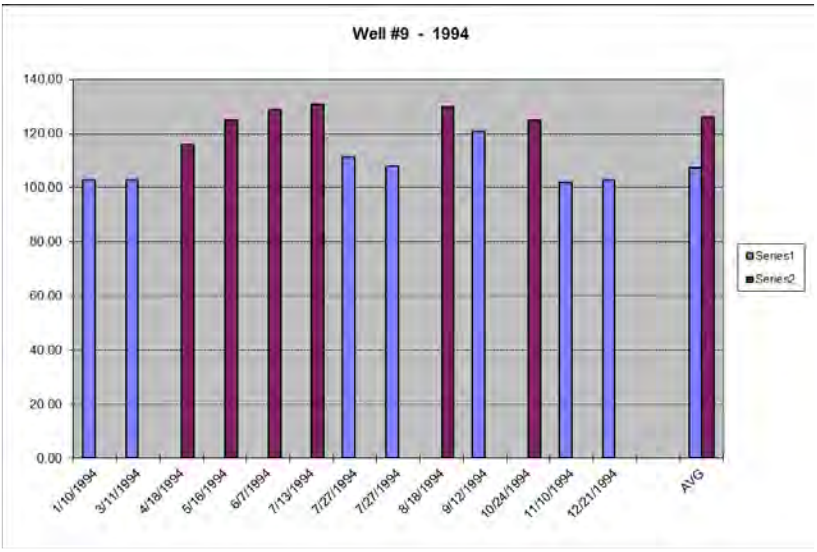

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6/26/1992
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11/23/1992
12/16/1992
AVG
Series1
Series2

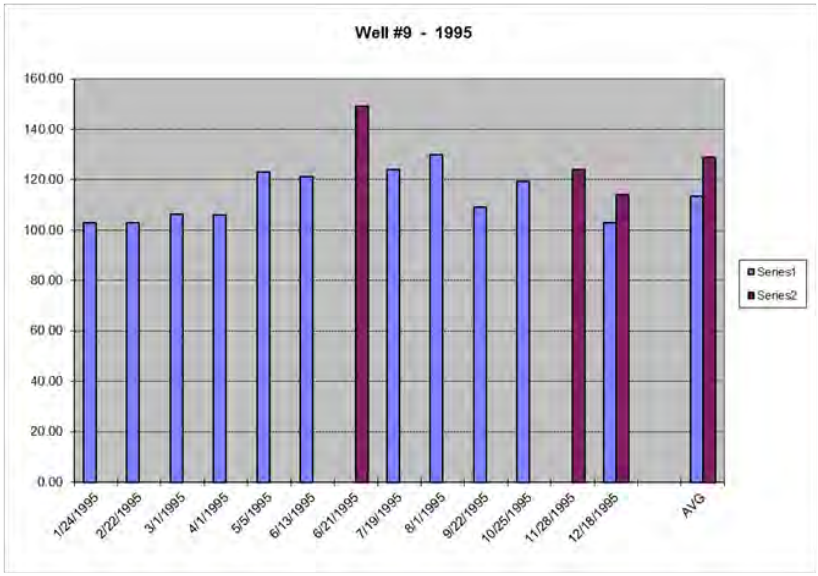

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10/22/1993
12/13/1993
AVG
Series1
Series2

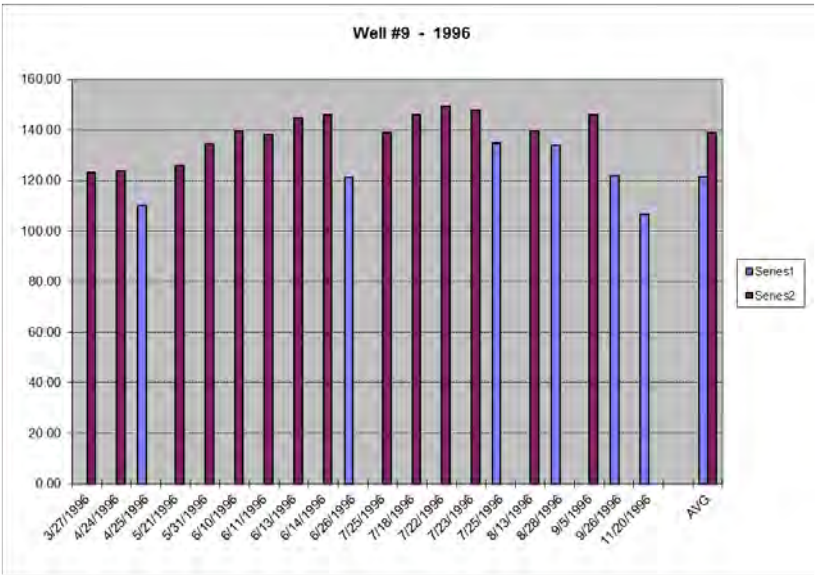

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12/21/1994
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Series1
Series2

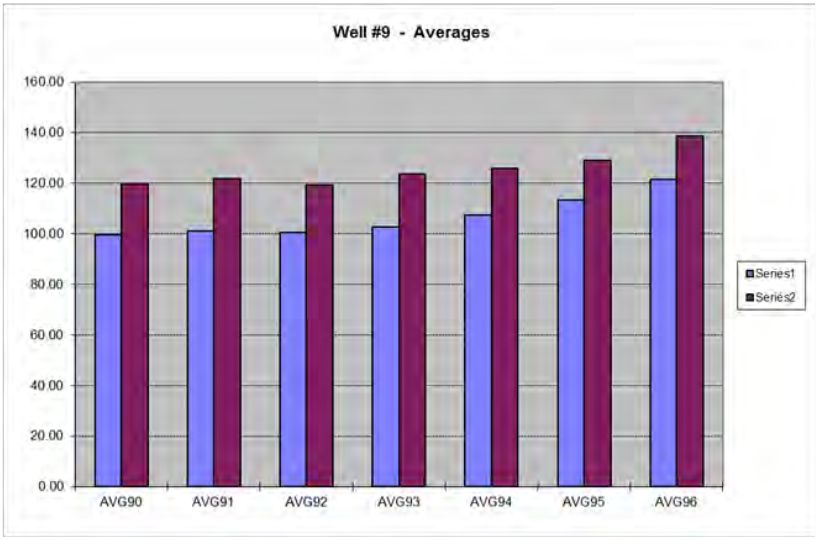

Well #9 - 1993
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4/19/1993
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7/26/1993
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9/21/1993
10/22/1993
12/13/1993
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Series1
Series2

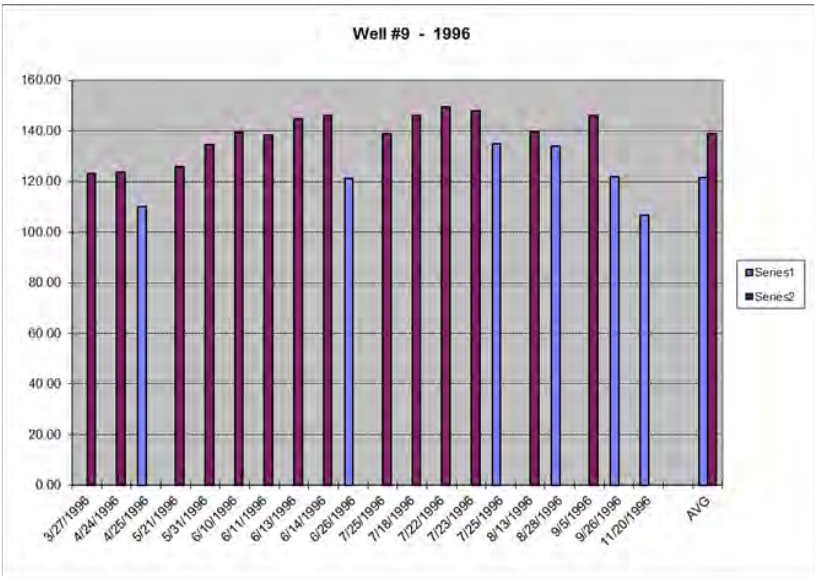

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6/13/1995
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8/1/1995
9/22/1995
10/25/1995
11/28/1995
12/18/1995
AVG
Series1
Series2

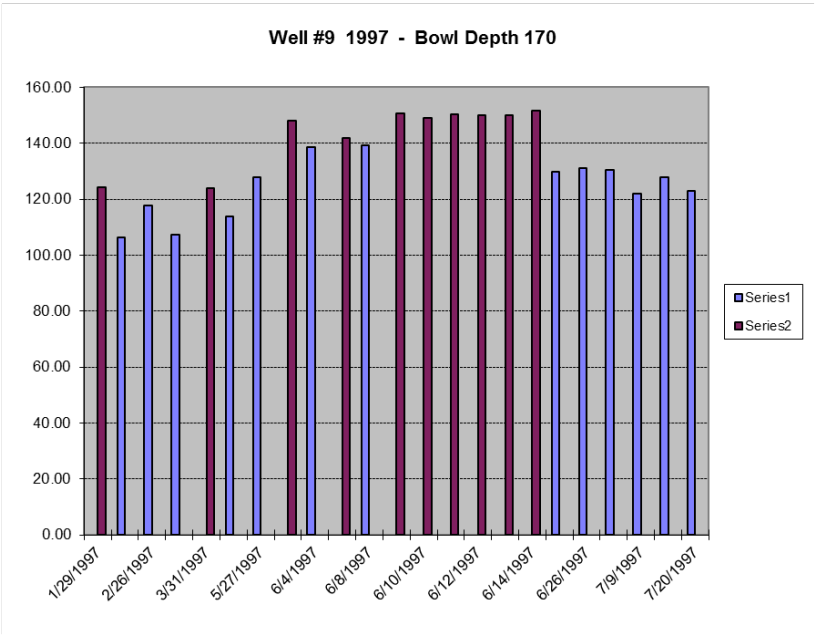

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7/13/1994
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12/21/1994
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Series1
Series2

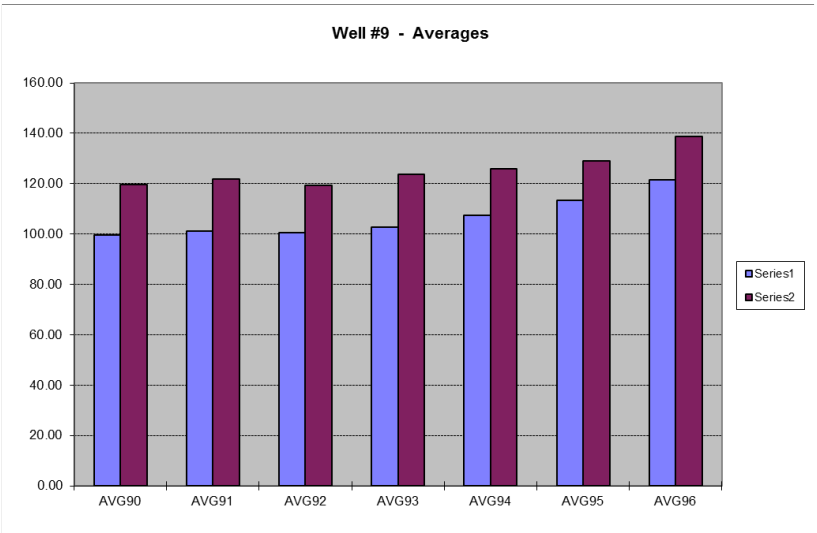

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6/13/1995
6/21/1995
7/19/1995
8/1/1995
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11/28/1995
12/18/1995
AVG
Series1
Series2

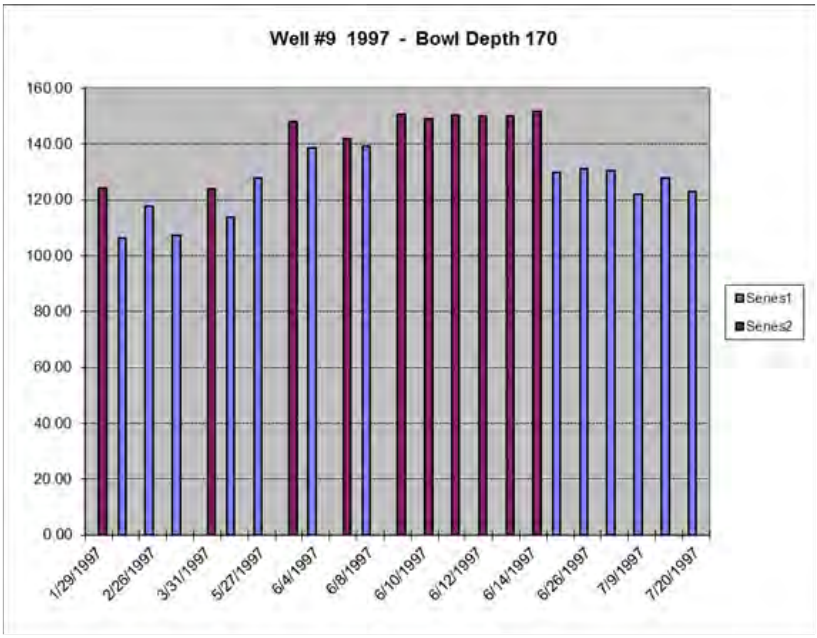

Well #9 - 1996
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20.00
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6/10/1996
6/11/1996
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7/22/1996
7/23/1996
7/25/1996
8/13/1996
8/28/1996
9/5/1996
9/26/1996
11/20/1996
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Series1
Series2

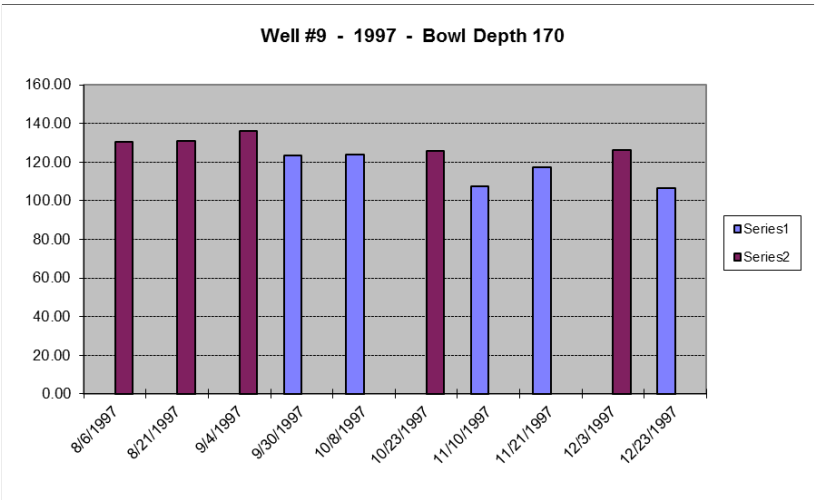

Well #9 - Averages
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80.00
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40.00
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AVG90
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

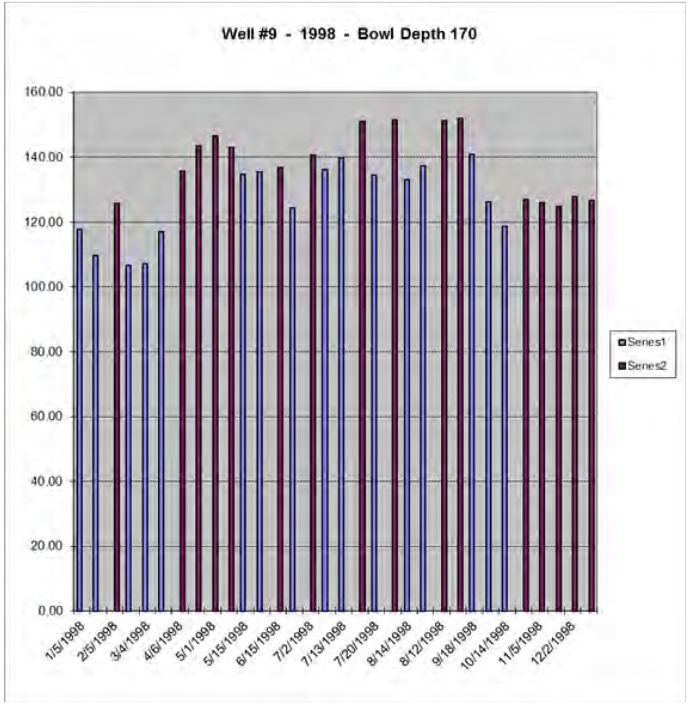

Well #9 - 1996
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20.00
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3/27/1996
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6/10/1996
6/11/1996
6/13/1996
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6/26/1996
7/25/1996
7/18/1996
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9/26/1996
11/20/1996
AVG
Series1
Series2

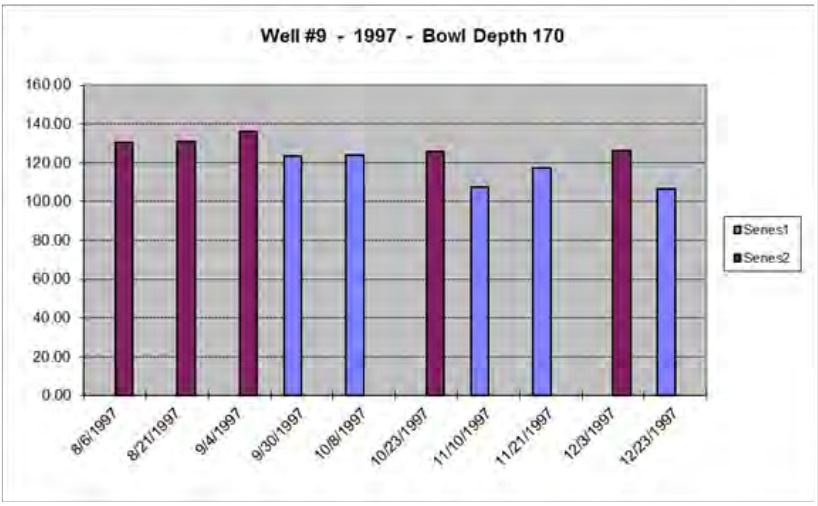

Well #9 1997 - Bowl Depth 170
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
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5/27/1997
6/4/1997
6/8/1997
6/10/1997
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6/14/1997
6/26/1997
7/9/1997
7/20/1997
Series1
Series2

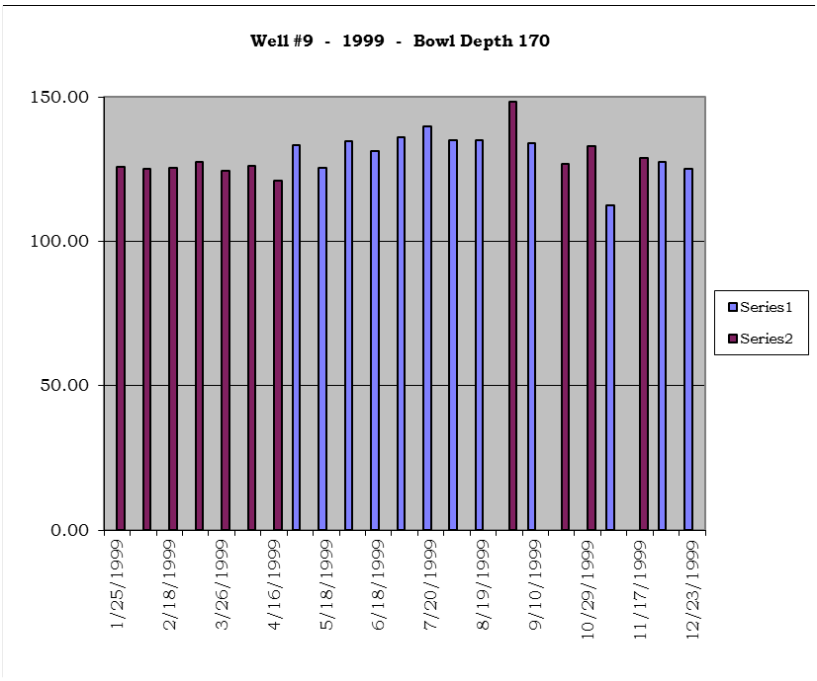

Well #9 - Averages
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140.00
120.00
100.00
80.00
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40.00
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0.00
AVG90
AVG91
AVG92
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AVG94
AVG95
AVG96
Series1
Series2

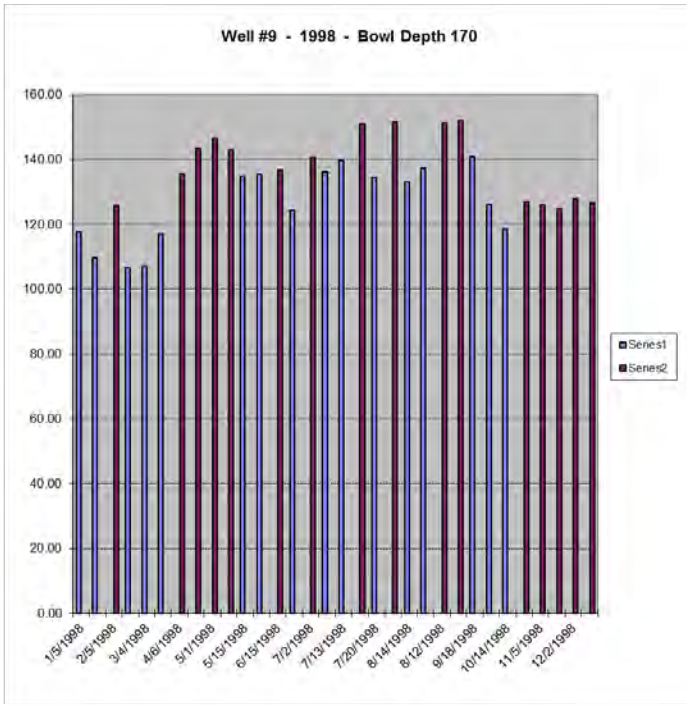

Well #9 1997 - Bowl Depth 170
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80.00
60.00
40.00
20.00
0.00
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5/27/1997
6/4/1997
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6/12/1997
6/14/1997
6/26/1997
7/9/1997
7/20/1997
Series1
Series2

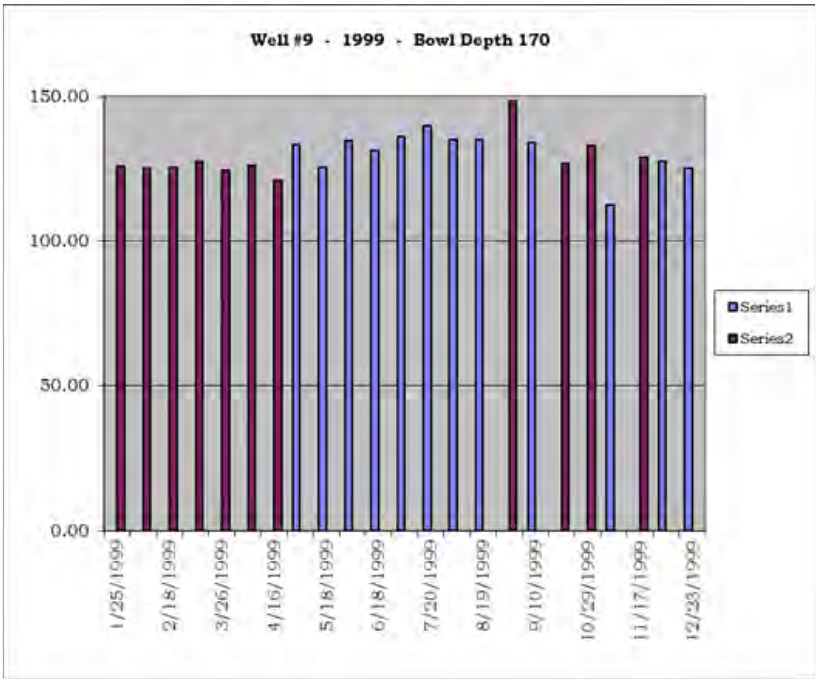

Well #9 - 1997 - Bowl Depth 170
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100.00
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20.00
0.00
8/6/1997
8/21/1997
9/4/1997
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10/8/1997
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11/21/1997
12/3/1997
12/23/1997
Series1
Series2

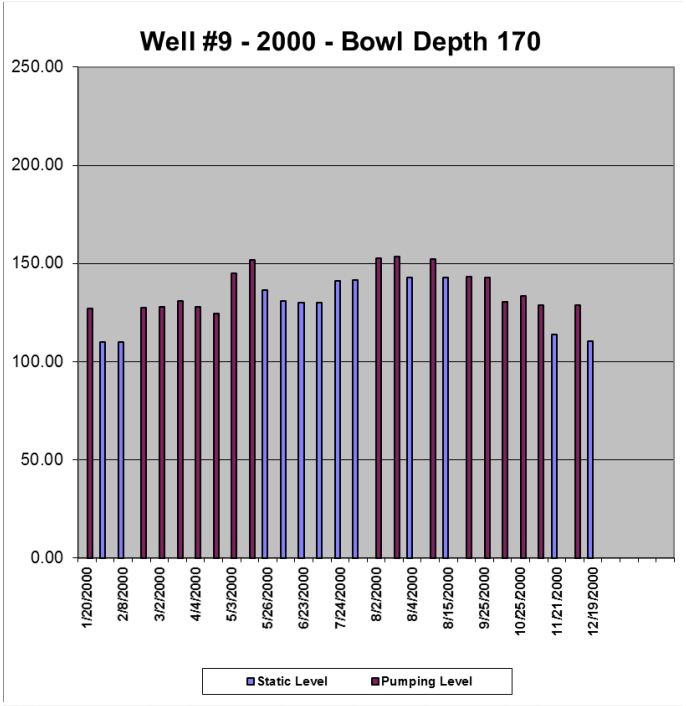

Well #9 - 1998 - Bowl Depth 170
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
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7/2/1998
7/13/1998
7/20/1998
8/14/1998
8/12/1998
9/18/1998
10/14/1998
11/5/1998
12/2/1998
Series1
Series2

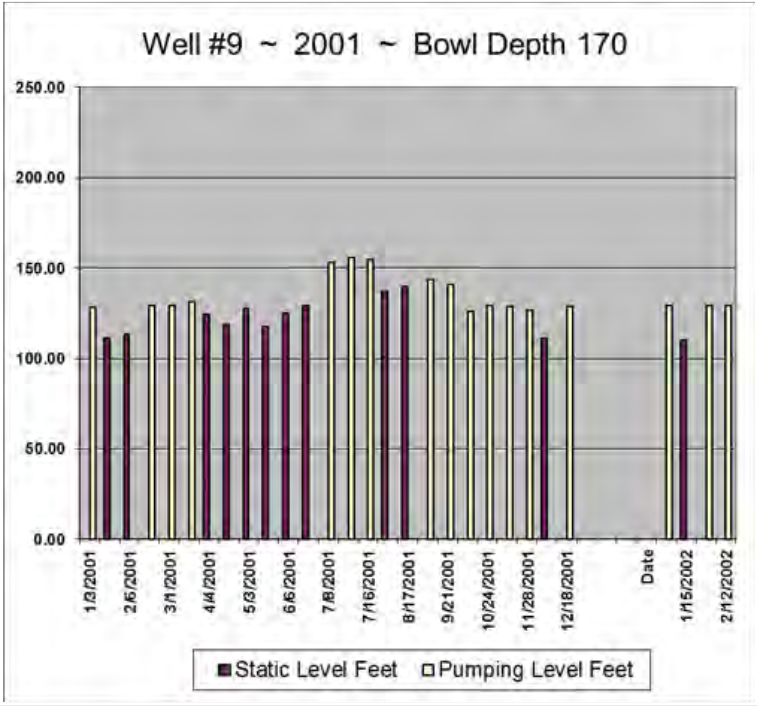

Well #9 - 1997 - Bowl Depth 170
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/6/1997
8/21/1997
9/4/1997
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12/3/1997
12/23/1997
Series1
Series2

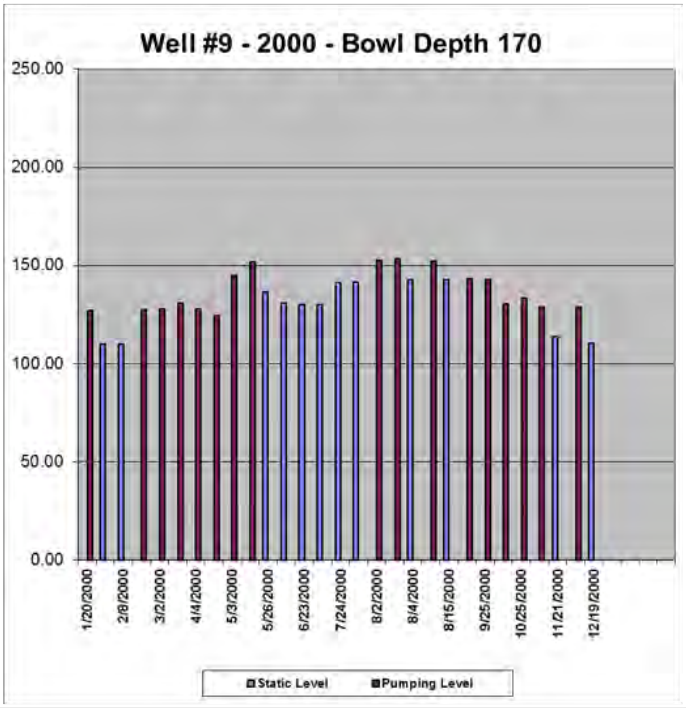

Well #9 - 1999 - Bowl Depth 170
150.00
100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
5/18/1999
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9/10/1999
10/29/1999
11/17/1999
12/23/1999
Series1
Series2

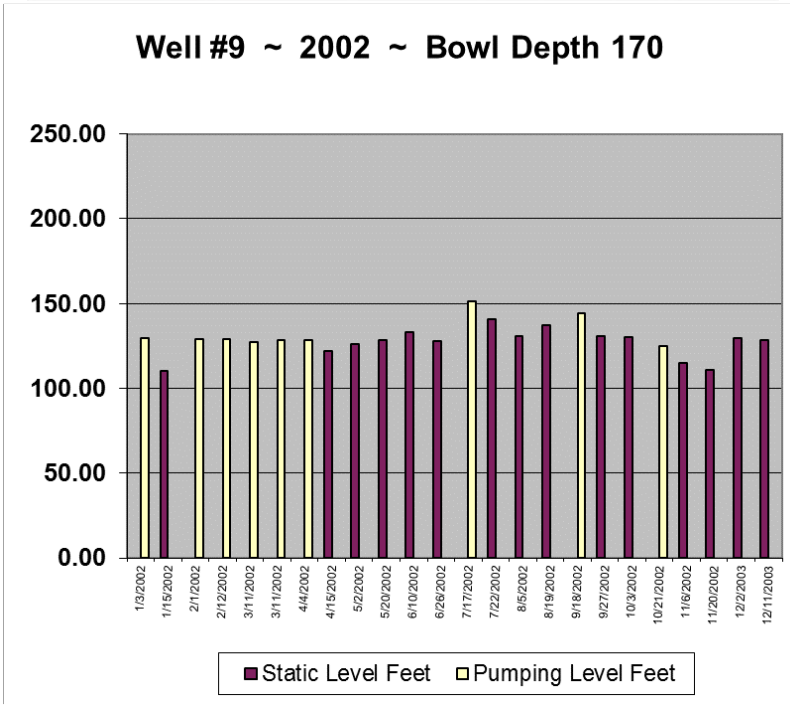

Well #9 - 1998 - Bowl Depth 170
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
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2/5/1998
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7/2/1998
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10/14/1998
11/5/1998
12/2/1998
Series1
Series2

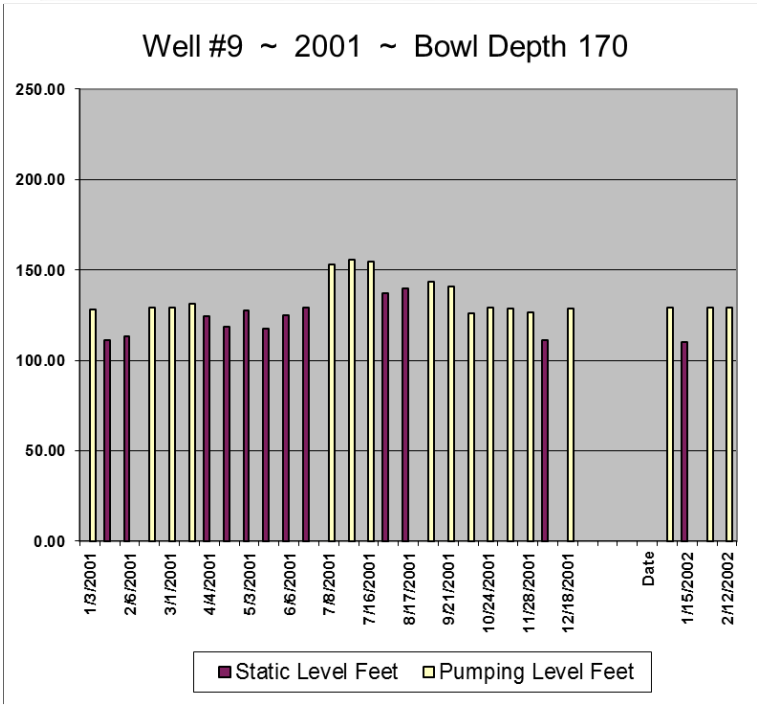

Well #9 - 1999 - Bowl Depth 170
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50.00
0.00
1/25/1999
2/18/1999
3/26/1999
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5/18/1999
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11/17/1999
12/23/1999
Series1
Series2

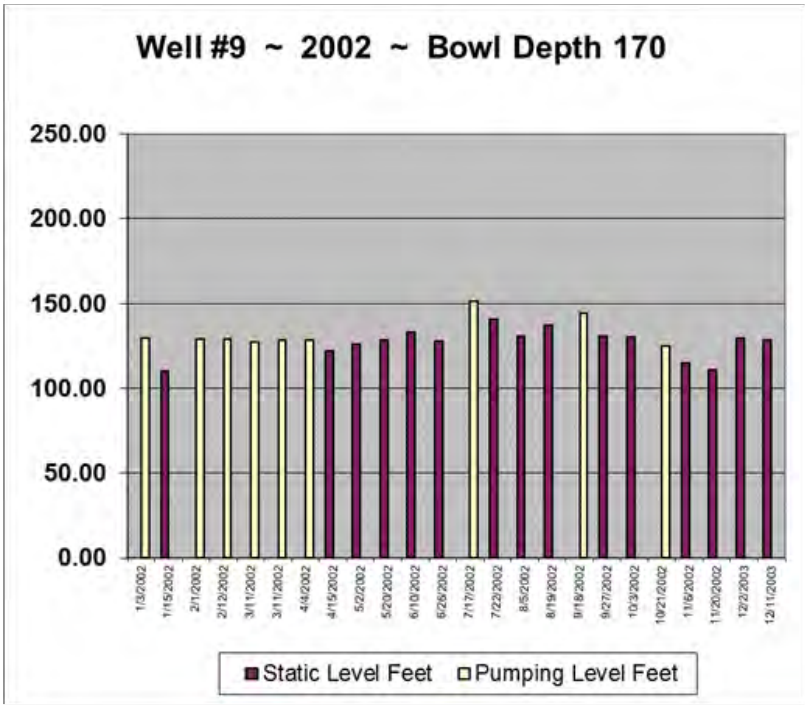

Well #9 - 2000 - Bowl Depth 170
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200.00
150.00
100.00
50.00
0.00
1/20/2000
2/8/2000
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6/23/2000
7/24/2000
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9/25/2000
10/25/2000
11/21/2000
12/19/2000
Static Level
Pumping Level

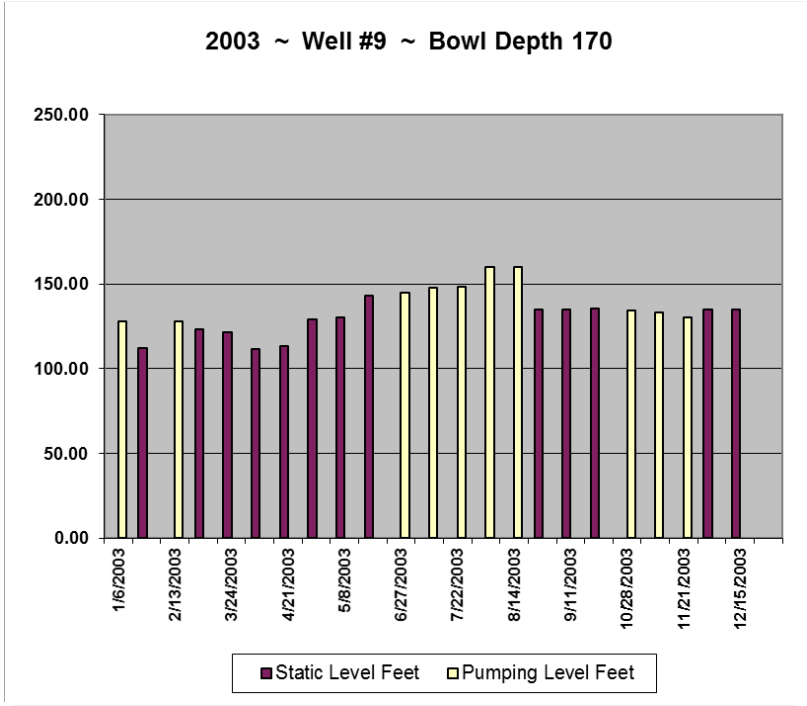

Well #9 ~ 2001 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2001
2/6/2001
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4/4/2001
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7/16/2001
8/17/2001
9/21/2001
10/24/2001
11/28/2001
12/18/2001
Date
1/15/2002
2/12/2002
Static Level Feet
Pumping Level Feet

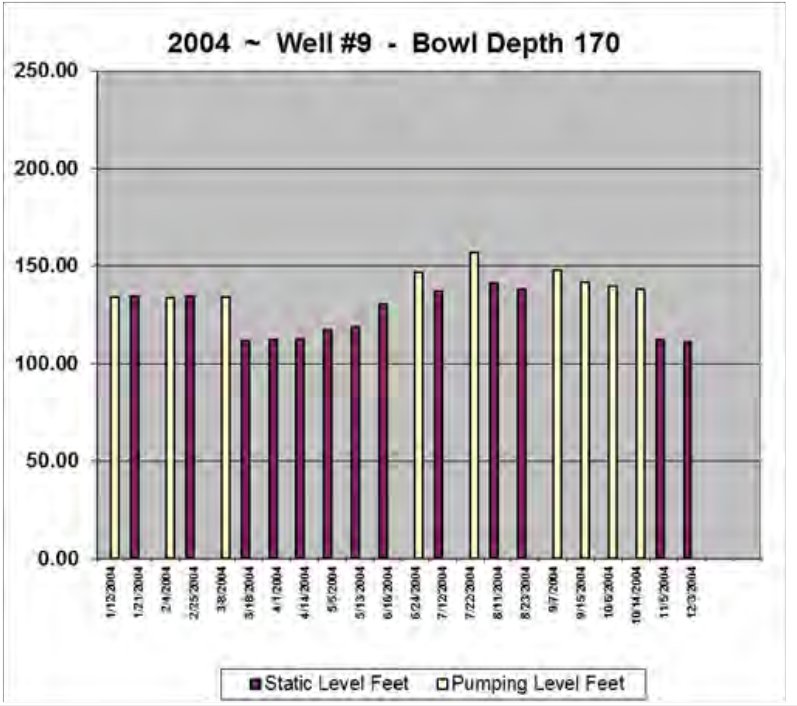

Well #9 - 2000 - Bowl Depth 170
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0.00
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2/8/2000
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6/23/2000
7/24/2000
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8/15/2000
9/25/2000
10/25/2000
11/21/2000
12/19/2000
Static Level
Pumping Level

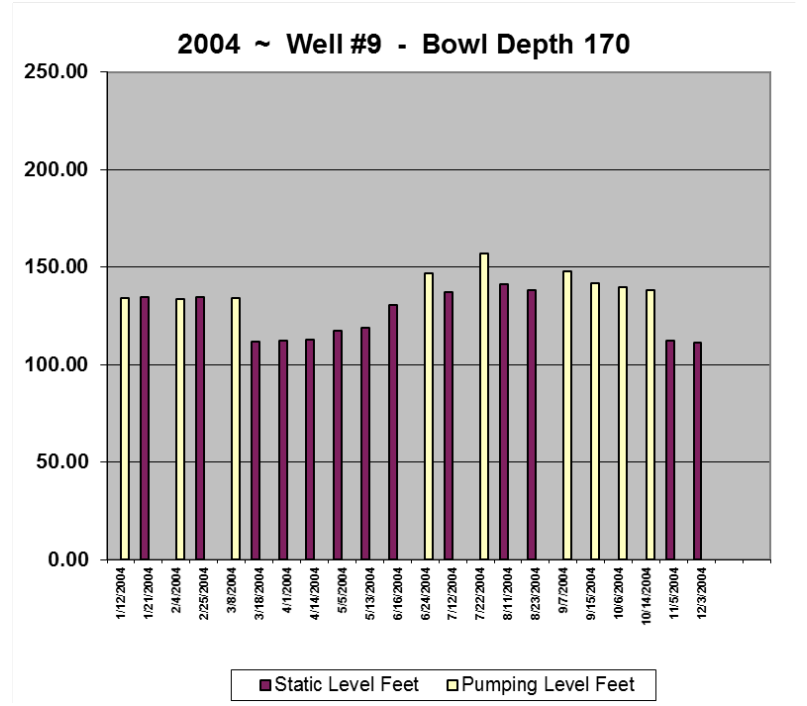

Well #9 ~ 2002 ~ Bowl Depth 170
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0.00
1/3/2002
1/15/2002
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8/19/2002
9/18/2002
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10/21/2002
11/8/2002
11/20/2002
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

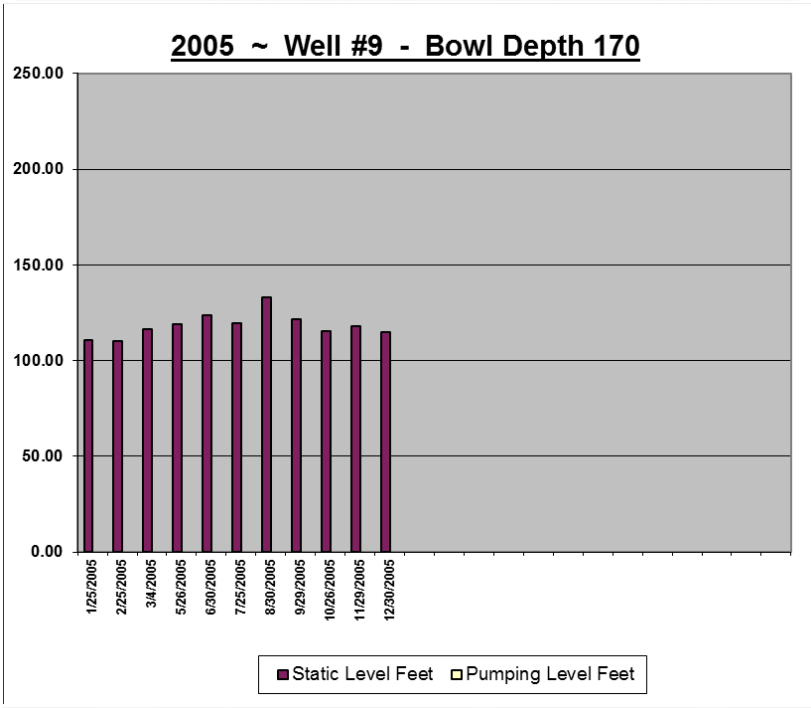

Well #9 ~ 2001 ~ Bowl Depth 170
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0.00
1/3/2001
2/6/2001
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7/16/2001
8/17/2001
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11/28/2001
12/18/2001
Date
1/15/2002
2/12/2002
Static Level Feet
Pumping Level Feet

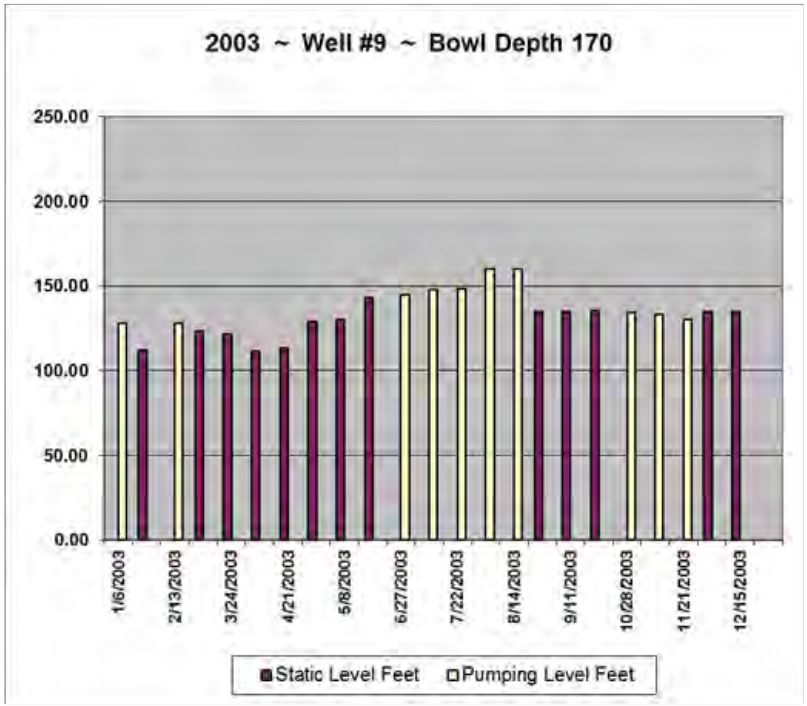

Well #9 ~ 2002 ~ Bowl Depth 170
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100.00
50.00
0.00
1/3/2002
1/15/2002
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8/19/2002
9/18/2002
9/27/2002
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10/21/2002
11/8/2002
11/20/2002
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

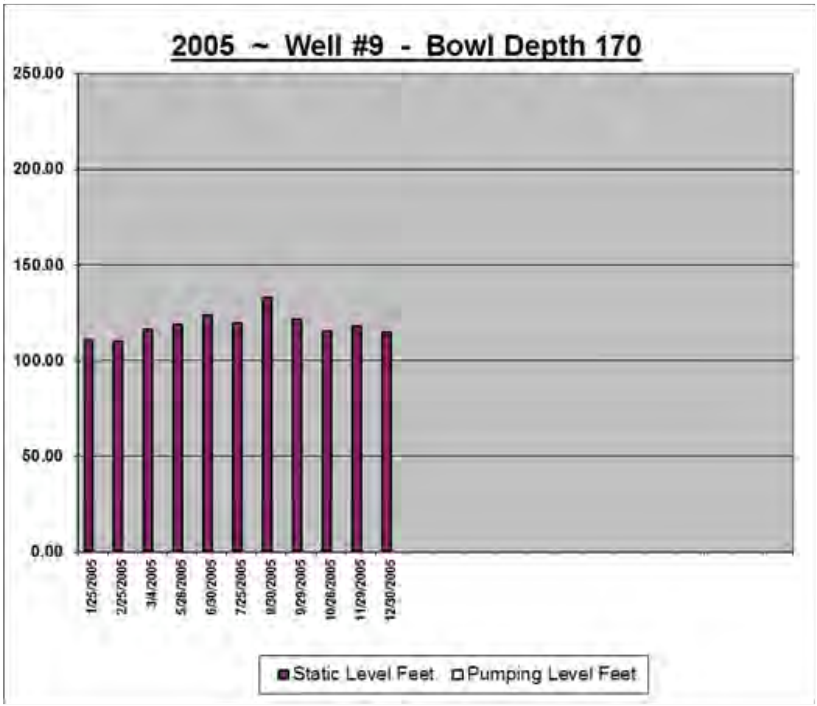

2003 ~ Well #9 ~ Bowl Depth 170
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100.00
50.00
0.00
1/6/2003
2/13/2003
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5/8/2003
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8/14/2003
9/11/2003
10/28/2003
11/21/2003
12/15/2003
Static Level Feet
Pumping Level Feet

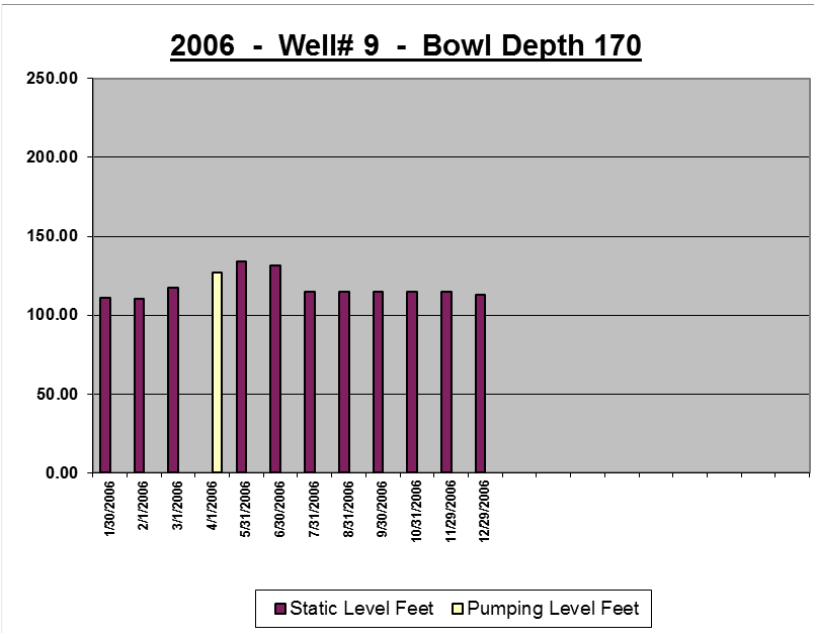

2004 ~ Well #9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

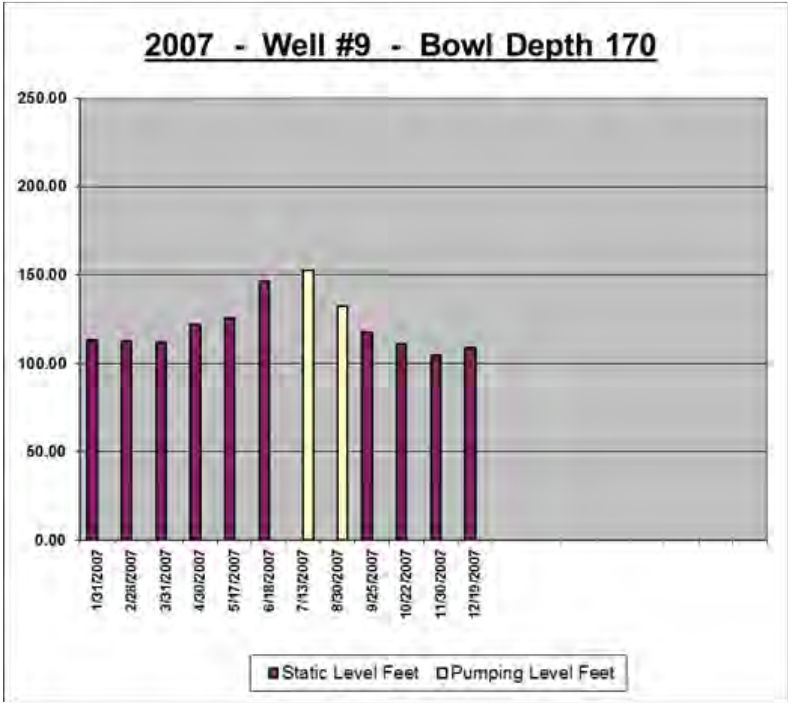

2004 ~ Well #9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
2/4/2004
2/25/2004
3/8/2004
3/18/2004
4/1/2004
4/14/2004
5/5/2004
5/13/2004
6/16/2004
6/24/2004
7/12/2004
7/22/2004
8/11/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

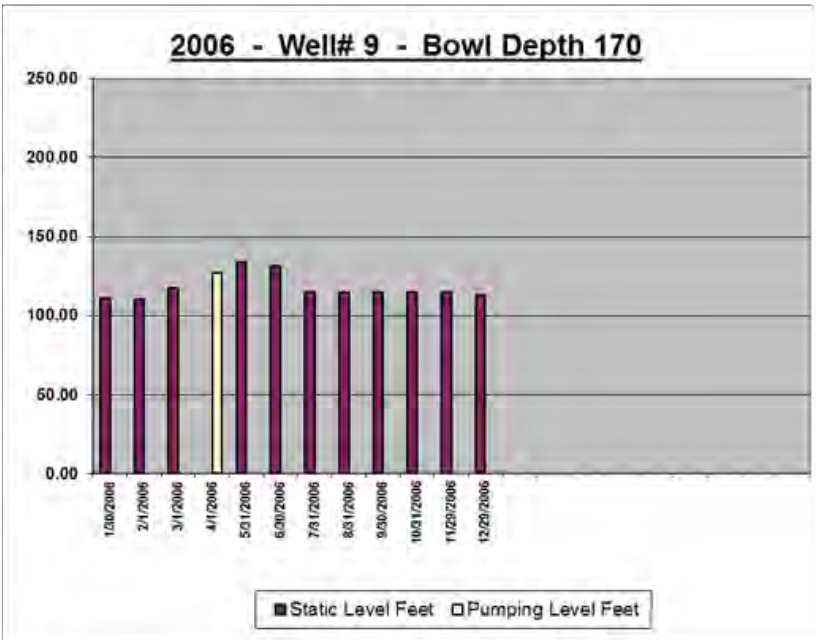

2005 ~ Well #9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/29/2005
10/26/2005
11/29/2005
12/30/2005
Static Level Feet
Pumping Level Feet

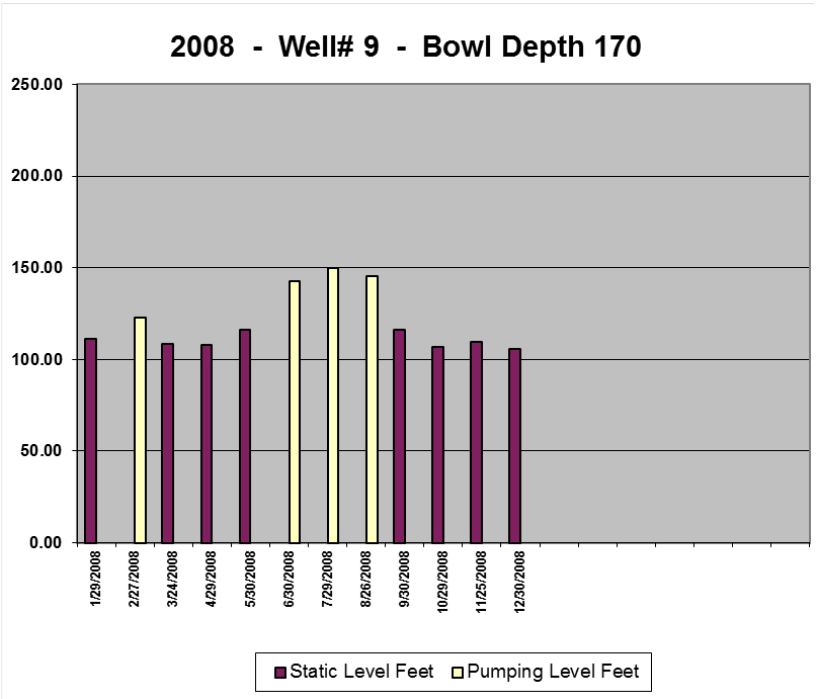

2003 ~ Well #9 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
2/13/2003
3/24/2003
4/21/2003
5/8/2003
6/27/2003
7/22/2003
8/14/2003
9/11/2003
10/28/2003
11/21/2003
12/15/2003
Static Level Feet
Pumping Level Feet

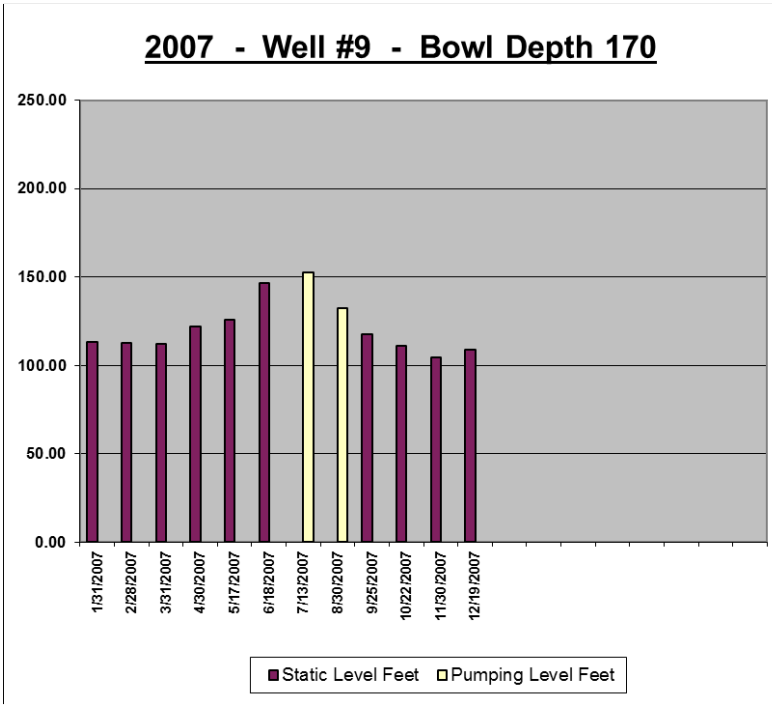

2005 ~ Well #9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/29/2005
10/26/2005
11/29/2005
12/30/2005
Static Level Feet
Pumping Level Feet

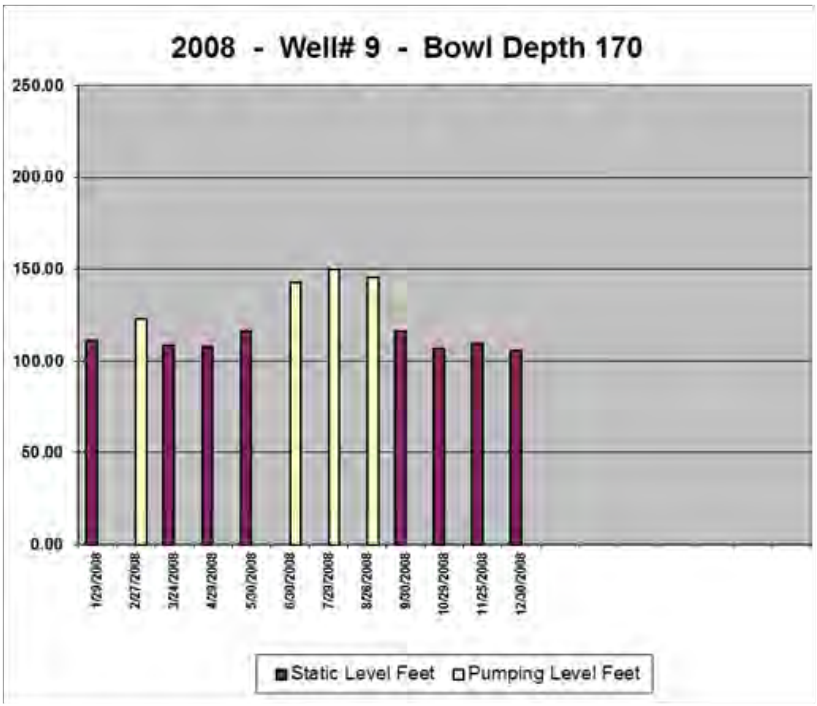

2006 - Well# 9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

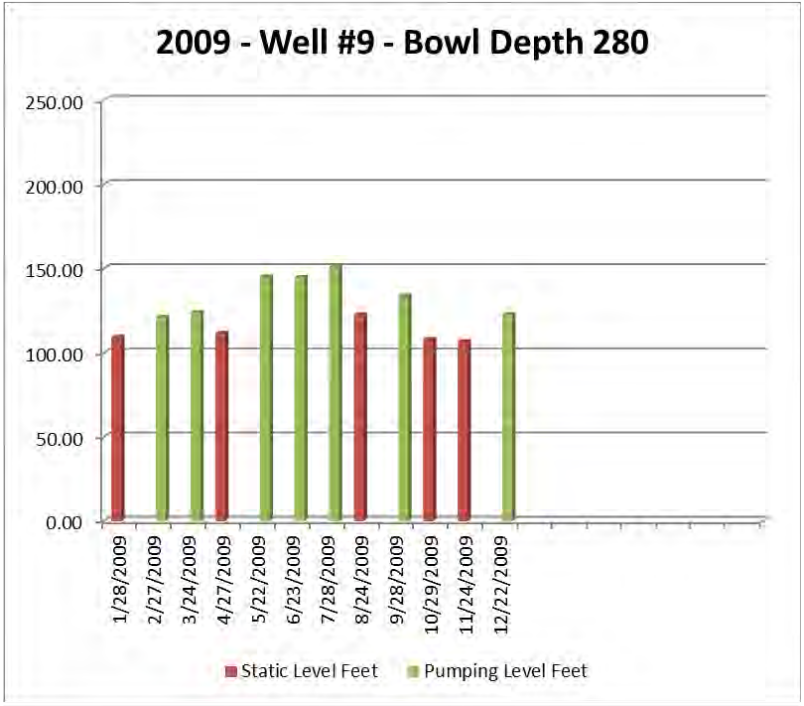

2007 - Well #9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/17/2007
6/18/2007
7/13/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

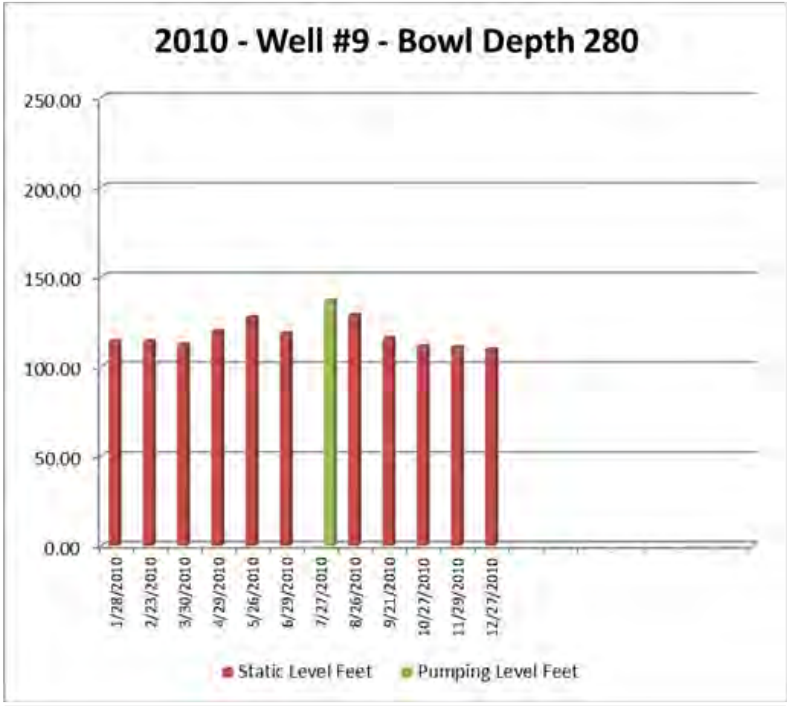

2006 - Well# 9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

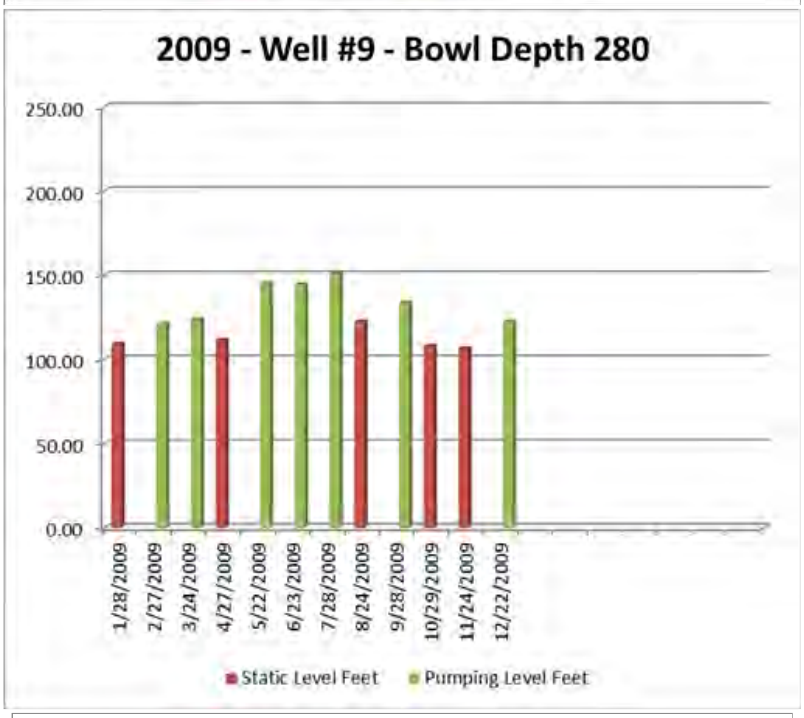

2008 - Well# 9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/24/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

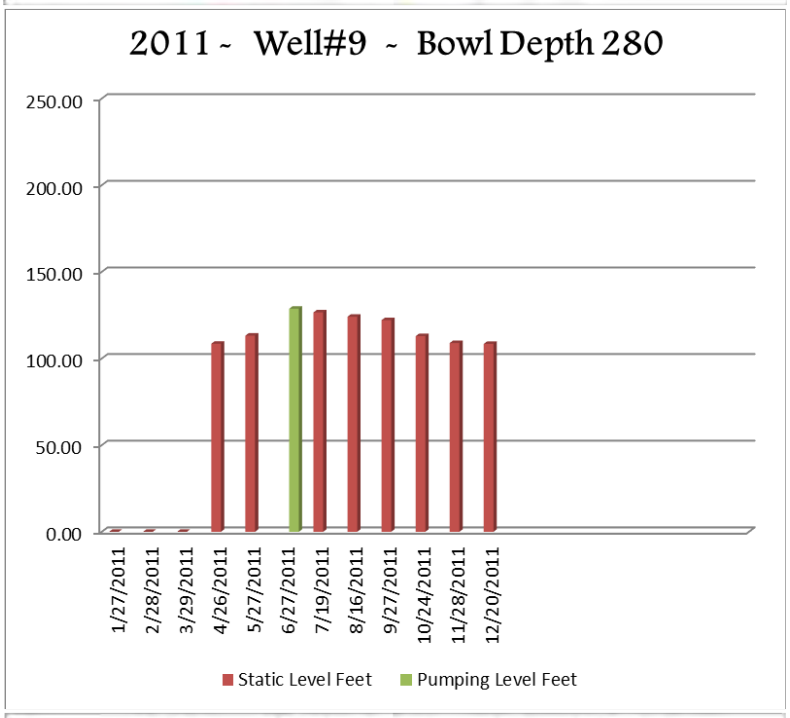

2007 - Well #9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/17/2007
6/18/2007
7/13/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

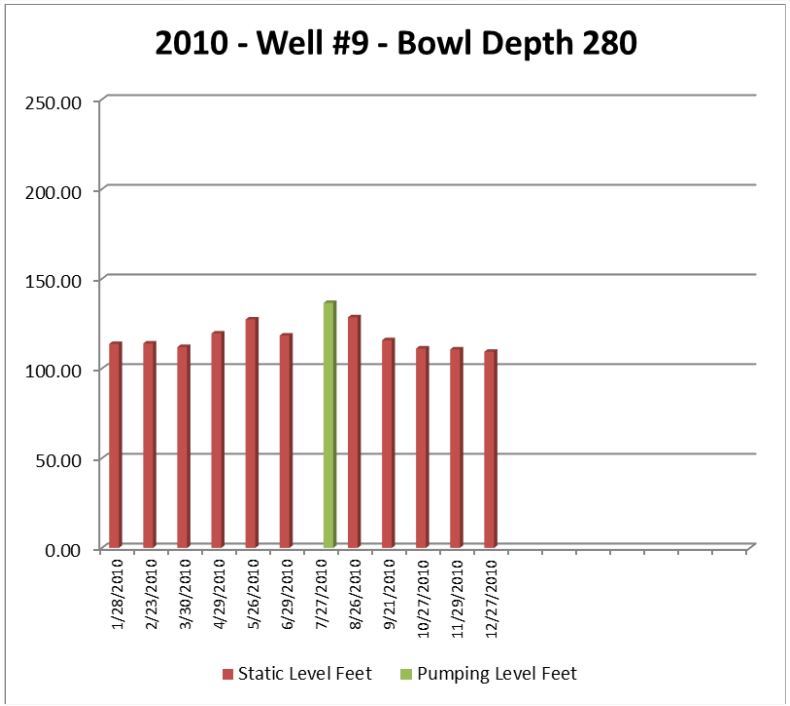

2008 - Well# 9 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/24/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

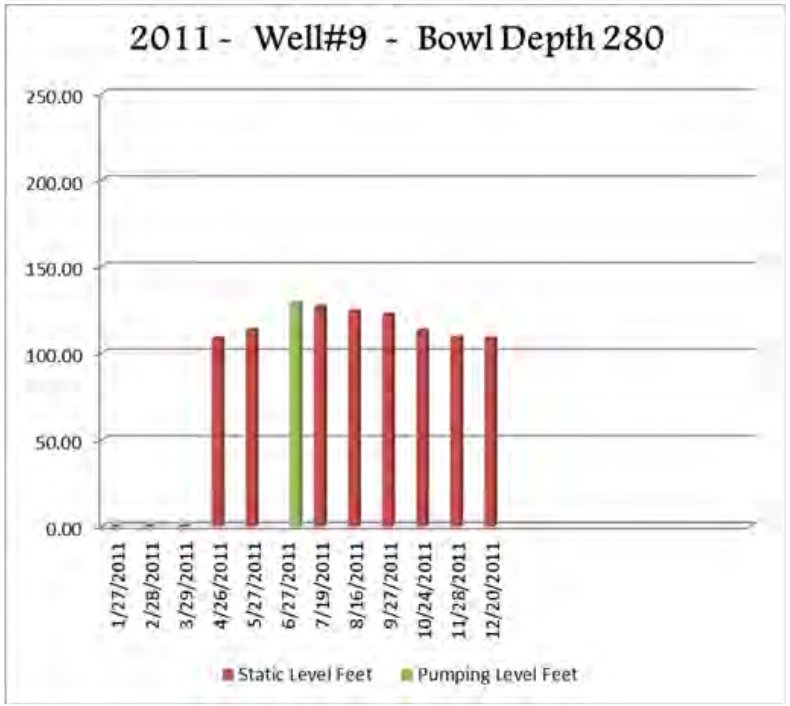

2009 - Well #9 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

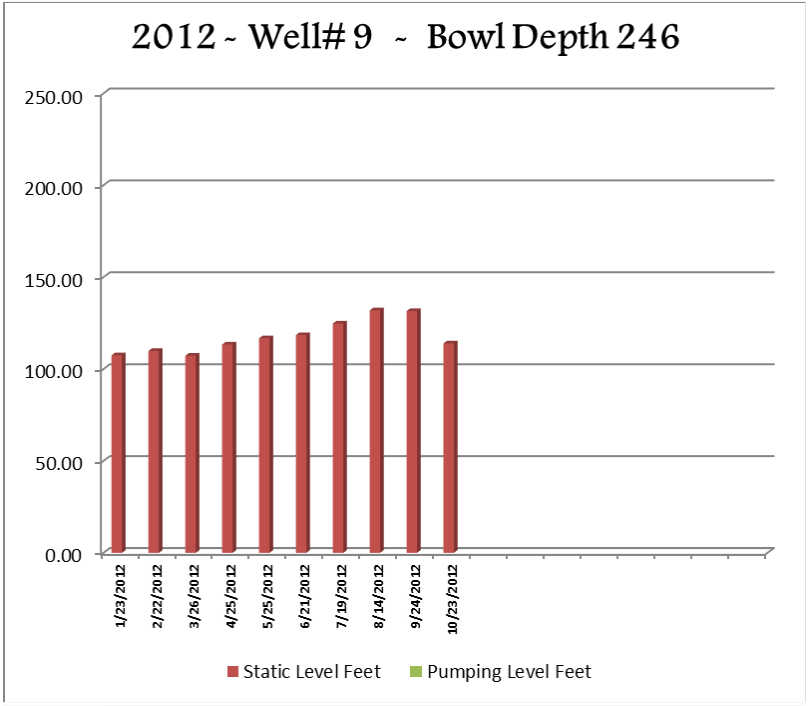

2010 - Well #9 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

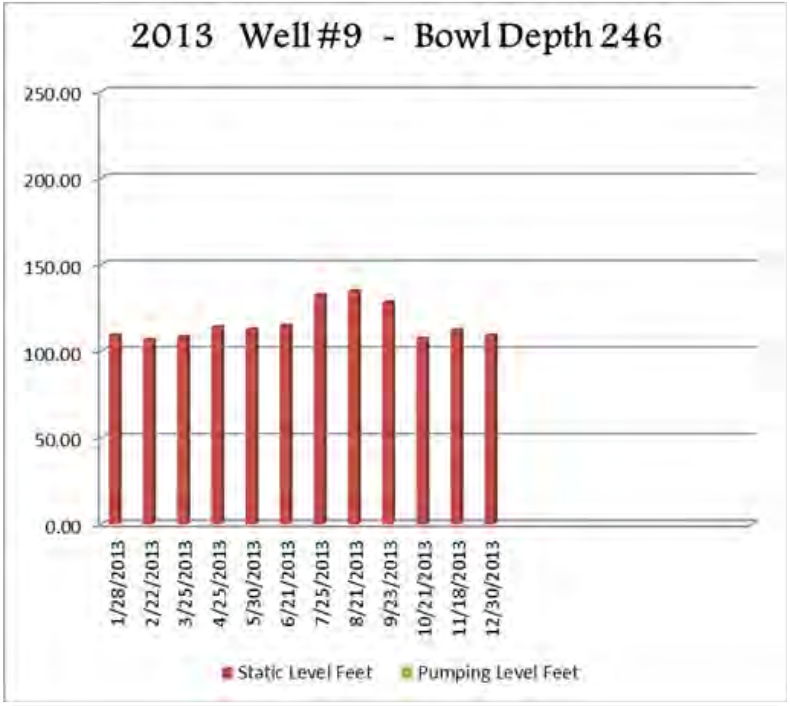

2009 - Well #9 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

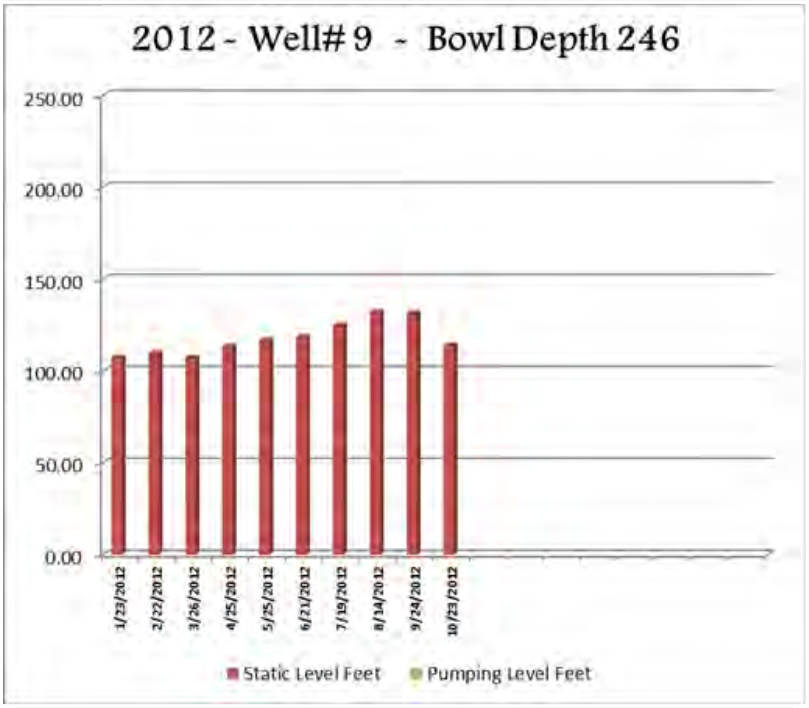

2011 - Well#9 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

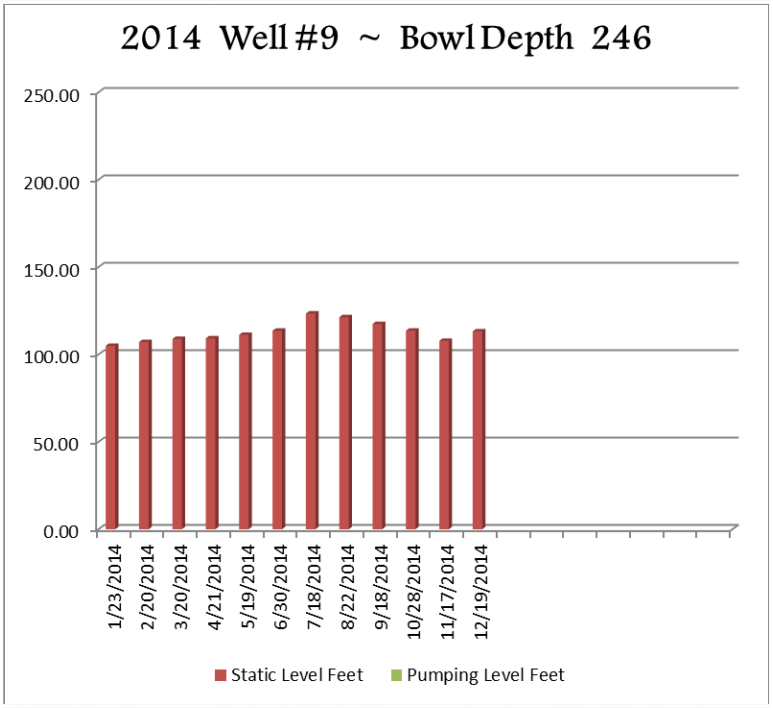

2010 - Well #9 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

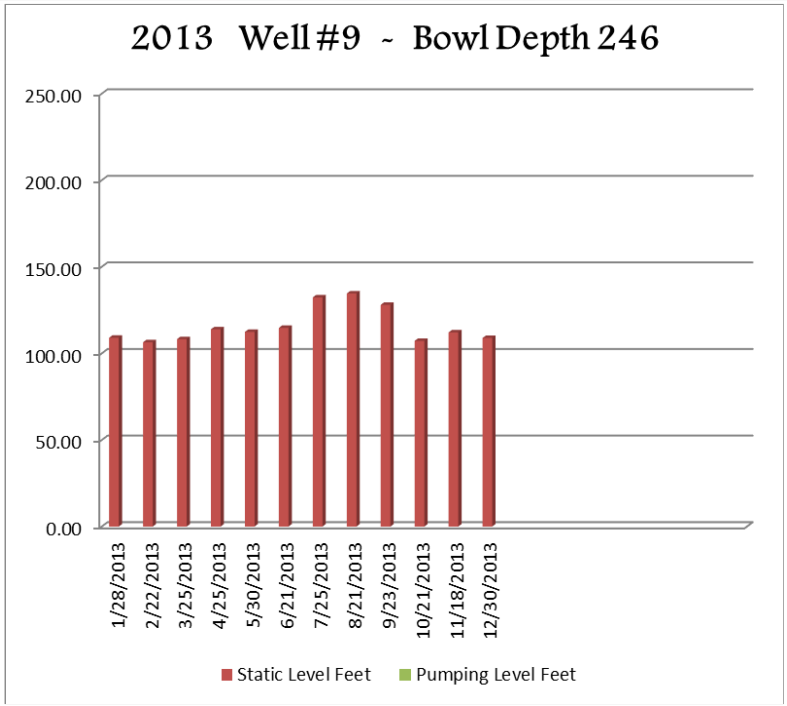

2011 - Well#9 - Bowl Depth 280
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

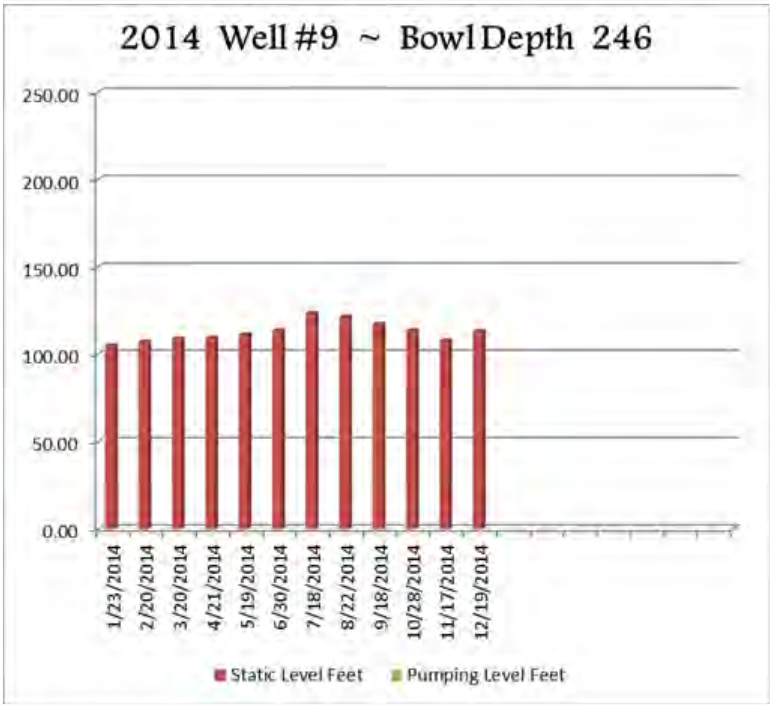

2012 - Well# 9 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

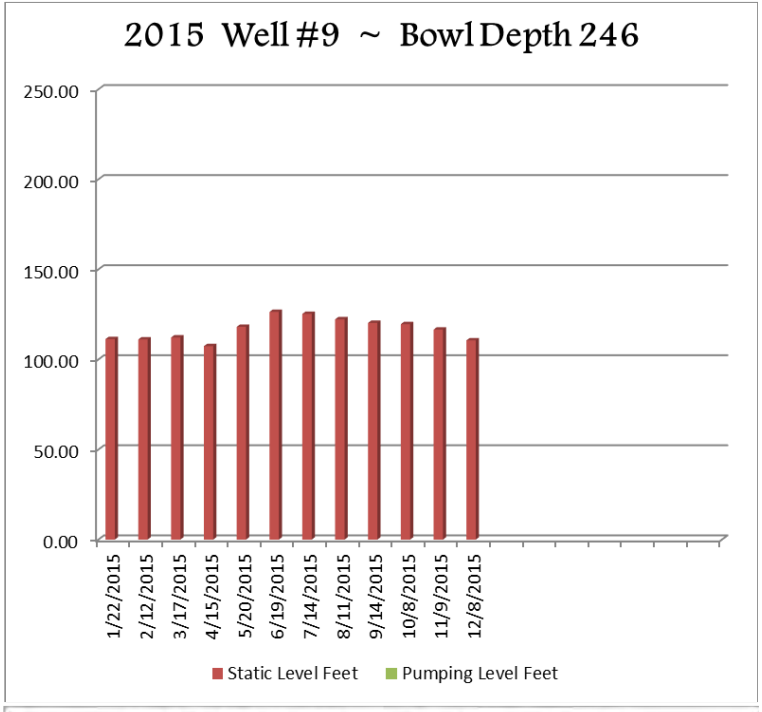

2013 Well #9 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

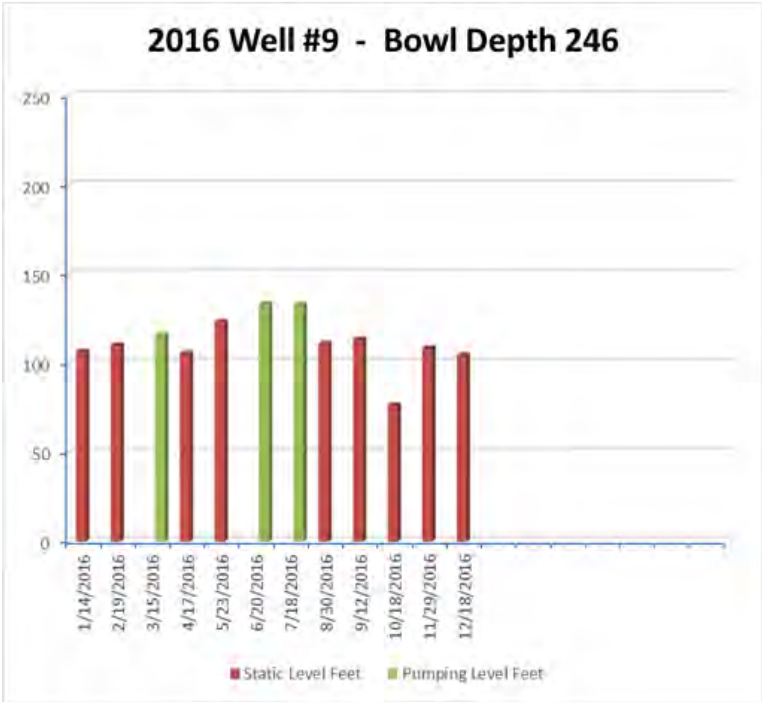

2012 - Well# 9 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

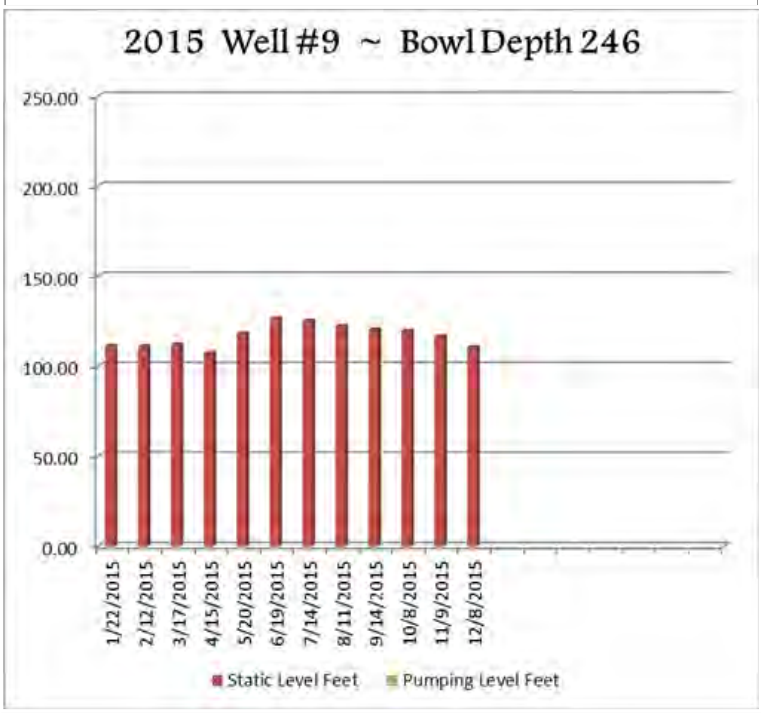

2014 Well #9 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

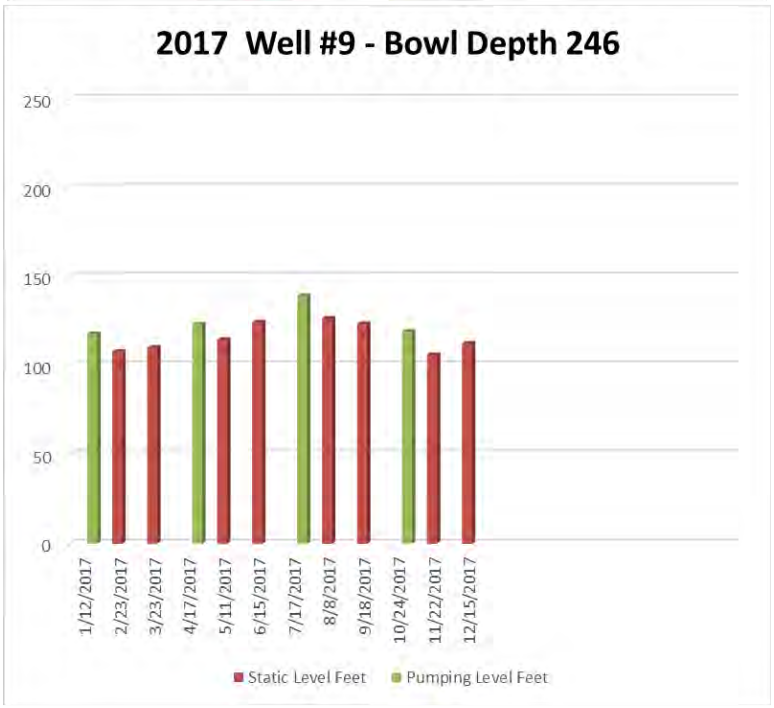

2013 Well #9 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

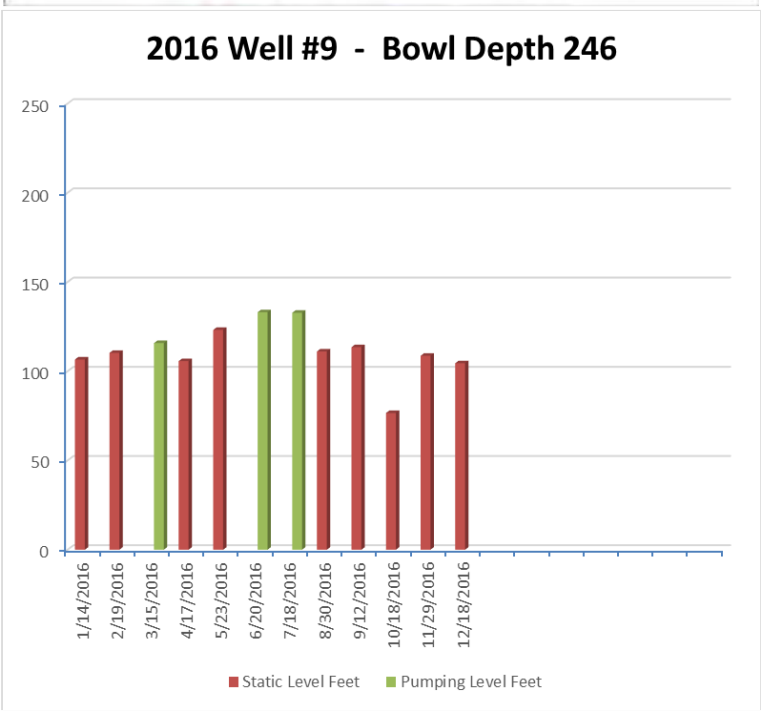

2014 Well #9 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

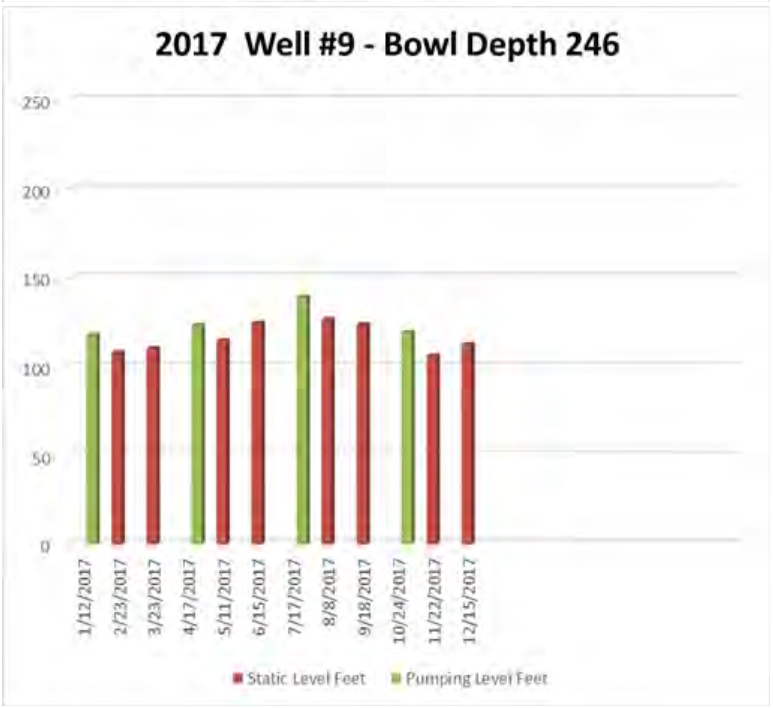

2015 Well #9 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

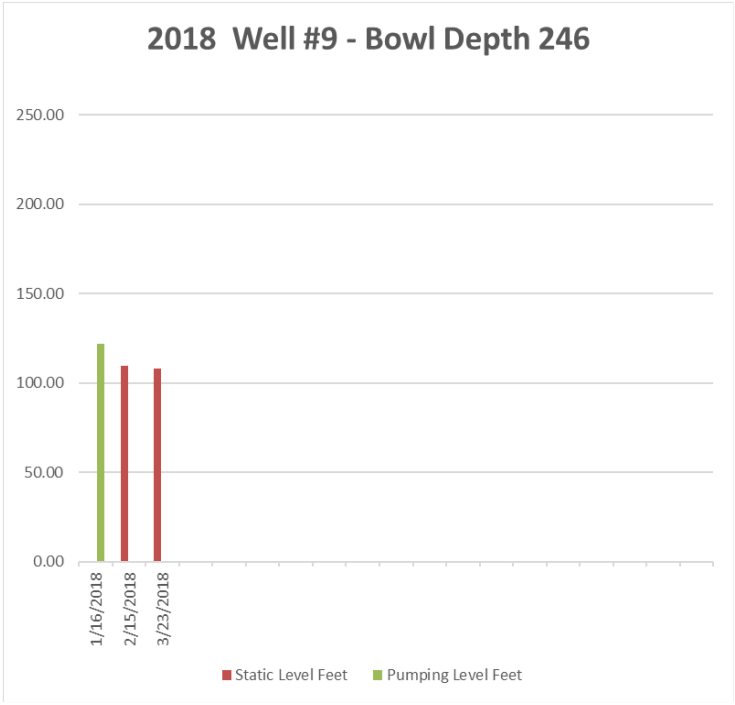

2016 Well #9 - Bowl Depth 246
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/18/2016
Static Level Feet
Pumping Level Feet

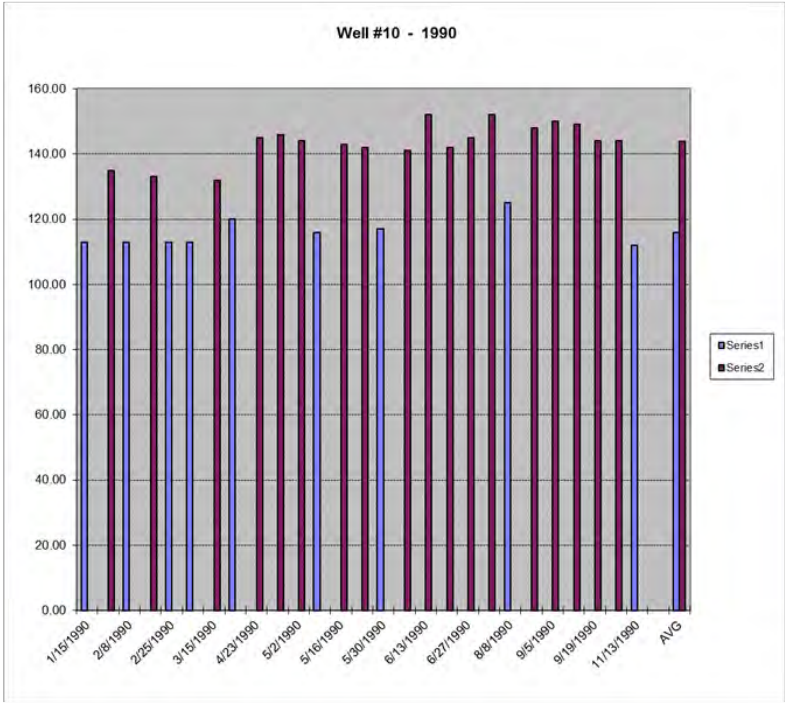

2015 Well #9 ~ Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

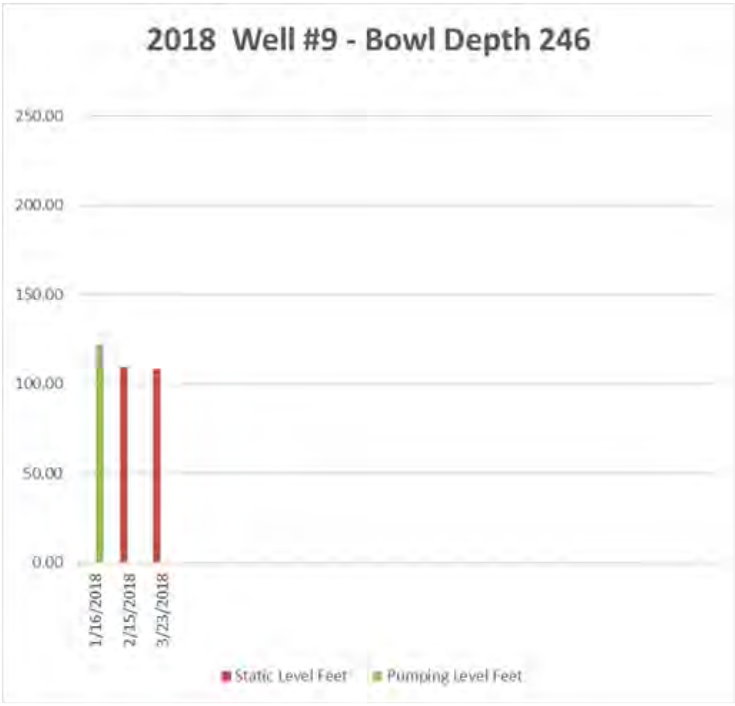

2017 Well #9 - Bowl Depth 246
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

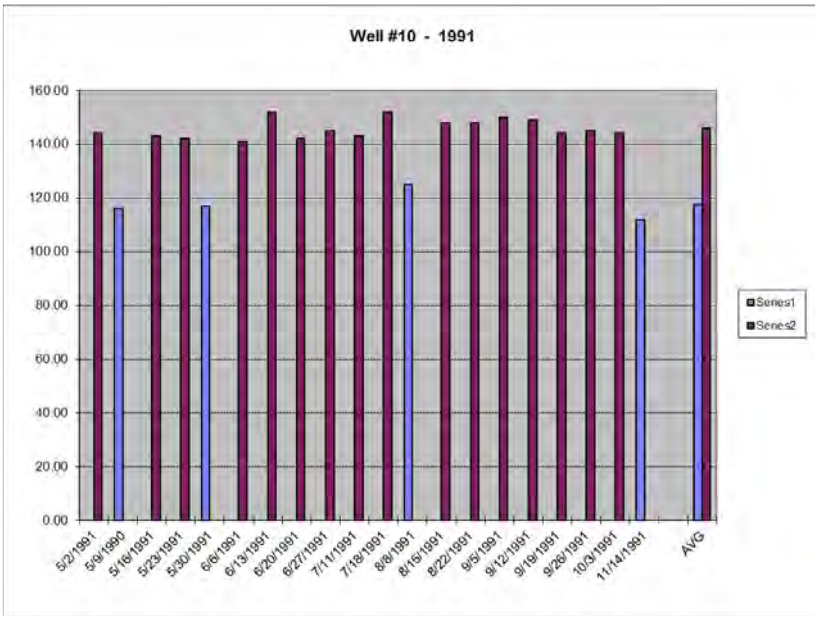

2016 Well #9 - Bowl Depth 246
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/18/2016
Static Level Feet
Pumping Level Feet

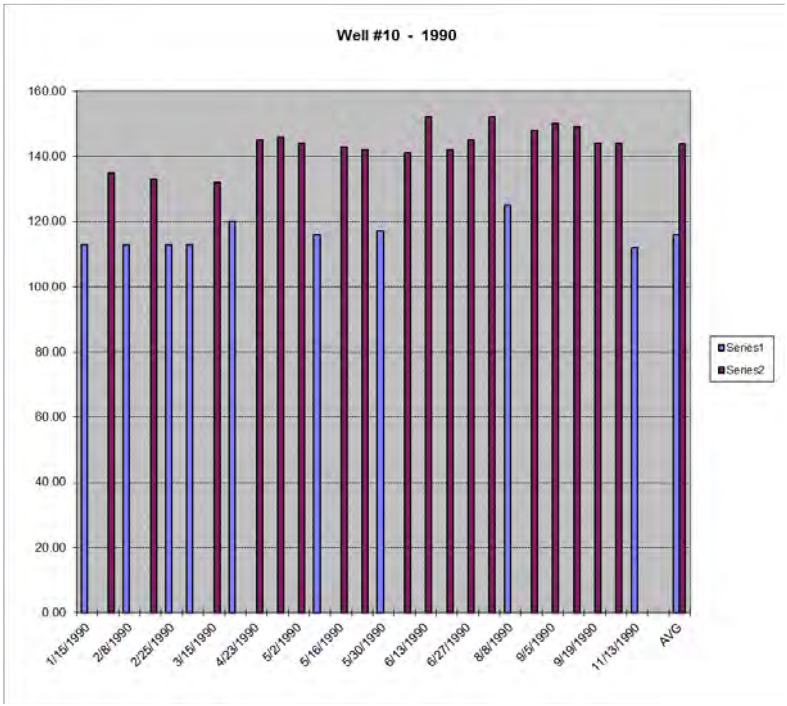

2017 Well #9 - Bowl Depth 246
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

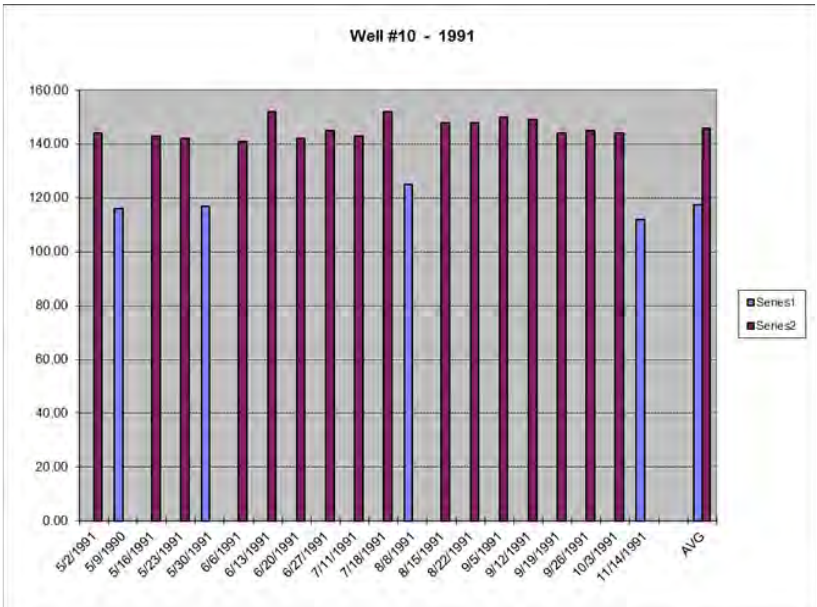

2018 Well #9 - Bowl Depth 246
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

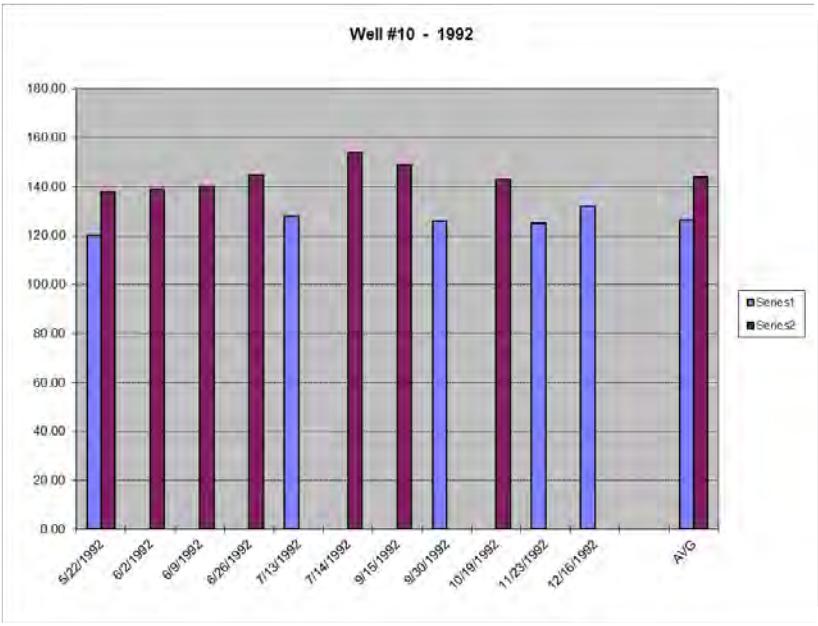

Well #10 - 1990
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1990
2/8/1990
2/25/1990
3/15/1990
4/23/1990
5/2/1990
5/16/1990
5/30/1990
6/13/1990
6/27/1990
8/8/1990
9/5/1990
9/19/1990
11/13/1990
AVG
Series1
Series2

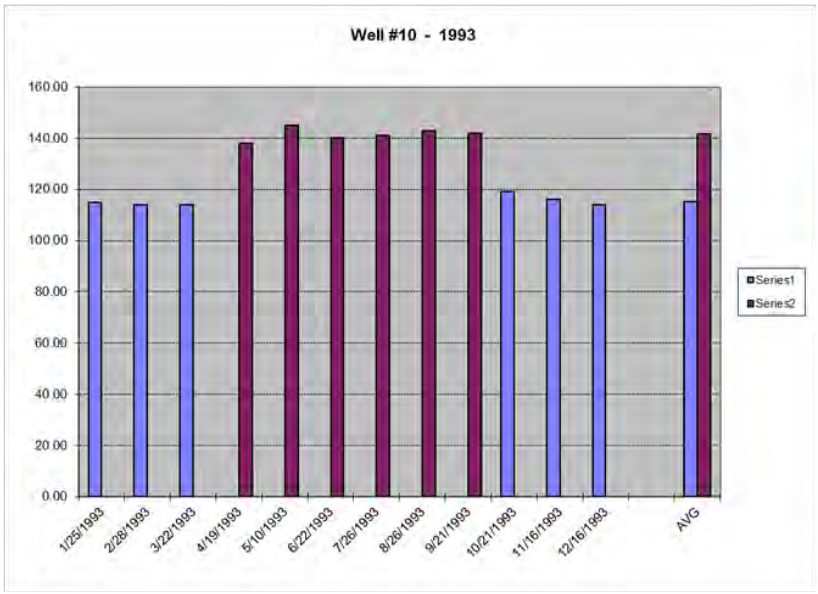

2018 Well #9 - Bowl Depth 246
250.00
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50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

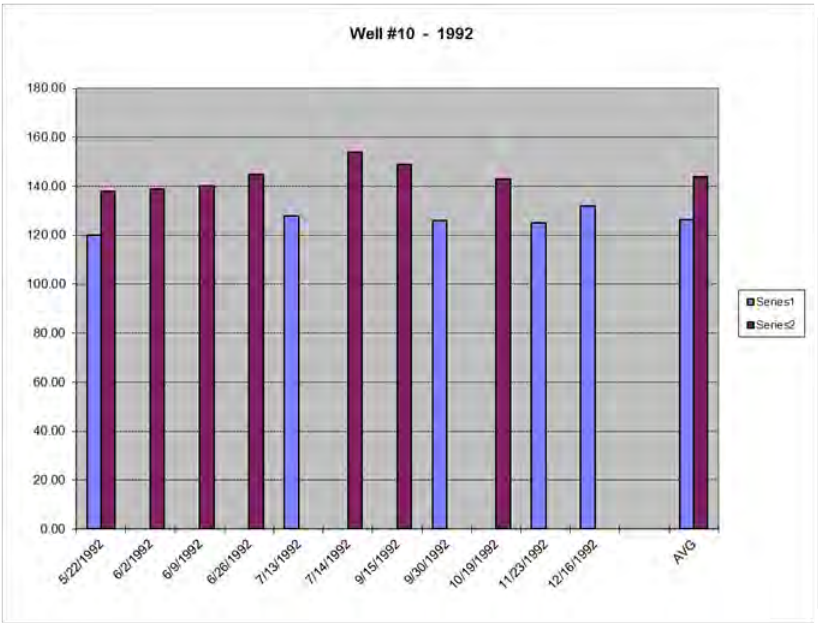

Well #10 - 1991
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120.00
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80.00
60.00
40.00
20.00
0.00
5/2/1991
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6/27/1991
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7/18/1991
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9/26/1991
10/3/1991
11/14/1991
AVG
Series1
Series2

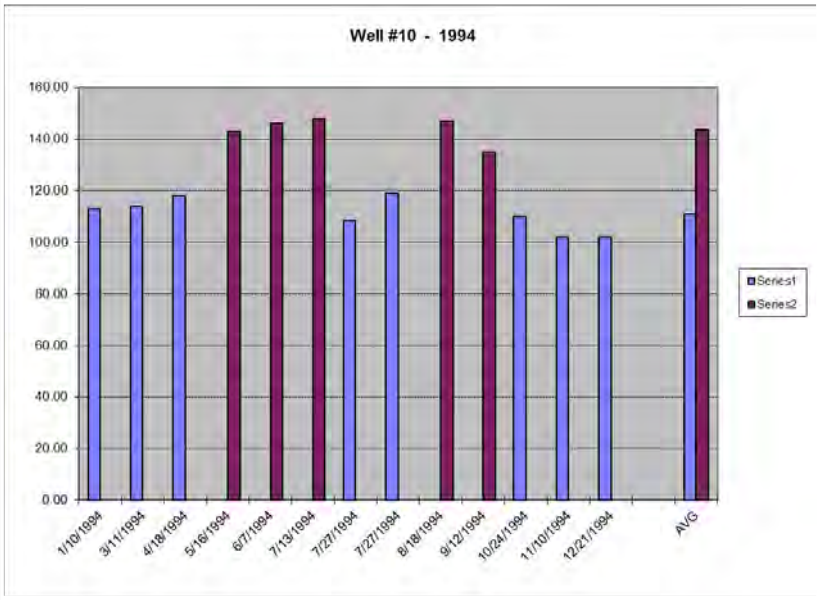

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120.00
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80.00
60.00
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20.00
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2/25/1990
3/15/1990
4/23/1990
5/2/1990
5/16/1990
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8/8/1990
9/5/1990
9/19/1990
11/13/1990
AVG
Series1
Series2

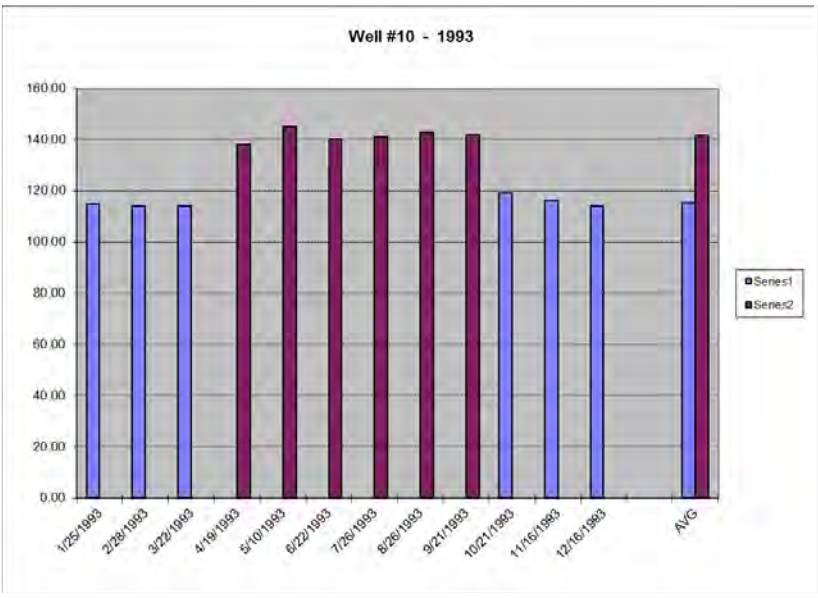

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120.00
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80.00
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0.00
5/2/1991
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6/6/1991
6/13/1991
6/20/1991
6/27/1991
7/11/1991
7/18/1991
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8/15/1991
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9/26/1991
10/3/1991
11/14/1991
AVG
Series1
Series2

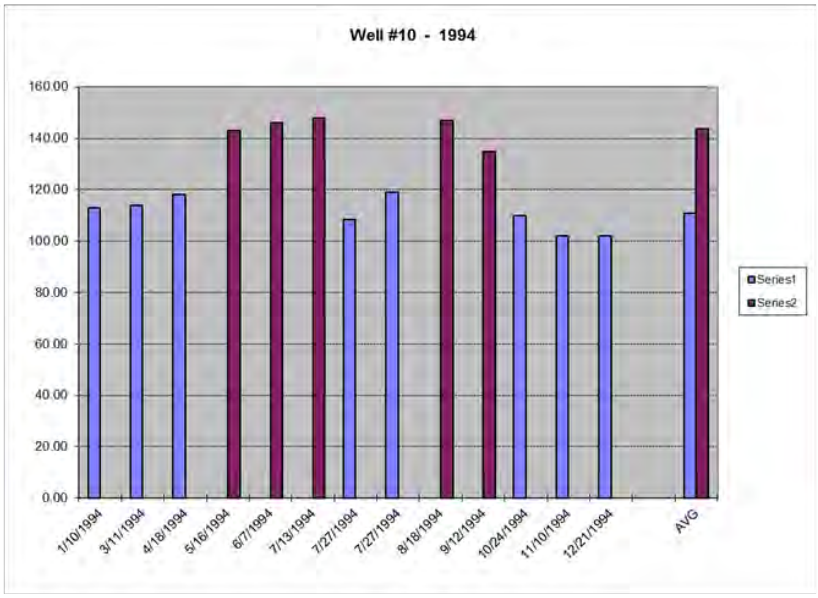

Well #10 - 1992
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80.00
60.00
40.00
20.00
0.00
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6/2/1992
6/9/1992
6/26/1992
7/13/1992
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9/30/1992
10/19/1992
11/23/1992
12/16/1992
AVG
Series1
Series2

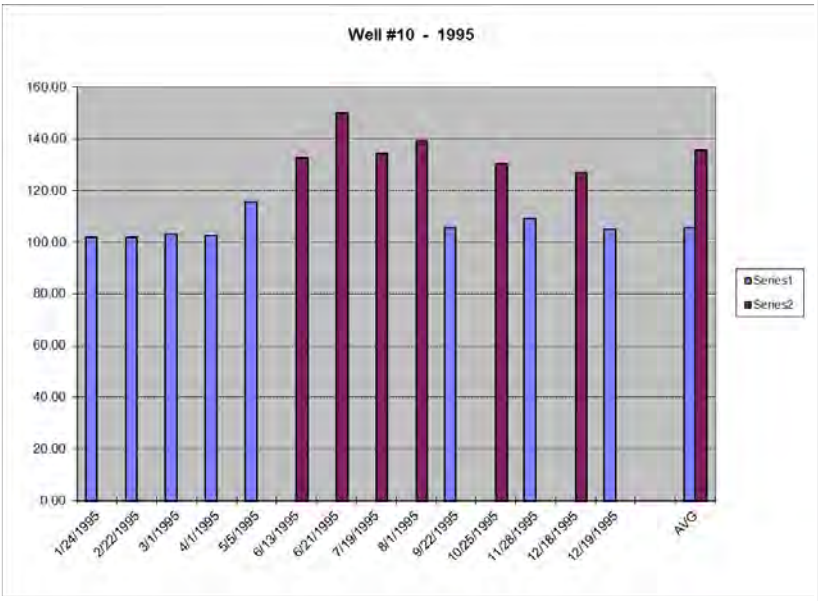

Well #10 - 1993
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80.00
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0.00
1/25/1993
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4/19/1993
5/10/1993
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8/26/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

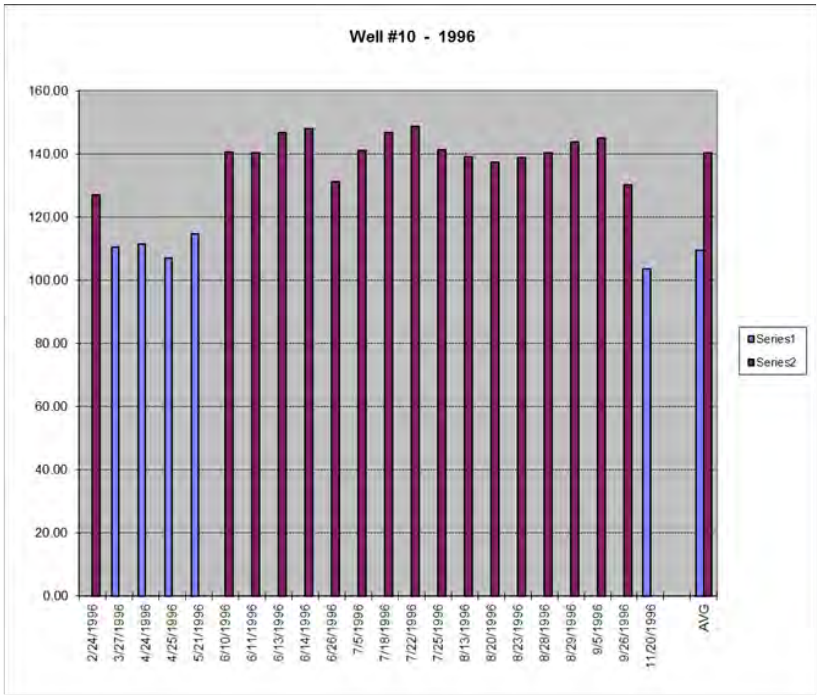

Well #10 - 1992
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40.00
20.00
0.00
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6/26/1992
7/13/1992
7/14/1992
9/15/1992
9/30/1992
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11/23/1992
12/16/1992
AVG
Series1
Series2

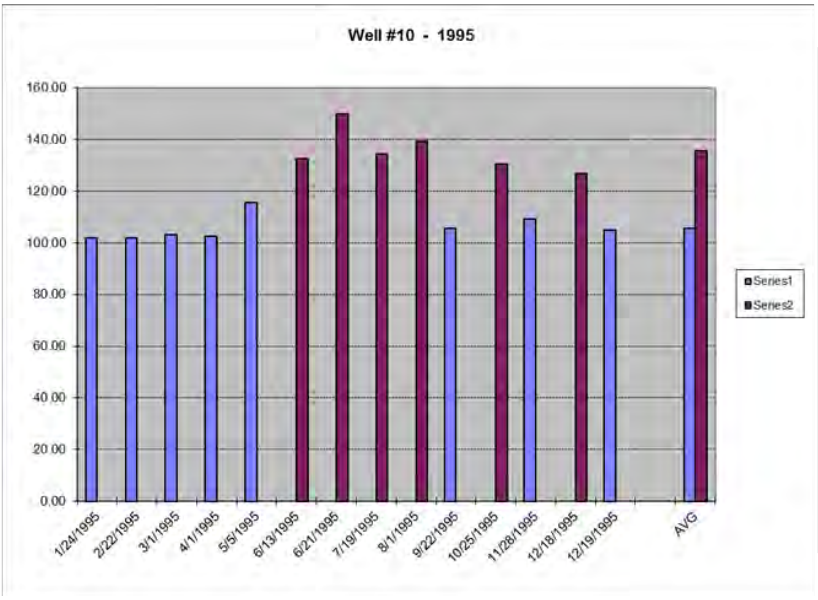

Well #10 - 1994
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120.00
100.00
80.00
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40.00
20.00
0.00
1/10/1994
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5/16/1994
6/7/1994
7/13/1994
7/27/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/10/1994
12/21/1994
AVG
Series1
Series2

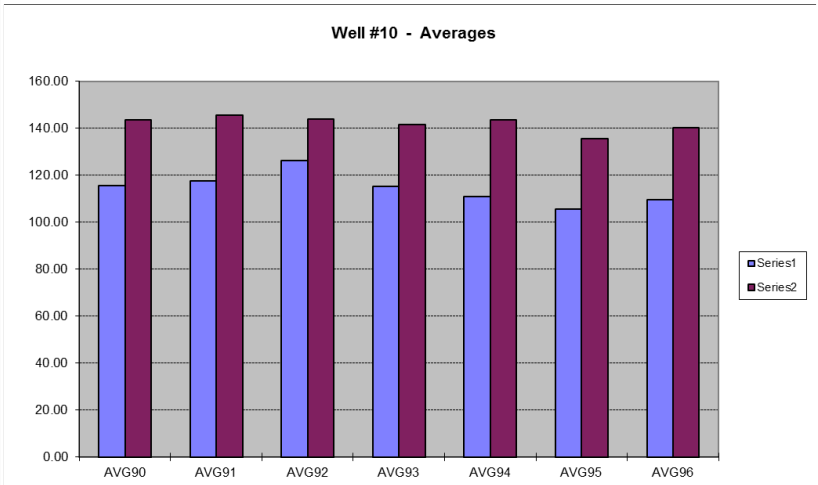

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5/10/1993
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10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

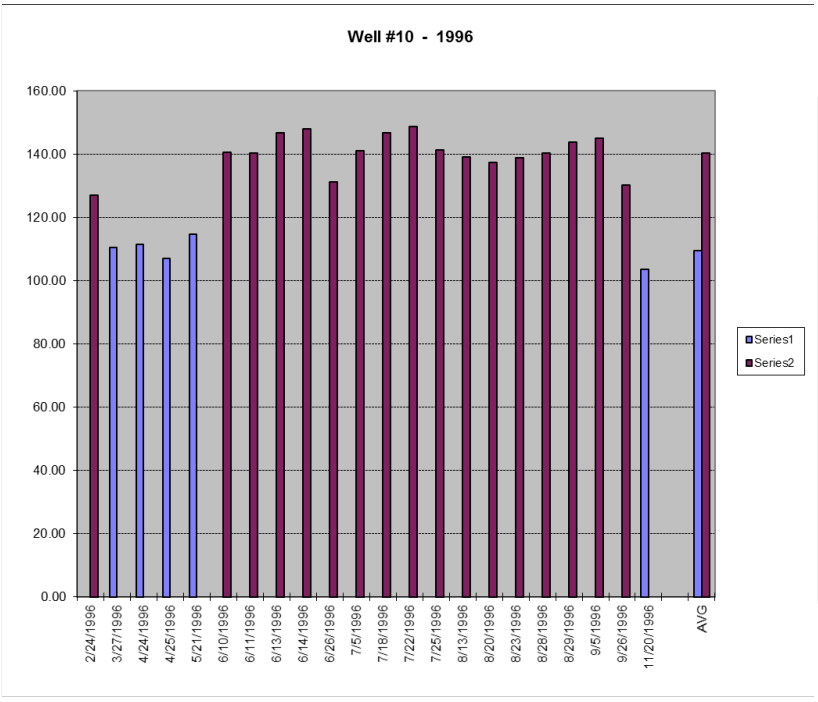

Well #10 - 1994
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120.00
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20.00
0.00
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7/13/1994
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9/12/1994
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11/10/1994
12/21/1994
AVG
Series1
Series2

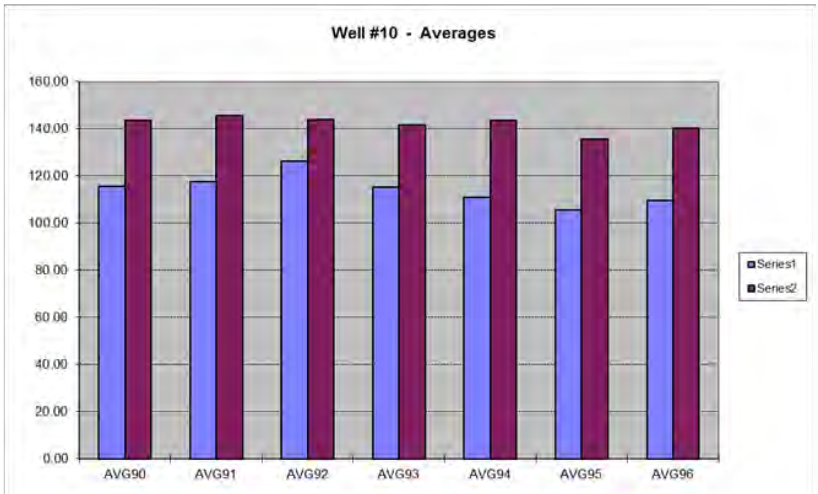

Well #10 - 1995
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120.00
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80.00
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40.00
20.00
0.00
1/24/1995
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6/21/1995
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10/25/1995
11/28/1995
12/18/1995
12/19/1995
AVG
Series1
Series2

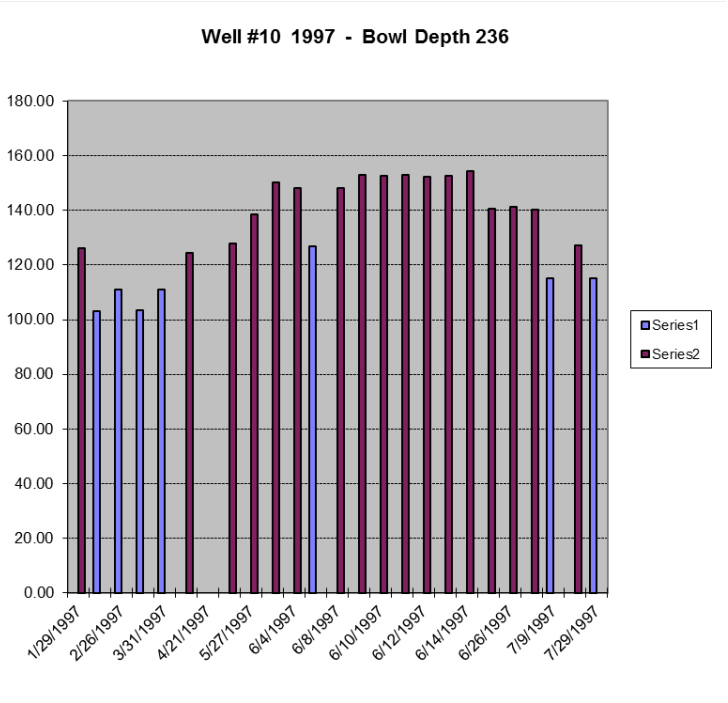

Well #10 - 1996
160.00
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100.00
80.00
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40.00
20.00
0.00
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4/24/1996
4/25/1996
5/21/1996
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6/11/1996
6/13/1996
6/14/1996
6/26/1996
7/5/1996
7/18/1996
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8/13/1996
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9/26/1996
11/20/1996
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Series1
Series2

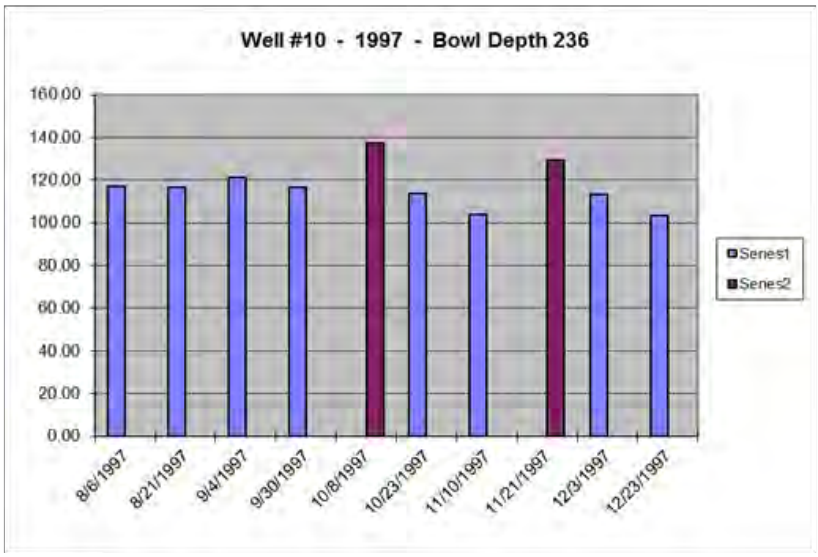

Well #10 - 1995
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100.00
80.00
60.00
40.00
20.00
0.00
1/24/1995
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6/13/1995
6/21/1995
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9/22/1995
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11/28/1995
12/18/1995
12/19/1995
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Series1
Series2

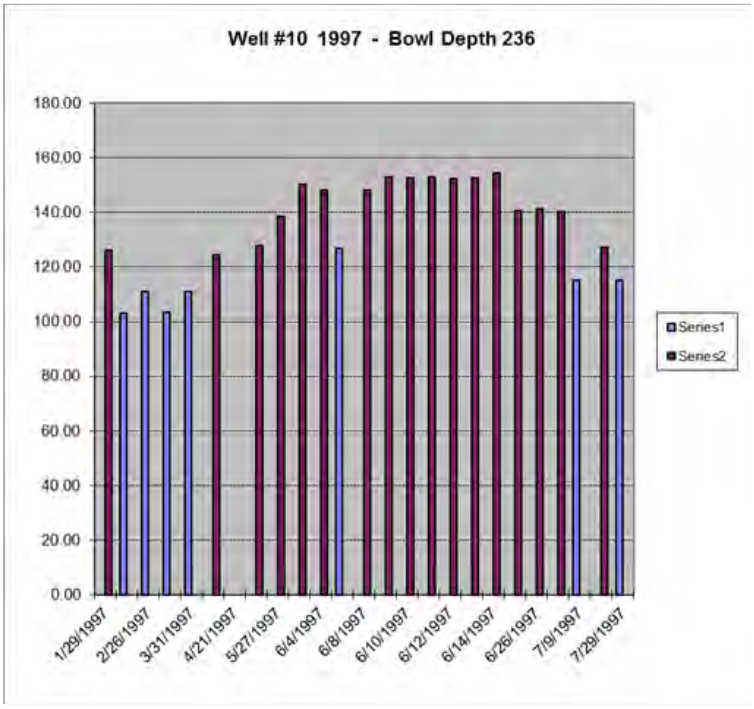

Well #10 - Averages
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140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG90
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

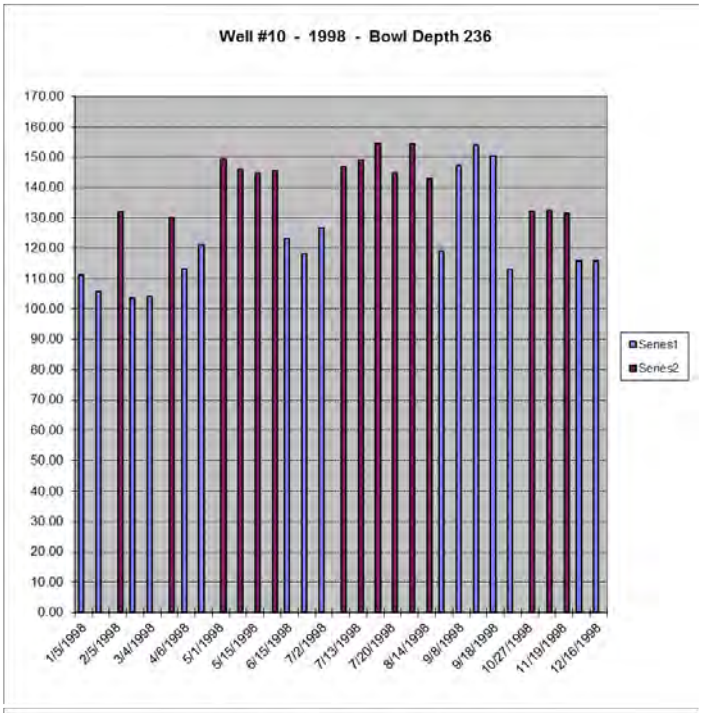

Well #10 - 1996
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/24/1996
3/27/1996
4/24/1996
4/25/1996
5/21/1996
6/10/1996
6/11/1996
6/13/1996
6/14/1996
6/26/1996
7/5/1996
7/18/1996
7/22/1996
7/25/1996
8/13/1996
8/20/1996
8/23/1996
8/28/1996
8/29/1996
9/5/1996
9/26/1996
11/20/1996
AVG
Series1
Series2

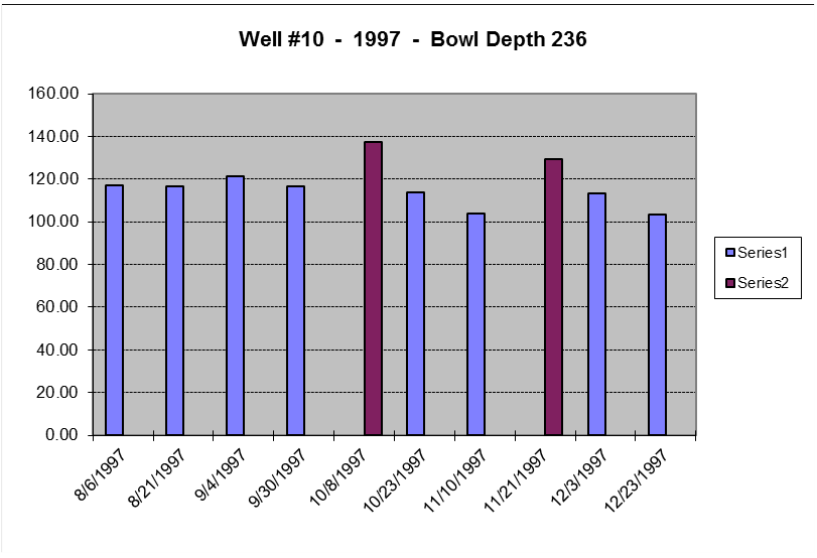

Well #10 - Averages
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG90
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

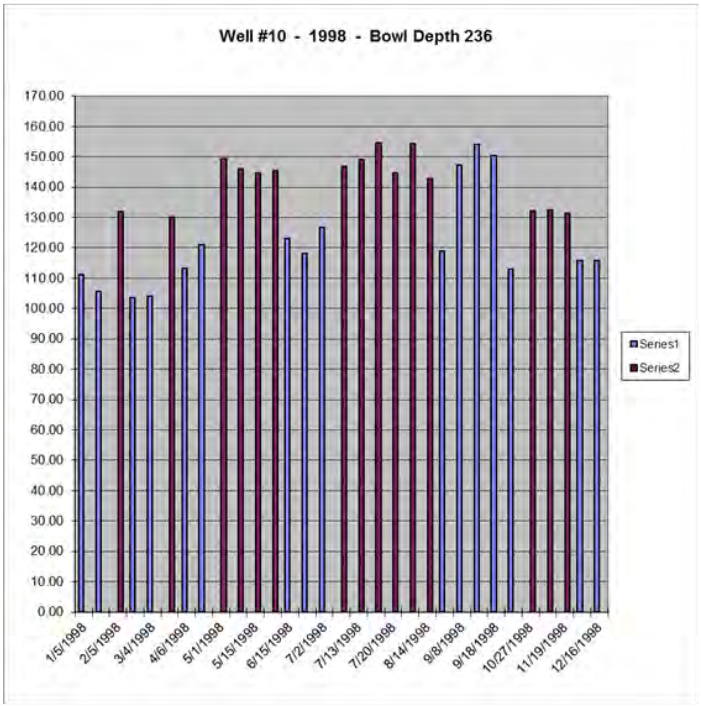

Well #10 1997 - Bowl Depth 236
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/29/1997
2/26/1997
3/31/1997
4/21/1997
5/27/1997
6/4/1997
6/8/1997
6/10/1997
6/12/1997
6/14/1997
6/26/1997
7/9/1997
7/29/1997
Series1
Series2

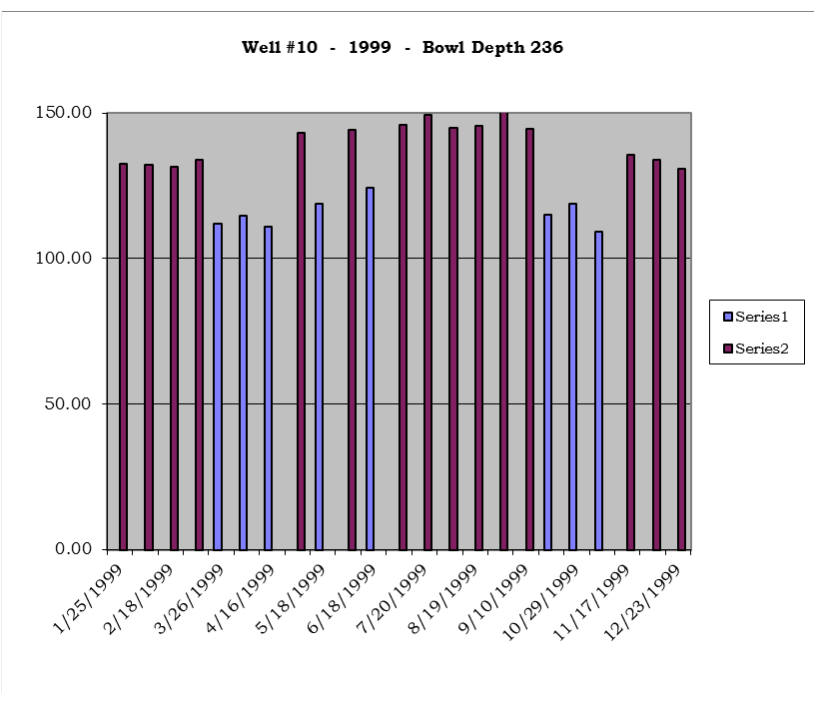

Well #10 - 1997 - Bowl Depth 236
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/6/1997
8/21/1997
9/4/1997
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10/8/1997
10/23/1997
11/10/1997
11/21/1997
12/3/1997
12/23/1997
Series1
Series2

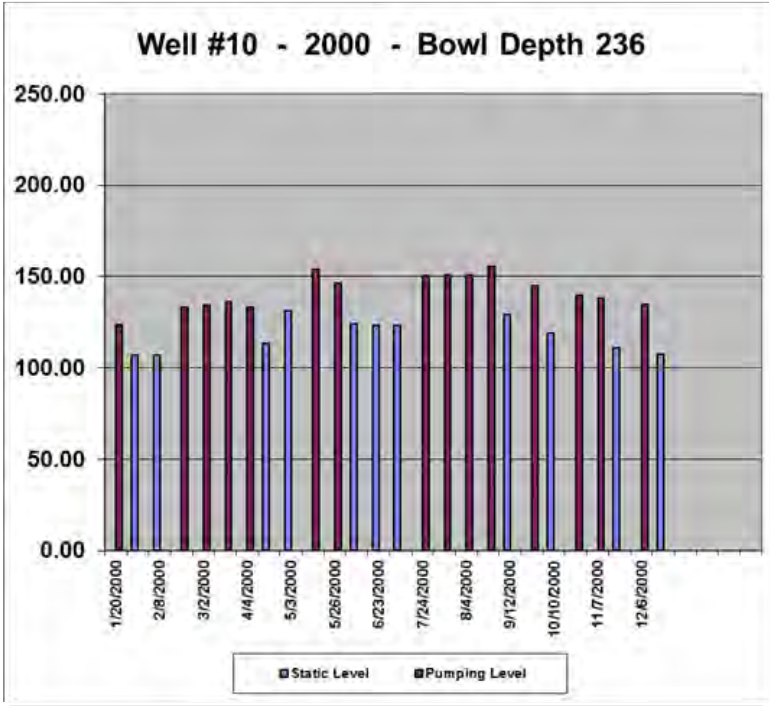

Well #10 1997 - Bowl Depth 236
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120.00
100.00
80.00
60.00
40.00
20.00
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2/26/1997
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4/21/1997
5/27/1997
6/4/1997
6/8/1997
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6/12/1997
6/14/1997
6/26/1997
7/9/1997
7/29/1997
Series1
Series2

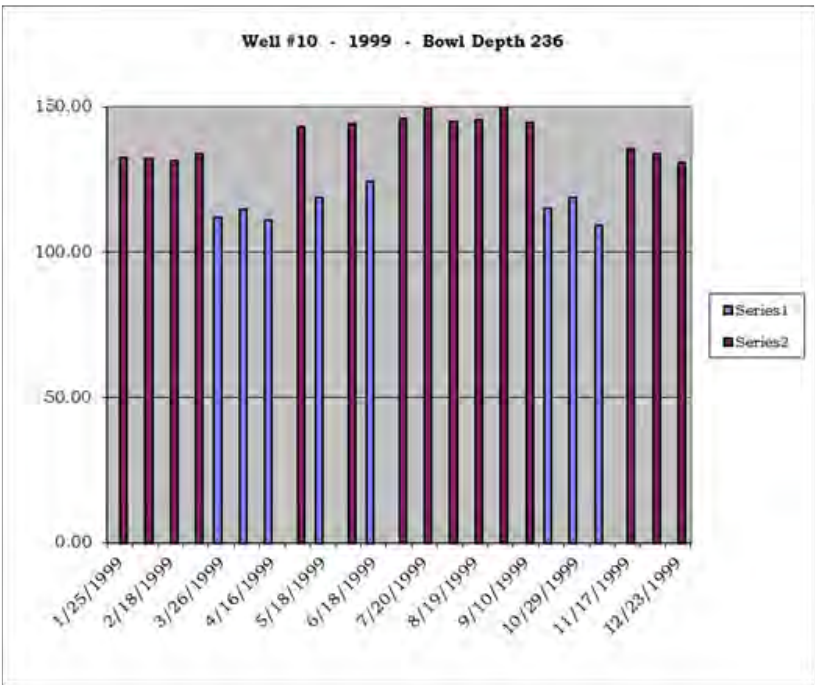

Well #10 - 1998 - Bowl Depth 236
170.00
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
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70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1/5/1998
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7/2/1998
7/13/1998
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8/14/1998
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11/19/1998
12/16/1998
Series1
Series2

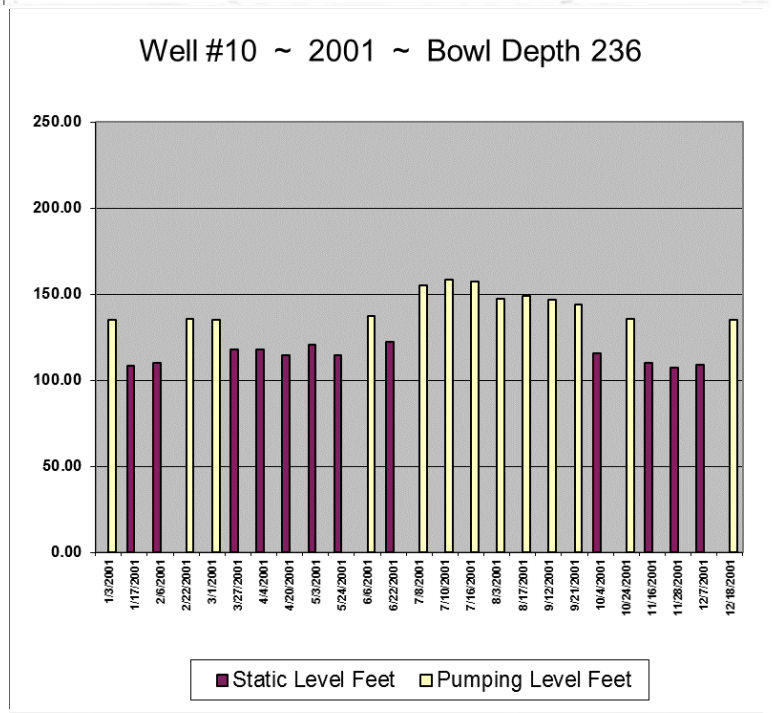

Well #10 - 1997 - Bowl Depth 236
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120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/6/1997
8/21/1997
9/4/1997
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10/23/1997
11/10/1997
11/21/1997
12/3/1997
12/23/1997
Series1
Series2

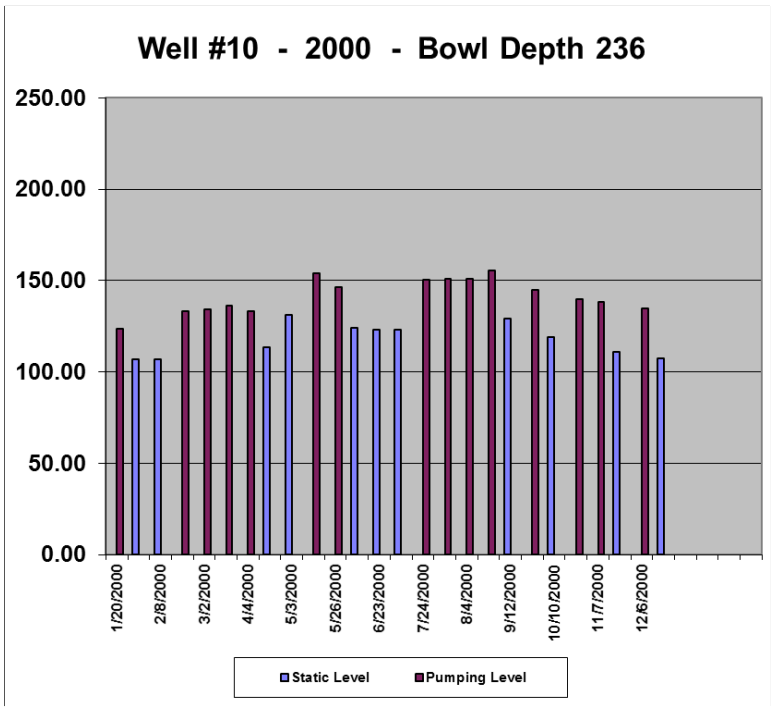

Well #10 - 1998 - Bowl Depth 236
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150.00
140.00
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120.00
110.00
100.00
90.00
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60.00
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40.00
30.00
20.00
10.00
0.00
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7/13/1998
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11/19/1998
12/16/1998
Series1
Series2

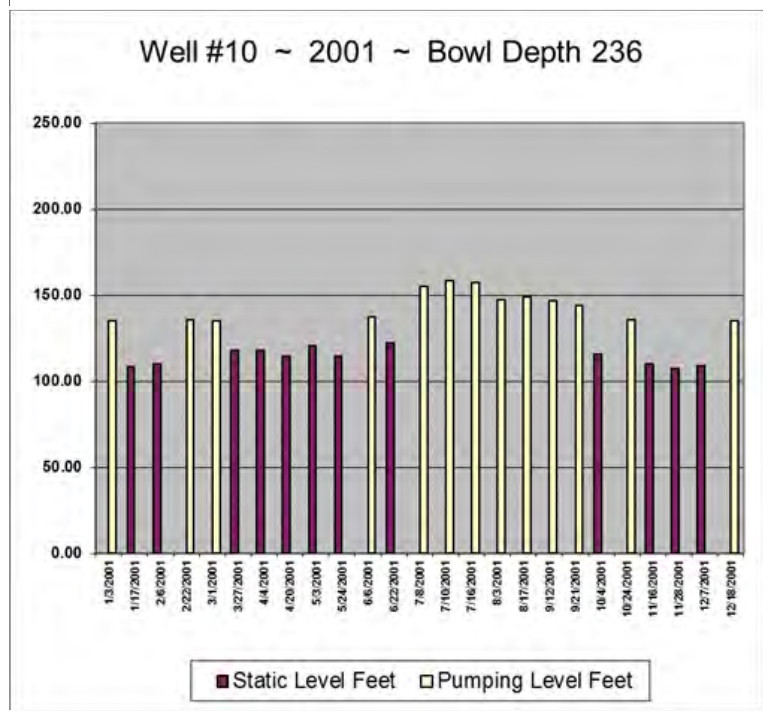

Well #10 - 1999 - Bowl Depth 236
150.00
100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
5/18/1999
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7/20/1999
8/19/1999
9/10/1999
10/29/1999
11/17/1999
12/23/1999
Series1
Series2

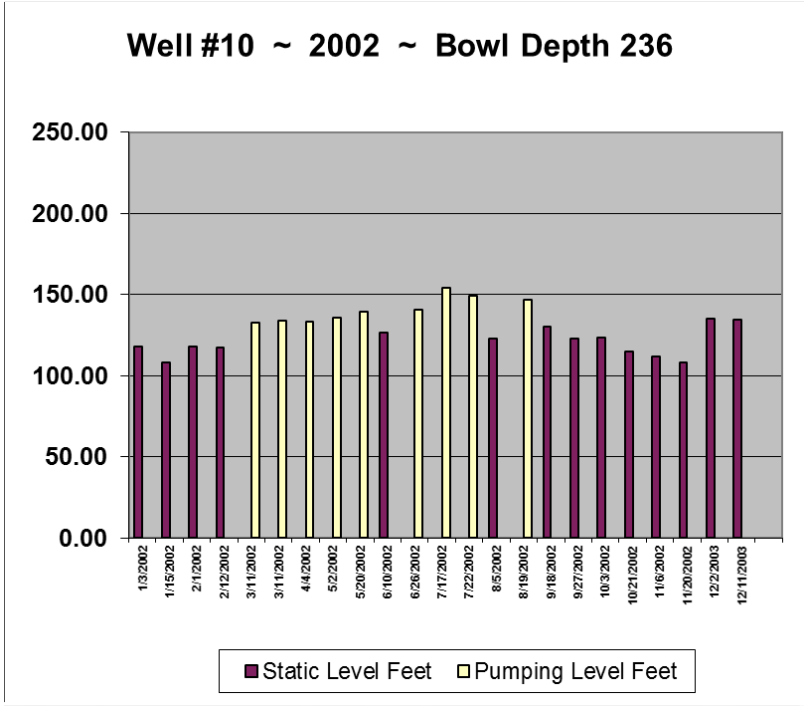

Well #10 - 2000 - Bowl Depth 236
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150.00
100.00
50.00
0.00
1/20/2000
2/8/2000
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5/3/2000
5/26/2000
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8/4/2000
9/12/2000
10/10/2000
11/7/2000
12/6/2000
Static Level
Pumping Level

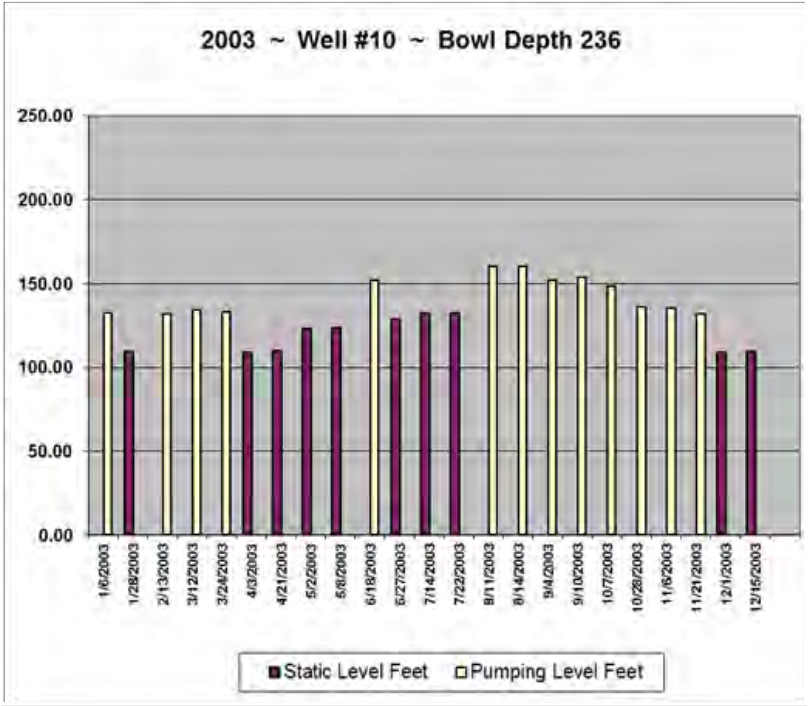

Well #10 - 1999 - Bowl Depth 236
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100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
5/18/1999
6/18/1999
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8/19/1999
9/10/1999
10/29/1999
11/17/1999
12/23/1999
Series1
Series2

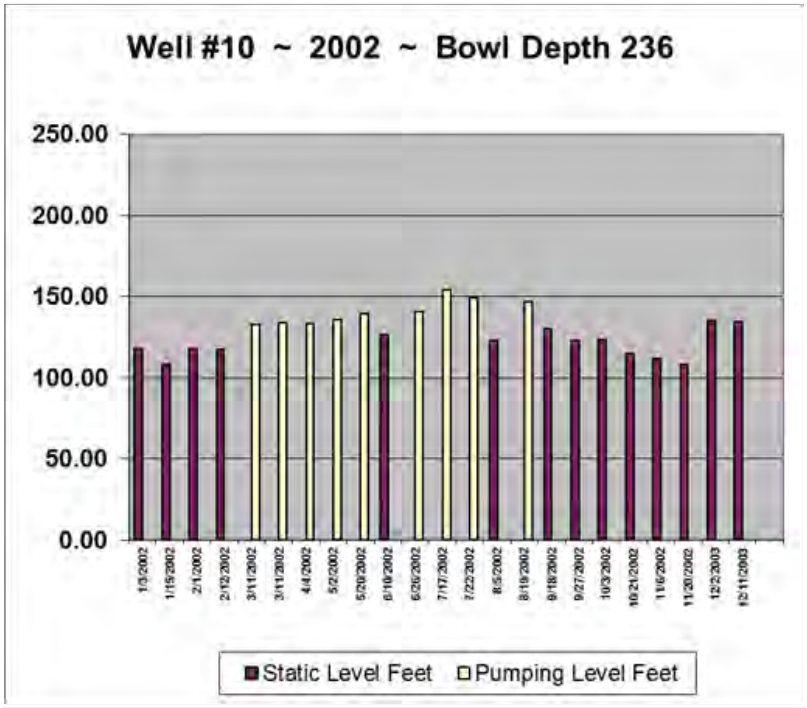

Well #10 ~ 2001 ~ Bowl Depth 236
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100.00
50.00
0.00
1/3/2001
1/17/2001
2/6/2001
2/22/2001
3/1/2001
3/27/2001
4/4/2001
4/20/2001
5/3/2001
5/24/2001
6/6/2001
6/22/2001
7/8/2001
7/10/2001
7/16/2001
8/3/2001
8/17/2001
9/12/2001
9/21/2001
10/4/2001
10/24/2001
11/16/2001
11/28/2001
12/7/2001
12/18/2001
Static Level Feet
Pumping Level Feet

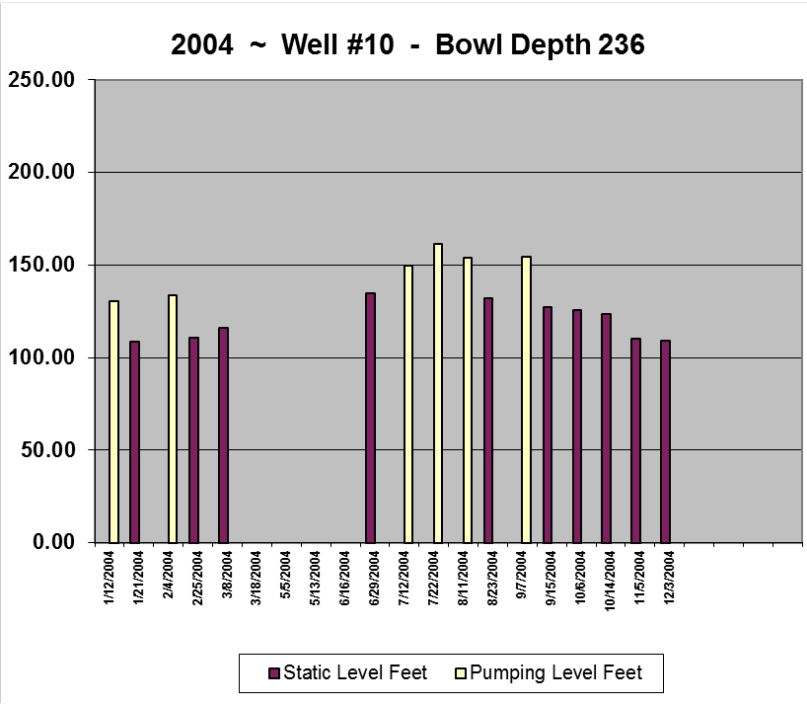

Well #10 - 2000 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/20/2000
2/8/2000
3/2/2000
4/4/2000
5/3/2000
5/26/2000
6/23/2000
7/24/2000
8/4/2000
9/12/2000
10/10/2000
11/7/2000
12/6/2000
Static Level
Pumping Level

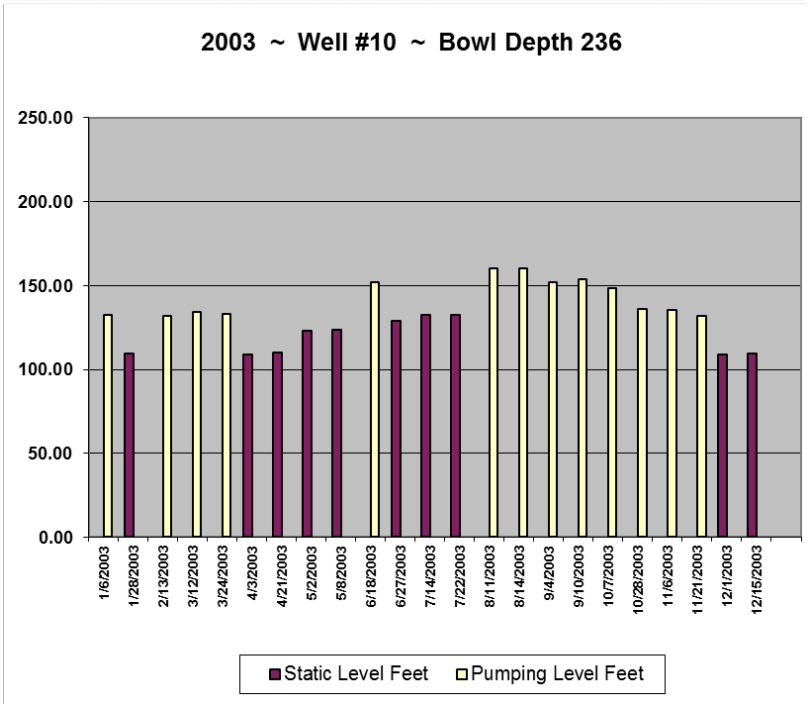

Well #10 ~ 2001 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2001
1/17/2001
2/6/2001
2/22/2001
3/1/2001
3/27/2001
4/4/2001
4/20/2001
5/3/2001
5/24/2001
6/6/2001
6/22/2001
7/8/2001
7/10/2001
7/16/2001
8/3/2001
8/17/2001
9/12/2001
9/21/2001
10/4/2001
10/24/2001
11/16/2001
11/28/2001
12/7/2001
12/18/2001
Static Level Feet
Pumping Level Feet

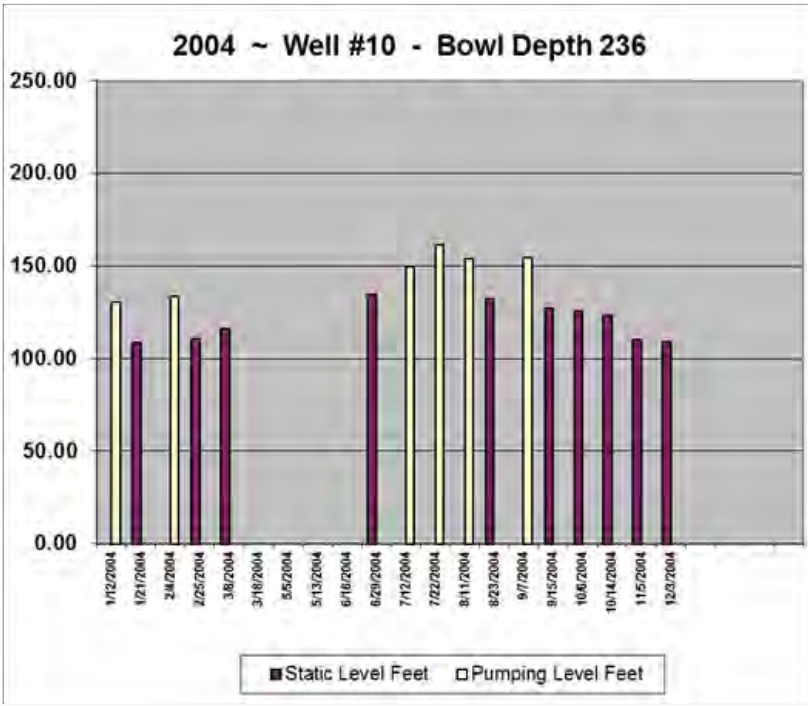

Well #10 ~ 2002 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2002
1/15/2002
2/1/2002
2/12/2002
3/11/2002
3/11/2002
4/4/2002
5/2/2002
5/20/2002
6/10/2002
6/26/2002
7/17/2002
7/22/2002
8/5/2002
8/19/2002
9/18/2002
9/27/2002
10/3/2002
10/21/2002
11/6/2002
11/20/2002
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

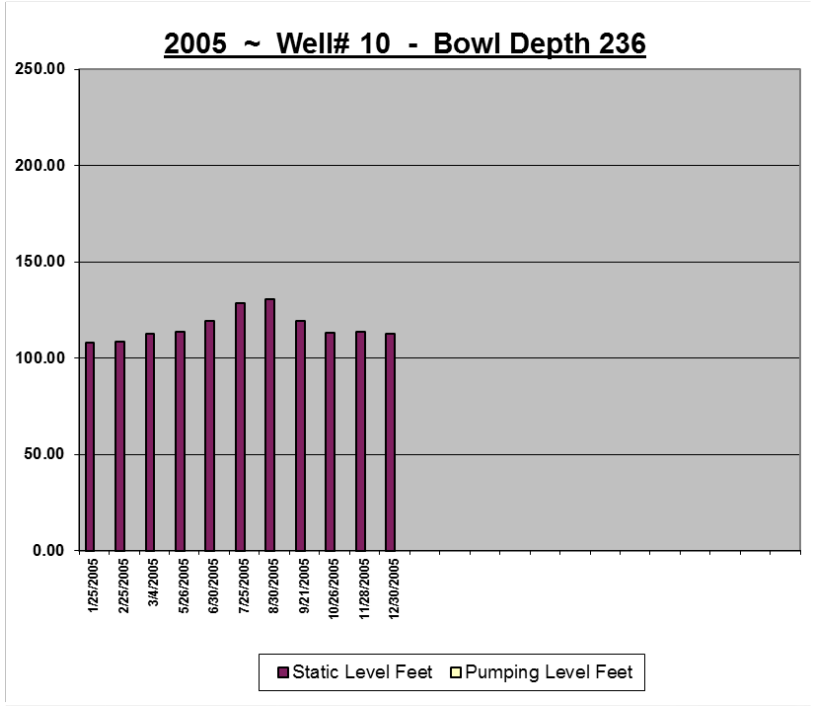

2003 ~ Well #10 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
1/28/2003
2/13/2003
3/12/2003
3/24/2003
4/3/2003
4/21/2003
5/2/2003
5/8/2003
6/18/2003
6/27/2003
7/14/2003
7/22/2003
8/11/2003
8/14/2003
9/4/2003
9/10/2003
10/7/2003
10/28/2003
11/6/2003
11/21/2003
12/1/2003
12/15/2003
Static Level Feet
Pumping Level Feet

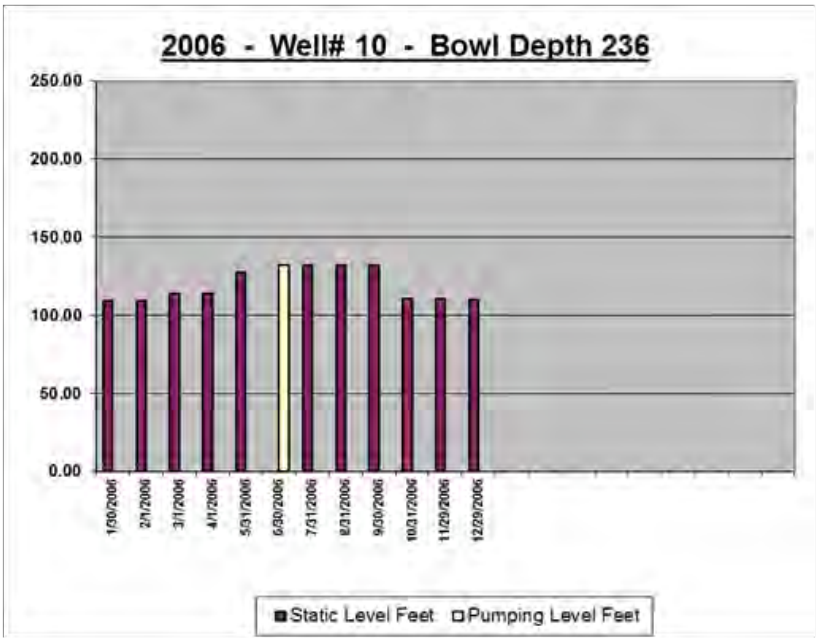

Well #10 ~ 2002 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

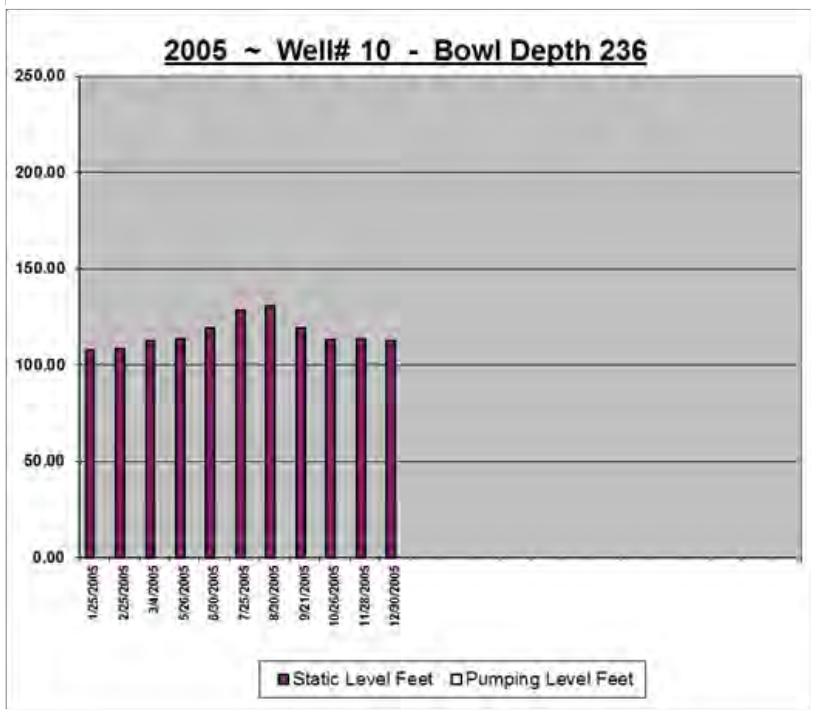

2004 ~ Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
2/4/2004
2/25/2004
3/8/2004
3/18/2004
5/5/2004
5/13/2004
6/16/2004
6/29/2004
7/12/2004
7/22/2004
8/11/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

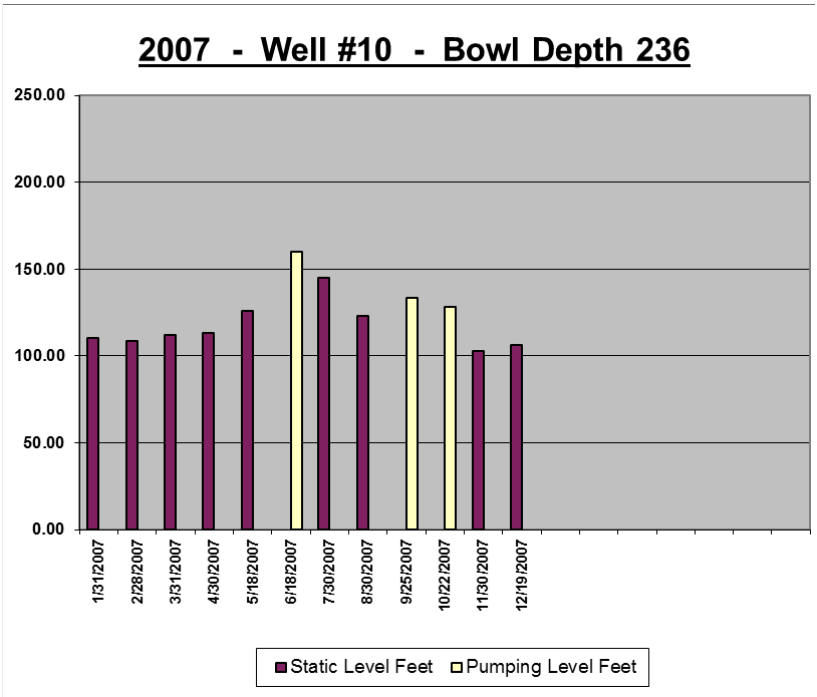

2003 ~ Well #10 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
1/28/2003
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3/12/2003
3/24/2003
4/3/2003
4/21/2003
5/2/2003
5/8/2003
6/18/2003
6/27/2003
7/14/2003
7/22/2003
8/11/2003
8/14/2003
9/4/2003
9/10/2003
10/7/2003
10/28/2003
11/6/2003
11/21/2003
12/1/2003
12/15/2003
Static Level Feet
Pumping Level Feet

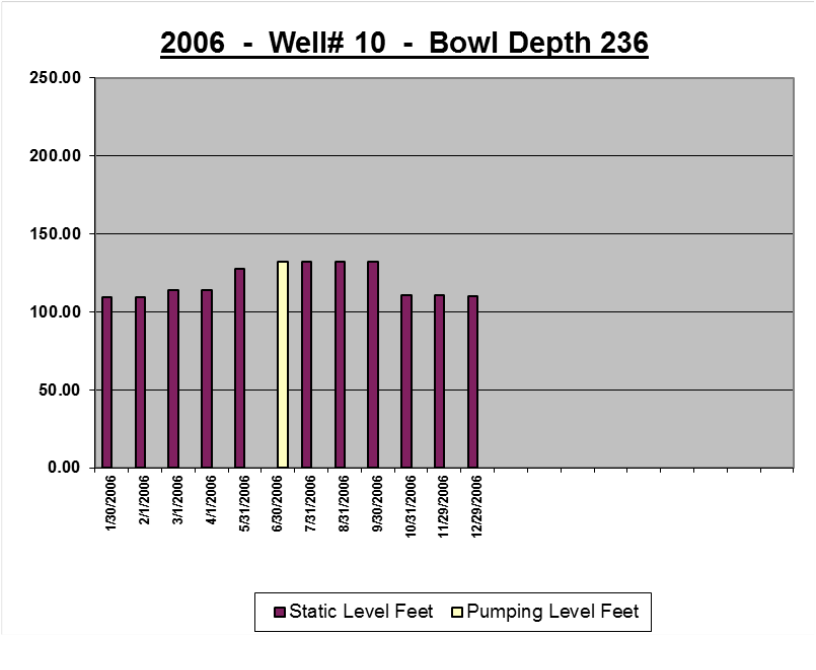

2004 ~ Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
2/4/2004
2/25/2004
3/8/2004
3/18/2004
5/5/2004
5/13/2004
6/16/2004
6/29/2004
7/12/2004
7/22/2004
8/11/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

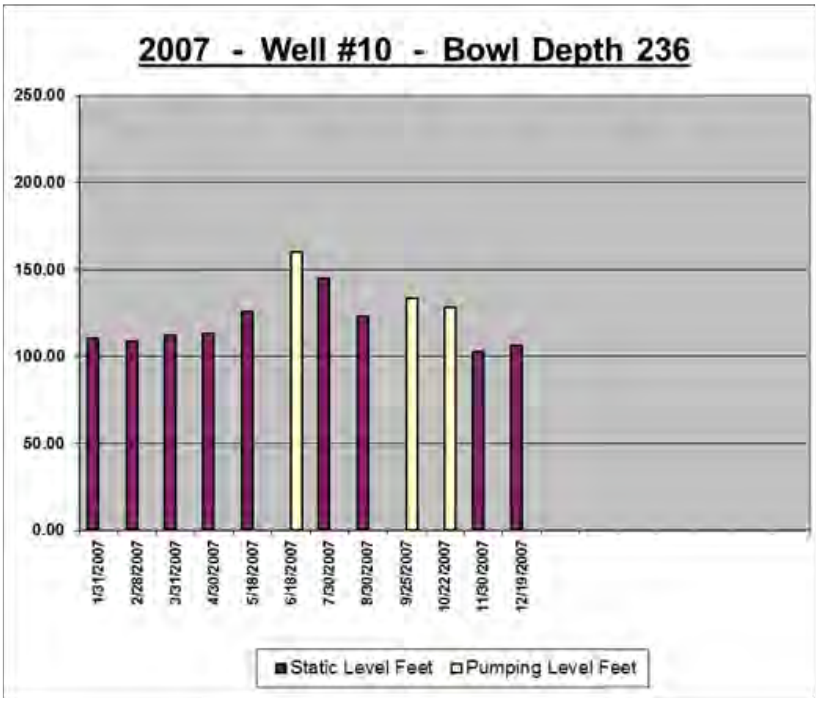

2005 ~ Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/21/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

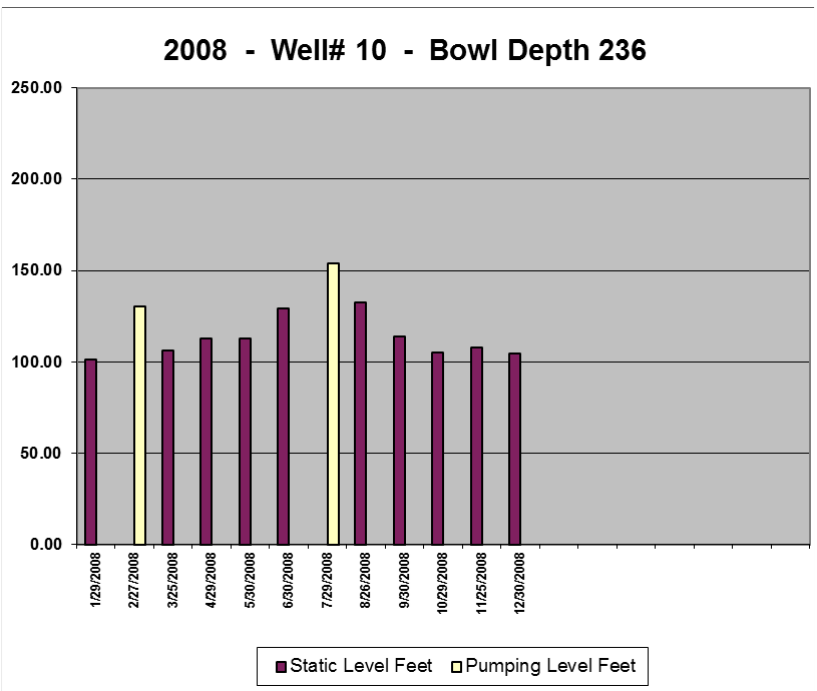

2006 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

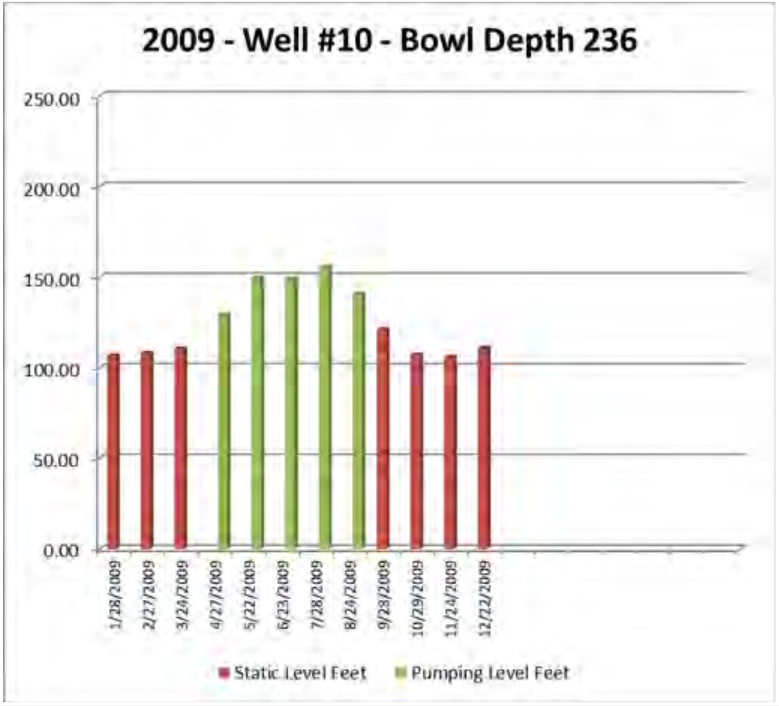

2005 ~ Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/21/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

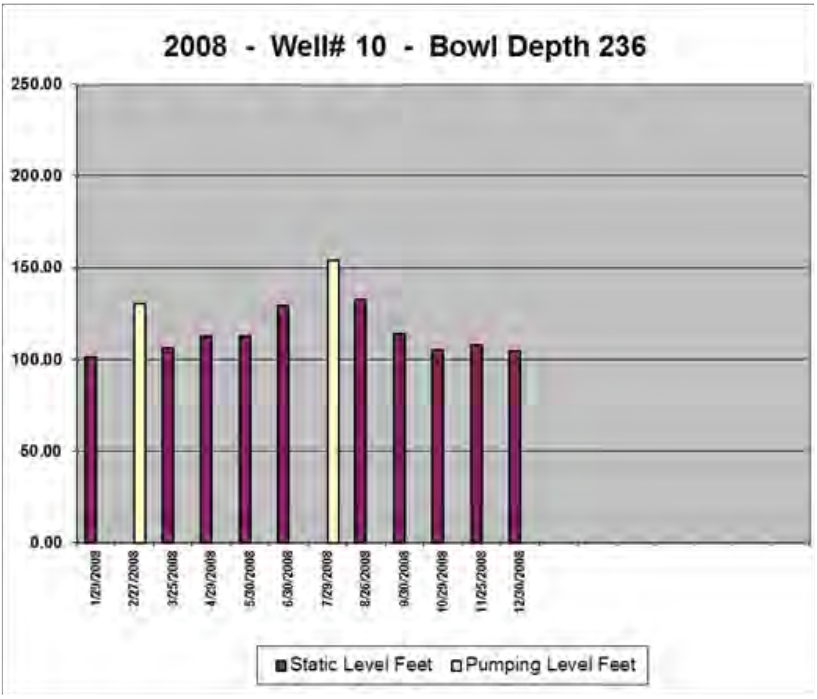

2007 - Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

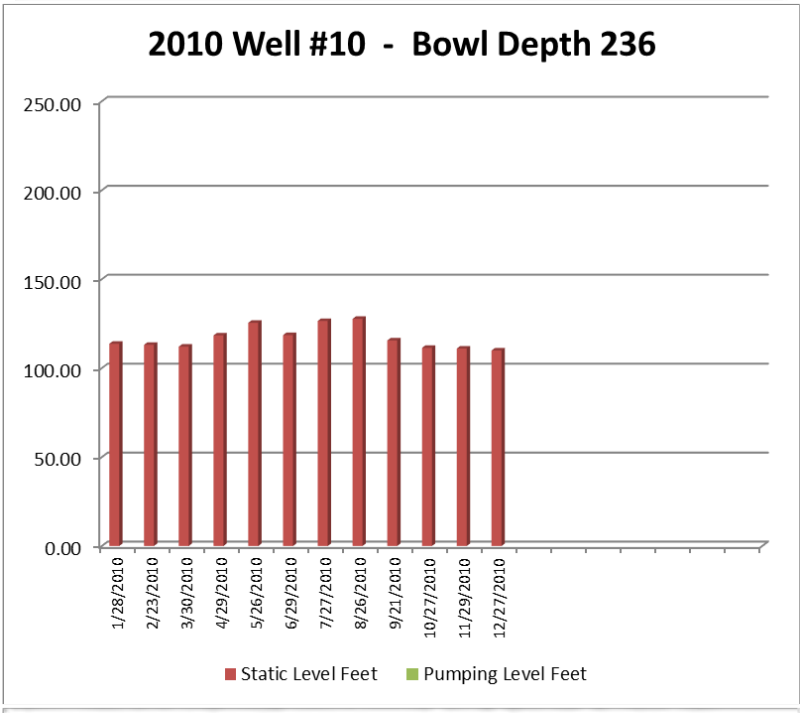

2006 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

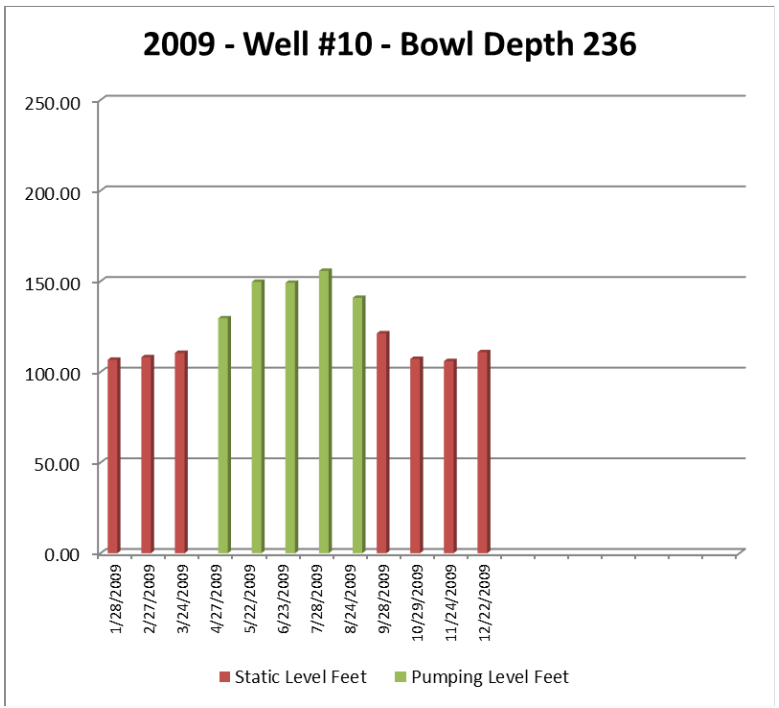

2007 - Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

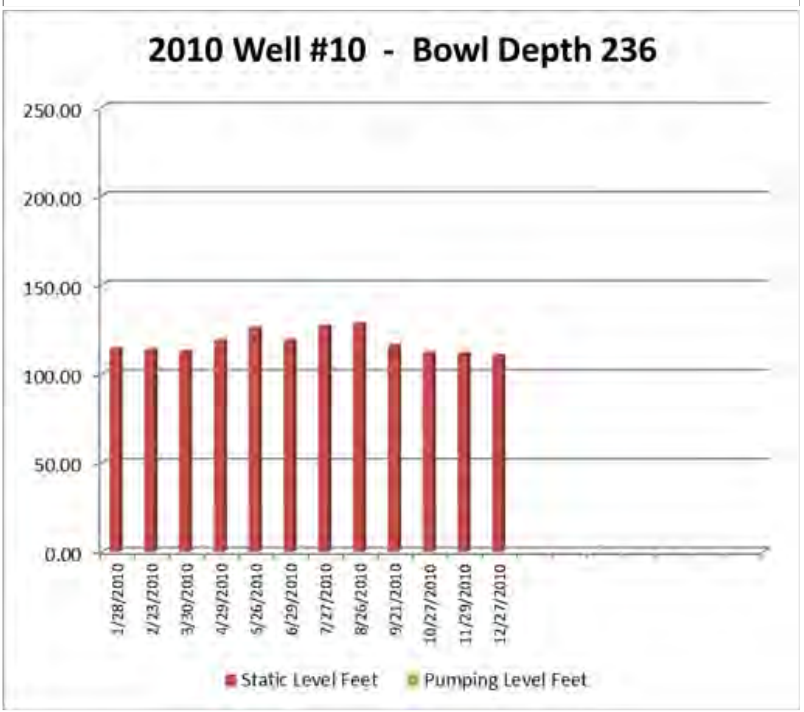

2008 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

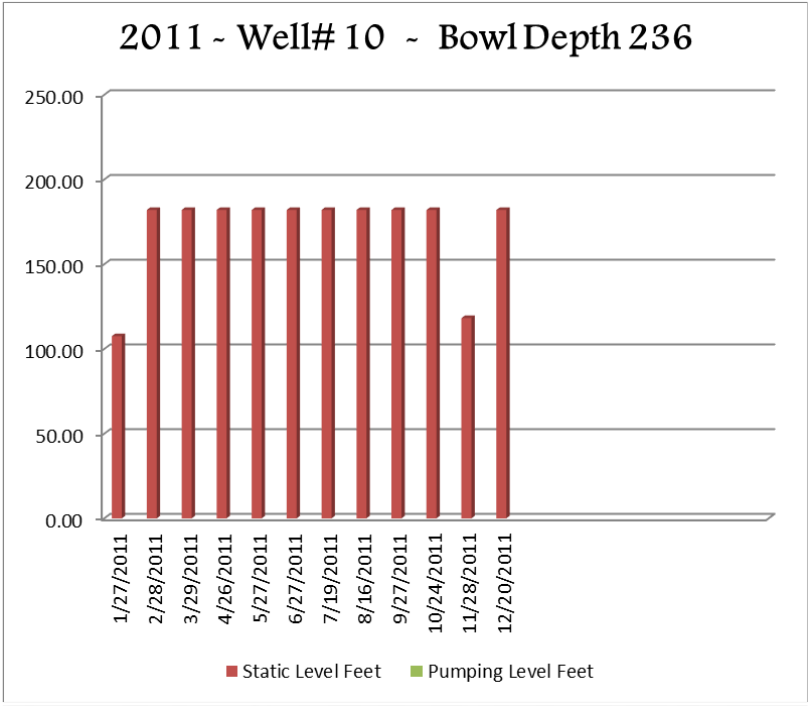

2009 - Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

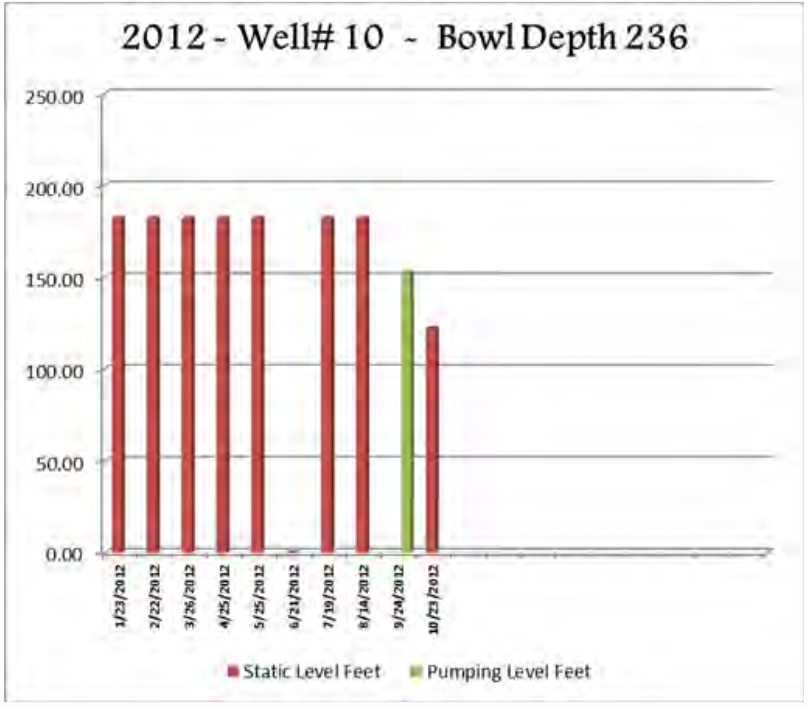

2008 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

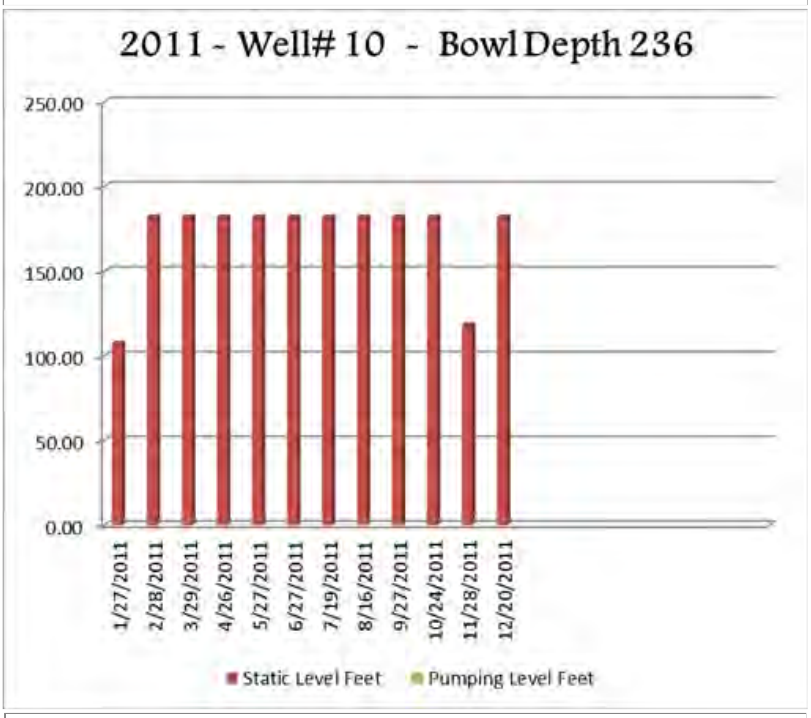

2010 Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

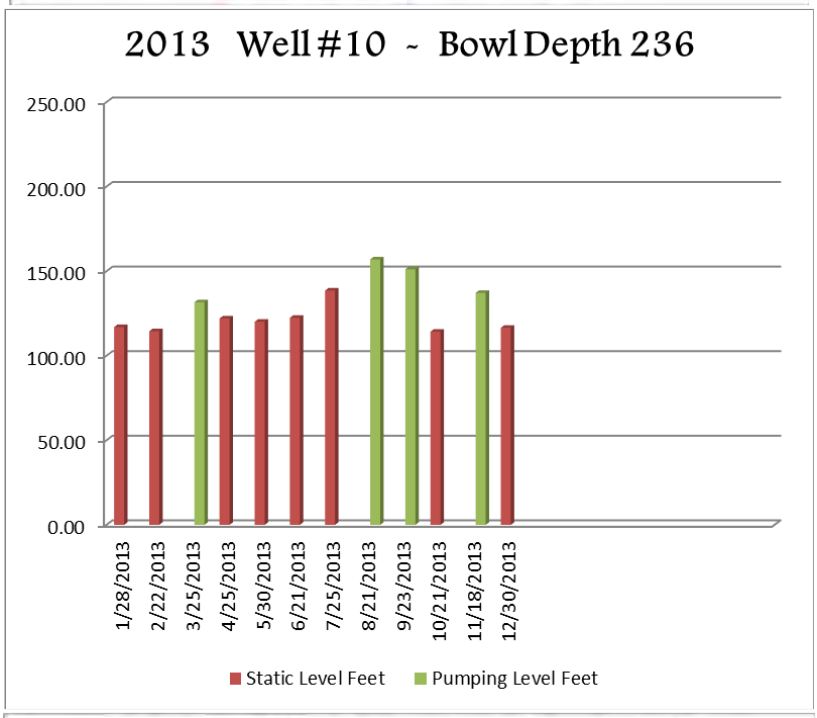

2009 - Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

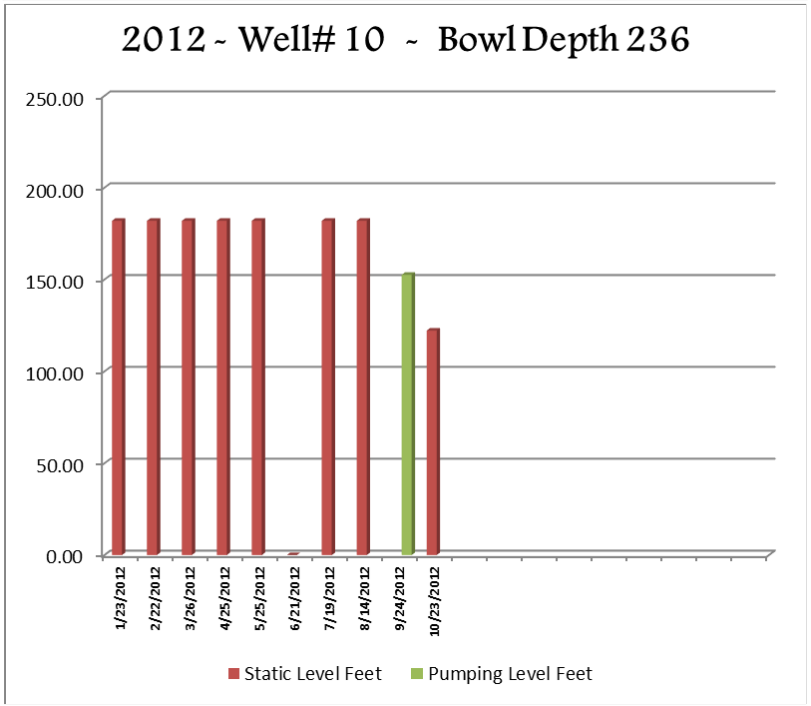

2010 Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

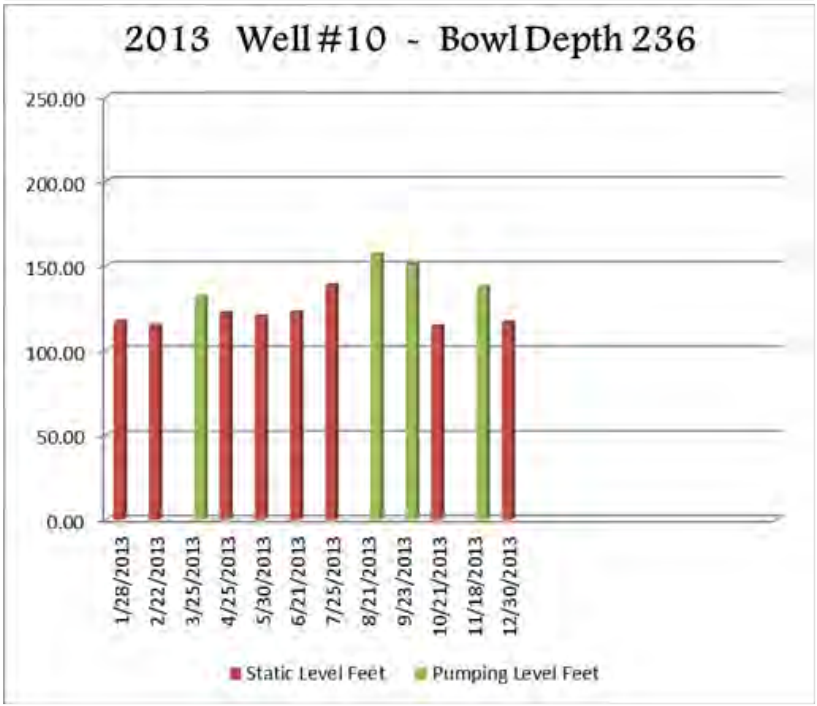

2011 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

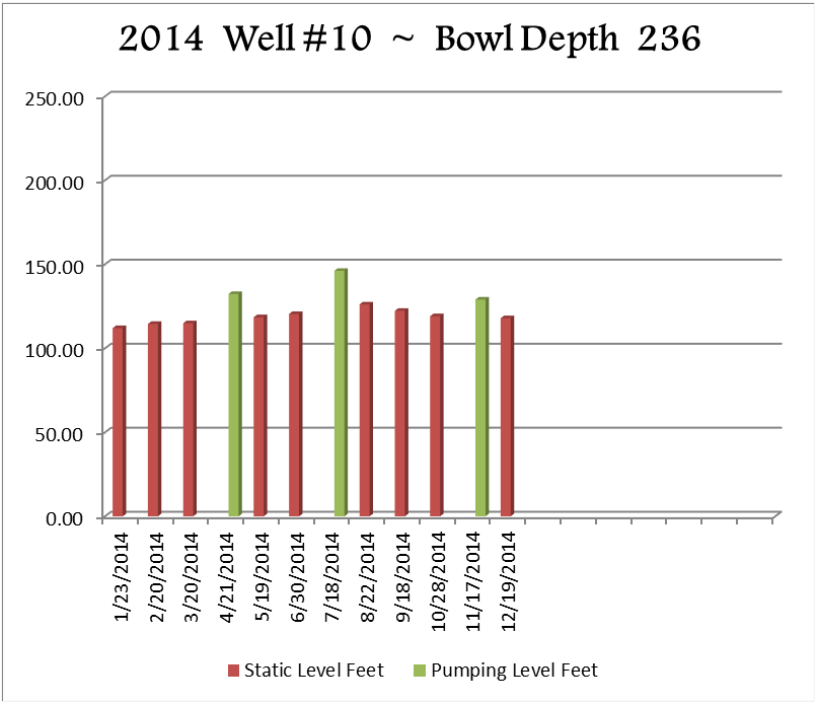

2012 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

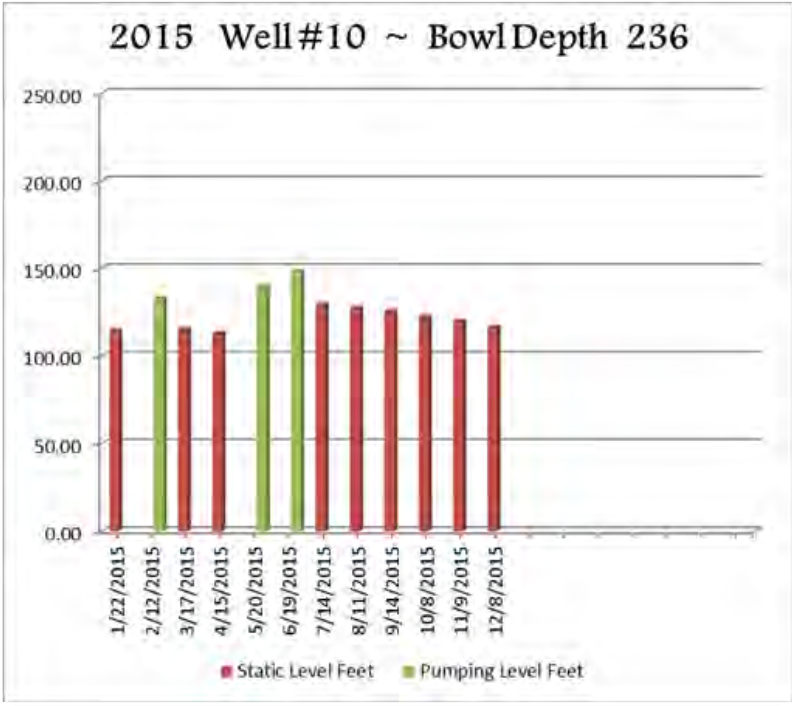

2011 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

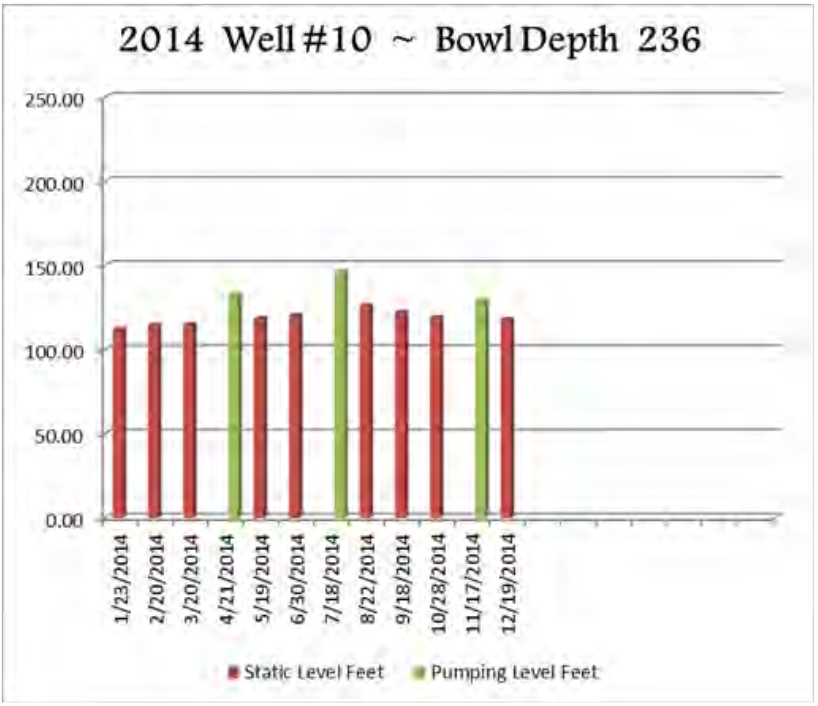

2013 Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

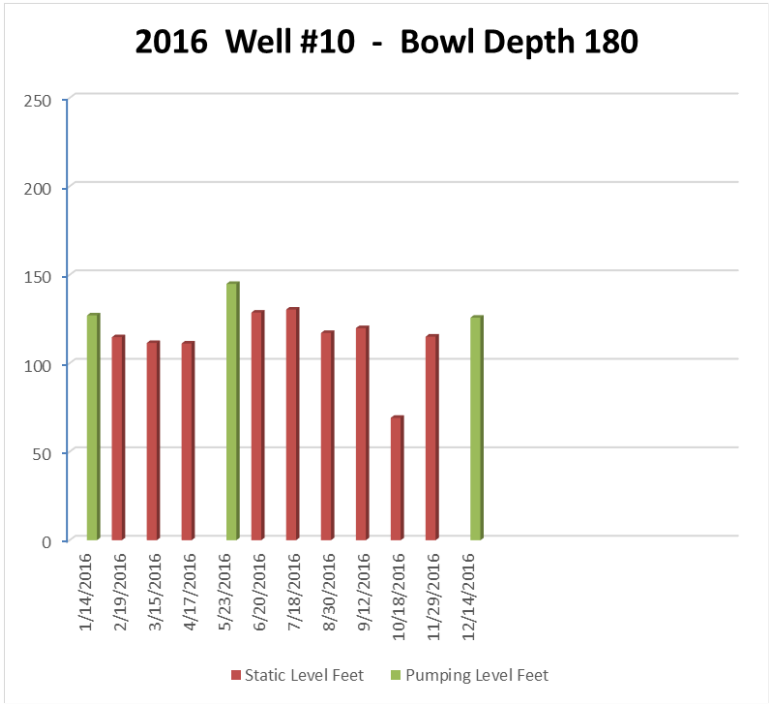

2012 - Well# 10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

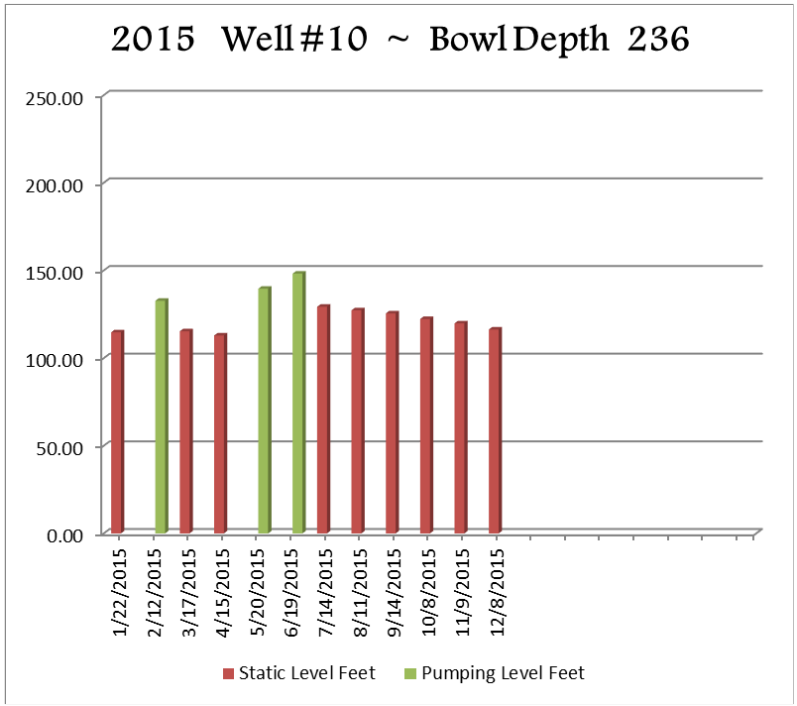

2013 Well #10 - Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

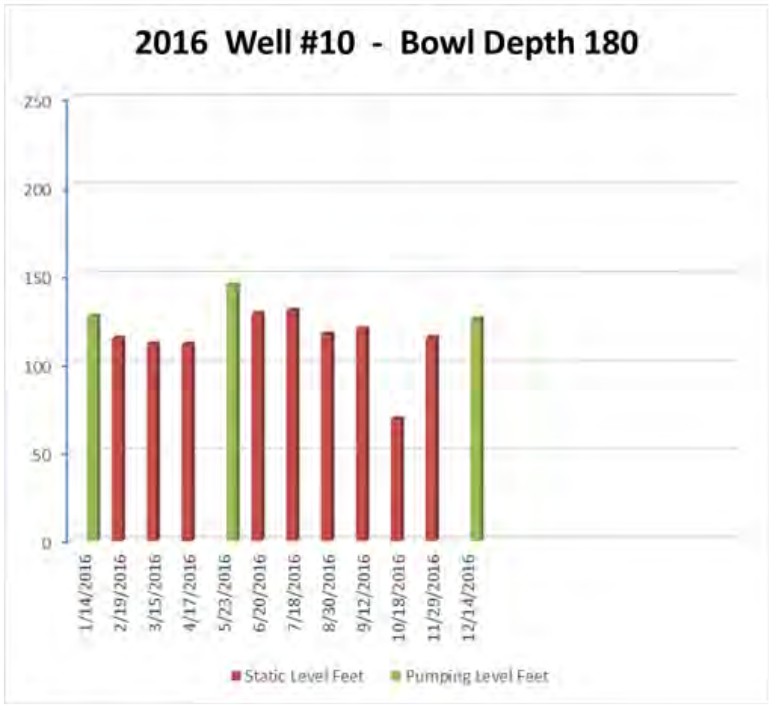

2014 Well #10 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

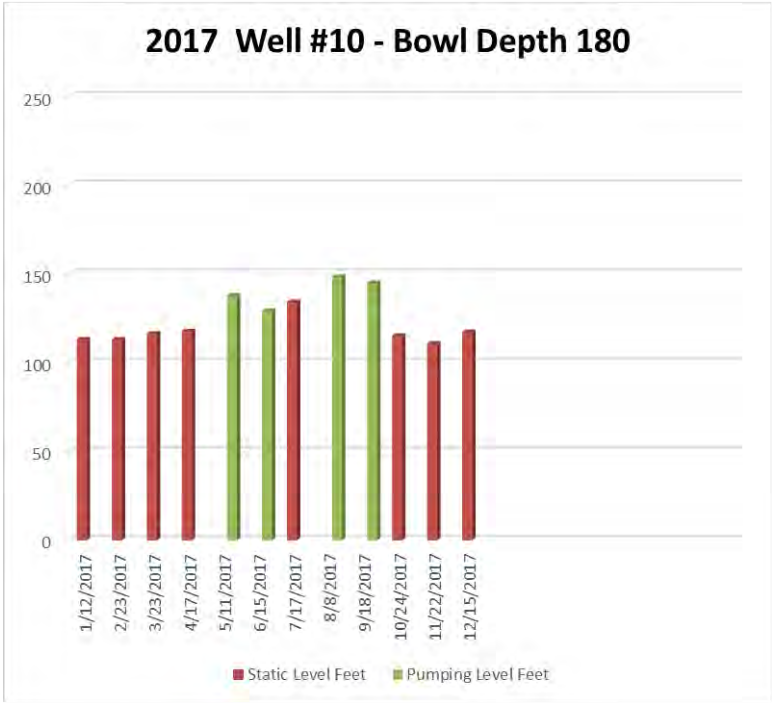

2015 Well #10 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

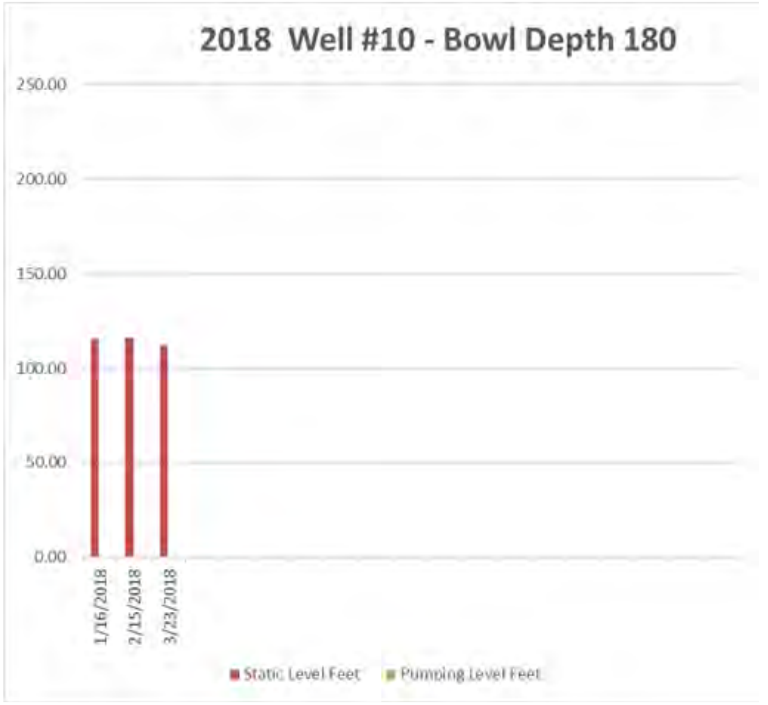

2014 Well #10 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

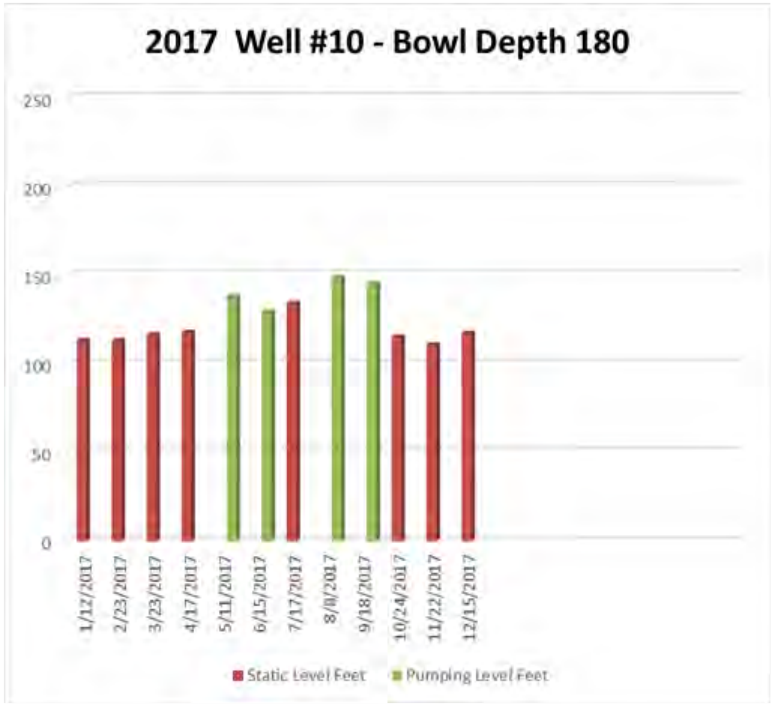

2016 Well #10 - Bowl Depth 180
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

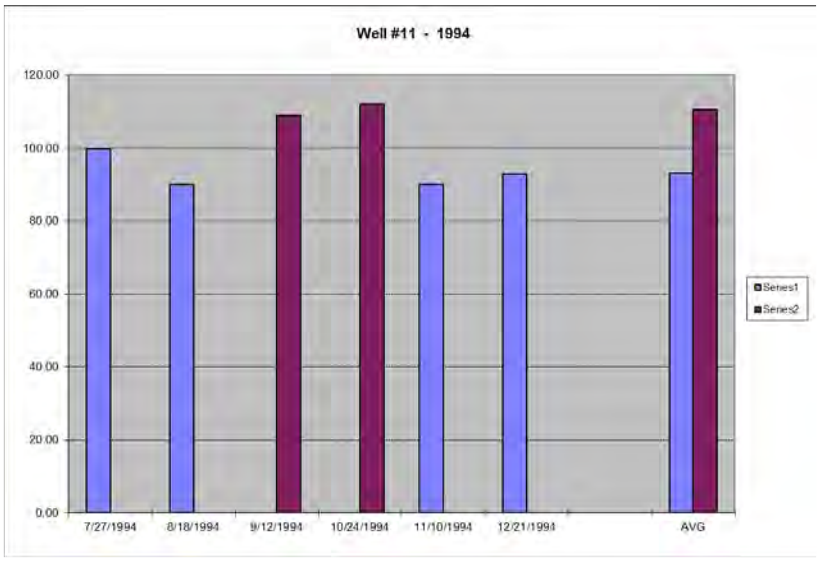

2015 Well #10 ~ Bowl Depth 236
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

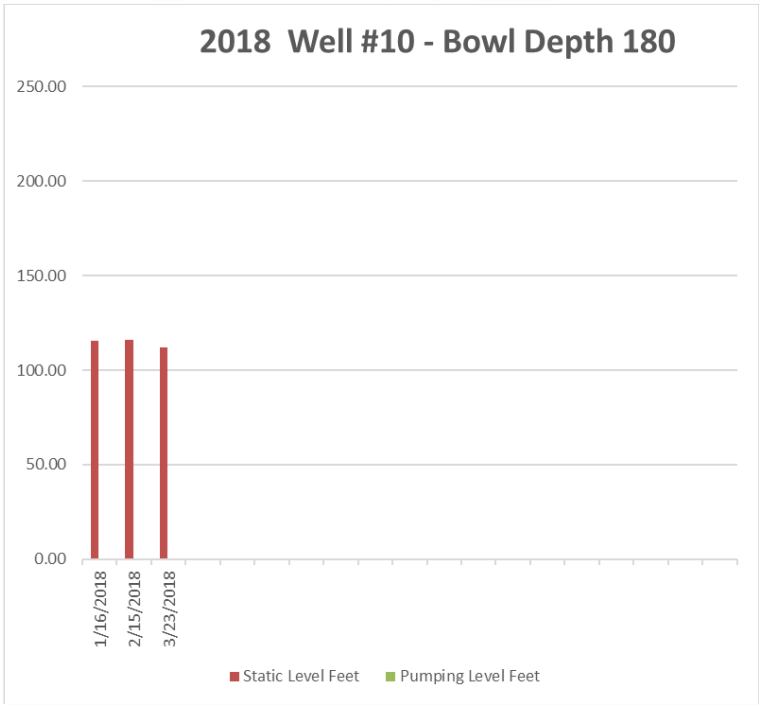

2016 Well #10 - Bowl Depth 180
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

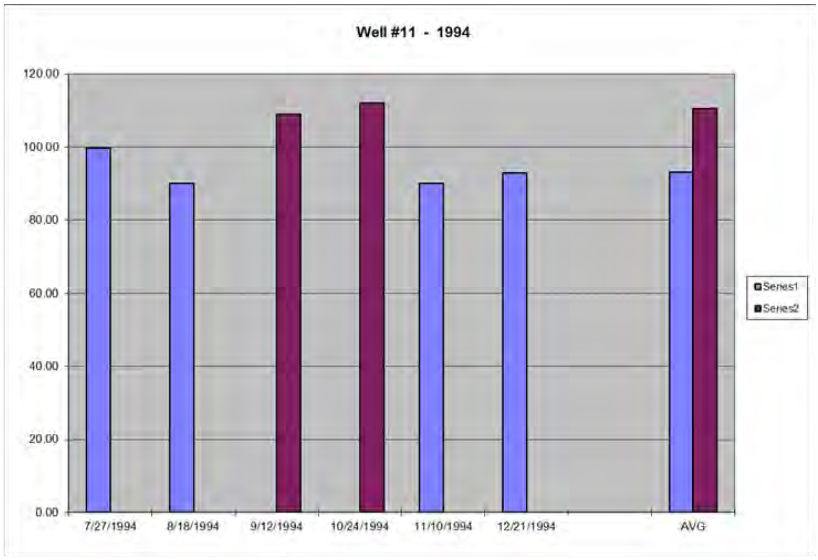

2017 Well #10 - Bowl Depth 180
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

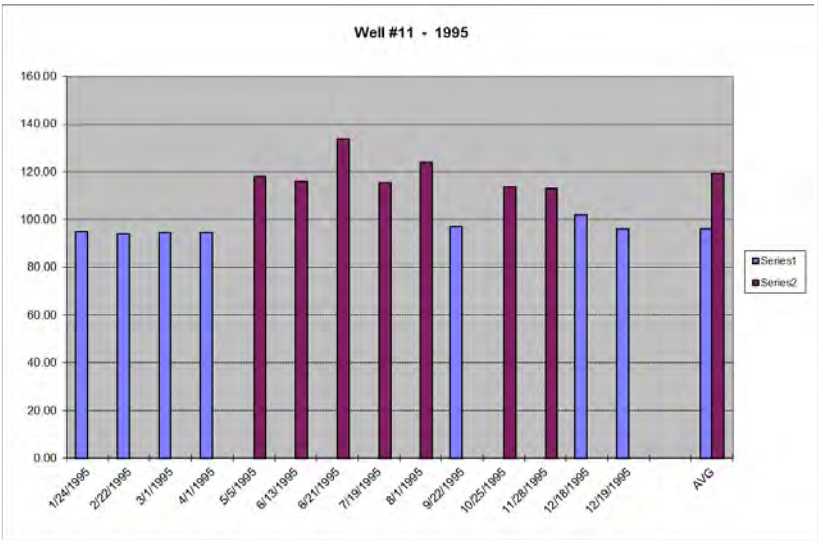

2018 Well #10 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

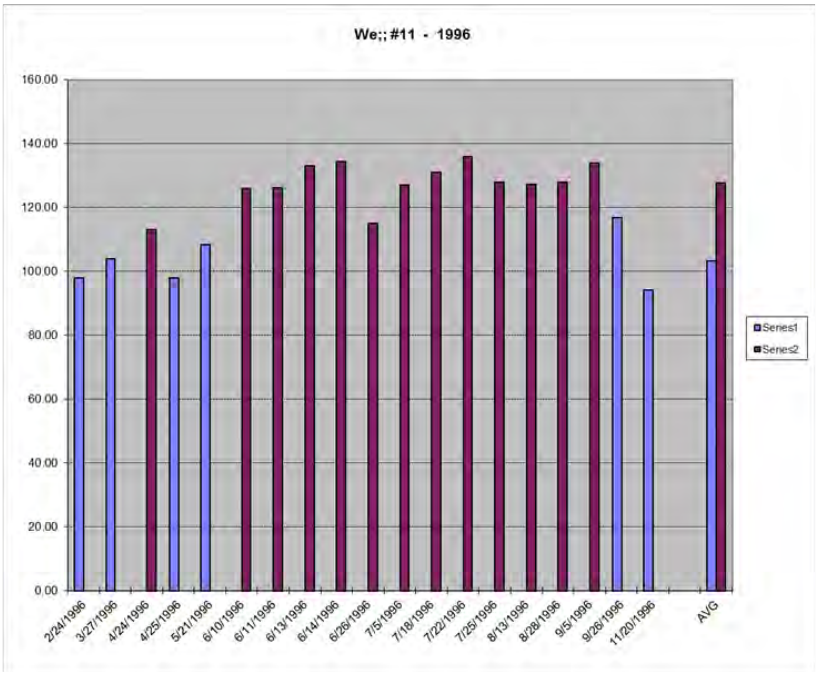

2017 Well #10 - Bowl Depth 180
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

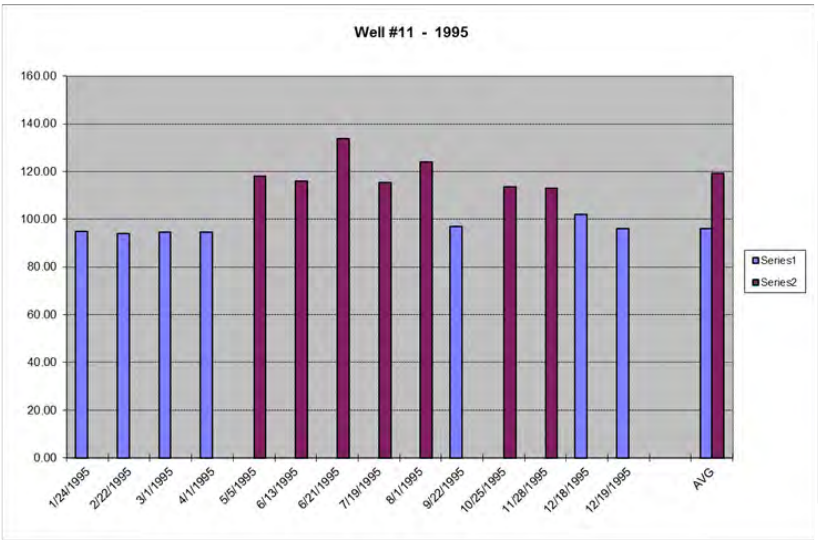

Well #11 - 1994
120.00
100.00
80.00
60.00
40.00
20.00
0.00
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/10/1994
12/21/1994
AVG
Series1
Series2

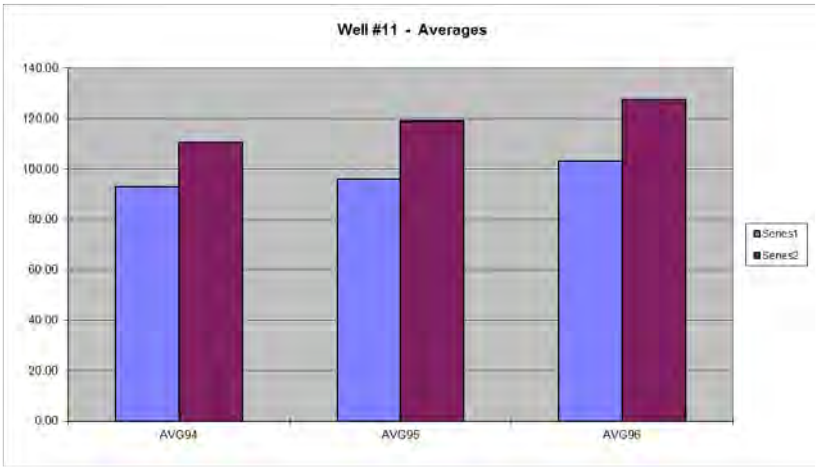

2018 Well #10 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

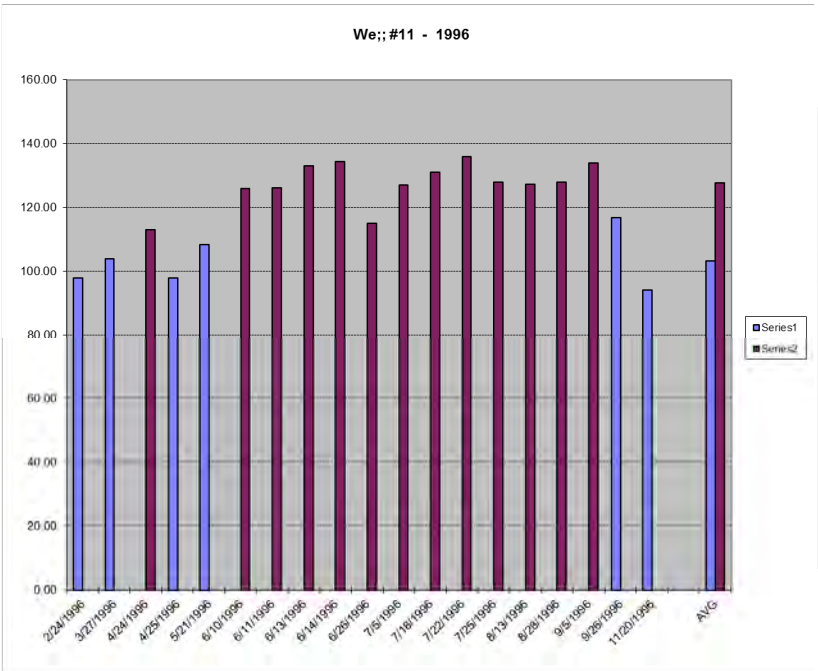

Well #11 - 1994
120.00
100.00
80.00
60.00
40.00
20.00
0.00
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/10/1994
12/21/1994
AVG
Series1
Series2

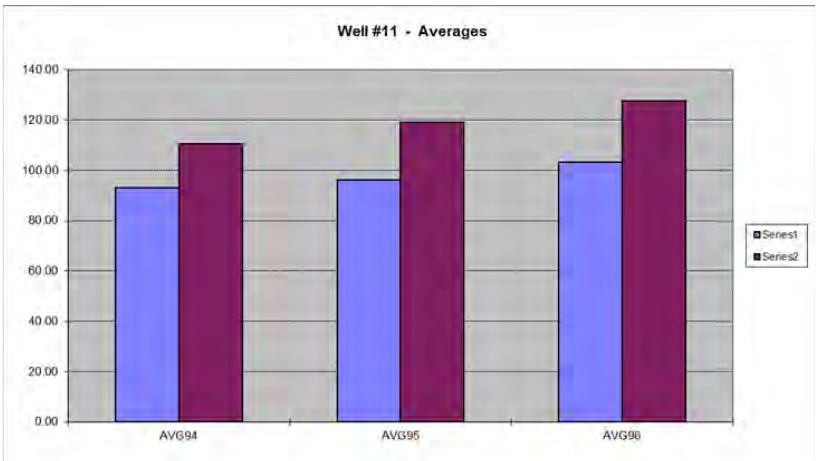

Well #11 - 1995
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/24/1995
2/22/1995
3/1/1995
4/1/1995
5/5/1995
6/13/1995
6/21/1995
7/19/1995
8/1/1995
9/22/1995
10/25/1995
11/28/1995
12/18/1995
12/19/1995
AVG
Series1
Series2

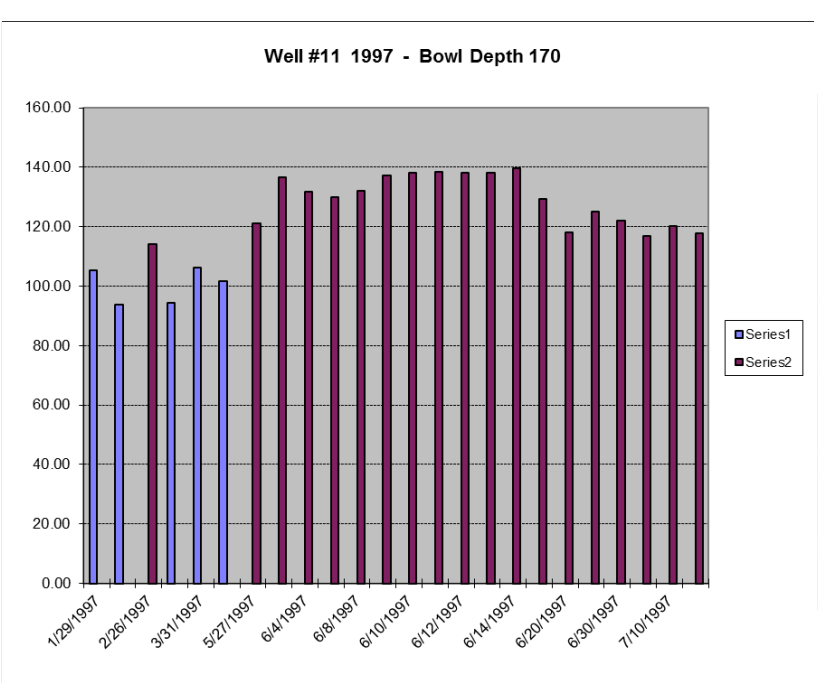

We;; #11 - 1996
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/24/1996
3/27/1996
4/24/1996
4/25/1996
5/21/1996
6/10/1996
6/11/1996
6/13/1996
6/14/1996
6/26/1996
7/5/1996
7/18/1996
7/22/1996
7/25/1996
8/13/1996
8/28/1996
9/5/1996
9/26/1996
11/20/1996
AVG
Series1
Series2

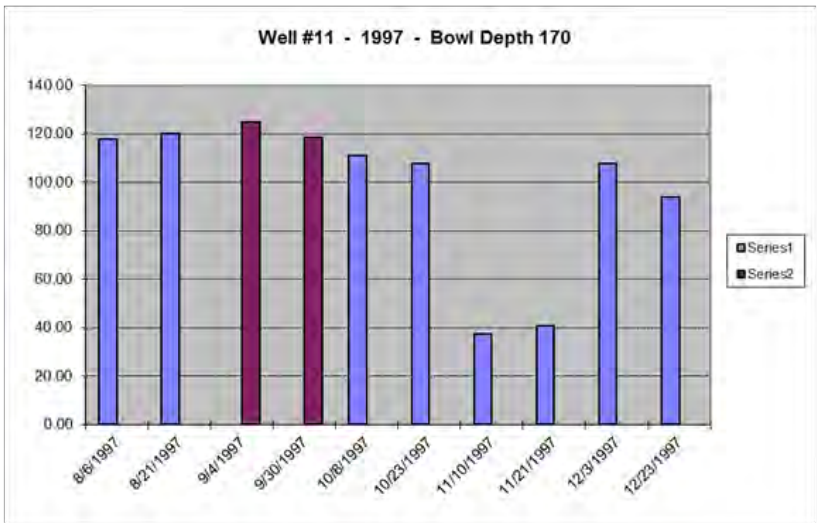

Well #11 - 1995
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/24/1995
2/22/1995
3/1/1995
4/1/1995
5/5/1995
6/13/1995
6/21/1995
7/19/1995
8/1/1995
9/22/1995
10/25/1995
11/28/1995
12/18/1995
12/19/1995
AVG
Series1
Series2

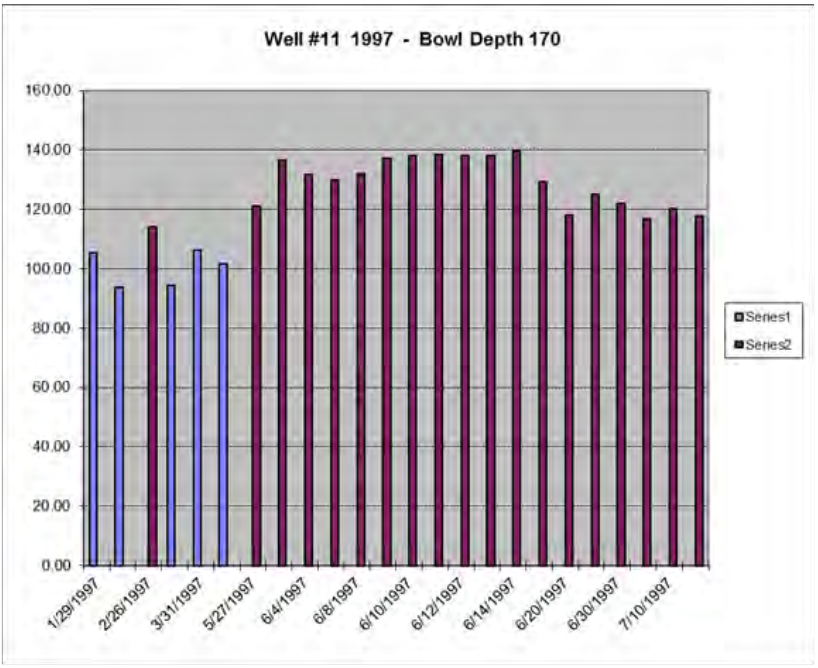

Well #11 - Averages
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG94
AVG95
AVG96
Series1
Series2

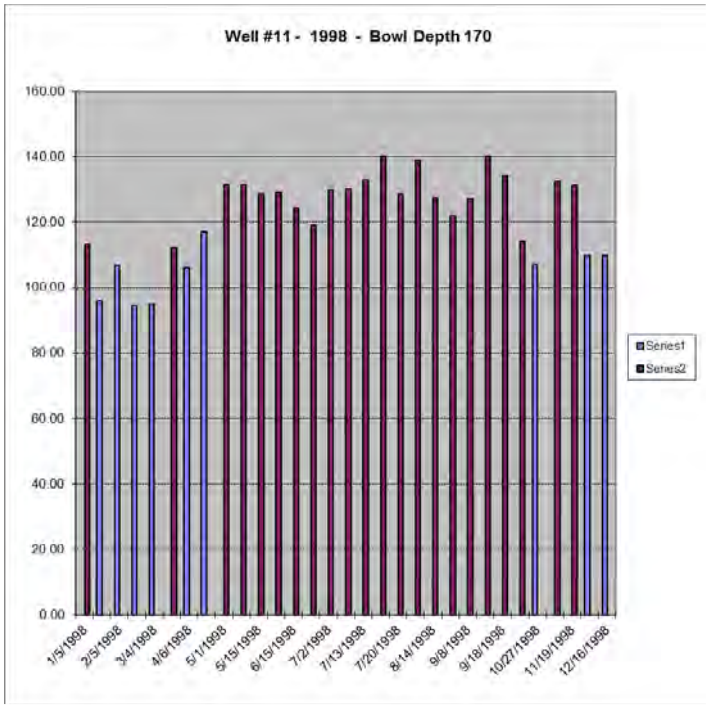

We;; #11 - 1996
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/24/1996
3/27/1996
4/24/1996
4/25/1996
5/21/1996
6/10/1996
6/11/1996
6/13/1996
6/14/1996
6/26/1996
7/5/1996
7/18/1996
7/22/1996
7/25/1996
8/13/1996
8/28/1996
9/5/1996
9/26/1996
11/20/1996
AVG
Series1
Series2

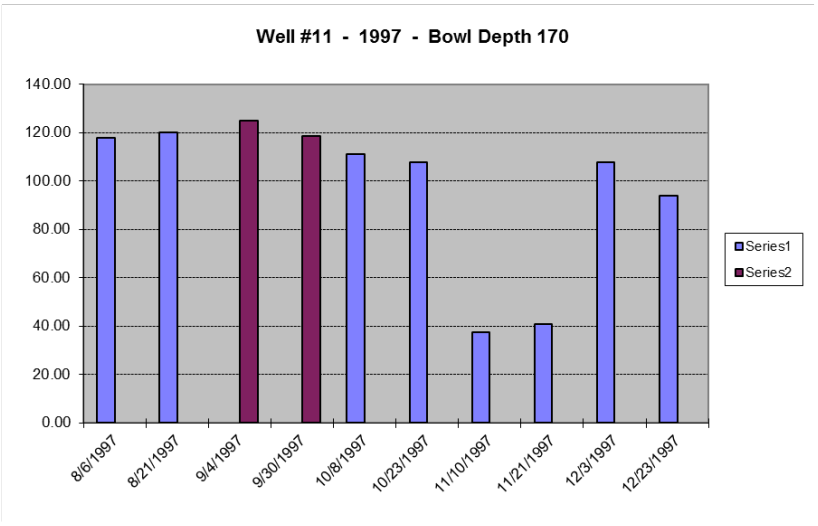

Well #11 - Averages
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG94
AVG95
AVG96
Series1
Series2

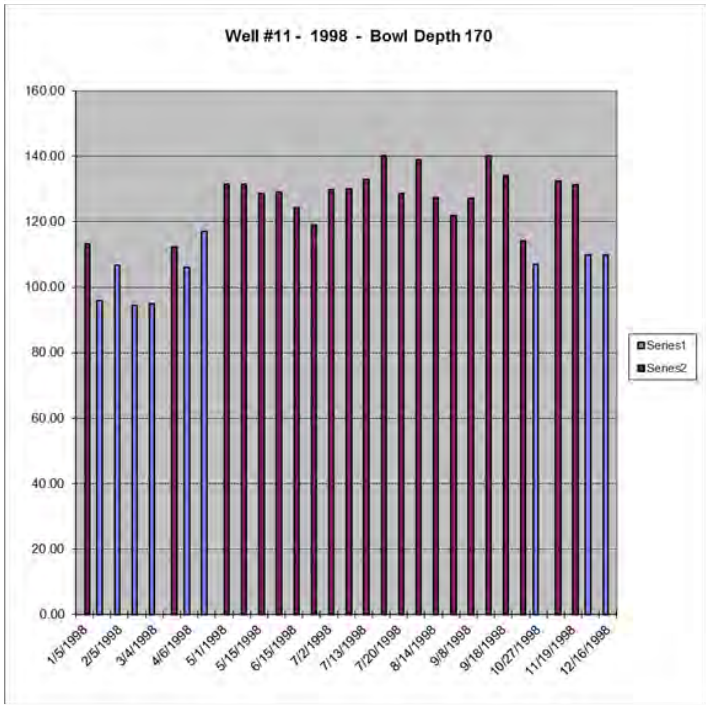

Well #11 1997 - Bowl Depth 170
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/29/1997
2/26/1997
3/31/1997
5/27/1997
6/4/1997
6/8/1997
6/10/1997
6/12/1997
6/14/1997
6/20/1997
6/30/1997
7/10/1997
Series1
Series2

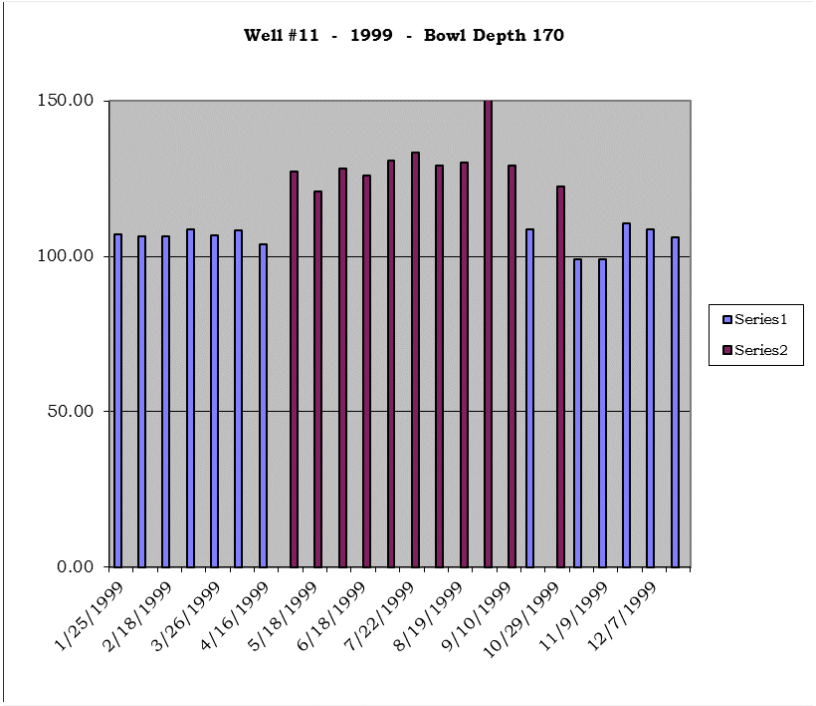

Well #11 - 1997 - Bowl Depth 170
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/6/1997
8/21/1997
9/4/1997
9/30/1997
10/8/1997
10/23/1997
11/10/1997
11/21/1997
12/3/1997
12/23/1997
Series1
Series2

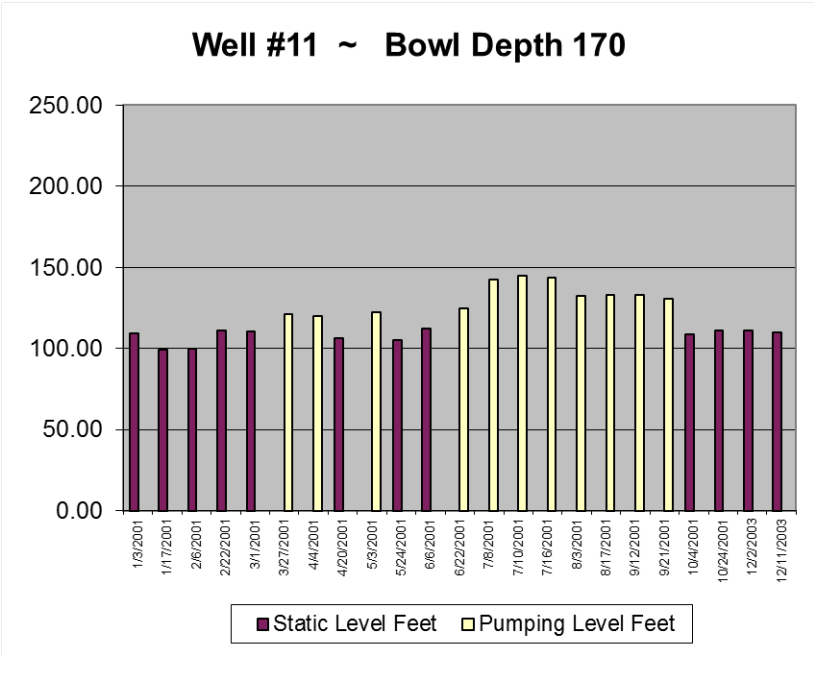

Well #11 1997 - Bowl Depth 170
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/29/1997
2/26/1997
3/31/1997
5/27/1997
6/4/1997
6/8/1997
6/10/1997
6/12/1997
6/14/1997
6/20/1997
6/30/1997
7/10/1997
Series1
Series2

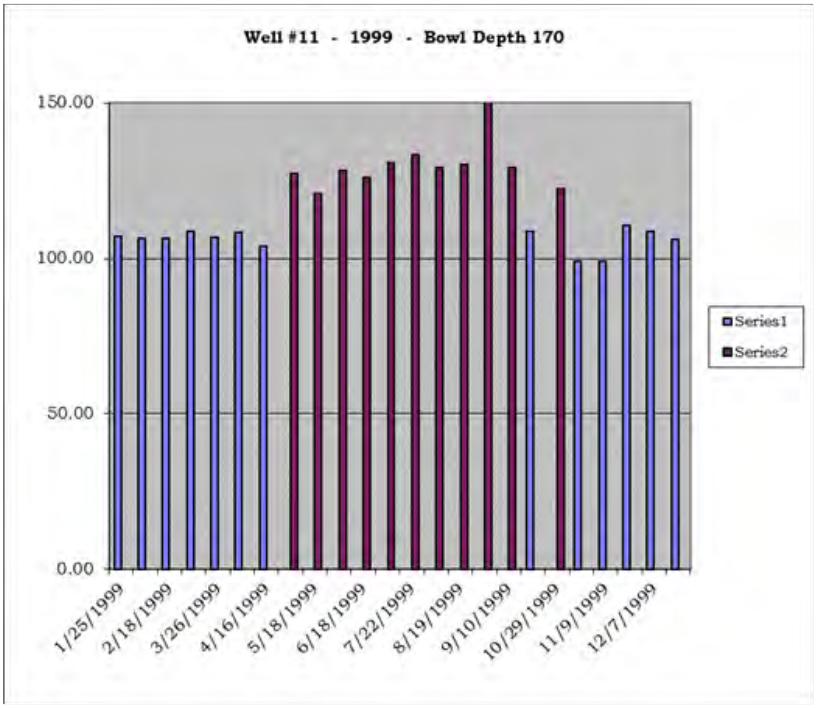

Well #11 - 1998 - Bowl Depth 170
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/5/1998
2/5/1998
3/4/1998
4/6/1998
5/1/1998
5/15/1998
6/15/1998
7/2/1998
7/13/1998
7/20/1998
8/14/1998
9/8/1998
9/18/1998
10/27/1998
11/19/1998
12/16/1998
Series1
Series2

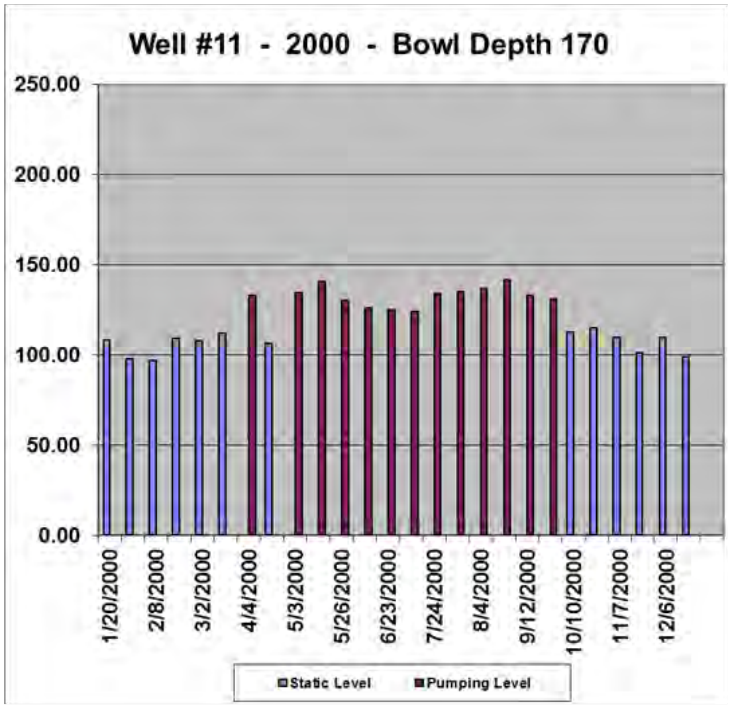

Well #11 - 1997 - Bowl Depth 170
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/6/1997
8/21/1997
9/4/1997
9/30/1997
10/8/1997
10/23/1997
11/10/1997
11/21/1997
12/3/1997
12/23/1997
Series1
Series2

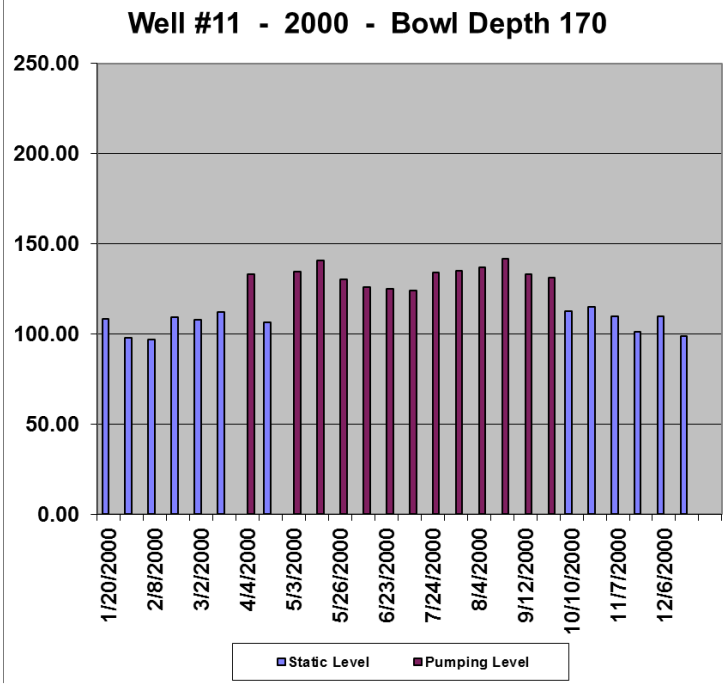

Well #11 - 1998 - Bowl Depth 170
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/5/1998
2/5/1998
3/4/1998
4/6/1998
5/1/1998
5/15/1998
6/15/1998
7/2/1998
7/13/1998
7/20/1998
8/14/1998
9/8/1998
9/18/1998
10/27/1998
11/19/1998
12/16/1998
Series1
Series2

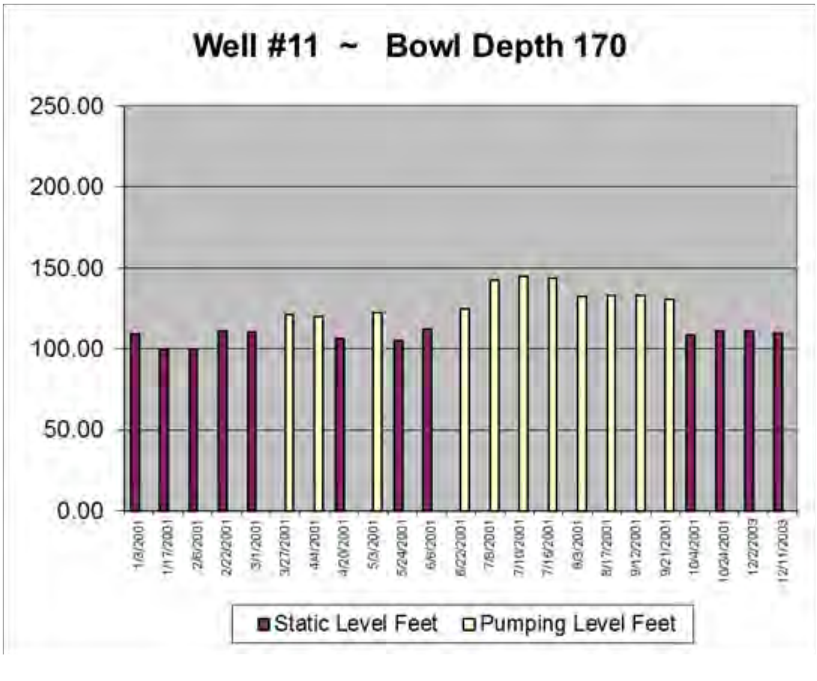

Well #11 - 1999 - Bowl Depth 170
150.00
100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
5/18/1999
6/18/1999
7/22/1999
8/19/1999
9/10/1999
10/29/1999
11/9/1999
12/7/1999
Series1
Series2

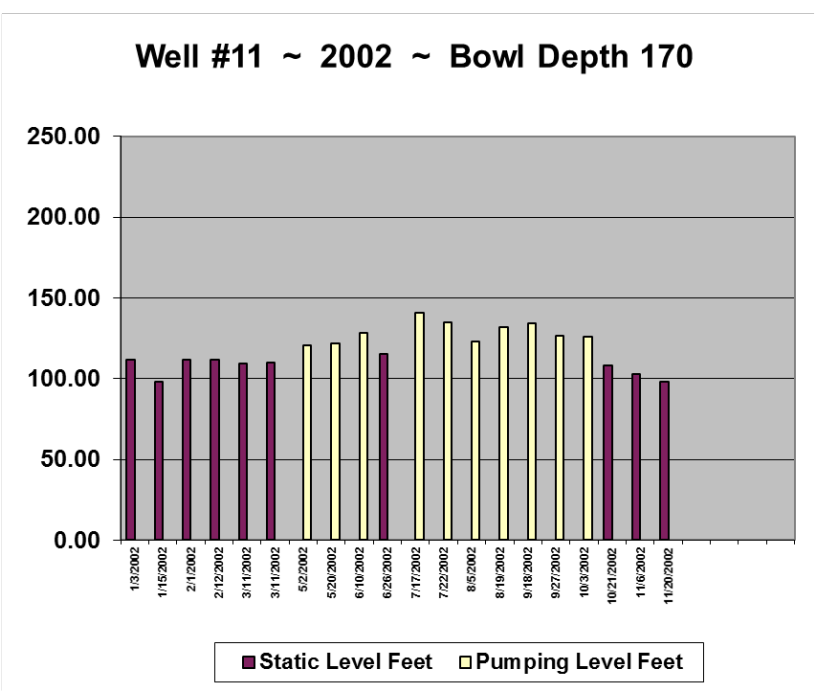

Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2001
1/17/2001
2/6/2001
2/22/2001
3/1/2001
3/27/2001
4/4/2001
4/20/2001
5/3/2001
5/24/2001
6/6/2001
6/22/2001
7/8/2001
7/10/2001
7/16/2001
8/3/2001
8/17/2001
9/12/2001
9/21/2001
10/4/2001
10/24/2001
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

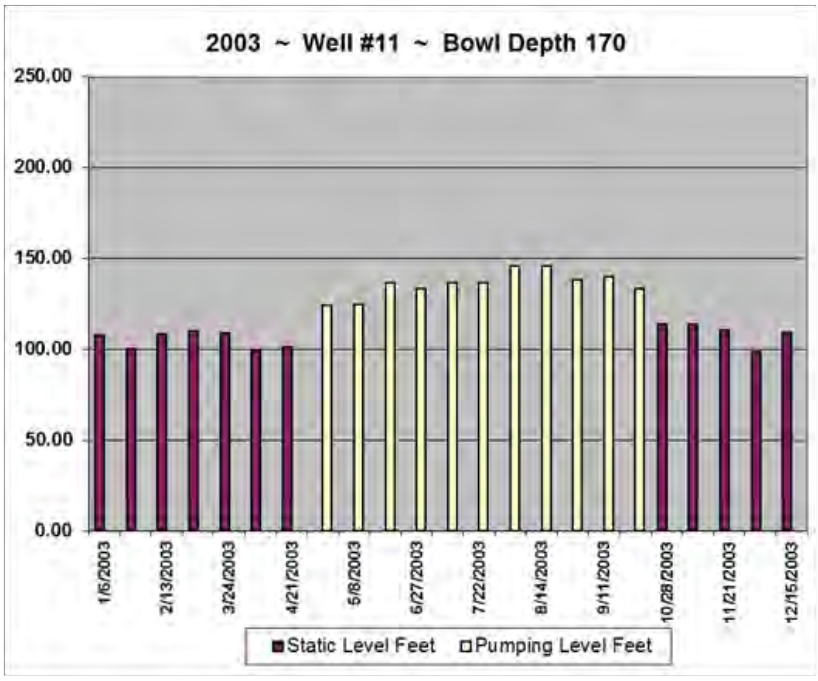

Well #11 - 1999 - Bowl Depth 170
150.00
100.00
50.00
0.00
1/25/1999
2/18/1999
3/26/1999
4/16/1999
5/18/1999
6/18/1999
7/22/1999
8/19/1999
9/10/1999
10/29/1999
11/9/1999
12/7/1999
Series1
Series2

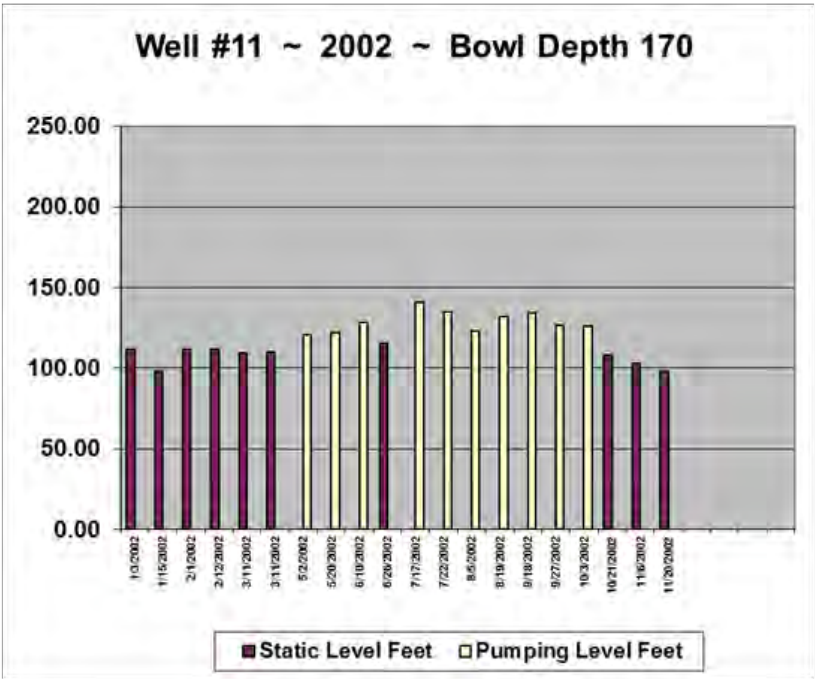

Well #11 - 2000 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/20/2000
2/8/2000
3/2/2000
4/4/2000
5/3/2000
5/26/2000
6/23/2000
7/24/2000
8/4/2000
9/12/2000
10/10/2000
11/7/2000
12/6/2000
Static Level
Pumping Level

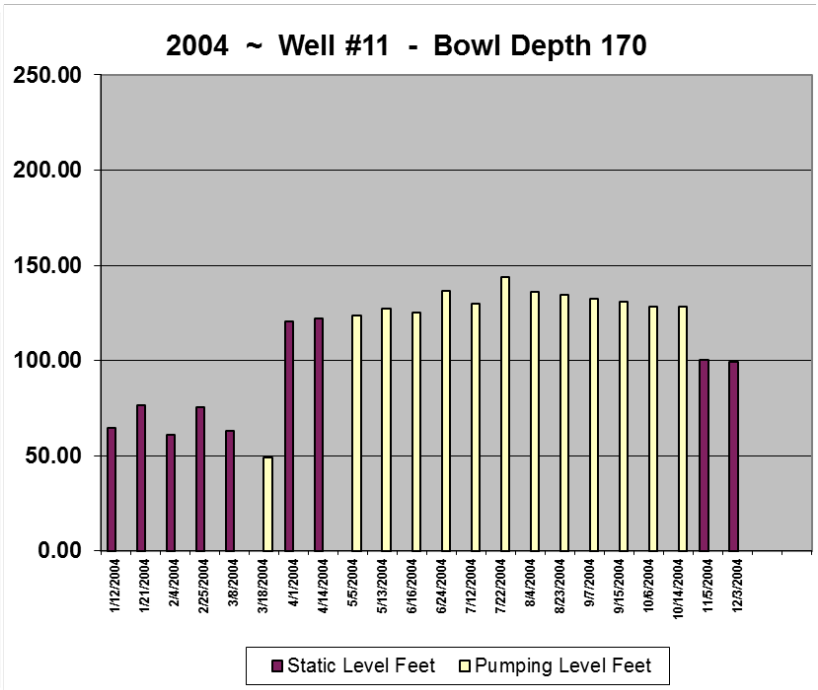

Well #11 - 2000 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/20/2000
2/8/2000
3/2/2000
4/4/2000
5/3/2000
5/26/2000
6/23/2000
7/24/2000
8/4/2000
9/12/2000
10/10/2000
11/7/2000
12/6/2000
Static Level
Pumping Level

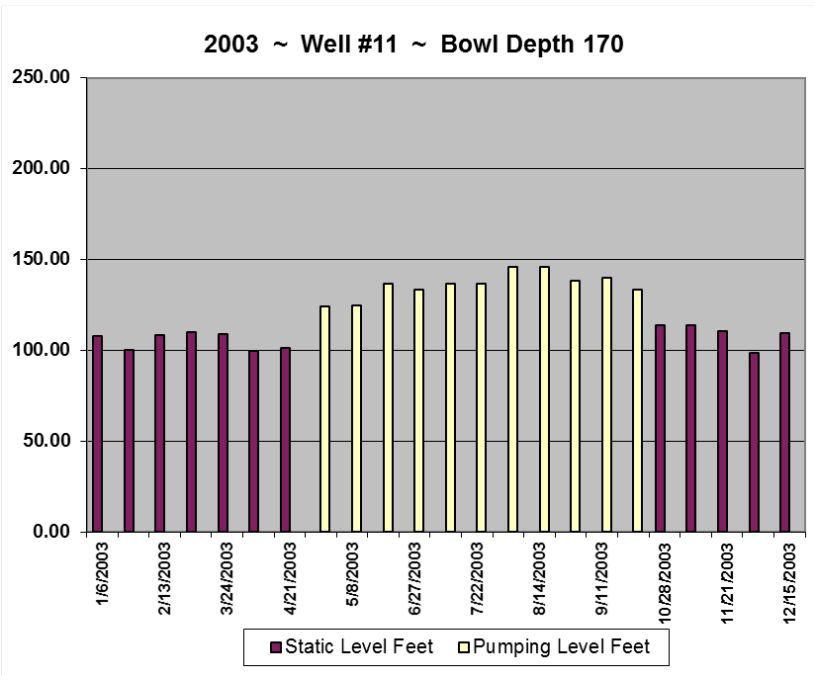

Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2001
1/17/2001
2/6/2001
2/22/2001
3/1/2001
3/27/2001
4/4/2001
4/20/2001
5/3/2001
5/24/2001
6/6/2001
6/22/2001
7/8/2001
7/10/2001
7/16/2001
8/3/2001
8/17/2001
9/12/2001
9/21/2001
10/4/2001
10/24/2001
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

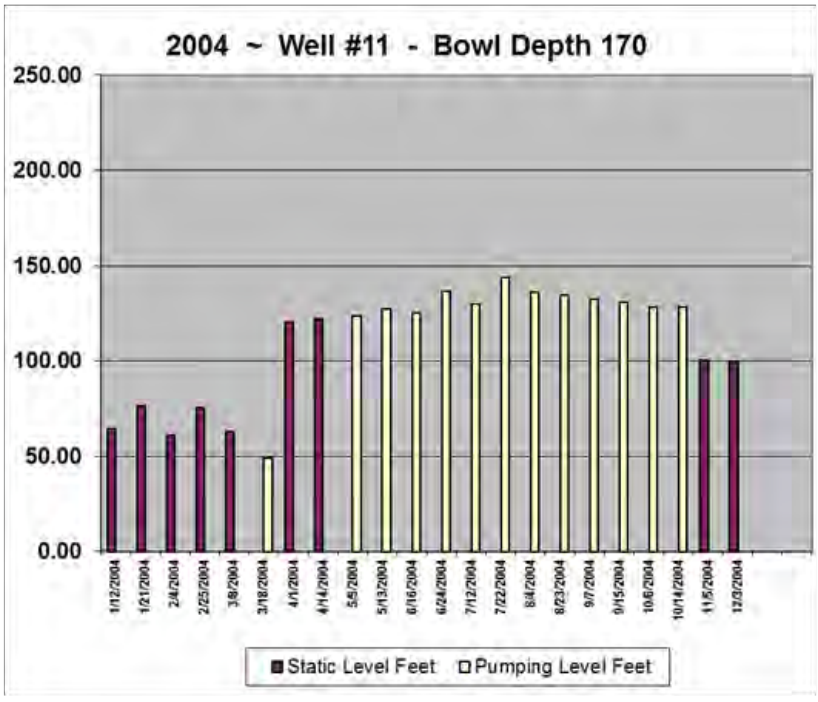

Well #11 ~ 2002 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/3/2002
1/15/2002
2/1/2002
2/12/2002
3/11/2002
3/11/2002
5/2/2002
5/20/2002
6/10/2002
6/26/2002
7/17/2002
7/22/2002
8/5/2002
8/19/2002
9/18/2002
9/27/2002
10/3/2002
10/21/2002
11/6/2002
11/20/2002
Static Level Feet
Pumping Level Feet

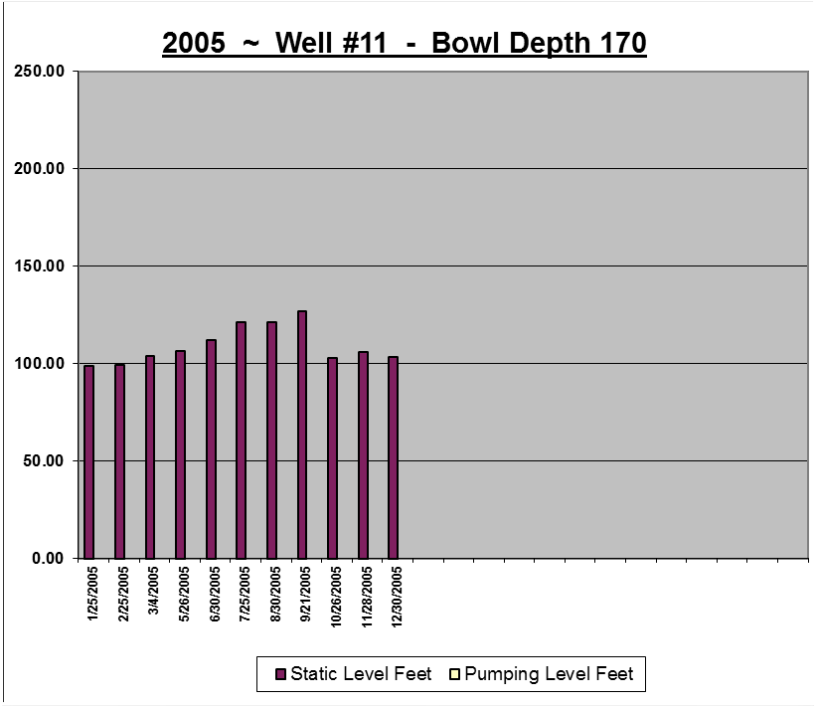

2003 ~ Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
2/13/2003
3/24/2003
4/21/2003
5/8/2003
6/27/2003
7/22/2003
8/14/2003
9/11/2003
10/28/2003
11/21/2003
12/15/2003
Static Level Feet
Pumping Level Feet

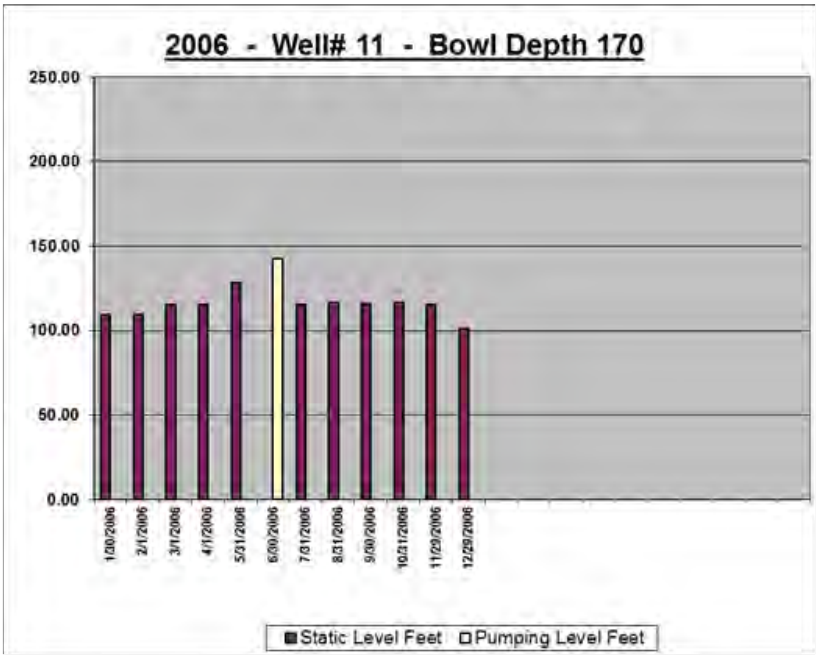

Well #11 ~ 2002 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

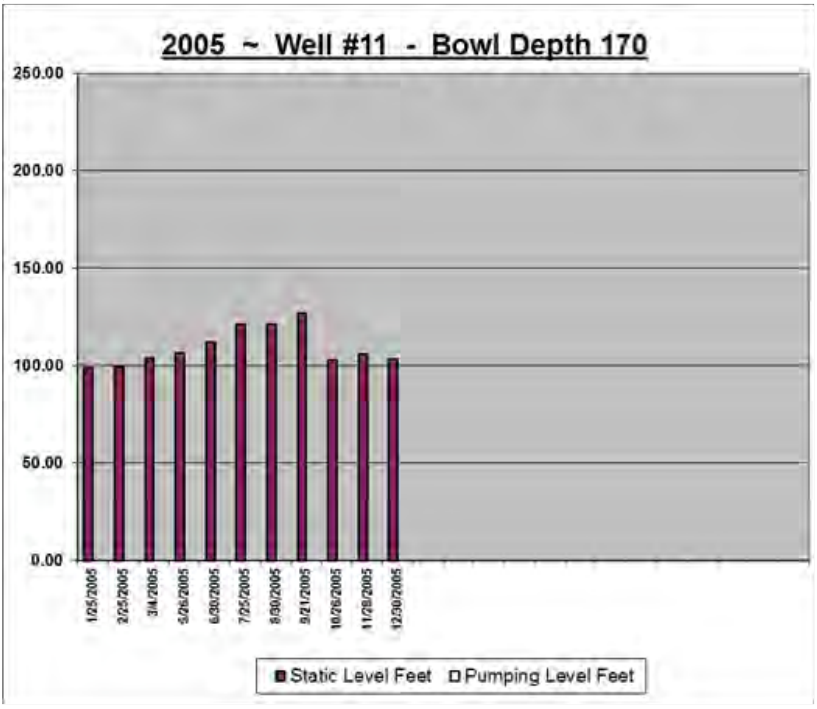

2004 ~ Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
2/4/2004
2/25/2004
3/8/2004
3/18/2004
4/1/2004
4/14/2004
5/5/2004
5/13/2004
6/16/2004
6/24/2004
7/12/2004
7/22/2004
8/4/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

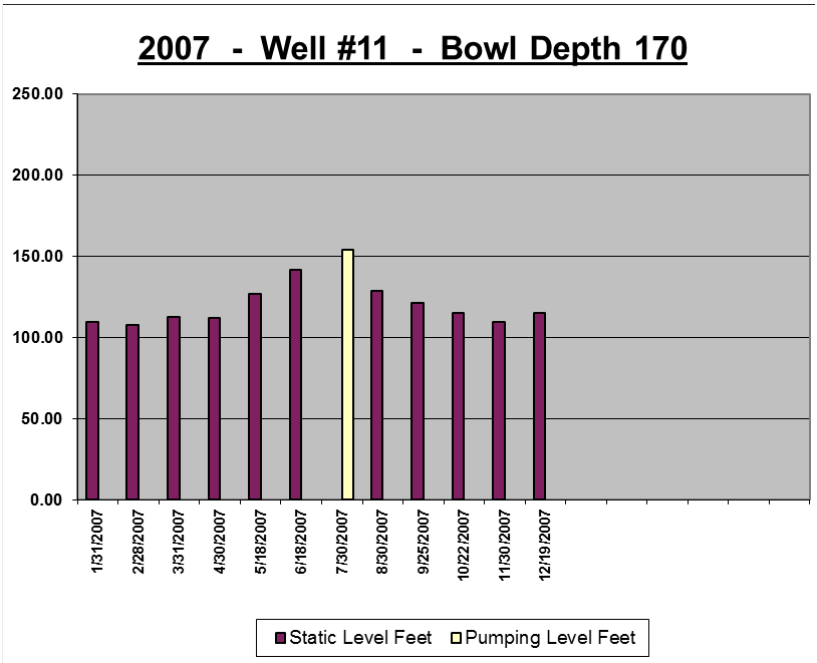

2003 ~ Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
2/13/2003
3/24/2003
4/21/2003
5/8/2003
6/27/2003
7/22/2003
8/14/2003
9/11/2003
10/28/2003
11/21/2003
12/15/2003
Static Level Feet
Pumping Level Feet

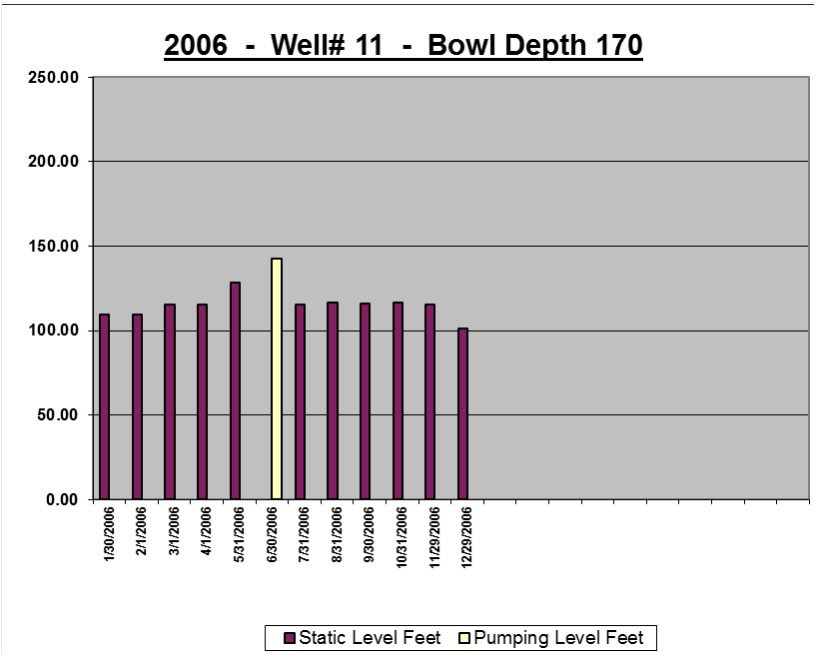

2004 ~ Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
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2/25/2004
3/8/2004
3/18/2004
4/1/2004
4/14/2004
5/5/2004
5/13/2004
6/16/2004
6/24/2004
7/12/2004
7/22/2004
8/4/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

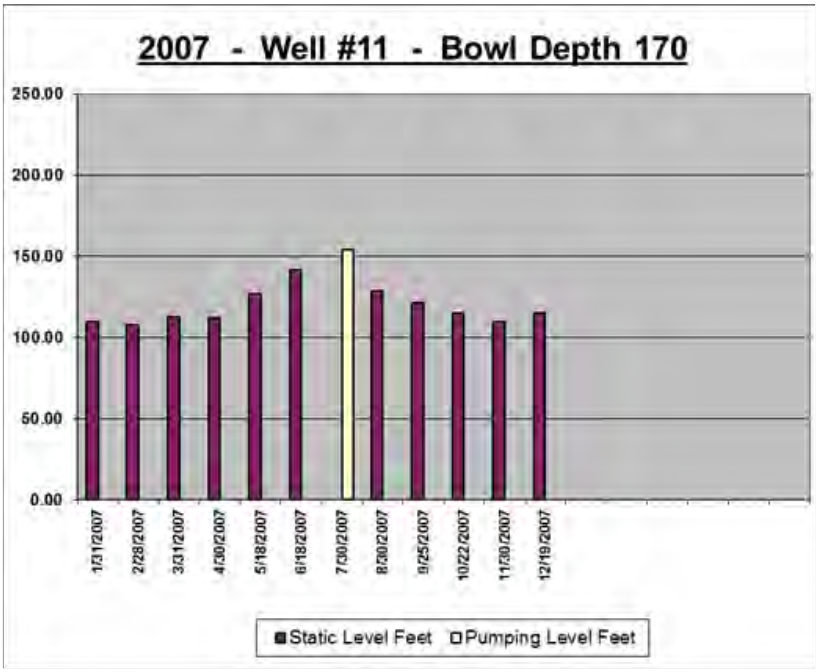

2005 ~ Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/21/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

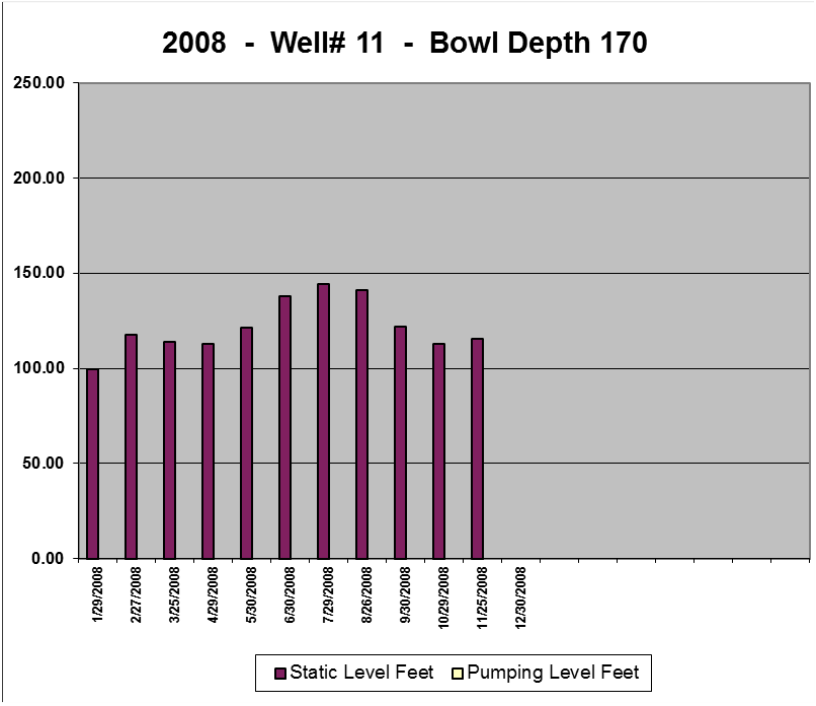

2006 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

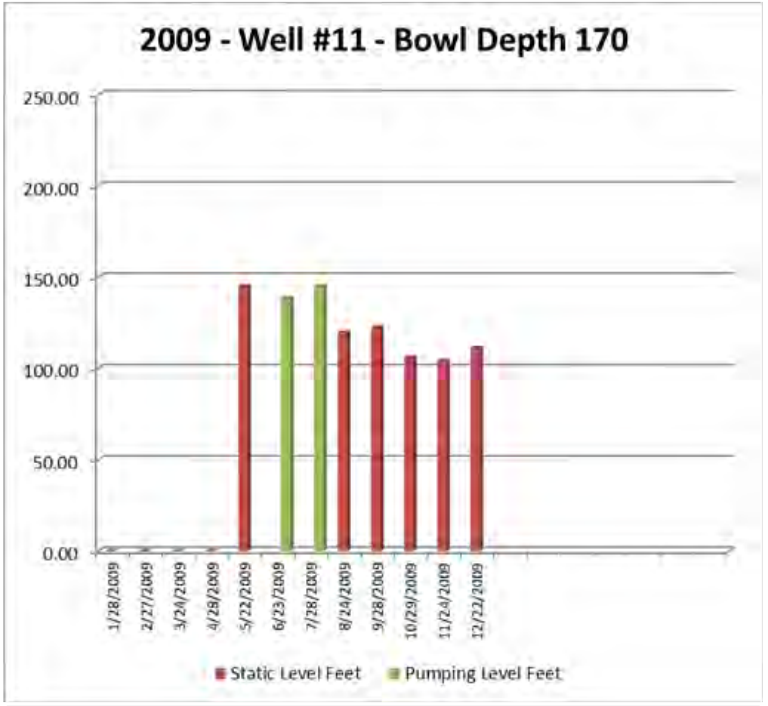

2005 ~ Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/25/2005
8/30/2005
9/21/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

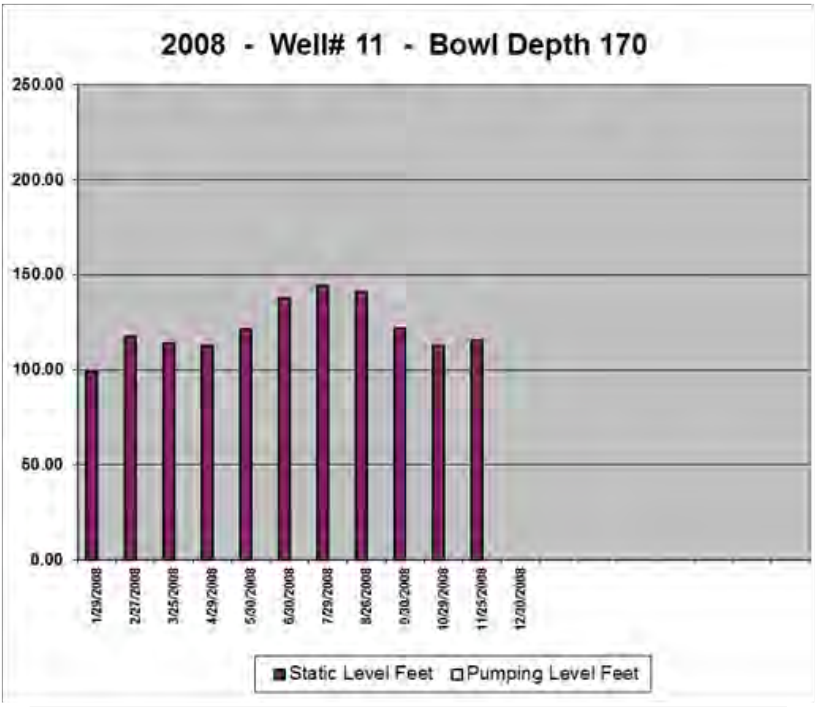

2007 - Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

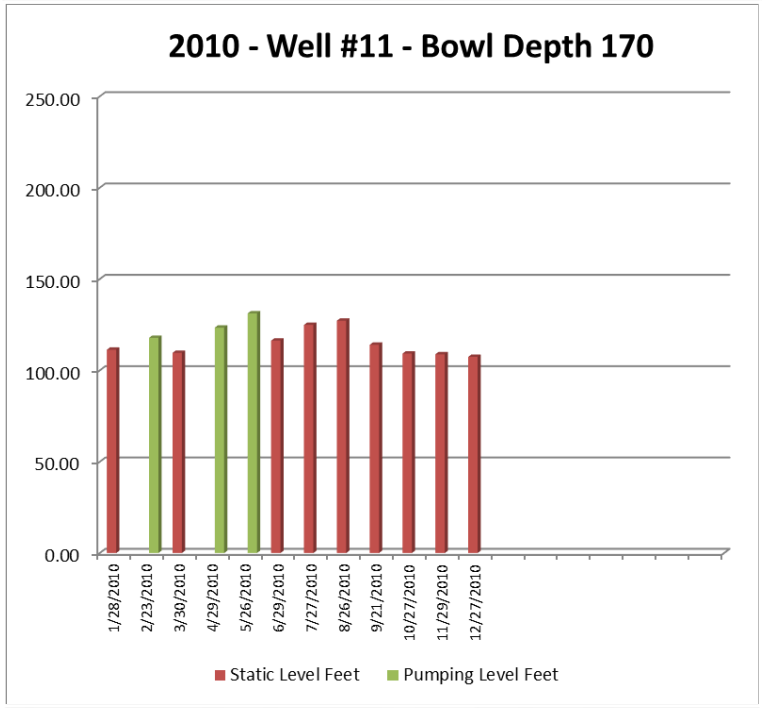

2006 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

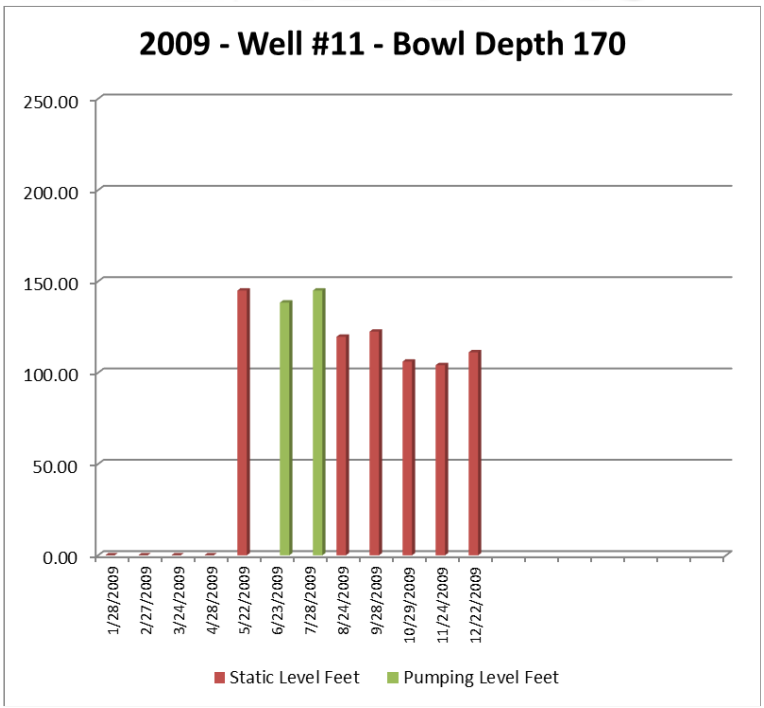

2007 - Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

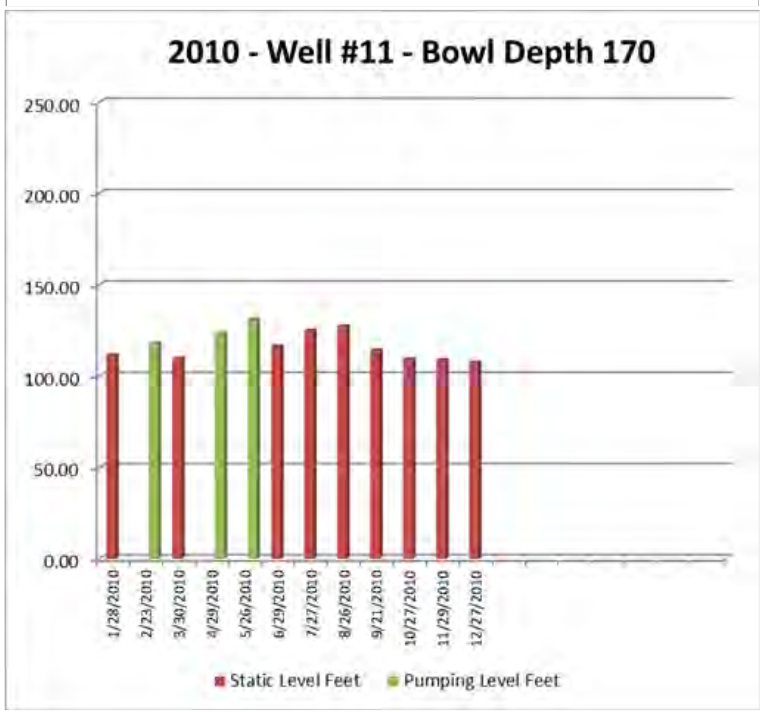

2008 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

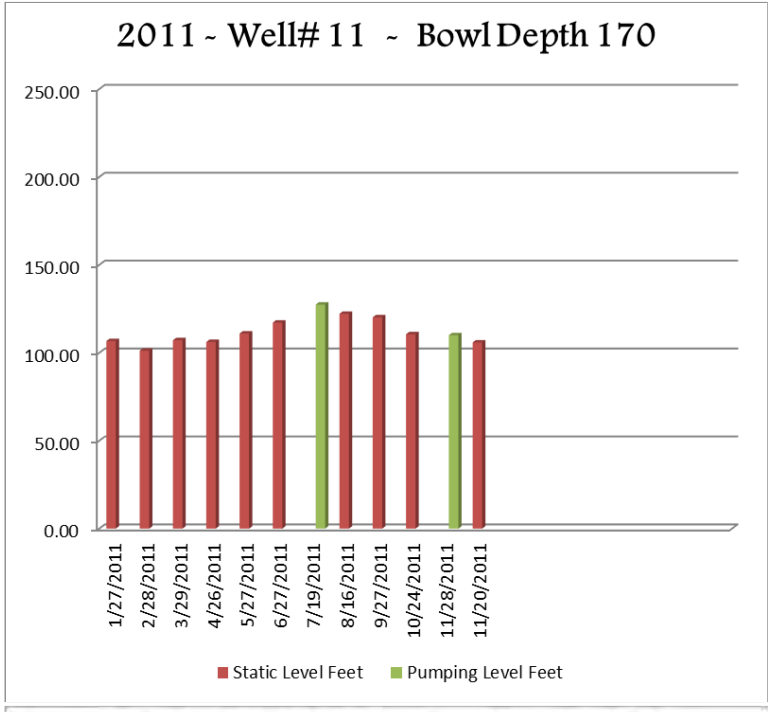

2009 - Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/29/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

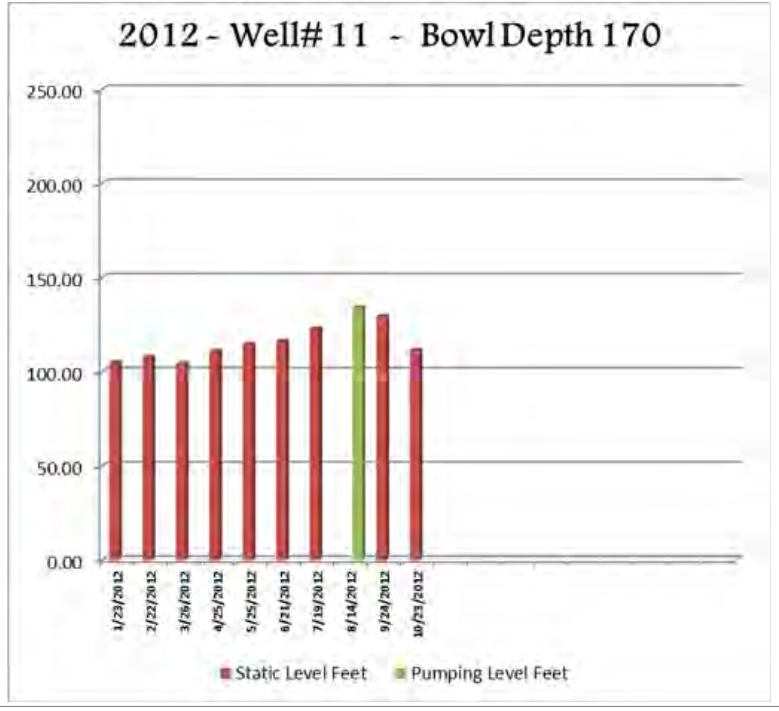

2008 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

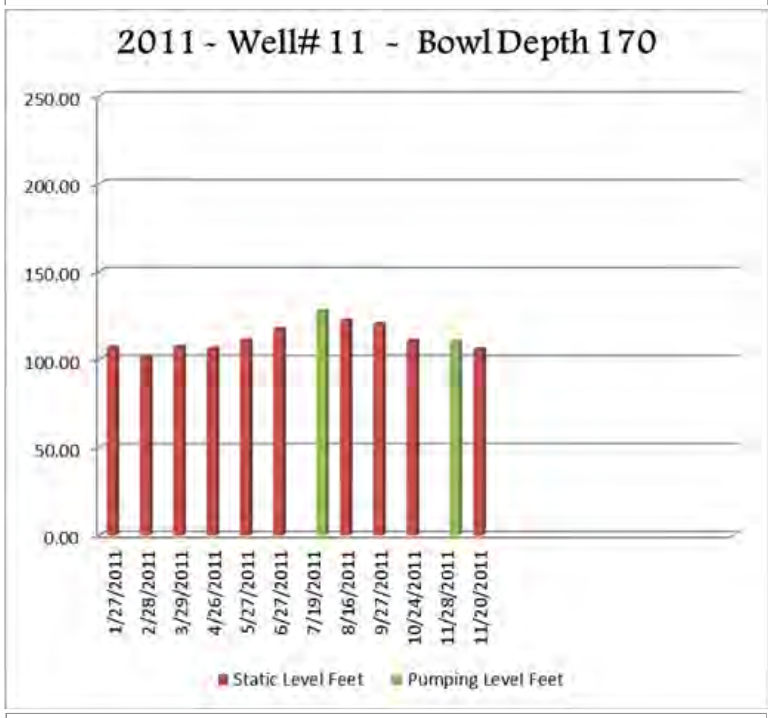

2010 - Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

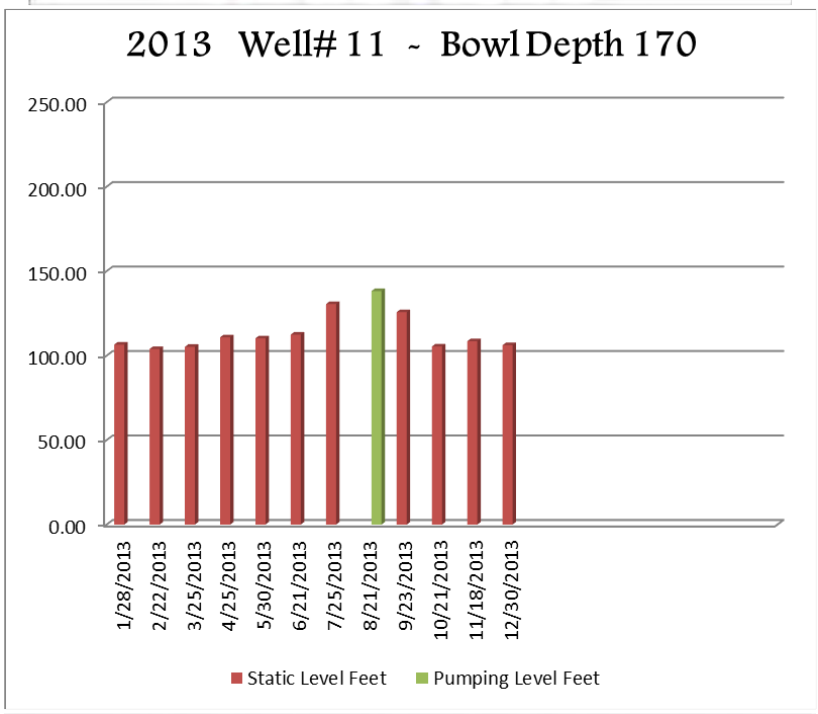

2009 - Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/28/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

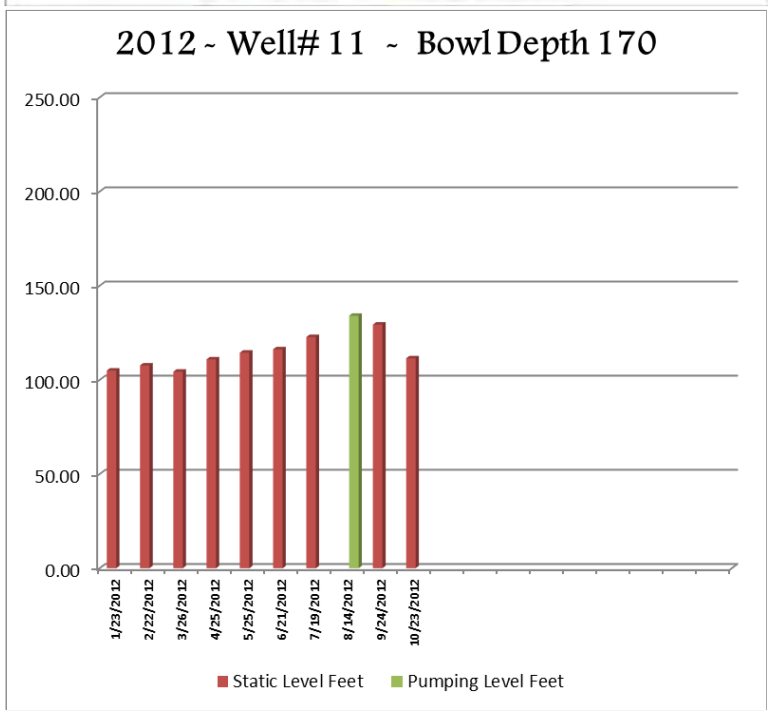

2010 - Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

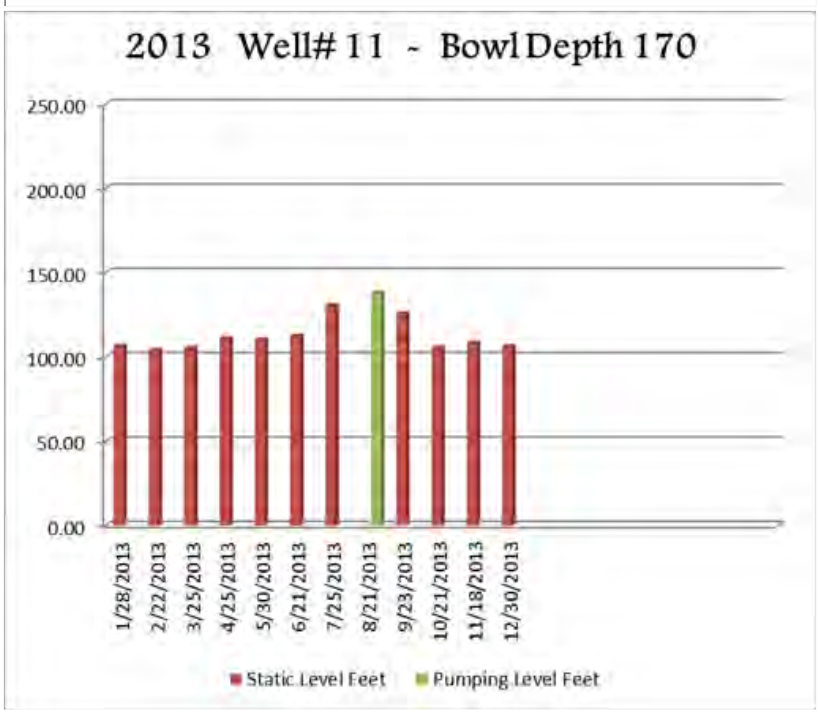

2011 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
11/20/2011
Static Level Feet
Pumping Level Feet

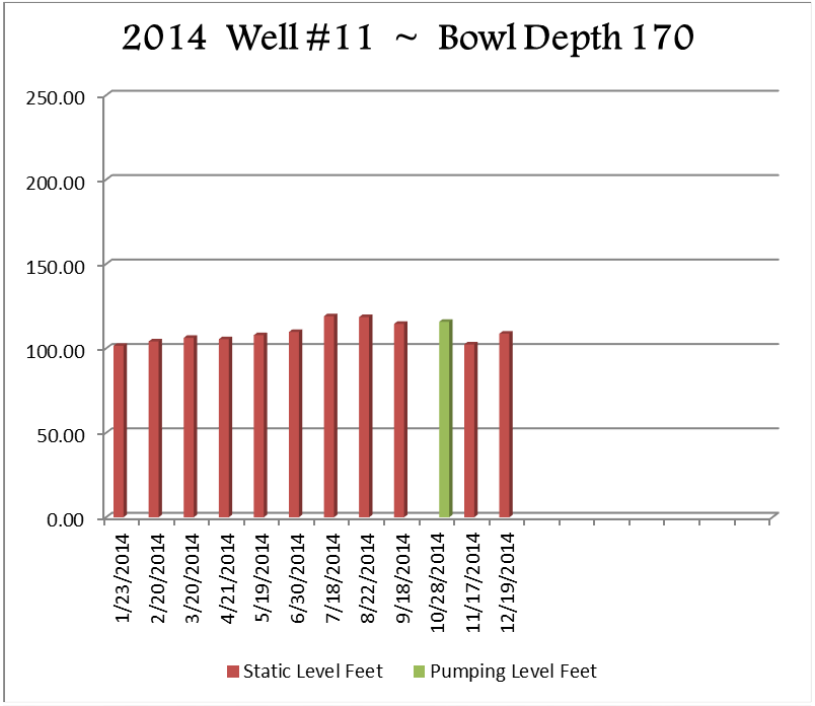

2012 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

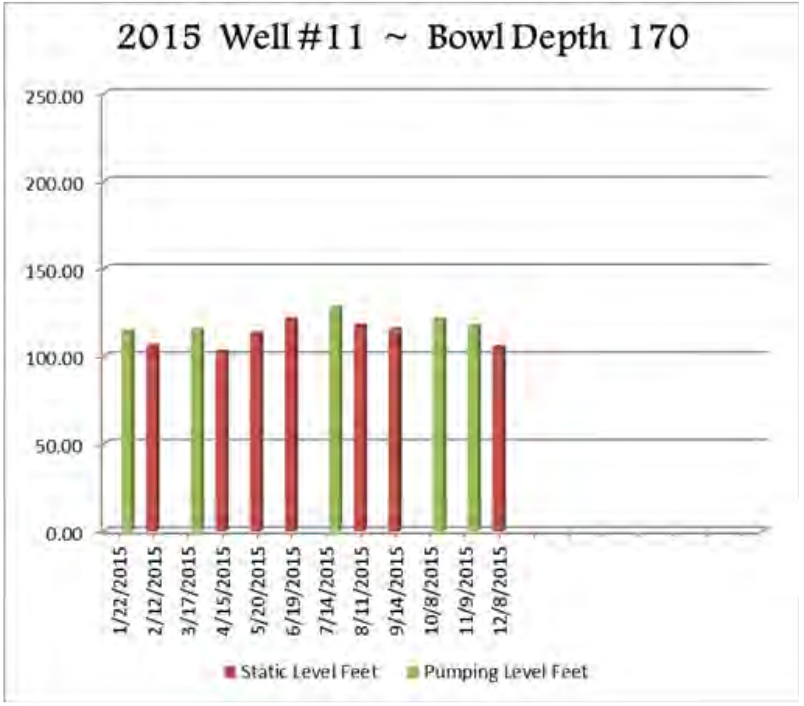

2011 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
11/20/2011
Static Level Feet
Pumping Level Feet

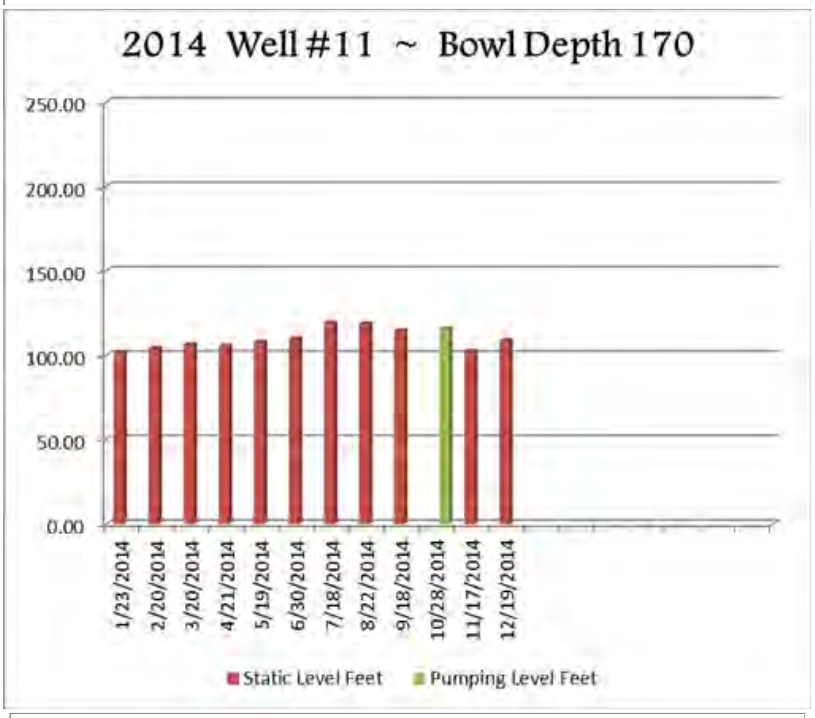

2013 Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

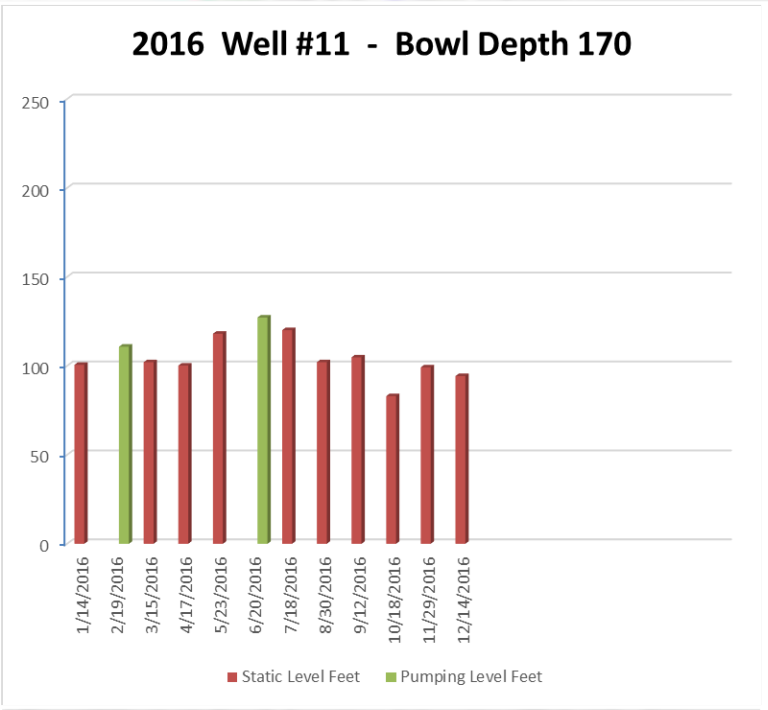

2012 - Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

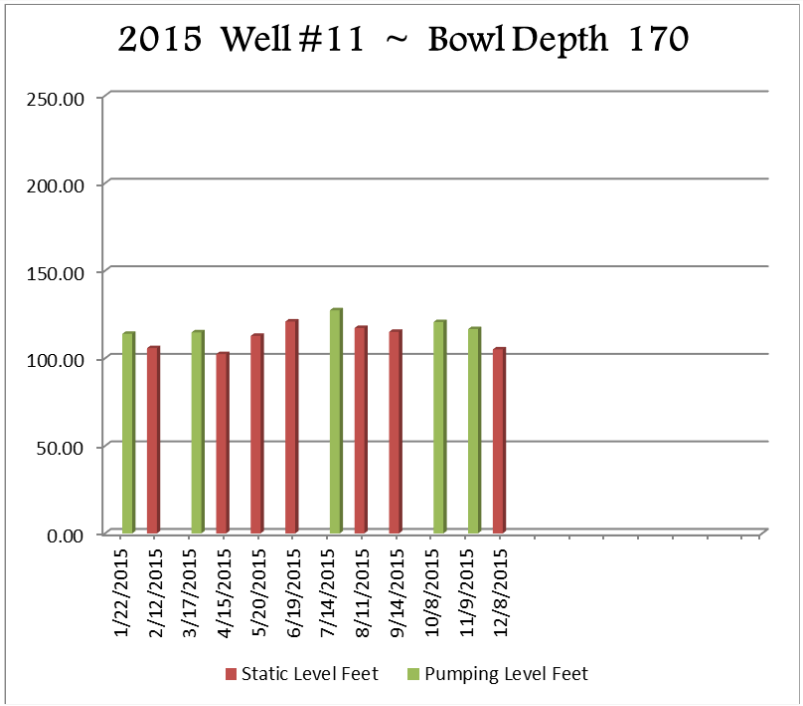

2013 Well# 11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

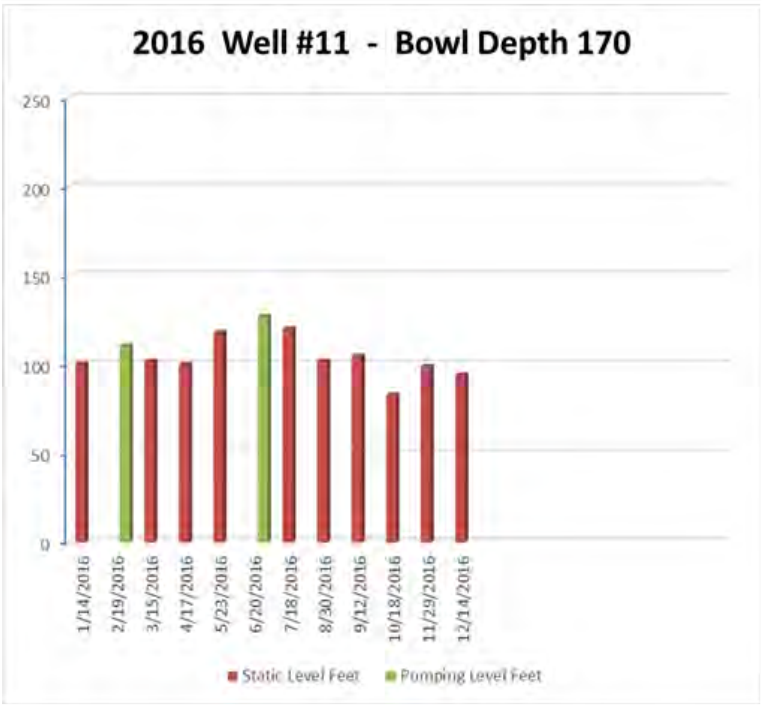

2014 Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

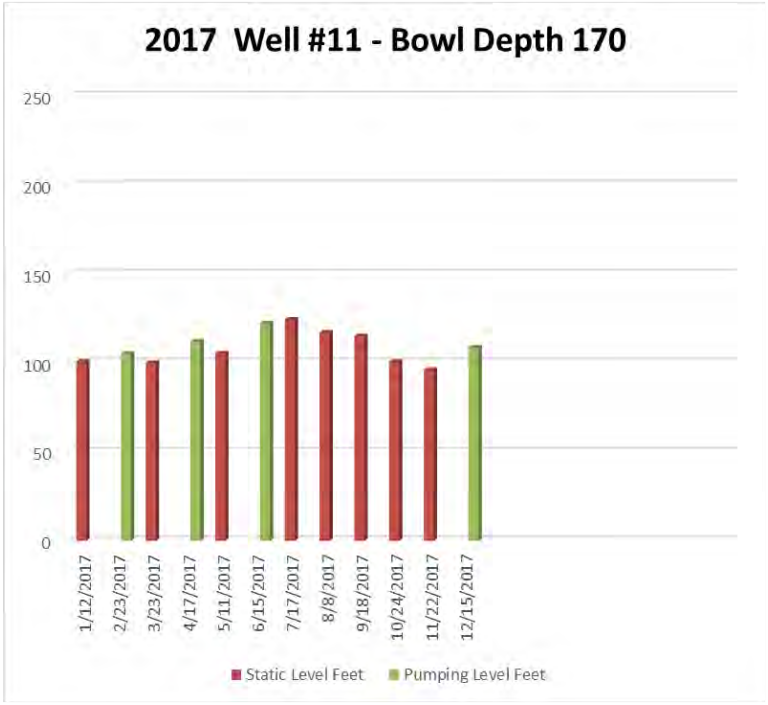

2015 Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

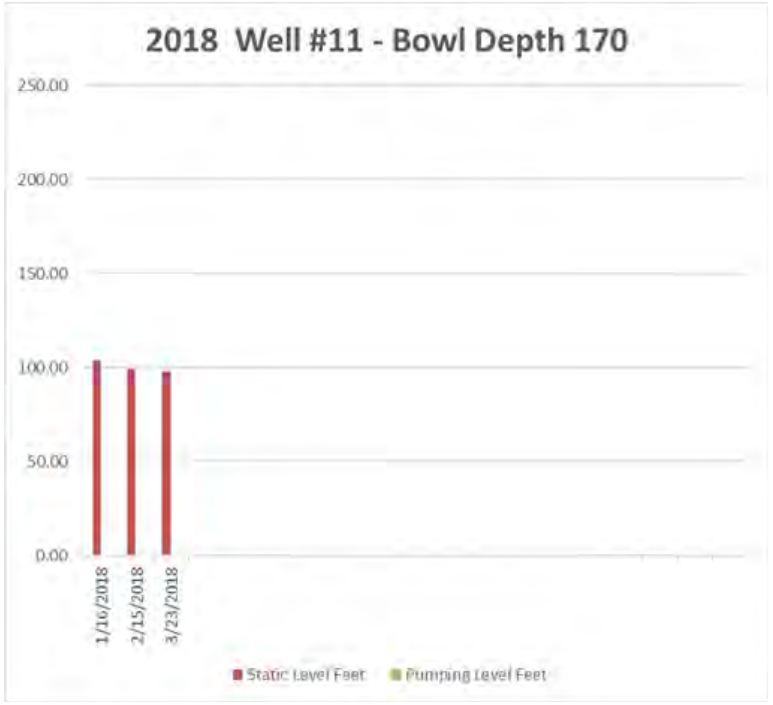

2014 Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

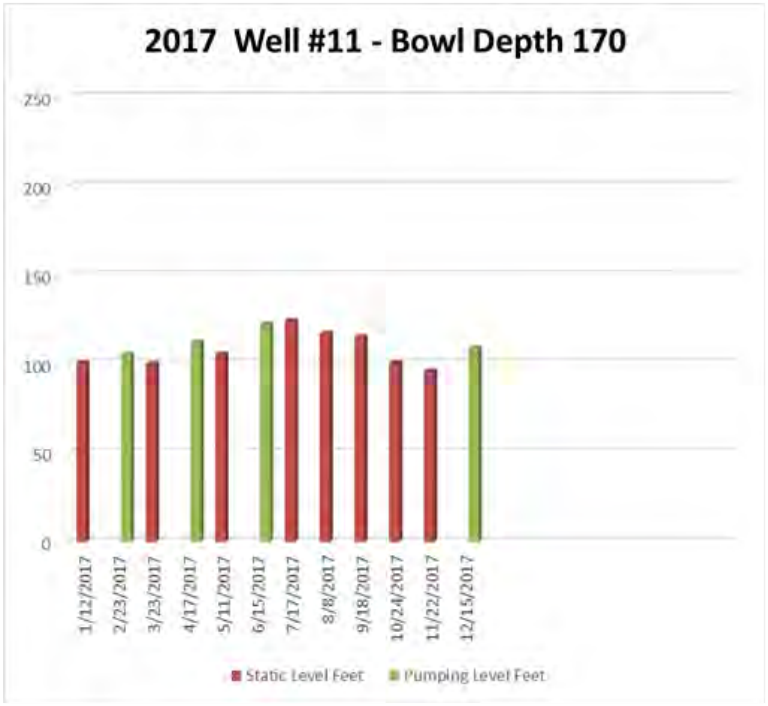

2016 Well #11 - Bowl Depth 170
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

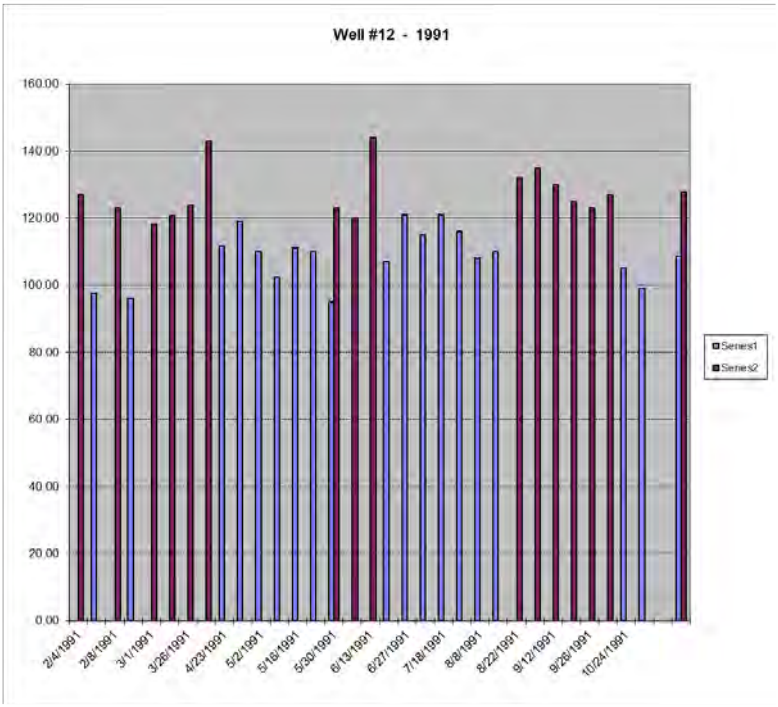

2015 Well #11 ~ Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

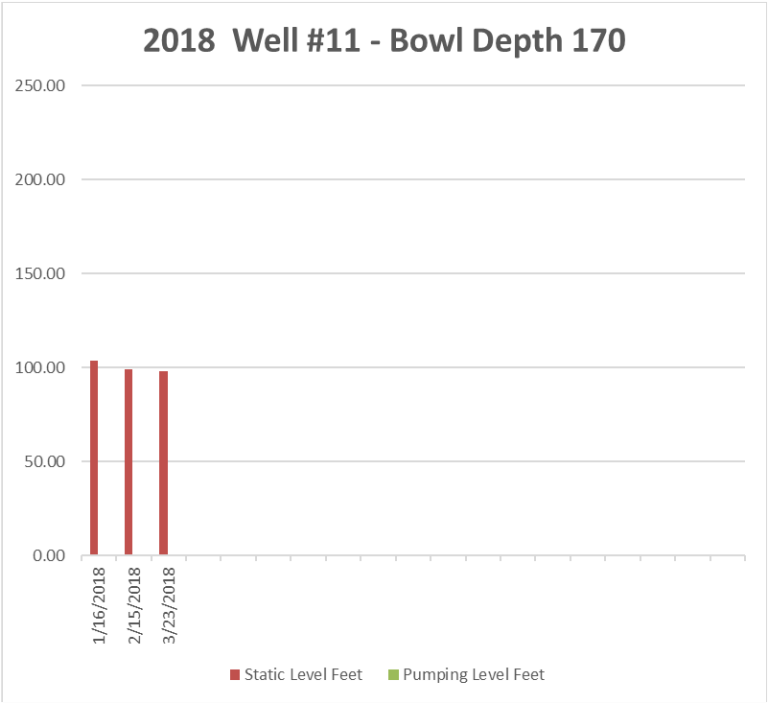

2016 Well #11 - Bowl Depth 170
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

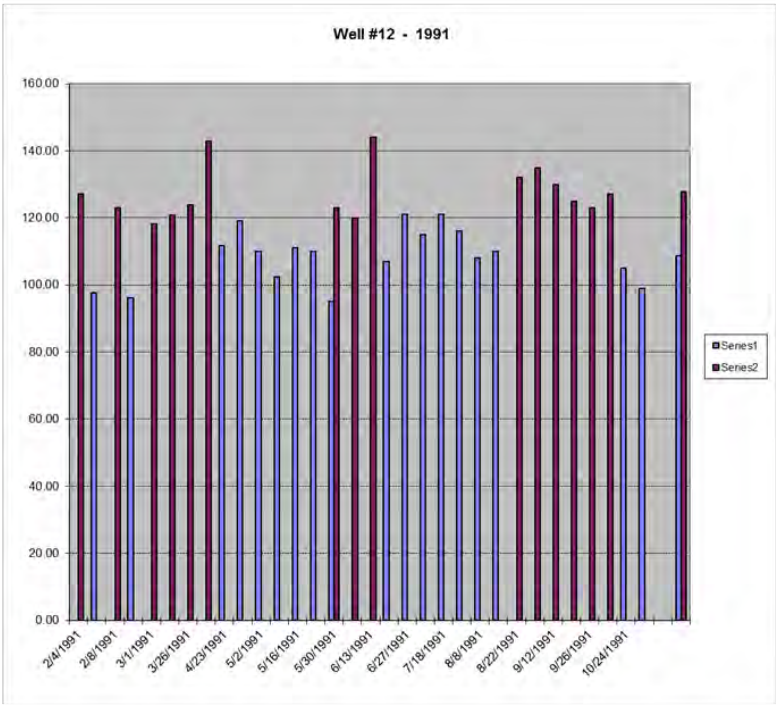

2017 Well #11 - Bowl Depth 170
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

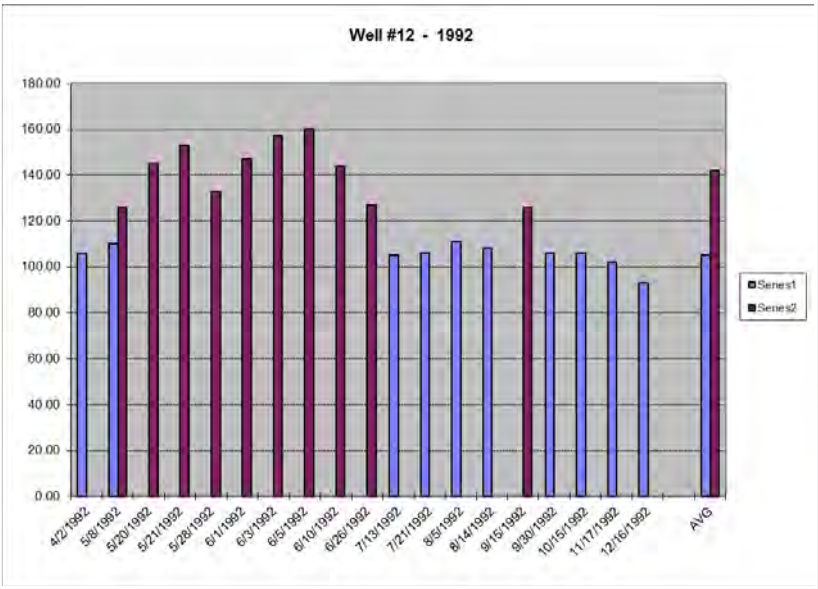

2018 Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

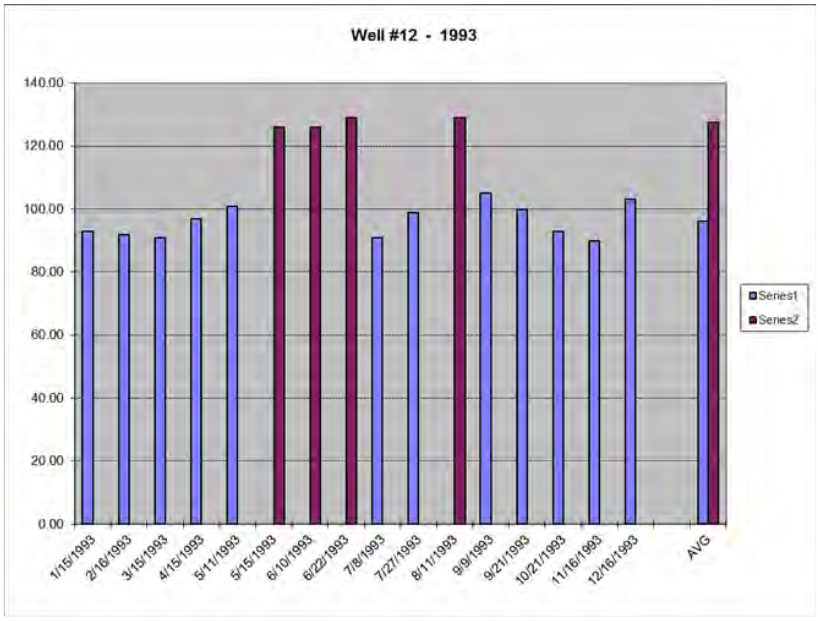

2017 Well #11 - Bowl Depth 170
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

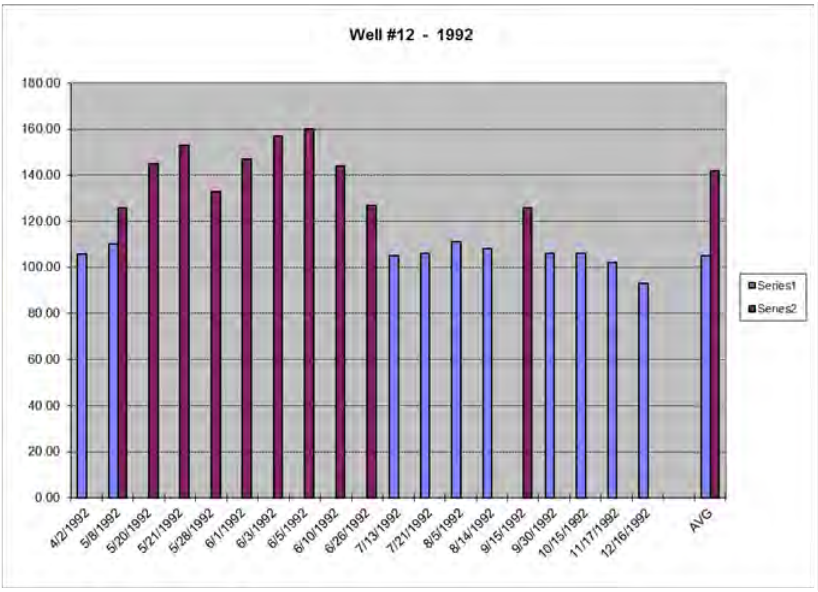

Well #12 - 1991
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/4/1991
2/8/1991
3/1/1991
3/26/1991
4/23/1991
5/2/1991
5/16/1991
5/30/1991
6/13/1991
6/27/1991
7/18/1991
8/8/1991
8/22/1991
9/12/1991
9/26/1991
10/24/1991
Series1
Series2

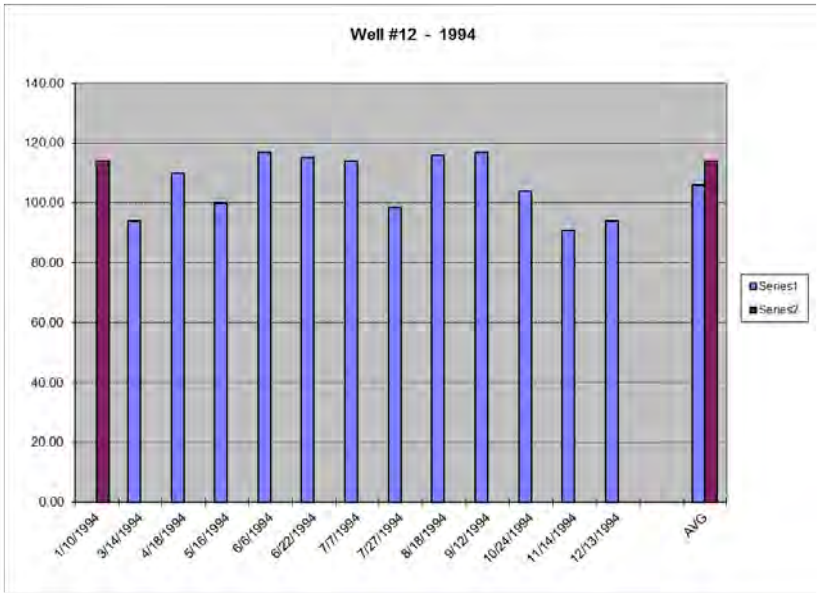

2018 Well #11 - Bowl Depth 170
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

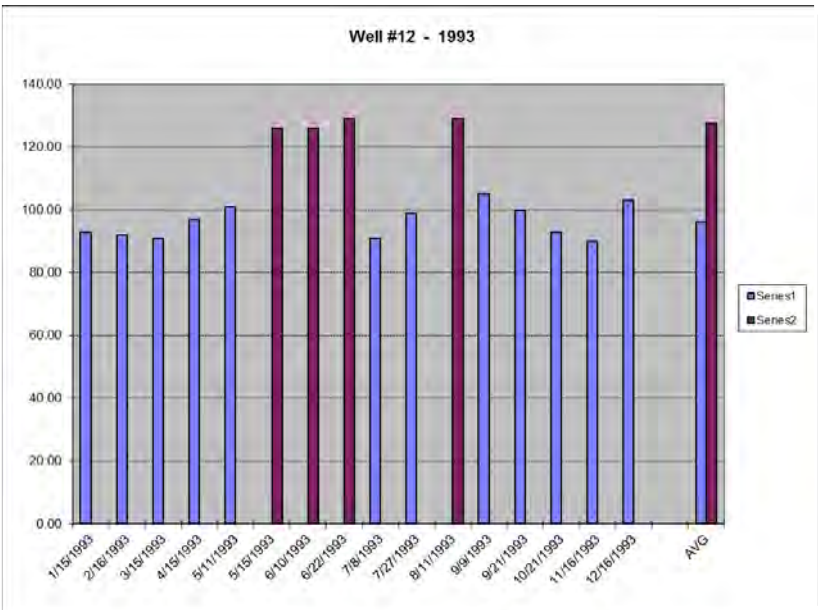

Well #12 - 1991
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2/4/1991
2/8/1991
3/1/1991
3/26/1991
4/23/1991
5/2/1991
5/16/1991
5/30/1991
6/13/1991
6/27/1991
7/18/1991
8/8/1991
8/22/1991
9/12/1991
9/26/1991
10/24/1991
Series1
Series2

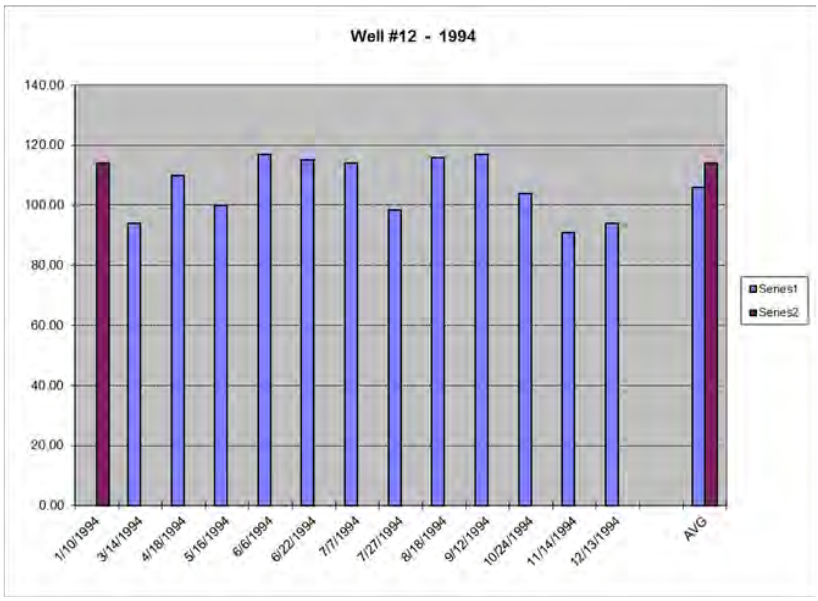

Well #12 - 1992
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/2/1992
5/8/1992
5/20/1992
5/21/1992
5/28/1992
6/1/1992
6/3/1992
6/5/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

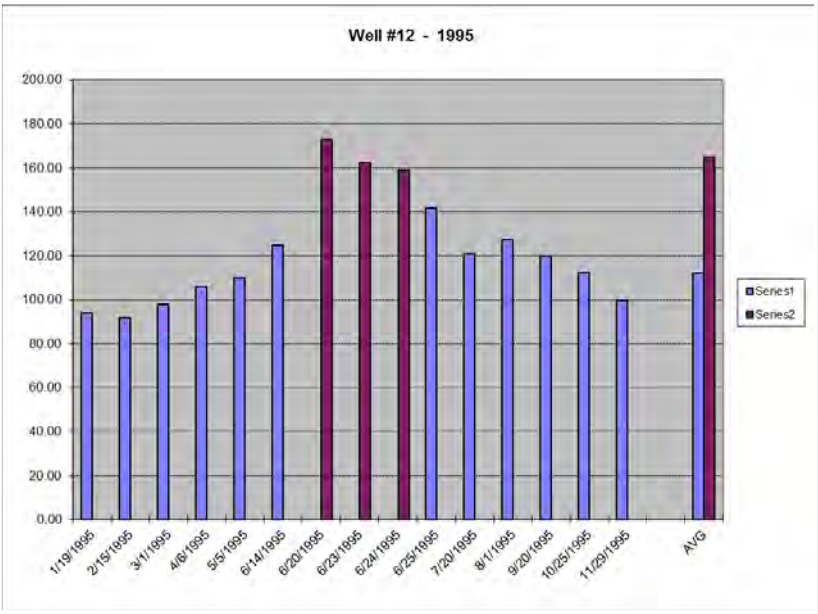

Well #12 - 1993
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1993
2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/15/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

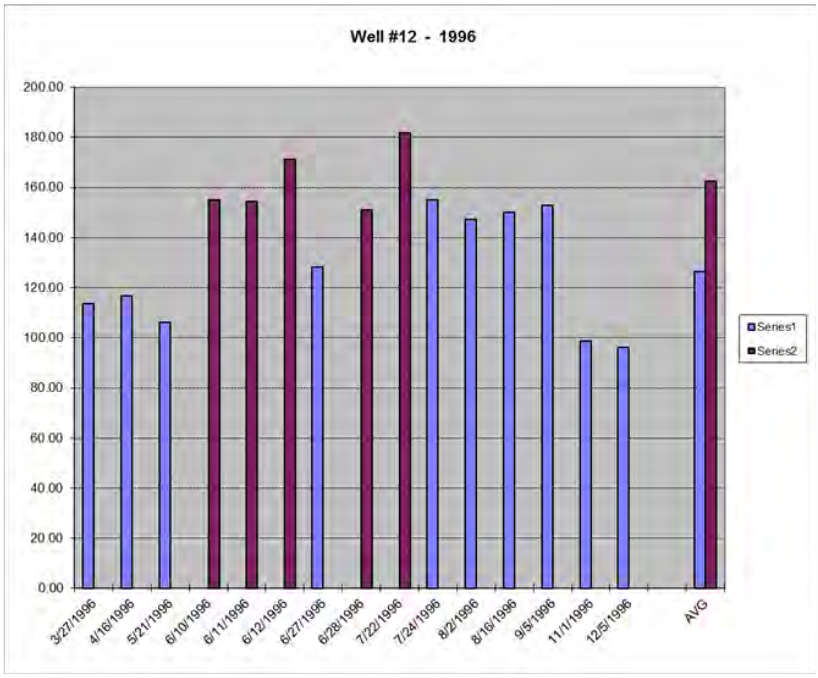

Well #12 - 1992
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4/2/1992
5/8/1992
5/20/1992
5/21/1992
5/28/1992
6/1/1992
6/3/1992
6/5/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
8/14/1992
9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

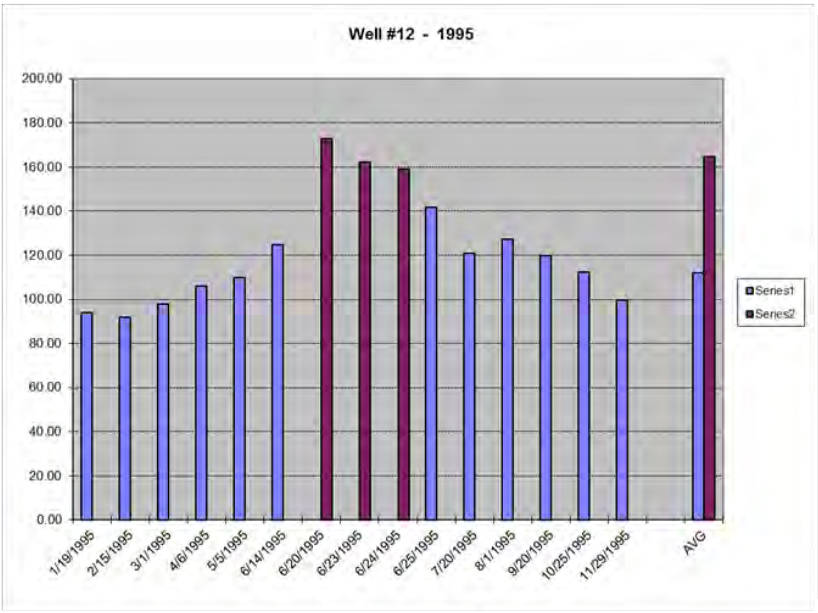

Well #12 - 1994
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
3/14/1994
4/18/1994
5/16/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

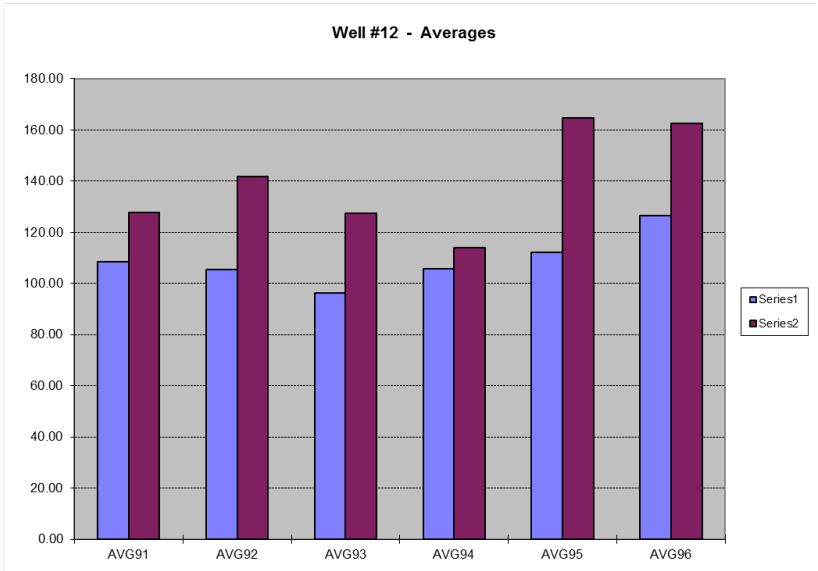

Well #12 - 1993
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/15/1993
2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/15/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/9/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

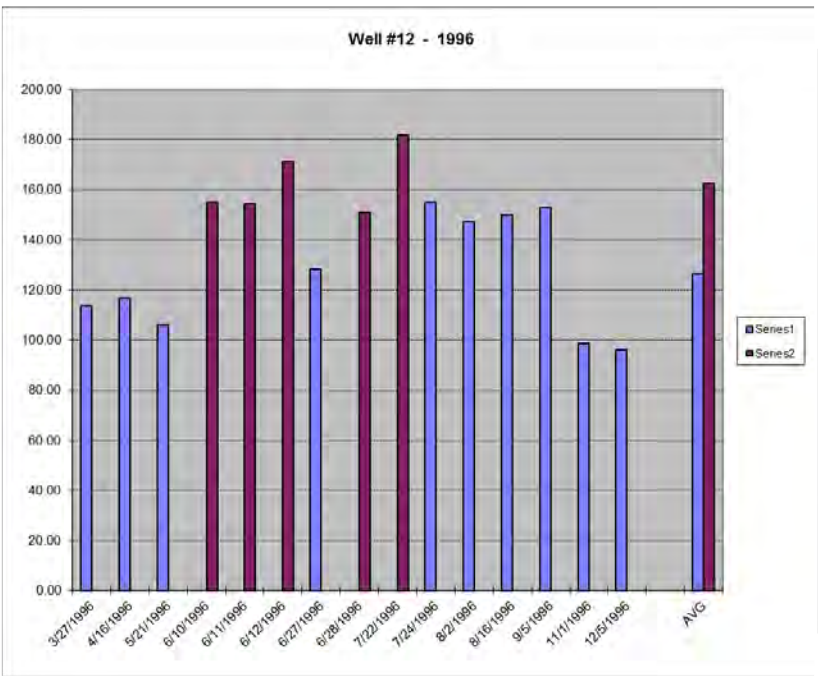

Well #12 - 1994
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/10/1994
3/14/1994
4/18/1994
5/16/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

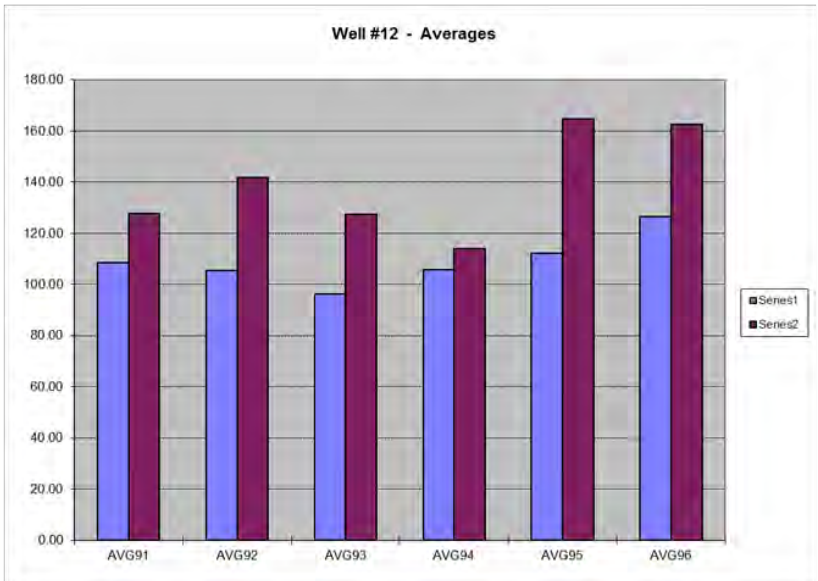

Well #12 - 1995
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/19/1995
2/15/1995
3/1/1995
4/6/1995
5/5/1995
6/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

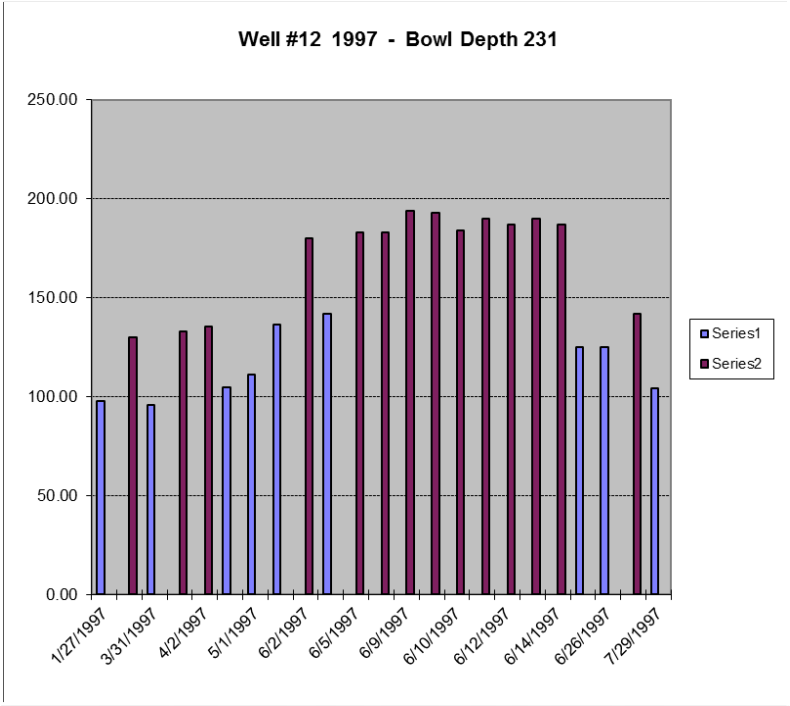

Well #12 - 1996
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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3/27/1996
4/16/1996
5/21/1996
6/10/1996
6/11/1996
6/12/1996
6/27/1996
6/28/1996
7/22/1996
7/24/1996
8/2/1996
8/16/1996
9/5/1996
11/1/1996
12/5/1996
AVG
Series1
Series2

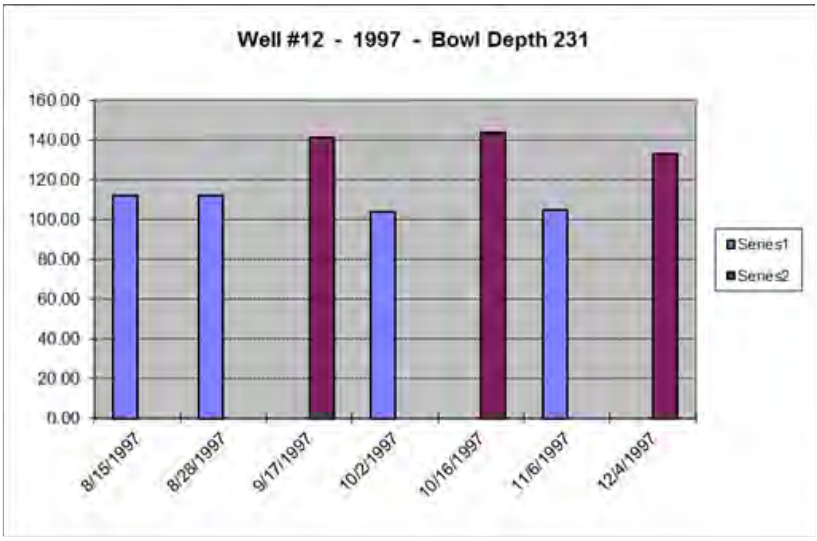

Well #12 - 1995
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/19/1995
2/15/1995
3/1/1995
4/6/1995
5/5/1995
6/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

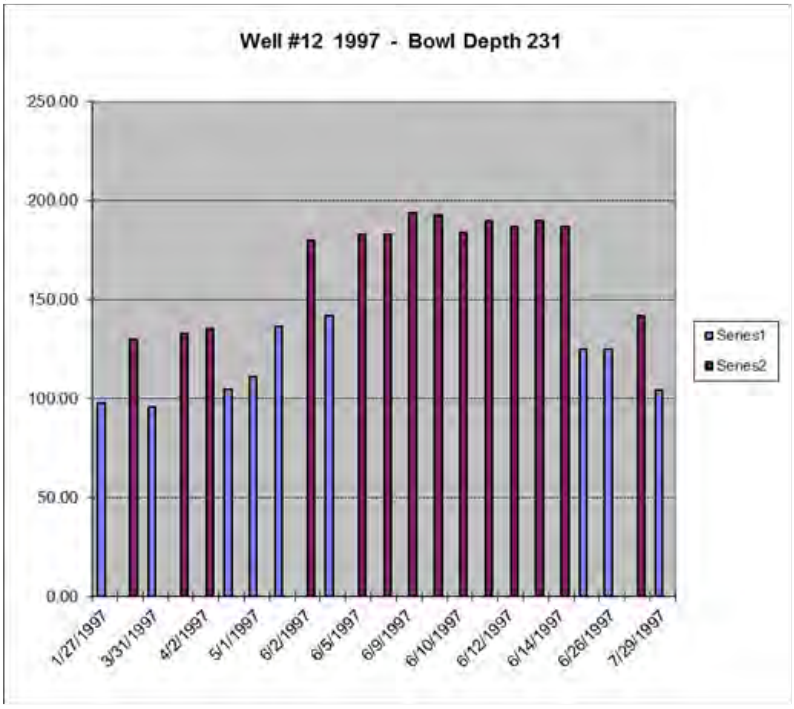

Well #12 - Averages
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

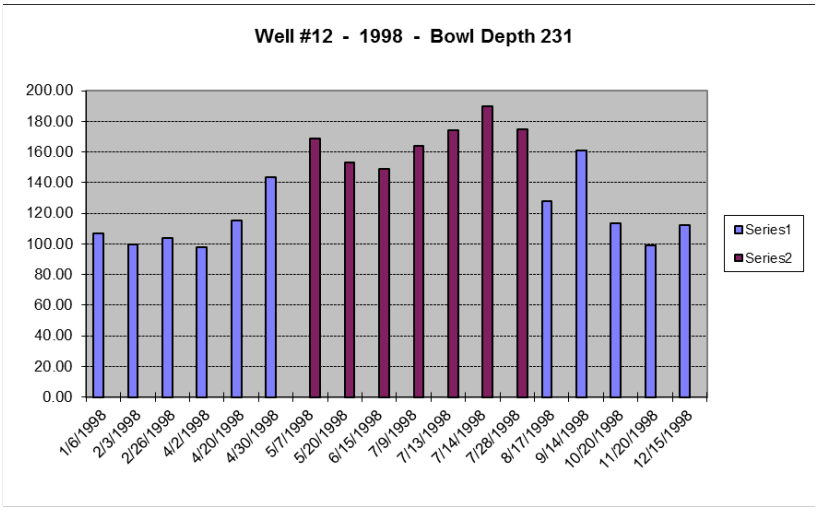

Well #12 - 1996
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
3/27/1996
4/16/1996
5/21/1996
6/10/1996
6/11/1996
6/12/1996
6/27/1996
6/28/1996
7/22/1996
7/24/1996
8/2/1996
8/16/1996
9/5/1996
11/1/1996
12/5/1996
AVG
Series1
Series2

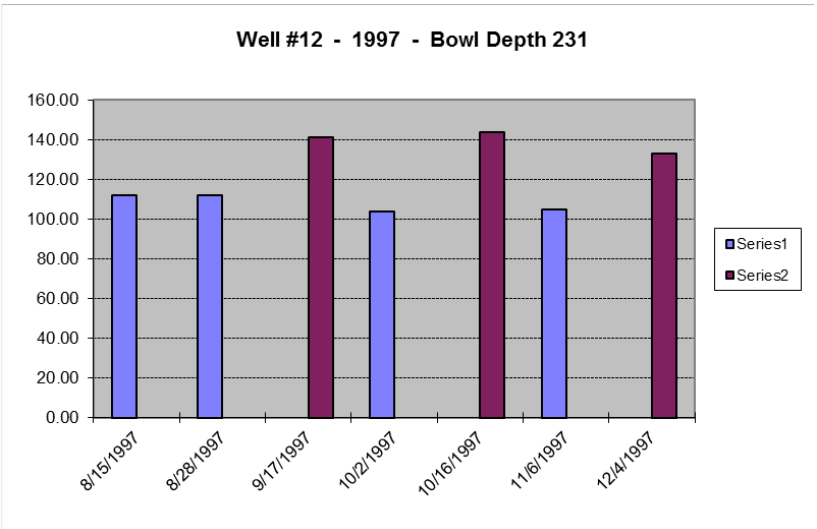

Well #12 - Averages
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
AVG91
AVG92
AVG93
AVG94
AVG95
AVG96
Series1
Series2

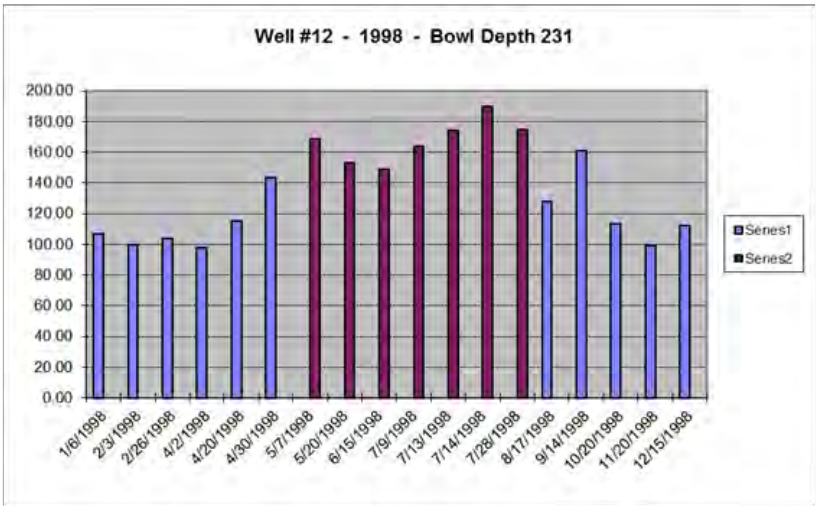

Well #12 1997 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
3/31/1997
4/2/1997
5/1/1997
6/2/1997
6/5/1997
6/9/1997
6/10/1997
6/12/1997
6/14/1997
6/26/1997
7/29/1997
Series1
Series2

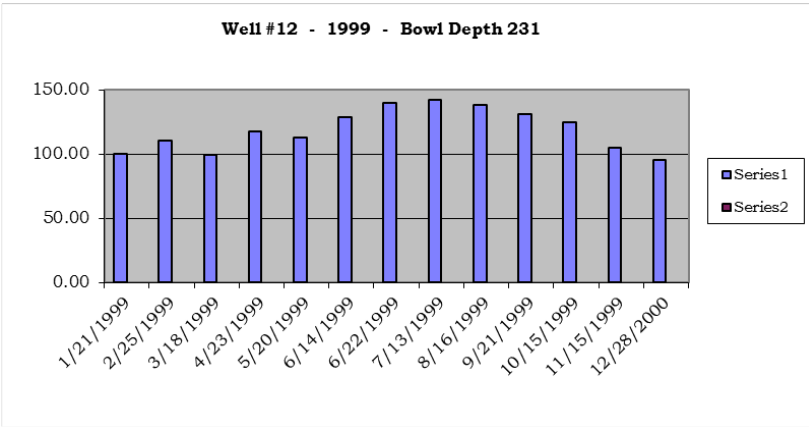

Well #12 - 1997 - Bowl Depth 231
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

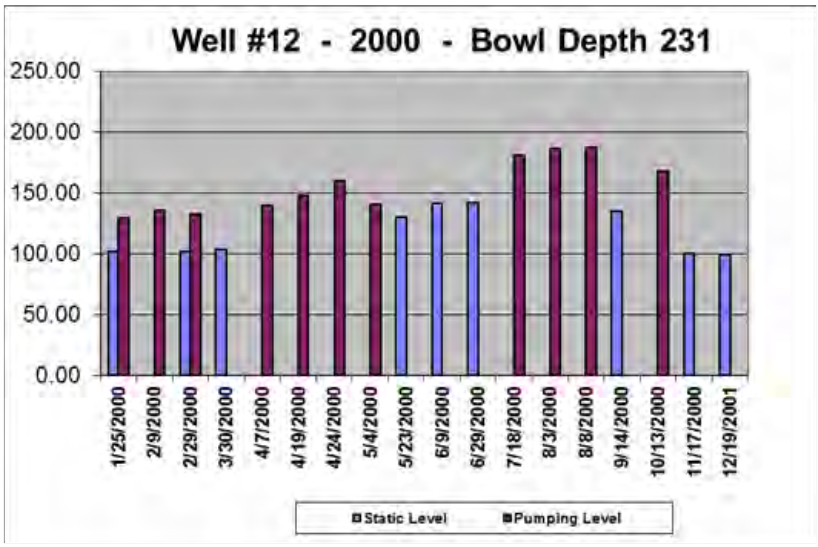

Well #12 1997 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/27/1997
3/31/1997
4/2/1997
5/1/1997
6/2/1997
6/5/1997
6/9/1997
6/10/1997
6/12/1997
6/14/1997
6/26/1997
7/29/1997
Series1
Series2

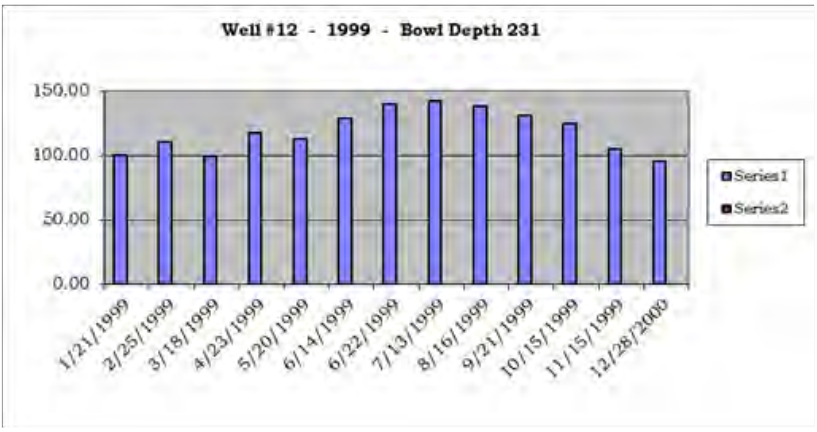

Well #12 - 1998 - Bowl Depth 231
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/13/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

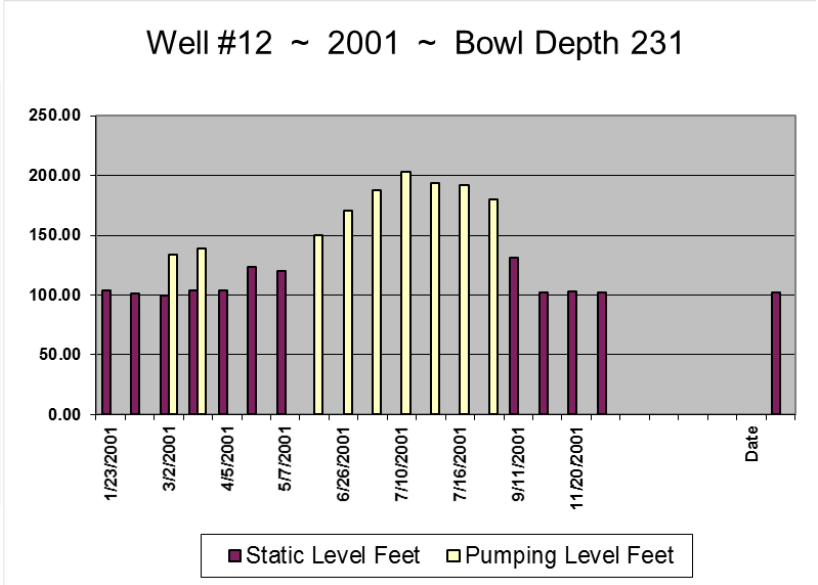

Well #12 - 1997 - Bowl Depth 231
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/15/1997
8/28/1997
9/17/1997
10/2/1997
10/16/1997
11/6/1997
12/4/1997
Series1
Series2

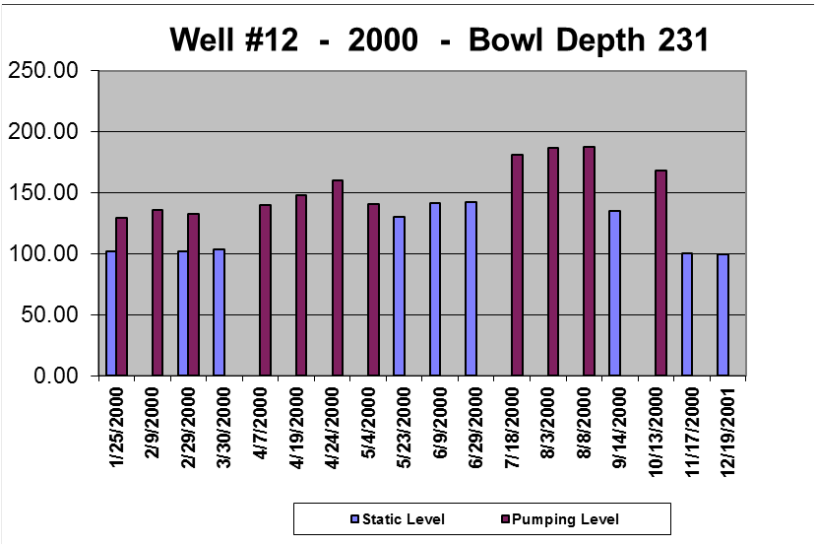

Well #12 - 1998 - Bowl Depth 231
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/9/1998
7/13/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/15/1998
Series1
Series2

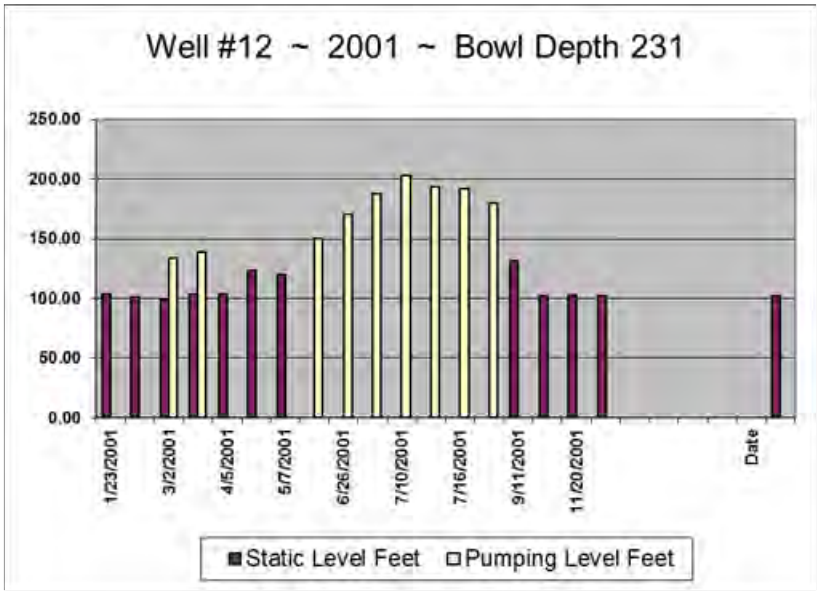

Well #12 - 1999 - Bowl Depth 231
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/2000
Series1
Series2


Well #12 - 2000 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/9/2000
2/29/2000
3/30/2000
4/7/2000
4/19/2000
4/24/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

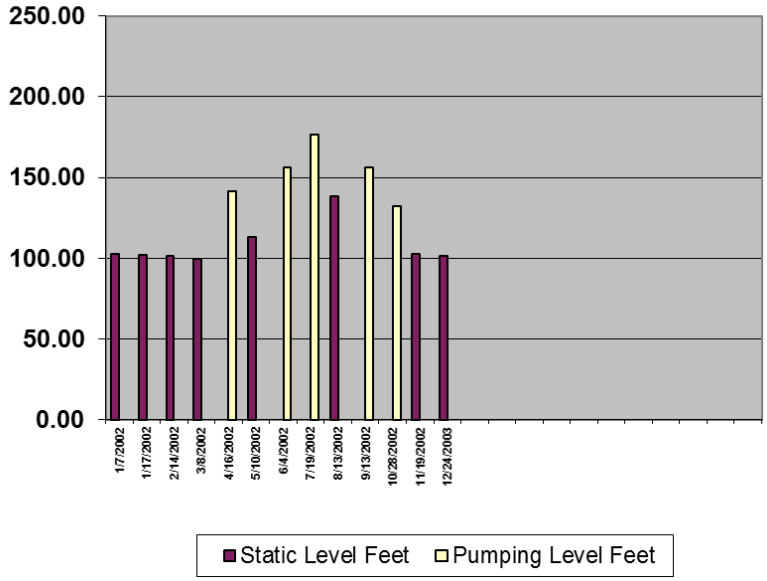

Well #12 - 1999 - Bowl Depth 231
150.00
100.00
50.00
0.00
1/21/1999
2/25/1999
3/18/1999
4/23/1999
5/20/1999
6/14/1999
6/22/1999
7/13/1999
8/16/1999
9/21/1999
10/15/1999
11/15/1999
12/28/2000
Series1
Series2


Well #12 ~ 2001 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/2/2001
4/5/2001
5/7/2001
6/26/2001
7/10/2001
7/16/2001
9/11/2001
11/20/2001
Date
Static Level Feet
Pumping Level Feet

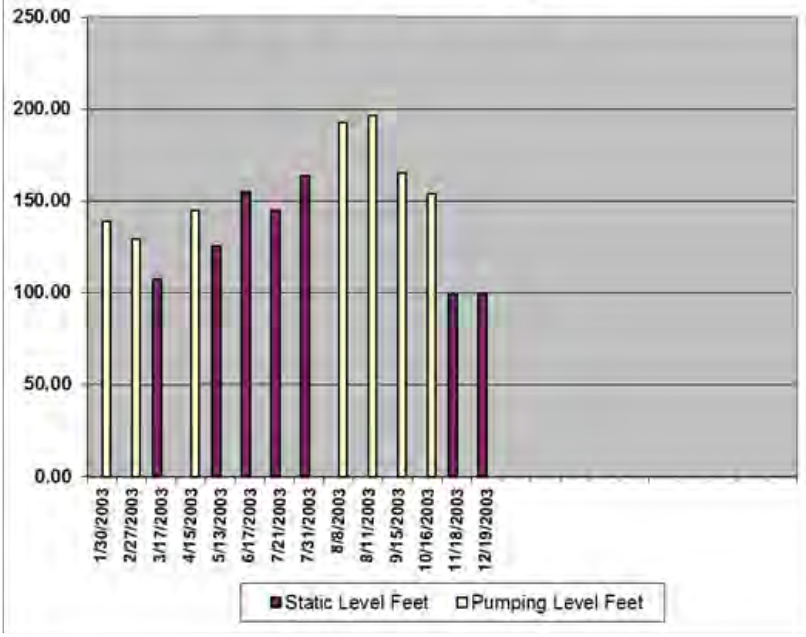

Well #12 - 2000 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/9/2000
2/29/2000
3/30/2000
4/7/2000
4/19/2000
4/24/2000
5/4/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level


Well #12 ~ 2001 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2001
3/2/2001
4/5/2001
5/7/2001
6/26/2001
7/10/2001
7/16/2001
9/11/2001
11/20/2001
Date
Static Level Feet
Pumping Level Feet

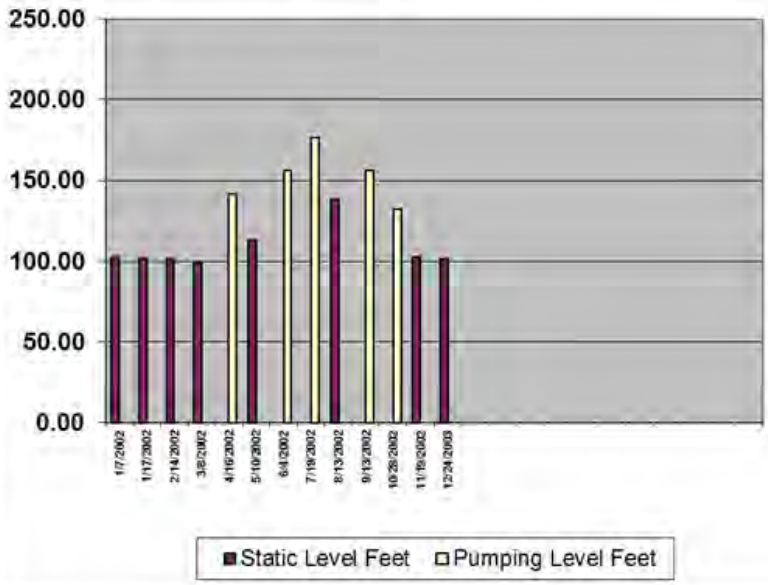
## Well #12 ~ 2002 ~ Bowl Depth 231



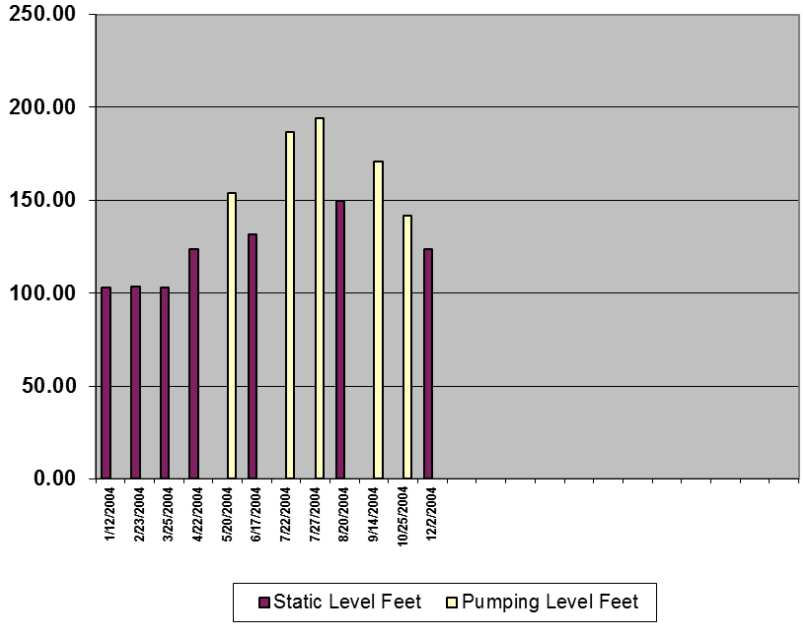

## 2003 ~ Well #12 ~ Bowl Depth 231



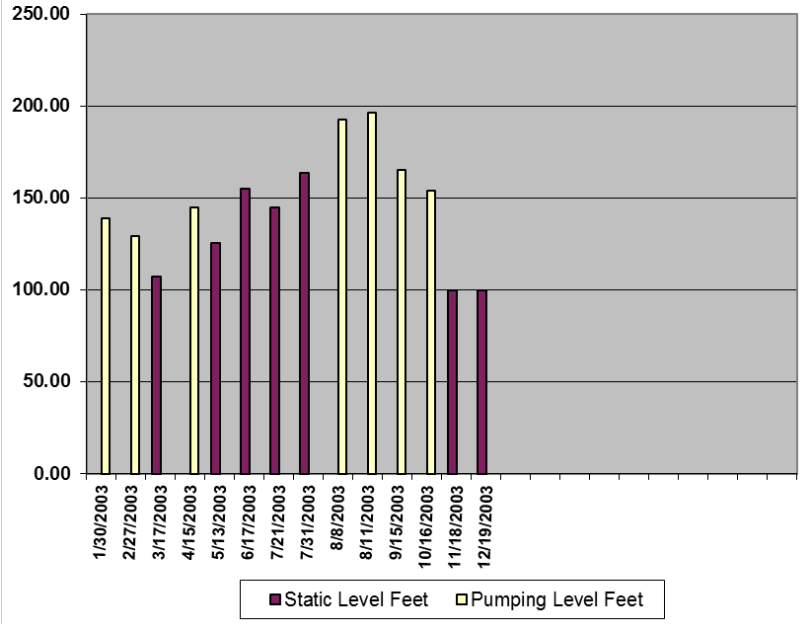

## Well #12 ~ 2002 ~ Bowl Depth 231



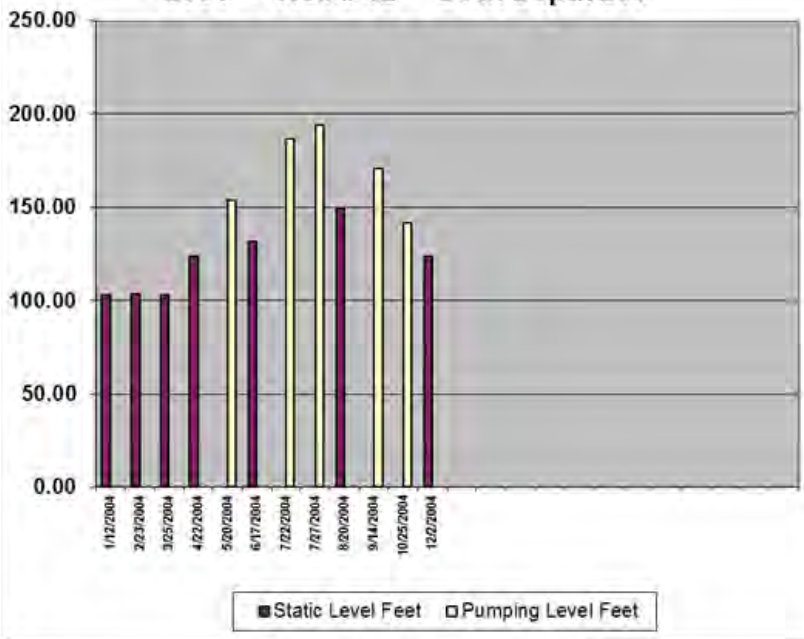

## 2004 ~ Well # 12 - Bowl Depth 231



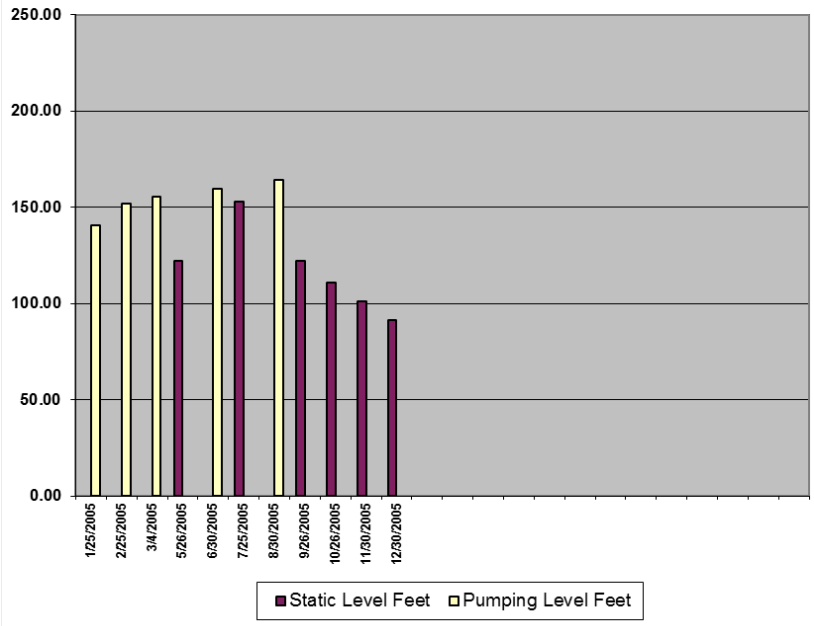

## 2003 ~ Well #12 ~ Bowl Depth 231



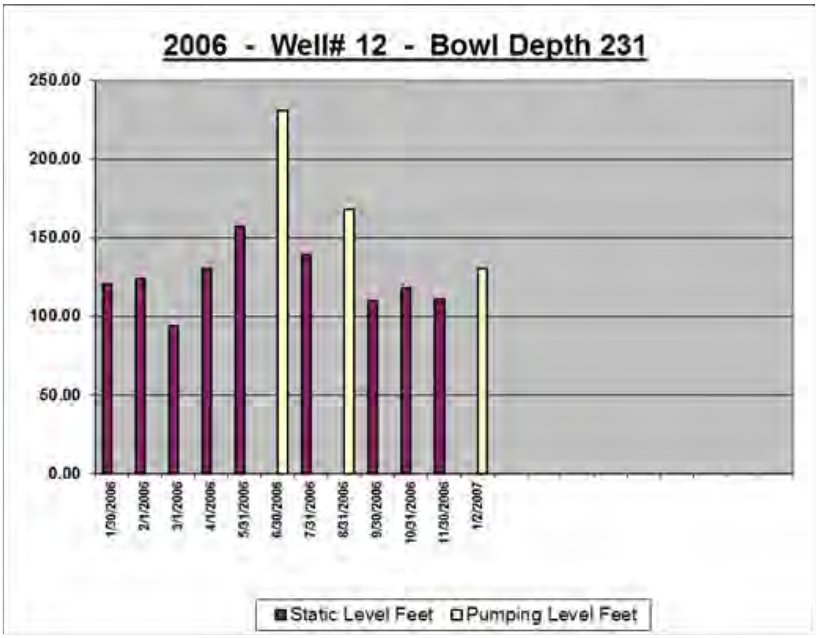

## 2004 ~ Well # 12 - Bowl Depth 231



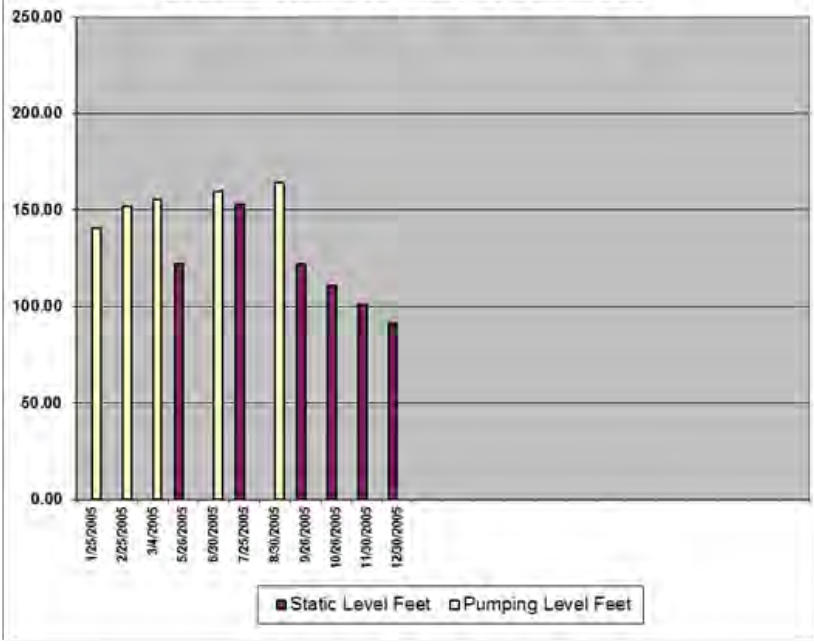
## 2005 ~ Well #12 - Bowl Depth 231



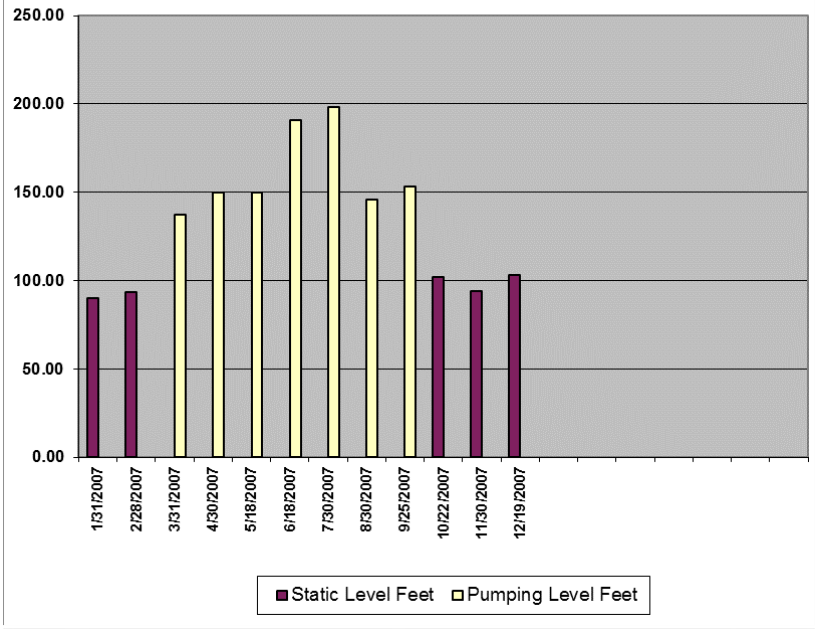

## 2006 - Well# 12 - Bowl Depth 231



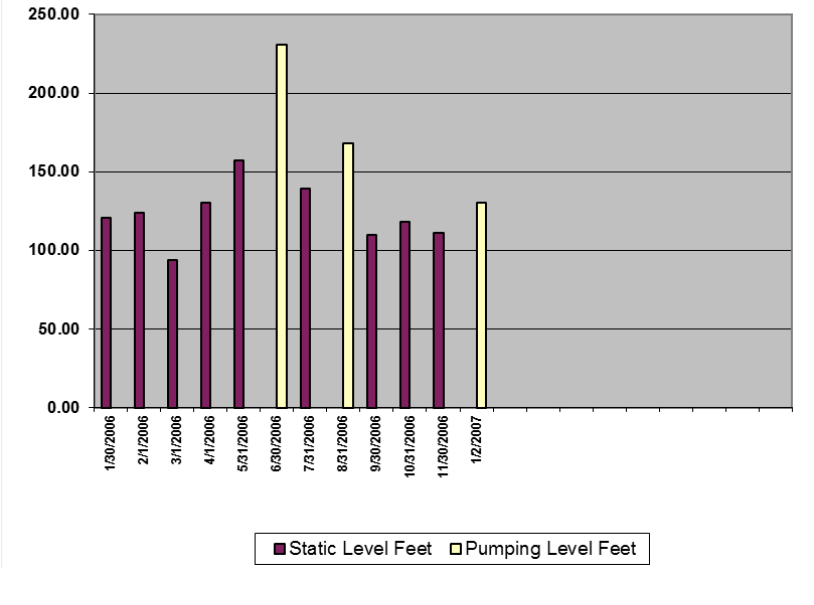

## 2005 ~ Well #12 - Bowl Depth 231



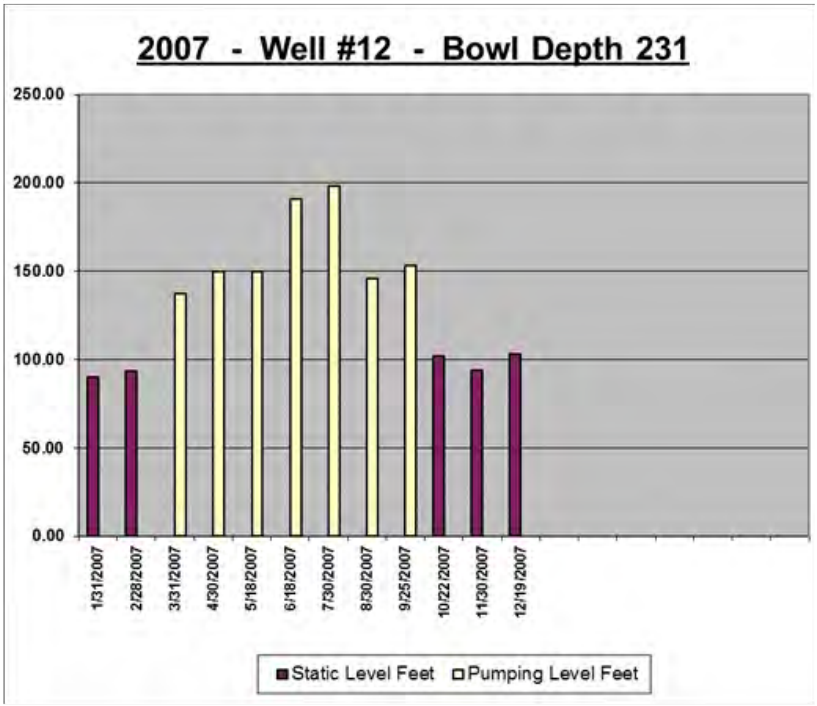

## 2007 - Well #12 - Bowl Depth 231

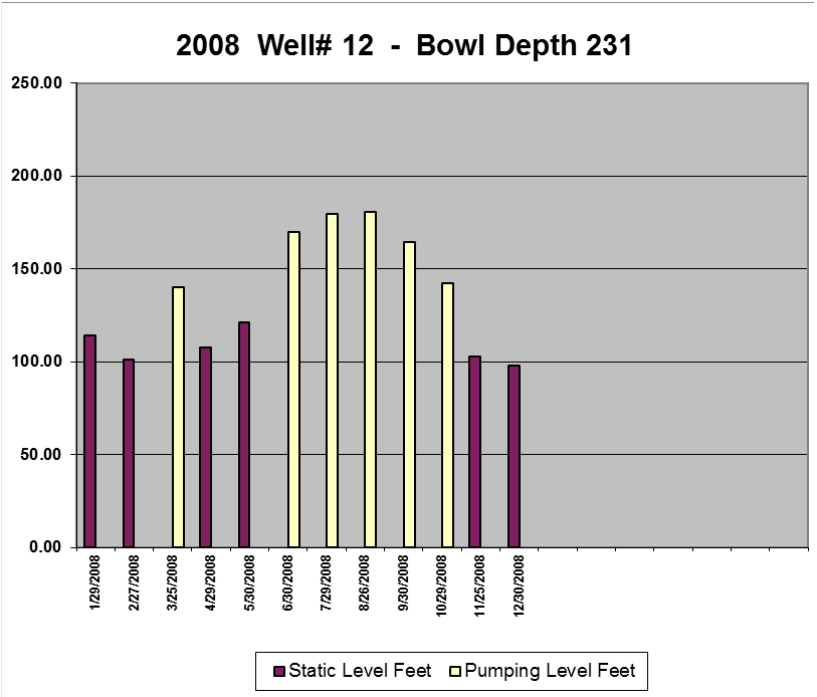


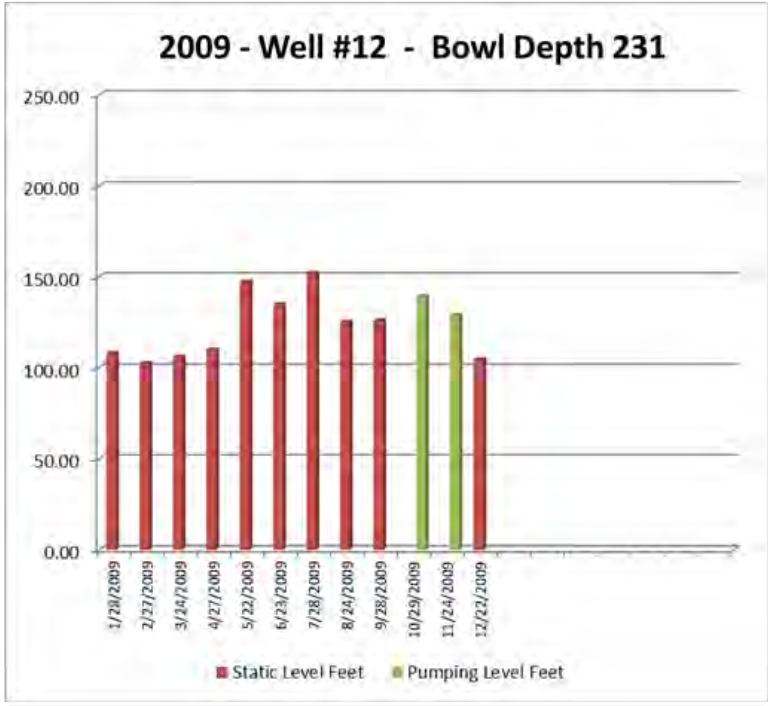

## 2006 - Well# 12 - Bowl Depth 231

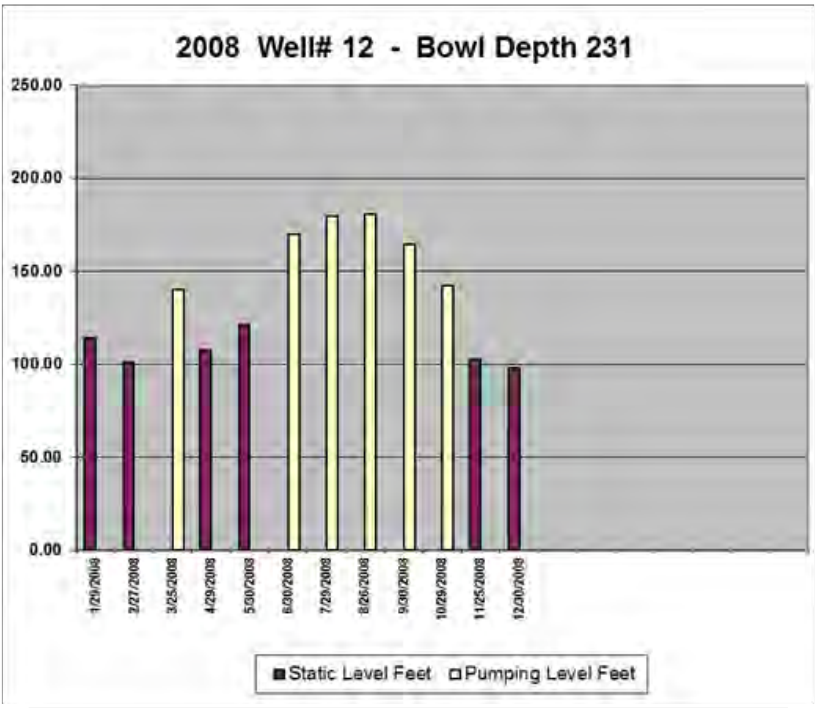


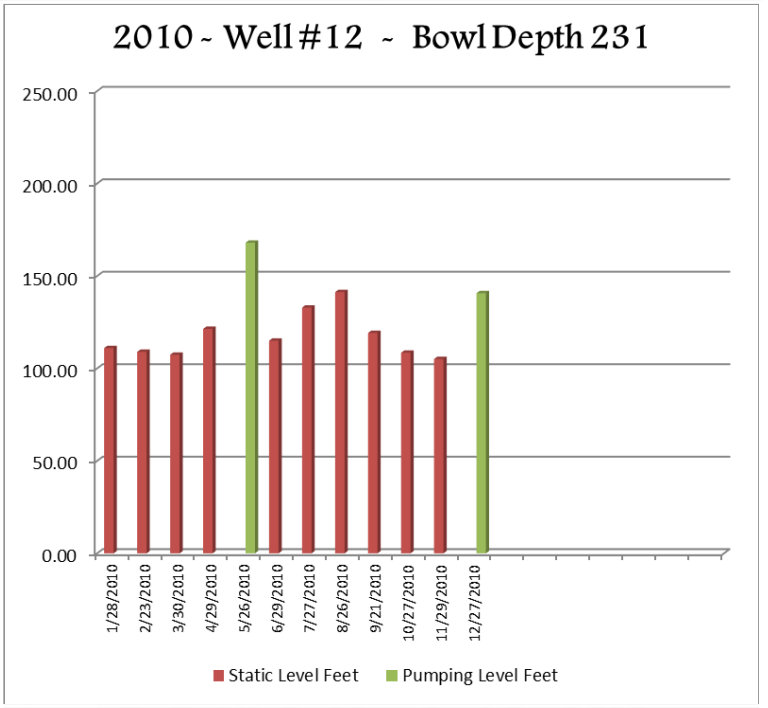

## 2007 - Well #12 - Bowl Depth 231

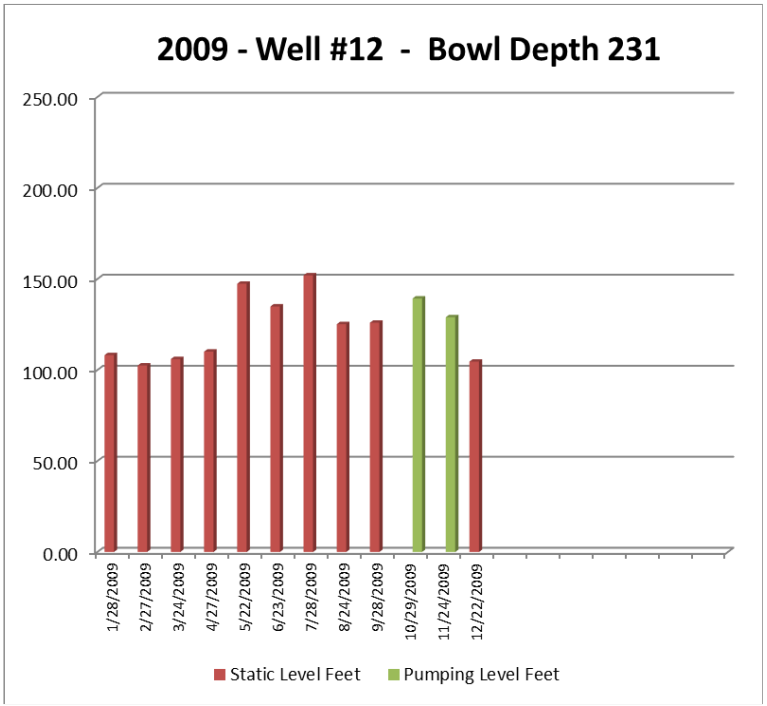


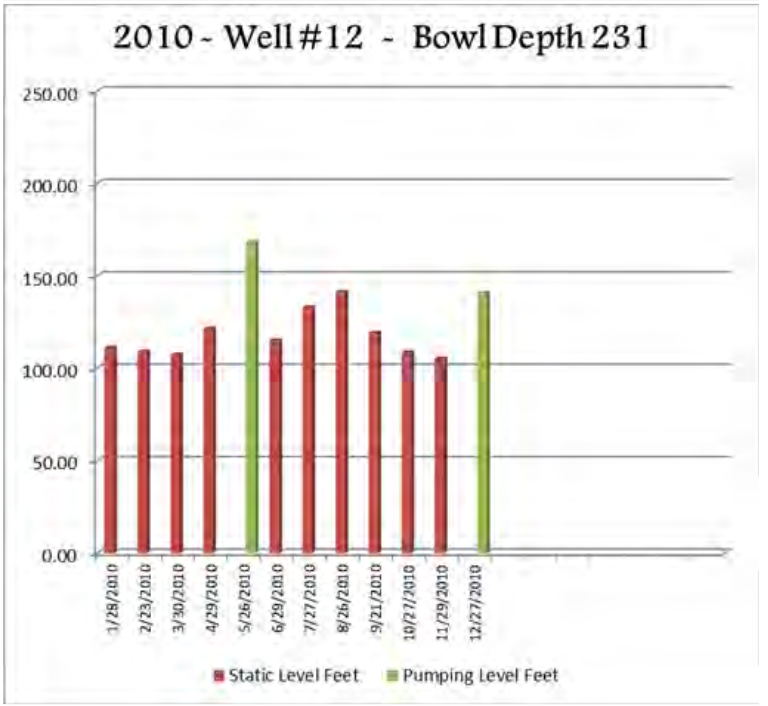

2008 Well# 12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

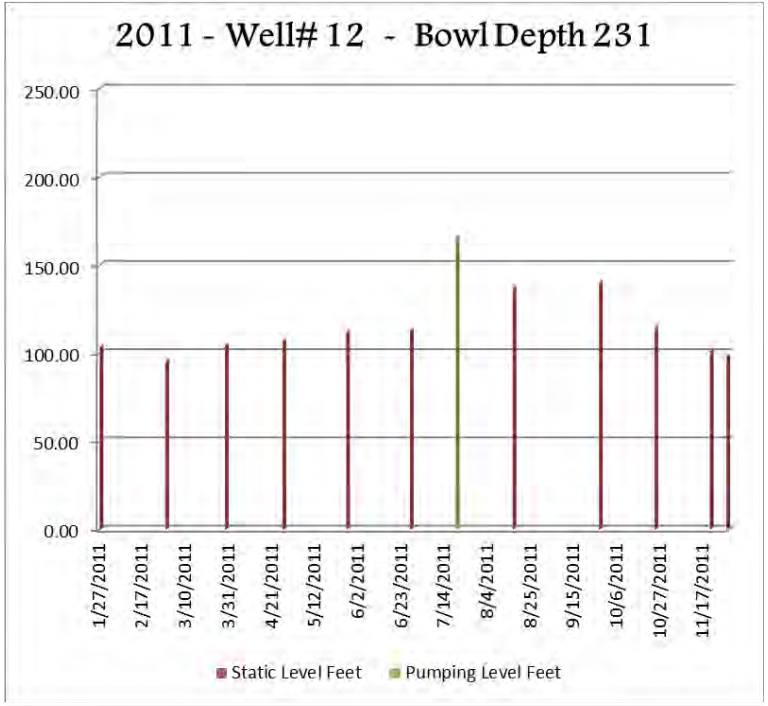

2009 - Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/21/2009
Static Level Feet
Pumping Level Feet

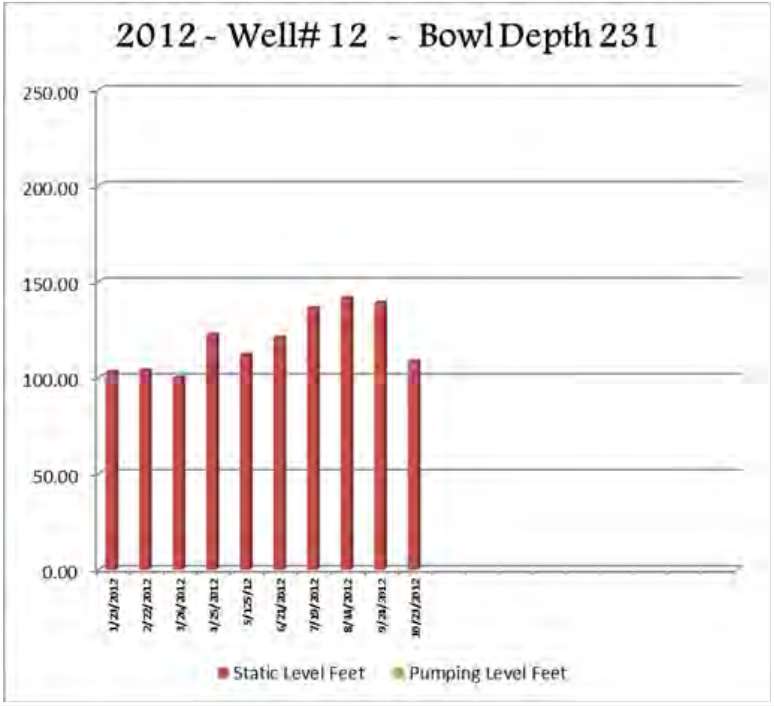

2008 Well# 12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

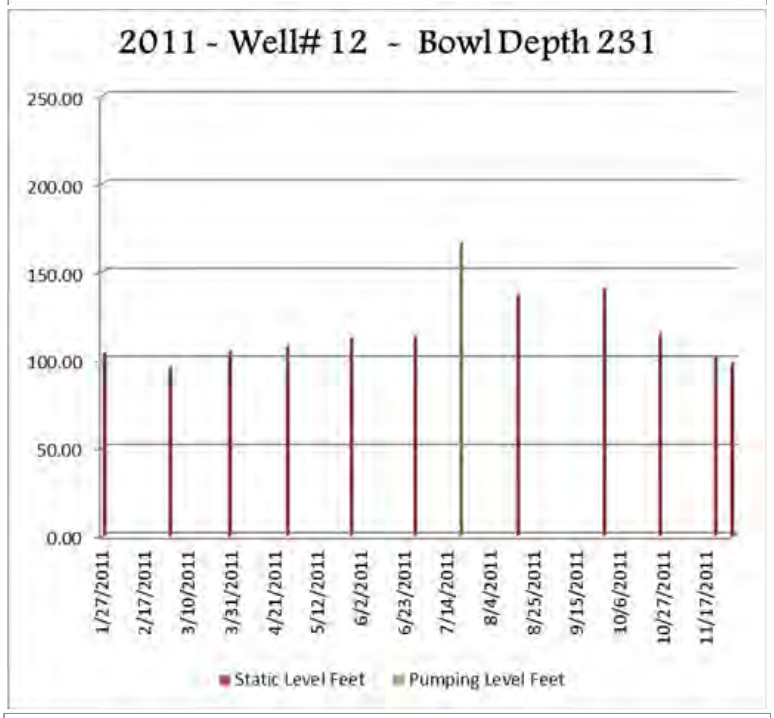

2010 - Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

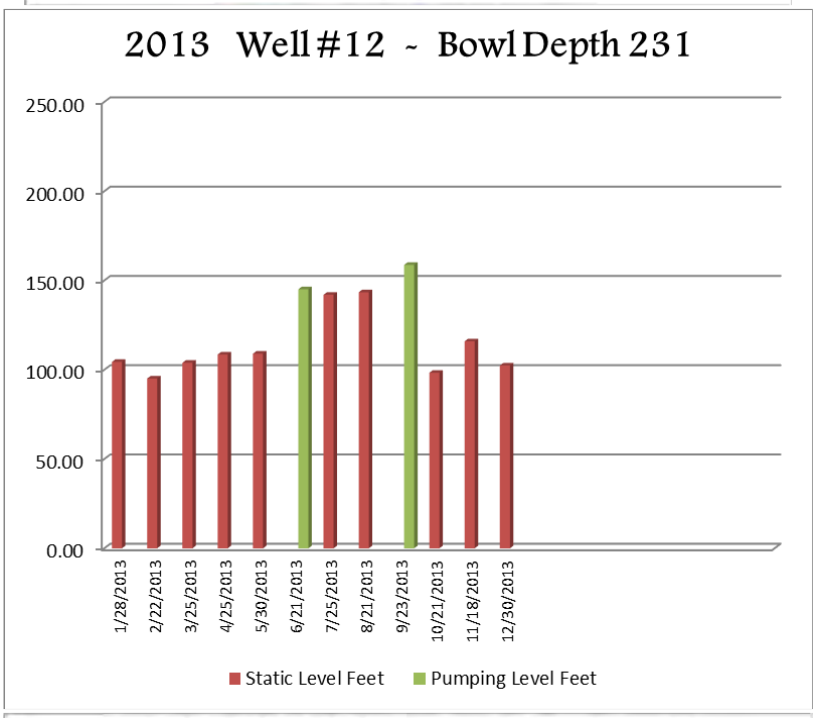

2009 - Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

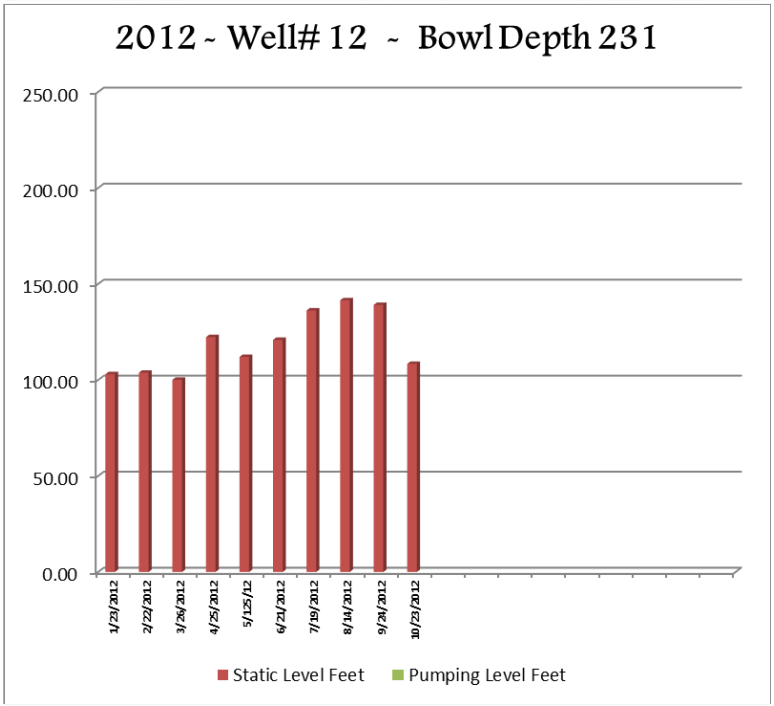

2010 - Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

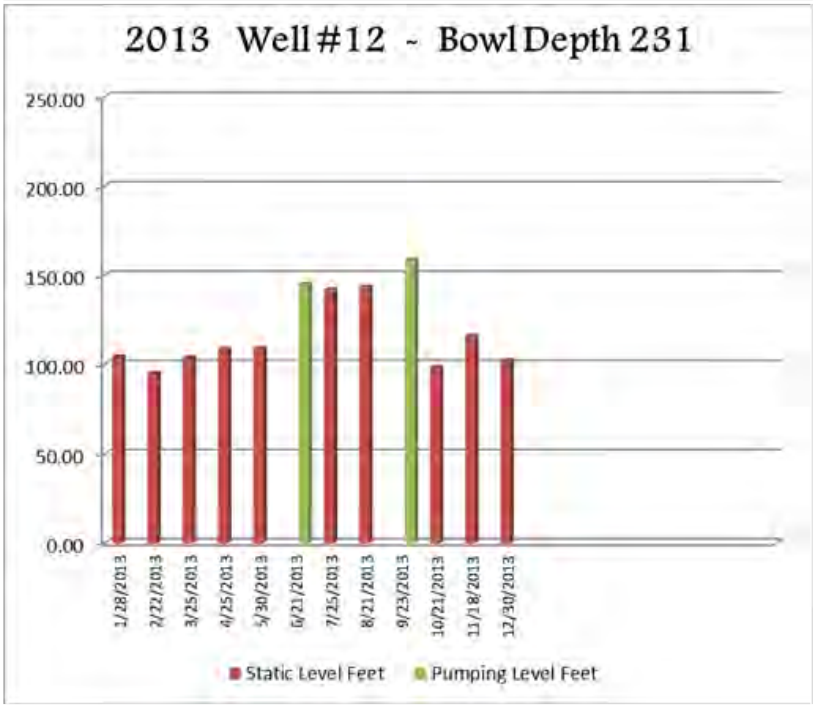

2011 - Well# 12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/17/2011
3/10/2011
3/31/2011
4/21/2011
5/12/2011
6/2/2011
6/23/2011
7/14/2011
8/4/2011
8/25/2011
9/15/2011
10/6/2011
10/27/2011
11/17/2011
Static Level Feet
Pumping Level Feet

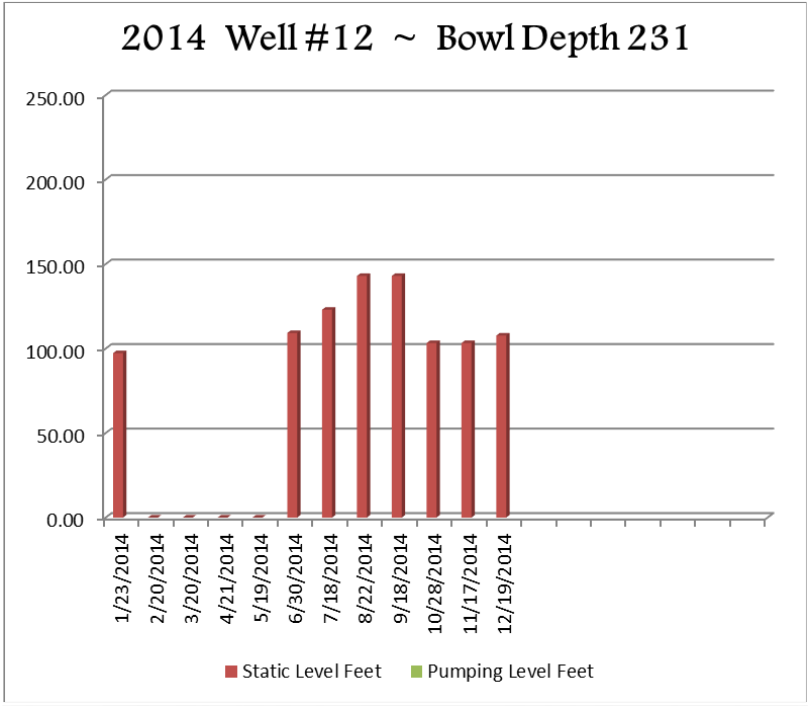

2012 - Well# 12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

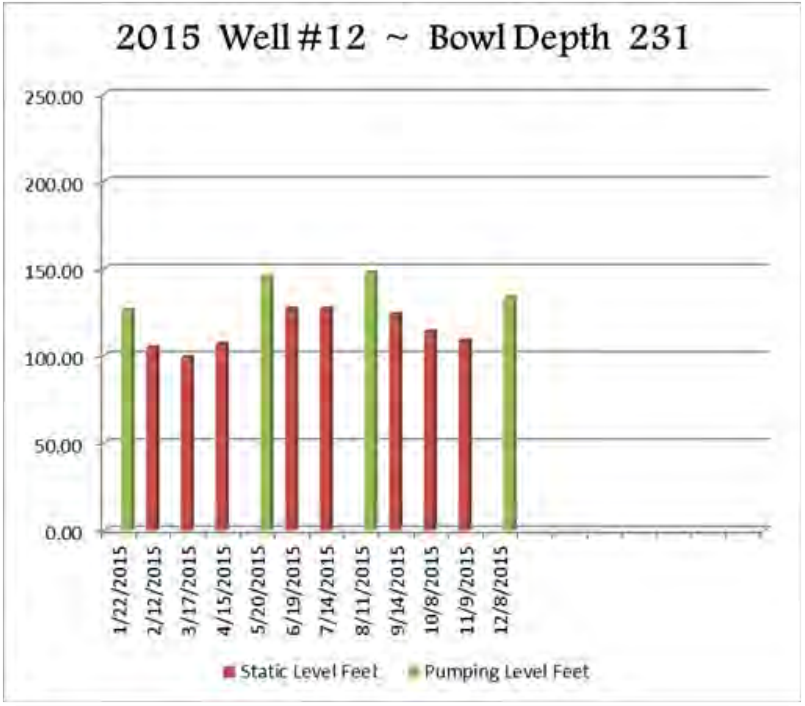

2011 - Well# 12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/17/2011
3/10/2011
3/31/2011
4/21/2011
5/12/2011
6/2/2011
6/23/2011
7/14/2011
8/4/2011
8/25/2011
9/15/2011
10/6/2011
10/27/2011
11/17/2011
Static Level Feet
Pumping Level Feet

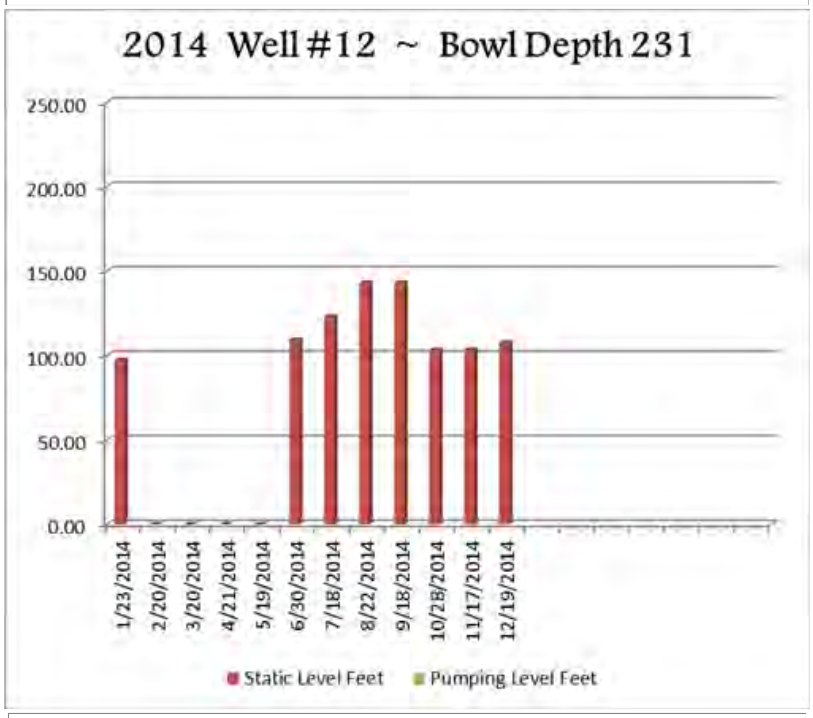

2013 Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

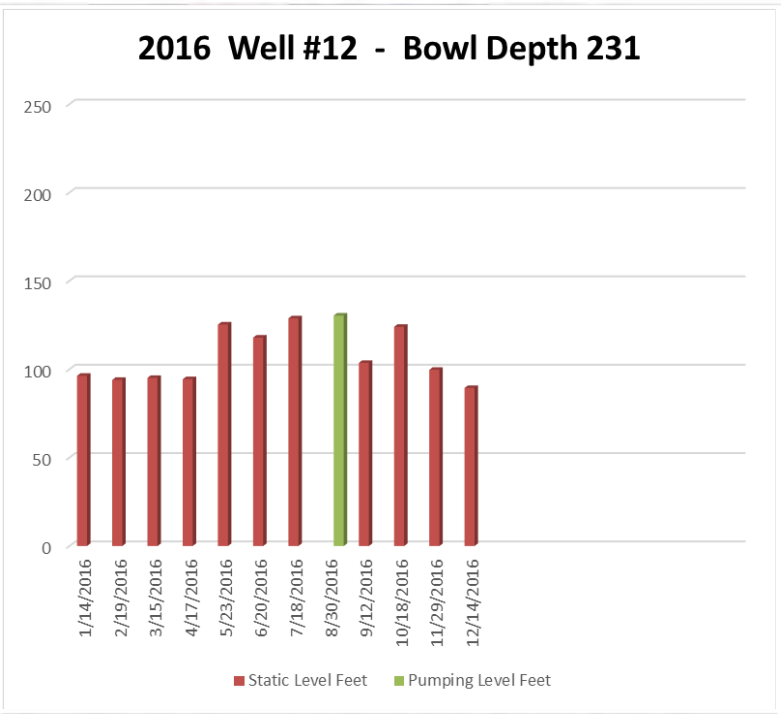

2012 - Well# 12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/125/12
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

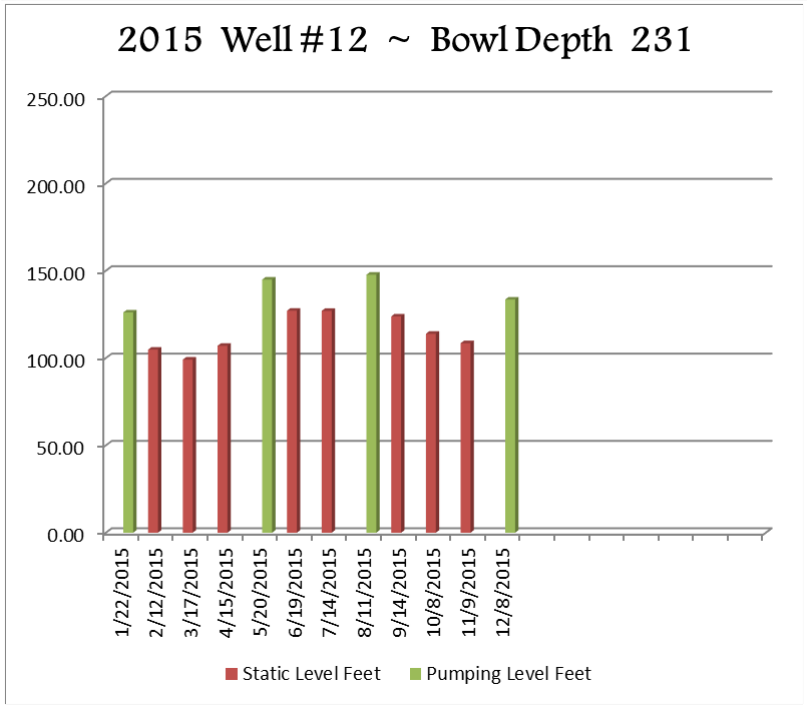

2013 Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

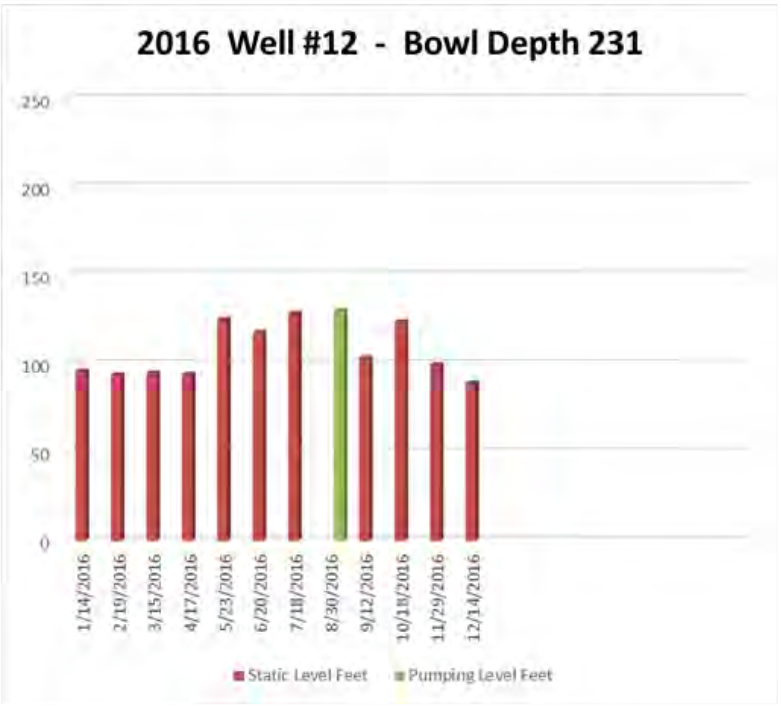

2014 Well #12 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

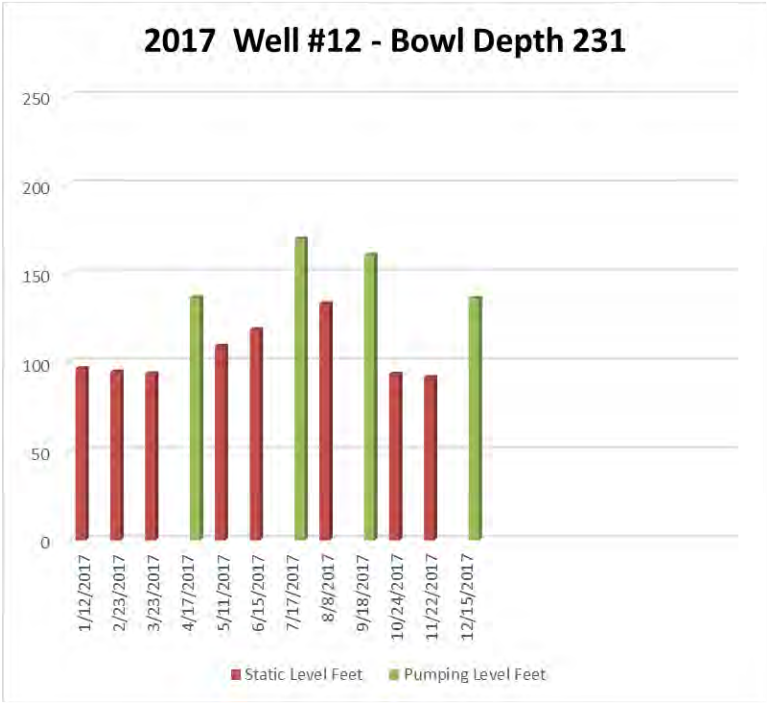

2015 Well #12 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

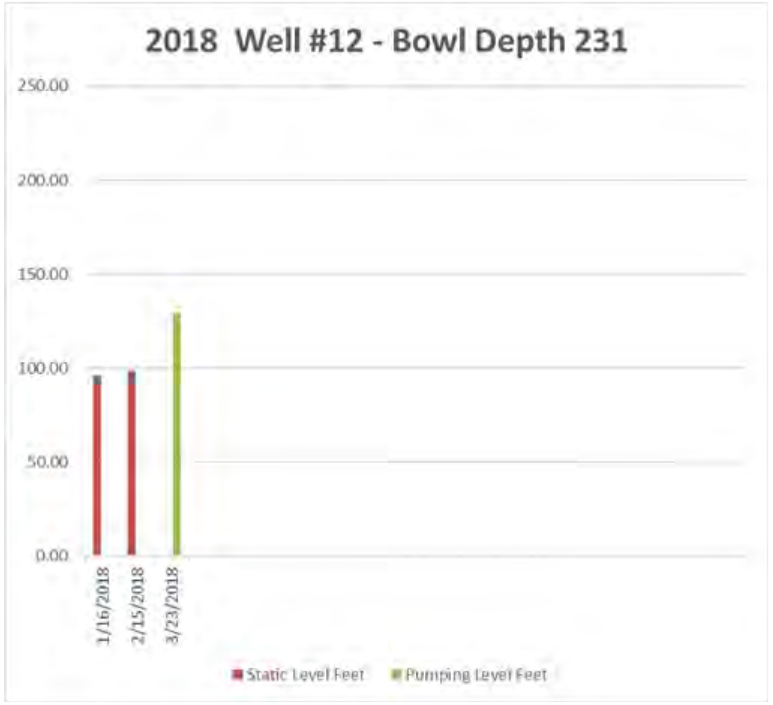

2014 Well #12 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

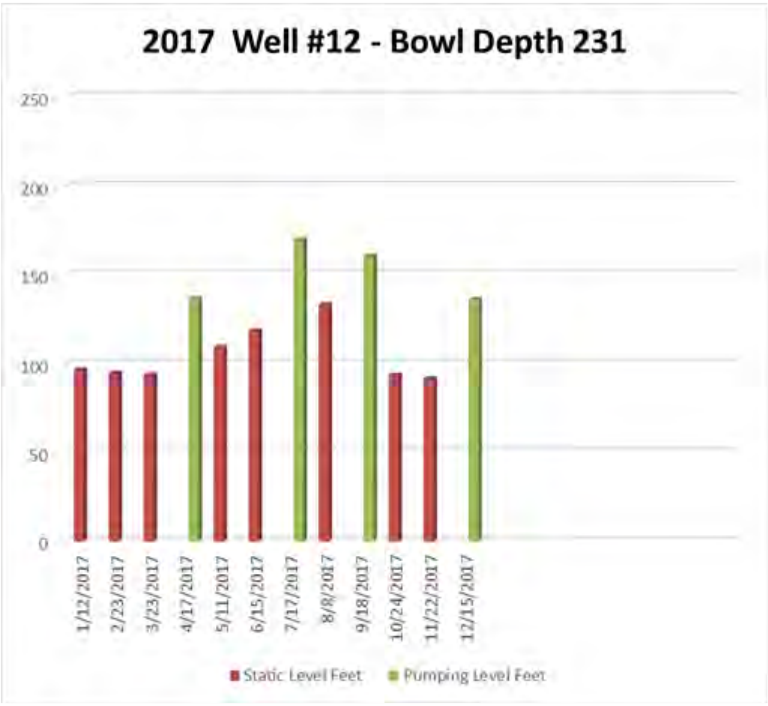

2016 Well #12 - Bowl Depth 231
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

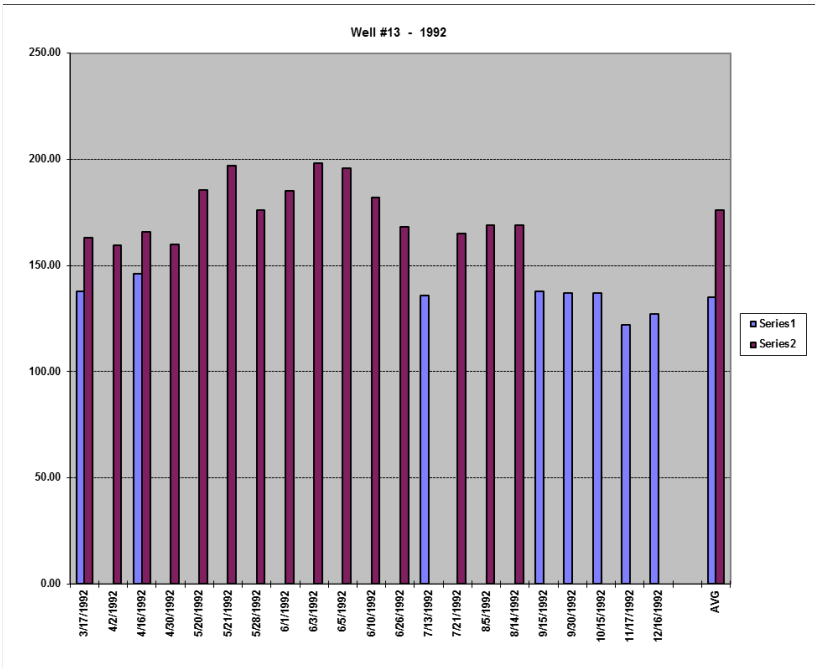

2015 Well #12 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

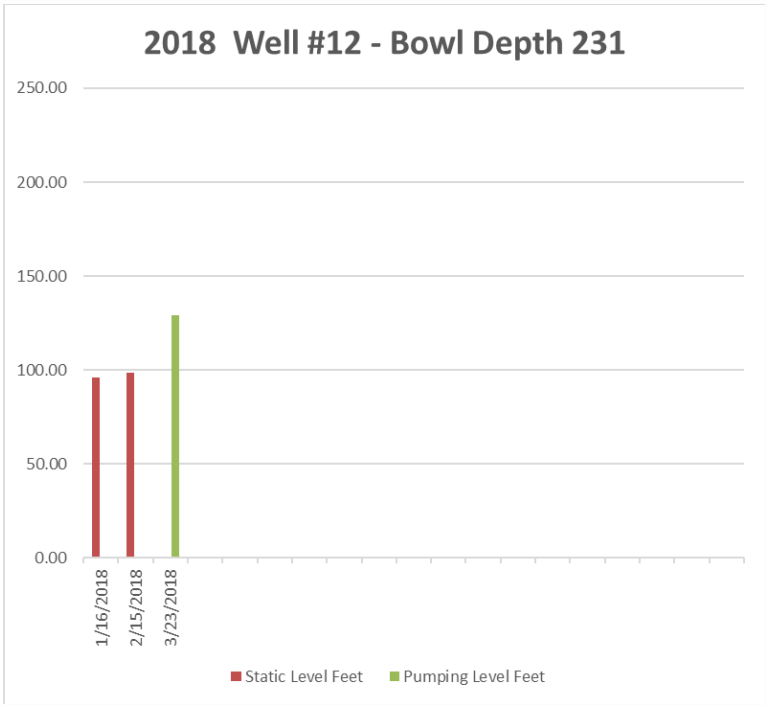

2016 Well #12 - Bowl Depth 231
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

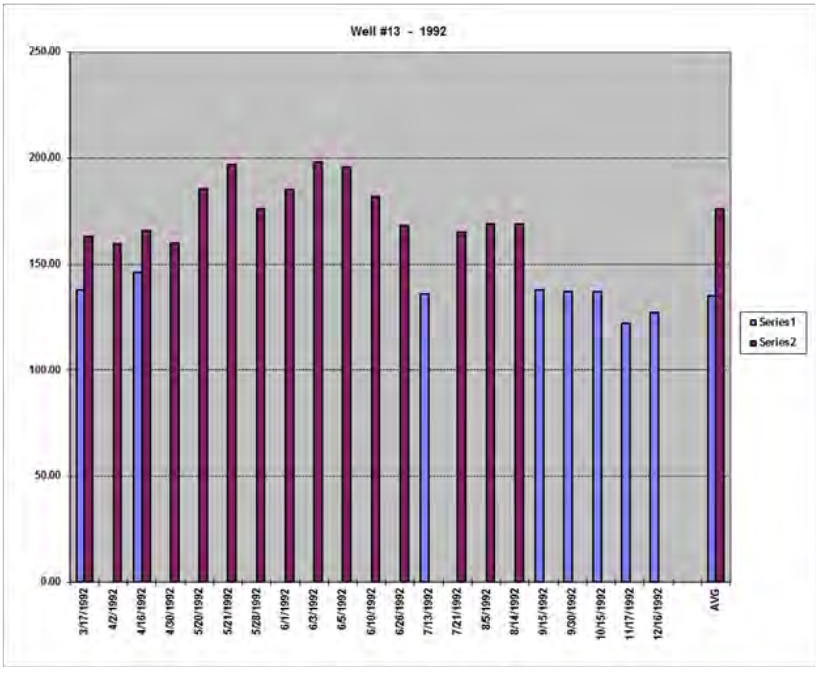

2017 Well #12 - Bowl Depth 231
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

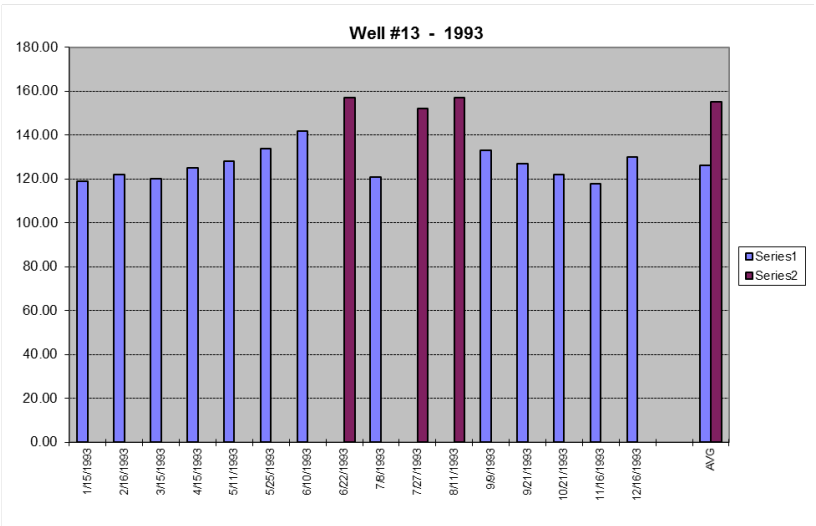

2018 Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

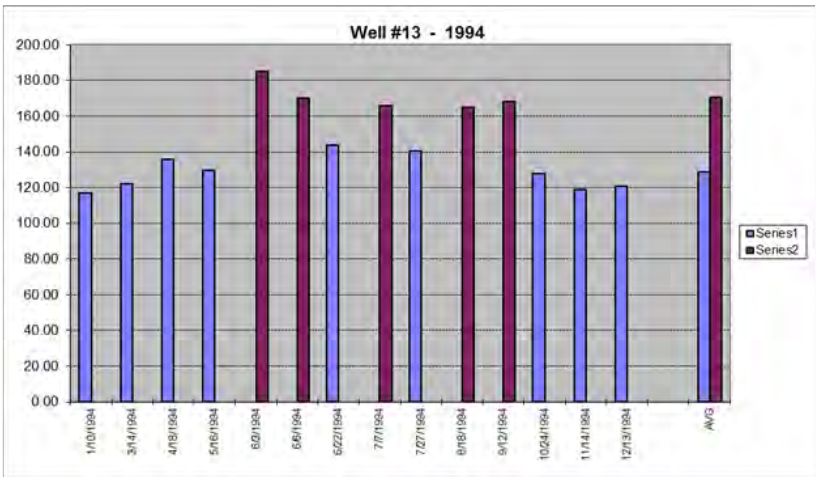

2017 Well #12 - Bowl Depth 231
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

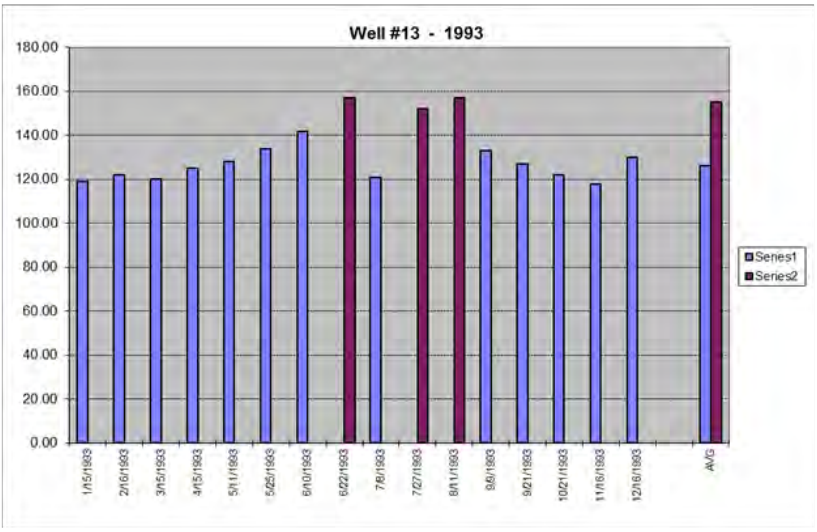

Well #13 - 1992
250.00
200.00
150.00
100.00
50.00
0.00
3/17/1992
4/2/1992
4/16/1992
4/30/1992
5/20/1992
5/21/1992
5/28/1992
6/1/1992
6/3/1992
6/5/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
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9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

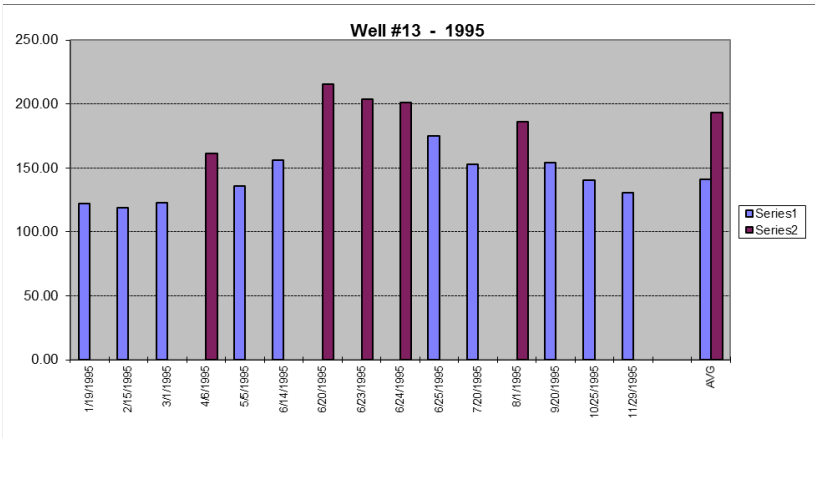

2018 Well #12 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

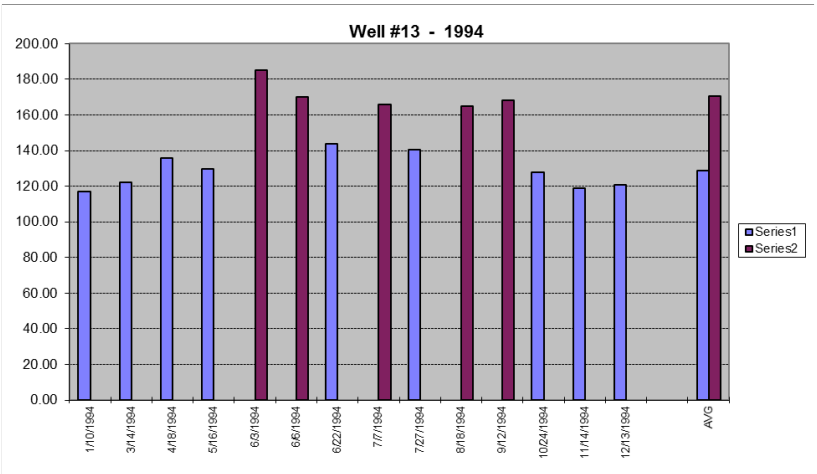

Well #13 - 1992
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200.00
150.00
100.00
50.00
0.00
3/17/1992
4/2/1992
4/16/1992
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5/20/1992
5/21/1992
5/28/1992
6/1/1992
6/3/1992
6/5/1992
6/10/1992
6/26/1992
7/13/1992
7/21/1992
8/5/1992
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9/15/1992
9/30/1992
10/15/1992
11/17/1992
12/16/1992
AVG
Series1
Series2

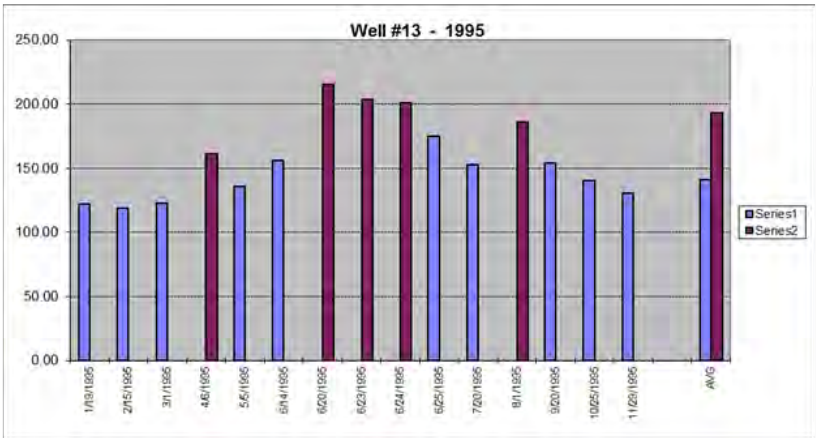

Well #13 - 1993
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
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2/16/1993
3/15/1993
4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/6/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

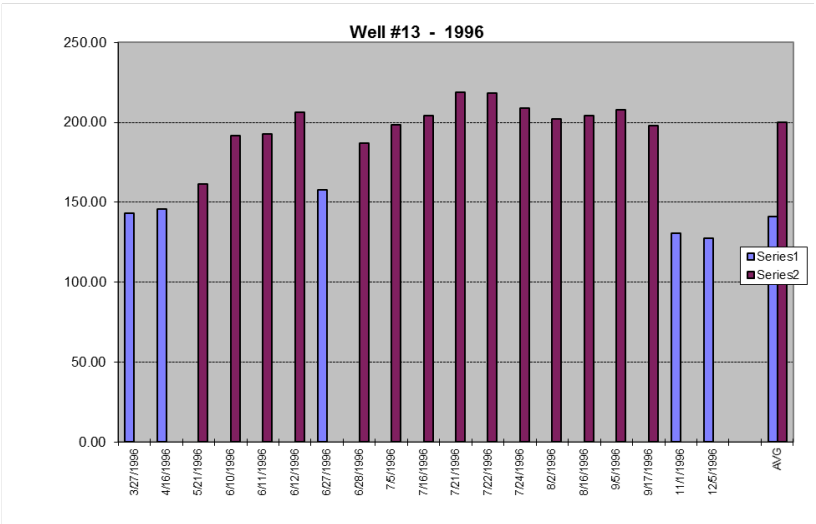

Well #13 - 1994
200.00
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160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
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1/10/1994
3/14/1994
4/18/1994
5/16/1994
6/9/1994
6/6/1994
6/22/1994
7/7/1994
7/27/1994
8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

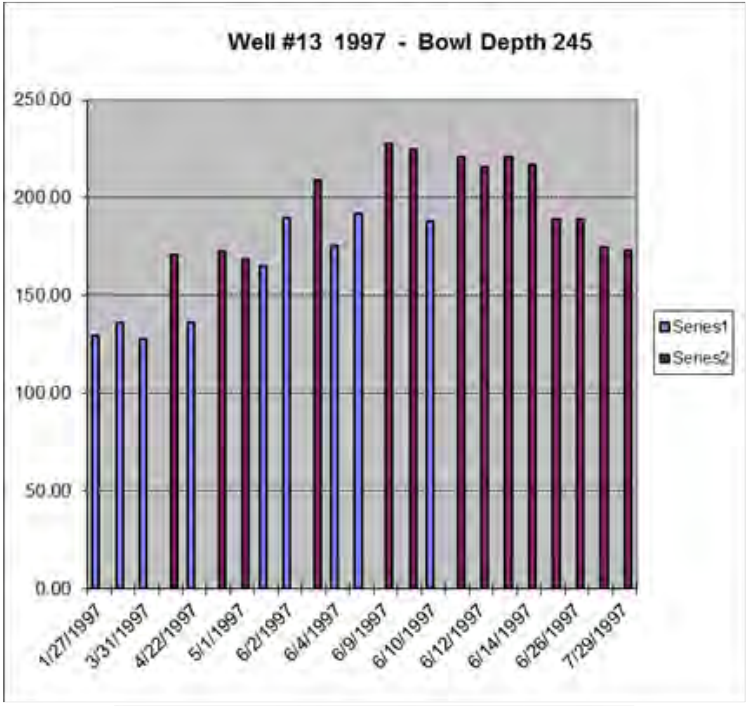

Well #13 - 1993
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20.00
0.00
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3/15/1993
4/15/1993
5/11/1993
5/25/1993
6/10/1993
6/22/1993
7/8/1993
7/27/1993
8/11/1993
9/6/1993
9/21/1993
10/21/1993
11/16/1993
12/16/1993
AVG
Series1
Series2

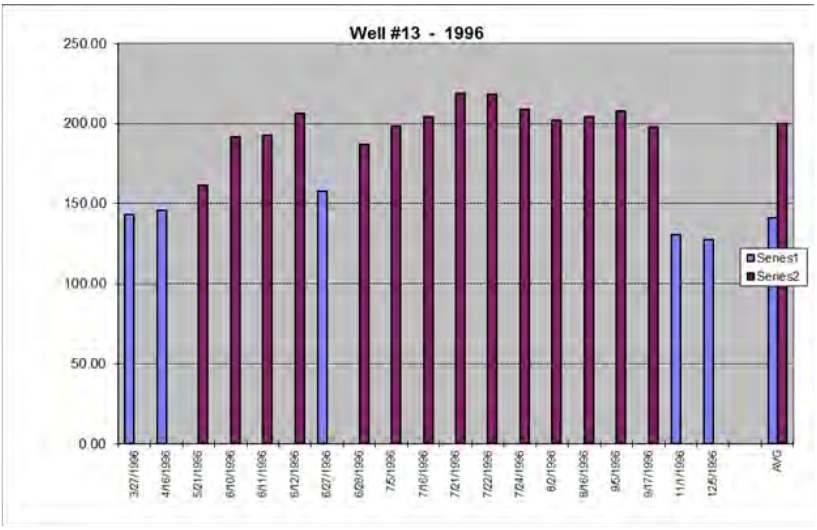

Well #13 - 1995
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150.00
100.00
50.00
0.00
1/19/1995
2/15/1995
3/1/1995
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5/5/1995
5/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

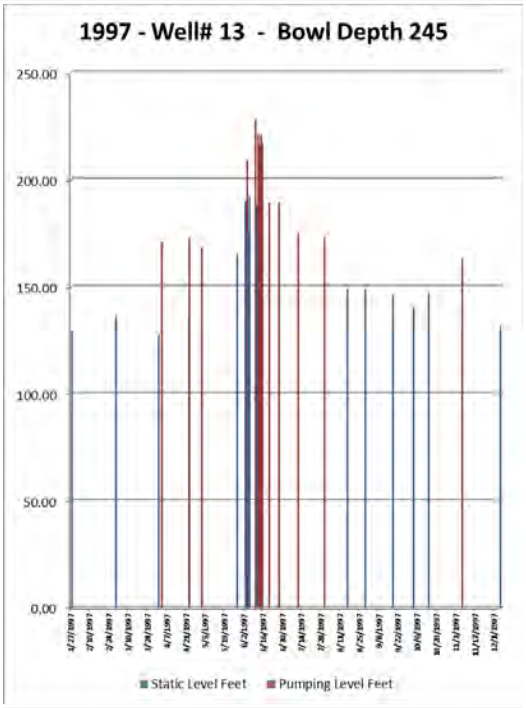

Well #13 - 1994
200.00
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120.00
100.00
80.00
60.00
40.00
20.00
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1/10/1994
3/14/1994
4/18/1994
5/16/1994
6/9/1994
6/6/1994
6/22/1994
7/7/1994
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8/18/1994
9/12/1994
10/24/1994
11/14/1994
12/13/1994
AVG
Series1
Series2

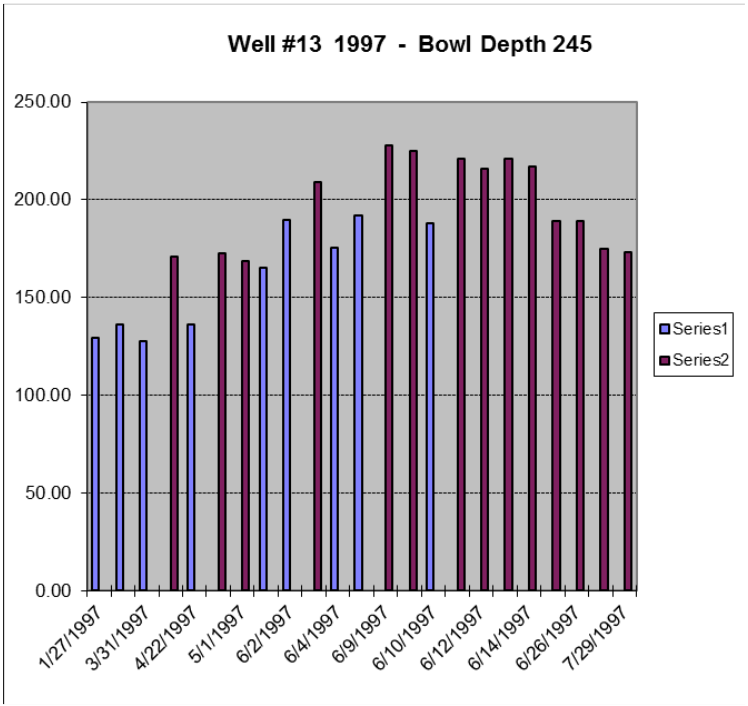

Well #13 - 1995
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200.00
150.00
100.00
50.00
0.00
1/19/1995
2/15/1995
3/1/1995
4/6/1995
5/5/1995
5/14/1995
6/20/1995
6/23/1995
6/24/1995
6/25/1995
7/20/1995
8/1/1995
9/20/1995
10/25/1995
11/29/1995
AVG
Series1
Series2

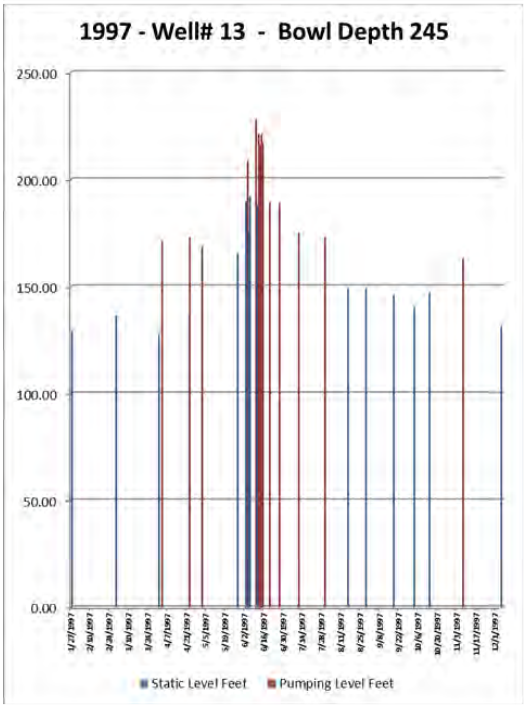

Well #13 - 1996
250.00
200.00
150.00
100.00
50.00
0.00
Series1
Series2
3/27/1996
4/16/1996
5/21/1996
6/10/1996
6/11/1996
6/12/1996
6/27/1996
6/28/1996
7/5/1996
7/16/1996
7/21/1996
7/22/1996
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8/2/1996
8/16/1996
9/5/1996
9/17/1996
11/1/1996
12/5/1996
AVG

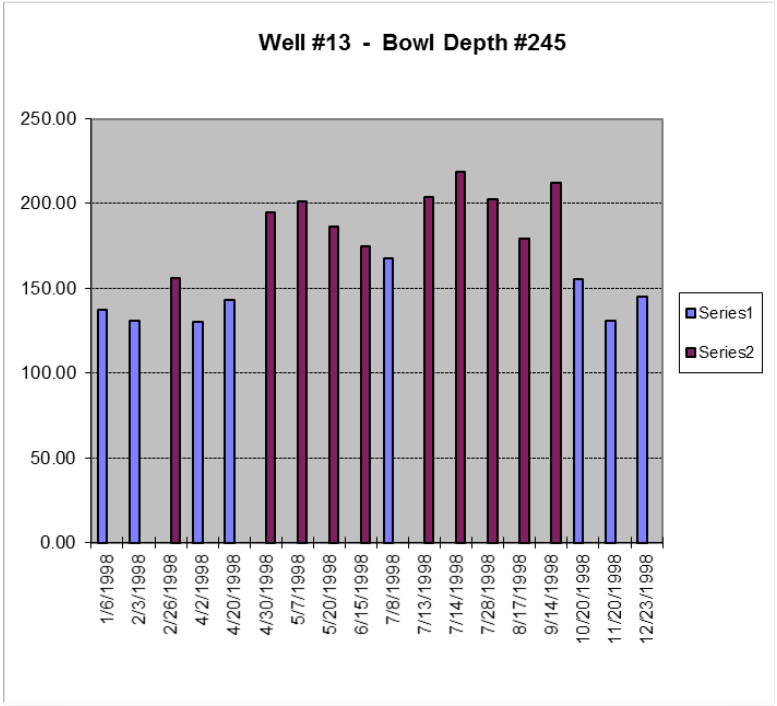

Well #13 1997 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
Series1
Series2
1/27/1997
3/31/1997
4/22/1997
5/1/1997
6/2/1997
6/4/1997
6/9/1997
6/10/1997
6/12/1997
6/14/1997
6/26/1997
7/29/1997

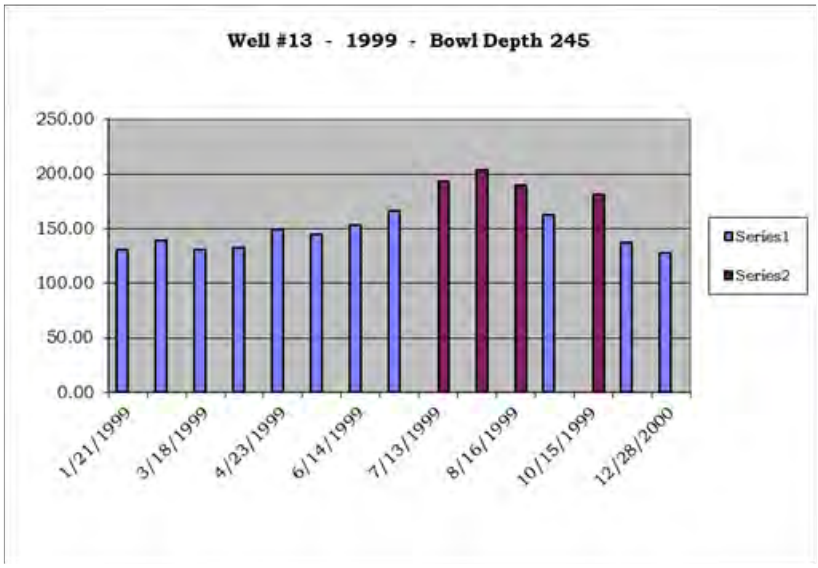

Well #13 - 1996
250.00
200.00
150.00
100.00
50.00
0.00
Series1
Series2
3/27/1996
4/16/1996
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6/10/1996
6/11/1996
6/12/1996
6/27/1996
6/28/1996
7/5/1996
7/16/1996
7/21/1996
7/22/1996
7/24/1996
8/2/1996
8/16/1996
9/5/1996
9/17/1996
11/1/1996
12/5/1996
AVG

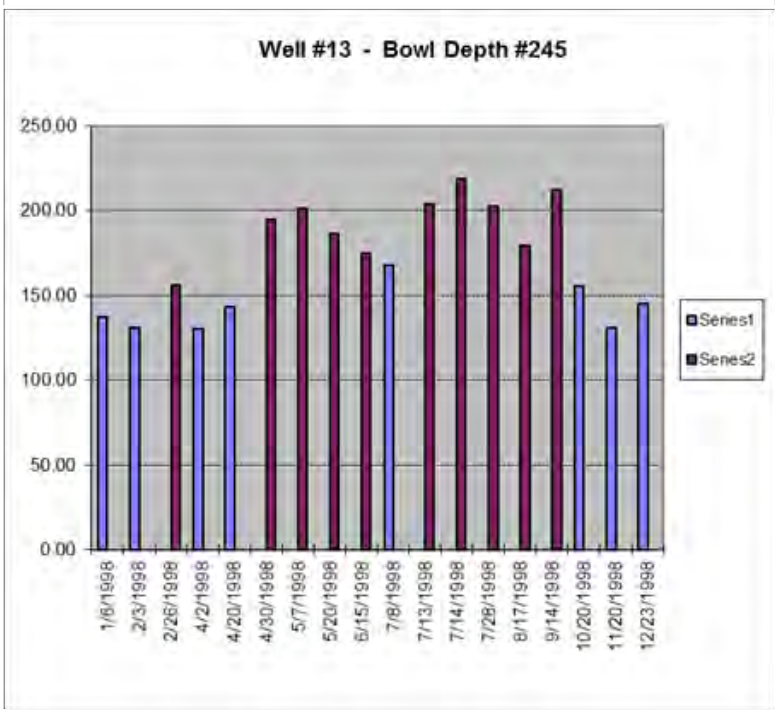

1997 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

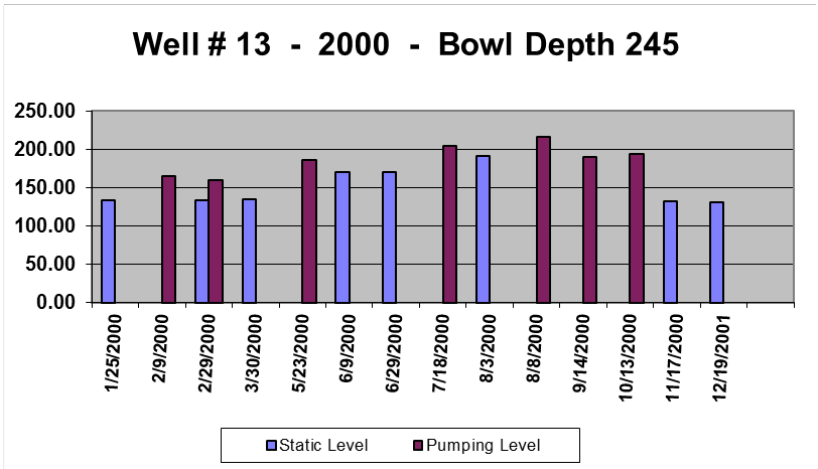

Well #13 1997 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
Series1
Series2
1/27/1997
3/31/1997
4/22/1997
5/1/1997
6/2/1997
6/4/1997
6/9/1997
6/10/1997
6/12/1997
6/14/1997
6/26/1997
7/29/1997

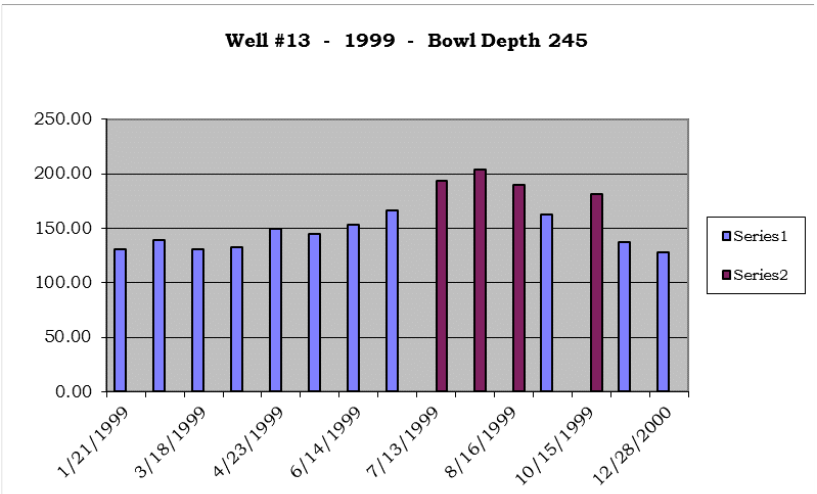

1997 - Well# 13 - Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

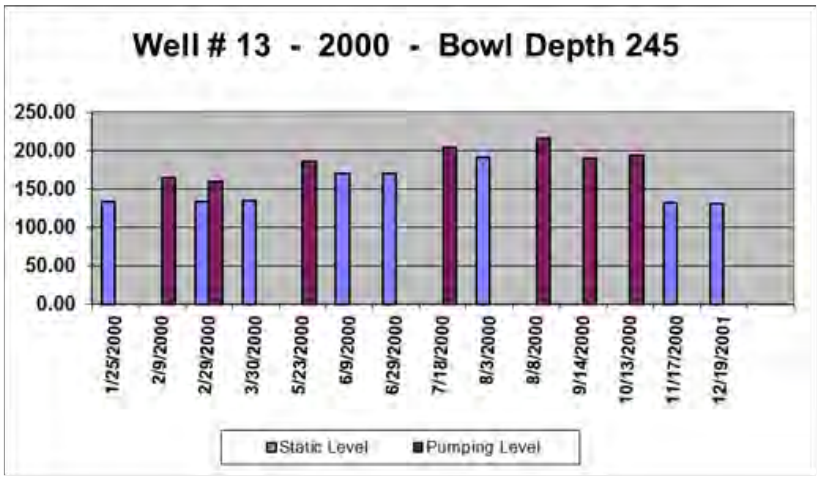

Well #13 - Bowl Depth #245
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200.00
150.00
100.00
50.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/8/1998
7/13/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/23/1998
Series1
Series2

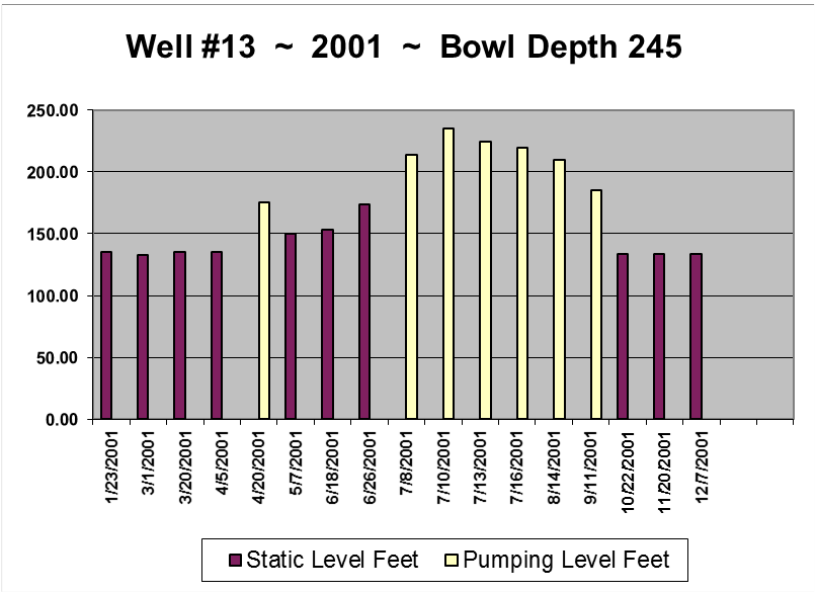

Well #13 - 1999 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/21/1999
3/18/1999
4/23/1999
6/14/1999
7/13/1999
8/16/1999
10/15/1999
12/28/2000
Series1
Series2

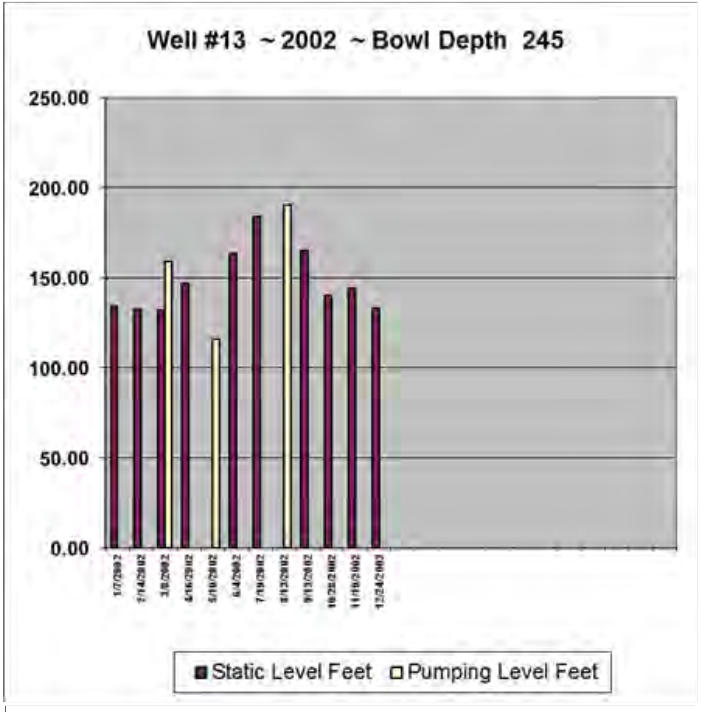

Well #13 - Bowl Depth #245
250.00
200.00
150.00
100.00
50.00
0.00
1/6/1998
2/3/1998
2/26/1998
4/2/1998
4/20/1998
4/30/1998
5/7/1998
5/20/1998
6/15/1998
7/8/1998
7/13/1998
7/14/1998
7/28/1998
8/17/1998
9/14/1998
10/20/1998
11/20/1998
12/23/1998
Series1
Series2

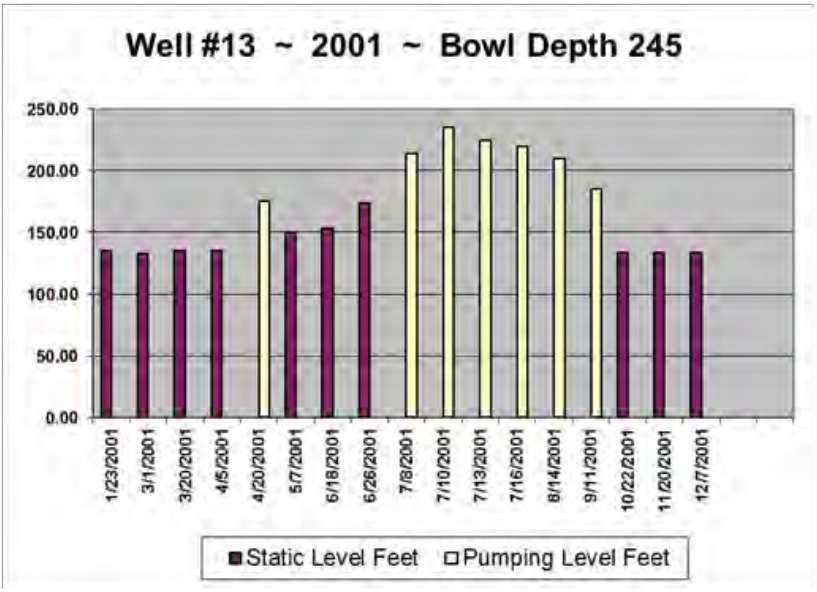

Well # 13 - 2000 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2000
2/9/2000
2/29/2000
3/30/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

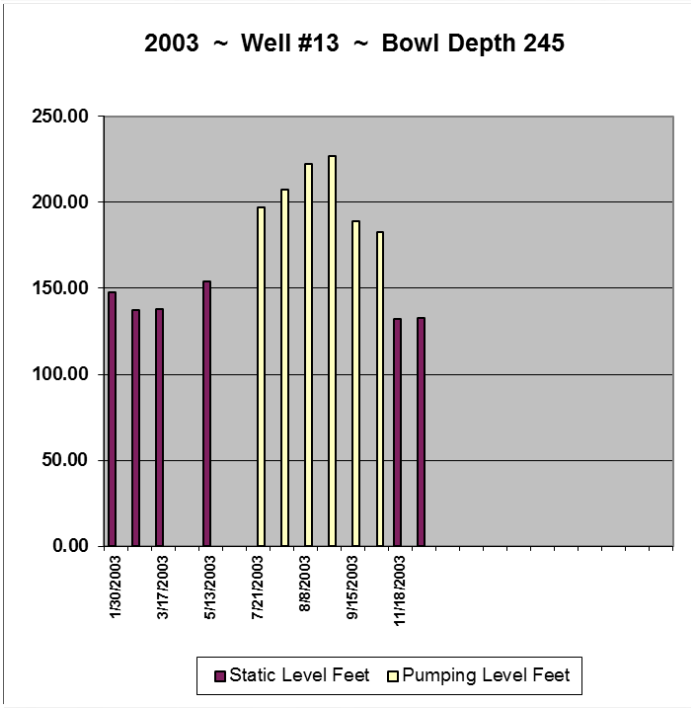

Well #13 - 1999 - Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
1/21/1999
3/18/1999
4/23/1999
6/14/1999
7/13/1999
8/16/1999
10/15/1999
12/28/2000
Series1
Series2

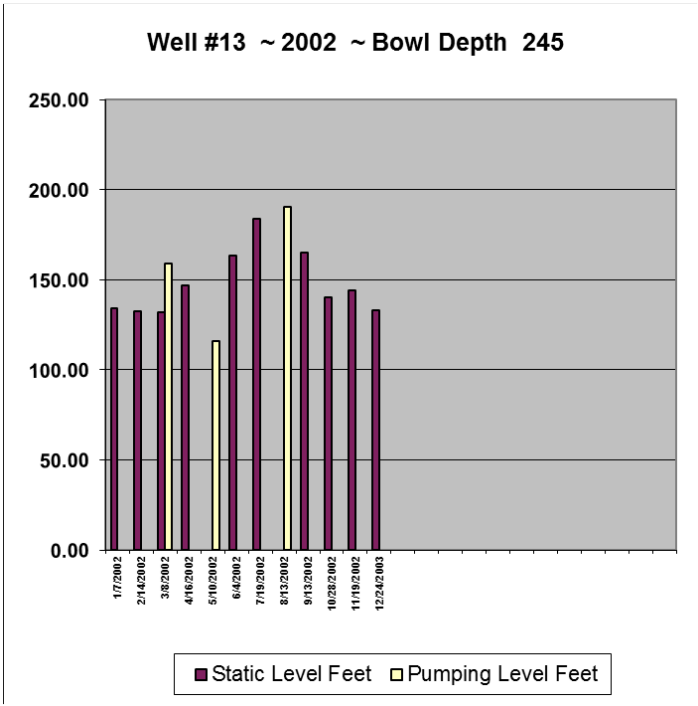

Well # 13 - 2000 - Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
1/25/2000
2/9/2000
2/29/2000
3/30/2000
5/23/2000
6/9/2000
6/29/2000
7/18/2000
8/3/2000
8/8/2000
9/14/2000
10/13/2000
11/17/2000
12/19/2001
Static Level
Pumping Level

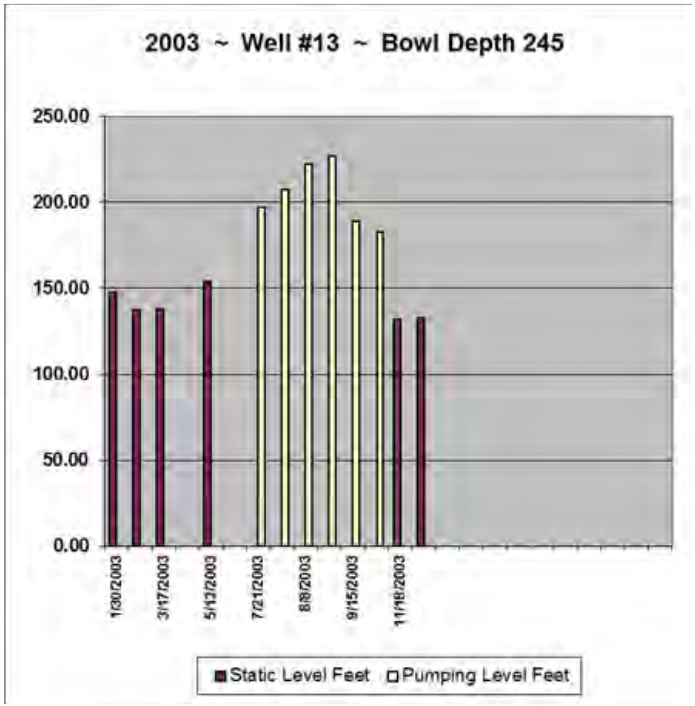

Well #13 ~ 2001 ~ Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
3/20/2001
4/5/2001
4/20/2001
5/7/2001
6/18/2001
6/26/2001
7/8/2001
7/10/2001
7/13/2001
7/16/2001
8/14/2001
9/11/2001
10/22/2001
11/20/2001
12/7/2001
Static Level Feet
Pumping Level Feet

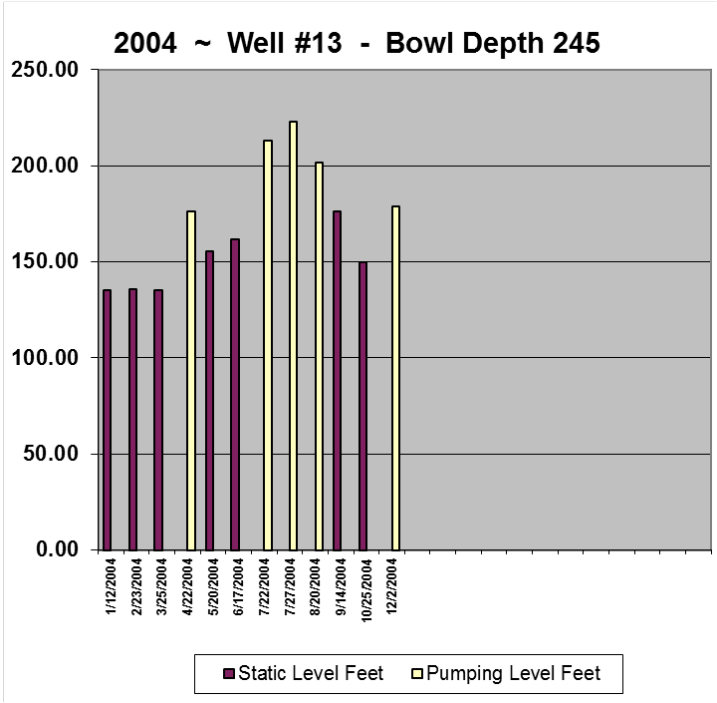

Well #13 ~ 2002 ~ Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

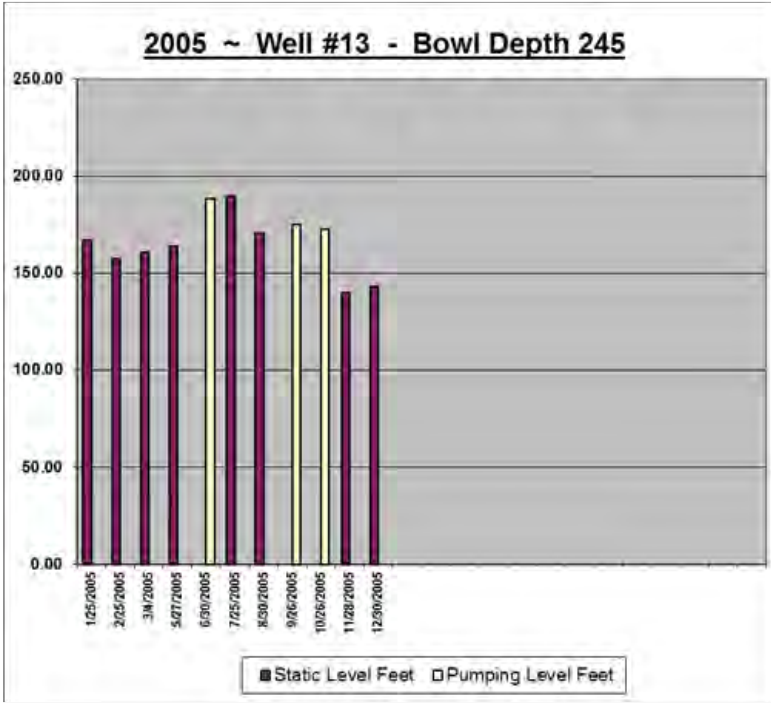

Well #13 ~ 2001 ~ Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
1/23/2001
3/1/2001
3/20/2001
4/5/2001
4/20/2001
5/7/2001
6/18/2001
6/26/2001
7/8/2001
7/10/2001
7/13/2001
7/16/2001
8/14/2001
9/11/2001
10/22/2001
11/20/2001
12/7/2001
Static Level Feet
Pumping Level Feet

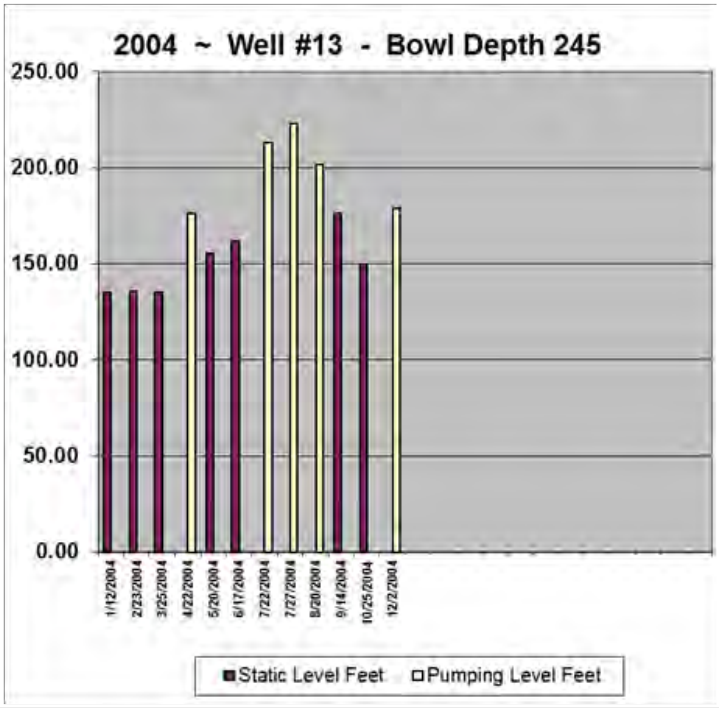

2003 ~ Well #13 ~ Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
3/17/2003
5/13/2003
7/21/2003
8/8/2003
9/15/2003
11/18/2003
Static Level Feet
Pumping Level Feet

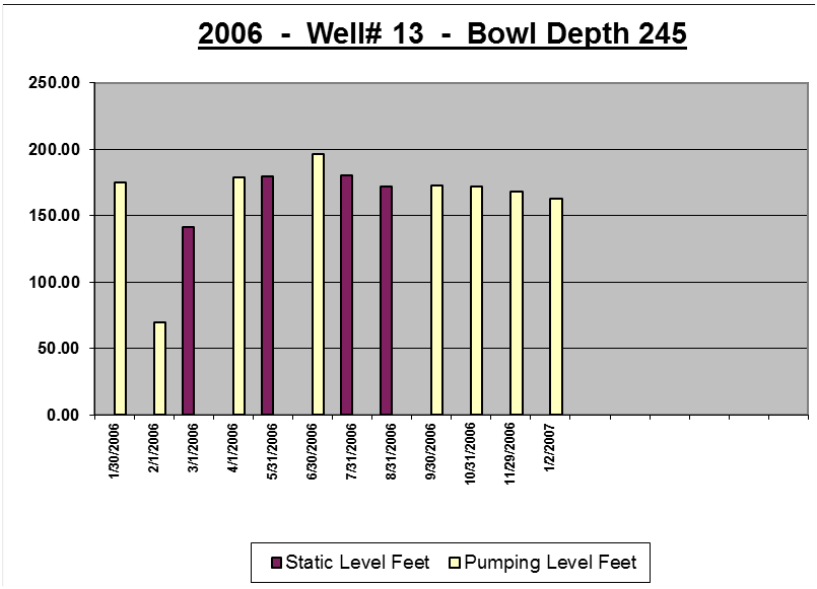

Well #13 ~ 2002 ~ Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/7/2002
2/14/2002
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4/16/2002
5/10/2002
6/4/2002
7/19/2002
8/13/2002
9/13/2002
10/28/2002
11/19/2002
12/24/2003
Static Level Feet
Pumping Level Feet

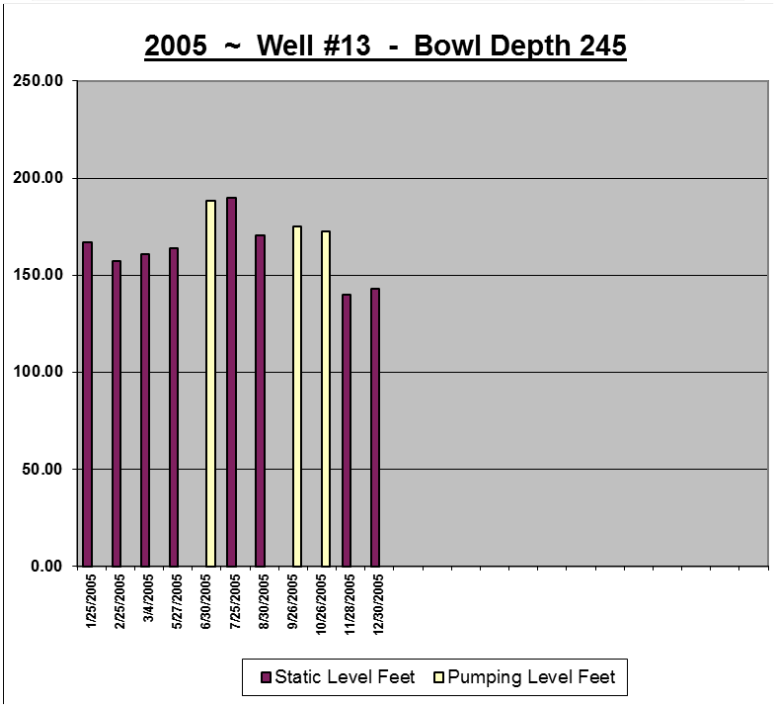

2003 ~ Well #13 ~ Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2003
3/17/2003
5/13/2003
7/21/2003
8/8/2003
9/15/2003
11/18/2003
Static Level Feet
Pumping Level Feet

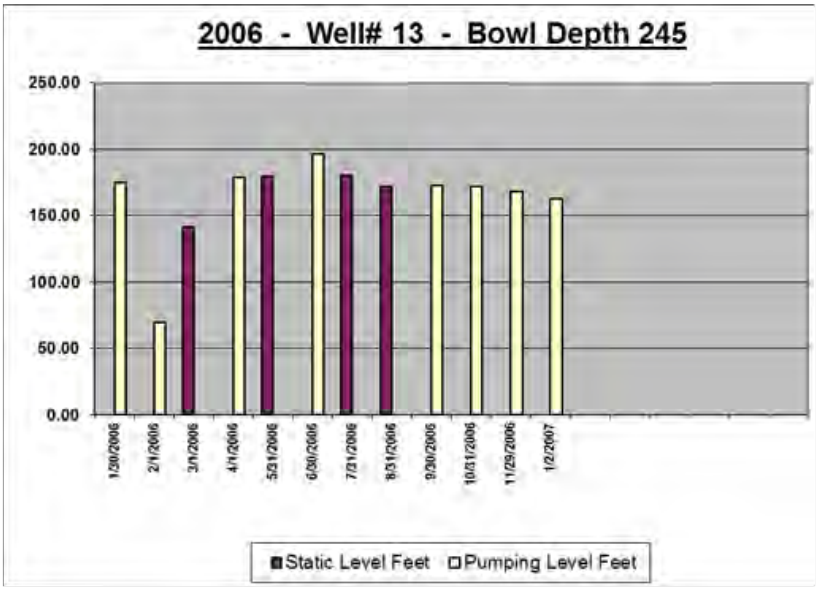

2004 ~ Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
7/27/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

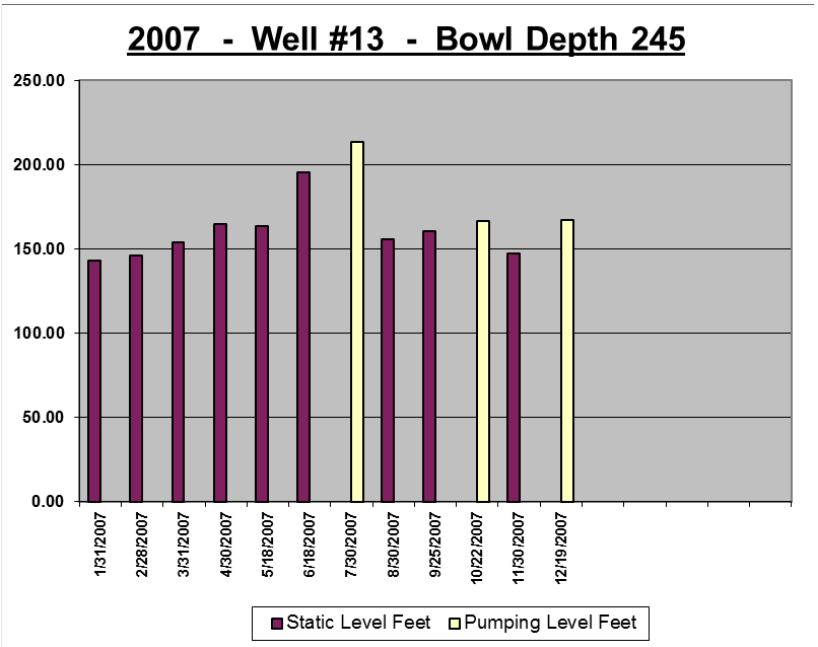

2005 ~ Well #13 - Bowl Depth 245
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200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

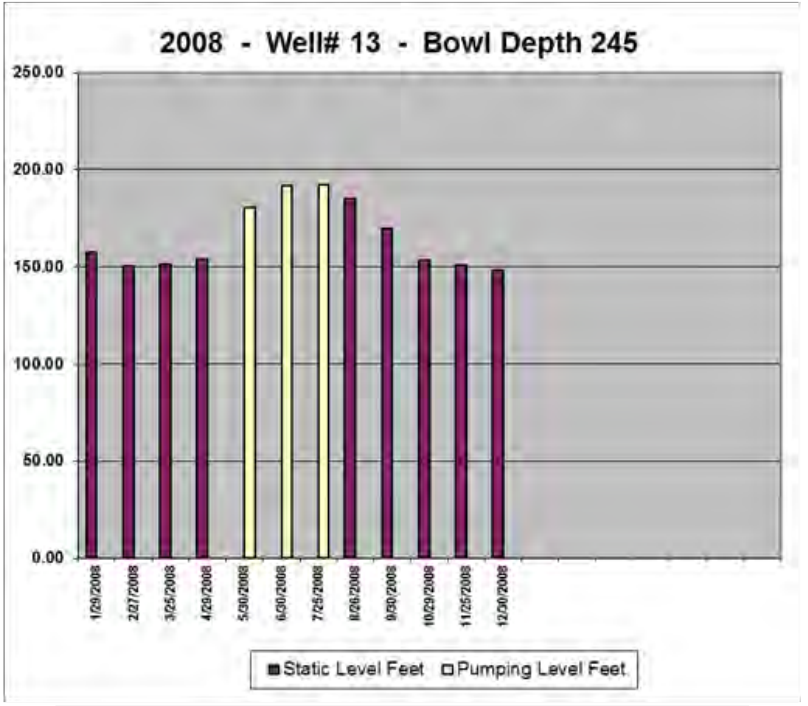

2004 ~ Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
2/23/2004
3/25/2004
4/22/2004
5/20/2004
6/17/2004
7/22/2004
7/27/2004
8/20/2004
9/14/2004
10/25/2004
12/2/2004
Static Level Feet
Pumping Level Feet

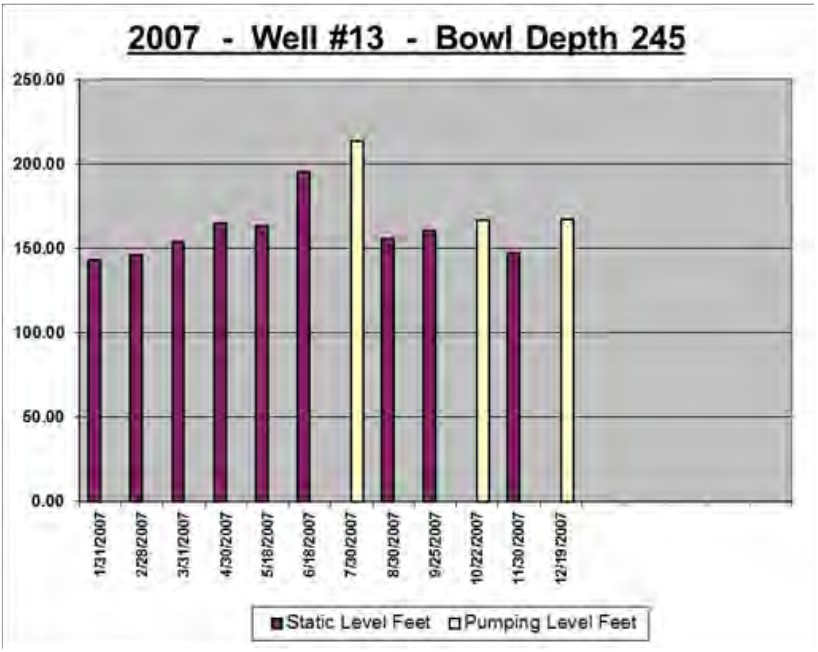

2006 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
1/2/2007
Static Level Feet
Pumping Level Feet

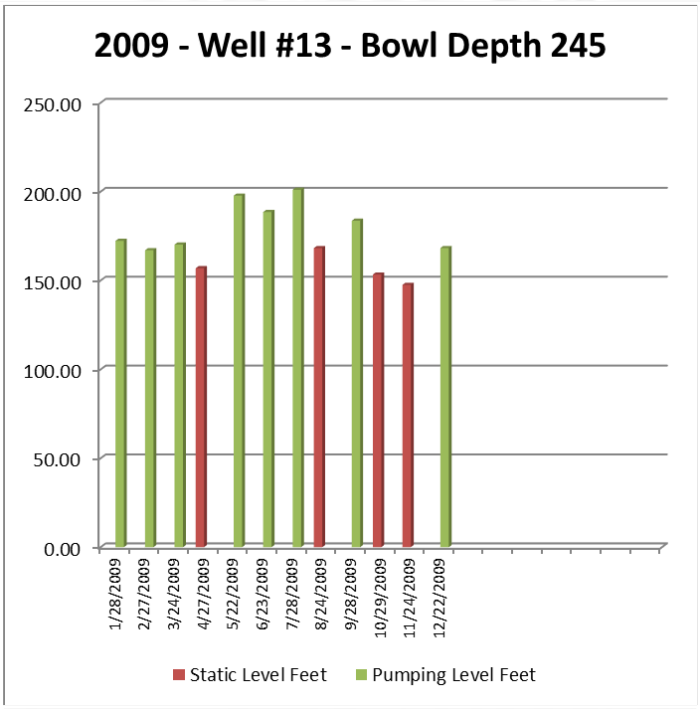

2005 ~ Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
3/4/2005
5/27/2005
6/30/2005
7/25/2005
8/30/2005
9/26/2005
10/26/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

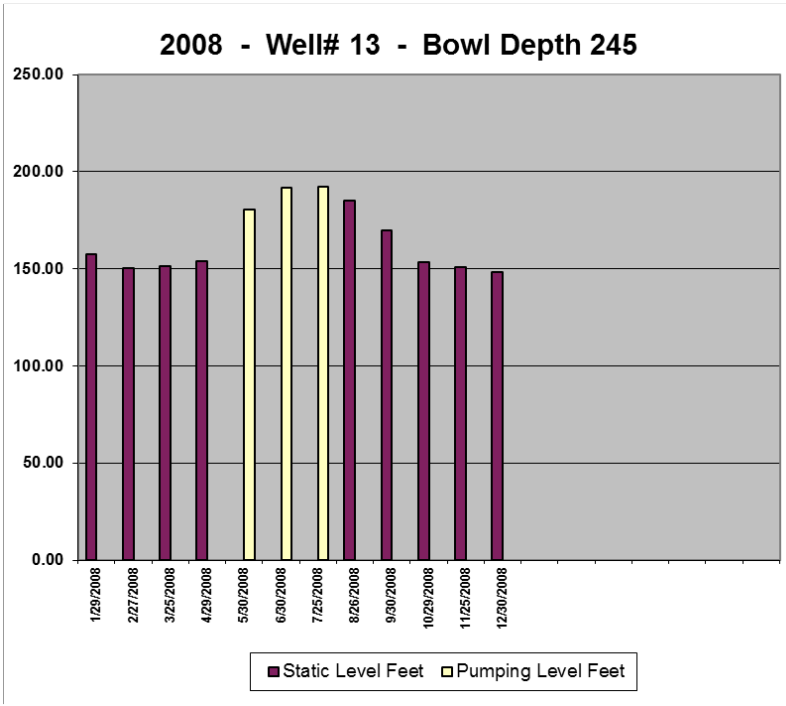

2006 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
1/2/2007
Static Level Feet
Pumping Level Feet

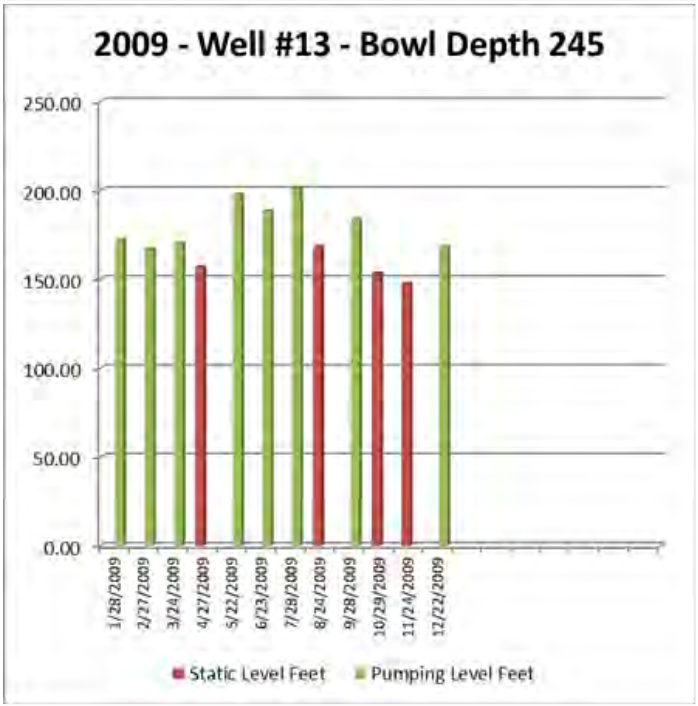

2007 - Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

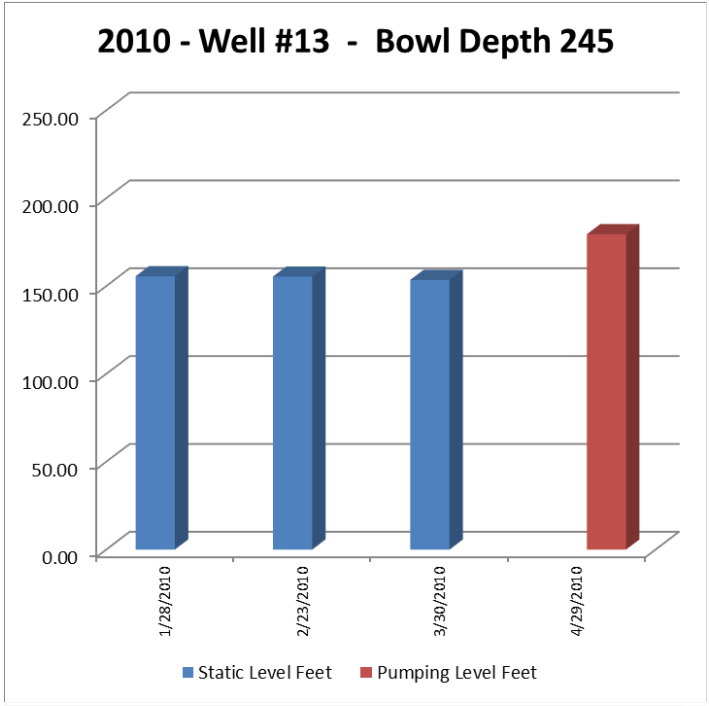

2008 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/25/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

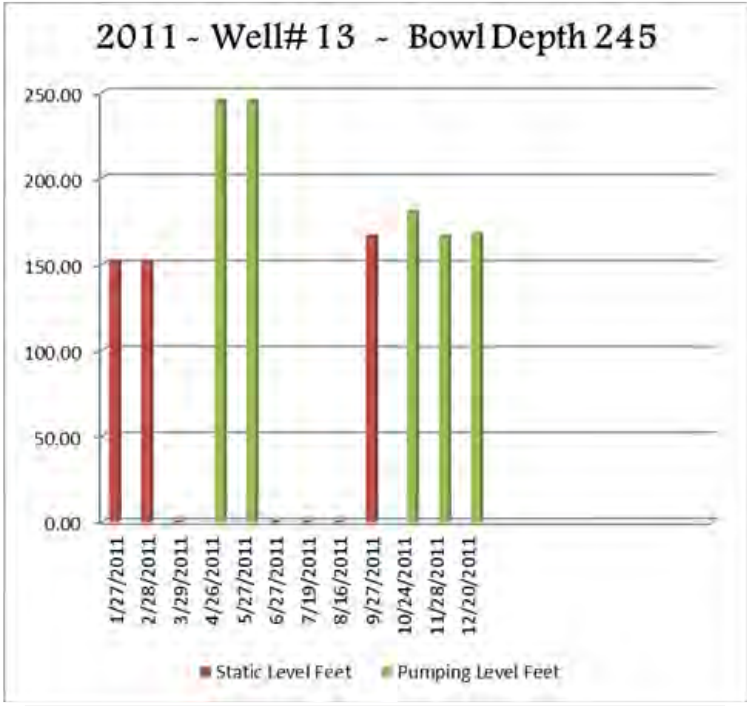

2007 - Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/19/2007
Static Level Feet
Pumping Level Feet

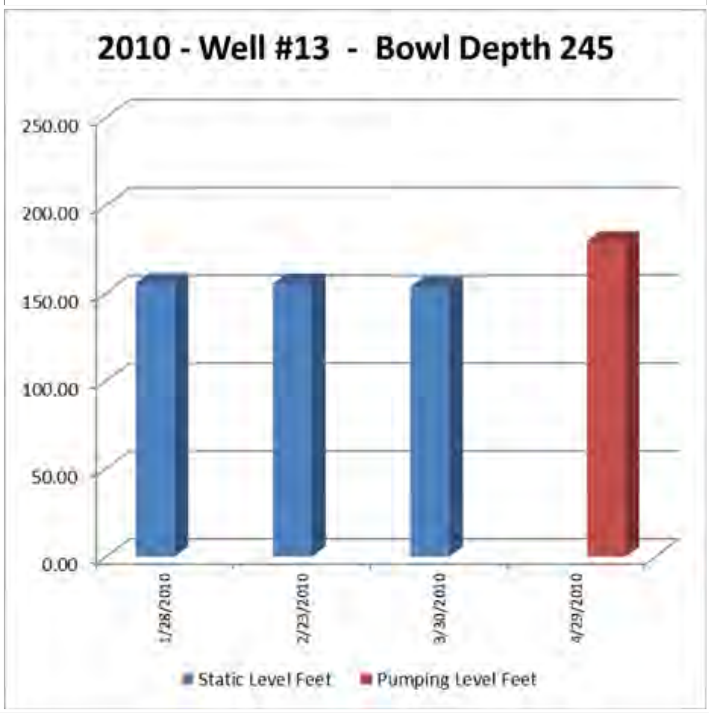

2009 - Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

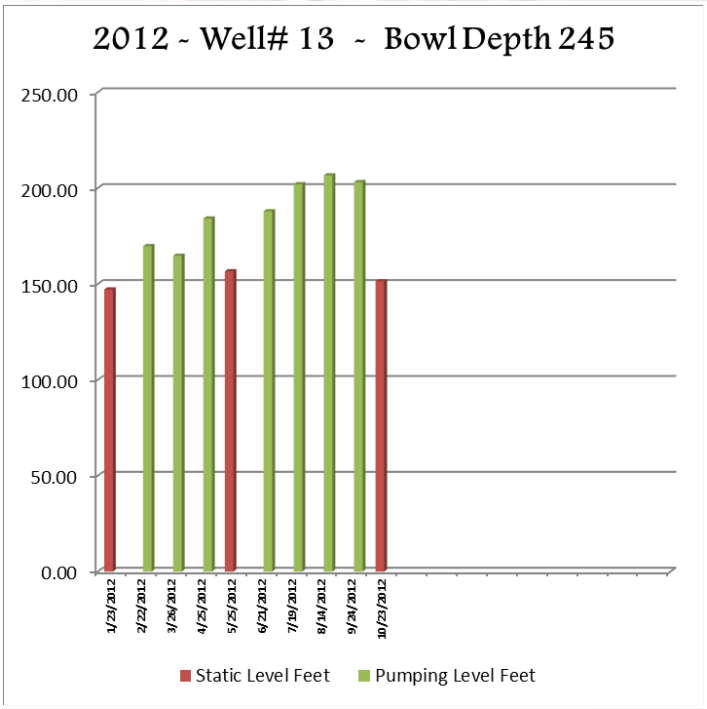

2008 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/25/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

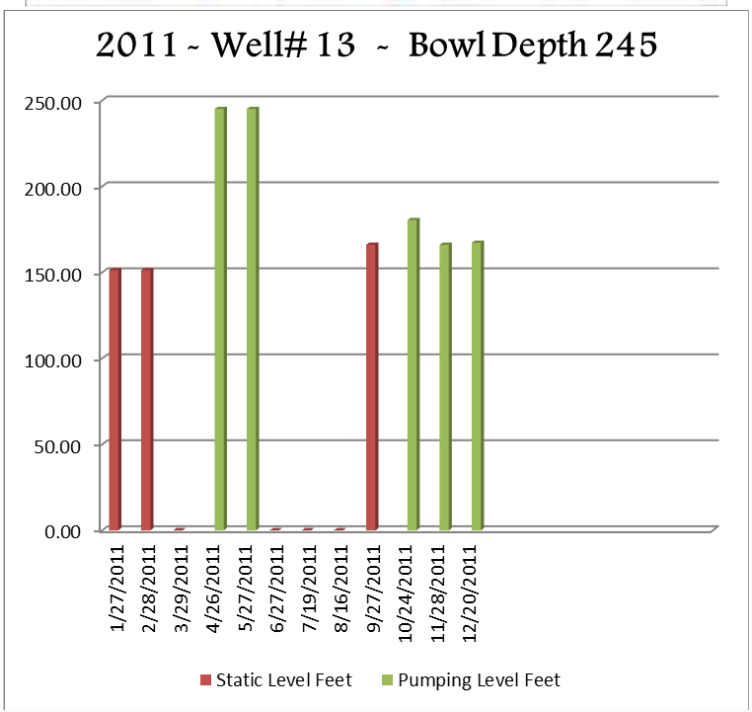

2009 - Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

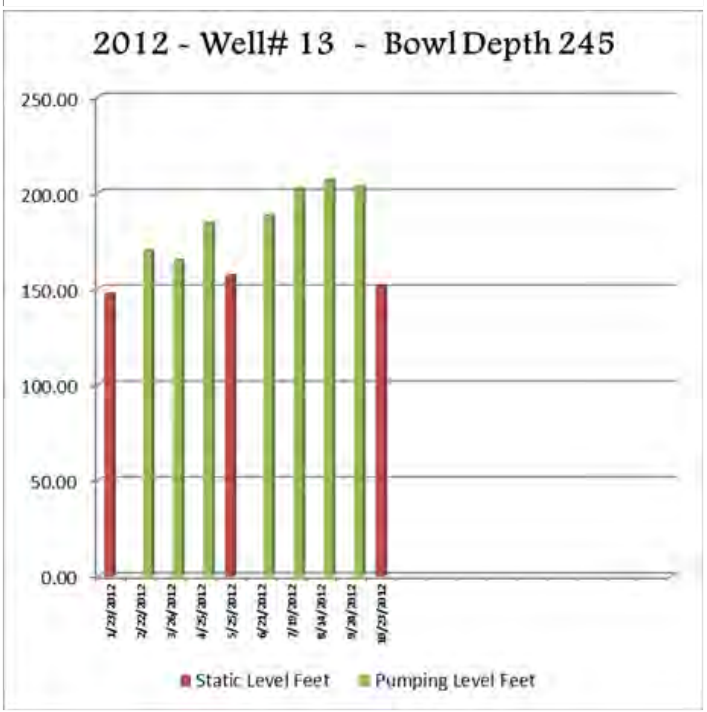

2010 - Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
Static Level Feet
Pumping Level Feet

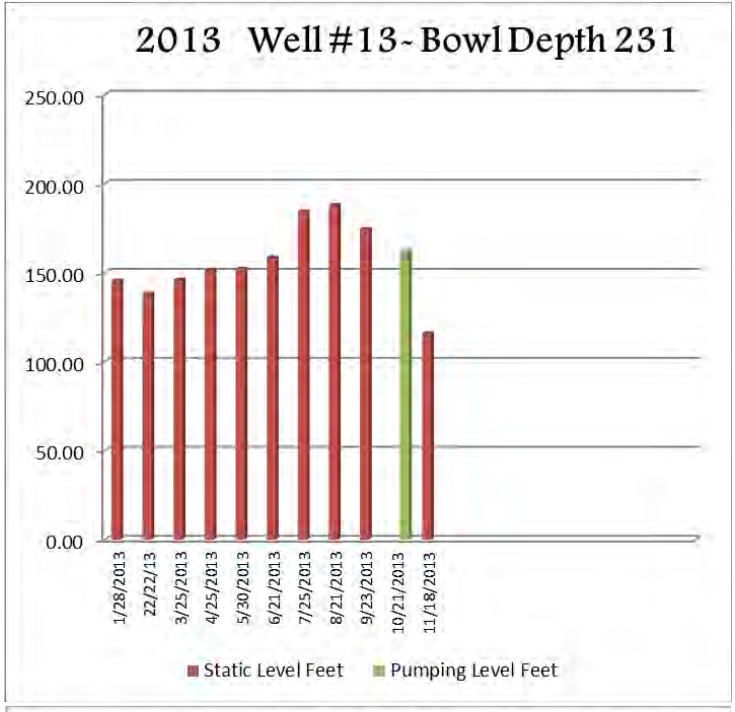

2011 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

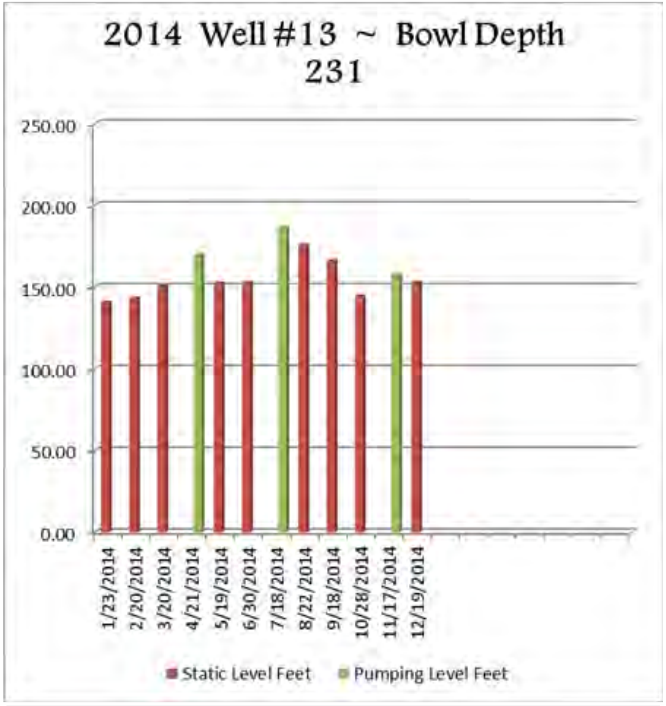

2010 - Well #13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
Static Level Feet
Pumping Level Feet

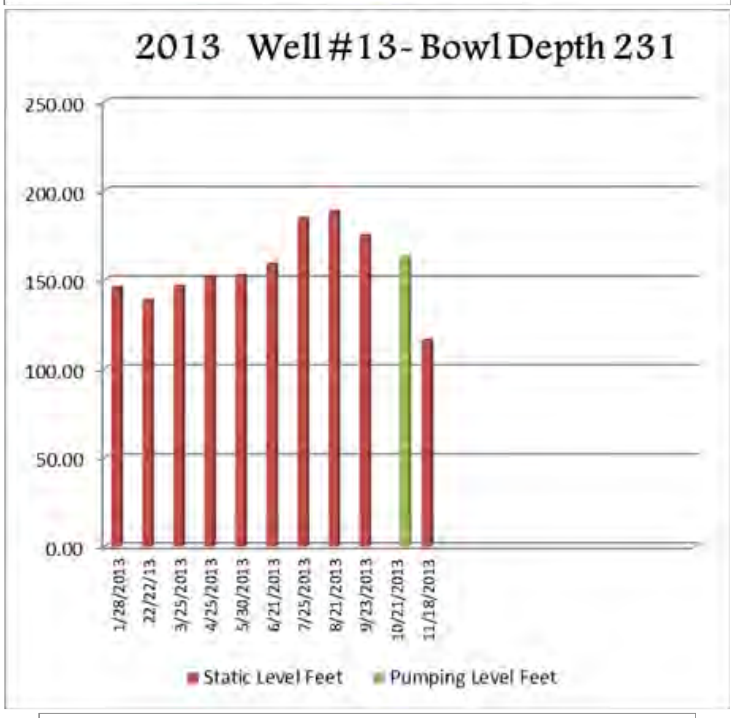

2012 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/28/2012
10/23/2012
Static Level Feet
Pumping Level Feet

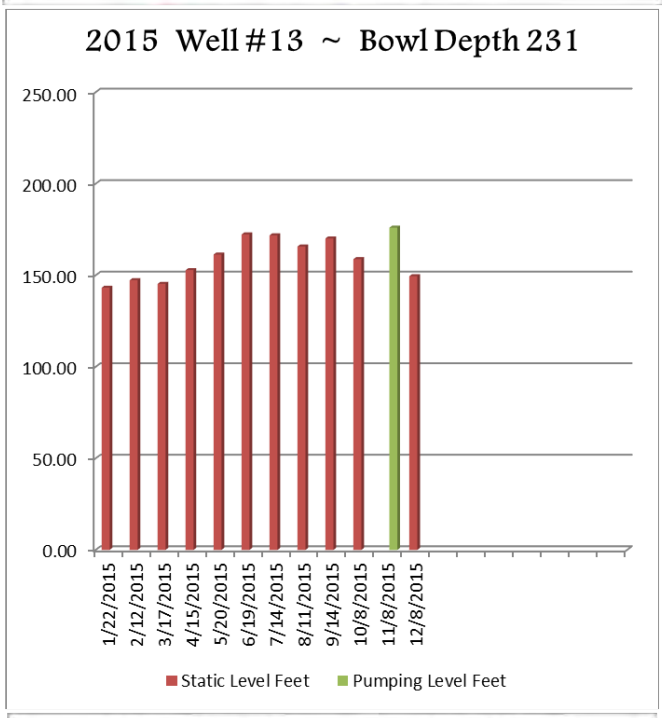

2011 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

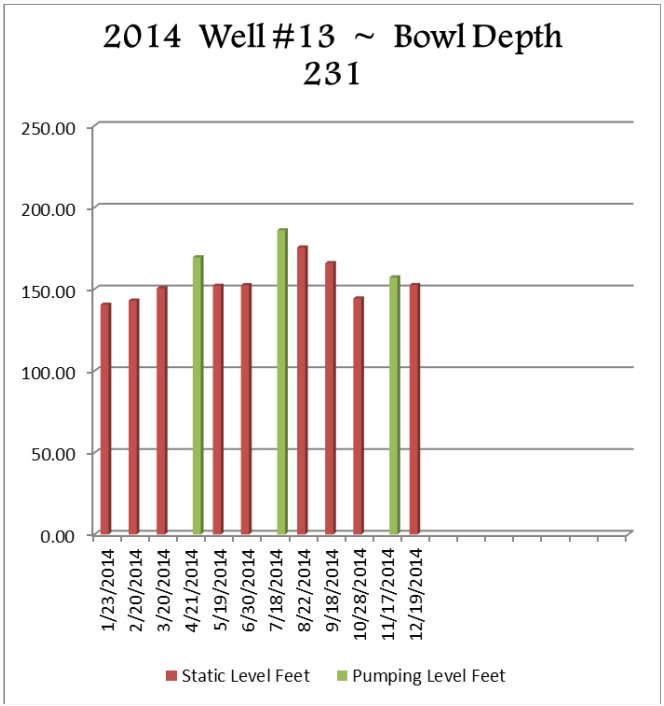

2012 - Well# 13 - Bowl Depth 245
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/28/2012
10/23/2012
Static Level Feet
Pumping Level Feet

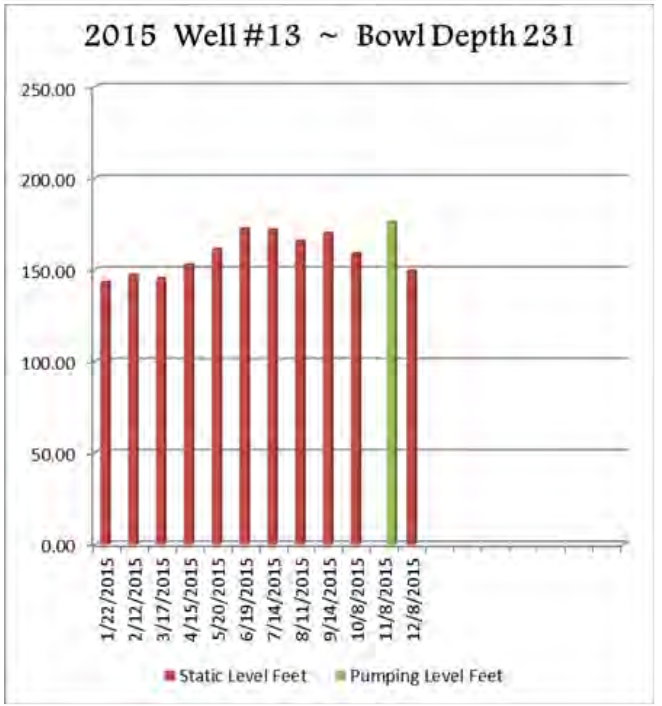

2013 Well #13 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
22/22/13
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
Static Level Feet
Pumping Level Feet

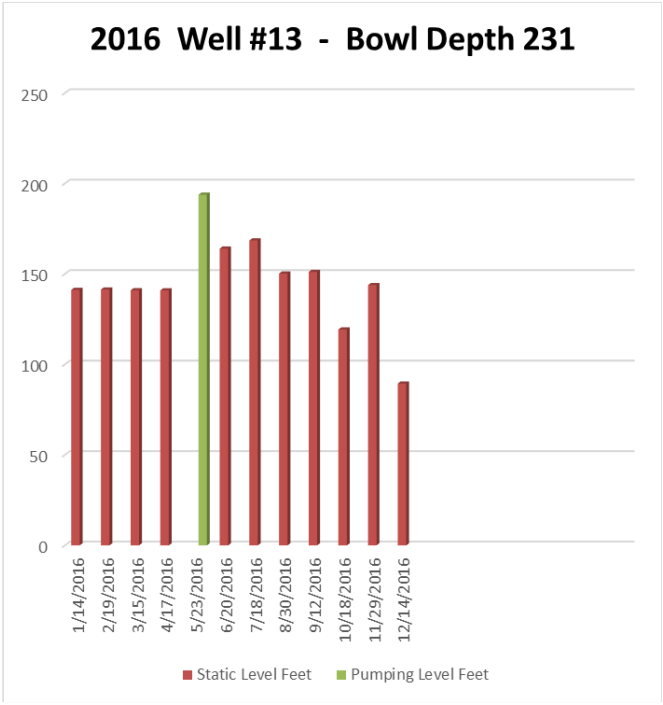

2014 Well #13 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

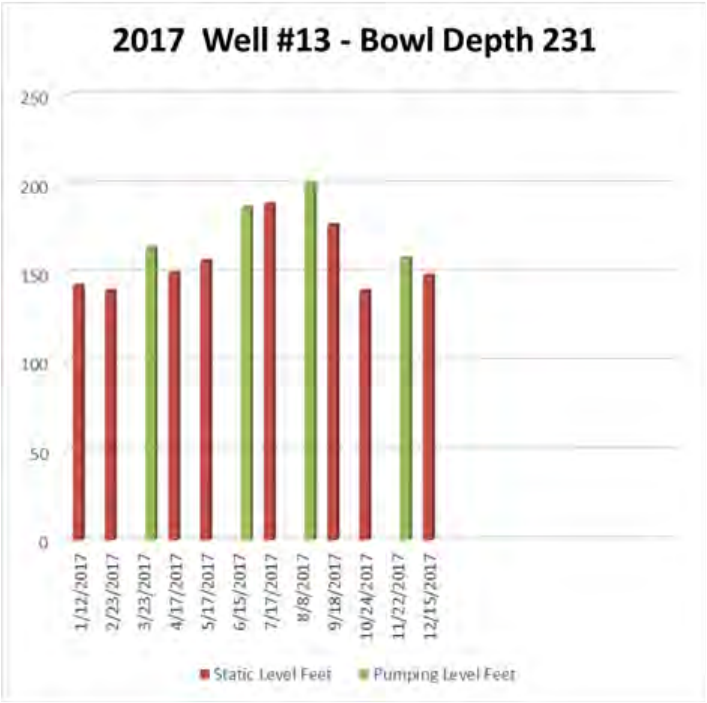

2013 Well #13 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
22/22/13
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
Static Level Feet
Pumping Level Feet

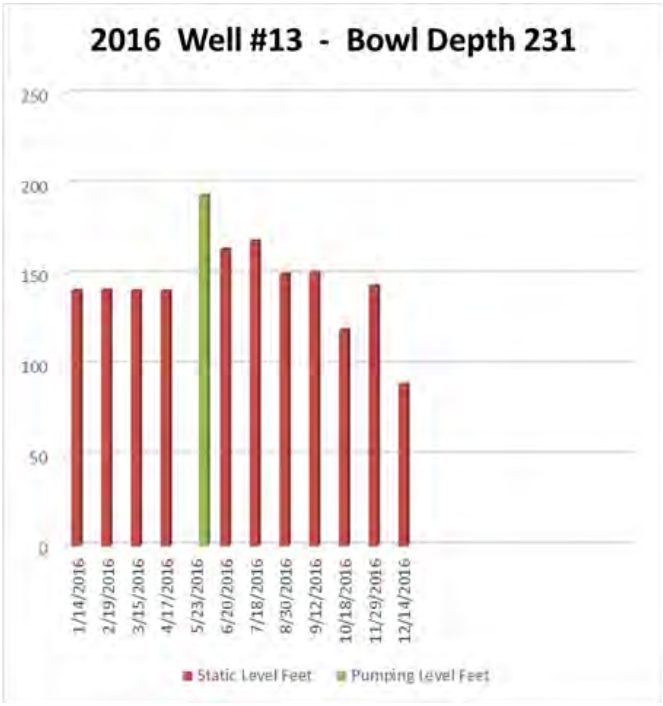

2015 Well #13 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/8/2015
12/8/2015
Static Level Feet
Pumping Level Feet

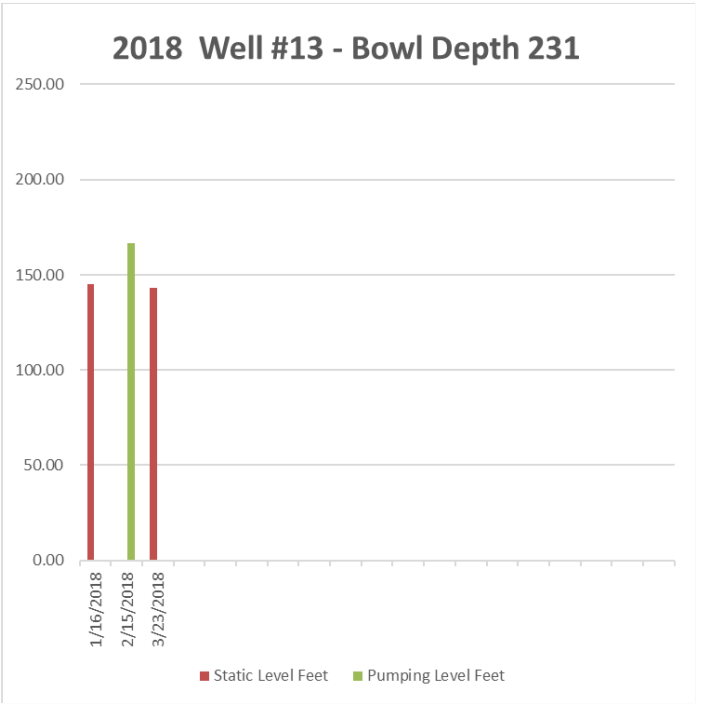

2014 Well #13 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

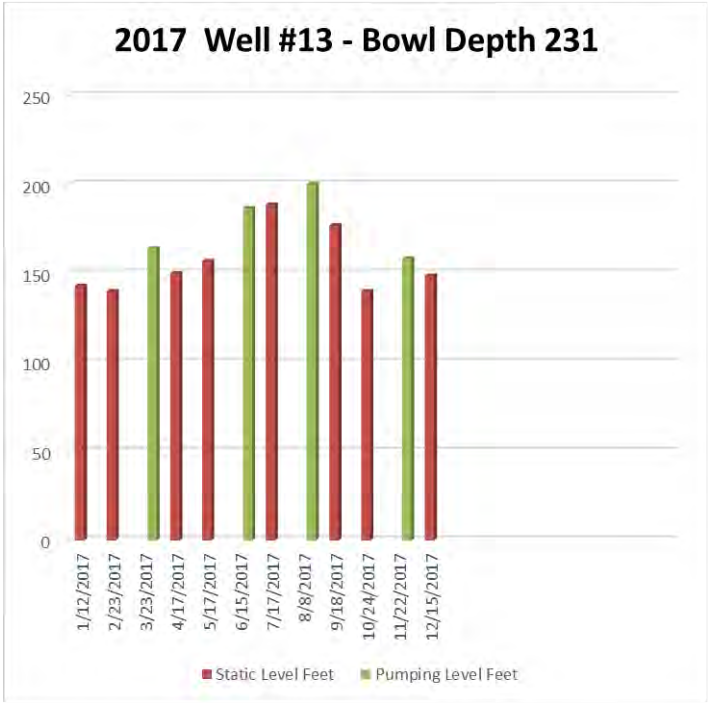

2015 Well #13 ~ Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/8/2015
12/8/2015
Static Level Feet
Pumping Level Feet

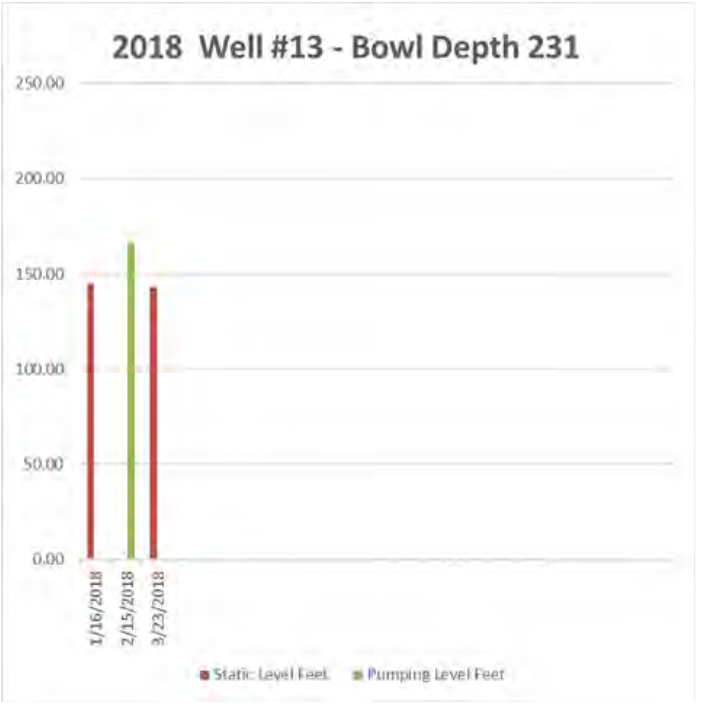

2016 Well #13 - Bowl Depth 231
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

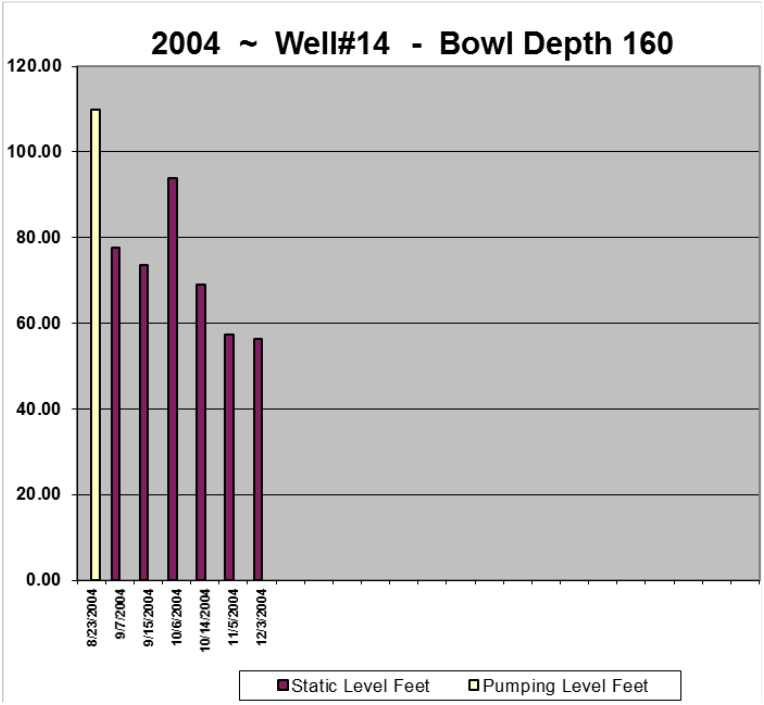

2017 Well #13 - Bowl Depth 231
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/17/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

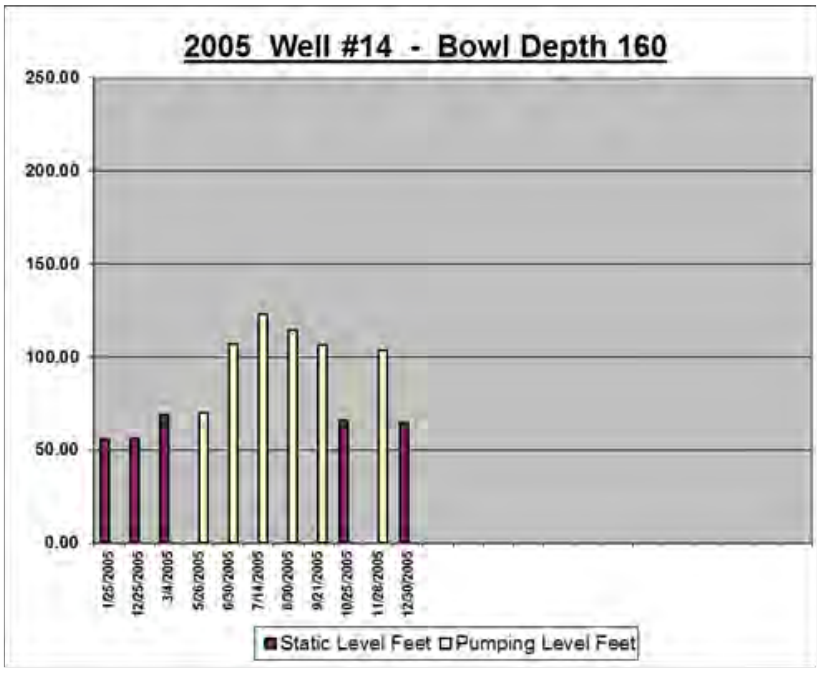

2016 Well #13 - Bowl Depth 231
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

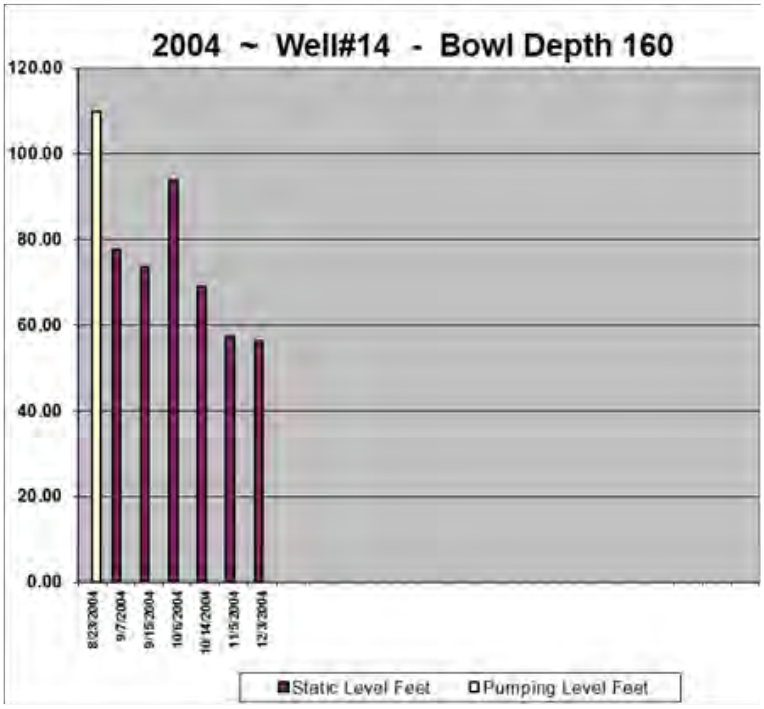

2018 Well #13 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

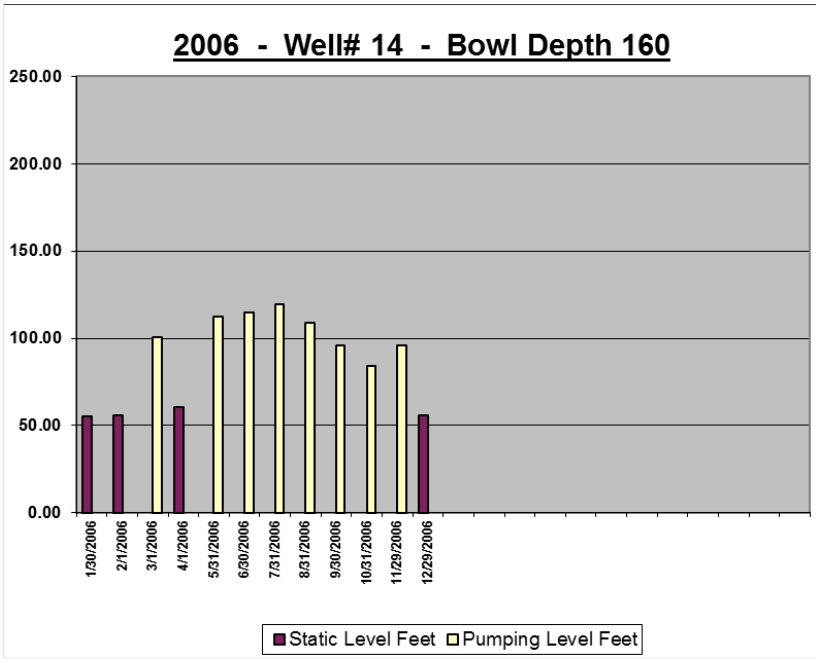

2017 Well #13 - Bowl Depth 231
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/17/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

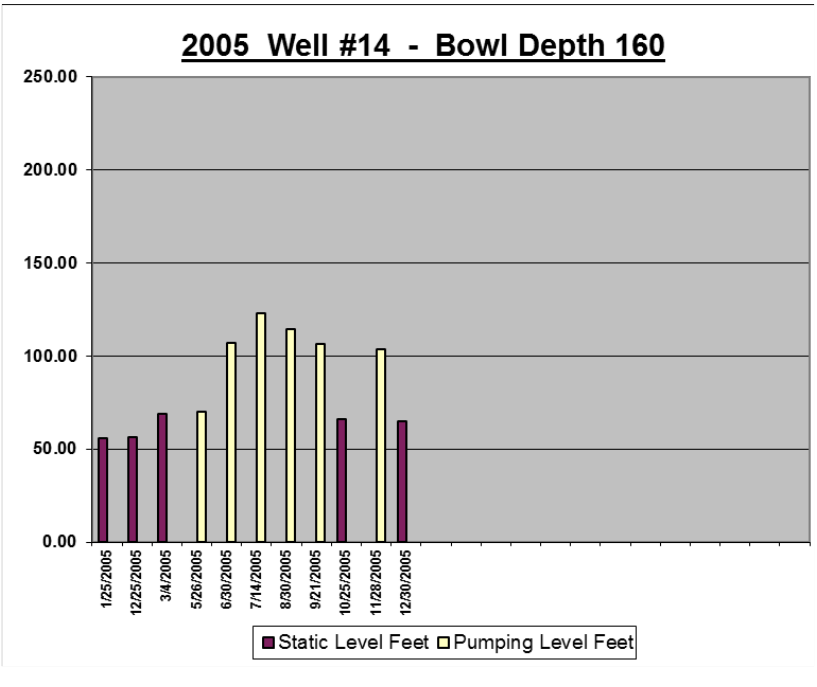

2018 Well #13 - Bowl Depth 231
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

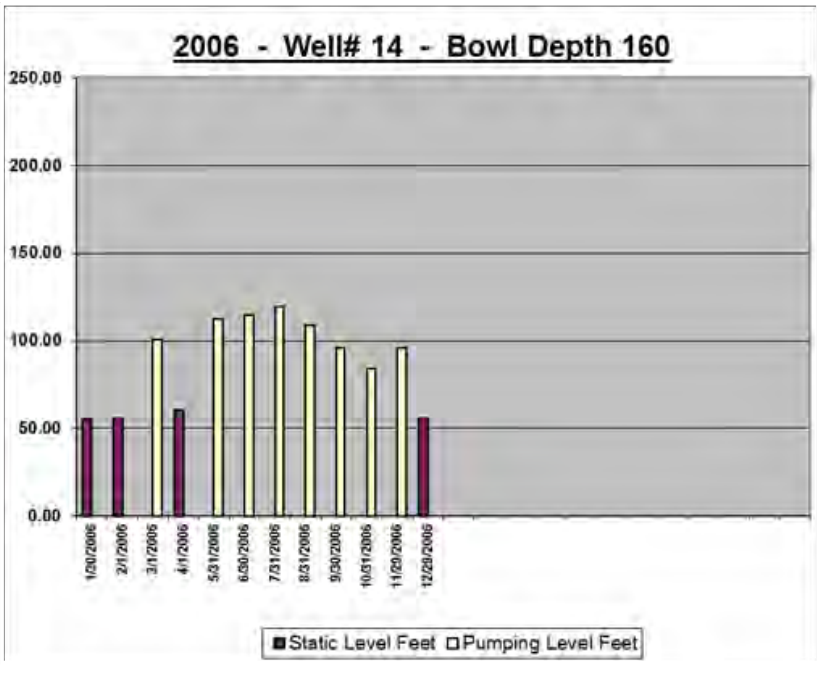

2004 ~ Well#14 - Bowl Depth 160
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

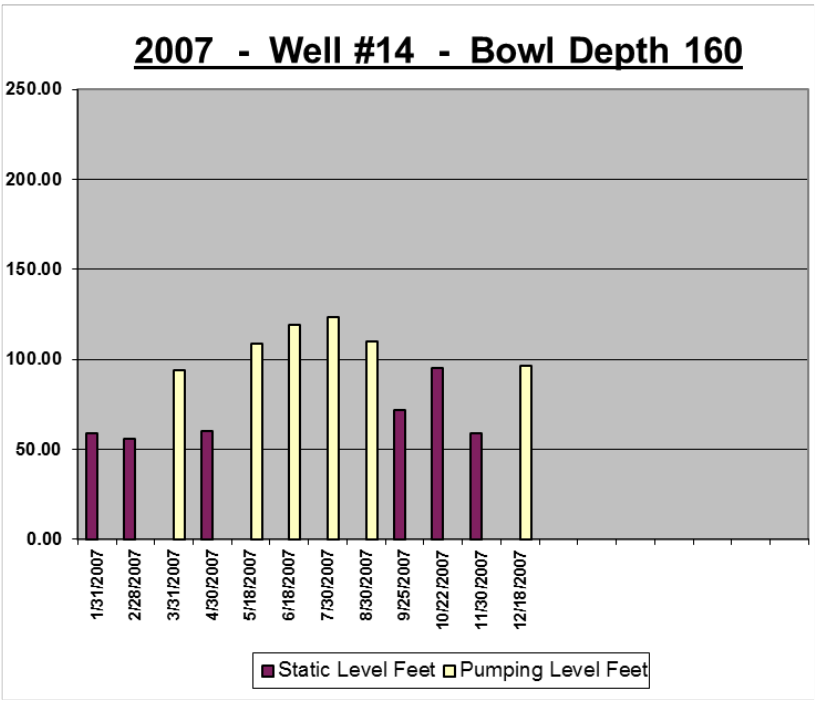

2005 Well #14 - Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
12/25/2005
3/4/2005
5/26/2005
6/30/2005
7/14/2005
8/30/2005
9/21/2005
10/25/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

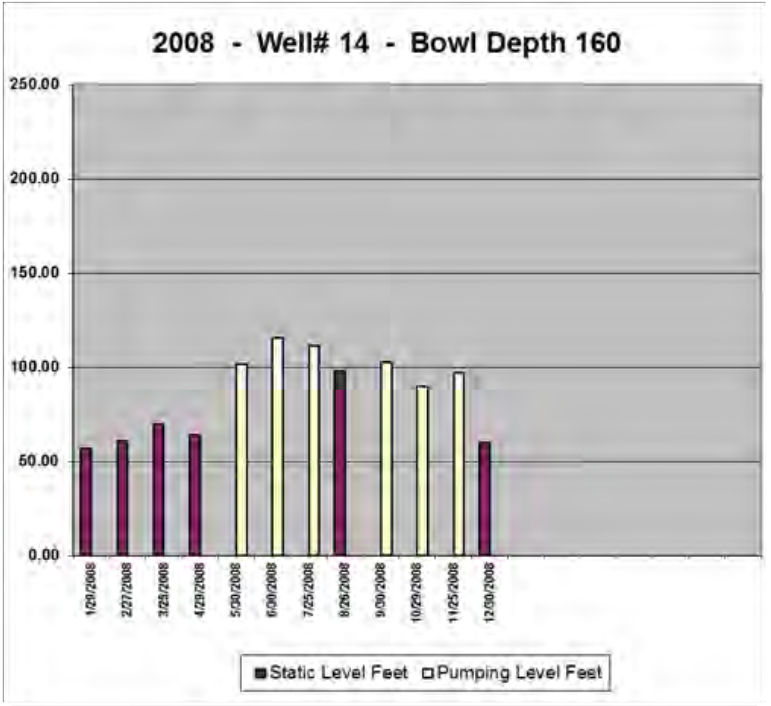

2004 ~ Well#14 - Bowl Depth 160
120.00
100.00
80.00
60.00
40.00
20.00
0.00
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

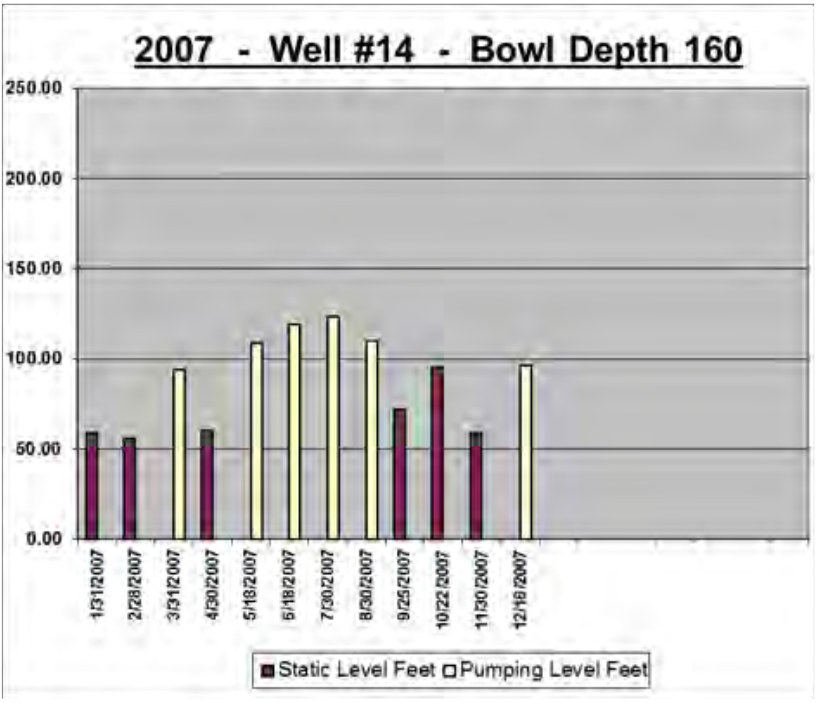

2006 - Well# 14 - Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

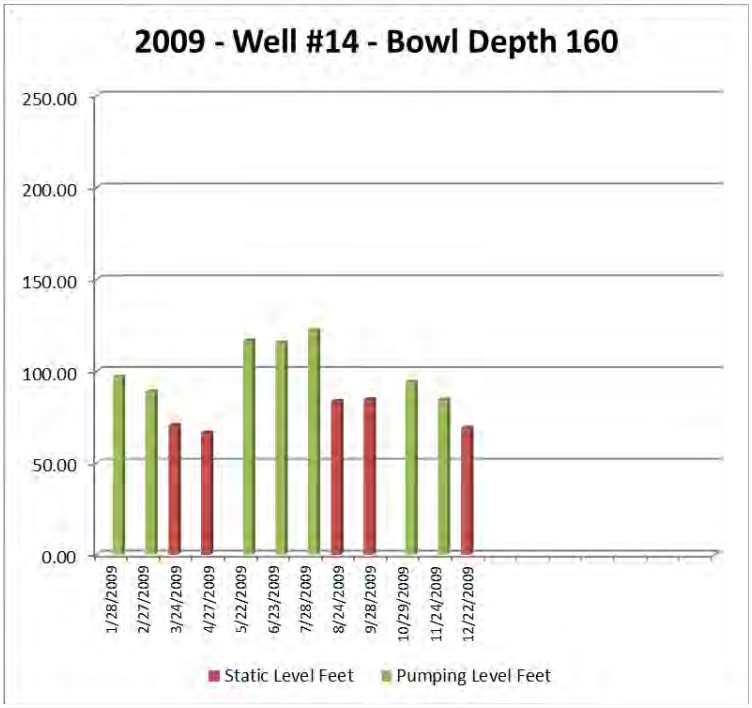

2005 Well #14 - Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
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1/25/2005
12/25/2005
3/4/2005
5/26/2005
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8/30/2005
9/21/2005
10/25/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

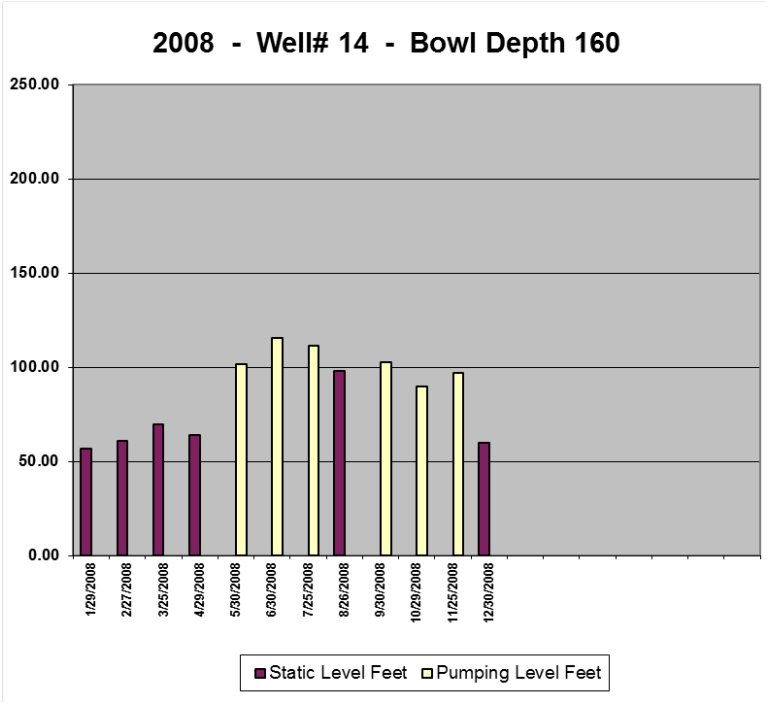

2006 - Well# 14 - Bowl Depth 160
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1/30/2006
2/1/2006
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5/31/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

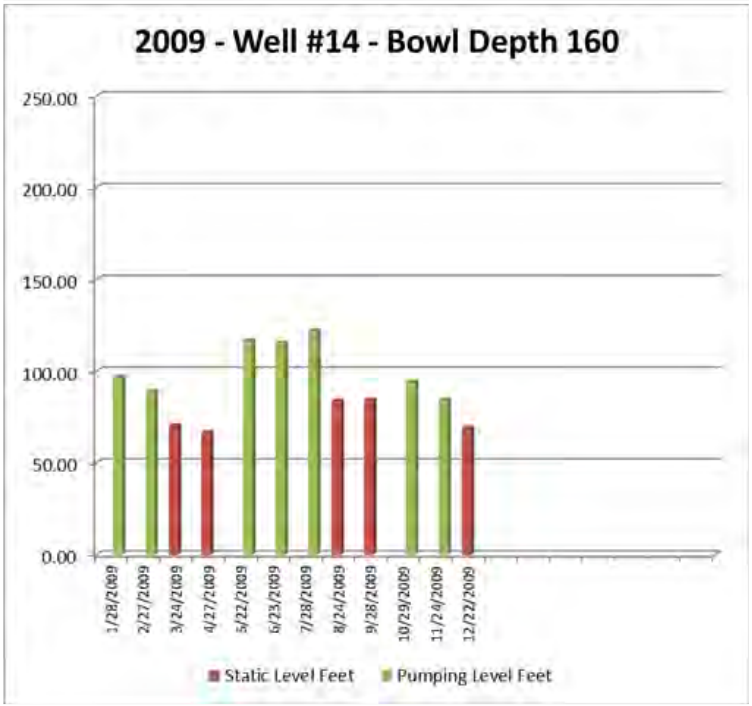

2007 - Well #14 - Bowl Depth 160
250.00
200.00
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1/31/2007
2/28/2007
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4/30/2007
5/18/2007
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8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/18/2007
Static Level Feet
Pumping Level Feet

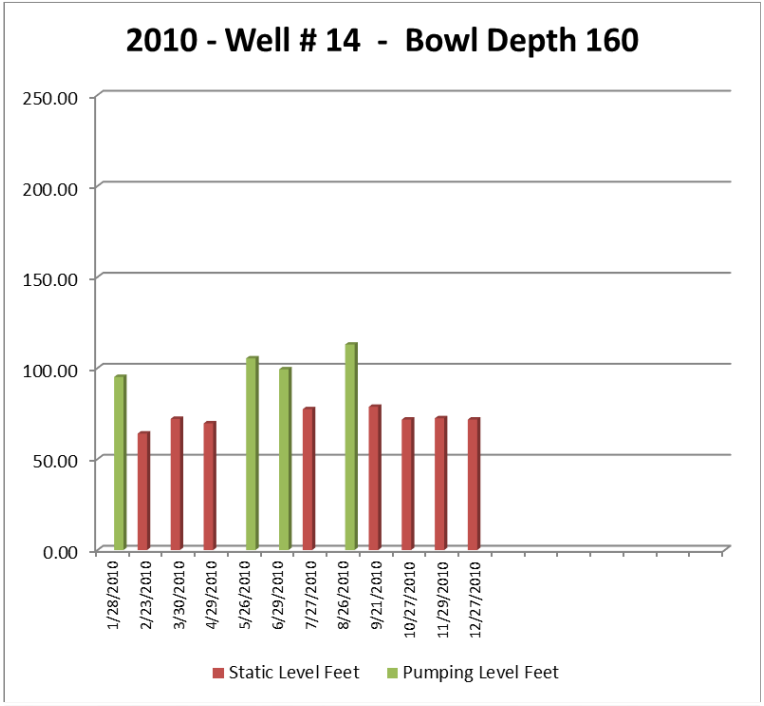

2008 - Well# 14 - Bowl Depth 160
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1/29/2008
2/27/2008
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4/29/2008
5/30/2008
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8/26/2008
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10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

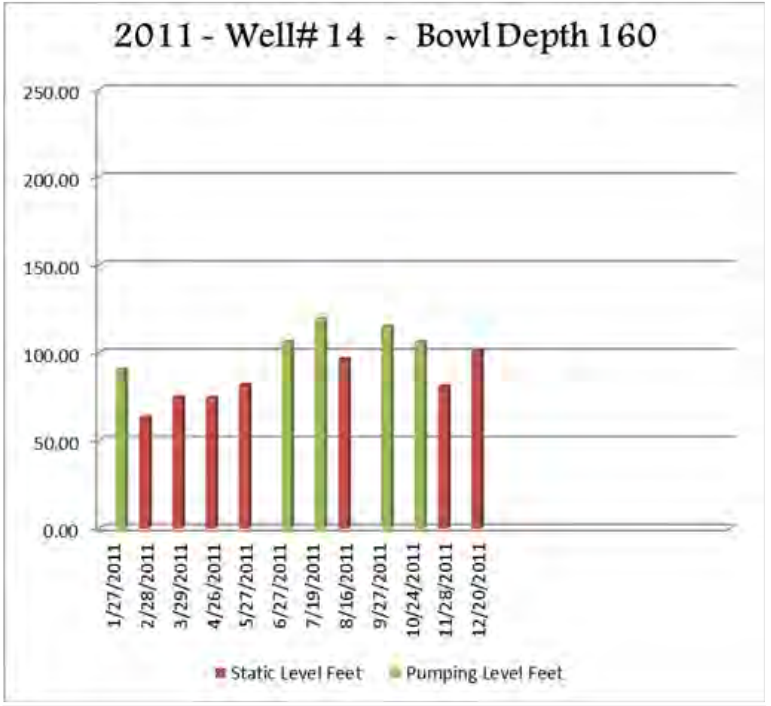

2007 - Well #14 - Bowl Depth 160
250.00
200.00
150.00
100.00
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0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
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8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/18/2007
Static Level Feet
Pumping Level Feet

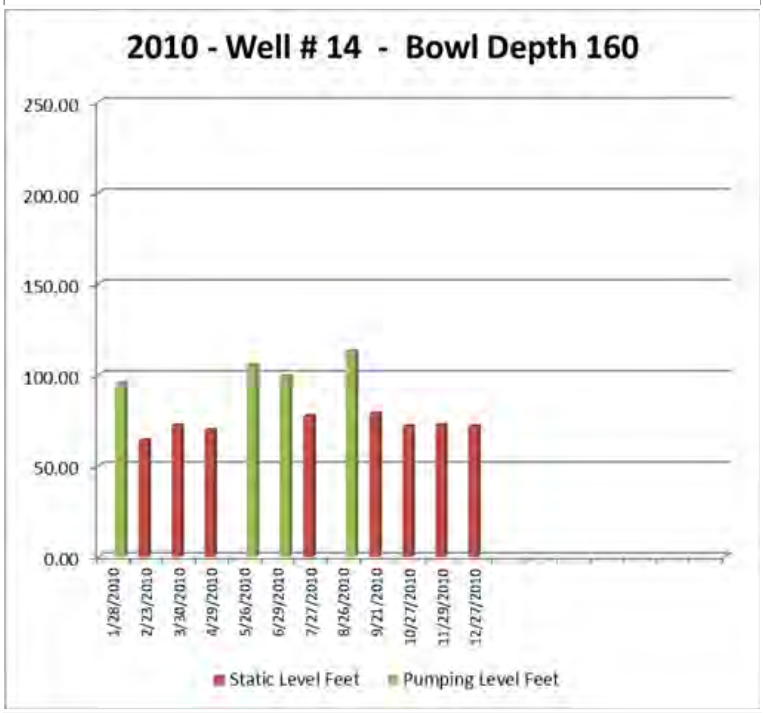

2009 - Well #14 - Bowl Depth 160
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1/28/2009
2/27/2009
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4/27/2009
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8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

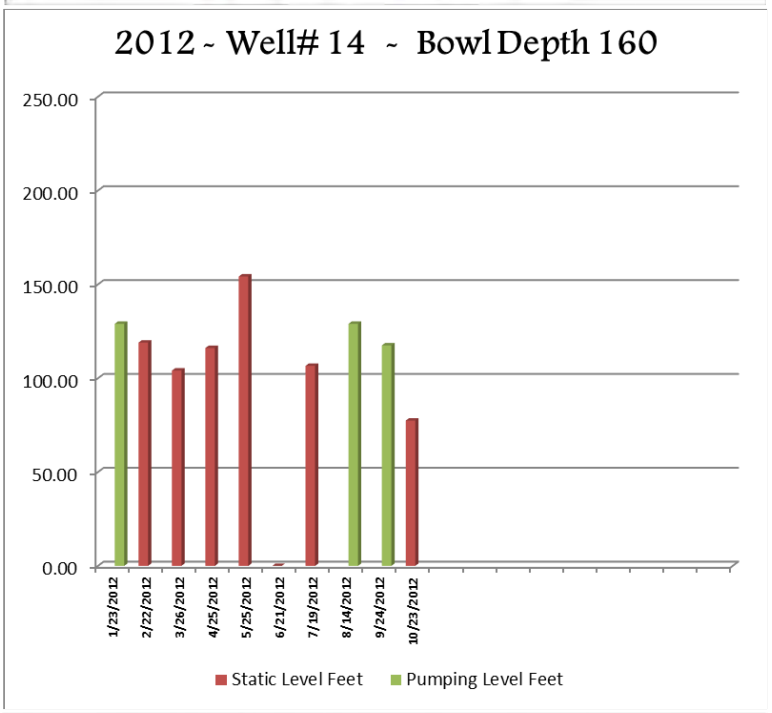

2008 - Well# 14 - Bowl Depth 160
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1/29/2008
2/27/2008
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5/30/2008
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8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

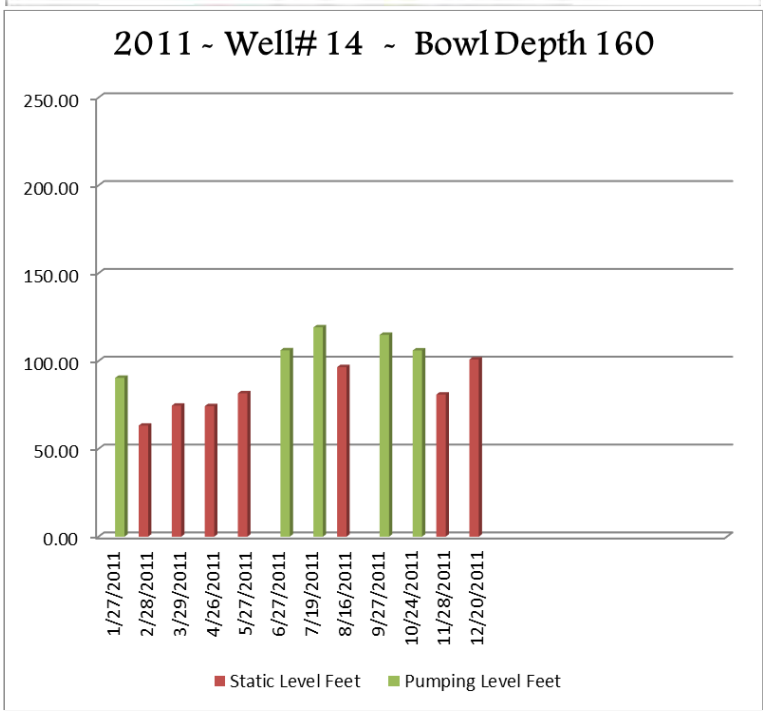

2009 - Well #14 - Bowl Depth 160
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1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
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8/24/2009
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11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

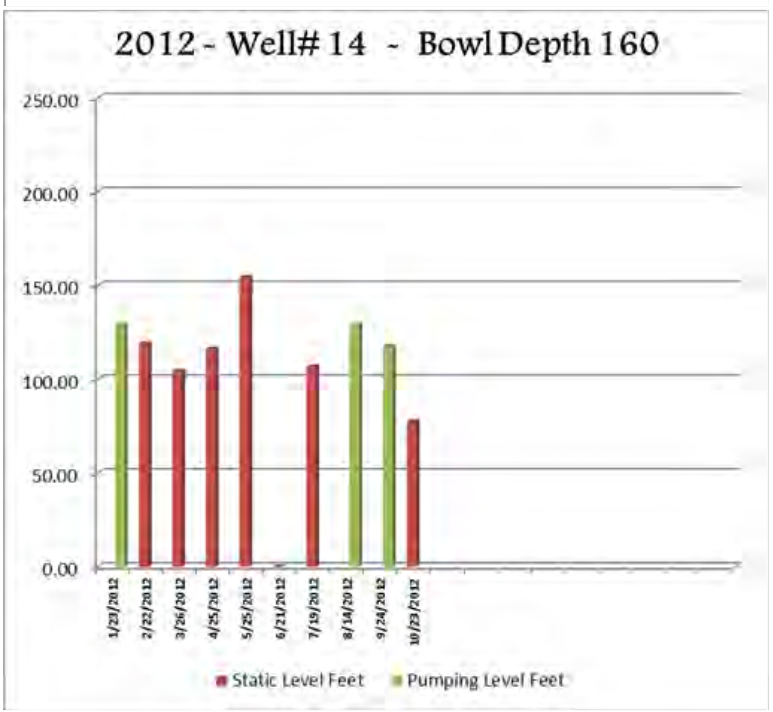

2010 - Well # 14 - Bowl Depth 160
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1/28/2010
2/23/2010
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4/29/2010
5/26/2010
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8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

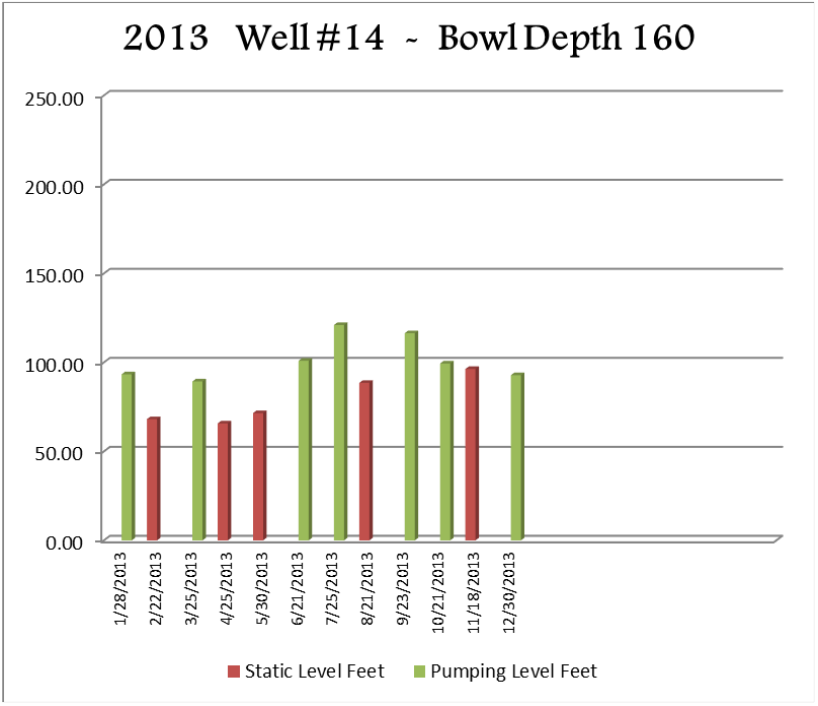

2011 - Well# 14 - Bowl Depth 160
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1/27/2011
2/28/2011
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4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

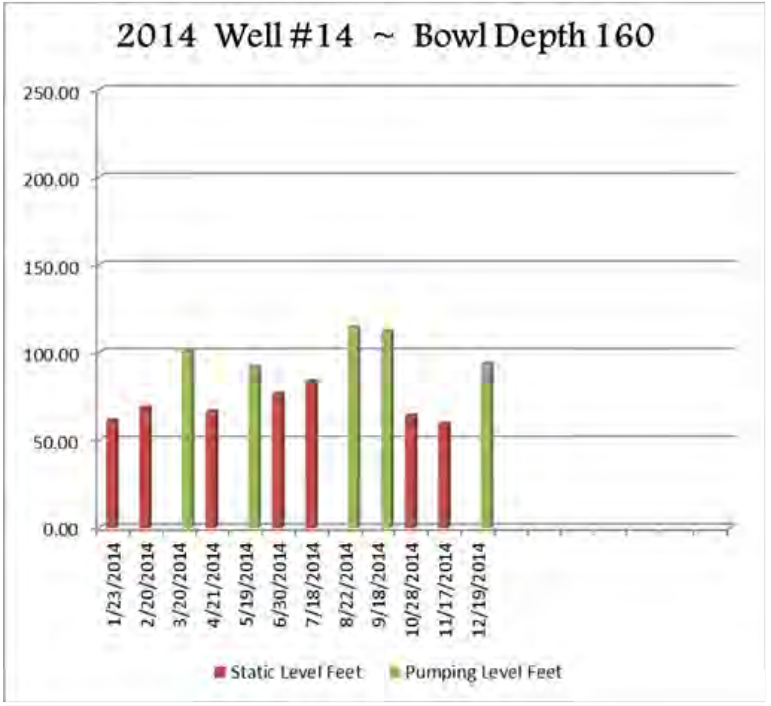

2010 - Well # 14 - Bowl Depth 160
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1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
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8/26/2010
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10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

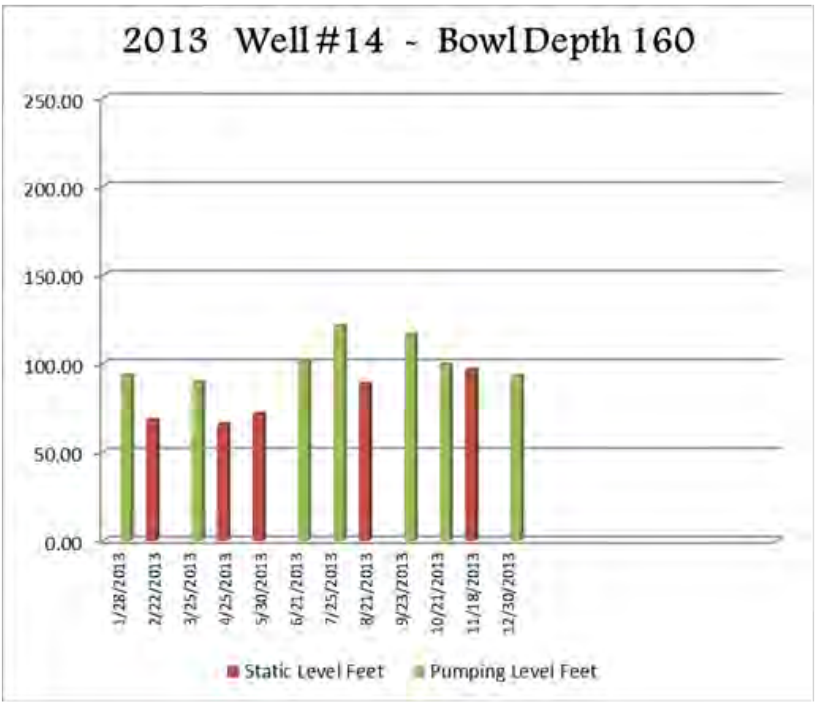

2012 - Well# 14 - Bowl Depth 160
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1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

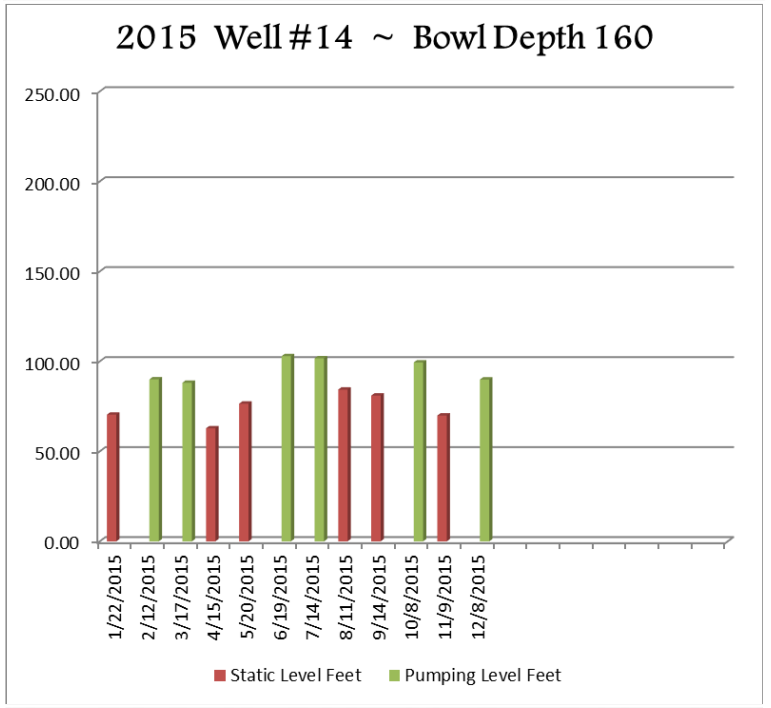

2011 - Well# 14 - Bowl Depth 160
250.00
200.00
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0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
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8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

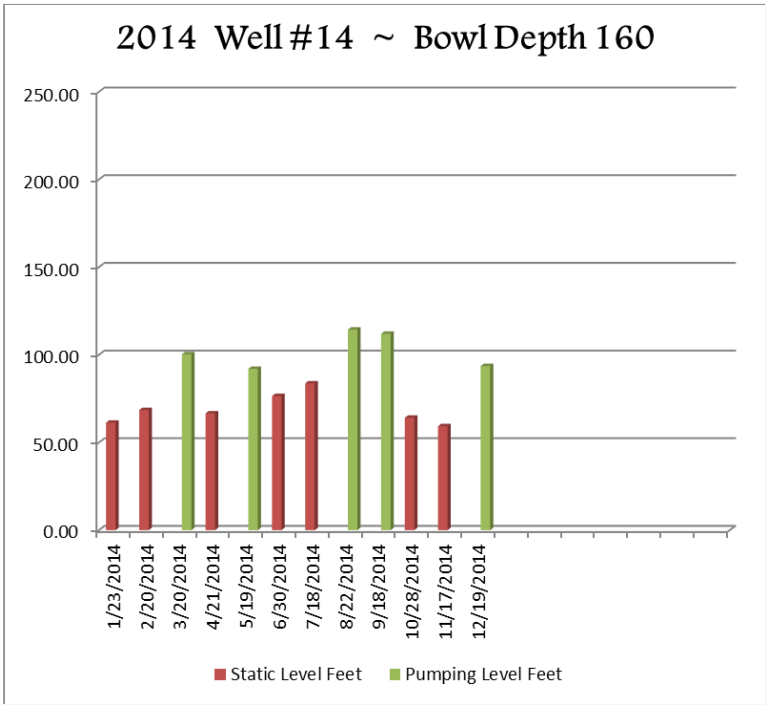

2012 - Well# 14 - Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

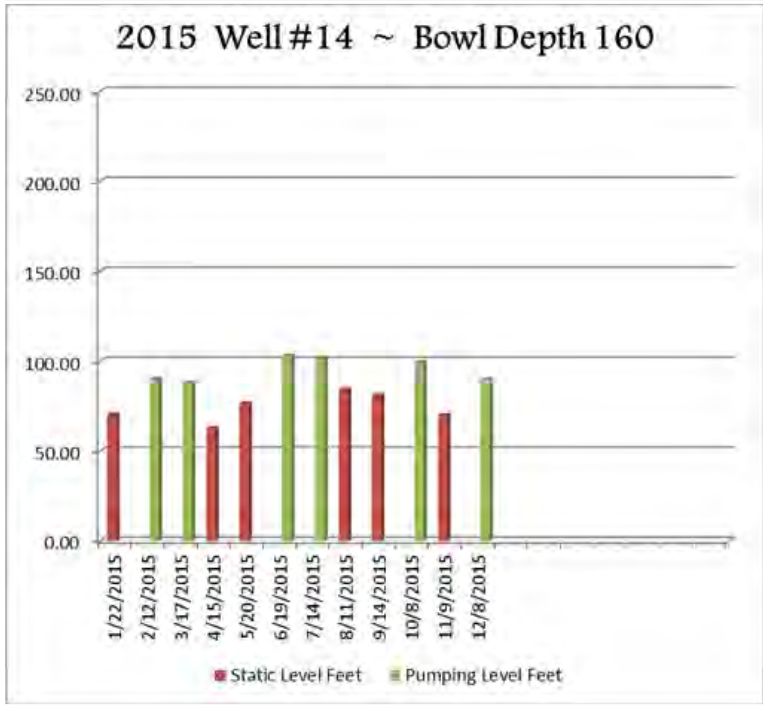

2013 Well #14 - Bowl Depth 160
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200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

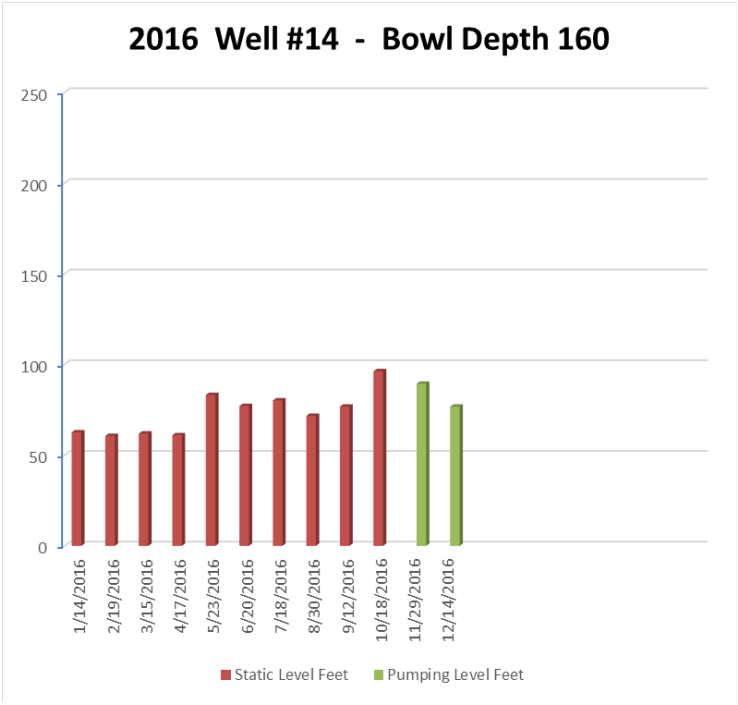

2014 Well #14 ~ Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

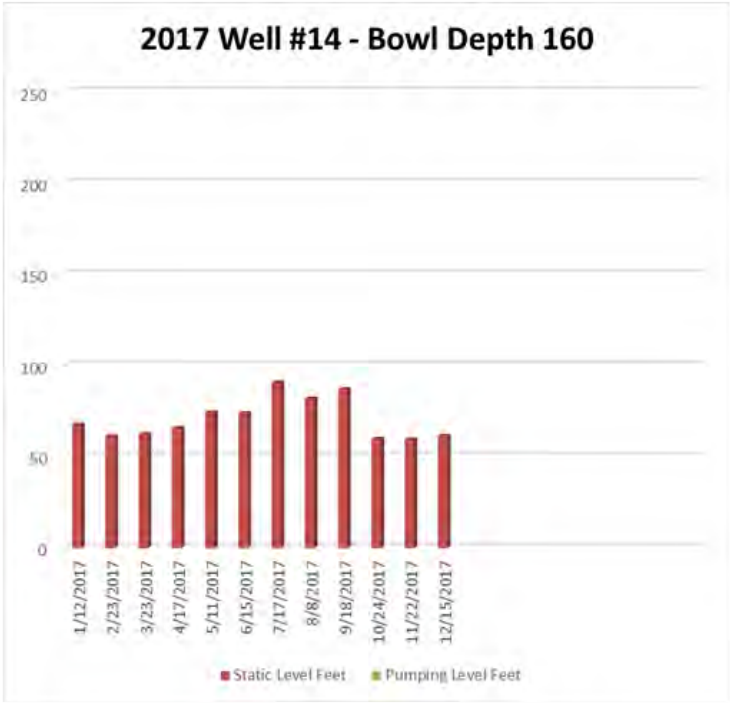

2013 Well #14 - Bowl Depth 160
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200.00
150.00
100.00
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1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

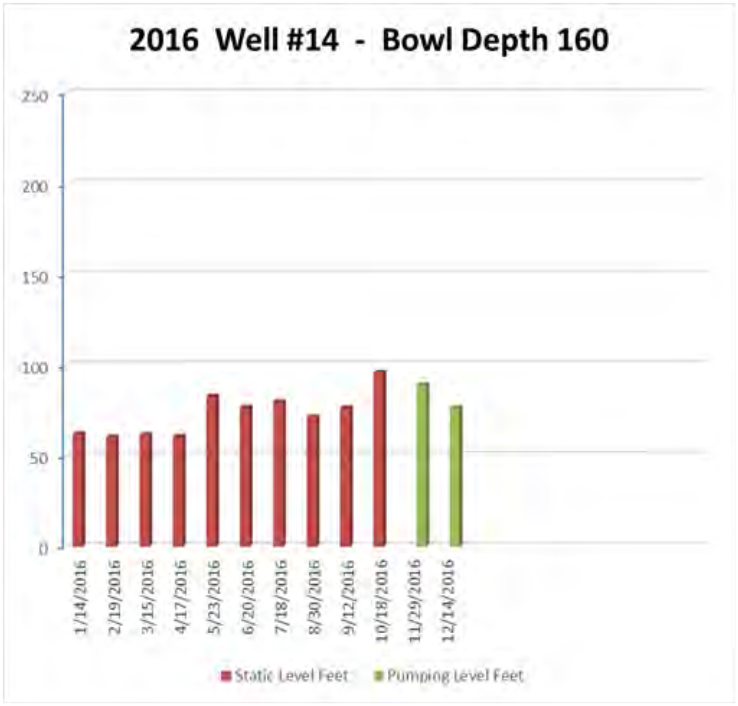

2015 Well #14 ~ Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

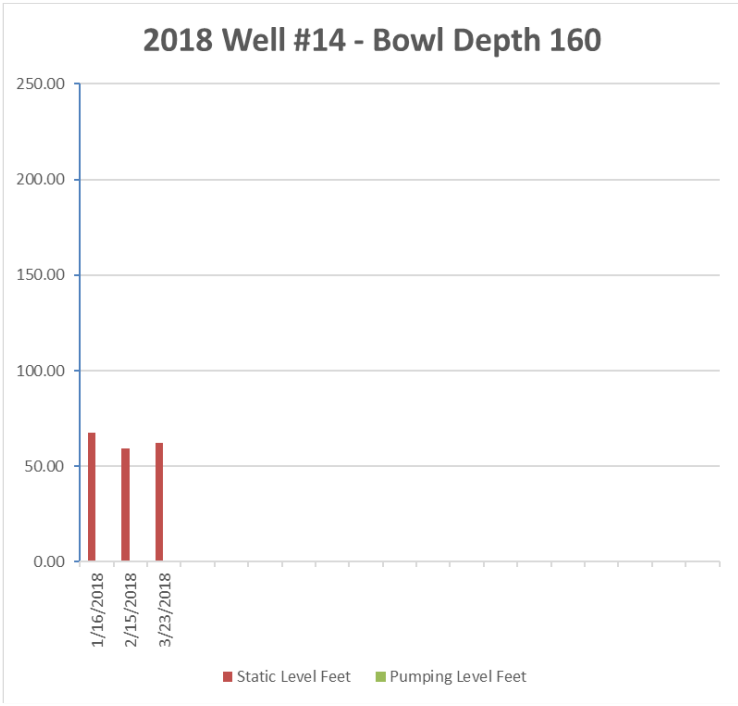

2014 Well #14 ~ Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

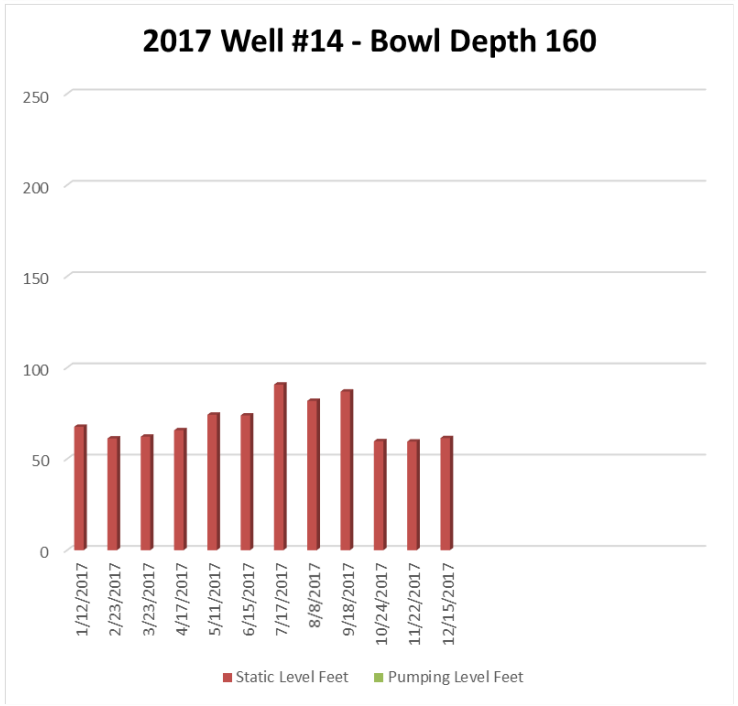

2015 Well #14 ~ Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

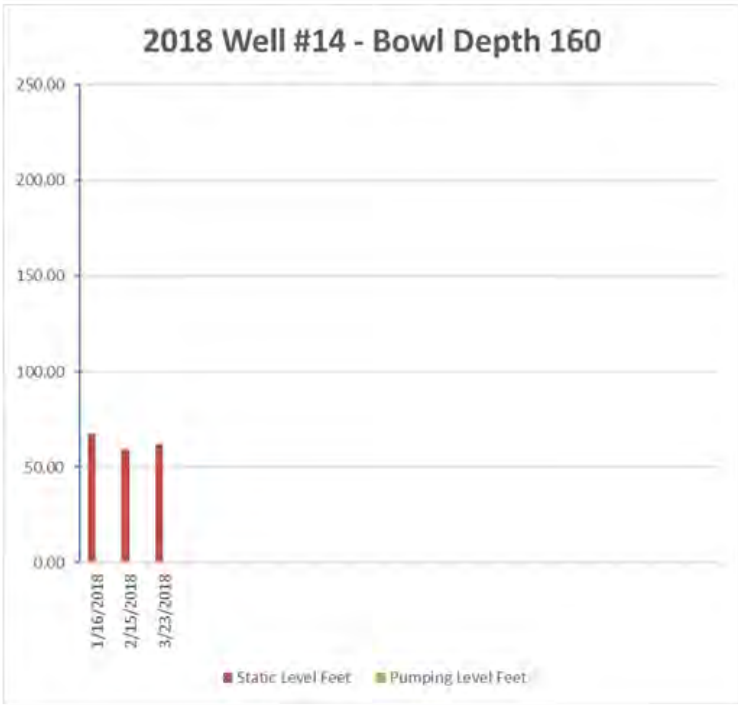

2016 Well #14 - Bowl Depth 160
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

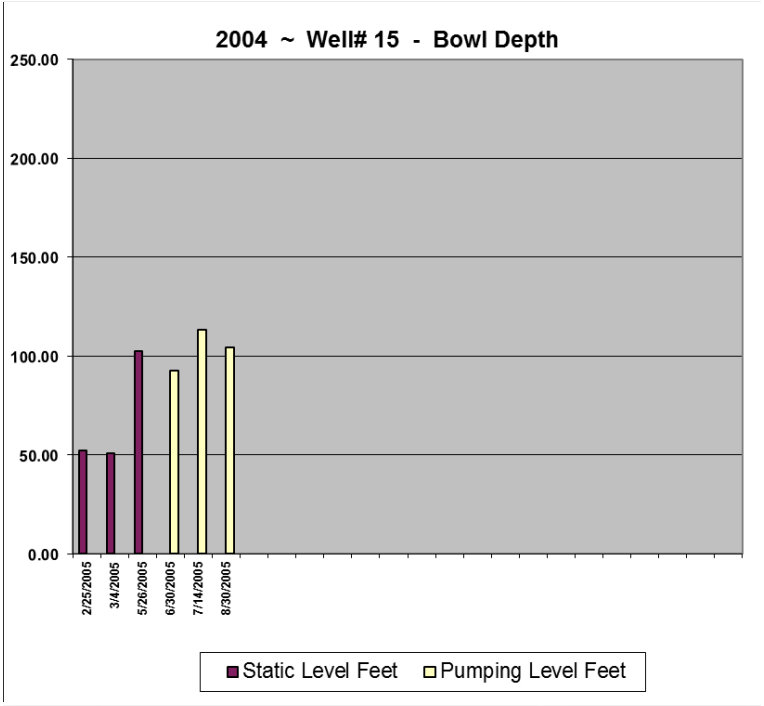

2017 Well #14 - Bowl Depth 160
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

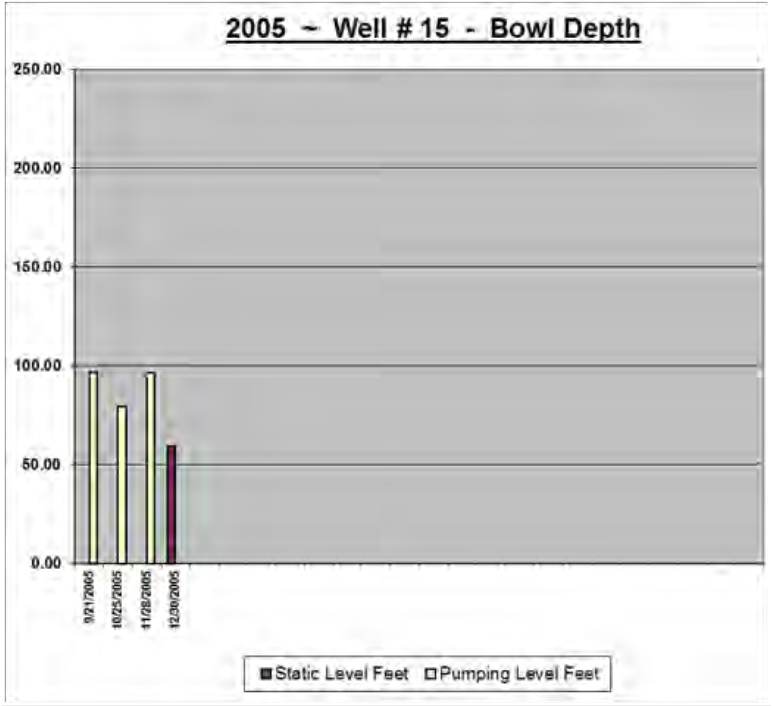

2016 Well #14 - Bowl Depth 160
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

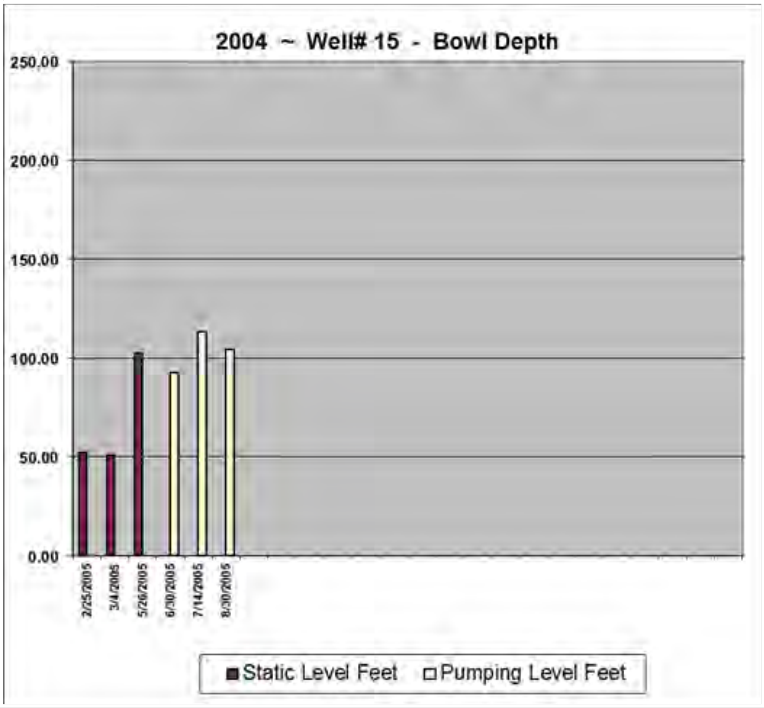

2018 Well #14 - Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

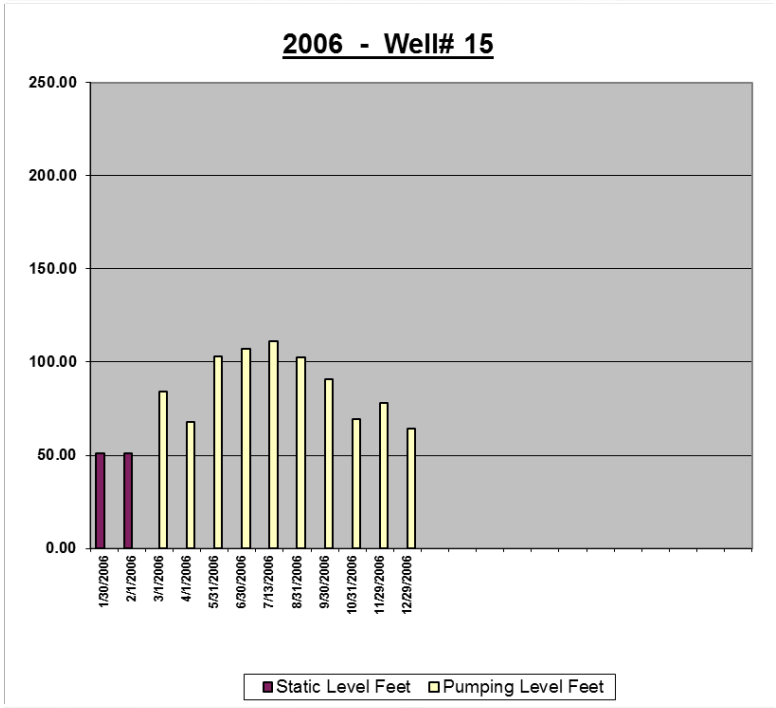

2017 Well #14 - Bowl Depth 160
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

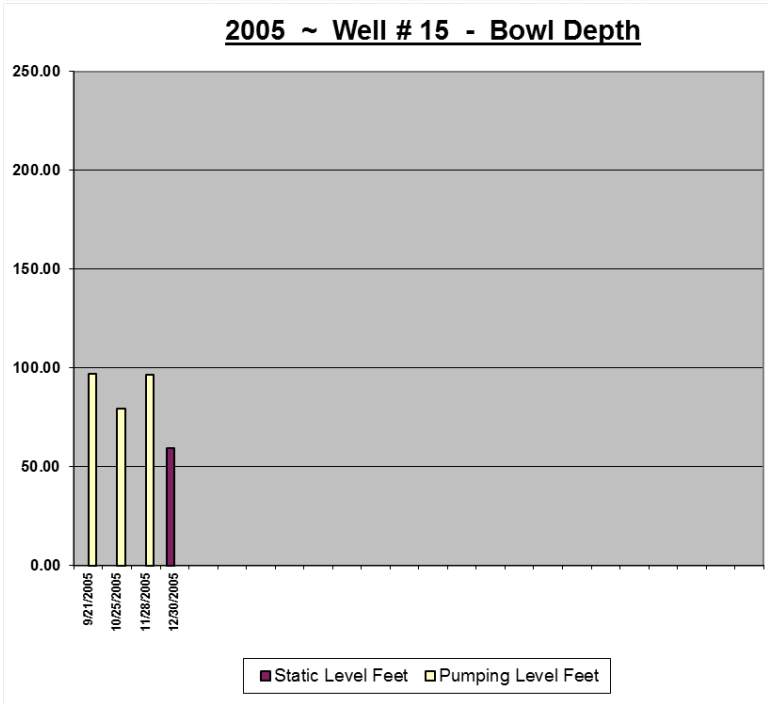

2018 Well #14 - Bowl Depth 160
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

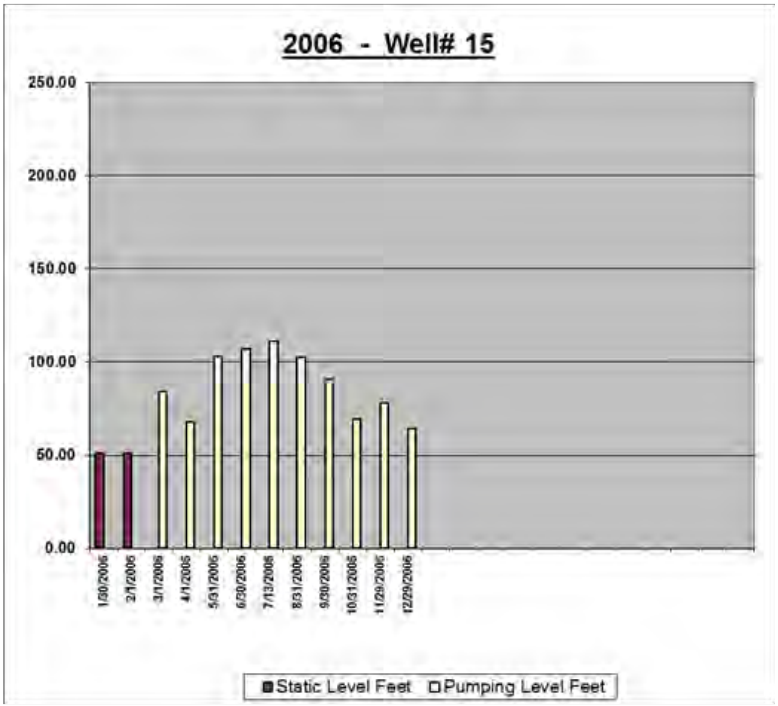

2004 ~ Well# 15 - Bowl Depth
250.00
200.00
150.00
100.00
50.00
0.00
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/14/2005
8/30/2005
Static Level Feet
Pumping Level Feet

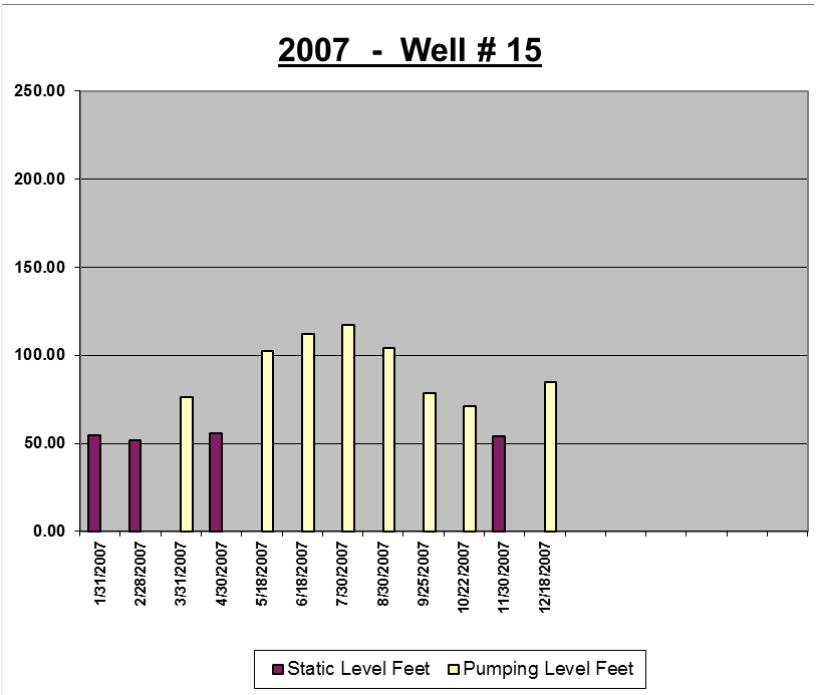

2005 ~ Well # 15 - Bowl Depth
250.00
200.00
150.00
100.00
50.00
0.00
9/21/2005
10/25/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

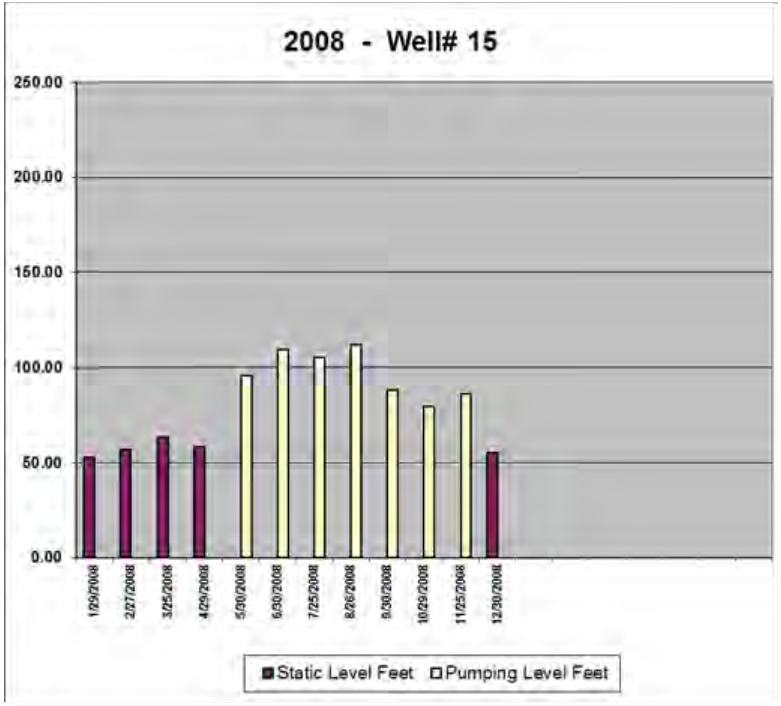

2004 ~ Well# 15 - Bowl Depth
250.00
200.00
150.00
100.00
50.00
0.00
2/25/2005
3/4/2005
5/26/2005
6/30/2005
7/14/2005
8/30/2005
Static Level Feet
Pumping Level Feet

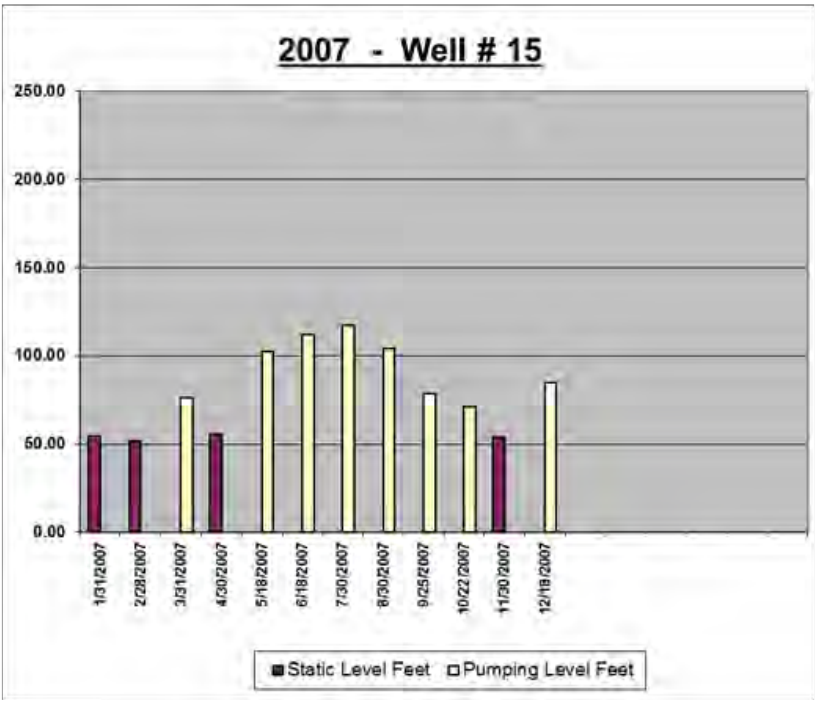

2006 - Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/13/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

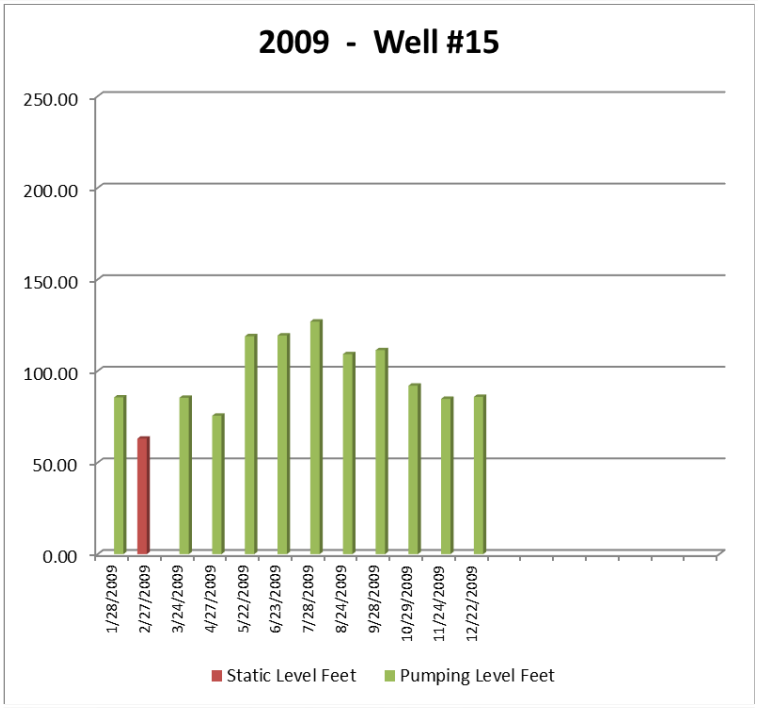

2005 ~ Well # 15 - Bowl Depth
250.00
200.00
150.00
100.00
50.00
0.00
9/21/2005
10/25/2005
11/28/2005
12/30/2005
Static Level Feet
Pumping Level Feet

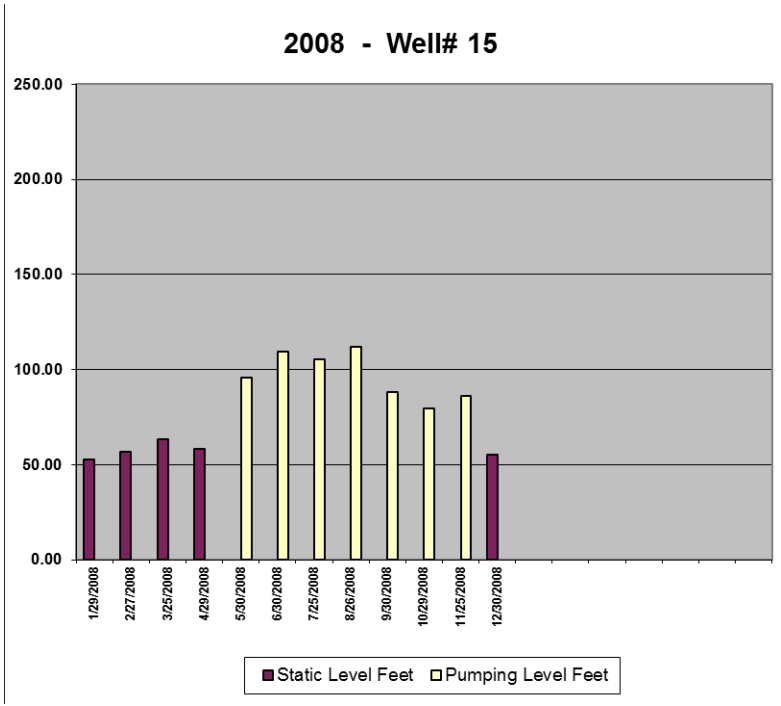

2006 - Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/31/2006
6/30/2006
7/13/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

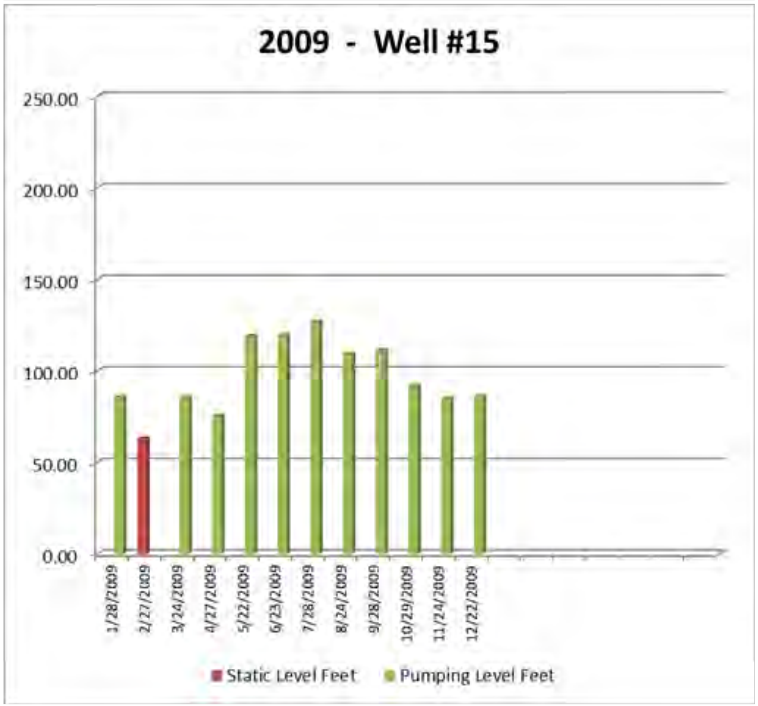

2007 - Well # 15
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/18/2007
Static Level Feet
Pumping Level Feet

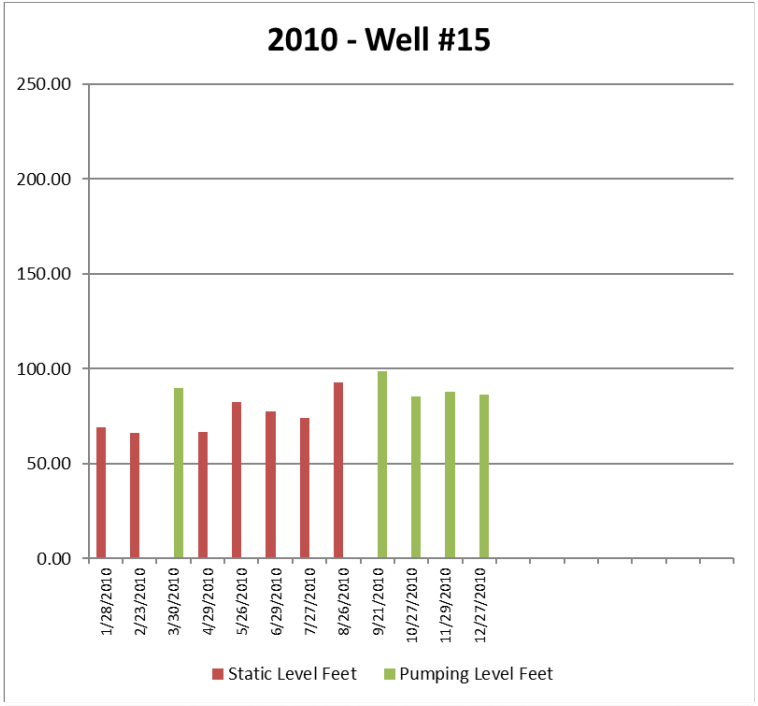

2008 - Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/25/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

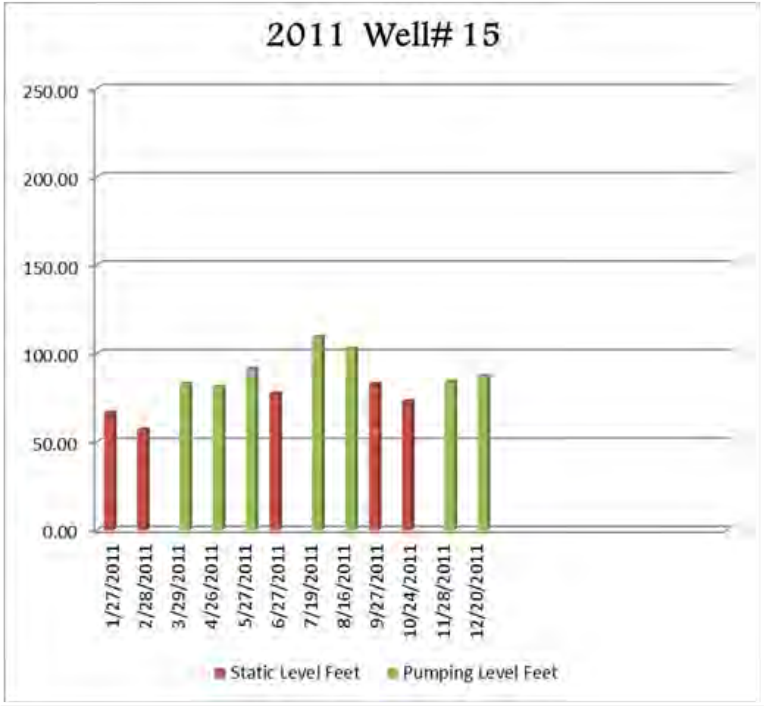

2007 - Well # 15
250.00
200.00
150.00
100.00
50.00
0.00
1/31/2007
2/28/2007
3/31/2007
4/30/2007
5/18/2007
6/18/2007
7/30/2007
8/30/2007
9/25/2007
10/22/2007
11/30/2007
12/18/2007
Static Level Feet
Pumping Level Feet

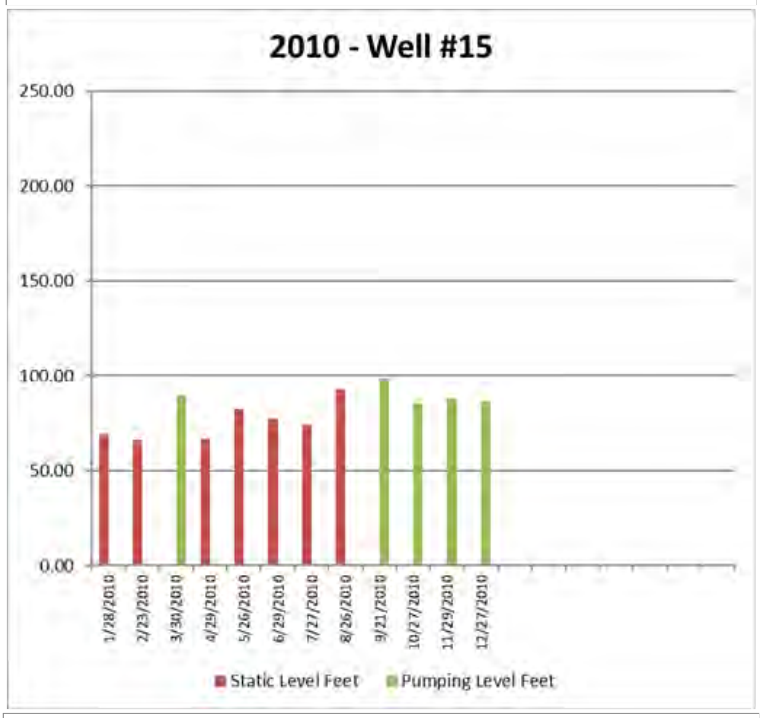

2009 - Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

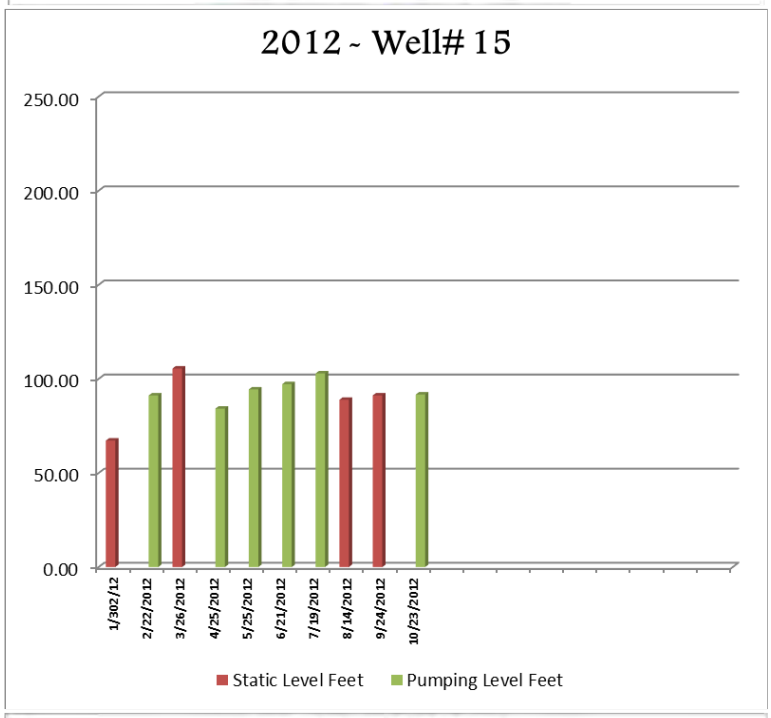

2008 - Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/25/2008
4/29/2008
5/30/2008
6/30/2008
7/25/2008
8/26/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

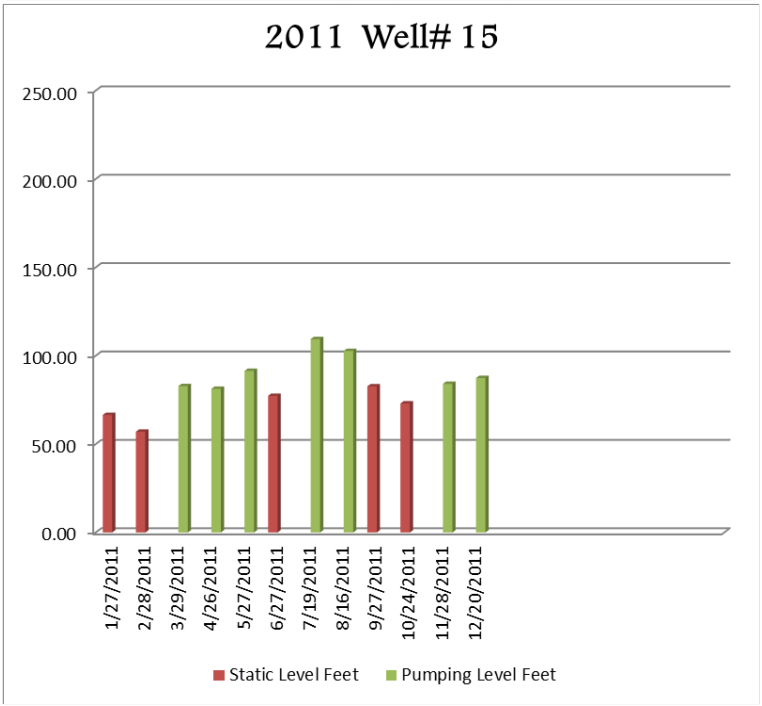

2009 - Well #15
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200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
4/27/2009
5/22/2009
6/23/2009
7/28/2009
8/24/2009
9/28/2009
10/29/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

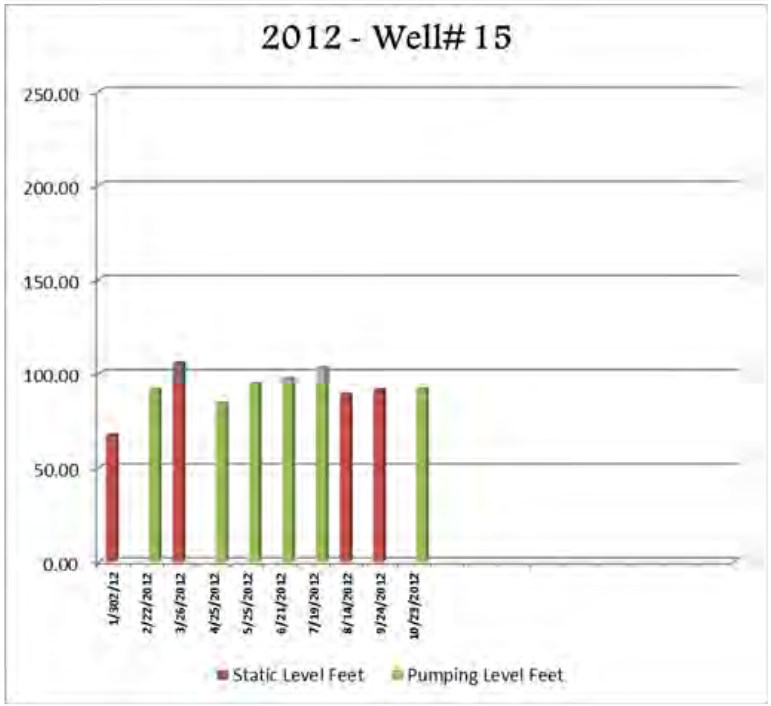

2010 - Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

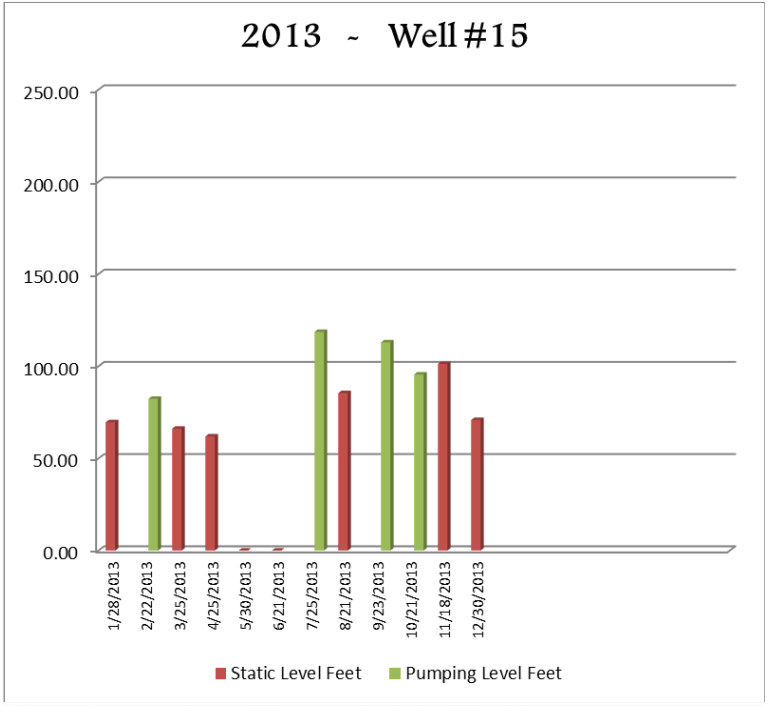

2011 Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

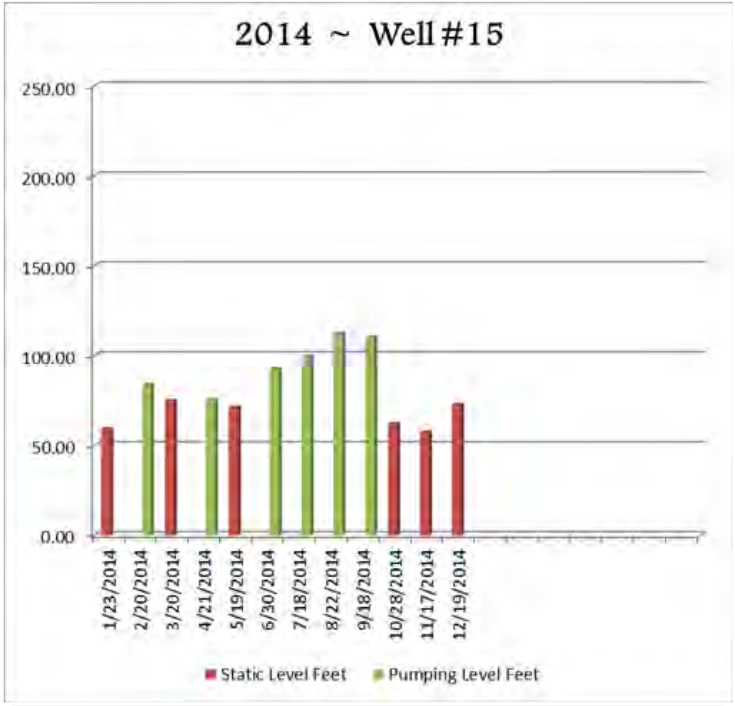

2010 - Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

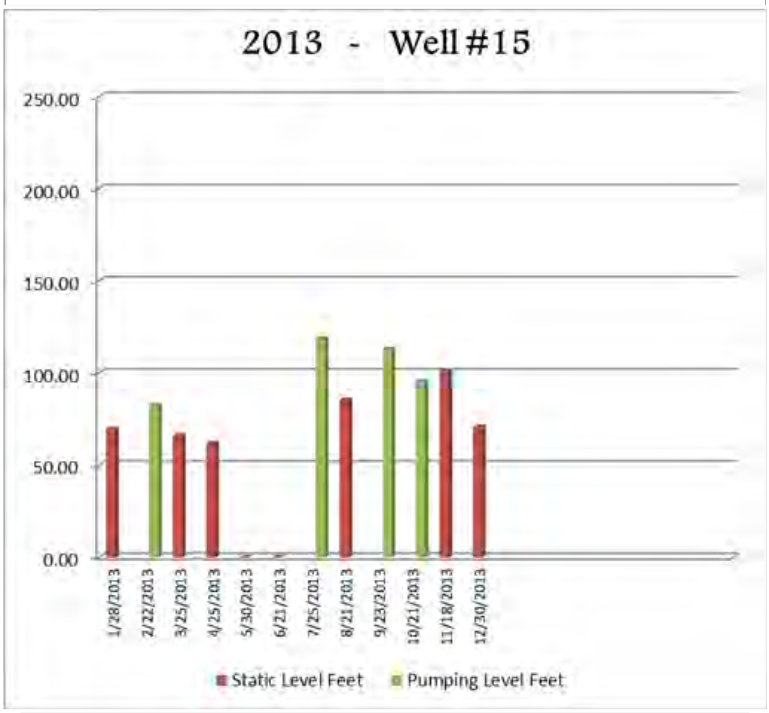

2012 - Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/302/12
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

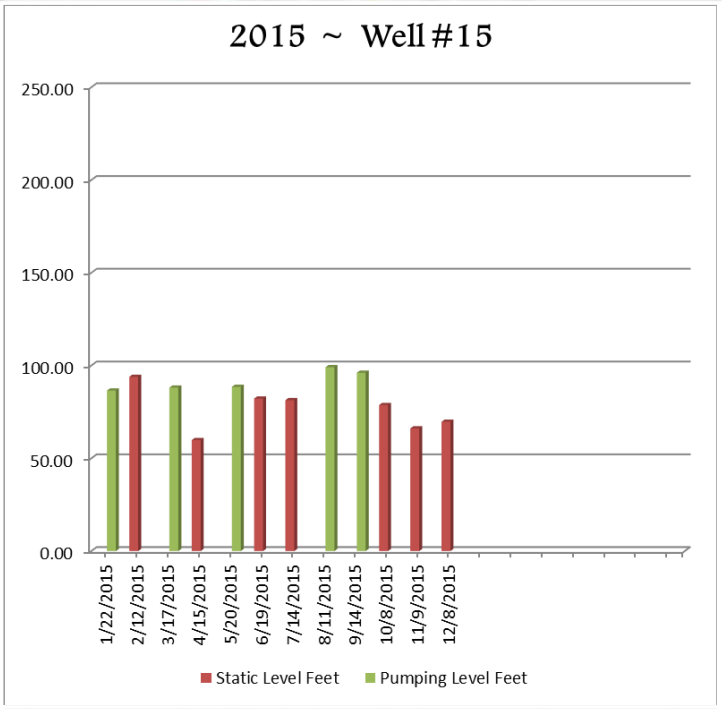

2011 Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

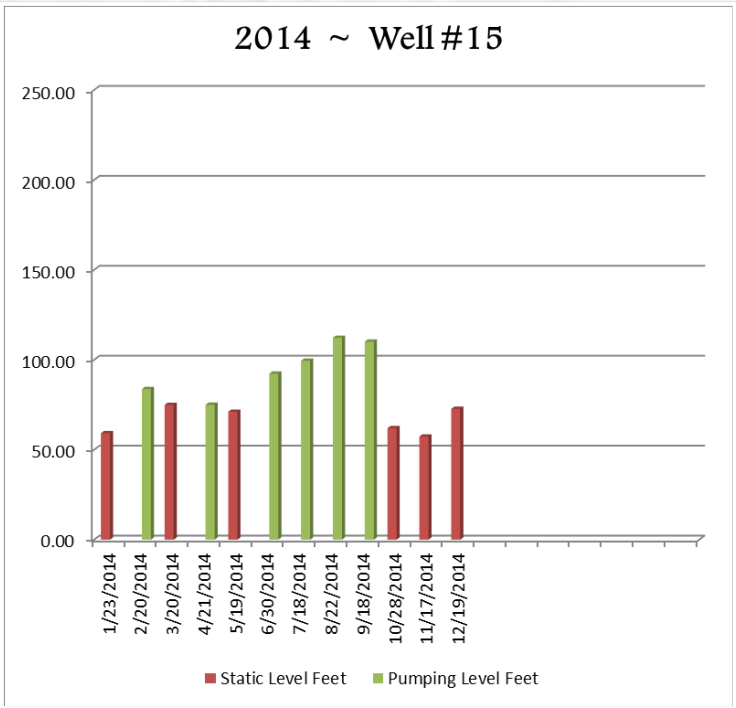

2012 - Well# 15
250.00
200.00
150.00
100.00
50.00
0.00
1/302/12
2/22/2012
3/26/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

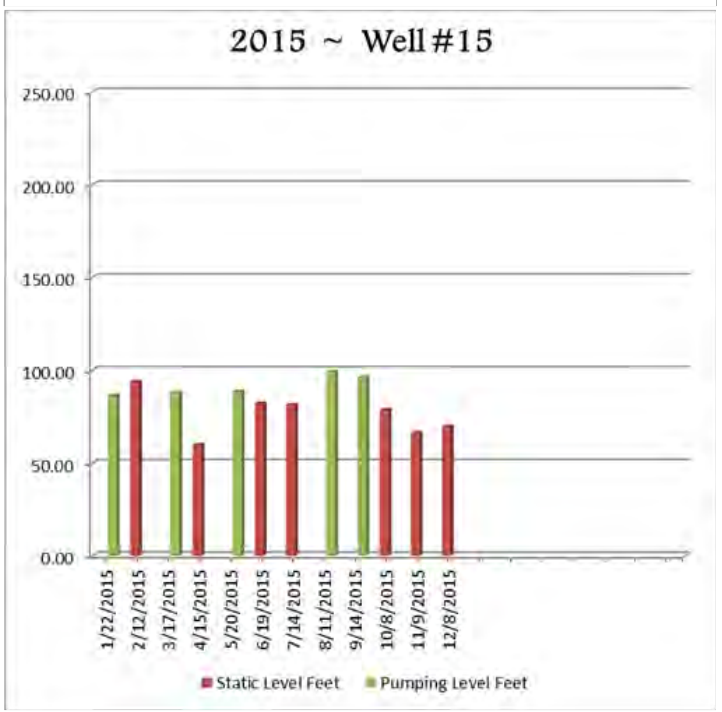

2013 ~ Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

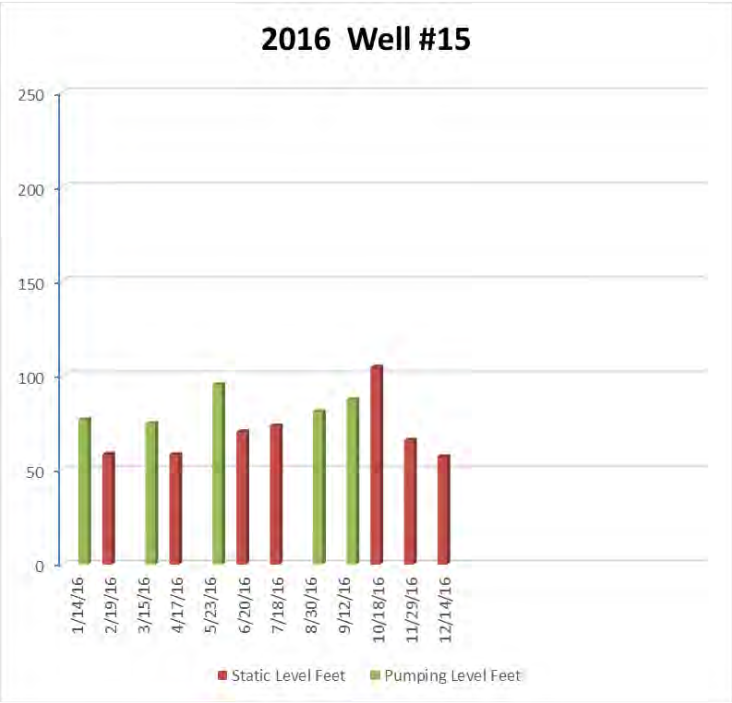

2014 ~ Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

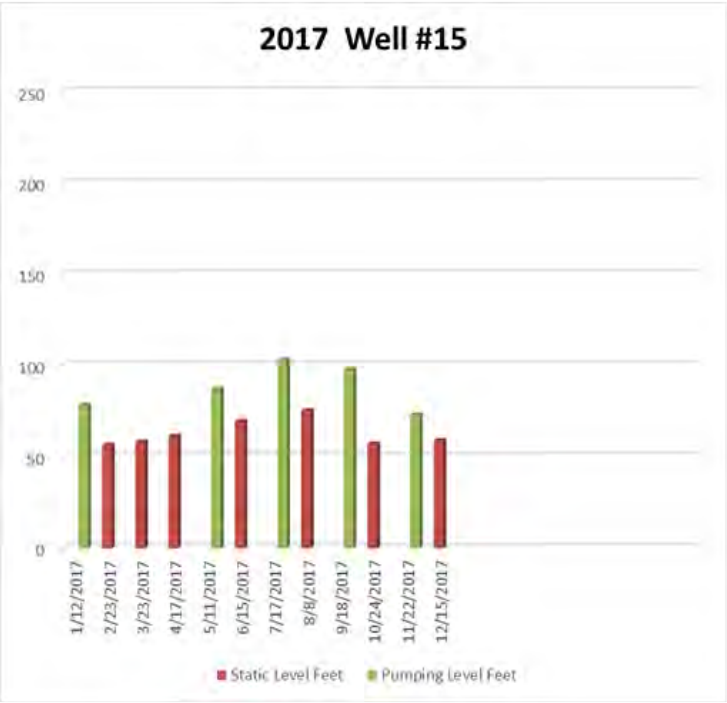

2013 - Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

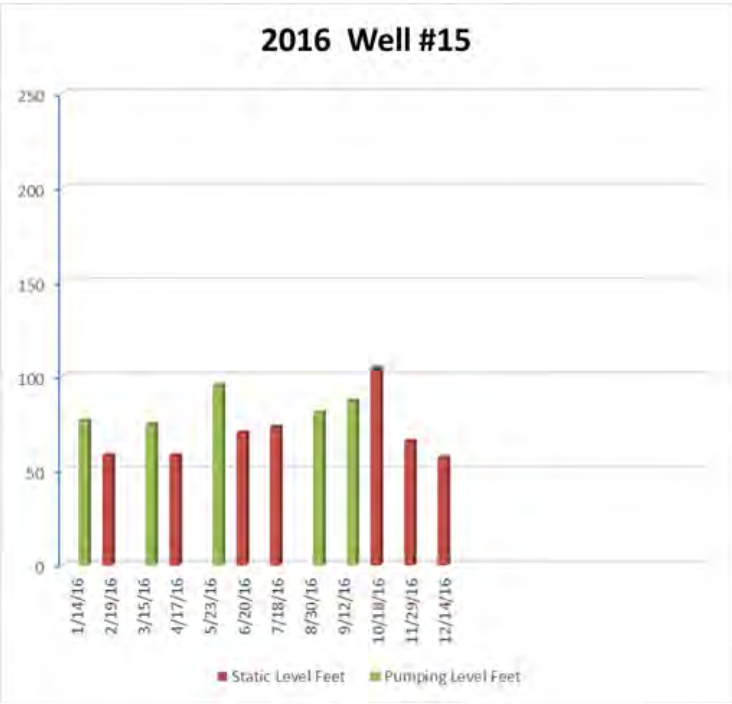

2015 ~ Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

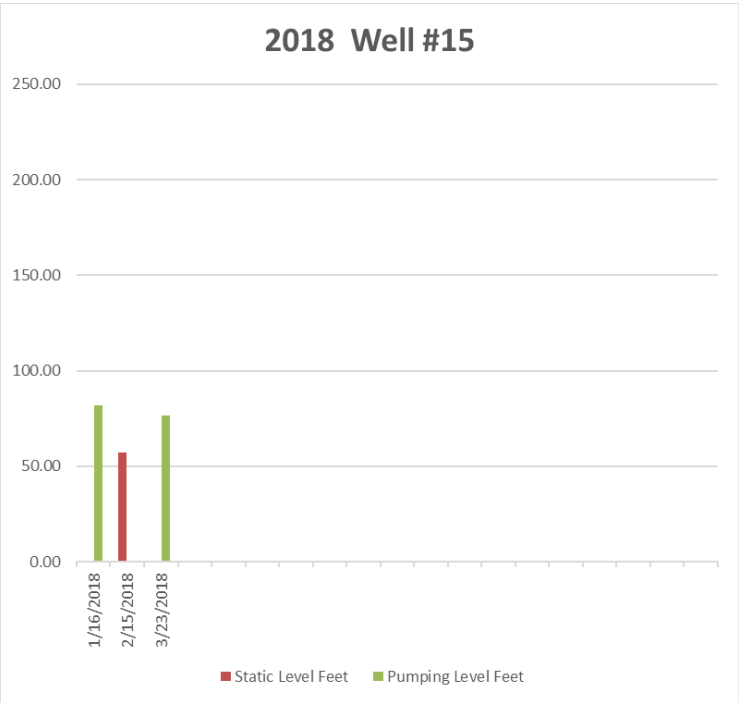

2014 ~ Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

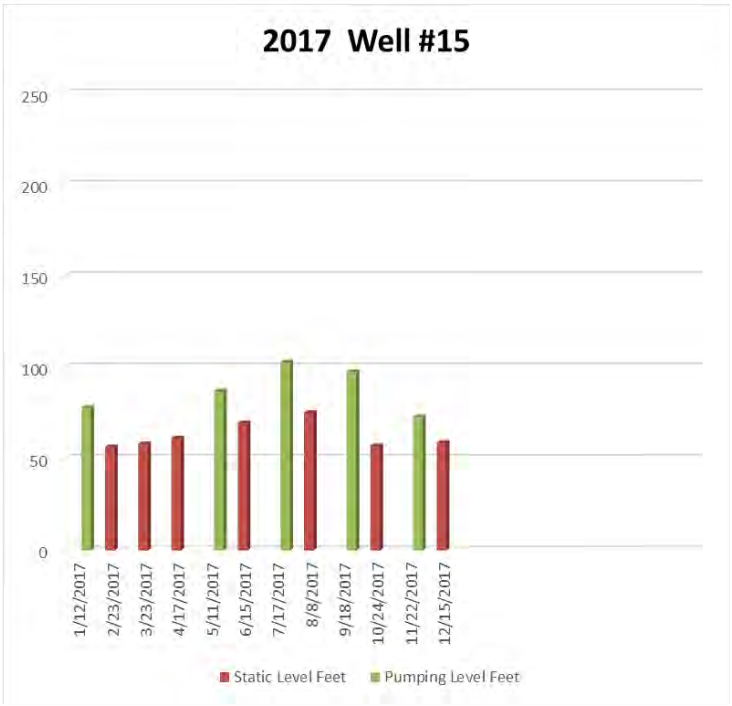

2015 ~ Well #15
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200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

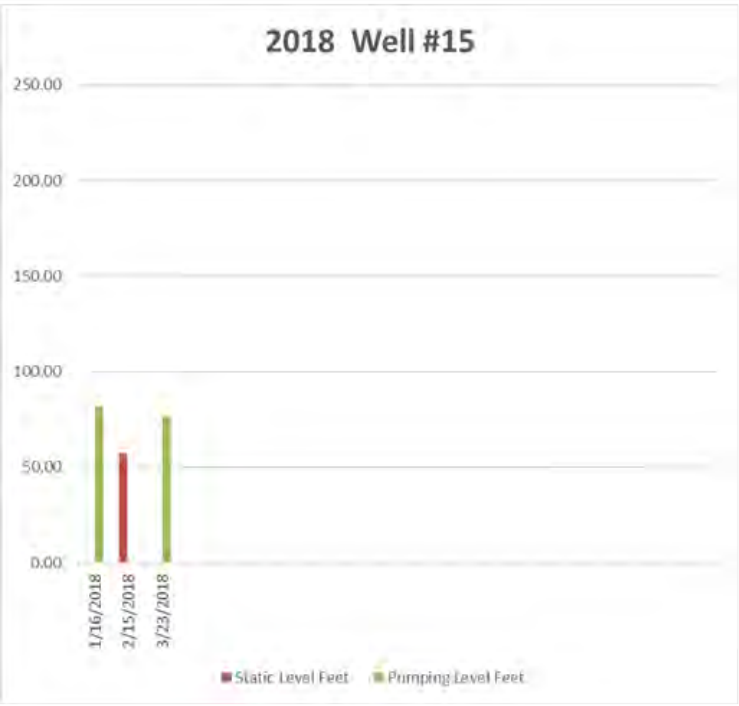

2016 Well #15
250
200
150
100
50
0
1/14/16
2/19/16
3/15/16
4/17/16
5/23/16
6/20/16
7/18/16
8/30/16
9/12/16
10/18/16
11/29/16
12/14/16
Static Level Feet
Pumping Level Feet

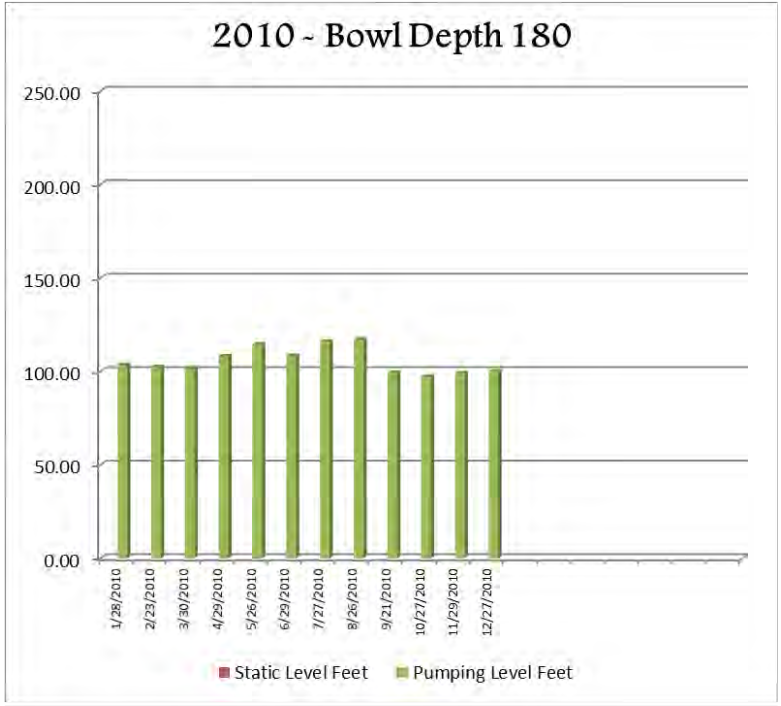

2017 Well #15
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

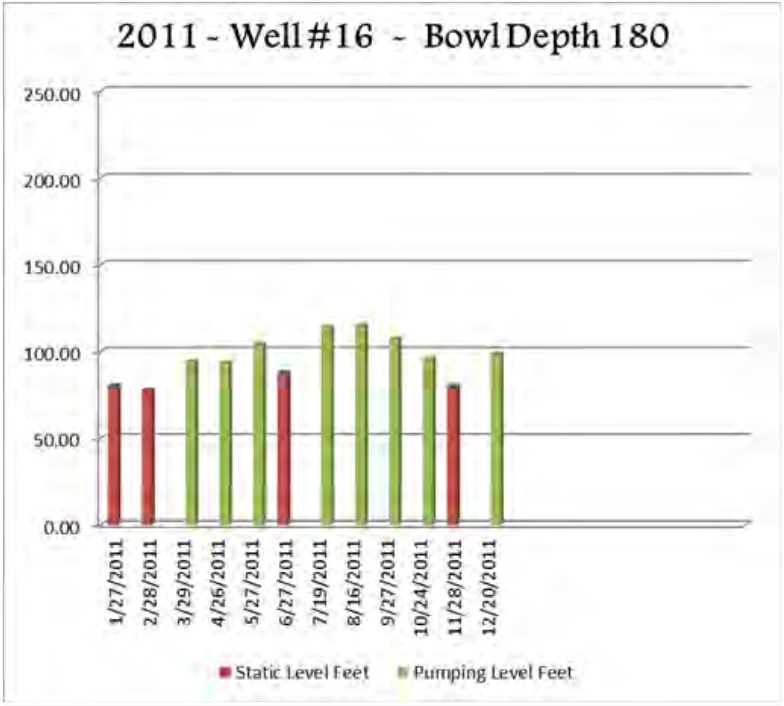

2016 Well #15
250
200
150
100
50
0
1/14/16
2/19/16
3/15/16
4/17/16
5/23/16
6/20/16
7/18/16
8/30/16
9/12/16
10/18/16
11/29/16
12/14/16
Static Level Feet
Pumping Level Feet

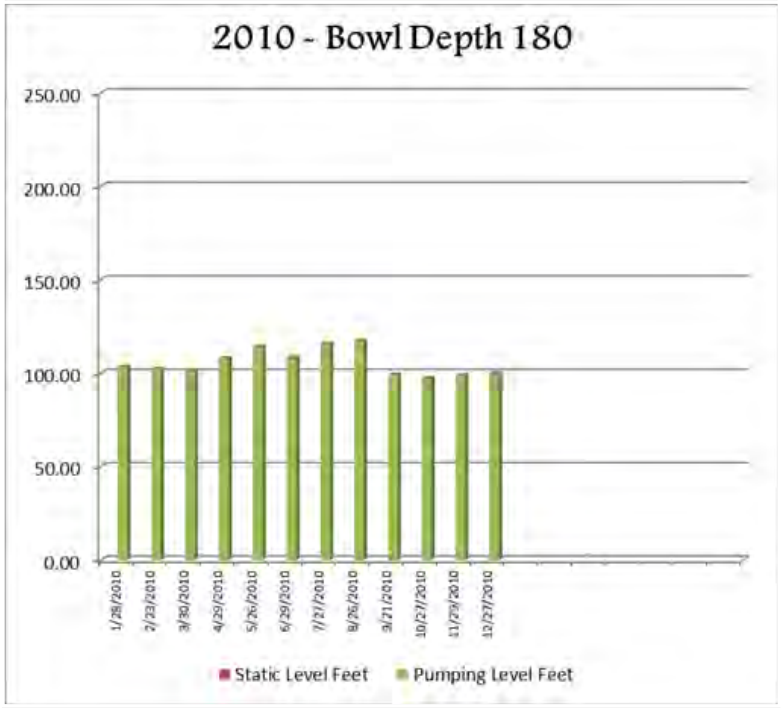

2018 Well #15
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

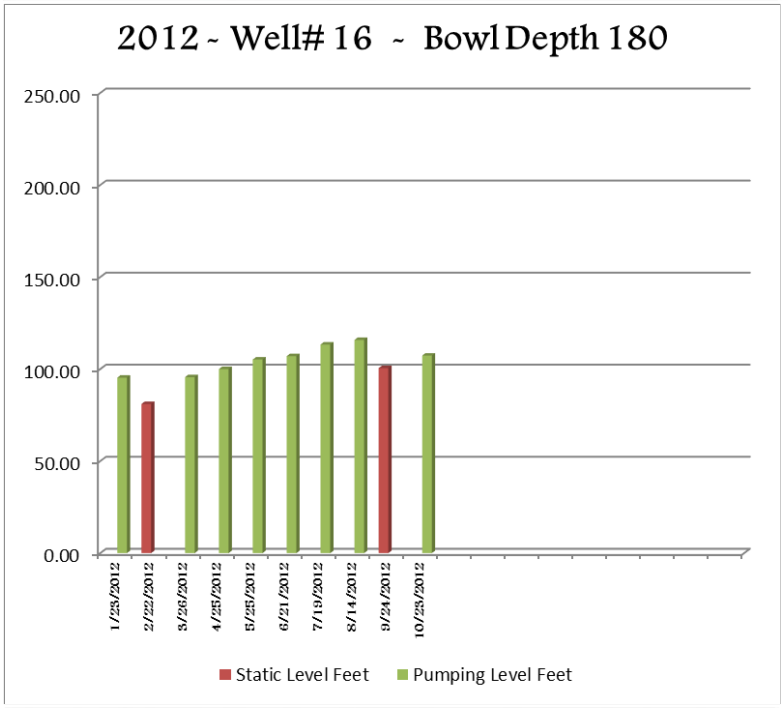

2017 Well #15
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

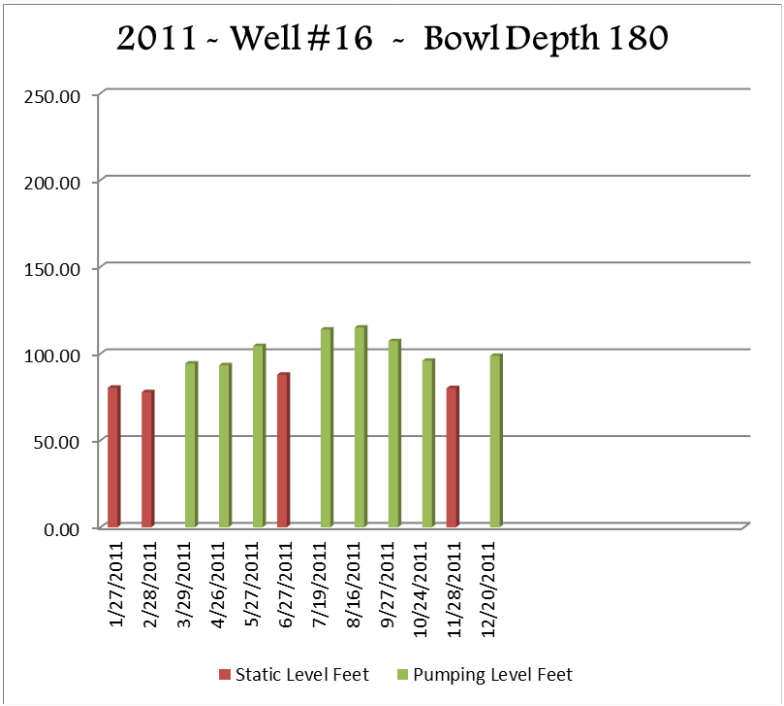

2018 Well #15
250.00
200.00
150.00
100.00
50,00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

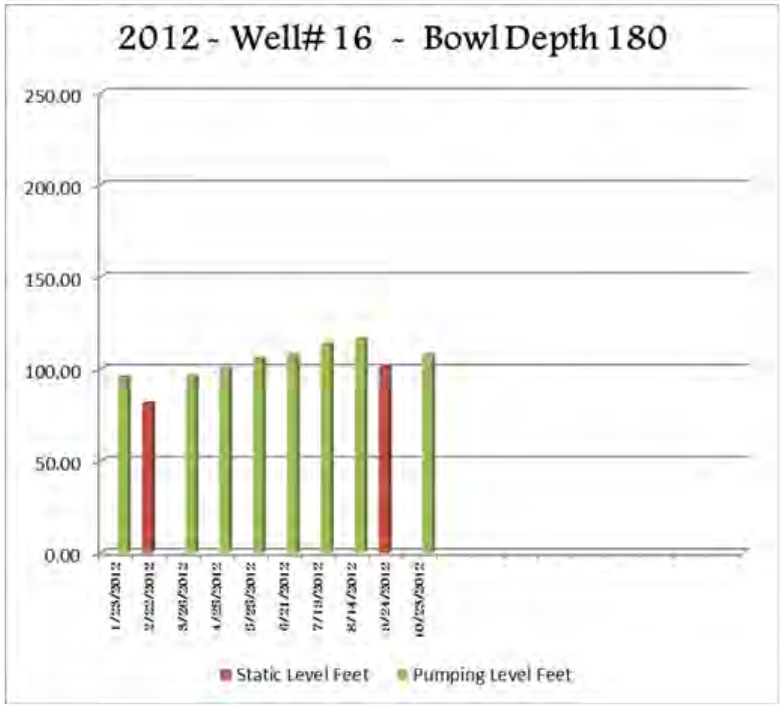

2010 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

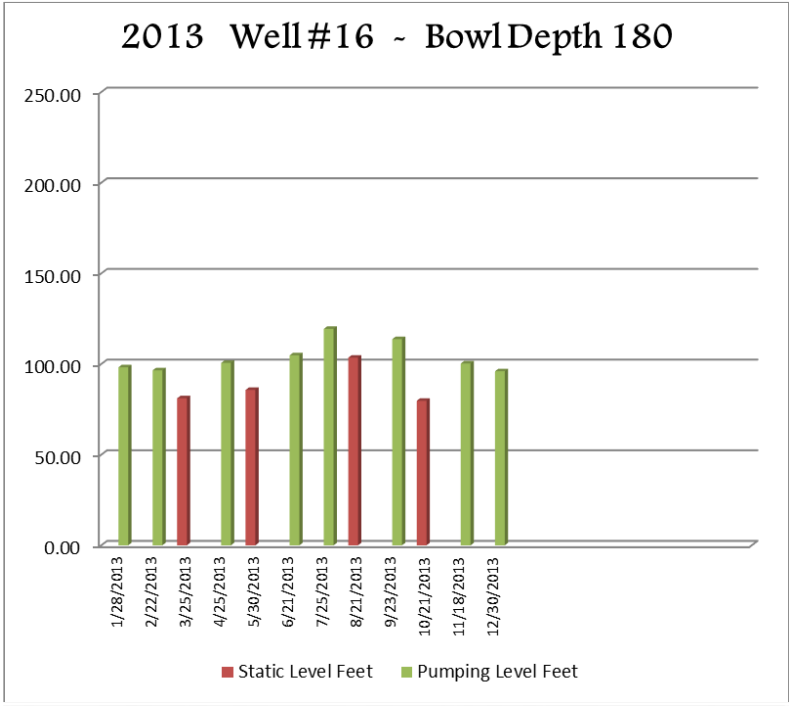

2011 - Well#16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

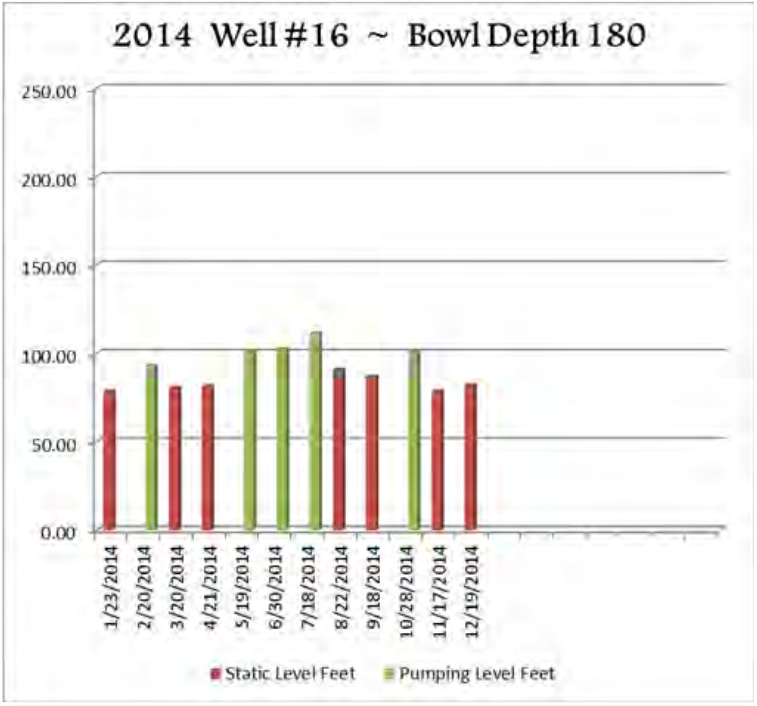

2010 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
4/29/2010
5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

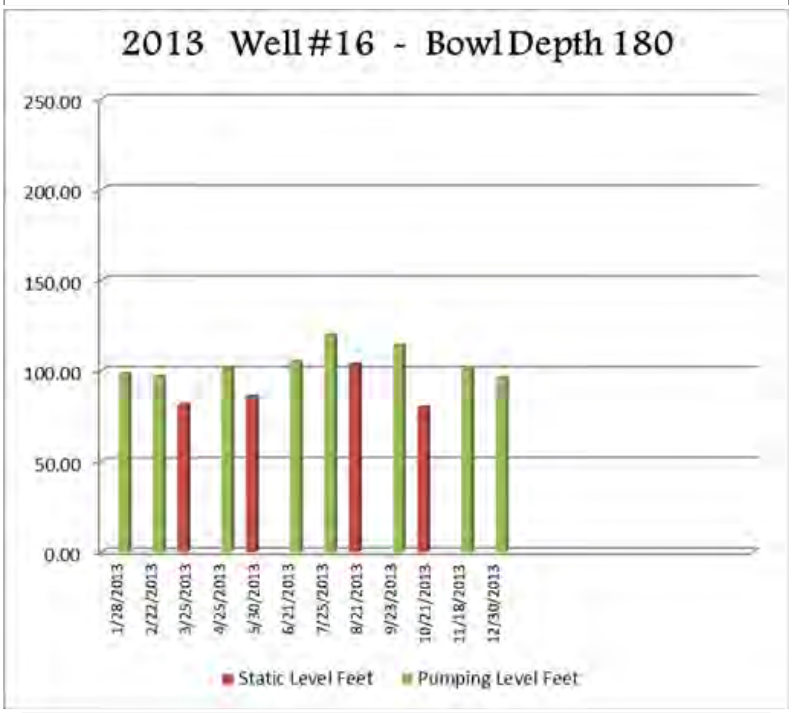

2012 - Well# 16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2012
2/22/2012
3/25/2012
4/25/2012
5/25/2012
6/21/2012
7/19/2012
8/14/2012
9/24/2012
10/23/2012
Static Level Feet
Pumping Level Feet

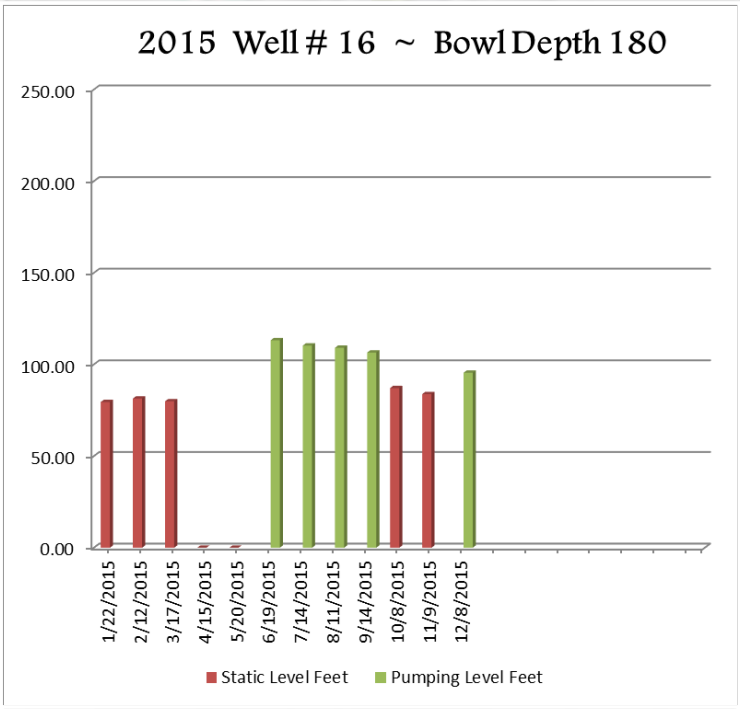

2011 - Well#16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/27/2011
2/28/2011
3/29/2011
4/26/2011
5/27/2011
6/27/2011
7/19/2011
8/16/2011
9/27/2011
10/24/2011
11/28/2011
12/20/2011
Static Level Feet
Pumping Level Feet

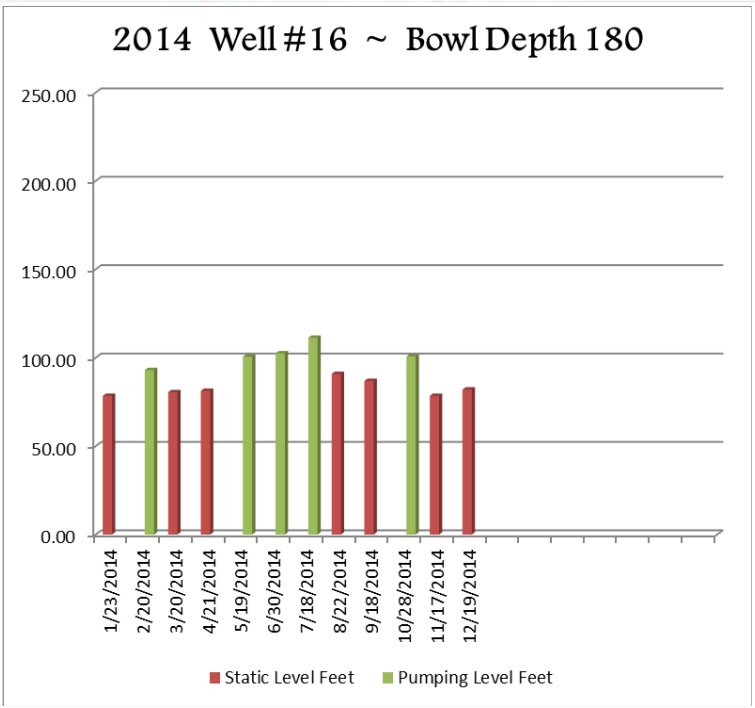

2012 - Well# 16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

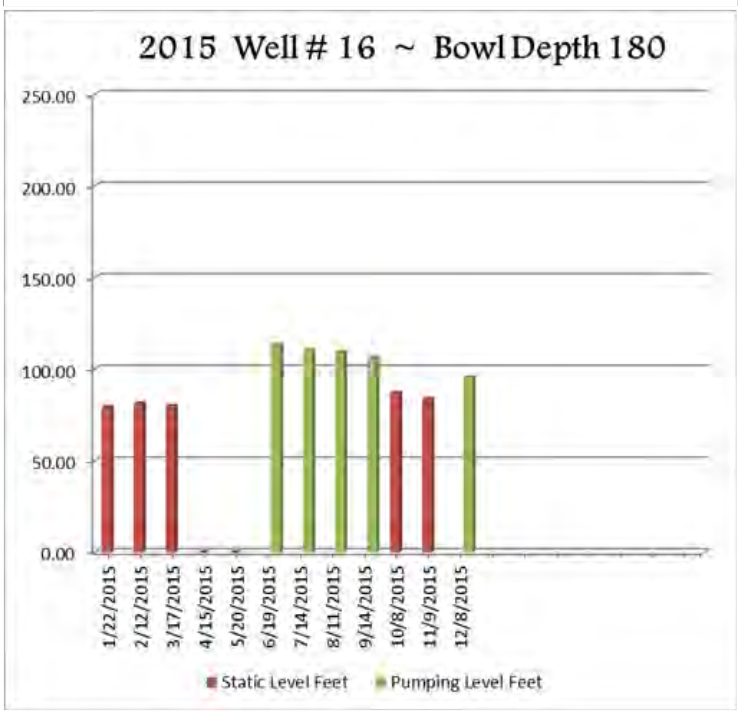

2013 Well #16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

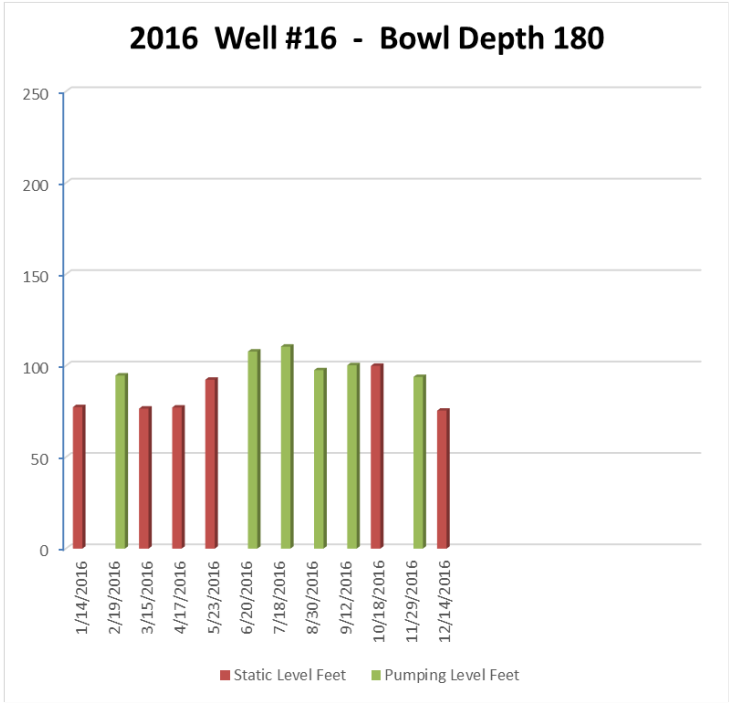

2014 Well #16 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

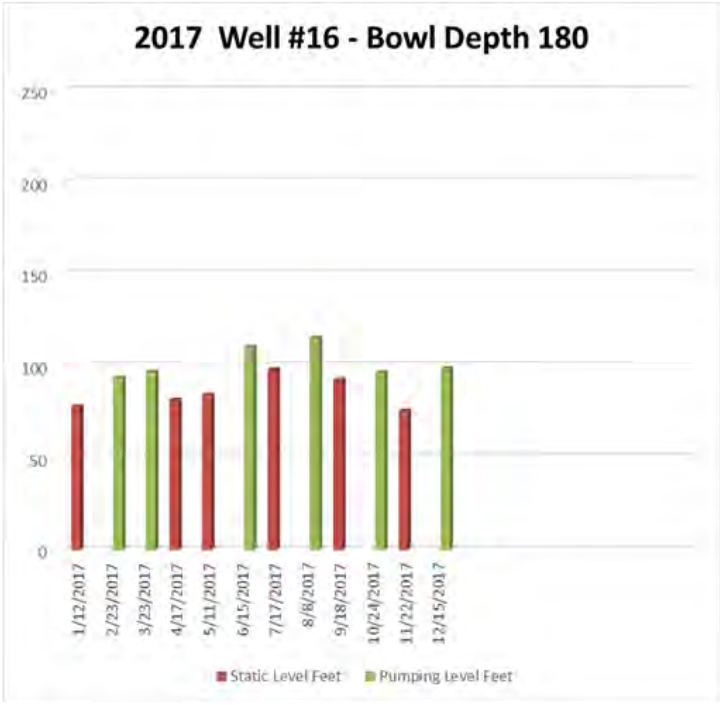

2013 Well #16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
4/25/2013
5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

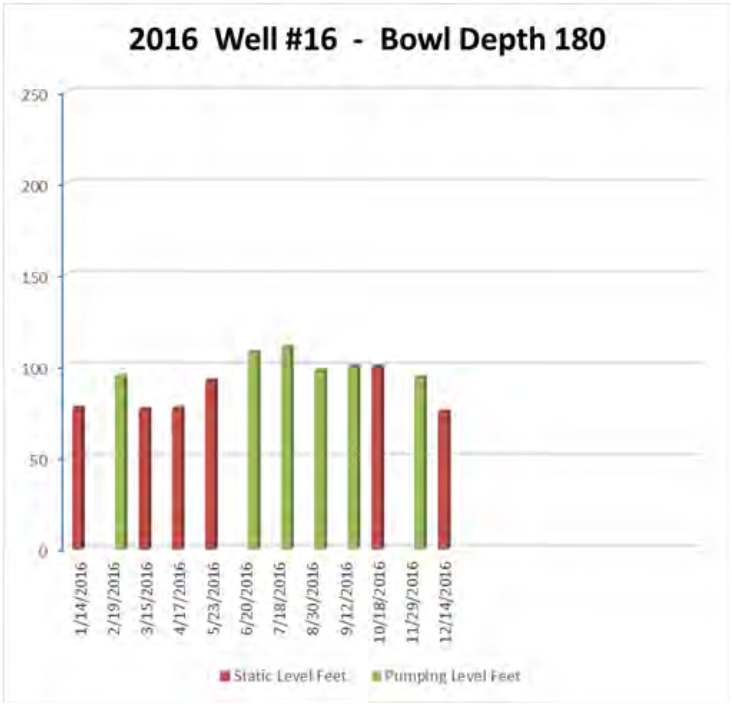

2015 Well # 16 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

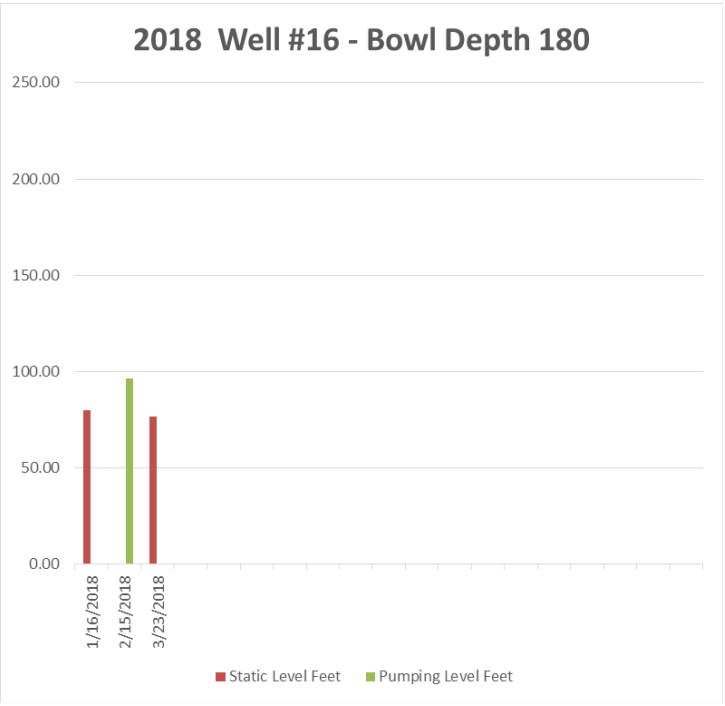

2014 Well #16 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

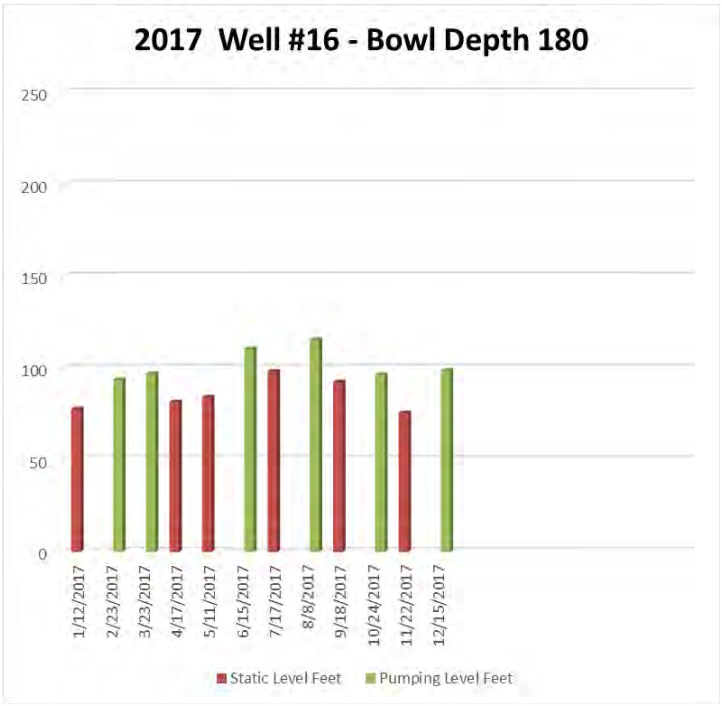

2015 Well # 16 ~ Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

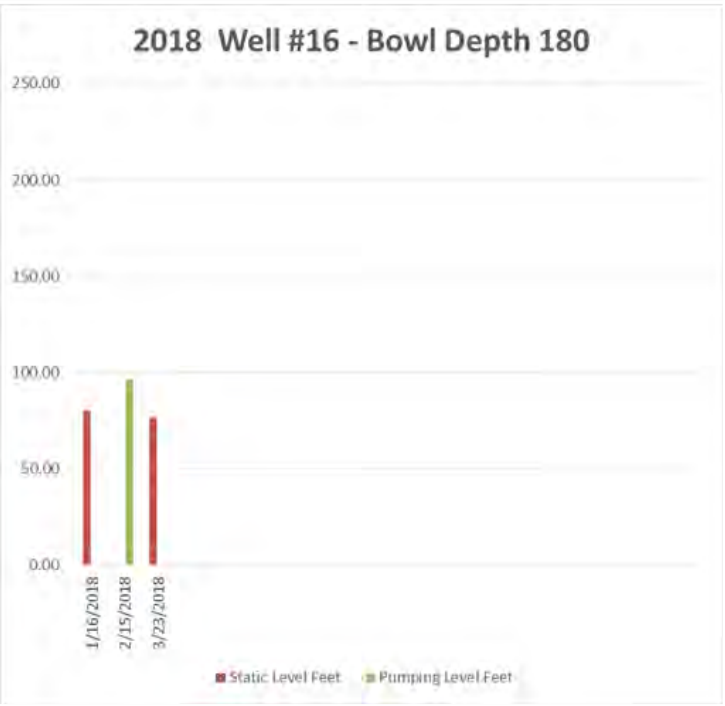

2016 Well #16 - Bowl Depth 180
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

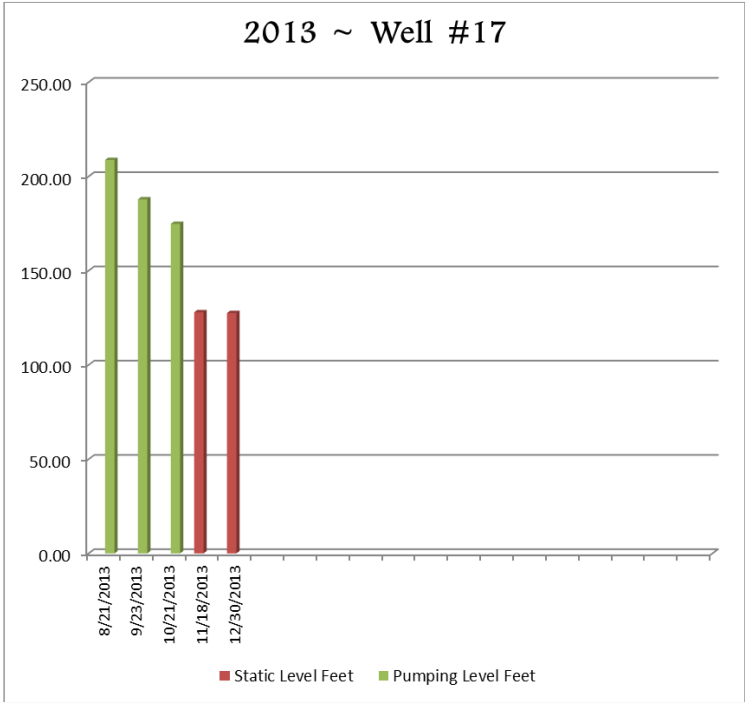

2017 Well #16 - Bowl Depth 180
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

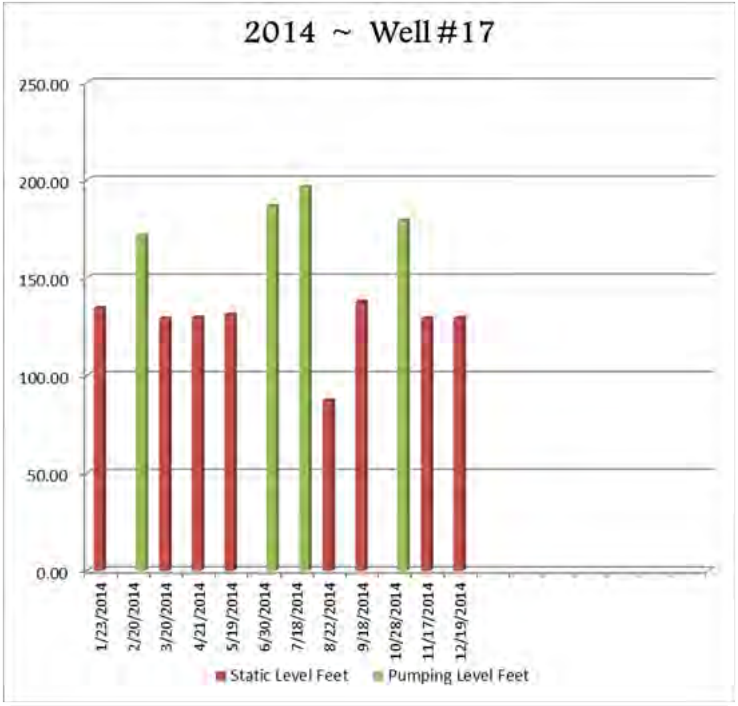

2016 Well #16 - Bowl Depth 180
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

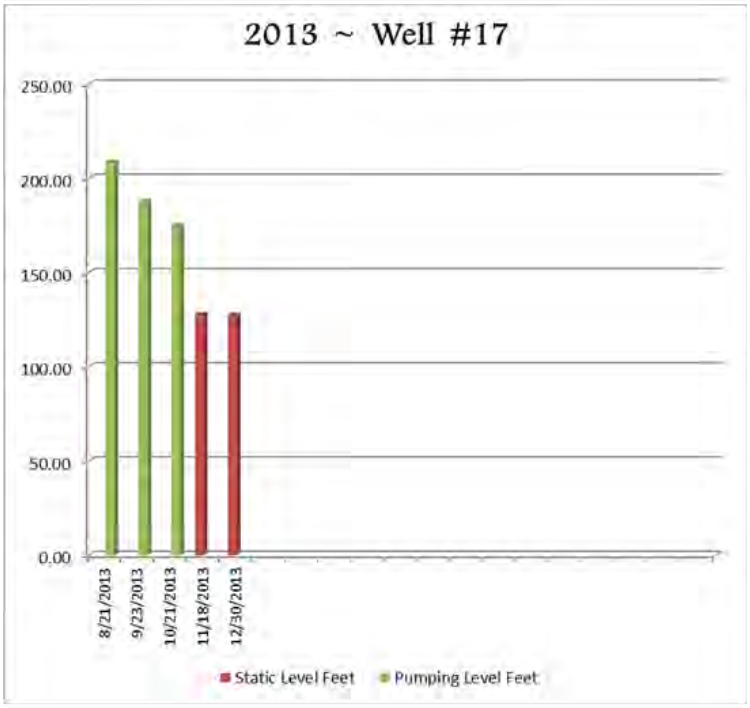

2018 Well #16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

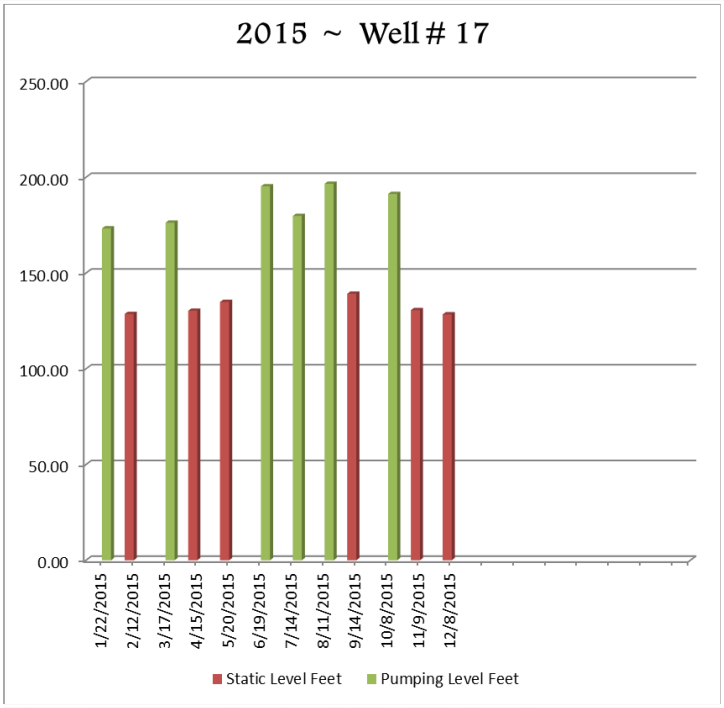

2017 Well #16 - Bowl Depth 180
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet

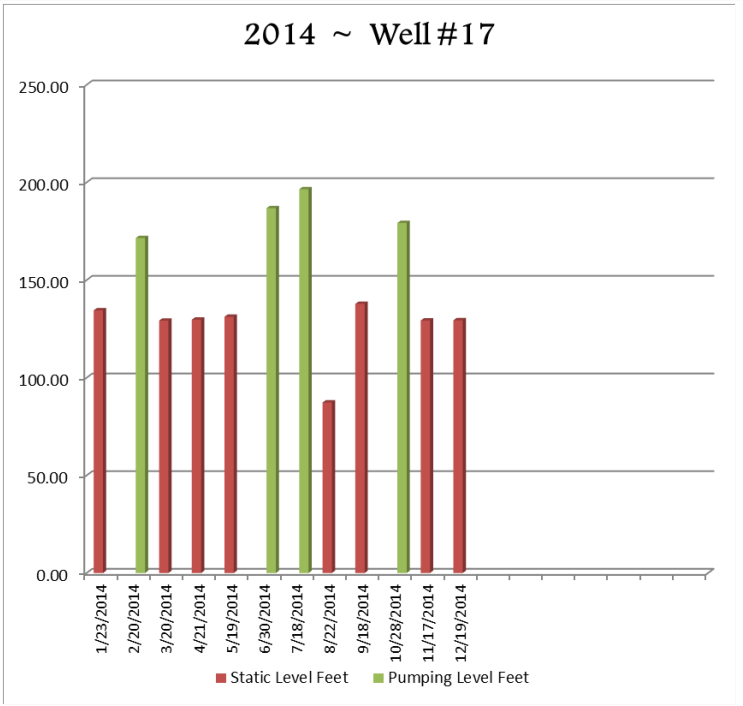

2018 Well #16 - Bowl Depth 180
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2018
3/23/2018
Static Level Feet
Pumping Level Feet

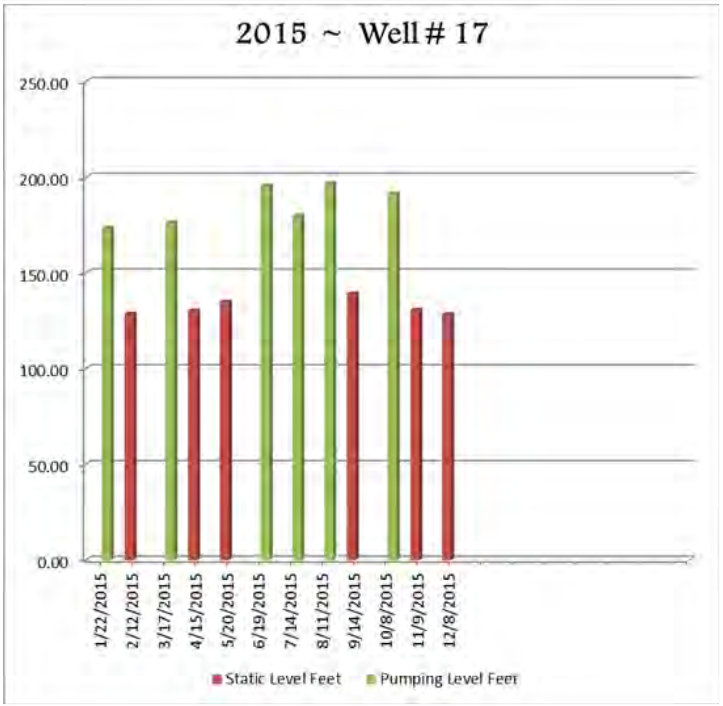

2013 ~ Well #17
250.00
200.00
150.00
100.00
50.00
0.00
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet


2014 ~ Well #17
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

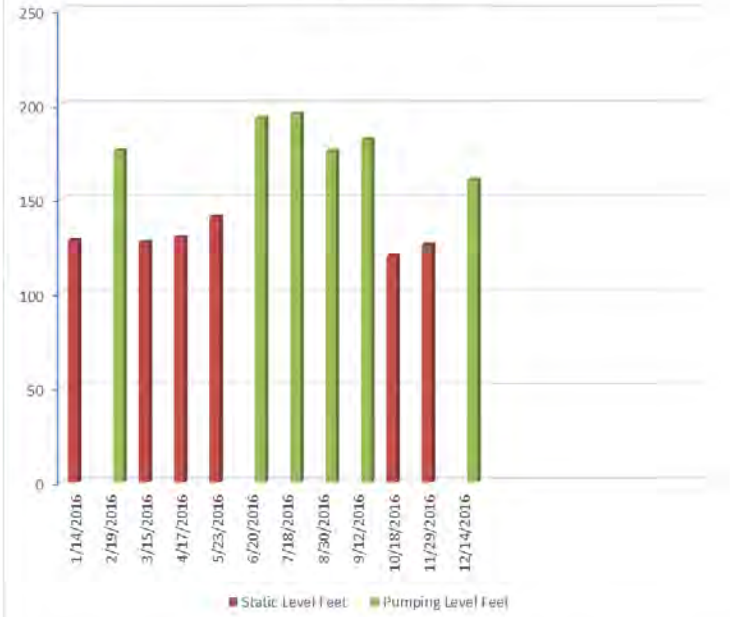

2013 ~ Well #17
250.00
200.00
150.00
100.00
50.00
0.00
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet


2015 ~ Well # 17
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet


2014 ~ Well #17
250.00
200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
4/21/2014
5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet


2015 ~ Well # 17
250.00
200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
4/15/2015
5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

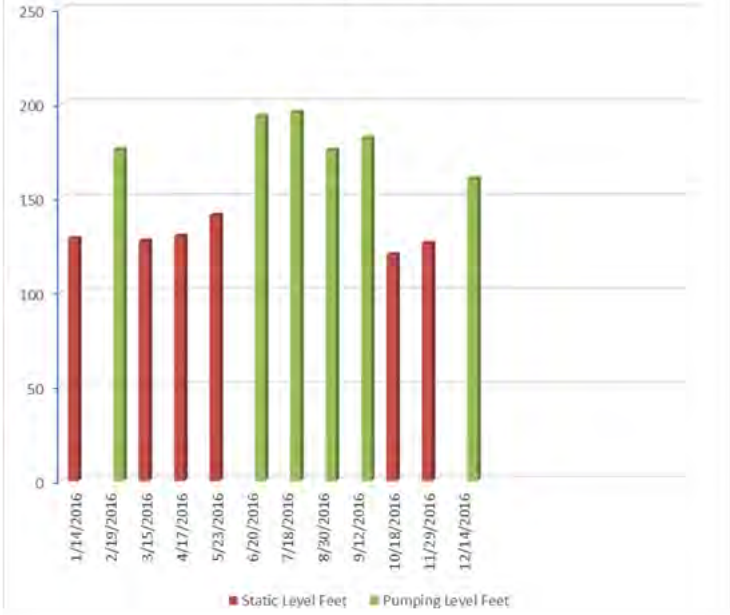
## 2016 Well #17



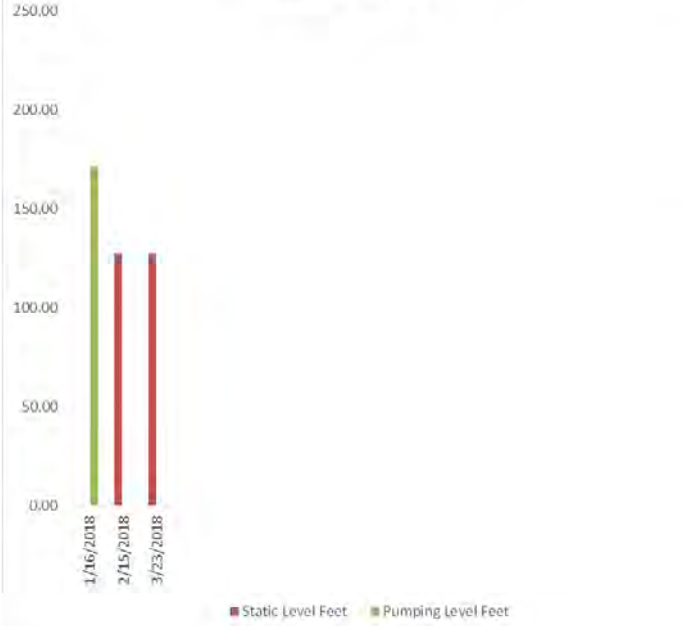

## 2017 Well #17



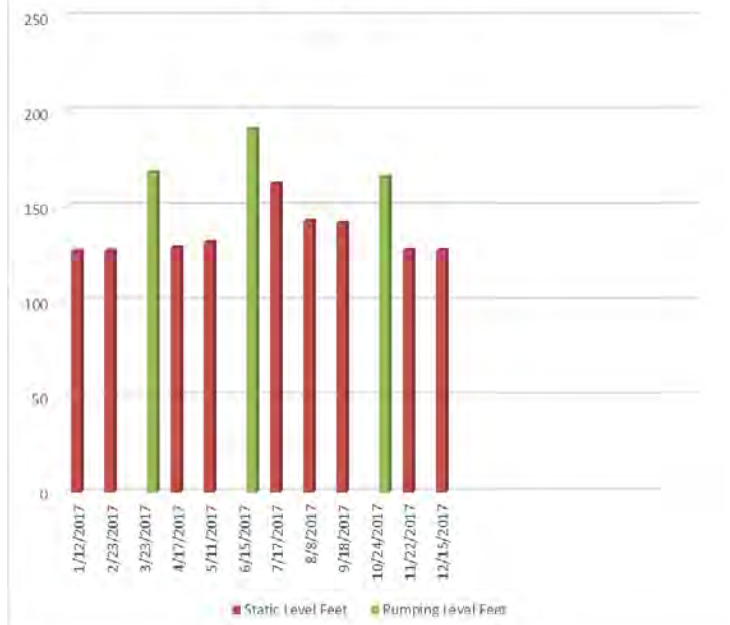

## 2016 Well #17



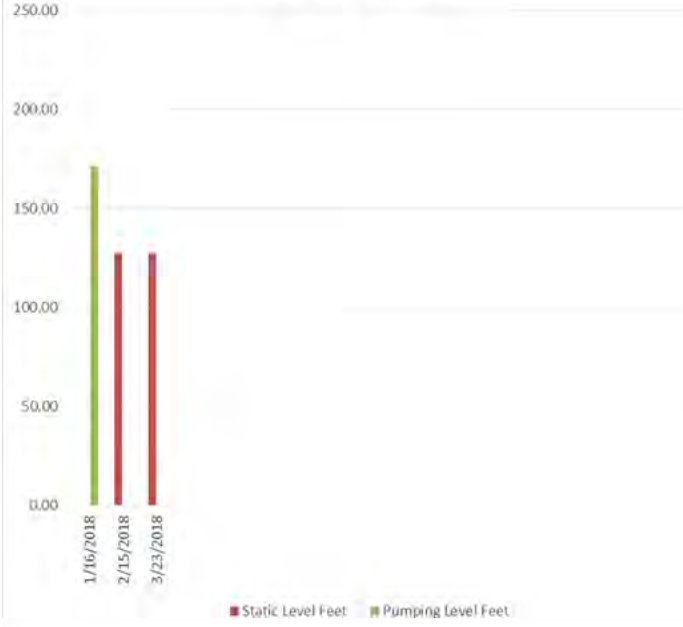

## 2018 Well #17

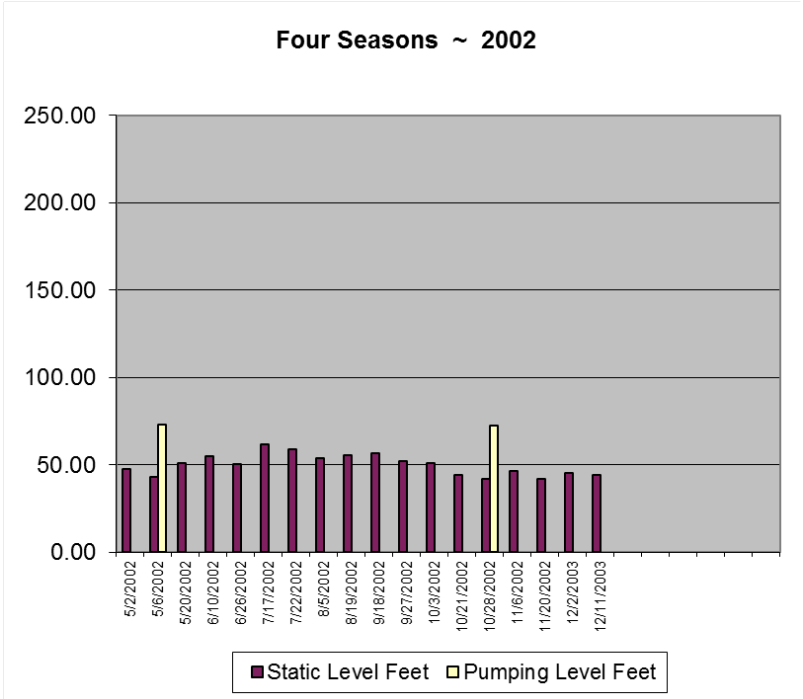


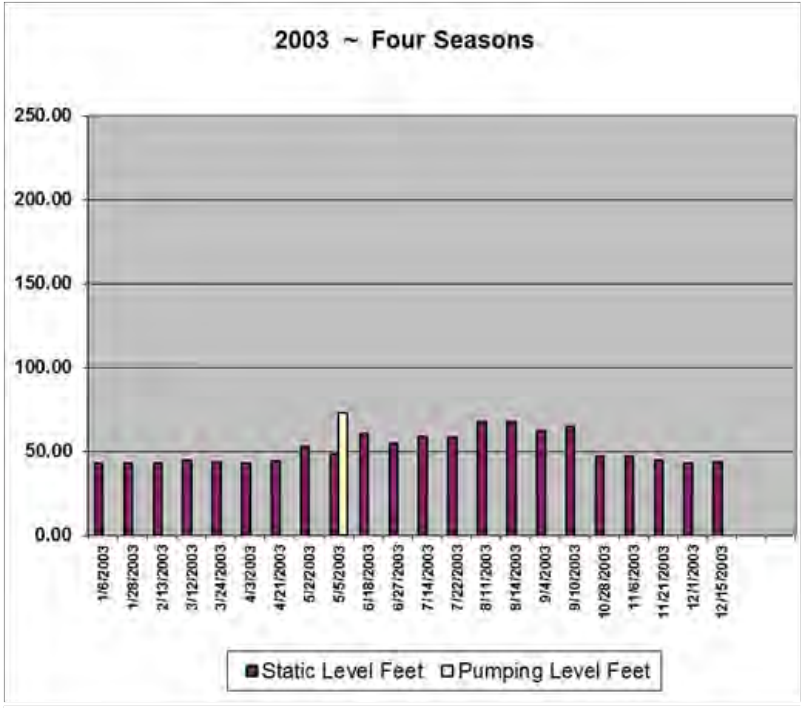

## 2017 Well #17

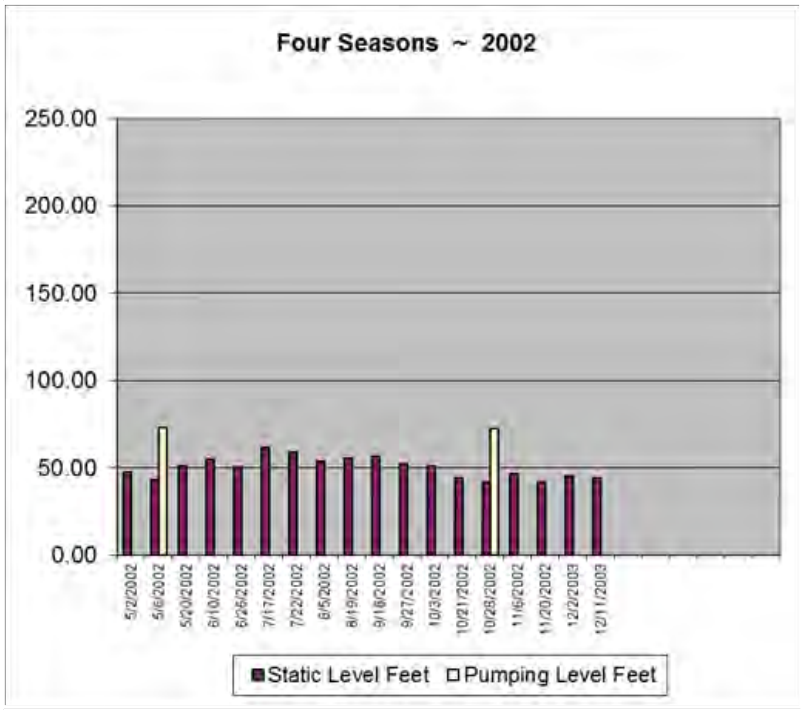


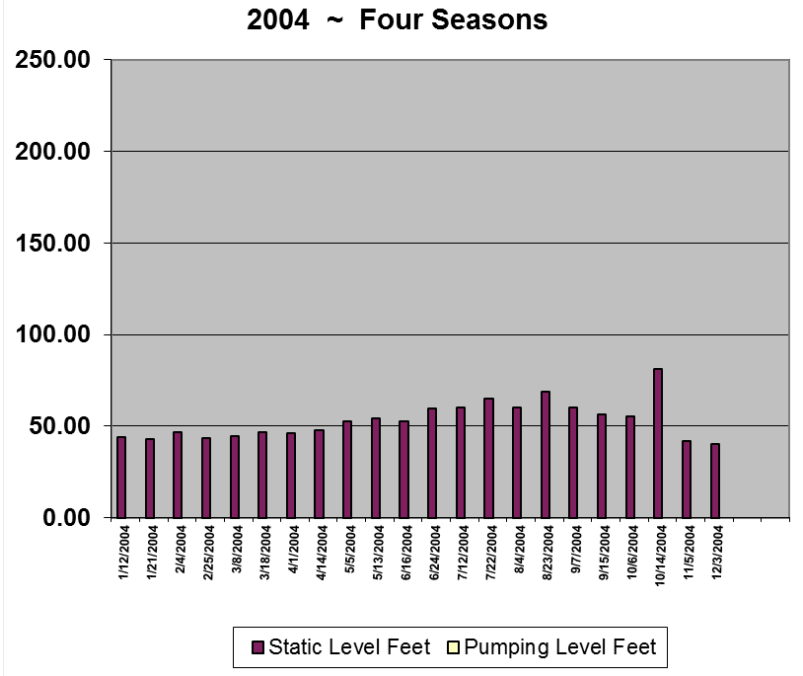

## 2018 Well #17

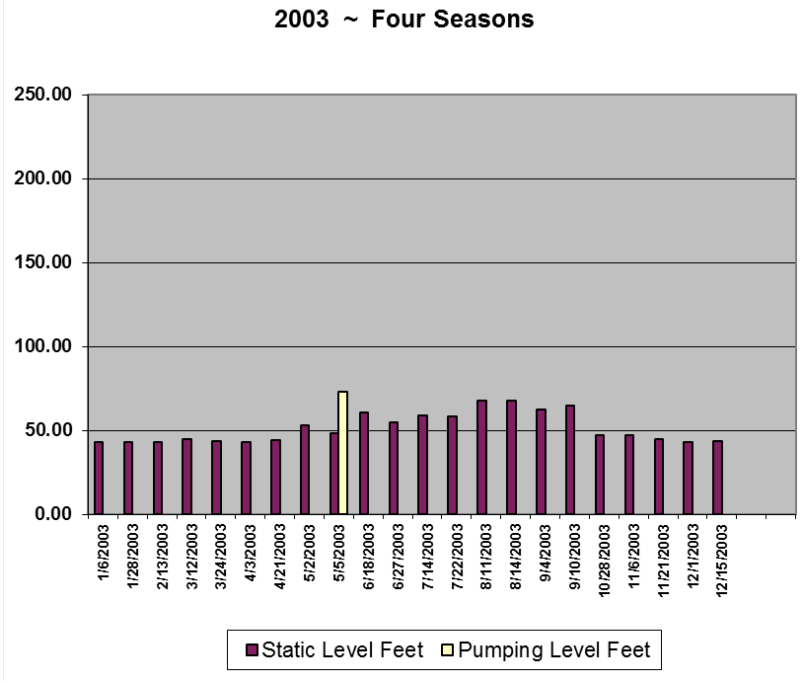


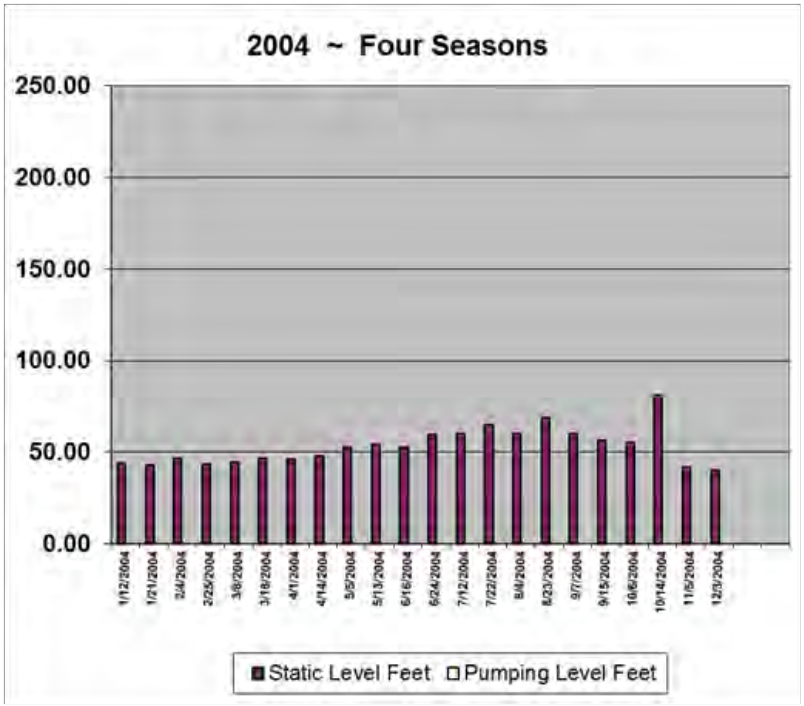

Four Seasons ~ 2002
250.00
200.00
150.00
100.00
50.00
0.00
5/2/2002
5/6/2002
5/20/2002
6/10/2002
6/26/2002
7/17/2002
7/22/2002
8/5/2002
8/19/2002
9/18/2002
9/27/2002
10/3/2002
10/21/2002
10/28/2002
11/6/2002
11/20/2002
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

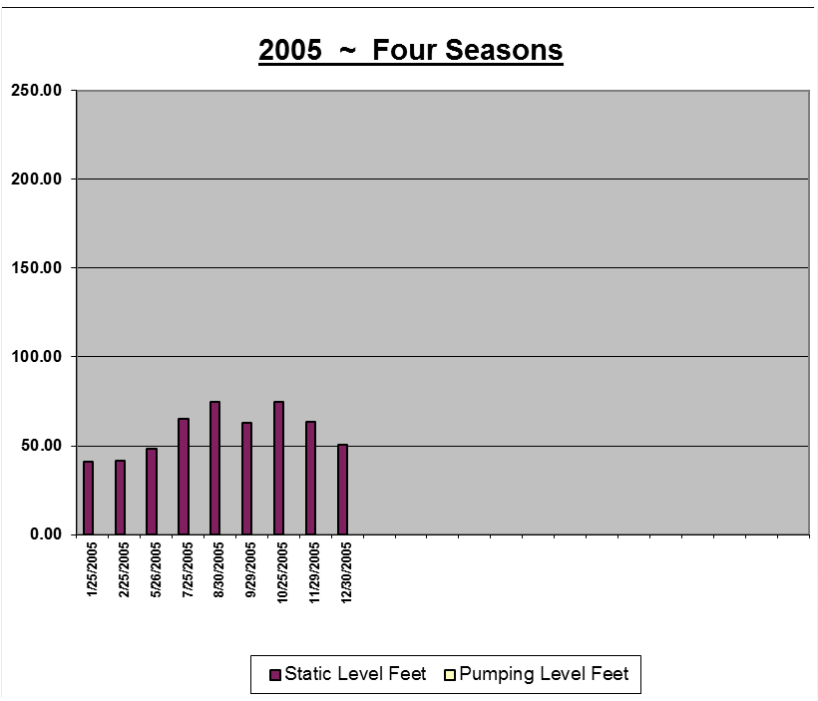

2003 ~ Four Seasons
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
1/28/2003
2/13/2003
3/12/2003
3/24/2003
4/3/2003
4/21/2003
5/2/2003
5/5/2003
6/18/2003
6/27/2003
7/14/2003
7/22/2003
8/11/2003
8/14/2003
9/4/2003
9/10/2003
10/28/2003
11/6/2003
11/21/2003
12/1/2003
12/15/2003
Static Level Feet
Pumping Level Feet

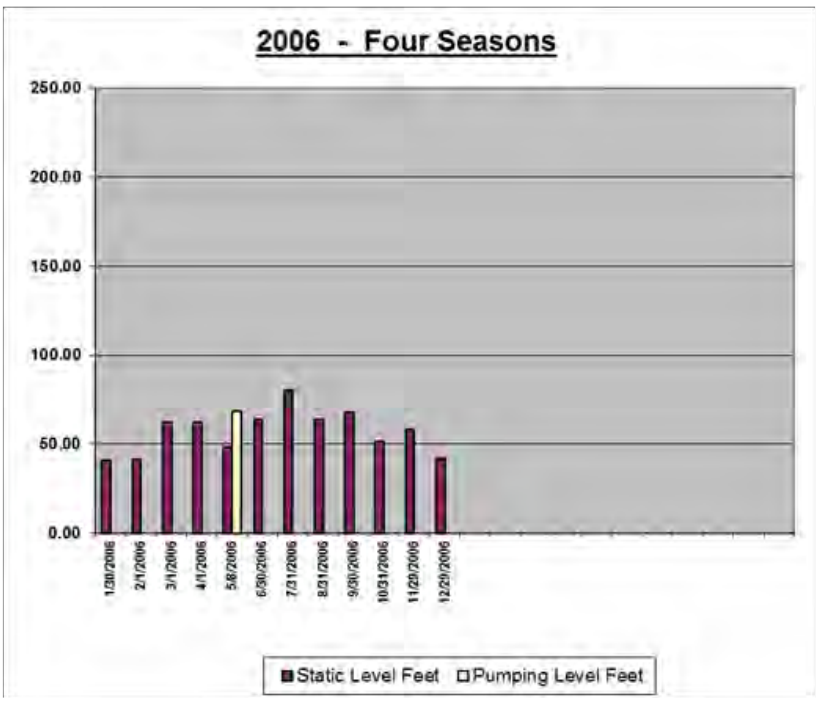

Four Seasons ~ 2002
250.00
200.00
150.00
100.00
50.00
0.00
5/2/2002
5/6/2002
5/20/2002
6/10/2002
6/26/2002
7/17/2002
7/22/2002
8/5/2002
8/19/2002
9/18/2002
9/27/2002
10/3/2002
10/21/2002
10/28/2002
11/6/2002
11/20/2002
12/2/2003
12/11/2003
Static Level Feet
Pumping Level Feet

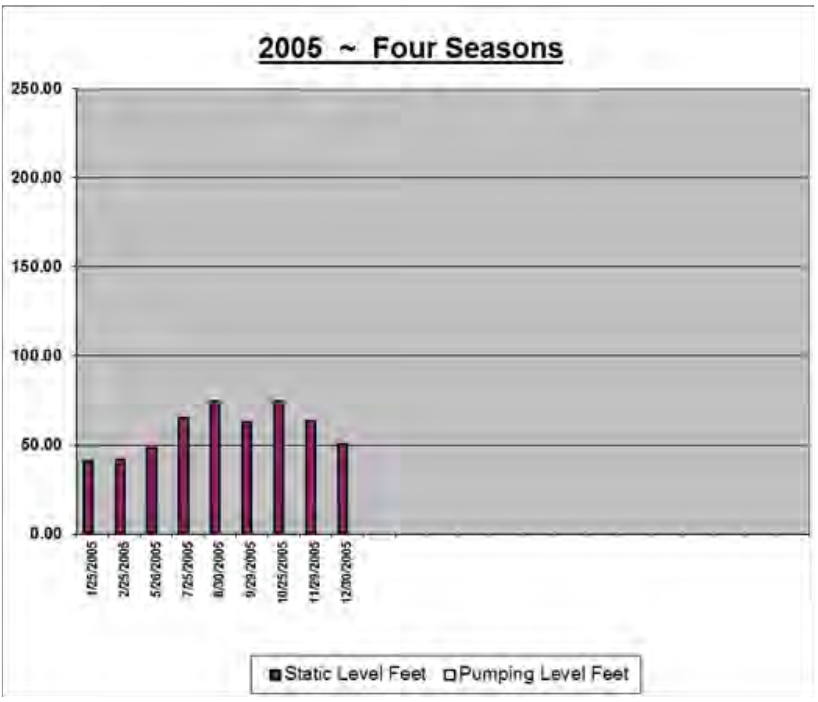

2004 ~ Four Seasons
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
2/4/2004
2/25/2004
3/8/2004
3/18/2004
4/1/2004
4/14/2004
5/5/2004
5/13/2004
6/16/2004
6/24/2004
7/12/2004
7/22/2004
8/4/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

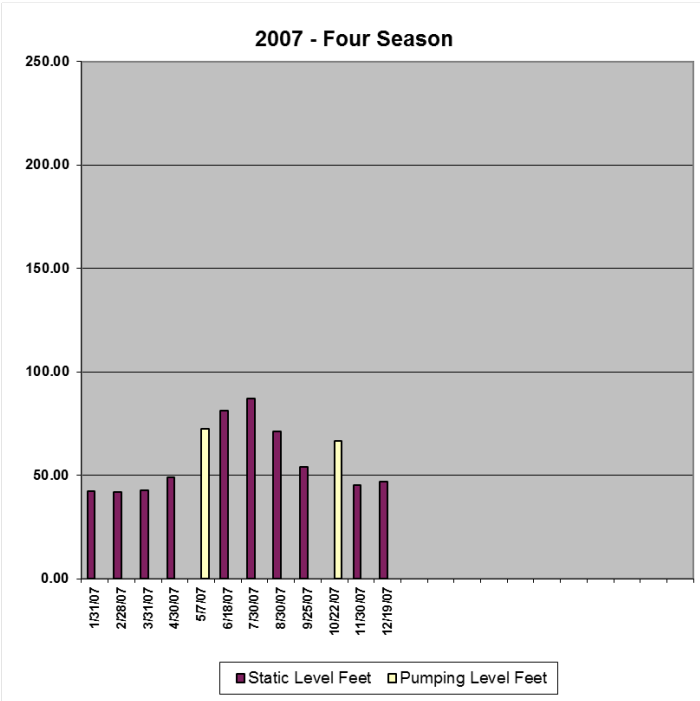

2003 ~ Four Seasons
250.00
200.00
150.00
100.00
50.00
0.00
1/6/2003
1/28/2003
2/13/2003
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3/24/2003
4/3/2003
4/21/2003
5/2/2003
5/5/2003
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8/14/2003
9/4/2003
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10/28/2003
11/6/2003
11/21/2003
12/1/2003
12/15/2003
Static Level Feet
Pumping Level Feet

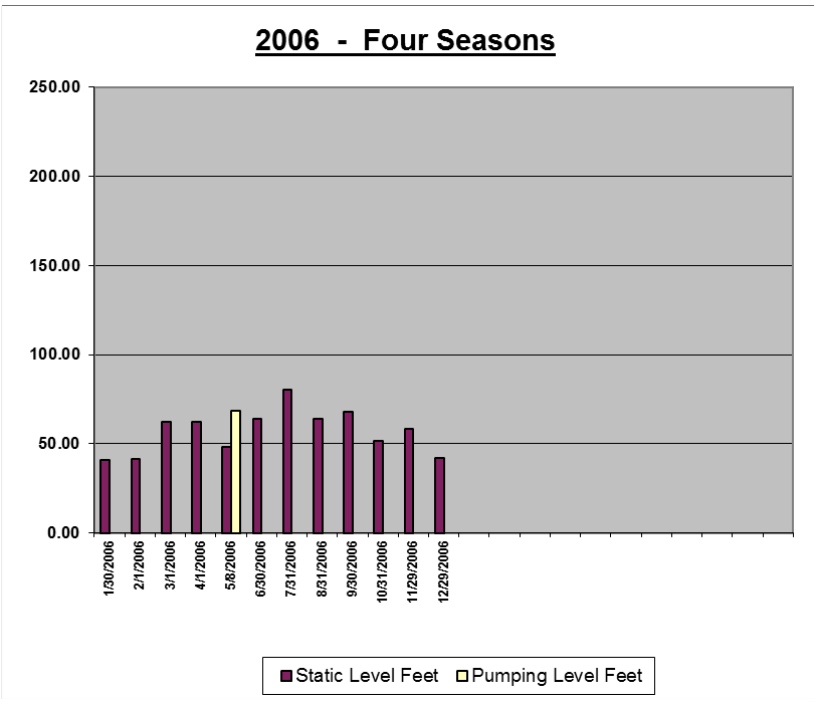

2004 ~ Four Seasons
250.00
200.00
150.00
100.00
50.00
0.00
1/12/2004
1/21/2004
2/4/2004
2/25/2004
3/8/2004
3/18/2004
4/1/2004
4/14/2004
5/5/2004
5/13/2004
6/16/2004
6/24/2004
7/12/2004
7/22/2004
8/4/2004
8/23/2004
9/7/2004
9/15/2004
10/6/2004
10/14/2004
11/5/2004
12/3/2004
Static Level Feet
Pumping Level Feet

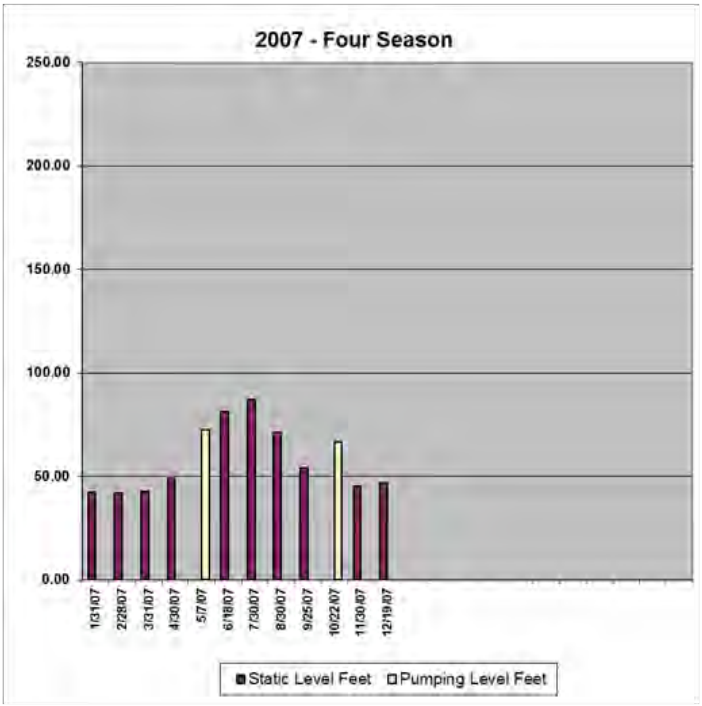

2005 ~ Four Seasons
250.00
200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
5/26/2005
7/25/2005
8/30/2005
9/29/2005
10/25/2005
11/29/2005
12/30/2005
Static Level Feet
Pumping Level Feet

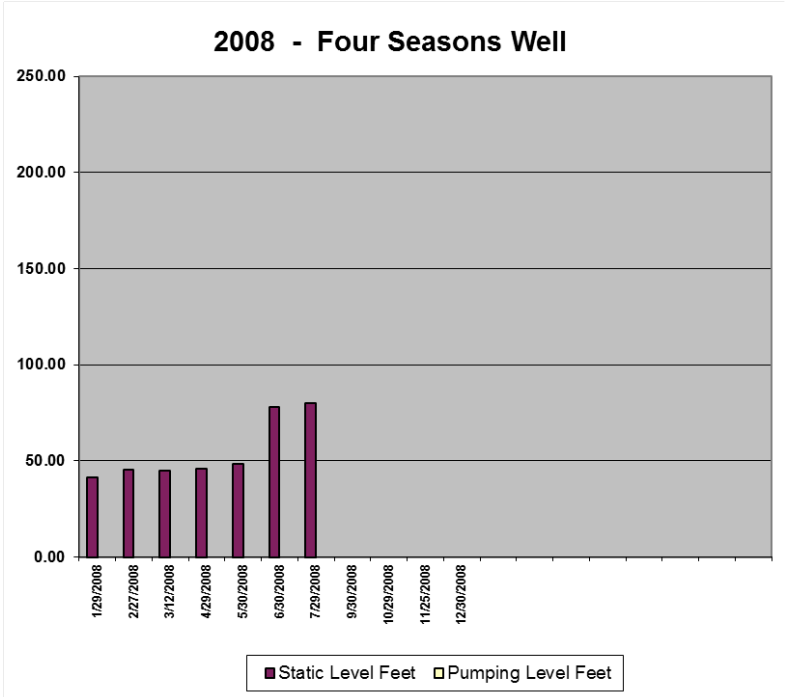

2006 - Four Seasons
250.00
200.00
150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/8/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

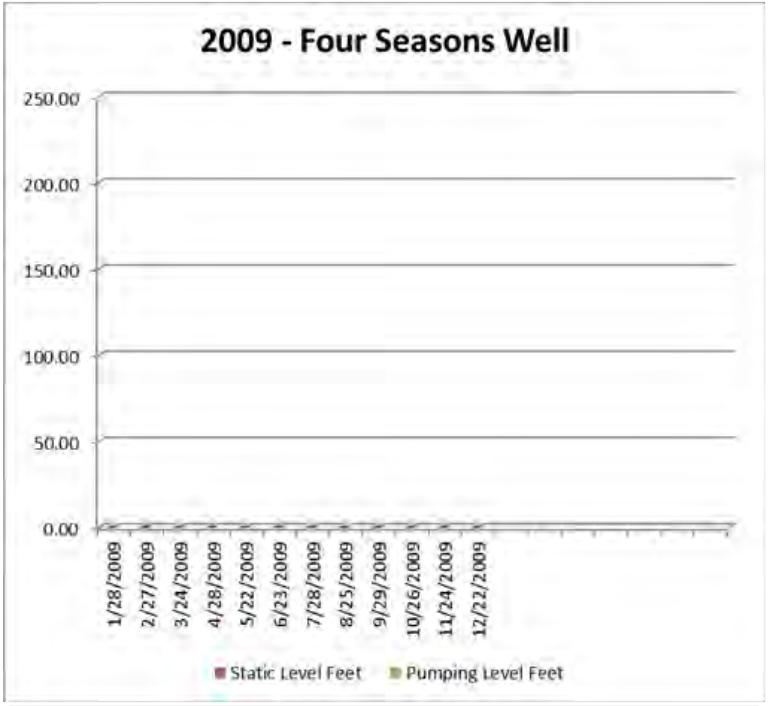

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200.00
150.00
100.00
50.00
0.00
1/25/2005
2/25/2005
5/26/2005
7/25/2005
8/30/2005
9/29/2005
10/25/2005
11/29/2005
12/30/2005
Static Level Feet
Pumping Level Feet

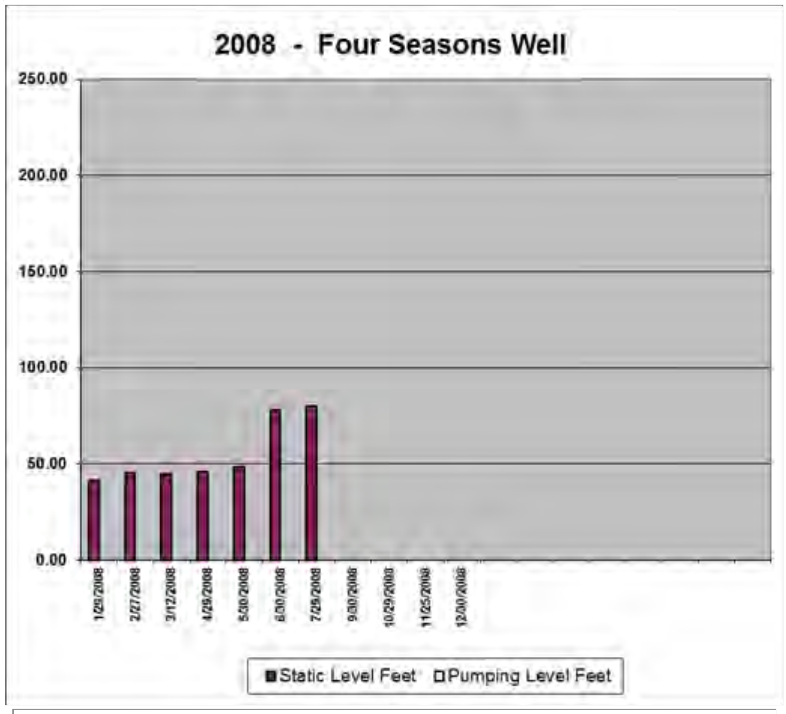

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200.00
150.00
100.00
50.00
0.00
1/31/07
2/28/07
3/31/07
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5/7/07
6/18/07
7/30/07
8/30/07
9/25/07
10/22/07
11/30/07
12/19/07
Static Level Feet
Pumping Level Feet

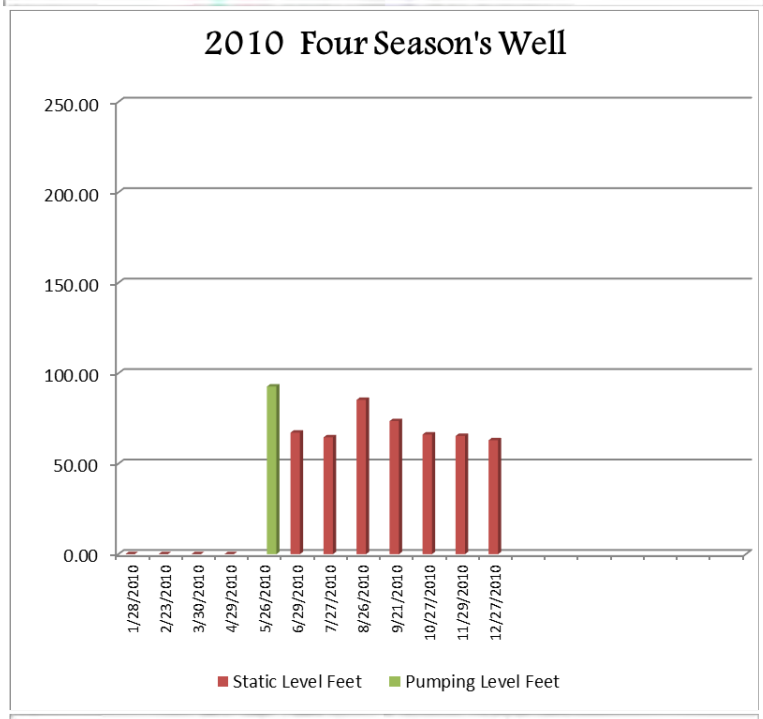

2006 - Four Seasons
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150.00
100.00
50.00
0.00
1/30/2006
2/1/2006
3/1/2006
4/1/2006
5/8/2006
6/30/2006
7/31/2006
8/31/2006
9/30/2006
10/31/2006
11/29/2006
12/29/2006
Static Level Feet
Pumping Level Feet

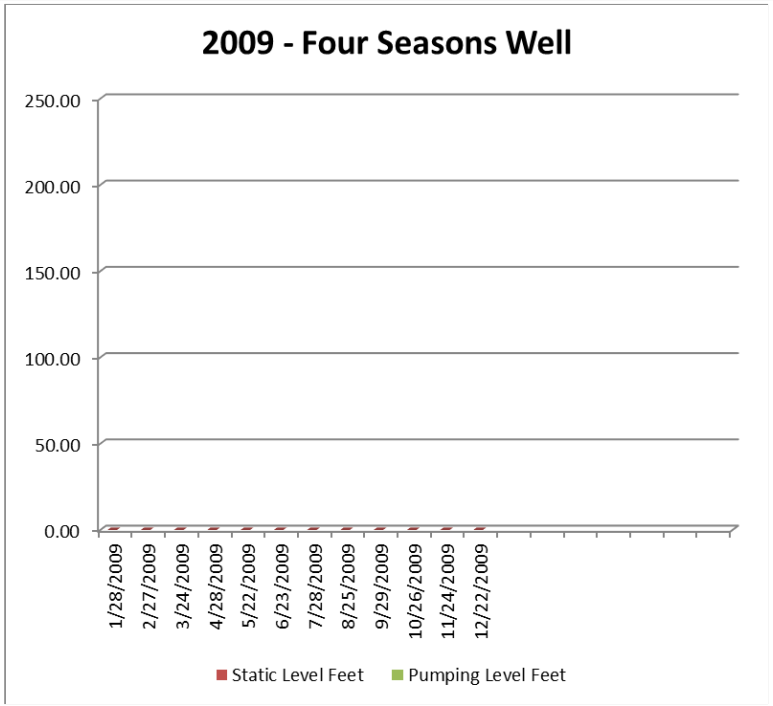

2007 - Four Season
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200.00
150.00
100.00
50.00
0.00
1/31/07
2/28/07
3/31/07
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5/7/07
6/18/07
7/30/07
8/30/07
9/25/07
10/22/07
11/30/07
12/19/07
Static Level Feet
Pumping Level Feet

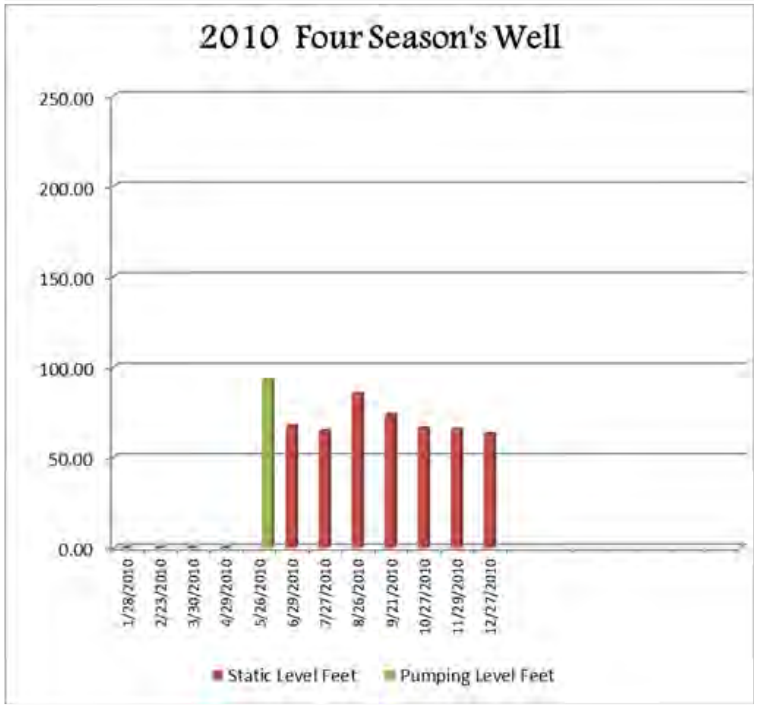

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150.00
100.00
50.00
0.00
1/29/2008
2/27/2008
3/12/2008
4/29/2008
5/30/2008
6/30/2008
7/29/2008
9/30/2008
10/29/2008
11/25/2008
12/30/2008
Static Level Feet
Pumping Level Feet

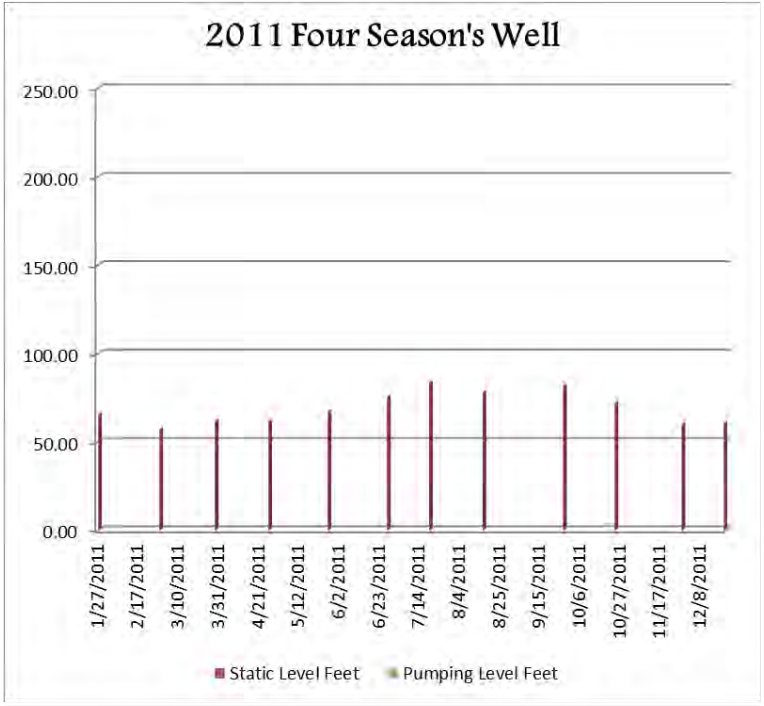

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200.00
150.00
100.00
50.00
0.00
1/28/2009
2/27/2009
3/24/2009
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5/22/2009
6/23/2009
7/28/2009
8/25/2009
9/29/2009
10/26/2009
11/24/2009
12/22/2009
Static Level Feet
Pumping Level Feet

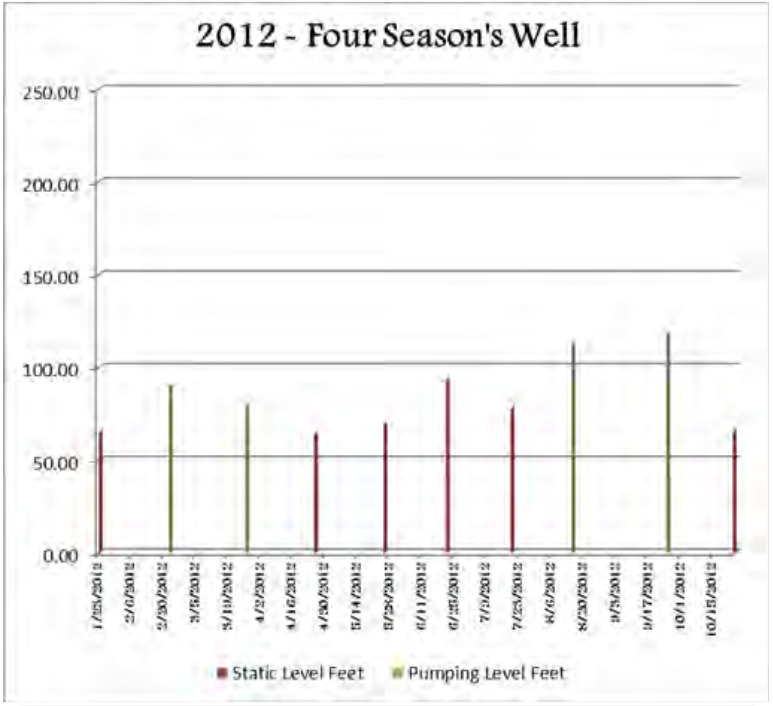

2008 - Four Seasons Well
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150.00
100.00
50.00
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Static Level Feet
Pumping Level Feet

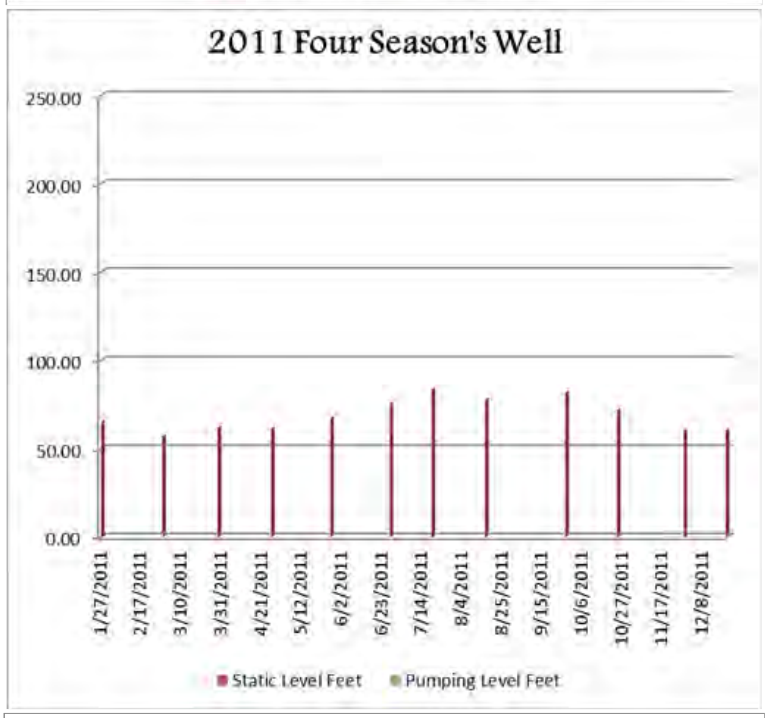

2010 Four Season's Well
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150.00
100.00
50.00
0.00
1/28/2010
2/23/2010
3/30/2010
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5/26/2010
6/29/2010
7/27/2010
8/26/2010
9/21/2010
10/27/2010
11/29/2010
12/27/2010
Static Level Feet
Pumping Level Feet

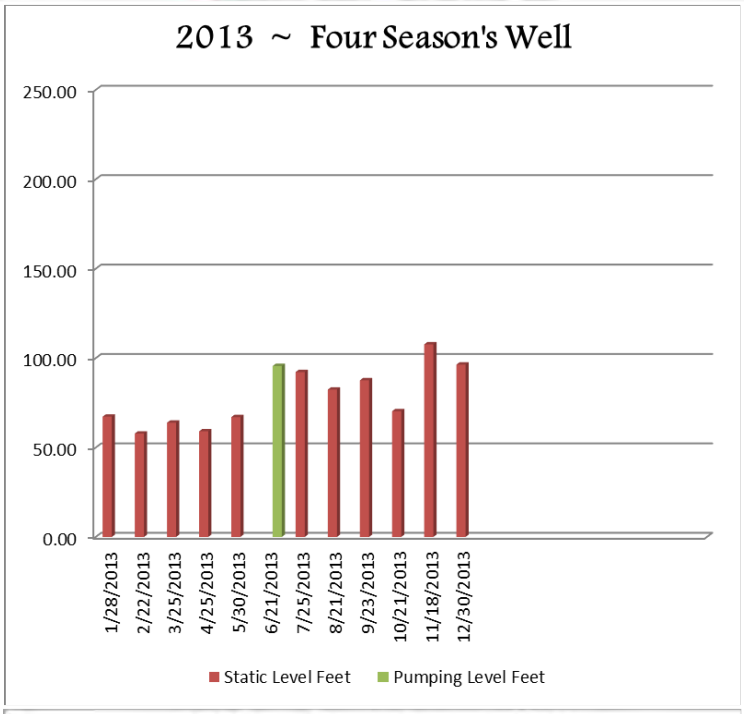

2009 - Four Seasons Well
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150.00
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50.00
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1/28/2009
2/27/2009
3/24/2009
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5/22/2009
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Static Level Feet
Pumping Level Feet

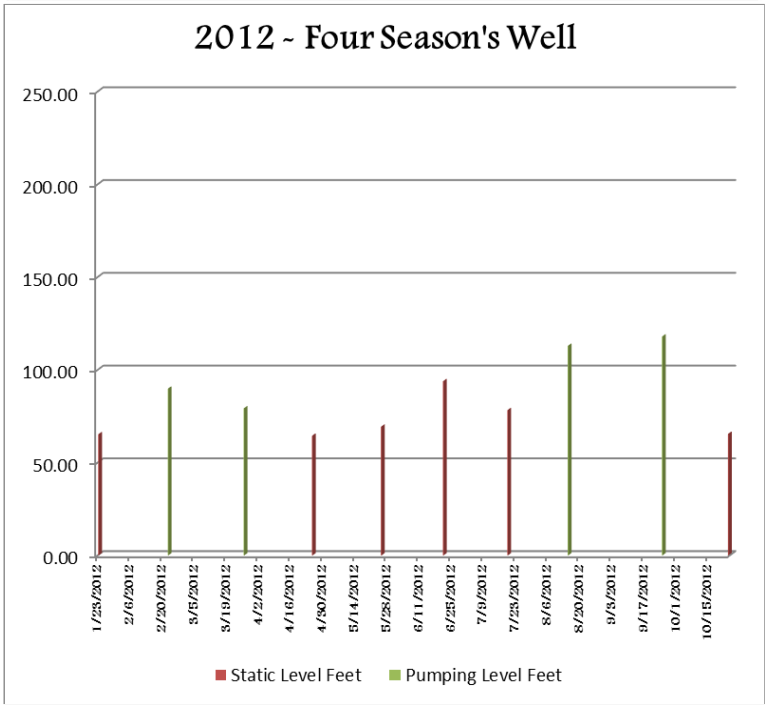

2010 Four Season's Well
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50.00
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1/28/2010
2/23/2010
3/30/2010
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5/26/2010
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12/27/2010
Static Level Feet
Pumping Level Feet

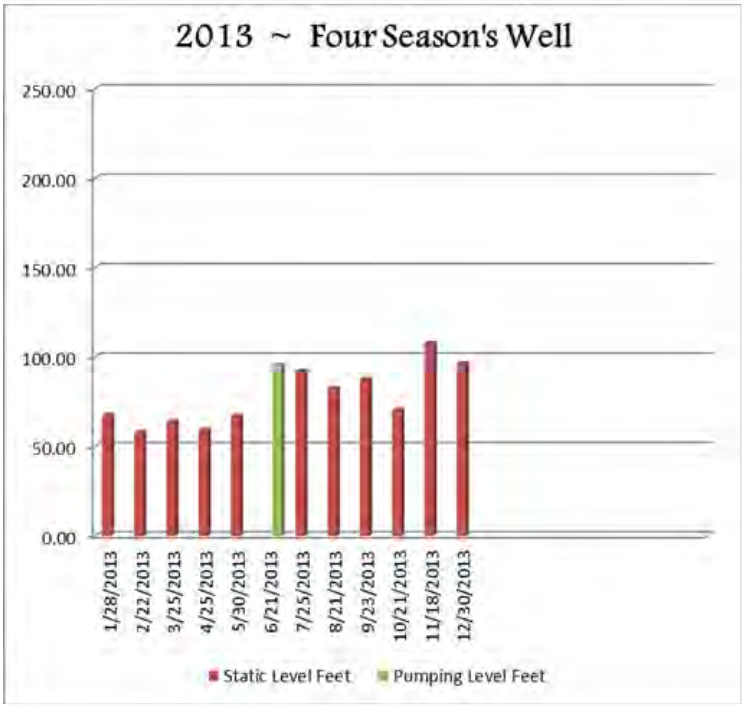

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150.00
100.00
50.00
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2/17/2011
3/10/2011
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5/12/2011
6/2/2011
6/23/2011
7/14/2011
8/4/2011
8/25/2011
9/15/2011
10/6/2011
10/27/2011
11/17/2011
12/8/2011
Static Level Feet
Pumping Level Feet

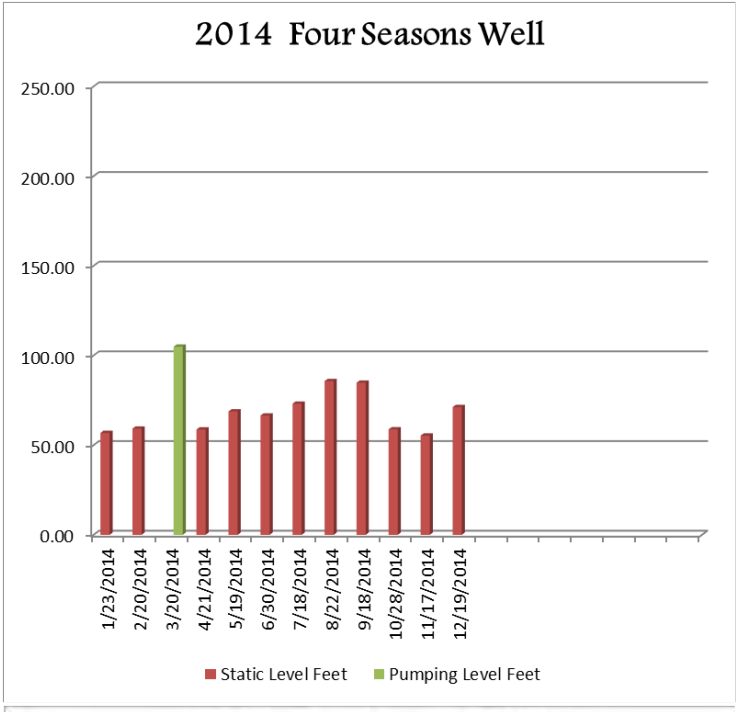

2012 - Four Season's Well
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150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

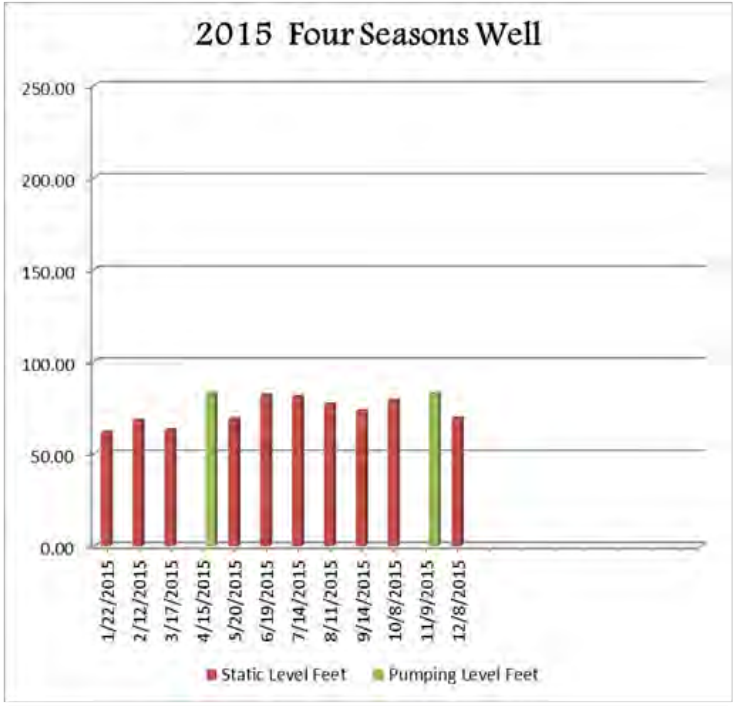

2011 Four Season's Well
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150.00
100.00
50.00
0.00
1/27/2011
2/17/2011
3/10/2011
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4/21/2011
5/12/2011
6/2/2011
6/23/2011
7/14/2011
8/4/2011
8/25/2011
9/15/2011
10/6/2011
10/27/2011
11/17/2011
12/8/2011
Static Level Feet
Pumping Level Feet

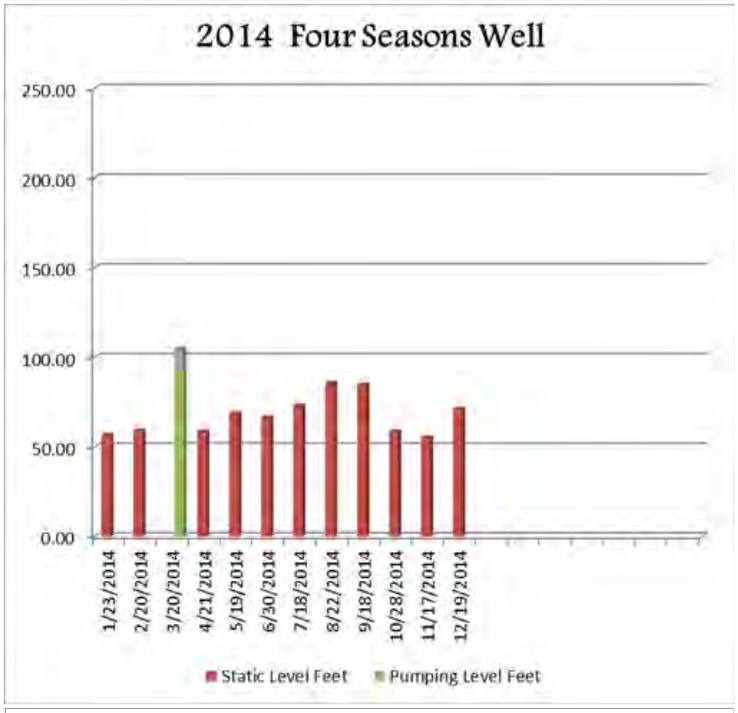

2013 ~ Four Season's Well
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200.00
150.00
100.00
50.00
0.00
1/28/2013
2/22/2013
3/25/2013
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5/30/2013
6/21/2013
7/25/2013
8/21/2013
9/23/2013
10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

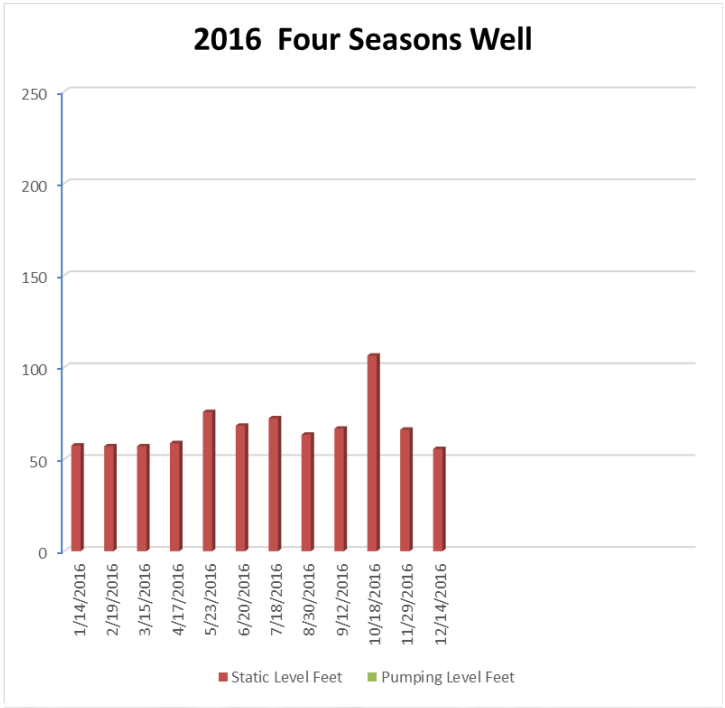

2012 - Four Season's Well
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200.00
150.00
100.00
50.00
0.00
Static Level Feet
Pumping Level Feet

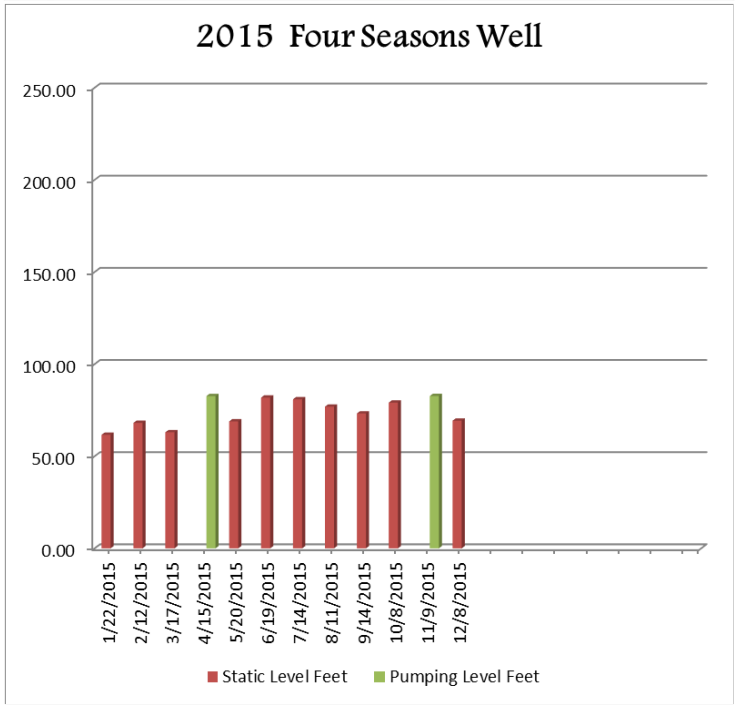

2013 ~ Four Season's Well
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150.00
100.00
50.00
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1/28/2013
2/22/2013
3/25/2013
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5/30/2013
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8/21/2013
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10/21/2013
11/18/2013
12/30/2013
Static Level Feet
Pumping Level Feet

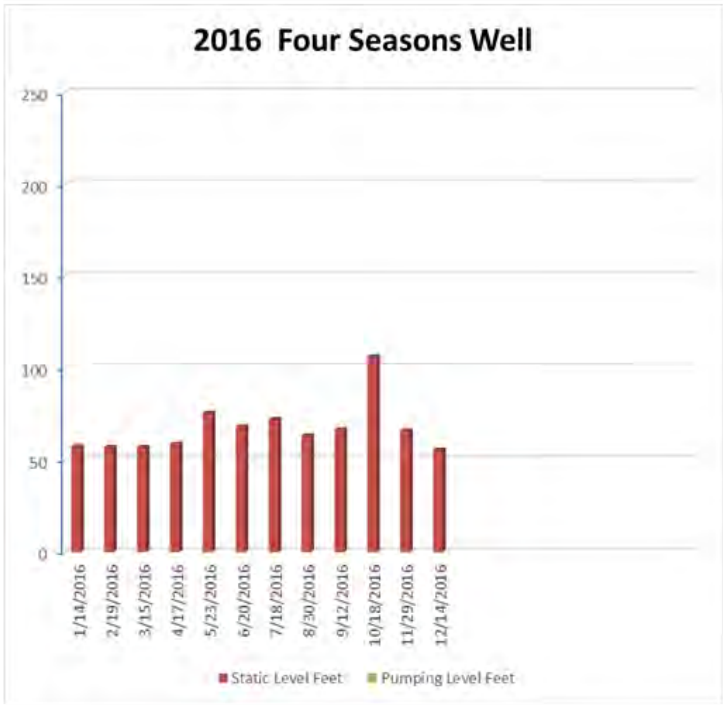

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100.00
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1/23/2014
2/20/2014
3/20/2014
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5/19/2014
6/30/2014
7/18/2014
8/22/2014
9/18/2014
10/28/2014
11/17/2014
12/19/2014
Static Level Feet
Pumping Level Feet

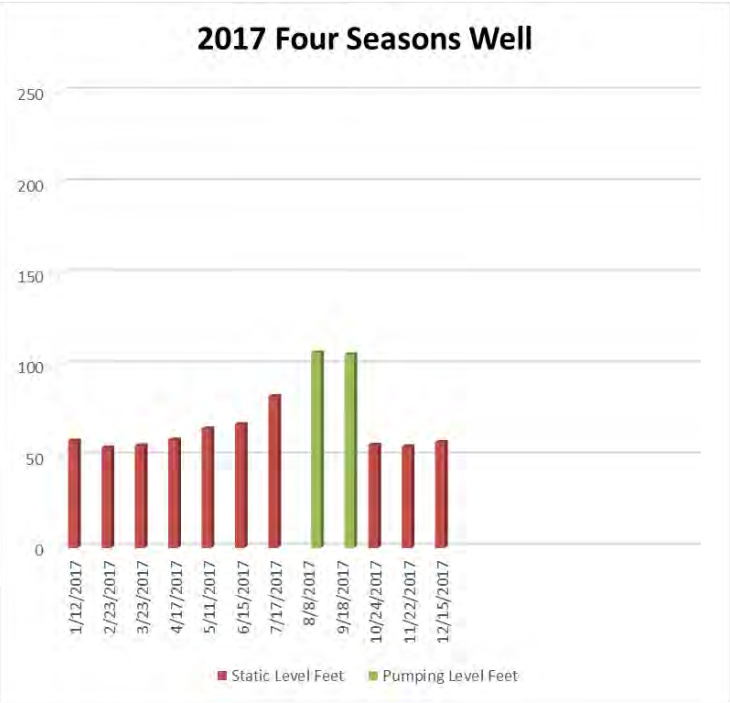

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200.00
150.00
100.00
50.00
0.00
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2/12/2015
3/17/2015
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5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet

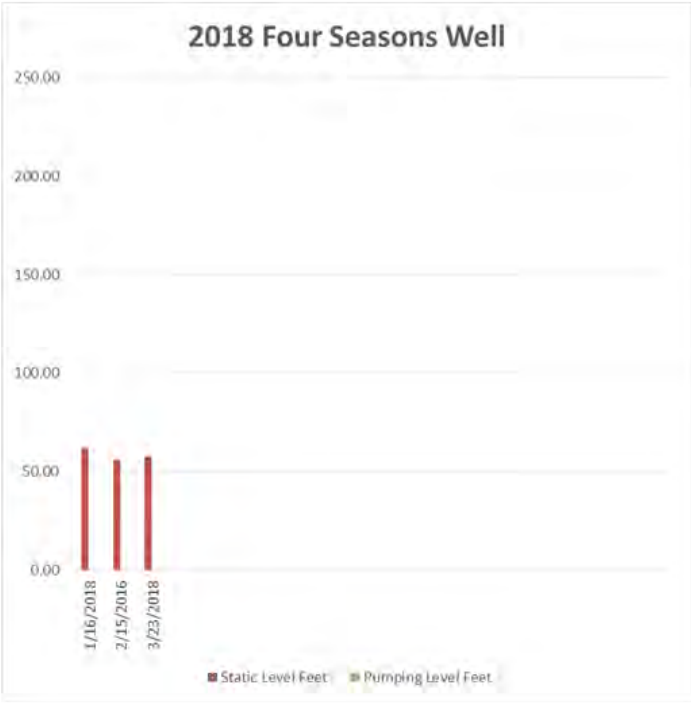

2014 Four Seasons Well
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200.00
150.00
100.00
50.00
0.00
1/23/2014
2/20/2014
3/20/2014
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5/19/2014
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11/17/2014
12/19/2014
Static Level Feet
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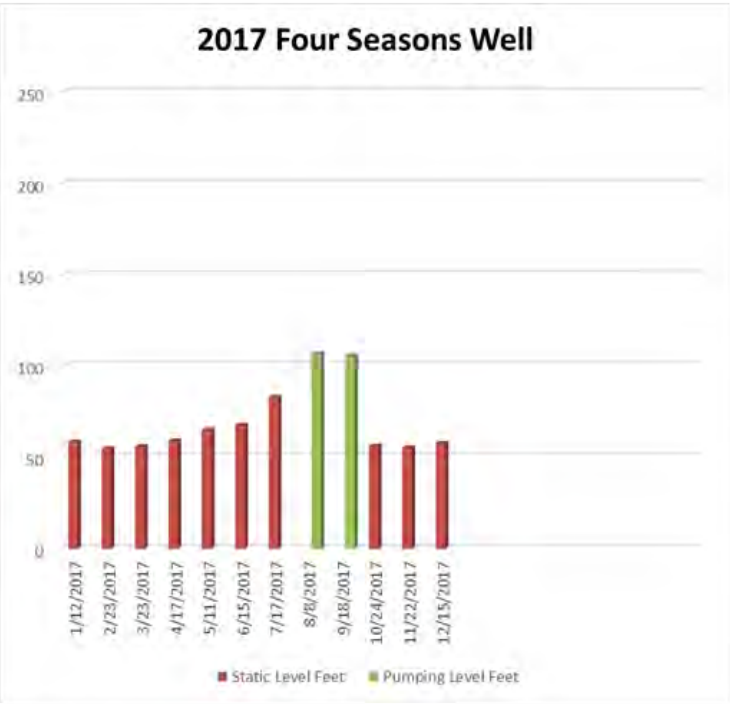

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250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet

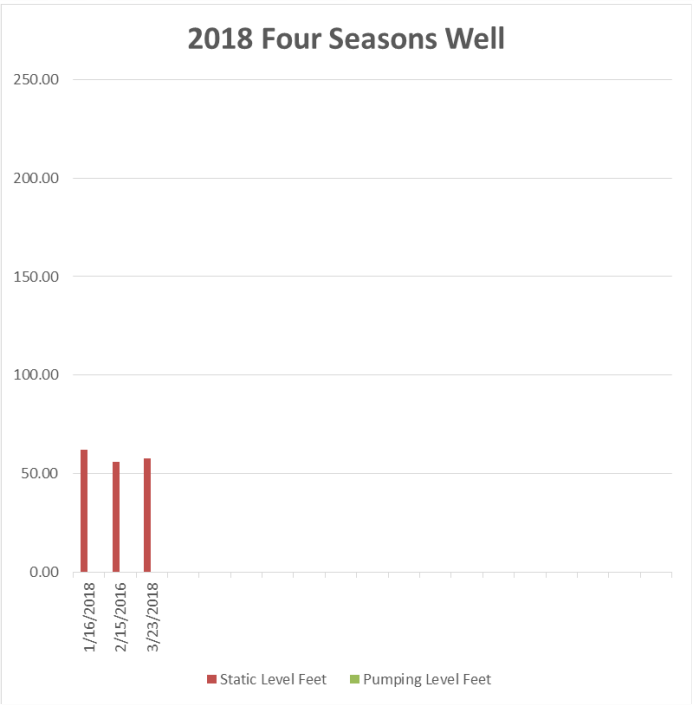

2015 Four Seasons Well
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200.00
150.00
100.00
50.00
0.00
1/22/2015
2/12/2015
3/17/2015
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5/20/2015
6/19/2015
7/14/2015
8/11/2015
9/14/2015
10/8/2015
11/9/2015
12/8/2015
Static Level Feet
Pumping Level Feet


2016 Four Seasons Well
250
200
150
100
50
0
1/14/2016
2/19/2016
3/15/2016
4/17/2016
5/23/2016
6/20/2016
7/18/2016
8/30/2016
9/12/2016
10/18/2016
11/29/2016
12/14/2016
Static Level Feet
Pumping Level Feet


2017 Four Seasons Well
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet


2018 Four Seasons Well
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2016
3/23/2018
Static Level Feet
Pumping Level Feet


2017 Four Seasons Well
250
200
150
100
50
0
1/12/2017
2/23/2017
3/23/2017
4/17/2017
5/11/2017
6/15/2017
7/17/2017
8/8/2017
9/18/2017
10/24/2017
11/22/2017
12/15/2017
Static Level Feet
Pumping Level Feet


2018 Four Seasons Well
250.00
200.00
150.00
100.00
50.00
0.00
1/16/2018
2/15/2016
3/23/2018
Static Level Feet
Pumping Level Feet

## Appendix 4 – Capital Improvement Plan

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| **ADMINISTRATIVE SERVICES** | | | | | | | | |
| **Information Technology** | | | | | | | | |
| IT-15-0011 | Replace Permitting System | 2015 | 375,000 | 0 | 0 | 0 | 0 | 375,000 |
| IT-16-0005 | VDI - Virtual Desktop Infrastructure | 2016 | 50,000 | 0 | 0 | 0 | 0 | 50,000 |
| IT-16-0010 | Fiberoptics Interconnections | 2016 | 80,000 | 80,000 | 80,000 | 80,000 | 0 | 320,000 |
| IT-17-0001 | Replace Production Image Scanners | 2014 | 27,000 | 0 | 0 | 0 | 0 | 27,000 |
| IT-17-0002 | Squad Car Printer Replacement | 2016 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| IT-17-0003 | Public Safety Body Cameras | 2016 | 0 | 250,000 | 0 | 0 | 0 | 250,000 |
| IT-17-0007 | Switch Upgrades | 2017 | 30,000 | 30,000 | 30,000 | 0 | 0 | 90,000 |
| IT-17-0008 | Camera System Upgrades | 2017 | 40,000 | 40,000 | 40,000 | 0 | 0 | 120,000 |
| IT-17-0009 | Phone System Upgrades | 2017 | 30,000 | 30,000 | 0 | 0 | 0 | 60,000 |
| IT-18-0001 | UPS Server Room Upgrade | 2017 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| IT-18-0004 | Laserfiche licensing web forms | 2018 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| IT-18-0005 | Firewall replacement | 2018 | 100,000 | 100,000 | 0 | 0 | 0 | 200,000 |
| IT-19-0001 | PureStorage Expansion | 2018 | 0 | 100,000 | 0 | 0 | 0 | 100,000 |
| IT-19-0002 | Public Safety Dell Isilon Expansion | 2018 | 0 | 80,000 | 0 | 80,000 | 0 | 160,000 |
| IT-19-0003 | Public Safety Squad Car Computer/Camera upgrade | 2018 | 0 | 230,000 | 0 | 0 | 0 | 230,000 |
| **Total: Information Technology** | | | **$822,000** | **$940,000** | **$150,000** | **$160,000** | **$0** | **$2,072,000** |
| **TOTAL: ADMINISTRATIVE SERVICES** | | | **$822,000** | **$940,000** | **$150,000** | **$160,000** | **$0** | **$2,072,000** |
| **PARKS AND RECREATION** | | | | | | | | |
| **Ice Center** | | | | | | | | |
| IC-13-0001 | Replace Ice Center Zambonis | 2013 | 0 | 150,000 | 0 | 0 | 0 | 150,000 |
| IC-14-0003 | Replace Ice Center Dehumidifier Desiccant Wheels | 2013 | 0 | 0 | 40,000 | 0 | 0 | 40,000 |
| IC-16-0001 | Replace Ice Center Roof Top Air Handler | 2013 | 70,000 | 0 | 0 | 225,000 | 0 | 295,000 |
| IC-16-0002 | Replace Ice Center Roof | 2013 | 720,000 | 0 | 0 | 0 | 0 | 720,000 |
| IC-16-0003 | RUPP Roof Air-Exchange/Handler | 2014 | 125,000 | 0 | 0 | 0 | 0 | 125,000 |
| IC-17-0001 | Replace Ice Center Dasher Boards | 2013 | 0 | 140,000 | 0 | 0 | 0 | 140,000 |
| IC-18-0001 | Replace Ice Center Scoreboards | 2014 | 40,000 | 0 | 0 | 0 | 0 | 40,000 |
| IC-18-0002 | LED Lighting | 2018 | 180,000 | 0 | 0 | 0 | 0 | 180,000 |
| IC-18-003 | Low E-Ceilings | 2018 | 144,000 | 0 | 0 | 0 | 0 | 144,000 |

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| IC-20-0001 | Replace Cooling Towers at Plymouth Ice Center | 2016 | 0 | 0 | 150,000 | 0 | 0 | 150,000 |
| **Total: Ice Center** | | | **$1,279,000** | **$290,000** | **$190,000** | **$225,000** | **$0** | **$1,984,000** |
| **Parks & Rec Admin** | | | | | | | | |
| PR-07-0003 | Land Acquisition | 2003 | 500,000 | 500,000 | 0 | 0 | 0 | 1,000,000 |
| PR-07-0005 | Replace Irrigation Systems | 2003 | 0 | 0 | 375,000 | 252,000 | 225,500 | 852,500 |
| PR-10-0004 | Add/Replace Outdoor Hockey Rinks | 2006 | 0 | 150,000 | 300,000 | 0 | 175,000 | 625,000 |
| PR-13-0001 | Neighborhood Parks | 2012 | 420,000 | 500,000 | 0 | 500,000 | 0 | 1,420,000 |
| PR-14-0003 | Replace Miscellaneous Boardwalks | 2010 | 150,000 | 80,000 | 90,000 | 0 | 0 | 320,000 |
| PR-14-0004 | Tennis Court Repair | 2012 | 0 | 0 | 250,000 | 0 | 275,000 | 525,000 |
| PR-14-0005 | Northwest Greenway Trail | 2012 | 1,200,000 | 2,500,000 | 1,600,000 | 2,500,000 | 0 | 7,800,000 |
| PR-15-0002 | Parking Lot Repair/Replacement | 2012 | 200,000 | 0 | 300,000 | 0 | 0 | 500,000 |
| PR-15-0003 | Outdoor Turf Field | 2012 | 0 | 0 | 0 | 1,000,000 | 0 | 1,000,000 |
| PR-16-0002 | Park Lighting | 2016 | 100,000 | 0 | 120,000 | 0 | 0 | 220,000 |
| PR-16-0003 | Electronic Reader Board Repair/Renovation | 2016 | 75,000 | 0 | 0 | 0 | 0 | 75,000 |
| PR-17-0001 | Park Building Renovation and Repair | 2016 | 900,000 | 35,000 | 500,000 | 0 | 0 | 1,435,000 |
| PR-20-0001 | 10th Playfield Land Development | 2016 | 0 | 0 | 0 | 0 | 4,000,000 | 4,000,000 |
| PR-XX-9001 | New Trails | 2003 | 450,000 | 250,000 | 0 | 375,000 | 0 | 1,075,000 |
| PR-XX-9002 | Trail Repair | 2003 | 210,000 | 300,000 | 300,000 | 400,000 | 400,000 | 1,610,000 |
| PR-XX-9003 | Playground Replacement or Renovation | 2006 | 260,000 | 350,000 | 500,000 | 400,000 | 270,000 | 1,780,000 |
| PR-XX-9004 | Miscellaneous Park Improvements | 2006 | 0 | 75,000 | 75,000 | 100,000 | 100,000 | 350,000 |
| **Total: Parks & Rec Admin** | | | **$4,465,000** | **$4,740,000** | **$4,410,000** | **$5,527,000** | **$5,445,500** | **$24,587,500** |
| **Plymouth Creek Activity Center** | | | | | | | | |
| PR-18-0001 | Plymouth Creek Center Renovation & Expansion | 2018 | 0 | 0 | 0 | 0 | 25,000,000 | 25,000,000 |
| **Total: Plymouth Creek Activity Center** | | | **$0** | **$0** | **$0** | **$0** | **$25,000,000** | **$25,000,000** |
| **TOTAL: PARKS AND RECREATION** | | | **$5,744,000** | **$5,030,000** | **$4,600,000** | **$5,752,000** | **$30,445,500** | **$51,571,500** |
| **PUBLIC WORKS** | | | | | | | | |
| **Central Services - Central Equipment** | | | | | | | | |
| CE-11-0230 | Street Sweeper | 2007 | 210,000 | 0 | 0 | 0 | 0 | 210,000 |
| CE-11-0319 | Air Compressor | 2007 | 38,000 | 0 | 0 | 0 | 0 | 38,000 |
| CE-12-0237 | Back Hoe | 2008 | 0 | 150,000 | 0 | 0 | 0 | 150,000 |
| CE-12-0275 | Single Axle Plow with Sander | 2008 | 230,000 | 0 | 0 | 0 | 0 | 230,000 |
| CE-12-237A | Hammer for Back Hoe | 2008 | 0 | 30,000 | 0 | 0 | 0 | 30,000 |
| CE-13-0238 | Motorgrader | 2009 | 0 | 0 | 308,000 | 0 | 0 | 308,000 |

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| CE-13-0283 | Single Axle Plow with Sander | 2009 | 230,000 | 0 | 0 | 0 | 0 | 230,000 |
| CE-13-0404 | Engineering All Wheel Drive Van | 2011 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| CE-13-0590 | Chipper Truck | 2009 | 85,000 | 0 | 0 | 0 | 0 | 85,000 |
| CE-13-0592 | One Ton Truck with Plow | 2009 | 0 | 75,000 | 0 | 0 | 0 | 75,000 |
| CE-13-0595 | 3/4 Ton Pickup With Irrigation Utility Box | 2011 | 0 | 41,000 | 0 | 0 | 0 | 41,000 |
| CE-14-0228 | Excavator | 2015 | 0 | 0 | 0 | 220,000 | 0 | 220,000 |
| CE-14-0279 | Single Axle Plow with Sander | 2013 | 0 | 240,000 | 0 | 0 | 0 | 240,000 |
| CE-14-0402 | Engineering 1/2 Ton 4X4 Pickup | 2010 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| CE-15-0205 | Remote Sheepsfoot Trench Compactor | 2012 | 0 | 0 | 42,000 | 0 | 0 | 42,000 |
| CE-16-0303 | Hydro-Seeder | 2012 | 0 | 35,000 | 0 | 0 | 0 | 35,000 |
| CE-16-1700 | Building Inspections Pickup | 2012 | 28,000 | 0 | 0 | 0 | 0 | 28,000 |
| CE-16-1705 | Police CSO 1/2 Ton Pickup | 2012 | 0 | 0 | 30,000 | 0 | 0 | 30,000 |
| CE-17-0225 | Excavator | 2013 | 0 | 0 | 150,000 | 0 | 0 | 150,000 |
| CE-17-0333 | Back Hoe | 2013 | 0 | 0 | 0 | 200,000 | 0 | 200,000 |
| CE-17-0575 | One Ton Truck with Lift Gate | 2013 | 0 | 80,000 | 0 | 0 | 0 | 80,000 |
| CE-17-0596 | One Ton 4X4 with Plow and Lift Gate | 2013 | 0 | 78,000 | 0 | 0 | 0 | 78,000 |
| CE-17-1703 | Building Inspection Pickup 4X4 | 2013 | 0 | 28,000 | 0 | 0 | 0 | 28,000 |
| CE-17-1717 | Police CSO 1/2 Ton Pickup | 2013 | 36,468 | 0 | 0 | 0 | 0 | 36,468 |
| CE-18-0033 | Engineering SUV | 2014 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| CE-18-0198 | Minivan | 2016 | 0 | 0 | 30,000 | 0 | 0 | 30,000 |
| CE-18-0203 | 2000 Wheel Loader w/plow | 2014 | 300,000 | 0 | 0 | 0 | 0 | 300,000 |
| CE-18-0325 | 1990 25 KW Generator | 2016 | 0 | 30,000 | 0 | 0 | 0 | 30,000 |
| CE-18-0360 | One Ton with Plow and Contractor Box | 2014 | 85,000 | 0 | 0 | 0 | 0 | 85,000 |
| CE-18-0364 | Jetter Truck | 2014 | 200,800 | 0 | 0 | 0 | 0 | 200,800 |
| CE-18-0365 | One Ton Truck with Lift Gate | 2014 | 74,000 | 0 | 0 | 0 | 0 | 74,000 |
| CE-18-0598 | One Ton 4X4 with Plow | 2014 | 0 | 80,000 | 0 | 0 | 0 | 80,000 |
| CE-18-1000 | Police Squad Cars (7) | 2014 | 280,000 | 0 | 0 | 0 | 0 | 280,000 |
| CE-18-1719 | Police CSO 1/2 Ton Pickup | 2016 | 0 | 32,000 | 0 | 0 | 0 | 32,000 |
| CE-18-2000 | One Ton Truck with Plow | 2014 | 0 | 79,000 | 0 | 0 | 0 | 79,000 |
| CE-18-200X | Tandem Axle Truck for Hauling | 2016 | 172,000 | 0 | 0 | 0 | 0 | 172,000 |
| CE-18-3022 | Jetter Vac | 2014 | 32,800 | 0 | 0 | 0 | 0 | 32,800 |
| CE-18-5002 | Wood Chipper | 2014 | 55,400 | 0 | 0 | 0 | 0 | 55,400 |
| CE-18-5003 | Forestry Pickup | 2014 | 26,400 | 0 | 0 | 0 | 0 | 26,400 |
| CE18-700x | Portable hoists (6) units | 2018 | 62,000 | 0 | 0 | 0 | 0 | 62,000 |
| CE-19-0285 | Tandem Axle Plow with Sander | 2015 | 0 | 270,000 | 0 | 0 | 0 | 270,000 |
| CE-19-0367 | Televising Van | 2015 | 0 | 214,000 | 0 | 0 | 0 | 214,000 |
| CE-19-0700 | Fork Lift 6000 Pound Capacity | 2015 | 0 | 36,500 | 0 | 0 | 0 | 36,500 |

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| CE-19-1000 | Police Squad Cars (7) | 2015 | 0 | 301,000 | 0 | 0 | 0 | 301,000 |
| CE-19-2004 | Steel Drum Roller 6500lbs | 2015 | 0 | 50,500 | 0 | 0 | 0 | 50,500 |
| CE-19-5005 | 3/4 Ton Pickup with Plow | 2015 | 0 | 39,500 | 0 | 0 | 0 | 39,500 |
| CE-19-5006 | 3/4 Ton Pickup with Plow | 2015 | 0 | 0 | 42,000 | 0 | 0 | 42,000 |
| CE-20-0217 | 4 Inch Pump | 2016 | 0 | 0 | 40,000 | 0 | 0 | 40,000 |
| CE-20-0239 | 2005 Air Compressor | 2016 | 0 | 0 | 31,000 | 0 | 0 | 31,000 |
| CE-20-0286 | Tandem Axle Dump Truck with Sander | 2016 | 0 | 0 | 280,000 | 0 | 0 | 280,000 |
| CE-20-0287 | Tandem Axle Truck with Sander | 2016 | 0 | 0 | 280,000 | 0 | 0 | 280,000 |
| CE-20-0353 | Step Van for Excavations | 2016 | 0 | 0 | 81,000 | 0 | 0 | 81,000 |
| CE-20-0368 | 3/4 Ton Pickup 4x4 | 2016 | 0 | 0 | 34,000 | 0 | 0 | 34,000 |
| CE-20-1706 | 2010 Police Investigations SUV | 2016 | 0 | 0 | 30,000 | 0 | 0 | 30,000 |
| CE-20-1707 | Police Investigation Vehicle | 2016 | 0 | 0 | 29,000 | 0 | 0 | 29,000 |
| CE-20-2006 | 3/4 Ton Pickup 4x4 with Plow | 2016 | 0 | 0 | 38,000 | 0 | 0 | 38,000 |
| CE-20-4003 | Minivan | 2016 | 0 | 0 | 28,000 | 0 | 0 | 28,000 |
| CE-20-5008 | 3/4 Ton Pickup 4x4 with Plow | 2016 | 0 | 0 | 41,000 | 0 | 0 | 41,000 |
| CE-20-5009 | 3/4 Ton Pickup 4X4 with Plow | 2016 | 0 | 0 | 41,000 | 0 | 0 | 41,000 |
| CE-20-500X | Park Maintenance 5115M Utility Tractor | 2016 | 140,000 | 0 | 0 | 0 | 0 | 140,000 |
| CE-20-5011 | Cargo Van | 2016 | 0 | 0 | 30,000 | 0 | 0 | 30,000 |
| CE-20-5015 | Mower 16' | 2016 | 0 | 0 | 112,300 | 0 | 0 | 112,300 |
| CE-20-5016 | Mower 6' | 2016 | 0 | 0 | 53,000 | 0 | 0 | 53,000 |
| CE-21-0031 | Aerial 100 Platform Fire Truck | 2017 | 0 | 0 | 0 | 1,200,000 | 0 | 1,200,000 |
| CE-21-0284 | 2007 Single Axle Plow | 2017 | 0 | 0 | 0 | 250,000 | 0 | 250,000 |
| CE-21-0288 | Tandem Axle Plow with Sander | 2017 | 0 | 0 | 0 | 278,000 | 0 | 278,000 |
| CE-21-0302 | 1996 350 Kw Generator on Wheels | 2017 | 0 | 0 | 0 | 100,000 | 0 | 100,000 |
| CE-21-0304 | 2006 Dozer | 2017 | 0 | 0 | 0 | 235,000 | 0 | 235,000 |
| CE-21-0369 | One Ton 4X4 Pickup | 2017 | 0 | 0 | 0 | 37,000 | 0 | 37,000 |
| CE-21-0370 | Utility Pickup | 2017 | 0 | 0 | 0 | 44,600 | 0 | 44,600 |
| CE-21-0371 | 2011 Pickup 4x4 | 2017 | 0 | 0 | 0 | 30,000 | 0 | 30,000 |
| CE-21-0372 | 2011 Pickup 4x4 | 2017 | 0 | 0 | 0 | 30,000 | 0 | 30,000 |
| CE-21-1708 | Police Investigations SUV | 2017 | 0 | 0 | 0 | 32,500 | 0 | 32,500 |
| CE-21-5010 | 2010 Crew Cab 4x4 | 2017 | 0 | 0 | 0 | 36,000 | 0 | 36,000 |
| CE-21-5012 | 6' Mower | 2017 | 0 | 0 | 0 | 60,864 | 0 | 60,864 |
| CE-21-5013 | 2011 Pickup 4x4 with Plow | 2017 | 0 | 0 | 0 | 42,000 | 0 | 42,000 |
| CE-22-0044 | Fire Deputy Chief SUV | 2018 | 0 | 0 | 0 | 0 | 47,700 | 47,700 |
| CE-22-1710 | Police Chief SUV | 2018 | 0 | 0 | 0 | 0 | 42,871 | 42,871 |
| CE-22-1711 | Police Investigations SUV | 2018 | 0 | 0 | 0 | 0 | 38,950 | 38,950 |
| CE-22-2011 | Asphalt Planer | 2018 | 0 | 0 | 0 | 0 | 28,425 | 28,425 |
| CE-22-5017 | 3/4 Ton Pickup with Plow | 2018 | 0 | 0 | 0 | 0 | 36,300 | 36,300 |
| CE-22-5018 | One Ton 4X4 with Plow | 2018 | 0 | 0 | 0 | 0 | 42,400 | 42,400 |
| CE-22-5024 | Mower 16' 2014 | 2018 | 0 | 0 | 0 | 0 | 119,000 | 119,000 |

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| **Total: Central Services - Central Equipment** | | | **$2,375,868** | **$1,889,500** | **$1,750,300** | **$2,795,964** | **$355,646** | **$9,167,278** |
| **Central Services - Public Facilities** | | | | | | | | |
| FM-08-0009 | Building Maintenance Software | 2004 | 25,000 | 0 | 0 | 0 | 0 | 25,000 |
| FM-16-0002 | Replace Rooftop Unit - Plymouth Creek Center | 2015 | 125,000 | 0 | 0 | 0 | 0 | 125,000 |
| FM-16-0004 | Lighting High Efficiency Improvements -Citywide | 2016 | 50,000 | 50,000 | 50,000 | 50,000 | 0 | 200,000 |
| FM-17-0003 | Administration and Parks office area | 2017 | 900,000 | 0 | 0 | 0 | 0 | 900,000 |
| FM-19-0001 | Resurface/Seal Concrete Floor - Public Works | 2015 | 65,000 | 0 | 0 | 0 | 0 | 65,000 |
| FM-19-0002 | Replace Air Makeup Unit - Public Safety Garage | 2015 | 0 | 50,000 | 0 | 0 | 0 | 50,000 |
| FM-20-0002 | Replace 3 Roof Top Units - City Hall | 2016 | 0 | 0 | 125,000 | 0 | 0 | 125,000 |
| FM-20-0003 | Replace Used Oil Burner - Public Works | 2016 | 0 | 0 | 30,000 | 0 | 0 | 30,000 |
| FM-20-0005 | Replace Radiant Heat -Fire Station 1 | 2016 | 0 | 0 | 30,000 | 0 | 0 | 30,000 |
| FM-20-0006 | Community Development, Engineering offices and lunchroom Remodel | 2018 | 0 | 0 | 1,000,000 | 0 | 0 | 1,000,000 |
| FM-21-0001 | RTU Replacement for Mechanic's Office and Sign Making Room | 2017 | 0 | 0 | 0 | 30,000 | 0 | 30,000 |
| **Total: Central Services - Public Facilities** | | | **$1,165,000** | **$100,000** | **$1,235,000** | **$80,000** | **$0** | **$2,580,000** |
| **Sewer** | | | | | | | | |
| SS-15-0001 | Refurbish Greentree Lift Station | 2011 | 600,000 | 0 | 0 | 0 | 0 | 600,000 |
| SS-15-0002 | 15th Ave./Pineview Lane San. Sewer Replacement | 2015 | 400,000 | 0 | 0 | 0 | 0 | 400,000 |
| SS-16-0001 | Autumn Hills Lift Station | 2014 | 0 | 100,000 | 500,000 | 0 | 0 | 600,000 |
| SS-18-0001 | Refurbish Bass Lake Plaza Lift Station | 2014 | 100,000 | 700,000 | 0 | 0 | 0 | 800,000 |
| SS-XX-9001 | Line Sanitary Sewer Main: Annual Program | 2002 | 930,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 4,930,000 |
| SS-XX-9002 | Trunk Sewer Oversizing | 2004 | 100,000 | 100,000 | 100,000 | 100,000 | 100,000 | 500,000 |
| **Total: Sewer** | | | **$2,130,000** | **$1,900,000** | **$1,600,000** | **$1,100,000** | **$1,100,000** | **$7,830,000** |
| **Street Maintenance** | | | | | | | | |
| ST-08-0006 | Rail X-ing Safety Improvements | 2004 | 50,000 | 550,000 | 0 | 0 | 0 | 600,000 |
| ST-11-0010 | Concrete Sidewalk Replacement | 2007 | 50,000 | 50,000 | 50,000 | 50,000 | 75,000 | 275,000 |
| ST-12-0002 | Nathan Lane & CR 10 Intersection | 2008 | 100,000 | 500,000 | 0 | 0 | 0 | 600,000 |
| ST-14-0002 | TH 55 Frontage Road Reconstruction | 2010 | 925,000 | 0 | 0 | 0 | 0 | 925,000 |

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| ST-17-0002 | Frontage Road Southwest Corner CSAH 101 and TH55 | 2016 | 0 | 900,000 | 0 | 0 | 0 | 900,000 |
| ST-17-0003 | 54th Avenue from Peony Lane to CSAH 101 | 2016 | 275,000 | 3,000,000 | 0 | 0 | 0 | 3,275,000 |
| ST-18-0002 | Troy Lane from 54th Avenue to CR 47 | 2016 | 1,450,000 | 2,200,000 | 0 | 0 | 0 | 3,650,000 |
| ST-18-0003 | Schmidt Lake Road at I-494 Street Expansion | 2017 | 1,700,000 | 0 | 0 | 0 | 0 | 1,700,000 |
| ST-18-0004 | Upgrade replacement single axle to a tandem | 2018 | 30,000 | 0 | 0 | 0 | 0 | 30,000 |
| ST-19-0002 | 57th Avenue from Woodcrest to Juneau Lane | 2016 | 0 | 0 | 0 | 3,300,000 | 0 | 3,300,000 |
| ST-19-0003 | Rockford Road at I-494 Bridge Replacement | 2017 | 200,000 | 1,000,000 | 14,720,000 | 0 | 0 | 15,920,000 |
| ST-20-0001 | Juneau Lane from Hampton Hills to 59th Avenue | 2016 | 0 | 0 | 2,500,000 | 0 | 0 | 2,500,000 |
| ST-XX-9001 | Annual Street Reconstruction | 2012 | 2,640,000 | 2,500,000 | 3,900,000 | 3,100,000 | 2,900,000 | 15,040,000 |
| ST-XX-9002 | Mill & Overlay Projects | 2005 | 1,100,000 | 1,600,000 | 1,300,000 | 1,400,000 | 1,000,000 | 6,400,000 |
| ST-XX-9003 | Replace Retaining Walls | 2005 | 140,000 | 160,000 | 100,000 | 100,000 | 100,000 | 600,000 |
| ST-XX-9004 | Edge Mill and Overlay Projects | 2005 | 3,480,000 | 3,480,000 | 3,480,000 | 3,480,000 | 3,480,000 | 17,400,000 |
| **Total: Street Maintenance** | | | **$12,140,000** | **$15,940,000** | **$26,050,000** | **$11,430,000** | **$7,555,000** | **$73,115,000** |
| **Water** | | | | | | | | |
| WA-12-0001 | Refurbish Zachary Water Tower | 2009 | 320,000 | 320,000 | 320,000 | 320,000 | 0 | 1,280,000 |
| WA-13-0002 | Wells 18 and 19 and New Water Treatment Plant | 2009 | 0 | 0 | 0 | 0 | 9,000,000 | 9,000,000 |
| WA-19-0001 | Refurbish Central Water Tower | 2015 | 0 | 350,000 | 350,000 | 350,000 | 350,000 | 1,400,000 |
| WA-XX-9001 | Well Refurbishing | 2003 | 270,000 | 280,000 | 280,000 | 300,000 | 300,000 | 1,430,000 |
| WA-XX-9002 | Trunk Watermain Oversizing | 2004 | 220,000 | 220,000 | 220,000 | 220,000 | 220,000 | 1,100,000 |
| **Total: Water** | | | **$810,000** | **$1,170,000** | **$1,170,000** | **$1,190,000** | **$9,870,000** | **$14,210,000** |
| **Water Resources** | | | | | | | | |
| WR-14-0004 | Kilmer Park Pond and Stream Restoration | 2012 | 1,350,000 | 0 | 0 | 0 | 0 | 1,350,000 |
| WR-15-0001 | Plymouth Creek Park Stream Restoration | 2012 | 400,000 | 0 | 0 | 0 | 0 | 400,000 |
| WR-15-0003 | Mount Olivet Stream Restoration | 2013 | 0 | 0 | 75,000 | 325,000 | 0 | 400,000 |
| WR-15-0004 | Chelsea Woods Drainage - Weston Ln. to CR 6 | 2014 | 0 | 0 | 300,000 | 0 | 0 | 300,000 |
| WR-16-0001 | Weston Lane Storm Sewer Lift Station Rehab. | 2013 | 25,000 | 50,000 | 0 | 475,000 | 0 | 550,000 |
| WR-16-0002 | Plymouth Creek Stream Restoration | 2014 | 0 | 0 | 0 | 0 | 50,000 | 50,000 |
| WR-16-0003 | 15th Ave./ Pineview Lane Storm Sewer Replacement | 2015 | 800,000 | 0 | 0 | 0 | 0 | 800,000 |
| WR-16-0004 | Quail Ridge 3rd Addition | 2016 | 350,000 | 0 | 0 | 0 | 0 | 350,000 |

# City of Plymouth
# Capital Improvement Plan 2018-2022
# Projects by Department

| | | Year Identified | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
|---|---|---|---|---|---|---|---|---|
| WR-17-0001 | Wild Wings Western Wetland Improvements | 2014 | 0 | 0 | 100,000 | 100,000 | 0 | 200,000 |
| WR-17-0003 | Harbor Place Erosion Repair | 2016 | 0 | 0 | 200,000 | 0 | 0 | 200,000 |
| WR-17-0004 | French Ridge Park Drainage Improvement | 2016 | 100,000 | 0 | 0 | 0 | 0 | 100,000 |
| WR-17-0005 | Greentree Forest Drainage Improvement | 2017 | 200,000 | 0 | 0 | 0 | 0 | 200,000 |
| WR-18-0001 | St. Marys Addition Drainage Improvement | 2016 | 10,000 | 125,000 | 0 | 0 | 0 | 135,000 |
| WR-18-0002 | Mengelkochs First Addition Drainage Improvement | 2016 | 0 | 10,000 | 50,000 | 0 | 0 | 60,000 |
| WR-18-0003 | Plum Tree East Drainage Improvement | 2017 | 0 | 10,000 | 250,000 | 0 | 0 | 260,000 |
| WR-18-0004 | Schiebers Addition Erosion Repair | 2017 | 0 | 10,000 | 150,000 | 0 | 0 | 160,000 |
| WR-18-0005 | Elm Creek Stream Restoration - Hwy 55 to WHS | 2018 | 75,000 | 750,000 | 0 | 0 | 0 | 825,000 |
| WR-18-0006 | 6105 Vicksburg Outlet Replacement (Cates Lake) | 2018 | 50,000 | 0 | 0 | 0 | 0 | 50,000 |
| WR-18-0007 | Ivanhoe/Pleasant Hills Drainage Improvement | 2018 | 25,000 | 100,000 | 0 | 0 | 0 | 125,000 |
| WR-18-0009 | Meadow Wood Drainage Improvement | 2018 | 45,000 | 250,000 | 0 | 0 | 0 | 295,000 |
| WR-18-0010 | 4th and Zircon Drainage Improvement | 2018 | 20,000 | 110,000 | 0 | 0 | 0 | 130,000 |
| WR-18-0011 | Sunset Trail Drainage Improvement | 2018 | 170,000 | 0 | 0 | 0 | 0 | 170,000 |
| WR-19-0001 | 19th Avenue/Dunkirk Lane Pond Improvement | 2016 | 0 | 50,000 | 500,000 | 0 | 0 | 550,000 |
| WR-19-0002 | Parkers Lake Park Drainage Improvement | 2016 | 0 | 0 | 0 | 75,000 | 325,000 | 400,000 |
| WR-20-0001 | Maple Creek Stream Restoration | 2016 | 0 | 0 | 100,000 | 750,000 | 0 | 850,000 |
| WR-20-0002 | Plymouth Marketplace Drainage Improvement | 2017 | 0 | 0 | 20,000 | 80,000 | 0 | 100,000 |
| WR-20-0005 | County Road 9/Larch Lane Drainage Improvement | 2018 | 0 | 0 | 75,000 | 100,000 | 0 | 175,000 |
| WR-20-0006 | Courts/Fields of Nantarre Drainage Improvement | 2018 | 0 | 0 | 10,000 | 75,000 | 0 | 85,000 |
| WR-21-0002 | Palmer Creek Estates Stream Restoration | 2017 | 0 | 0 | 0 | 100,000 | 500,000 | 600,000 |
| WR-21-0003 | Ponderosa Woods Stream Restoration | 2017 | 0 | 0 | 0 | 75,000 | 400,000 | 475,000 |
| WR-XX-9001 | Maintain Water Quality Ponds | 2002 | 125,000 | 0 | 100,000 | 100,000 | 100,000 | 425,000 |
| WR-XX-9002 | Unspecified Drainage Improvement | 2004 | 0 | 0 | 0 | 100,000 | 100,000 | 200,000 |
| **Total: Water Resources** | | | **$3,745,000** | **$1,465,000** | **$1,930,000** | **$2,355,000** | **$1,475,000** | **$10,970,000** |
| **TOTAL: PUBLIC WORKS** | | | **$22,365,868** | **$22,464,500** | **$33,735,300** | **$18,950,964** | **$20,355,646** | **$117,872,278** |
| **GRAND TOTAL** | | | **$28,931,868** | **$28,434,500** | **$38,485,300** | **$24,862,964** | **$50,801,146** | **$171,515,778** |

## Appendix 5 – Emergency Telephone List

Emergency Contact List

| | |
|---|---|
| Joe Paumen, Utility and Streets Manager | 763-509-5950 |
| Kevin Mastey, Utility Supervisor | 763-509-5998 |
| Pete Moen, Utility Supervisor | 763-509-5925 |
| Plymouth City Hall | 763-509-5000 |
| Plymouth Police Department | 763-509-5160 |
| Plymouth Fire Department | 763-509-5120 |
| Hennepin County Dispatch | 952-258-5321 |

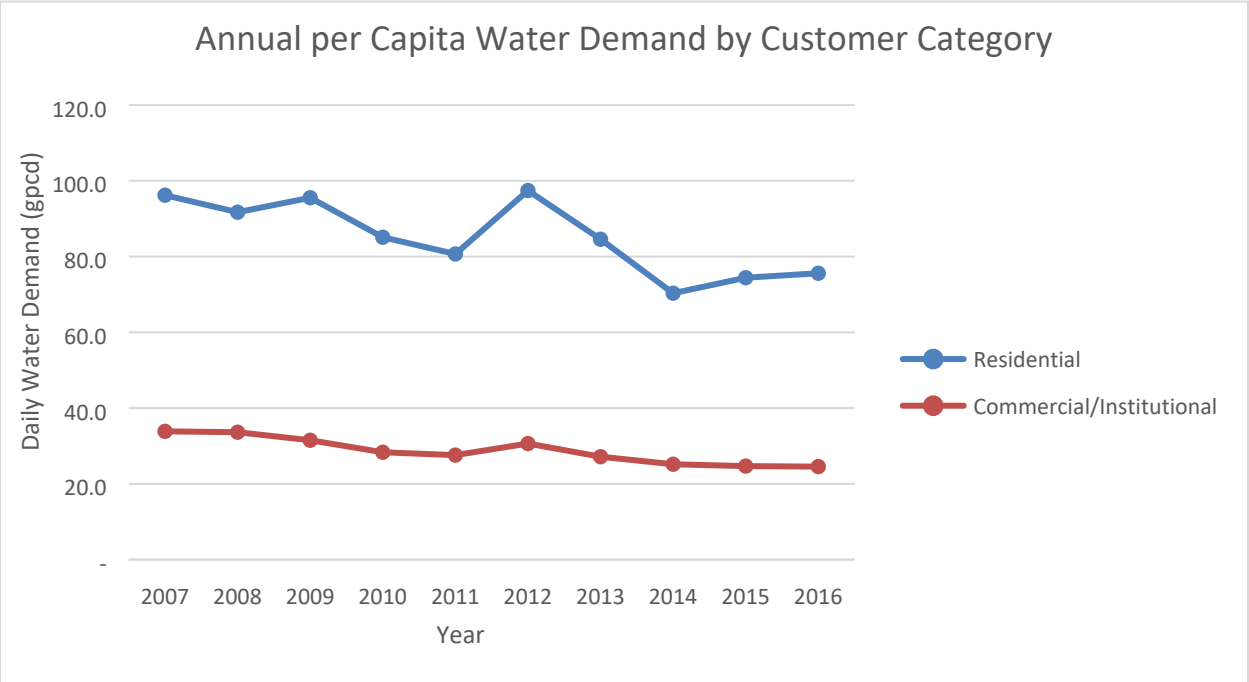
## Appendix 6 – Cooperative Agreements for Emergency Services

An informal agreement exists between the City of Plymouth and the adjacent communities for the water interconnections. The infrastructure exists to transfer water between each community in case of an emergency.

## Appendix 7 – Municipal Critical Water Deficiency Ordinance

The City of Plymouth will address the Critical Water Deficiency Ordinance within 6 months of this plan being approved.

## Appendix 8 – Graph of Ten Years of Annual Per Capita Water Demand for Each Customer Category



## Appendix 9 – Water Rate Structure



# Utility Rates

### Utility Rates - Effective for Services Incurred in 2017

Rate increase for 2017: 3.5% increase for water and 5.5 % increase for sewer

| | |
|---|---|
| **Water**: | Water rates are volume based.<br>$4.06 per month base charge, plus:<br>**Residential:**<br>$1.47 per 1,000 gallons up to 12,500 gallons<br>$1.84 per 1,000 gallons from 12,501 to 35,000 gallons<br>$3.17 per 1,000 gallons for all usage greater than 35,000 gallons<br>**Commercial/Industrial:**<br>$1.75 per 1,000 gallons |
| **Oversized Commercial Meter Accounts:** | The water usage fee includes a demand charge for metered service sizes larger than one inch.<br><br>**Demand Charge (based on the size of the meter):**<br>$50.53 – 1 ½" meter<br>$75.80 – 2" meter<br>$157.91 – 3" meter<br>$252.68 – 4" meter<br>$505.36 – 6" meter |
| **Irrigation:** | **Residential (separately metered):**<br>$1.84 per 1,000 gallons up to 35,000 gallons<br>$3.17 per 1,000 gallons for all usage greater than 35,000 gallons<br>**Commercial/Industrial:**<br>$2.18 per 1,000 gallons |
| **Sewer:** | $6.07 per month, plus $3.57 per 1,000 gallons |
| **Recycling:** | $2.25 per month, per household |
| **Surface Water:** | $5.96 per month – residential<br>$19.78 per month – multi-residential, per acre<br>$42.75 per month – Commercial, per acre |
| **Street Lighting:** | **Residential:**<br>$3.25 per month for properties that have neighborhood street lighting<br>**Commercial/Industrial:**<br>$3.25 per month multiplied by a rate factor of five for each street light benefiting the property |

## Appendix 10 – Ordinances or Regulations Related to Water Use



720.35. Connections Beyond Municipal Boundaries. In cases where water mains of the City have been or shall be extended to or constructed in any road, street, alley or public highway adjacent to or outside the corporate limits of the City, permits shall be issued to the owners or occupants of properties adjacent to, or accessible to, such water mains to tap and make proper water service pipe connections with such water mains of the City in conformity with and subject to all the terms, conditions and provisions of this Code. Water service rendered pursuant to this Subsection is subject to all provisions of this Code, and persons accepting such service shall thereby agree to be so bound and obligated.

720.37. Restricted Hours for Sprinkling. Subd. 1 Water Emergency. Whenever the Council shall determine that a shortage of water supply threatens the city, it may impose emergency regulations pertaining to city water use to protect the health and safety of the consumers as well as the general welfare:

A. During an emergency, restrictions for the use of City water may include, but are not limited to, the total prohibition of watering, sprinkling, or irrigation of lawn, grass, turf, plantings, car washing, air conditioning, or other uses specified therein.

B. Restrictions imposed during an emergency shall continue in effect until the end of the emergency and/or removed by the Council.

C. Notification of restrictions to City water use shall be given in such manner as the Council may determine, including but not limited to, newspaper articles, radio and television broadcasts stating the date on which the limitation is effective.

Subd. 2. Annual Water Use Restrictions. Sprinkling restrictions are in effect from May 1 to September 30 each year to conserve water resources and allow the City's water system flexibility in meeting peak demands.

A. Any water customers with odd numbered addresses may water on odd calendar days and customers with even numbered addresses may water on even calendar days.

B. Water customers must manage and operate irrigation systems in good repair in such a fashion so as to avoid water waste due to misalignment or damage to the system.

C. City water cannot be used for the purposes of watering lawns, sod or seeded areas between 12:00 p.m. and 5:00 p.m. daily.

Subd. 3. Exceptions.

A. Vehicle washing and the watering of trees, shrubs, and flowers is exempt from the above restrictions only if conducted by a person holding a squeeze activated pistol type nozzle equipped with an automatic shutoff.

## Appendix 11 – Implementation Checklist

Summary of Actions

- Monthly well monitoring
- Annual leak detection
- Wellhead Protection Plan in 2018
- Wells, water storage, treatment facilities, and distribution system will be rehabilitated or replaced as needed
- Annual distribution of Consumer Confidence Report
- Continued staff training
- Stormwater Management Program – MS4

CHAPTER 9

# Sanitary Sewer Plan

# TABLE OF CONTENTS


CHAPTER PURPOSE ....1
*Figure 9-1: MCES Interceptors Serving Plymouth* ....2
GOALS AND POLICIES ....3
PROJECTIONS ....4
*TABLE 9-1: Population, Household and Employment Projections* ....4
*TABLE 9-2: Wastewater Flow Projections* ....4
*Figure 9-2: 2040 Sanitary Sewer System Plan* ....5
*TABLE 9-3: Design Flow and Pipe Capacity* ....6
SANITARY SEWER DESIGN CRITERIA ....6
LAND USE ....6
ESTIMATED AVERAGE WASTEWATER FLOWS ....6
*TABLE 9-4: Future Land Use Sanitary Loading Rates* ....7
PEAK FLOW FACTORS ....7
*Figure 9-3: Peak Flow Factors* ....8
*TABLE 9-5: Peak Flow Factors for Wet Weather Simulation* ....9
INFILTRATION / INFLOW ....9
LARGE SEWER USERS ....13
*TABLE 9-6: Large Sewer Users* ....13
HYDRAULICS AND PIPE MATERIAL ....13
PROPOSED SANITARY SEWER SYSTEM ....14
GENERAL ....14
WASTEWATER FLOW PROJECTIONS ....14
INTERCOMMUNITY FLOWS ....15
EXISTING INDIVIDUAL SEWAGE TREATMENT SYSTEMS ....16
*Figure 9-4: Existing On-Site Sewage Disposal Systems* ....17
LIFT STATIONS ....18
FUNDING MECHANISMS ....18
IMPLEMENTATION ....19


# LIST OF APPENDICES


9A POPULATION, HOUSEHOLD, AND EMPLOYMENT PROJECTIONS BY SEWER DISCHARGE
9B ORDINANCE PROHIBITING DISCHARGES INTO THE SANITARY SEWER SYSTEM
9C HOUSING STOCK AGE MAP
9D INVENTORY OF FACILITIES
9E FLOW RATES BY MCES INTERCEPTOR AND BY SUB-DISTRICT
9F INTERCOMMUNITY SERVICE AGREEMENTS AND FLOWS MAP
9G INDIVIDUAL SEWAGE TREATEMENT ORDINANCE

Chapter 9

# SANITARY SEWER PLAN

## CHAPTER PURPOSE

The Sanitary Sewer Plan provides an analysis of the City's existing sewer system and a guide for expanding and upgrading the system to accommodate future development and redevelopment. The plan is intended to meet the requirements in state law for a "comprehensive sanitary sewer plan" and incorporate the requirements established by the Metropolitan Council.

Plymouth's wastewater is treated at the Metropolitan Council Environmental Services (MCES) Metropolitan Treatment Plant in St. Paul. The majority of the wastewater collected in the city is conveyed through several trunk sewers to Lift Station L-29 in the southeastern corner of the city. From there, it is pumped through the City of Golden Valley in an MCES force main along Highway 55 and eventually conveyed to the Metro Plant. Additionally, the MCES Elm Creek Interceptor enters the northwest portion of Plymouth from Medina and then flows north through Maple Grove. Most of the development in the northwest area of Plymouth will ultimately be connected to the Elm Creek Interceptor. Figure 9-1 presents the MCES interceptors serving Plymouth.

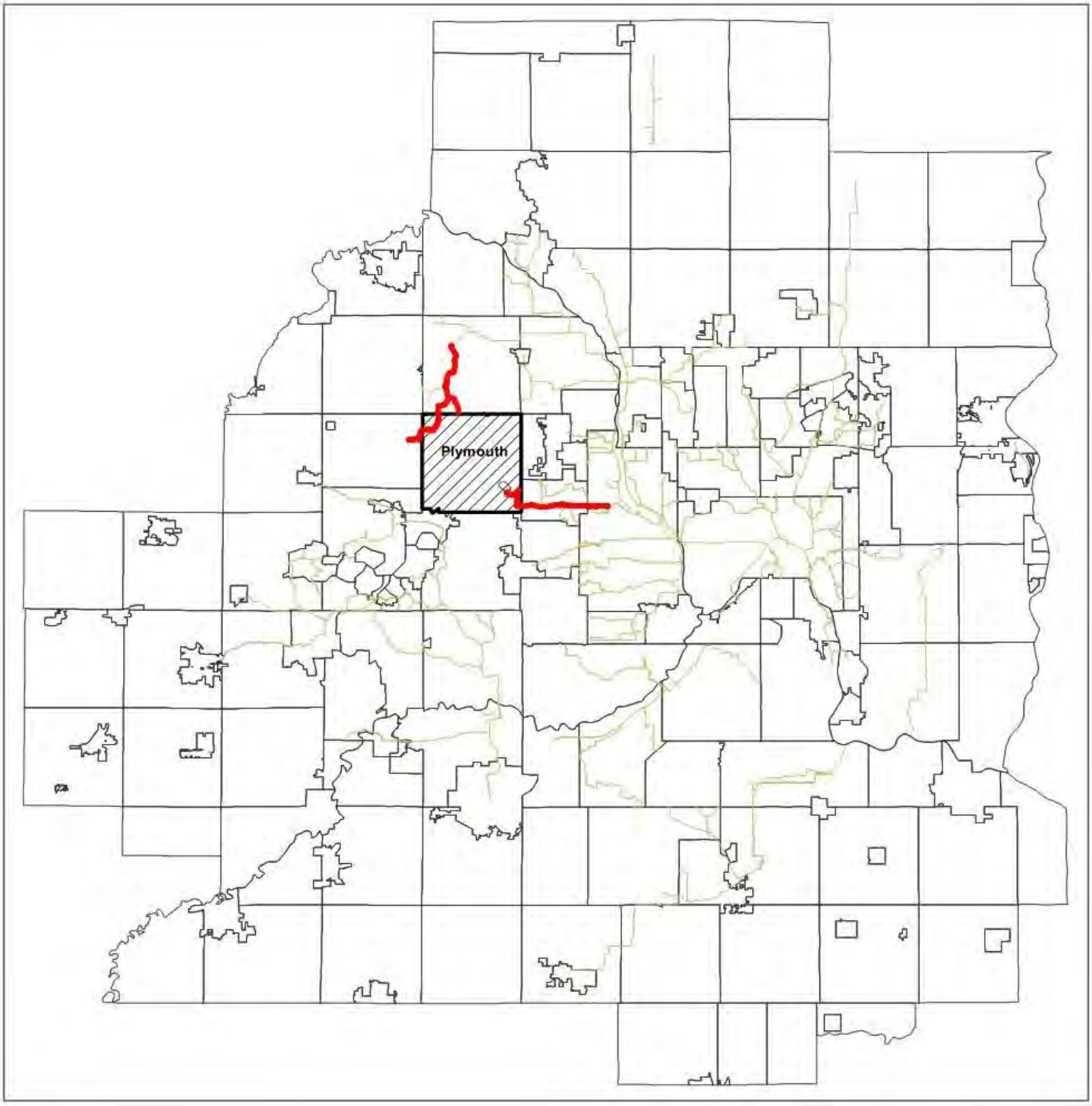



Figure 9-1

**MCES Interceptors Serving Plymouth**

As of 12/4/2017
Source: SEH, Inc.
Metropolitan Council

MCES Interceptors in Plymouth
MCES Interceptor System
Seven County Metro Area

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## GOALS AND POLICIES

### Provide a low maintenance and cost effective sanitary sewer system that meets the long-term needs of the City's residents and businesses.

- Design and construct a sanitary sewer system that supports the City's land use plan and its ultimate development.
- Establish assessments and connection charges to ensure that development pays for the construction of the initial system.
- Operate and maintain the sanitary sewer system to ensure its long-term function with equitable user charges.
- Continue to address infiltration/inflow of clear water into the sanitary sewer system.

### Work with the Metropolitan Council and adjoining communities to provide a mutually cooperative sanitary sewer system.

- Maintain existing arrangements for sanitary sewer with adjacent communities.
- Provide a trunk system that meets the needs of Plymouth and adjoining communities.
- Participate in cost sharing arrangements that result in mutual benefit to participating communities.

### **Provide sanitary sewer service to undeveloped areas in a planned manner.**

- Require developers to pay the cost of off-site sanitary sewer facilities necessary for any development that occurs in a non-sequential order.

## PROJECTIONS

Table 9-1 presents projections of population, households, and employment for Plymouth.

### TABLE 9-1
### POPULATION, HOUSEHOLD AND EMPLOYMENT PROJECTIONS

| Year | Sewered Population | Unsewered Population | Total Population | Sewered Households | Unsewered Households | Employees |
|---|---|---|---|---|---|---|
| 2020 | 76,850 | 350 | 77,200 | 31,663 | 137 | 53,900 |
| 2030 | 81,130 | 270 | 81,400 | 33,289 | 111 | 57,700 |
| 2040 | 84,860 | 240 | 85,100 | 34,602 | 98 | 61,500 |

Source: Metropolitan Council

The City's projections of sewered population, households, and employment broken down by MCES interceptor facility, MCES meter facility, and intercommunity connections are provided as Appendix 9A.

Table 9-2 presents the City's wastewater flow projections. Flows are based on the proposed land uses in anticipated growth areas and industry standard flow generation rates plus documented water usage in developed areas. These projections were used for the design of the trunk sewer system presented in this plan. Regional projections for 2020, 2030 and 2040 are from the Metropolitan Council's *Water Resources Management Policy Plan*. Projections for intermediate years are interpolated.

### TABLE 9-2
### WASTEWATER FLOW PROJECTIONS

| Year | MCES Projected Flows (MGD) |
|---|---|
| 2020 | 6.95 |
| 2025* | 7.07 |
| 2030 | 7.19 |
| 2035* | 7.22 |
| 2040 | 7.25 |

Source: Metropolitan Council
*Interpolated by SEH, Inc.

Figure 9-2 presents the City's 2040 Sanitary Sewer System Plan.

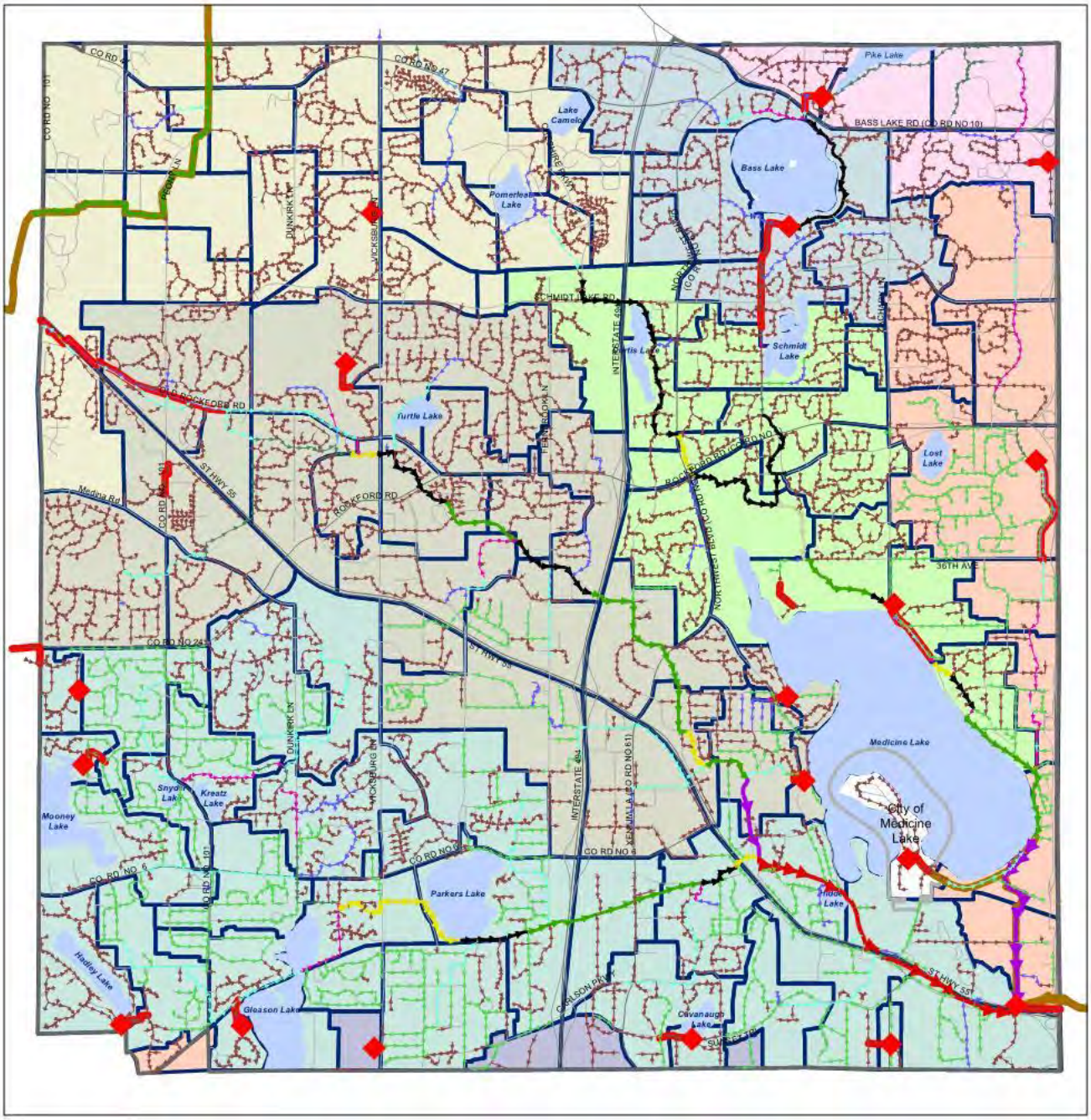



Figure 9-2

# 2040 Sanitary Sewer System Plan

As of 12/27/2017

City of Plymouth

Forcemain
8"
9"
10"
12"
14"
15"
16"
18"
21"
24"
27"
30"
33"
36"
42"
48"
MCES Interceptor

Lift Station

**Service District**
B
E
M
NC
NE
NW
P
S
W
Sub Districts

N

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

Table 9-3 presents design flow and pipe capacity for local sanitary sewer lines that are 12 inches or larger and connect to an MCES interceptor. Design flow and pipe capacity are based on city sewer models, projected growth, and available "as-built" data.

### TABLE 9-3
### DESIGN FLOW AND PIPE CAPACITY

| Facility ID | Location | District | Pipe Size (In) | Pipe Material | Discharge Location | 2040 Design Flow (GPM) | Pipe Capacity (GPM) |
|---|---|---|---|---|---|---|---|
| MH05421-MH05417 | E. Medicine | NE | 27 | RCP | 1-PM-466 | 1,920 | 6,010 |
| MH08085-MH07831 | 54th/Peony | E | 12 | PVC | 9004-2 | 475 | 1,630 |
| MH08973-MH07822 | Meadowridge | E | 12 | PVC | 9004-2 | 220 | 1,710 |
| MH02710-MH02673 | Hwy 55/Nathan | S | 48 | RCP | M118 | 3,305 | 15,650 |

Source: Metropolitan Council; Interpolated by SEH, Inc.

## SANITARY SEWER DESIGN CRITERIA

### LAND USE

The Sanitary Sewer Plan is based on the Land Use Plan (Chapter 3). The population, household, and employment forecasts are based on the Land Use Plan.

Total areas for each land use were calculated using the City's computer-based geographic information system (GIS). A description for each land use type is provided in the Land Use Plan.

### ESTIMATED AVERAGE WASTEWATER FLOWS

Municipal wastewater is made up of a mixture of domestic sewage, commercial and industrial wastes, groundwater infiltration and surface water inflows. With proper design and construction, groundwater infiltration and surface water inflows, typically referred to as infiltration/inflow (I/I), can be minimized. The City's plan to minimize I/I is addressed in later sections of this plan.

The existing sewer system was evaluated under future flow conditions. A hydraulic computer model was used together with GIS data to assess the sewer system's response to future flow conditions. This information was used to evaluate current and future sewer capacities and improvements.

Anticipated wastewater flows were calculated using the land use method. Table 9-4 presents sanitary loading rates. Flow was summed and assigned to the nearest manhole on the trunk lines modeled.

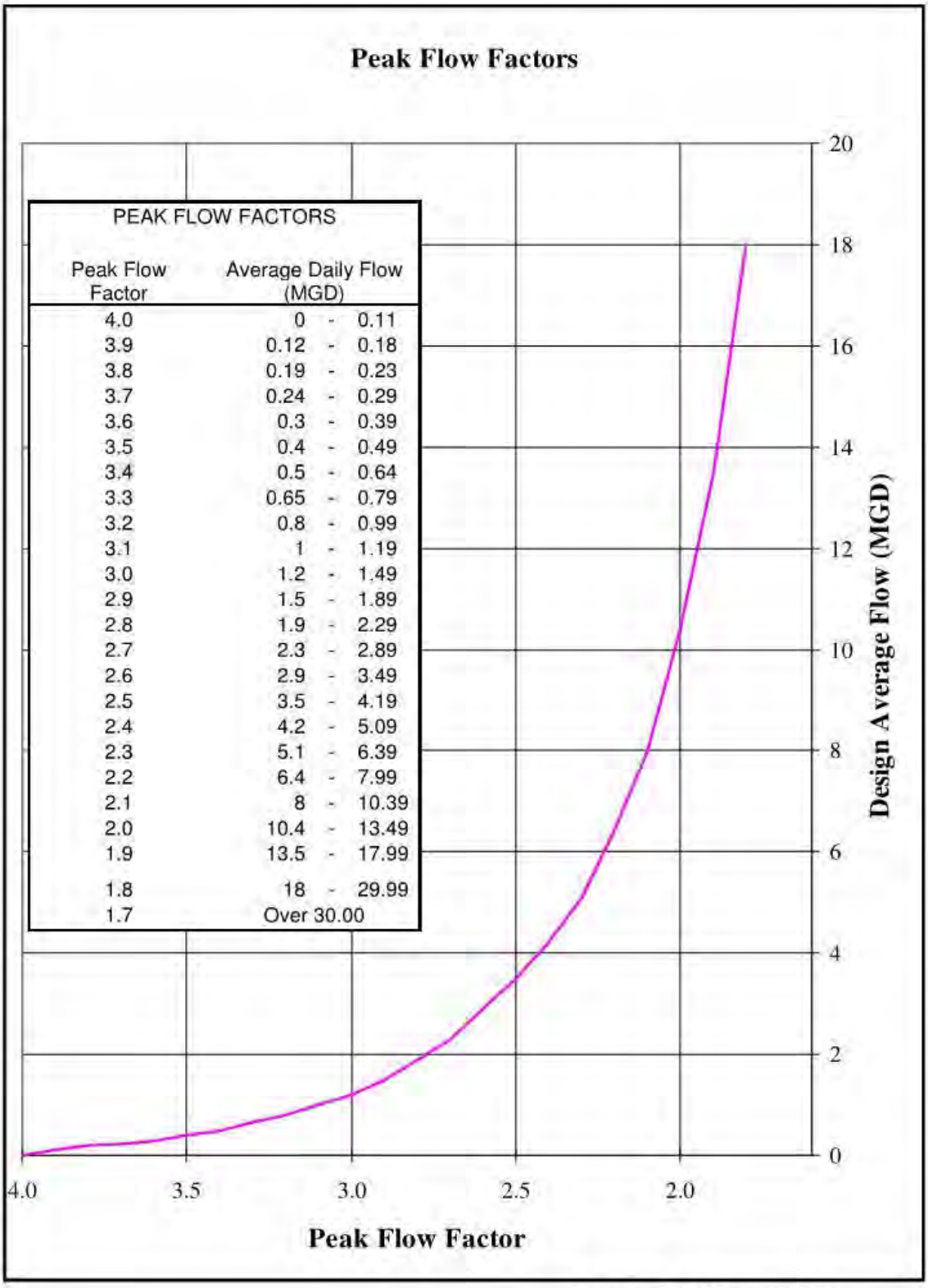
## TABLE 9-4
## FUTURE LAND USE SANITARY LOADING RATES

| Land Use Description | GPD/Acre |
|---|---|
| Commercial, C | 800 |
| City Center, CC | 800 |
| Commercial Office, CO | 1000 |
| Industrial, IND | 1100 |
| Living Area 1, LA-1 (2-3) | 450 |
| Living Area 2, LA-2 (3-6) | 800 |
| Living Area 3, LA-3 (6-12) | 1500 |
| Living Area 4, LA-4 (12-20) | 1800 |
| Living Area 5, LA-5 (20-60) | 1800 |
| Mixed Use, MXD | 1000 |
| Mixed Use, MXD-R | 1300 |
| Public/Semi-Public/Institutional, P-I | 800 |
| Right-of-Way | 0 |

## PEAK FLOW FACTORS

The sanitary sewer system must be capable of handling the anticipated peak wastewater flow rate, including any I/I. The design peak flow rate can be expressed as a variable ratio to the average flow rate. Curves used to describe this ratio, called the peak flow factor (PFF), indicate a decreasing ratio of peak flow to average flow with increasing average flow. These values are generally conservative and widely used throughout the state for municipal planning. They include a standard allowance for I/I, which is typical of new sanitary sewer construction as well as properly operating existing sewers. Figure 9-3 presents peak flow factors.

# Figure 9-3
# Peak Flow Factors




Source SEH Inc.-2017

Peak flow factors used in the model were assigned based on peak flow metered by MCES. The past few major storms measured peak flows between 18-20 MGD at MCES Lift Station L-29. Peaking factors were applied so that flow in the model approached 18-20 MGD at Lift Station 8. Table 9-5 presents the peak flow factors used in the model. This was applied in addition to a typical diurnal curve to simulate variances in flows.

TABLE 9-5
PEAK FLOW FACTORS FOR WET WEATHER SIMULATION

| Time | Peak Flow Factor |
|---|---|
| 12:00 AM | 1.67 |
| 1:00 AM | 1.93 |
| 2:00 AM | 2.13 |
| 3:00 AM | 2.19 |
| 4:00 AM | 2.41 |
| 5:00 AM | 2.27 |
| 6:00 AM | 2.45 |
| 7:00 AM | 2.56 |
| 8:00 AM | 2.6 |
| 9:00 AM | 2.53 |
| 10:00 AM | 2.48 |
| 11:00 AM | 2.36 |
| 12:00 PM | 2.3 |
| 1:00 PM | 2.3 |
| 2:00 PM | 2.3 |
| 3:00 PM | 2.31 |
| 4:00 PM | 2.24 |

## INFILTRATION / INFLOW

The Metropolitan Council has identified excessive infiltration/inflow (I/I) as a major regional problem. The MCES is required under state and federal requirements to ensure all wastewater throughout the Twin Cities Metropolitan Area does not leave their interceptors and is properly treated before discharge to local receiving streams. To address the problem of I/I in the system, which is occurring in many cities in the region, the Metropolitan Council collects a surcharge from affected communities. The money collected may be used by these communities to remove excessive I/I from their systems.

Based on regional criteria, Plymouth exceeded the allowable infiltration/inflow (I/I) peak rate established by the MCES at the start of the Surchage Program in 2005. The program was extended in 2013. During a 2014 rainfall event, the City's peak allowable discharge into the MCES interceptor system was exceeded, which resulted in a MCES surcharge of $296,725. The City worked with MCES to spend the surcharge funds locally on I/I abatement projects designed to reduce peak discharges. The Metropolitan Council has set the I/I peak allowable goals for all metropolitan cities entering their interceptor collection system, based on ten-year historical wastewater amounts. The goals include an allowable peak hour flow rate for I/I for each city so MCES has the capacity to convey wastewater flow from each community to their treatment facilities. Based on Plymouth's existing average wastewater flow contributions to MCES after subtracting average water sales from the winter months, the amount of I/I collected in the City's system represents roughly 13 to 14 percent of the overall wastewater flow. This plan assumes no increase in I/I from future growth.

Plymouth has actively been addressing I/I since 1995 when the City passed a code provision that: 1) prohibits the discharge of water from roofs, surface, groundwater sump pumps, footing tiles, and swimming pools into the municipal sewer system; and 2) requires those discharging into the system to disconnect those facilities. The code provision that addresses clear water discharges from surface water or groundwater (Section 740 of the Plymouth City Code) is provided as Appendix 9B. The City monitors this code provision through its building inspection program and does allow special permitted exceptions resulting from extreme groundwater conditions that require sump pump discharges year-round where freezing discharges to property can become a hazard or a nuisance. The efforts undertaken by the City have reduced, and will continue to reduce I/I and meet the I/I goal set by the Metropolitan Council. City efforts are outlined in the following paragraphs.

The City has adopted a back of curb program during street reconstruction projects to install storm sewer drainage piping along or in back of curb locations to facilitate sump pump discharge pipe connections where surface water drainage is limited in the area.

The City has roughly 79 miles of vitrified clay pipe (VCP) that is over 40 years old. An area of concern with I/I relates to VCP sewers. Due to the age of this pipe, the number of joints associated with it, and its susceptibility to root intrusion, VCP provides opportunities for increased I/I. The VCP sewers are generally located in the south portion of the city. The City has been undertaking maintenance of VCP sewers through in-place lining. The City will continue this maintenance effort. Plymouth also televises areas of its system where problems are likely to occur in order to prioritize where maintenance is needed.

In order to address sewer rehabiltation and I/I abatement, the City will continue its program of cleaning, televising, and lining pipes to ensure that VCP sewers are inspected and rehabilitated, and then will continue on to rehabilitation of reinforced concrete pipe (RCP) sewers. The City started this program in the mid-1990's and currently cleans roughly 60 miles per year, televises roughly 8 to 10 miles per year, and lines roughly 7 to 8 miles per year. Cleaning costs are estimated at $2,500 per mile when contracted. The actual cost to the City may be different depending on the amount of work accomplished with City crews versus private contractors. Televising costs are estimated at $4,000 per mile. Televising sewers is recommended every 10 years, and that can be planned in conjunction with the cleaning schedule. The City is committed to reducing I/I, and the proposed 2019-2023 Capital Improvement Program (CIP) includes $1,000,0000 annually for lining of sewer pipe.

Review of a city project completed in 2013 that lined 6,775 linear feet of VCP indicated that the City's sewer lining efforts are reducing I/I. That particular case demonstrated an I/I flow reduction during the study period of 1,056 gallons per lineal foot of VCP that had been lined. Positive results in I/I reduction support the abatement work and show taxpayers and the Metropolitan Council that the City is working to reduce costs to its residents and minimize issues and expenses from surcharges and other related damages.

The City is aware that there are two parts of the sanitary sewer collection system (public pipes and private pipes) that could contribute I/I. The City has placed past efforts, and will place current efforts, in addressing the oldest portions of the public infrastructure system. The majority of the sanitary sewer east of Interstate Highway 494 was installed prior to 1970, and the majority of sanitary sewer west of Interstate Highway 494 was installed after 1970. The City has not conducted any major studies to investigate specific sources of I/I.

It is unknown how many pre-1970's homes have an I/I issue with their private service lines. Roughly 14 percent (3,500 units) of the single-family housing stock was constructed prior to 1970. A map showing housing stock age is provided as Appendix 9C. A significant portion of I/I likely comes from private property sources. These types of I/I contributions could be a significant source of I/I, but a large majority of the City's infrastructure was built when it was typical to pre-install foundation drainage structures in residential properties. Thus, many older homes were constructed with drainage provisions to protect basement foundations, with proper inspection by City staff during installation. This does rule out some older structures having been retrofitted with drainage provisions such as drain tile, beaverboard and/or pump pit construction inside of the structures with discharge to the sanitary sewer collection system through private service laterals. Based on the fact that a significant number of homes were constructed prior to 1970, many of the service laterals were constructed using PVC pipe, which was intended to produce less operation and maintenance (O&M) issues, including I/I.

It is estimated that roughly 50 percent of the sanitary sewer collection system is located on private property. Consequently, it would be realistic to assume a proportionate percentage of clear water could be entering the City's sanitary sewer system from private I/I sources such as foundation drain connections, improper sump pump discharges, and other potential surface water connections directly connected to the sanitary sewer.

The City's goal is to effectively and efficiently manage its I/I in order to retain existing pipe capacity and reduce future operation and maintenance costs on the sanitary sewer collection system. All of the City's current focus has been on the public infrastructure collection system. These activities have included manhole and pipe (CCTV) inspection and sanitary sewer VCP pipe lining programs. Although the City has exceeded MCES standards for peak hourly flows during past wet weather events, the City continues to upgrade its public infrastructure and work with residents and businesses to reduce potential sources of I/I.

The City's current strategy is to invest in addressing existing sanitary infrastructure conditions that need improvement through public system condition assessments. Manhole and pipe ratings based on structural and O&M condition assessments through infrastructure (CCTV and other) inspection have been and will be used to establish sewer rehabilitation priority. The City will use O&M condition assessments to establish I/I collection system impacts and effectiveness.

Over 90 percent of the City's wastewater flow entering the MCES interceptor system is from the M118 metershed. The remainder consists of two smaller northeastern sewersheds entering MCES Meter Stations M241 and M226. Less than two percent of the total volume of Plymouth's wastewater flow contribution enters neighboring communities, including the Cities of Wayzata, Minnetonka and Maple Grove. Future I/I reduction strategies will focus on the M118 metershed as follows:

**Public Property**

Sanitary Sewer Investigation:

- Manhole inspections
- Closed circuit television (CCTV) inspections

Sewer Rehabilitation:

- Sanitary sewer lining
- Manhole repair (castings, chimney repairs, etc.)

Street Reconstruction Measures:

- Back of curb program (sump pump connection)

**Private Property**

Preventive Measures:

- Public education programs (e.g., information to residents and business owners in conjunction with street reconstruction projects and driveway or parking lot replacement)
- Building inspection compliance with existing sewer ordinance

The City will review future I/I reduction strategies and adjust them as necessary, based on the results of future MCES flow monitoring. The City has and will continue to invest the resources needed to mitigate I/I within the requirements locally and take the required corrective actions to manage I/I within acceptable levels.

## LARGE SEWER USERS

Table 9-6 presents sewer users that discharge average sewage flows greater than 50,000 gallons per day (gpd) into the City's sewer system.

### TABLE 9-6
### LARGE SEWER USERS

| Company | Address | Gallons per day (2015) |
|---|---|---|
| Aacron | 2705 Cheshire Lane | 152,716 |
| Honeywell | 12001 State Highway 55 | 119,394 |

Source: City of Plymouth

## HYDRAULICS AND PIPE MATERIAL

The trunk sewer system was designed to prevent surcharging and maintain a minimum flow velocity of two feet per second at design flow. The sewer system plan is shown in Figure 9-2. Sewer size and material type are included in Appendix 9D.

Polyvinyl Chloride (PVC) pipe is recommended for all pipes of 18 inches diameter or less. Above 18 inches, either PVC or RCP is recommended. PVC pipe is superior to concrete for a number of reasons. First, the joints require less care and form an excellent seal, reducing potential I/I. Second, PVC pipe comes in greater lengths, resulting in fewer joints and, therefore, fewer opportunities for I/I. Third, PVC pipe is less corrosive and typically lasts longer in clay soils, which are predominant in Plymouth.

Until full development of the system, some pipes will be oversized with regard to interim flows. The City will continue an annual pipe-cleaning program to maintain the hydraulics of the sewer system and prevent any build-up of sediment and sludge in the oversized pipes.

## PROPOSED SANITARY SEWER SYSTEM

### GENERAL

The sewer system layout for Plymouth is presented on the 2040 Sanitary Sewer System Plan (Figure 9-2). This map shows the main sanitary sewer districts, sub-districts, trunk sanitary sewers, lift stations, and force mains. Trunk sewers are those identified as larger than 8 inches in diameter. Installation of the city's trunk sewer is complete.

Most of the northwest area of Plymouth will flow directly to the Elm Creek Interceptor. The design of the 27-inch Elm Creek Interceptor provides for multiple points of connection for the sub-districts in this area. A portion of the northwest area will also flow north through a Maple Grove trunk sewer and into the Elm Creek Interceptor in Maple Grove. The southeast portion of the sub-district surrounding Pomerleau Lake will flow south and connect to existing sewer pipe south of the railroad.

Alignments shown on the sanitary sewer system map generally follow the natural drainage of the land and have been located to minimize the use of lift stations to provide the City with the most cost effective locations. The location of collection sewers and smaller laterals will be determined by future land development plans.

### WASTEWATER FLOW PROJECTIONS

Currently, the majority of the wastewater in the city is conveyed through several trunk sewer lines and collected at the MCES lift station in the southeast corner of Plymouth near Highway 55. From there it discharges to the City of Golden Valley. The Elm Creek Interceptor will ultimately handle the majority of flow from the northwest area of the city.

Population and household projections for the city were shown in Table 9-1. Wastewater flow projections were shown in Table 9-2.

Flow rates by MCES interceptor and by sub-district are shown in Appendix 9E.

## INTERCOMMUNITY FLOWS

**Maple Grove:** Sewage from 1,584 parcels in the north portion of Plymouth flows into Maple Grove's sewer system under a separate service agreement with Maple Grove. That sewer pipe eventually connects into the Elm Creek Interceptor in Maple Grove.

**Medicine Lake:** Sewage from the City of Medicine Lake flows through Plymouth in a separate Metropolitan Council sewer line located along South Shore Drive. That sewer pipe is not connected to Plymouth's system.

**Medina:** Under a separate service agreement with Medina, sewage from Holy Name of Jesus Catholic Church located at 155 County Road 24 in Medina, as well as the sewage from 17 parcels north of County Road 24 in Medina, flows into Plymouth's sewer system, and sewage from the Hamel VFW located at 19020 Hamel Road in Plymouth, flows into Medina's sewer system. Additionally, sewage from the home located at 19045 Hamel Road in Plymouth flows into Medina's sewer system under a separate service agreement with Medina. Sewage from Just for Kix, located at 50 Westfalen Trail in Medina, flows into Plymouth's sewer system under a separate service agreement with Medina. Sewage from 255 parcels located in the west portion of Plymouth (area east of Brockton Lane between Highway 55 and Medina Road) flows through Medina in a sewer system owned by Plymouth that discharges into an MCES Interceptor without a connection to Medina's sewer system. One unit in Medina (Just for Kix) flows into that sewer pipe.

**Minnetonka:** There are four intercommunity sewer connections in the south portion of Plymouth where sewage from 105 parcels in Plymouth flows into Minnetonka's sewer system. Those flows are addressed under a service agreement from 1972, an inter-municipal road and utility improvements agreement from 1983, and a Kingsview Lane construction agreement from 1999. The 1972 agreement also covers the sewage flow from the single-family home located at 11202 Ridgemount Avenue in Plymouth, which has a service connection into Minnetonka's sewer system.

**Orono:** Sewage from St. Edward the Confessor Episcopal Church, located at 865 Ferndale Road in Orono, flows into Plymouth's sewer system under a separate service agreement with Orono.

**Wayzata:** Sewage from 26 parcels in the southwest portion of Plymouth flows into Wayzata's sewer system, however, neither Plymouth nor Wayzata could locate a formal agreement relating to that connection. Sanitary sewer service for the 26 parcels is billed by Plymouth. Sewage from Wayzata Central Middle School, located at 305 Vicksburg Lane in Plymouth, formerly flowed into Wayzata's sewer system. However, that sewage was redirected into Plymouth's sewer system in 2013 as part of a lift station rehabilitation project.

A map showing the locations of intercommunity service agreements and flows is provided as Appendix 9F.

## EXISTING INDIVIDUAL SEWAGE TREATMENT SYSTEMS

There are roughly 137 lots that currently have individual sewage treatment systems (see Figure 9-4). Several of the parcels located in the northwest part of the city that presently contain individual sewage treatment systems are projected to receive municipal sewer by 2040. There are also some lots around Gleason and Mooney Lakes in the southwest corner of the city that have individual sewage treatment systems (ISTS).

The City of Plymouth is committed to the proper design, location, installation and ongoing maintenance of individual sewage treatment systems. The City intends to eventually provide municipal sewer service to all ISTS users as service is extended to new or redeveloping areas in the city.

Plymouth requires that all individual systems be designed and constructed in accordance with Chapter 7080 of Minnesota Rules. In 2000, the City delegated the responsibility for permitting and inspection of individual sewage treatment systems to Hennepin County, pursuant to Hennepin County Ordinance No. 19. A copy of the City ordinance regarding individual systems is included as Appendix 9G.

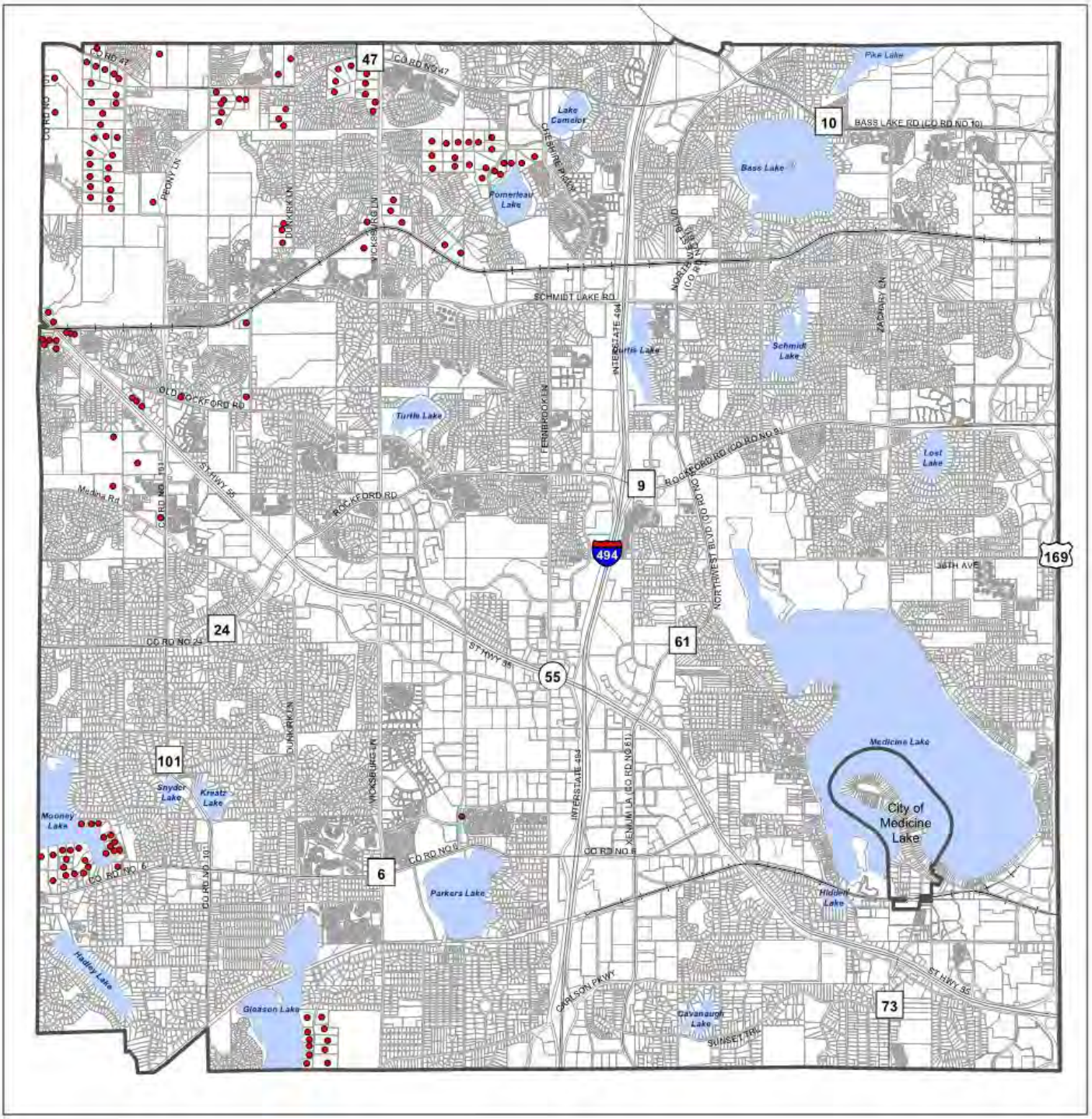



Figure 9-4

# Existing On-Site Sewage Disposal Systems

As 12/11/2017

- Individual Septic System

City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

## LIFT STATIONS

The City currently has 14 lift stations within the sanitary system. Collectively, the lift stations pump an average wastewater flow of approximately 12.6 million gallons per day (MGD). The average daily flow through the primary discharge point at the MCES (7026) interceptor forcemain is 7.67 MGD. This indicates that the average daily wastewater flow is pumped multiple times by the City's lift stations. The redundant pumping of the wastewater flow is indicative of the importance of Plymouth's lift stations to overall system performance.

## FUNDING MECHANISMS

The City uses three main sources of funding to pay for sanitary sewer:

- Area charges are commonly used to cover the cost of trunk collection sewers.
- Connection fees are commonly used to cover the costs of trunk sewer facilities, force mains and pumping stations.
- Sewer rates are commonly used to cover the costs of maintenance and enhancements to the system.

The City's Utility Rate Study is updated annually, and provides additional detail on funding sources.

# IMPLEMENTATION

| *Description* | *Timing* |
|---|---|
| **Capital Improvements Program –** Annually review the need for capital improvements and adjust the scheduled projects to meet the needs of new development and redevelopment. A complete listing of sanitary sewer related projects can be found in the City's current capital improvements program (CIP). | Ongoing |
| **Trunk Sewer System Funding –** Review the current system of funding the trunk sewer system through a combination of area charges, connection charges and lateral benefit assessments to ensure that the rates provide adequate funding and adjust the charges as necessary. | Short |
| **Infiltration/Inflow –** Continue to implement City Code Section 740 and continue to line VCP pipe according to priorities established through televising. | Ongoing |
| **Lift Station Rehabilitation –** Continue to implement lift station rehabilitation and replacement. | Ongoing |
| **Sewer User Charges –** Review sewer user charges to ensure that they will be sufficient to fund future operation and maintenance costs. | Ongoing |
| **Monitor Sewer Line Capacities –** Monitor flows of sewer lines with capacity/design flow ratios less than one for signs of unacceptable surcharging. | Ongoing |
| **On-Site Sewage Disposal Systems –** Continue to implement the current City ordinances and policies relating to on-site sewage disposal systems. | Ongoing |

Appendix 9A

# POPULATION, HOUSEHOLD, AND EMPLOYMENT PROJECTIONS BY SEWER DISCHARGE

| Facility | Facility Type | 2020 | | | 2030 | | | 2040 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Pop. | Number of Households | Employees | Pop. | Number of Households | Employees | Pop. | Number of Households | Employees |
| 1-PM-466 | Interceptor | 28,359 | 11,681 | 10,457 | 29,390 | 12,059 | 11,317 | 30,780 | 12,549 | 12,856 |
| 1-PM-467 | Interceptor | 408 | 168 | 653 | 436 | 179 | 660 | 439 | 179 | 768 |
| 9004-2 | Interceptor | 2260 | 931 | 759 | 3209 | 1317 | 781 | 4333 | 1767 | 850 |
| M118 | Meter | 41,122 | 16,941 | 39,324 | 42,363 | 17,383 | 42,016 | 42,897 | 17,494 | 43,864 |
| Maple Grove (To M226) | Interconnect | 3,822 | 1,574 | 138 | 4,150 | 1,703 | 167 | 4,658 | 1,900 | 240 |
| Medina (To M242) | Interconnect | 752 | 310 | 152 | 1,374 | 564 | 157 | 1,511 | 616 | 200 |
| Wayzata (To M437) | Interconnect | 137 | 56 | 76 | 137 | 56 | 76 | 138 | 56 | 80 |
| Minnetonka (To M437) | Interconnect | 93 | 38 | 45 | 94 | 38 | 45 | 94 | 38 | 48 |
| Minnetonka (To M410) | Interconnect | 247 | 101 | 2296 | 247 | 101 | 2481 | 250 | 101 | 2594 |
| TOTAL | | **77,200** | **31,800** | **53,900** | **81,400** | **33,400** | **57,700** | **85,100** | **34,700** | **61,500** |

Sources: Metropolitan Council Sanitary Sewer Services Areas; Plymouth 2040 Comprehensive Plan Projections

Appendix 9B

# ORDINANCE PROHIBITING DISCHARGES INTO THE SANITARY SEWER SYSTEM

## Section 740 - Prohibiting Discharges into the Sanitary Sewer System

740.01. Purpose. The discharge of water from roof, surface, groundwater sump pump, footing tile, swimming pool, or other natural precipitation into the City sewerage system results in flooding and overloading of the sewerage system. When this water is discharged into the sanitary sewer system it is treated at the sewage treatment plant. This results in very large and needless expenditures. The City Council, therefore, finds it in the best interest of the City to prohibit such discharges.

740.02. Discharge Prohibited. Except as otherwise expressly authorized in this Section, no water from any roof, surface, groundwater sump pump, footing tile, swimming pool, or other natural precipitation shall be discharged into the sanitary sewer system. Dwellings and other buildings and structures which require, because of infiltration of water into basements, crawl spaces, and the like, a sump pump discharge system shall have a permanently installed discharge line which shall not at any time discharge water into the sanitary sewer system, except as provided herein. A permanent installation shall be one which provides for year round discharge capability to either the outside of the dwelling, building, or structure, or is connected to City storm sewer or discharge through the curb and gutter to the street. It shall consist of a rigid discharge line, without valving or quick connections for altering the path of discharge, and if connections for altering the path of discharge, and if connected to the City storm sewer line, include a check valve and an air gap located in a small diameter structure as shown in the City's standard plates.

740.03. Disconnection. Before August 1, 1995, any person, firm, or corporation having a roof surface, groundwater sump pump, footing tile, or swimming pool now connected and/or discharging into the sanitary sewer system shall disconnect or remove same. Any disconnects or openings in the sanitary sewer system shall be closed or repaired in an effective, workmanlike manner.

740.04. Inspection. Every person owning improved real estate that discharges into the City's sanitary sewer system shall allow an employee of the City of Plymouth or a designated representative of the City to inspect the buildings to confirm that there is no sump pump or other prohibited discharge into the sanitary sewer system. In lieu of having the City inspect their property, any person may furnish a certificate from a licensed plumber certifying that their property is in compliance with this ordinance.

740.05. Future Inspections. Each sump pump connection identified will be reinspected periodically.

740.06. New Construction. All new dwellings with sumps for which a building permit is issued after August 1, 1995, shall have a pump and shall be piped to the outside of the dwelling before a certificate of occupancy is issued.

740.07. Surcharge. A surcharge of One Hundred and 00/100 Dollars ($100.00) per month is hereby imposed on every sewer bill mailed on and after October 1, 1995, to property owners who are not in compliance with this ordinance or who have refused to allow their property to be inspected to determine if there is compliance. All properties found during yearly reinspection to have violated this ordinance will be subject to the $100.00 per month penalty for all months between the two most recent inspections.

740.08. Winter Discharge. The City Manager is authorized to issue a permit to allow a property owner to discharge Surface Water into the sanitary sewer system. The permit shall authorize such discharge only from November 15 to March 15 and a property owner is required to meet at least one of the following criteria in order to obtain the permit:

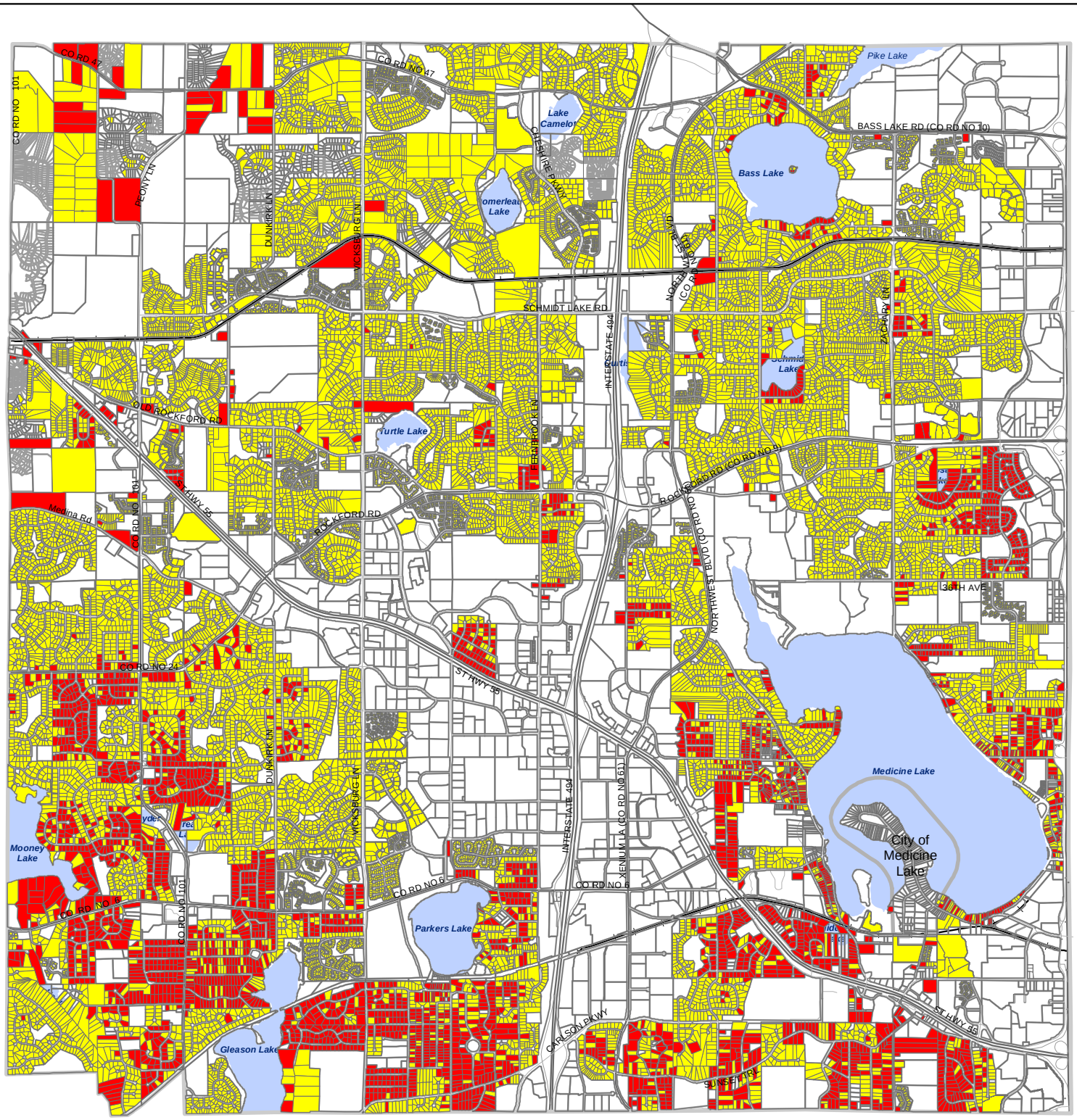
(a) The freezing of the surface water discharge from the sump pump or footing drain is causing a dangerous condition, such as ice buildup or flooding, on either public or private property.

(b) The property owner has demonstrated that there is a danger that the sump pump or footing drain pipes will freeze up and result in either failure or damage to the sump pump unit or the footing drain and cause basement flooding.

(c) The water being discharged from the sump pump or footing drain cannot be readily discharged into a storm drain or other acceptable drainage system.

Following ten (10) days written notice and an opportunity to be heard,. the City Manager may require a property to discharge their sump pump into the sanitary sewer from November 15 to March 15 if surface water discharge is causing an icy condition on streets.

*(Ord. 95-36, 06/20/95)*




Appendix 9C

# Housing Stock Age

No Data or Non-Residential
Built before 1970 (3500)
Built in or after 1970 (20641)

As of 9/27/2016

Source: Hennepin County

City of Plymouth

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THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

Appendix 9D

# INVENTORY OF FACILITIES

| Pipe Size/Type | Length (Ft) | Total Miles | Manholes |
|---|---|---|---|
| 4" PVC | 3,256 | 0.62 | |
| 6" PVC | 5,238 | 0.99 | |
| 8" PVC | 1,040,104 | 196.99 | |
| 8" DIP | 45,131 | 8.55 | |
| 8" HDPE | 2,095 | 0.40 | |
| 9" VCP | 358,337 | 67.87 | |
| 10" PVC | 43,935 | 8.32 | |
| 10" DIP | 20,190 | 3.82 | |
| 10" HDPE | 1,217 | 0.23 | |
| 12" PVC | 26,182 | 4.96 | |
| 12" DIP | 8,902 | 1.69 | |
| 12" RCP | 57,981 | 10.98 | |
| 15" | 25,100 | 4.75 | |
| 16" DIP | 7,331 | 1.39 | |
| 18" | 26,873 | 5.09 | |
| 21" | 10,082 | 1.91 | |
| 24" | 31,339 | 5.94 | |
| 27" | 24,034 | 4.55 | |
| 30" | 2,299 | 0.44 | |
| 33" | 8,712 | 1.65 | |
| 42" | 9,532 | 1.81 | |
| 48" | 552 | 0.10 | |
| Sanitary Sewer Forcemain | | | |
| 4" FM | 7,338 | 1.39 | |
| 6" FM | 3,588 | 0.68 | |
| 8" FM | 1,150 | 0.22 | |
| 10" FM | 1,267 | 0.24 | |
| 12" FM | 2,014 | 0.38 | |
| 16" FM | 5,825 | 1.10 | |
| 18" FM | 1,262 | 0.24 | |
| 30" FM | 1,450 | 0.27 | |
| Manholes | | | 8921 |
| Totals | 1,782,316 | 338 | 8,921 |

Note: Totals are prior to the 2017 construction season.

Appendix 9E

# FLOWS BY INTERCEPTOR

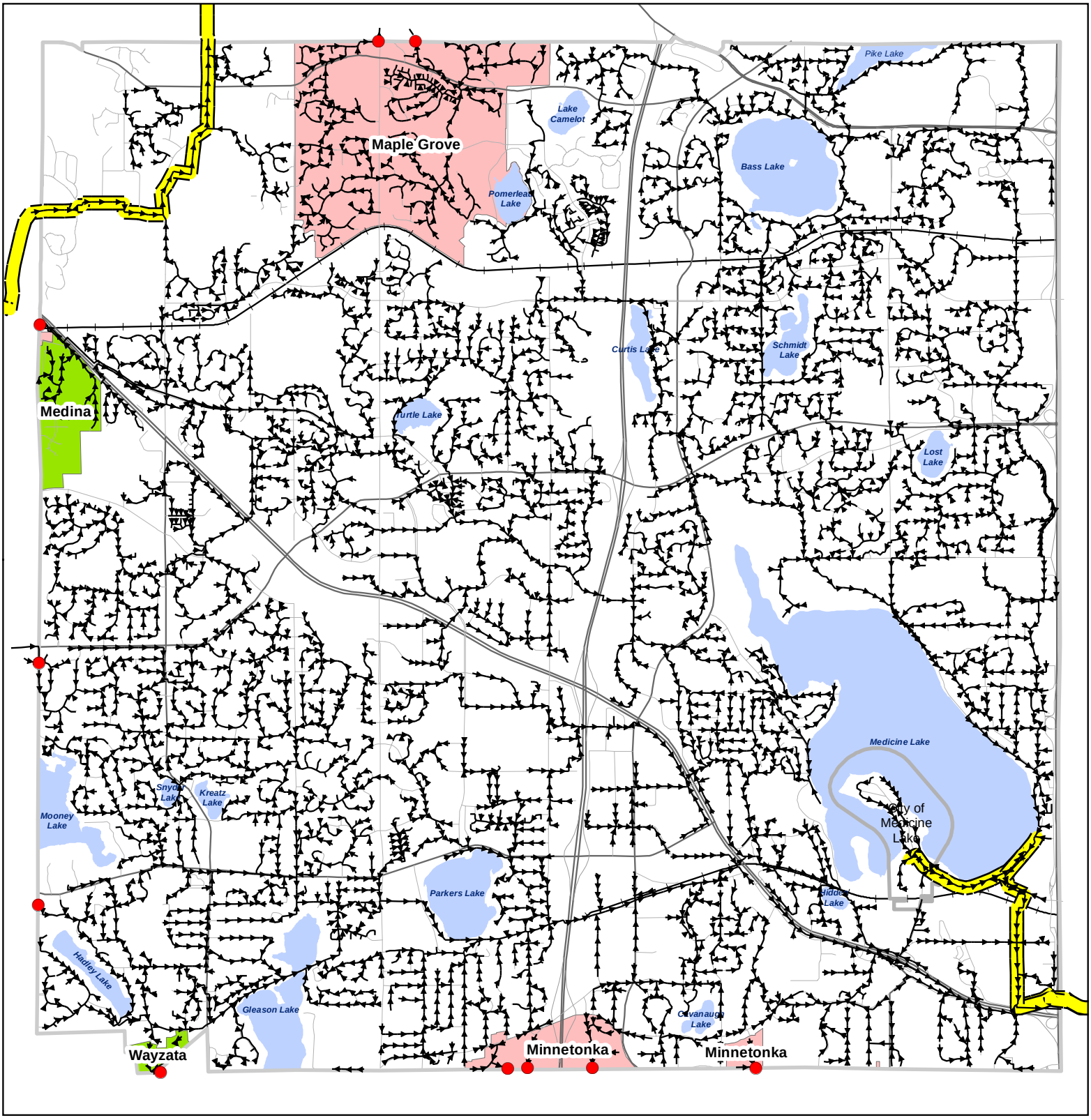
| MCES Meter | 2020 | 2030 | 2040 |
|---|---|---|---|
| **M226** | 0.2941 | 0.2941 | 0.2941 |
| **M241** | 0.1739 | 0.4326 | 0.4326 |
| **M118** | 7.4727 | 7.4727 | 7.6427 |
| ***Out*** | *0.1055* | *0.1055* | *0.1055* |
| **Total** | **8.0462** | **8.3049** | **8.4749** |
| | | | |

# FLOW RATES BY SUB-DISTRICT

| Lift Station | Sewer District | Acres | Average Flow (MGD) | Peak Flow Factor | Design Flow TOTAL (MGD) | Model Flow Value (gpm) |
|---|---|---|---|---|---|---|
| Bass Lake | **BL-1** | 156.74 | 0.129 | 3.9 | 0.503236569 | 349.4698399 |
| Bass Lake | **BL-2** | 268.33 | 0.233 | 3.8 | 0.887116512 | 616.0531334 |
| Bass Lake | **BL-3** | 211.52 | 0.189 | 3.9 | 0.736518912 | 511.4714664 |
| Bass Lake | **BL-4** | 99.66 | 0.052 | 4 | 0.208030162 | 144.4653905 |
| Bass Lake | **BL-5** | 301.53 | 0.322 | 3.6 | 1.158891185 | 804.7855451 |
| Gravity Service | **EC-1** | 174.84 | 0.181 | 3.9 | 0.704734746 | 489.3991293 |
| Gravity Service | **EC-2** | 171.90 | 0.146 | 3.9 | 0.571331606 | 396.7580597 |
| Gravity Service | **EC-3** | 117.29 | 0.065 | 4 | 0.26052451 | 180.9197983 |
| Gravity Service | **EC-4** | 219.30 | 0.291 | 3.7 | 1.075920619 | 747.1670966 |
| Gravity Service | **EC-5** | 166.38 | 0.050 | 4 | 0.19945324 | 138.5091948 |
| Gravity Service | **EC-6** | 89.77 | 0.200 | 3.8 | 0.758354635 | 526.635163 |
| Gravity Service | **EC-7a** | 84.81 | 0.051 | 4 | 0.204161844 | 141.7790582 |
| Conner Meadows | **EC-7b** | 165.22 | 0.100 | 4 | 0.398748982 | 276.9090151 |
| Gravity Service | **EC-8** | 256.34 | 0.242 | 3.7 | 0.894918185 | 621.4709619 |
| Gravity Service | **EC-9** | 215.93 | 0.250 | 3.7 | 0.924897269 | 642.2897698 |
| Gravity Service | **EC-10** | 215.91 | 0.137 | 3.9 | 0.533294725 | 370.3435588 |
| Gravity Service | **EC-11** | 86.31 | 0.173 | 3.9 | 0.675806461 | 469.3100423 |
| Gravity Service | **EC-12** | 47.21 | 0.007 | 4 | 0.028 | 19.44444444 |
| Mission Farms | **EC-13** | 334.49 | 0.395 | 3.6 | 1.421036644 | 986.8310028 |
| Autumn Hills | **EC-16** | 226.70 | 0.207 | 3.8 | 0.785109335 | 545.2148156 |
| Gravity Service | **EC-17** | 222.17 | 0.201 | 3.8 | 0.764710648 | 531.0490608 |
| Gravity Service | **EC-18** | 94.67 | 0.071 | 4 | 0.28377361 | 197.0650071 |
| Gravity Service | **EC-19** | 201.48 | 0.179 | 3.9 | 0.698412242 | 485.0085015 |
| Gravity Service | **LAKE** | 3.73 | 0.003 | 4 | 0.012086948 | 8.393713546 |
| Gravity Service | **LAKE** | 0.00 | 0.000 | 4 | 8.09531E-05 | 0.056217455 |

| Lift Station | Sewer District | Acres | Average Flow (MGD) | Peak Flow Factor | Design Flow TOTAL (MGD) | Model Flow Value (gpm) |
|---|---|---|---|---|---|---|
| Gravity Service | **M-1** | 58.04 | 0.015 | 4 | 0.058121195 | 40.36194075 |
| Gravity Service | **M-2** | 51.83 | 0.048 | 4 | 0.191562122 | 133.0292511 |
| Gravity Service | **M-3** | 53.79 | 0.052 | 4 | 0.207042537 | 143.7795399 |
| Gravity Service | **M-4** | 21.63 | 0.017 | 4 | 0.069939123 | 48.56883565 |
| Gravity Service | **MED LAKE** | 3.01 | 0.003 | 4 | 0.010334635 | 7.176830093 |
| Gravity Service | **NC-1** | 120.94 | 0.120 | 3.9 | 0.469345426 | 325.9343235 |
| Mission Farms | **NC-2** | 146.69 | 0.079 | 4 | 0.317379848 | 220.4026722 |
| Mission Farms | **NC-3** | 222.63 | 0.094 | 4 | 0.376014493 | 261.1211756 |
| Mission Farms | **NC-4** | 255.17 | 0.077 | 4 | 0.306740434 | 213.0141904 |
| Mission Farms | **NC-5** | 127.80 | 0.100 | 4 | 0.398929135 | 277.0341217 |
| Mission Farms | **NC-6** | 168.81 | 0.168 | 3.9 | 0.654656967 | 454.6228935 |
| Mission Farms | **NC-7** | 295.08 | 0.190 | 3.9 | 0.740900658 | 514.5143456 |
| Mission Farms | **NC-11** | 188.53 | 0.143 | 3.9 | 0.556348189 | 386.352909 |
| Mission Farms | **NC-12** | 188.58 | 0.129 | 3.9 | 0.503835926 | 349.8860599 |
| Mission Farms | **NC-13** | 251.39 | 0.205 | 3.8 | 0.778693686 | 540.7595041 |
| Gravity Service | **NE-1** | 221.28 | 0.233 | 3.8 | 0.88408699 | 613.9492984 |
| Gravity Service | **NE-2** | 108.57 | 0.091 | 4 | 0.365272063 | 253.6611546 |
| Gravity Service | **NE-3** | 82.13 | 0.058 | 4 | 0.231024726 | 160.4338373 |
| Gravity Service | **NE-4** | 118.40 | 0.121 | 3.9 | 0.47260279 | 328.1963821 |
| Lancaster | **NE-5** | 405.39 | 0.498 | 3.5 | 1.742220216 | 1209.87515 |
| Lancaster | **NE-6** | 196.20 | 0.200 | 3.8 | 0.759289361 | 527.2842784 |
| Lancaster | **NE-7** | 131.91 | 0.132 | 3.9 | 0.513936046 | 356.9000319 |
| Lancaster | **NE-9** | 209.04 | 0.201 | 3.8 | 0.763614655 | 530.2879551 |
| Gravity Service | **NW-1** | 178.59 | 0.123 | 3.9 | 0.479624307 | 333.0724354 |
| Waterfront | **NW-2** | 47.04 | 0.024 | 4 | 0.095595131 | 66.38550786 |
| 28th Ave | **NW-3** | 61.93 | 0.049 | 4 | 0.197365439 | 137.0593327 |
| Gravity Service | **NW-4** | 250.46 | 0.217 | 3.8 | 0.822998915 | 571.5270241 |
| Gravity Service | **NW-5** | 347.53 | 0.543 | 3.4 | 1.847563072 | 1283.029911 |
| Gravity Service | **NW-6** | 99.86 | 0.078 | 4 | 0.312768162 | 217.2001122 |
| Gravity Service | **NW-7** | 268.18 | 0.272 | 3.7 | 1.006338923 | 698.8464744 |
| Gravity Service | **NW-8** | 195.06 | 0.158 | 3.9 | 0.617821637 | 429.0428032 |
| Gravity Service | **NW-9** | 174.49 | 0.233 | 3.8 | 0.885126655 | 614.6712883 |
| Gravity Service | **NW-10** | 128.77 | 0.114 | 4 | 0.455471794 | 316.2998567 |
| Gravity Service | **NW-11** | 161.45 | 0.109 | 4 | 0.436835239 | 303.3578046 |
| Gravity Service | **NW-12** | 85.73 | 0.174 | 3.9 | 0.678837693 | 471.4150648 |
| Gravity Service | **NW-13** | 214.25 | 0.290 | 3.7 | 1.072612043 | 744.8694741 |
| Gravity Service | **NW-14** | 105.66 | 0.083 | 4 | 0.331880684 | 230.4726972 |
| Gravity Service | **NW-15** | 490.04 | 0.392 | 3.6 | 1.409588921 | 978.8811948 |
| Gravity Service | **NW-16** | 291.68 | 0.237 | 3.8 | 0.901052183 | 625.7306829 |
| Gravity Service | **NW-17** | 207.32 | 0.080 | 4 | 0.319710815 | 222.0213992 |
| Gravity Service | **NW-19a** | 276.19 | 0.231 | 3.8 | 0.877392995 | 609.3006913 |
| Gravity Service | **NW-19b** | 116.75 | 0.095 | 4 | 0.378316863 | 262.7200435 |
| Gravity Service | **NW-20** | 66.57 | 0.060 | 4 | 0.241320833 | 167.5839121 |
| Gravity Service | **NW-21a** | 163.54 | 0.284 | 3.7 | 1.05207034 | 730.6044027 |
| Gravity Service | **NW-21b** | 105.85 | 0.083 | 4 | 0.332135906 | 230.6499345 |

| Lift Station | Sewer District | Acres | Average Flow (MGD) | Peak Flow Factor | Design Flow TOTAL (MGD) | Model Flow Value (gpm) |
|---|---|---|---|---|---|---|
| Gravity Service | **NW-22** | 68.66 | 0.050 | 4 | 0.199369218 | 138.4508459 |
| Gravity Service | **NW-23** | 328.27 | 0.249 | 3.7 | 0.920461371 | 639.2092855 |
| Pike Lake | **PL-1** | 98.78 | 0.119 | 4 | 0.476219365 | 330.7078925 |
| Pike Lake | **PL-2** | 129.64 | 0.039 | 4 | 0.157634686 | 109.4685321 |
| Pike Lake | **PL-3** | 193.25 | 0.193 | 3.8 | 0.732923243 | 508.9744741 |
| Pike Lake | **PL-4a** | 203.78 | 0.219 | 3.8 | 0.831852442 | 577.675307 |
| Bass Lake Plaza | **PL-4b** | 17.83 | 0.018 | 4 | 0.071103753 | 49.37760634 |
| Gravity Service | **S-1** | 210.15 | 0.233 | 3.8 | 0.883739495 | 613.7079828 |
| Gravity Service | **S-2** | 128.43 | 0.231 | 3.8 | 0.87686853 | 608.9364789 |
| Gravity Service | **S-4** | 169.94 | 0.115 | 4 | 0.461043476 | 320.1690803 |
| Highway 73 | **S-5** | 27.68 | 0.022 | 4 | 0.086445635 | 60.03169105 |
| Gravity Service | **S-6** | 164.43 | 0.159 | 3.9 | 0.621202449 | 431.3905899 |
| Gravity Service | **S-7** | 201.31 | 0.171 | 3.9 | 0.667321569 | 463.4177562 |
| Gravity Service | **S-8** | 204.69 | 0.181 | 3.9 | 0.707783844 | 491.5165585 |
| Sunset Hills | **S-9** | 42.85 | 0.023 | 4 | 0.093055206 | 64.62167066 |
| Gravity Service | **S-11** | 176.47 | 0.176 | 3.9 | 0.68689031 | 477.0071597 |
| Gravity Service | **S-12** | 230.58 | 0.168 | 3.9 | 0.655795102 | 455.413265 |
| Gravity Service | **S-14** | 332.35 | 0.379 | 3.6 | 1.364160516 | 947.3336916 |
| Gravity Service | **S-15** | 260.22 | 0.200 | 3.8 | 0.758570118 | 526.7848038 |
| Gravity Service | **S-16** | 206.64 | 0.153 | 3.9 | 0.597666208 | 415.0459777 |
| Gravity Service | **S-17** | 82.53 | 0.064 | 4 | 0.257164818 | 178.586679 |
| Gravity Service | **S-18** | 67.51 | 0.054 | 4 | 0.216104095 | 150.0722885 |
| Gravity Service | **S-19** | 129.19 | 0.102 | 4 | 0.40711484 | 282.7186386 |
| Kingswood Farms | **S-20** | 53.69 | 0.034 | 4 | 0.137902933 | 95.76592541 |
| Gravity Service | **S-21** | 206.00 | 0.149 | 3.9 | 0.581048663 | 403.506016 |
| Villages | **S-22a** | 52.09 | 0.042 | 4 | 0.168766302 | 117.1988212 |
| Ferndale N | **S-22b** | 169.22 | 0.134 | 3.9 | 0.521451633 | 362.1191899 |
| Gravity Service | **S-23** | 263.88 | 0.241 | 3.7 | 0.890537307 | 618.4286851 |
| Gravity Service | **S-24** | 190.36 | 0.142 | 3.9 | 0.554463211 | 385.0438962 |
| Gravity Service | **S-25** | 222.79 | 0.205 | 3.8 | 0.780516724 | 542.0255025 |
| Gravity Service | **S-26** | 249.86 | 0.135 | 3.9 | 0.525164473 | 364.6975504 |
| Gravity Service | **S-27** | 238.11 | 0.175 | 3.9 | 0.683593614 | 474.7177878 |
| Gravity Service | **S-28** | 130.27 | 0.104 | 4 | 0.414710711 | 287.9935491 |
| Gravity Service | **S-29** | 87.08 | 0.085 | 4 | 0.339174897 | 235.5381232 |
| Gravity Service | **S-31** | 197.55 | 0.216 | 3.8 | 0.822265453 | 571.0176757 |
| Gravity Service | **S-30** | 222.25 | 0.175 | 3.9 | 0.680845366 | 472.8092817 |
| Imperial Hills | **S-31** | 55.36 | 0.043 | 4 | 0.173893384 | 120.7592946 |
| Greentree West | **S-32** | 62.38 | 0.041 | 4 | 0.16278384 | 113.0443333 |
| Gravity Service | **W-1** | 22.81 | 0.017 | 4 | 0.066019427 | 45.84682412 |




Appendix 9F

# Intercommunity Service Agreements and Flows

As of 12/27/2017

Source: City of Plymouth
Metropolitan Council

- Intercommunity Sewer Connections
- Sanitary Lines
- MCES Interceptors in Plymouth
- Intercommunity Service Agreements
- Intercommunity Flows

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THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

Appendix 9G

# INDIVIDUAL SEWAGE TREATMENT ORDINANCE

## Section 710 – Regulation of Individual Sewage Treatment Systems

710.01. Permits. No person shall install, alter, repair, extend, or abandon any individual sewage treatment system in the City without first applying for and obtaining a permit from Hennepin County as may be required pursuant to County Ordinance No. 19, Individual Sewage Treatment Systems. *(Ord. 2000-22, 5/23/2000; Ord. 2010-02, 2/23/2010)*

710.04-710.08 (*Sections were repealed by Ordinance 2000-22, 5/23/2000)*

*(Ord. 2011-29, 10/25/2011)*

CHAPTER 10

# Public Facilities Plan

# TABLE OF CONTENTS

CHAPTER PURPOSE....1
GOALS AND POLICIES....1
PUBLIC FACILITIES INVENTORY....1
CITY-OWNED BUILDINGS....1
City Hall and Public Safety....1
*Figure 10-1: City-Owned Buildings and Land*....2
Maintenance Building....3
Fire Stations....3
Plymouth Creek Center....3
Parkers Lake Cemetery....3
OTHER PUBLIC FACILITIES....4
NEEDS ASSESSMENT....4
FACILITIES NEEDED TO SERVE AN EXPANDING POPULATION....4
CITY HALL AND PUBLIC SAFETY....4
FIRE STATIONS....4
*Figure 10-2: Schools, Places of Worship, Public and Semi-Public Buildings*....5
IMPLEMENTATION....6

# LIST OF APPENDICES

10A PUBLIC FACILITIES INVENTORY

Chapter 10

# PUBLIC FACILITIES PLAN

## CHAPTER PURPOSE

This chapter identifies the City's public facilities and evaluates the future needs for City-owned facilities, specifically the City Hall and Public Safety complex, the public works building, fire stations, Plymouth Creek Center and the Parkers Lake Cemetery. This chapter only includes those facilities that are not covered by other plan elements. It does not address park facilities, transit stations, senior apartment buildings, water treatment plants and water towers because they are addressed elsewhere in the plan.

## GOALS AND POLICIES

Provide and maintain quality public facilities.

Provide for adequate maintenance and the orderly replacement of the City's buildings and equipment.

Continue to work with other public, private and non-profit agencies (e.g., Hennepin County, school districts and social service agencies) to ensure that the City's needs for facilities are met.

## PUBLIC FACILITIES INVENTORY

### CITY-OWNED BUILDINGS

Figure 10-1 identifies the City-owned buildings and land included with this plan.

#### City Hall and Public Safety

Plymouth City Hall is located at 3400 Plymouth Boulevard in City Center. The 90,000-square foot complex houses most City departments, including Administrative Services, Community Development, Engineering, Parks and Recreation and Public Safety. The original building was constructed in 1977. The Public Safety building was constructed in 1993. In 1995, the City constructed an addition to City Hall that included a connection to the Public Safety building. In 2004 and 2005, the City constructed an expansion of City Hall and the Public Safety building. The expansion project included an 18,000-square foot, two-story and basement addition to the existing Public Safety building. The expansion provided additional office and support space for police and fire personnel and an underground secured parking

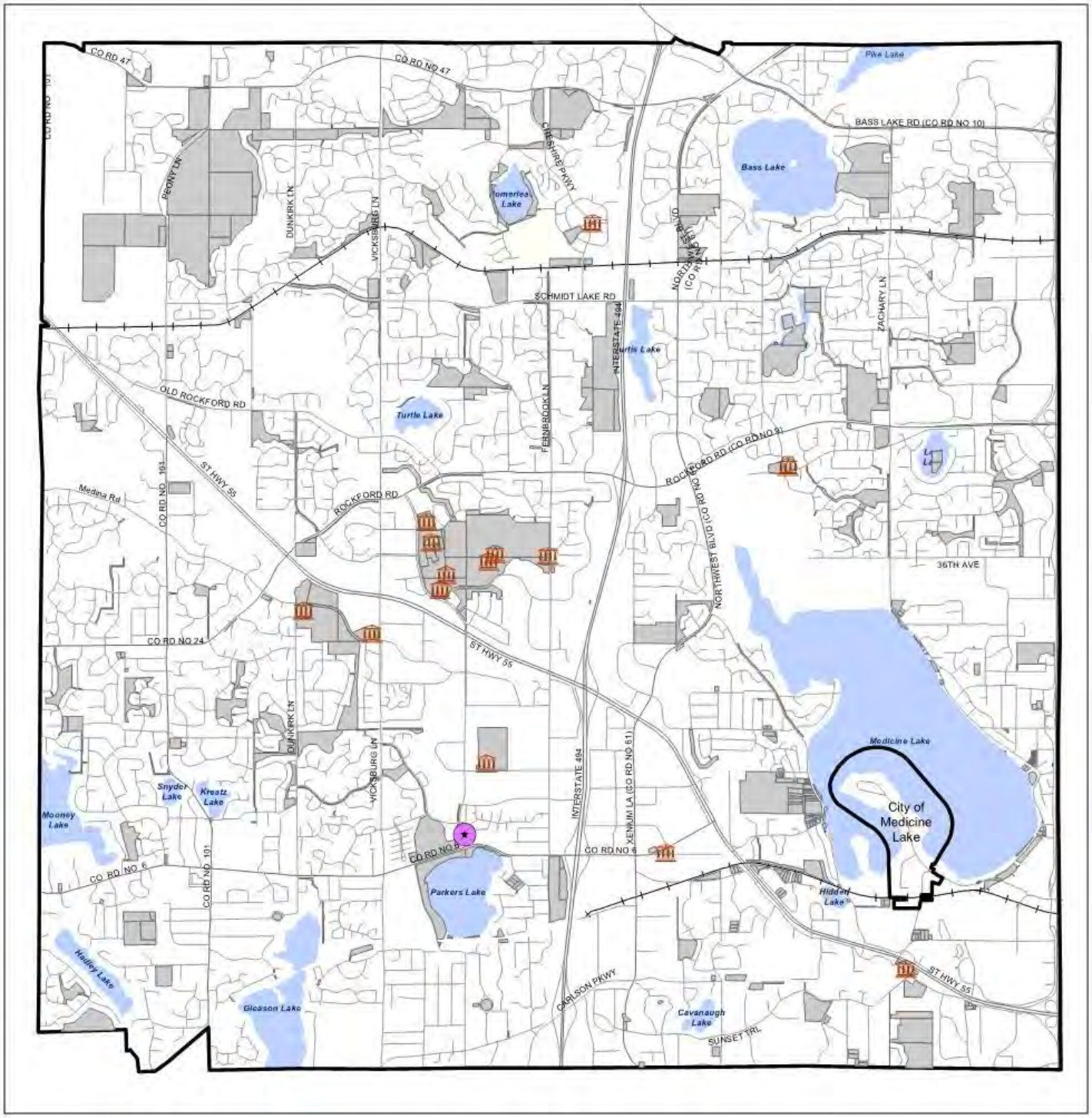



Figure 10-1

# City-Owned Buildings & Land

As of Date 7/31/2017

Parkers Lake Cemetery

City Buildings

City-Owned land

N

August, 2017
City of Plymouth

THIS REPRESENTS A COMPILATION OF INFORMATION AND DATA FROM CITY, COUNTY, STATE AND OTHER SOURCES THAT HAS NOT BEEN FIELD VERIFIED. INFORMATION SHOULD BE FIELD VERIFIED AND COMPARED WITH ORIGINAL SOURCE DOCUMENTS.

garage for public safety vehicles. The expansion project also included a 2,000-square foot lobby and conference room addition to the front of City Hall that linked the City Hall and Public Safety entrances. Various exterior site improvements were also completed with this project, including a green roof above the Public Safety garage.

### Maintenance Building

The maintenance building is located at 14900 23rd Avenue. This 131,675-square foot facility houses the Public Works Maintenance and Utility Divisions and the Park Maintenance and Forestry Divisions. The original 67,495-square foot facility was constructed in 1992. In 2000 and again in 2016, the garage was expanded to provide additional vehicle storage space. The 2016 expansion also included additional wash bay and office space.

### Fire Stations

Plymouth has three fire stations. Fire Station I is located at 13205 County Road 6 and was constructed in 1991. Fire Station II is located at 12000 Old Rockford Road and was constructed in 1977. Fire Station III is located at 3300 Dunkirk Lane and was constructed in 1989.

### Plymouth Creek Center

Plymouth Creek Center is located at 14800 34th Avenue in the City Center area. This multi-use facility includes a 30,000-square foot activity center and a 71,000 square foot inflatable dome fieldhouse. Plymouth Creek Center was constructed in 1999. In 2004, a 15,000-square foot, lower-level building addition was constructed. This facility is a destination for a wide variety of social and recreational activities. It also houses the Plymouth Senior Program. The activity center includes a social hall with dance floor, a fireside lounge, meeting rooms, a conference room, a multi-purpose room and soundproof music rooms. The grounds include a Millennium Garden, which opened in 2003. The initial plans for Plymouth Creek Center identified a potential second building that would connect to the existing building with a walkway.

### Parkers Lake Cemetery

Although there are two private cemeteries in Plymouth (Mount Olivet Lutheran Church and the Parish Community of St. Joseph), the Parkers Lake Cemetery is the only public cemetery. The two-acre cemetery near Niagara Lane and County Road 6 is owned and maintained by the City of Plymouth. This cemetery contains 1,154 plots, of which 261 are vacant. All of the vacant plots have been sold. The cemetery property cannot accommodate additional plots.

### OTHER PUBLIC FACILITIES

Figure 10-2 identifies the location of public facilities owned by other governmental units and semi-public facilities. They include the Hennepin County Adult Correctional Facility, library, churches, and public and private schools. The City did not evaluate the future needs for these facilities.

## NEEDS ASSESSMENT

### FACILITIES NEEDED TO SERVE AN EXPANDING POPULATION

As the city continues to grow, additional space for staff or equipment may be required. The City will monitor facility needs as part of its annual budget and Capital Improvements Program review. Facility needs will also be reexamined with the required 10-year update of the Comprehensive Plan.

### CITY HALL AND PUBLIC SAFETY

In 2018, the City remodeled the Administrative Services and Parks areas of City Hall. In 2020, the City will remodel the lower level of City Hall, including the Community Development and Engineering areas as well as the lunchroom and kitchen.

### FIRE STATIONS

The City has identified a potential need to relocate existing fire stations prior to 2040 to provide better response time to existing property owners and future development throughout the community. The addition of a fourth fire station may be needed to improve response time to all areas of the city. A fire services study will be completed as the community continues to develop.

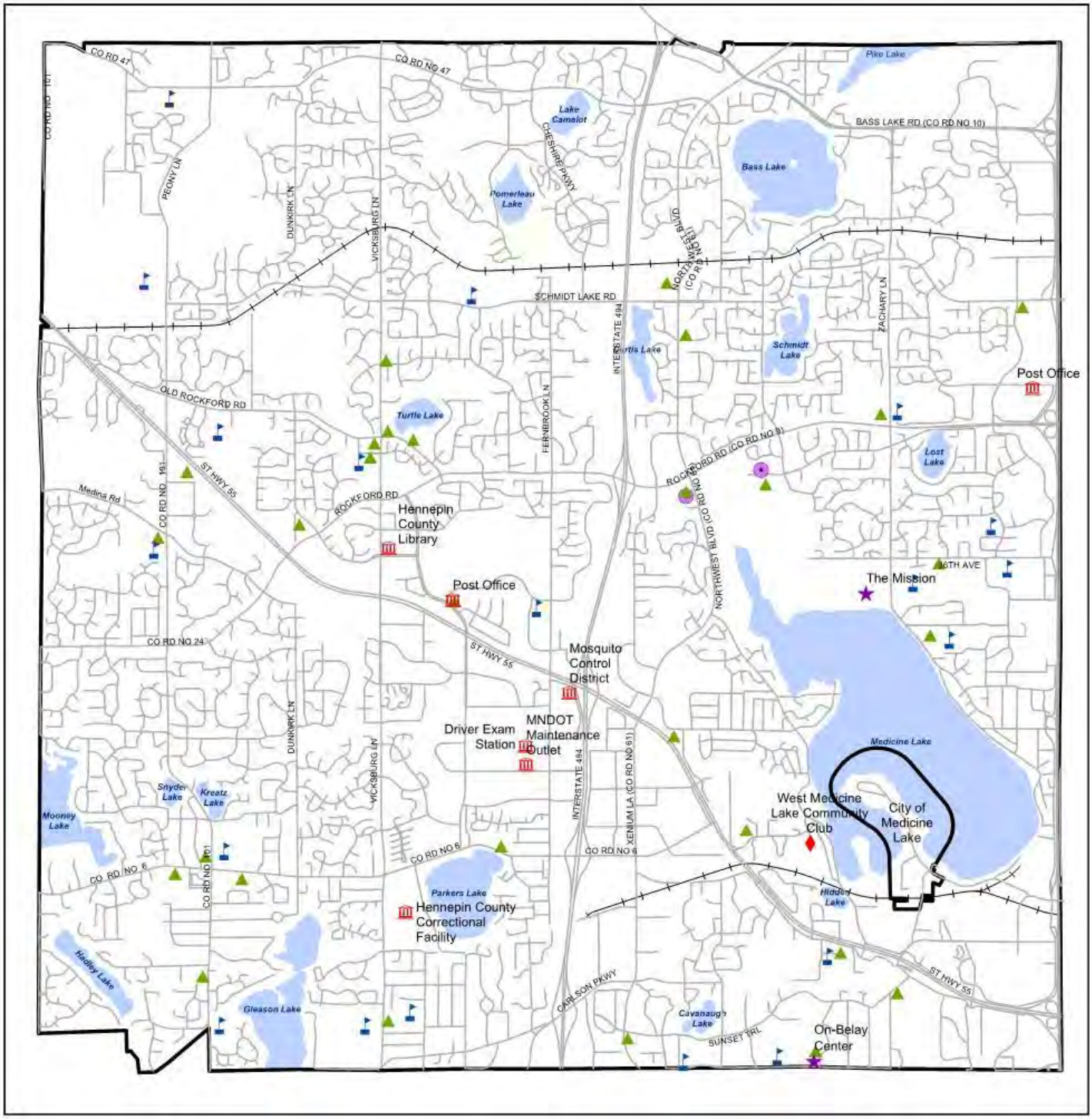



Figure 10-2

# Schools, Places of Worship, Public & Semi-Public Buildings

As of Date 8/15/2017

**DESCRIPTION**

- Community Club
- School
- School Closed
- Public Building
- Semi-Public Building
- Place of Worship
- Private Cemetery

N

City of Plymouth

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## IMPLEMENTATION

| *Description* | *Timing* |
|---|---|
| **City Hall and Public Safety—**Monitor office needs at City Hall and review any office maintenance and improvement projects through the annual budget and Capital Improvements Program review. | Ongoing |
| **Fire Stations—**Monitor needs for relocating existing fire stations and if needed, complete a formal fire services study for a fourth fire station. Review any projects through the annual budget and Capital Improvements Program review. | Ongoing |
| **Plymouth Creek Center—**Complete the use study to determine the need for expansion of the Creek Center. | Short |
| **City-Owned Public Facilities—**Continue to monitor facility needs for additional space, staff and/or equipment through the annual budget and Capital Improvements Program review. | Ongoing |

Appendix Chapter 10A

# Public Facilities Inventory

TABLE 10A-1
PUBLIC FACILITIES INVENTORY

| City Facilities | Address | Years Built | Square Footage |
|---|---|---|---|
| City Hall and Public Safety | 3400 Plymouth Boulevard | 1977, 1993, 1995 & 2005 | 90,000 |
| Hilde Performance Center | 3400 Plymouth Boulevard | 2001 | 25,000 |
| Ice Arena | 3650 Plymouth Boulevard | 1997 & 2004 | 125,000 |
| Plymouth Creek Center | 14800 34th Avenue | 1999 & 2004 | 30,000 |
| Plymouth Creek Dome | 14800 34th Avenue | 1999 & 2004 | 71,000 |
| Township Hall | 3605 Fernbrook Lane | 1895 | 1,400 |
| Plymouth Towne Square | 15500 37th Avenue | 1994 | 130,000 |
| Maintenance Building | 14900 23rd Avenue | 1979, 1992, 2001 & 2016 | 131,675 |
| Fire Station I | 13205 County Road 6 | 1991 | 8,500 |
| Fire Station II | 12000 Old Rockford Road | 1977 | 7,900 |
| Fire Station III | 3300 Dunkirk Lane | 1989 | 14,300 |
| Reserve Transit Station | 5300 Cheshire Lane | 2003 | 600 |
| Vicksburg Commons | 3155 Vicksburg Lane | 2006 | 140,000 |
| Transit Station 73 | 10905 State Highway 55 | 2006 | 79,000 |

Source: City of Plymouth