**GHS Environmental, LLC**
**PO Box 55802**
**St. Petersburg, FL 33732-5802**
**727-667-6786**

February 16, 2016

Mr. Patrick Flynn
Utilities, Inc. of Florida
200 Weathersfield Avenue
Altamonte Springs, FL 32714-4027

Re: Forest Lake Estates
PWS No. 6514842
Water Quality Review - Summary Report

Dear Mr. Flynn,

Gaydos Hydro Services, LLC (GHS) is pleased to provide this report summarizing our review of existing data regarding the potable water system at Forest Lake Estates. Pertinent information and data regarding the hydrogeology, well construction, permit information, groundwater pumpage and groundwater quality of the Forest Lake Estates water system was collected and evaluated in regards to aesthetic water quality issues such as taste and odor.

Additionally, GHS obtained the City of Zephyrhills historical and recent water quality records.

Please see attached summary report. If there are any questions regarding the submitted materials, please contact us at your convenience.

Sincerely yours,

**GHS Environmental, LLC**

Dana J. Gaydos
Principal

cc: Michael Wilson, Regional Manager

# Water Quality Review

for

## Utilities, Inc. of Florida
**(formerly Labrador Utilities, Inc.)**

**Located at**
**6429 Forest Lake Drive**
**Zephyrhills, Florida 33540**

**Prepared for:**
**Utilities, Inc. of Florida**
**200 Weathersfield Avenue**
**Altamonte Springs, FL 32714-4027**


**Prepared by:**

GHS, LLC

**GHS Environmental, LLC**
**PO Box 55802**
**St. Petersburg, FL 33732**


**February 2016**

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## Professional Certification

In accordance with provisions in Chapter 492, Florida Statutes, I hereby certify that I have prepared this Well Installation Report and attest that it has been reviewed and approved by the undersigned Florida Professional Geologist.

Gaydos Hydro Services, LLC has prepared this report in a manner consistent with sound geologic practices and that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar circumstances. Information provided to Gaydos Hydro Services, LLC by client representatives, agents, and other consultants has been accepted in good faith and is assumed to be accurate.

Douglas L. Crowson, P.G.
Registered Professional Geologist
Registration No. 1773, State of Florida

Gaydos Hydro Services, LLC
Geology Business License GB673, State of Florida

November 20, 2015
Date

# 1.0 Executive Summary

Utilities, Inc. of Florida, formerly Labrador Utilities, Inc., ("Utility") provides water and wastewater service to the residents and visitors of the Forest Lake Estates Mobile Home Park and RV Resort (FLE) located in eastern Pasco County. The Utility hired Gaydos Hydro Services, LLC (GHS) to review and provide an assessment regarding the quality of the potable water supplied to FLE.

The Utility's water source is two (2) groundwater wells that provide potable water for the FLE residents. Water quality data generated from 1992 to the present indicate that the Utility's potable water meets the majority of the drinking water standards established by the Florida Department of Environmental Protection (FDEP). No primary drinking water parameter's Maximum Contaminant Level (MCL) has been exceeded during that time frame. One secondary drinking water parameter, iron, was exceeded. This secondary drinking water parameter was not unexpected as this parameter is naturally occurring in Florida groundwater. An evaluation of chloride, manganese, sulfate, and total dissolved solids shows that these four parameters are present in concentrations below the established standards. However, these constituents may all impact the taste, color, and odor of the water, and all of these parameters are detected regularly.

In summary, the drinking water quality is relatively good. The presence of iron, manganese, sulfate and total dissolved solids may contribute to staining, odor and color problems downstream of the initial treatment point.

This report provides a summary of all pertinent data and includes graphics, tables, diagrams, and appendices. In addition, a copy of the Water Use Permit (WUP), as issued by the Southwest Florida Water Management District (District), and associated well logs are provided as supplemental information.

# 2.0 Project Site Information

## 2.1 General Location

The project site is located in Pasco County approximately 0.75 miles east of the intersection of State Road 54 and Chancey Road in Zephyrhills, Florida (Figure 1) on the south side of State Road 54. The property lies within Sections 5 and 8, Township 26S, Range 22E in Pasco County, Florida.

Figure 1 also highlights the location of the existing and proposed potable water lines owned by the City of Zephyrhills in the vicinity of Chancey Road.

## 2.2 Project Site

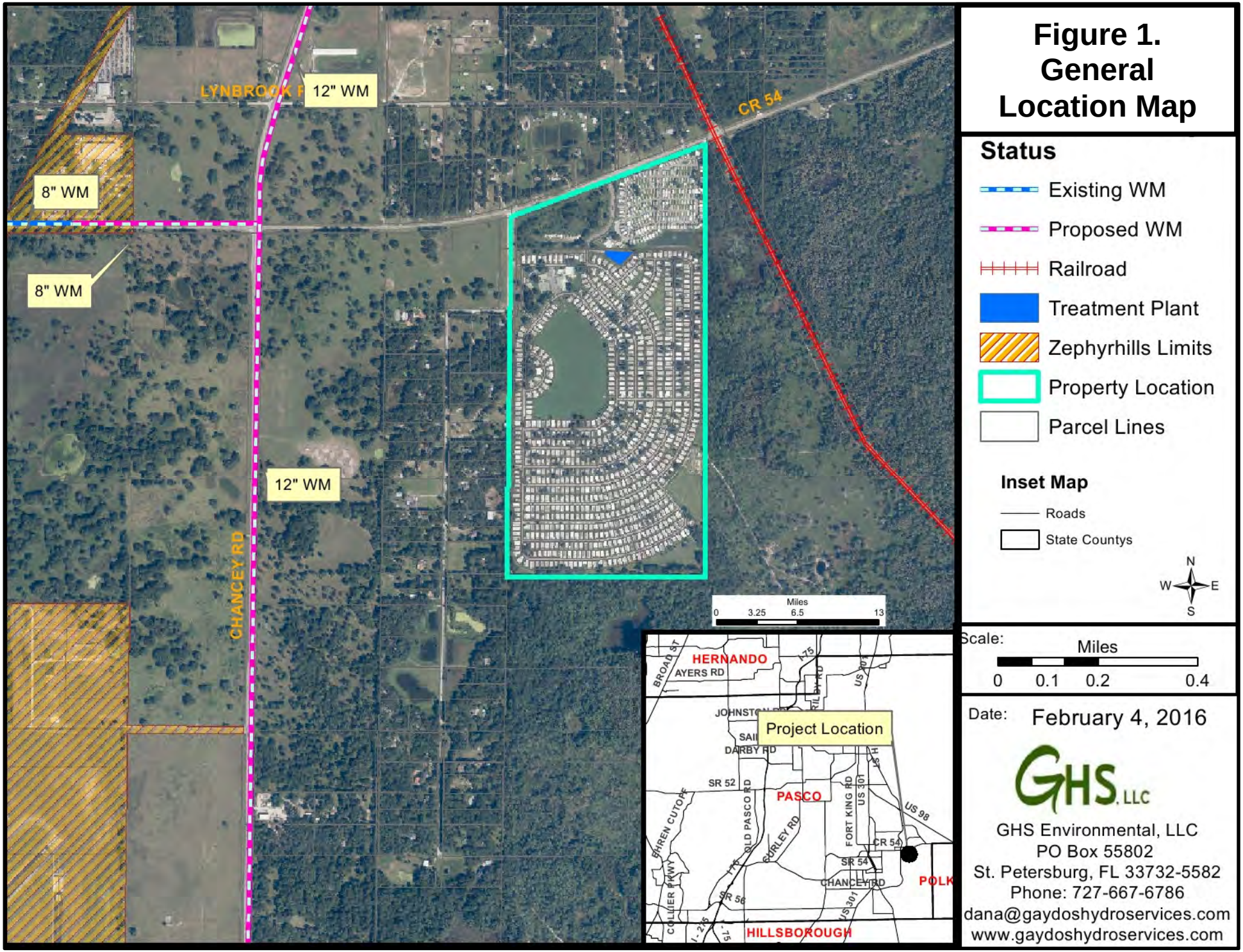
The project site (Figure 1) is approximately 200 acres in size, has an average elevation of about 85 feet NGVD and is bordered by natural vegetation on all sides. FLE contains approximately 900 mobile homes, a 275-unit RV park, two community pools, and a community clubhouse. FLE is a plus-55 community. The source of all potable water is the Floridan Aquifer utilizing two (2) groundwater wells and a newly constructed 35,000-gallon finished water ground storage tank. The existing treatment system includes polyphosphate addition for corrosion/sequestration control and sodium hypochlorite for disinfection.

## 2.3 WUP Summary

The existing Water Use Permit (WUP), District Permit No. 20006867-006, specifies annual average and peak month groundwater withdrawal limits from the on-site wells. Table 1 summarizes these permitted quantities. The District has identified the two wells as District ID #4 and #5. DID #4 is six (6) inches in diameter while DID #5 is ten (10) inches in diameter. Figures 1 and 2 depict the location of the two wells. The WUP authorized a combined annual average groundwater withdrawal of 99,785 gallons per day (gpd) and a peak month withdrawal of 160,650 gpd. The WUP is attached as Appendix A.

Table 1. WUP Summary.

| WUP #6867 | DID #4 / Permittee #2 | DID #5 / Permittee #1 |
|---|---|---|
| Diameter (in) | 6 | 10 |
| Casing Depth (ft) | 77 | 100 |
| Total Depth (ft) | 530 | 780 |
| Annual Average (gpd) | 58,000 | 99,785 |
| Peak Month (gpd) | 115,000 | 160,650 |




# Figure 1. General Location Map

## Status

- Existing WM
- Proposed WM
- Railroad
- Treatment Plant
- Zephyrhills Limits
- Property Location
- Parcel Lines

### Inset Map

- Roads
- State Countys

N
W E
S

Scale: Miles

0 0.1 0.2 0.4

Date: February 4, 2016

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# Figure 2. Water Treatment Plant (WTP) Site Map

## Legend

- Access Road
- WTP
- Parcel Lines
- Existing Wells

N
W E
S

Scale: Miles

0 0.005 0.01 0.02

Date: February 4, 2016

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# 3.0 Water Quality Summary

## 3.1 Data Review

Water quality data associated with the Forest Lake Estates water system were obtained from Utilities, Inc. of Florida, the Florida Department of Environmental Protection (FDEP), and the Southwest Florida Water Management District's (District) databases. Specifically, information and data collected from FDEP's files include the most recent triennial test results as well as historic water quality data. Groundwater pumpage and well construction information was obtained from the District.

Over 1,200 water quality analyses have been conducted since 1982. For this report, data collected from January 1992 through November 2015 are summarized and commented upon for recommendations. Several parameters that had been detected in prior years are no longer of concern and are not used in this report or discussion. Of these hundreds of analyses, forty four (44) parameters were detected and are listed in Table 2. Minimum, maximum, and average values are provided along with the number of samples and the number of detections for every parameter that was detected.

## 3.2 Laboratory Analysis Summary

The one parameter that was detected in concentrations that surpassed its respective maximum contamination levels (MCL) was iron during the time period of 1992 through present.

### 3.2.1 Iron

Making up at least 5 percent of the earth's crust, iron is one of the earth's most plentiful resources. Rainwater, as it infiltrates the soil and underlying geologic formations, dissolves iron, causing it to seep into porous layers of the earth to form aquifers that serve as sources of groundwater. Although present in drinking water, iron is seldom found naturally at concentrations greater than 10 milligrams per liter (mg/L) or 10 parts per million. However, as little as 0.3 mg/l of iron, the secondary drinking water standard, can cause water to turn a reddish brown color.

Iron is not hazardous to health, but it is considered a secondary or aesthetic contaminant. Essential for good health, iron helps transport oxygen in the blood. Most tap water in the United States supplies approximately 5% of the daily dietary requirement for iron.

Dissolved iron gives water a disagreeable metallic taste. Iron can combine readily with various naturally occurring organic acids and tannins. Organic iron occurs when iron combines with an organic acid. Water with this type of iron is usually yellow or brown, but may be colorless. When the iron combines with tea, coffee and other beverages, it produces an inky, black appearance and a harsh, unacceptable taste. Vegetables cooked in water containing excessive iron turn dark and look unappealing. Organic iron and tannins are more frequently found in shallow wells, or wells under the influence of surface water.

Table 2. Detected Parameters, 1992 through present.

| CONTAMINANT DESCRIPTION | MIN | MAX | AVG | # SAMPLES | # DETECTIONS |
|---|---|---|---|---|---|
| ANTIMONY | 0 | 0.0011 | 0.00014 | 8 | 1 |
| BARIUM | 0 | 0.034 | 0.013 | 9 | 8 |
| BERYLLIUM | 0 | 0.0001 | 0.00001 | 8 | 1 |
| BROMODICHLOROMETHANE | 0 | 18 | 9.58 | 9 | 9 |
| BROMOFORM | 0 | 0.54 | 0.054 | 10 | 1 |
| CADMIUM | 0 | 0.0015 | 0.00017 | 9 | 1 |
| CALCIUM | 66 | 66 | 66 | 1 | 1 |
| CHLORIDE | 6 | 14 | 11.5 | 10 | 10 |
| CHLOROFORM | 0 | 49 | 22.2 | 10 | 9 |
| COLOR | 0 | 13 | 4.4 | 10 | 6 |
| COMBINED URANIUM | 0 | 0.26 | 0.1 | 2 | 1 |
| COPPER | 0 | 1.50 | 1.00 | 10 | 8 |
| CYANIDE | 0 | 0.015 | 0.0028 | 8 | 3 |
| DIBROMOACETIC ACID | 0 | 1.7 | 0.53 | 8 | 3 |
| DIBROMOCHLOROMETHANE | 0 | 6.12 | 3.39 | 10 | 9 |
| DICHLOROACETIC ACID | 0 | 15 | 8.24 | 8 | 7 |
| DICHLOROMETHANE | 0 | 0.47 | 0.05 | 10 | 1 |
| FLUORIDE | 0.11 | 0.25 | 0.18 | 17 | 17 |
| FOAMING AGENTS | 0.00 | 0.19 | 0.05 | 10 | 5 |
| ROSS ALPHA INCL RADON AND URANIU | 0 | 6.9 | 2.56 | 8 | 7 |
| HARDNESS - CALCIUM | 186 | 210 | 198 | 2 | 2 |
| HYDROGEN SULFIDE | 0 | 0.21 | 0.09 | 3 | 2 |
| IRON | 0 | 0.88 | 0.25 | 10 | 9 |
| LEAD | 0 | 0.0013 | 0.00027 | 9 | 2 |
| MANGANESE | 0 | 0.03 | 0.01 | 10 | 9 |
| MERCURY | 0 | 0.0002 | 0.00002 | 9 | 1 |
| MONOCHLORACETIC ACID | 0 | 0.65 | 0.04333 | 15 | 1 |
| ODOR THRESHOLD | 0 | 2 | 0.30 | 10 | 2 |
| pH (FIELD) | 7 | 7.9 | 7.51 | 5 | 5 |
| pH (LAB) (6.5 to 8.5) | 0 | 7.77 | 6.49 | 9 | 9 |
| RADIUM-228 | 0 | 1.2 | 0.39 | 8 | 4 |
| SELENIUM | 0 | 0.0034 | 0.0009 | 9 | 3 |
| SILVER | 0 | 0.0006 | 0.0001 | 9 | 2 |
| SODIUM | 3.9 | 9.5 | 7.3 | 9 | 9 |
| STABILITY INDEX | 6.5 | 7.45 | 6.9 | 3 | 3 |
| SULFATE | 0 | 10.1 | 5.2 | 10 | 8 |
| TOTAL ALKALINITY | 196 | 202 | 199 | 2 | 2 |
| TOTAL DISSOLVED SOLIDS | 207 | 296 | 252 | 10 | 10 |
| TOTAL HALOACETIC ACIDS (HAA5) | 6.1 | 29.17 | 18.89 | 11 | 11 |
| TOTAL NITRATE+NITRITE | 0 | 0.27 | 0.057 | 11 | 6 |
| TOTAL THMS | 0 | 72.9 | 38.3 | 10 | 9 |
| TRICHLOROACETIC ACID | 2.7 | 11.52 | 6.8 | 8 | 8 |
| TURBIDITY | 0.44 | 2.3 | 1.3 | 3 | 3 |
| ZINC | 0 | 0.061 | 0.019 | 10 | 7 |

Parameter detected in concentrations above the MCL.

Concentrations of iron as low as 0.3 mg/L will leave reddish brown stains on fixtures, tableware and laundry and are very hard to remove. When these deposits break loose from water piping, rusty water will flow through the faucet.

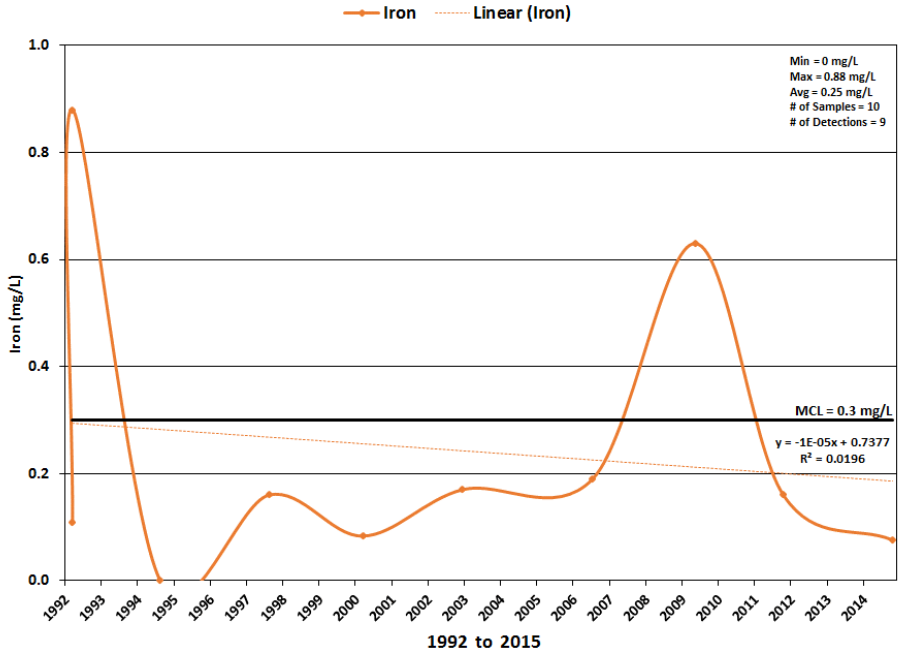
Table 3 summarizes the water quality data available between 1992 and 2015 for iron. There were a total of 10 samples collected. Out of those 10 samples, iron was detected nine times with a maximum concentration of 0.88 mg/l but overall having an average concentration of 0.25 mg/l, which is only slightly below the secondary drinking water standard of 0.3 mg/l. Figure 3 shows the concentrations of iron from 1992 through present along with a downward sloping trend line. The strength of the trend line signifies no correlation, and therefore, the downward slope is not significant.

Table 3. Iron Concentration from 1992 through present.

| SAMPLE DATE | RESULT | Units |
|---|---|---|
| 7/30/1992 | 0.109 | MG/L |
| 7/30/1992 | 0.88 | MG/L |
| 12/21/1994 | 0 | MG/L |
| 12/16/1997 | 0.16 | MG/L |
| 7/6/2000 | 0.0831 | MG/L |
| 4/28/2003 | 0.17 | MG/L |
| 11/21/2006 | 0.19 | MG/L |
| 9/22/2009 | 0.63 | MG/L |
| 2/8/2012 | 0.16 | MG/L |
| 2/4/2015 | 0.076 | MG/L |
| **MIN** | **MAX** | **AVG** |
| 0 | 0.88 | 0.25 |
| **DWS = 0.3 mg/l** | | |

Parameter detected in concentrations above the MCL.

Figure 3. Iron concentration from 1992 through present.



## 3.3 Chloride, Manganese, Sulfate, and Total Dissolved Solids

Chloride, manganese, sulfate and total dissolved solids are four parameters that are frequently used to evaluate the aesthetic quality of water. High chloride concentrations can influence the taste of groundwater. Manganese in fairly low concentrations can affect color and taste. Sulfate generates a detectable odor in very low concentrations. Total dissolved solids (TDS) value reflects the presence of metal salts such as calcium, phosphate, sodium, nitrate and potassium.

### 3.3.1 Chloride

Chloride is one of the most common anions found in tap water and combines readily with calcium, magnesium, and sodium. Sodium chloride (NaCl) is one of the most common constituents found in tap water. When present in high concentrations, it is generally the result of salt water intrusion into the aquifer, road salt runoff and native soil types.

Water high in sodium chloride will taste unpleasant and can damage plants if used for watering or irrigation. It is also highly corrosive and can damage plumbing. Water high in sodium chloride can damage appliances and hot water heaters over time.

There is no federally enforceable standard (e.g. Maximum Contaminant Level) for chloride in drinking water. However, EPA has set a recommended standard for chloride levels in drinking water at 250 mg/L or less. Drinking water with chloride levels above 250 mg/L may exhibit a salty taste. Secondary standards or Secondary Maximum Contaminant Levels (SMCL's) have been developed to protect the aesthetic quality of water, such as taste, odor, color, and appearance. SMCL's are non-enforceable guidelines that states may choose to implement.

Table 4 summarizes the water quality data available between 1992 and 2015 for chloride. There were a total of 10 samples collected. Out of those 10 samples, chloride was detected in all 10 with the highest concentration being 14 mg/l in three different years, which is well below the secondary drinking water standard of 250 mg/l. Figure 4 shows the concentrations of chloride over time and a nearly flat linear trend line.

### 3.3.2 Manganese

Manganese is a mineral that naturally occurs in rocks and soil. Manganese is seldom found alone in a water supply. It is frequently found in iron-bearing waters but at lower concentrations than iron. Chemically it can be considered a close relative of iron since it occurs in forms similar to iron.

When manganese is present in water, it is every bit as annoying as iron, perhaps even more so. In low concentrations, it produces extremely objectionable stains on everything with which it comes in contact. Deposits collect in pipelines and tap water may contain black sediment that causes water to become turbid due to precipitated manganese. When fabrics are washed in manganese-bearing water, dark brown or black stains are formed due to the oxidation of the manganese.

The U.S. EPA Secondary Drinking Water Regulations recommend a limit of 0.05 mg/l manganese because of the staining which may be caused. In concentrations higher than 0.05 mg/l the manganese may become noticeable by impairing color, odor, or taste to the water. However, according to the EPA, health effects are not a concern until concentrations are approximately 10 times higher.

Due to the fact that dissolved manganese oxidizes slower than iron, it is generally more difficult to remove from water. Pure elemental manganese metal is gray tinged with pink, brittle and somewhat harder than iron, which it resembles. The metal is not found in nature in pure form. However, this chemically active element is found in many compounds. Manganese is present most frequently as a manganous ion (Mn++) in water. Salts of manganese are generally more soluble in acid than in alkaline water. In this way they are similar to iron. The manganous ion is usually introduced to water through the solubility of manganous bicarbonate.

Table 5 summarizes the water quality data available between 1992 and 2015 for manganese. There were a total of 10 samples collected. Out of those 10 samples, manganese was detected 9 times with the highest detection having a concentration of 0.028 mg/l, which is well below the secondary drinking water standard of 0.05 mg/l. Figure 5 shows the concentrations of manganese over time along with a decreasing trend line.

### 3.3.3 Sulfate

Sulfate is a substance that occurs naturally in drinking water. Sulfate in drinking water currently has a secondary maximum contaminant level (SMCL) of 250 mg/L based on aesthetic effects (i.e., taste and odor).

Sulfate ($SO_4$) occurs naturally in most of Florida's groundwater. As water moves through soil and rock formations that contain sulfate minerals, some of the sulfate dissolves into the groundwater. Minerals that contain sulfate include magnesium sulfate (Epsom salt), sodium sulfate (Glauber's salt), and calcium sulfate (gypsum).

If sulfate in water exceeds 250 mg/L, a bitter taste may render the water unpleasant to drink. High sulfate levels may also corrode plumbing, particularly copper piping. In areas with high sulfate levels, plumbing materials more resistant to corrosion, such as plastic pipe, are commonly used. Three types of treatment systems will remove sulfate from drinking water: reverse osmosis, distillation, or ion exchange. Water softeners, carbon filters, and sediment filters do not remove sulfate. Water softeners merely change magnesium or calcium sulfate into sodium sulfate, which is somewhat more laxative.

Table 6 summarizes the water quality data available between 1992 and 2015 for sulfate. There were a total of 10 samples collected. Out of those 10 samples, sulfate was detected 9 times with the highest detection being 10.1 mg/l, which is below the secondary drinking water standard of 250 mg/l. Figure 6 shows the concentrations of sulfate over time along with a nearly flat linear trend line.

### 3.3.4 Total Dissolved Solids

Total Dissolved Solids (TDS) is a measure of the combined content of all contaminants contained in drinking water. A standard definition for “dissolved solids” is that they must be small enough to pass through a 2 micron filter. Contaminants larger than 2 microns are often referred to as Total Suspended Solids.

Total Dissolved Solids are classified by the EPA as a Secondary Contaminant. As a whole, they are considered more of a nuisance than a threat. Certain individual water contaminants that contribute to the Total Dissolved Solids level, however, may pose long term health risks if they exceed certain levels.

Primary sources for TDS in receiving waters are agricultural and residential runoff, leaching of soil contamination and point source water pollution discharge from industrial or sewage treatment plants. The most common chemical constituents are calcium, phosphate, nitrate, sodium, potassium and chloride, which are found in nutrient runoff, general stormwater runoff and runoff from snowy climates where road de-icing salts are applied. The chemicals may be cations, anions, molecules or agglomerations on the order of one thousand or fewer molecules, so long as a soluble micro-granule is formed. More exotic and harmful elements of TDS are pesticides arising from surface runoff. Certain naturally occurring total dissolved solids arise from the weathering and dissolution of rocks and soils.

Table 7 summarizes the water quality data available between 1992 and 2015 for total dissolved solids. There were a total of 10 samples collected, and all reported detections. The highest value was 296 mg/l, which is below the secondary drinking water standard of 500 mg/l. Figure 7 shows the concentrations of TDS over time along with a slight upward linear trend line, which is an artifact of the data set distribution.

Table 4. Chloride Concentration.

| SAMPLE DATE | RESULT | Units |
|---|---|---|
| 7/30/1992 | 7 | MG/L |
| 7/30/1992 | 6 | MG/L |
| 12/21/1994 | 10.3 | MG/L |
| 12/16/1997 | 13 | MG/L |
| 7/6/2000 | 13.2 | MG/L |
| 4/28/2003 | 14 | MG/L |
| 11/21/2006 | 11 | MG/L |
| 9/22/2009 | 12 | MG/L |
| 2/8/2012 | 14 | MG/L |
| 2/4/2015 | 14 | MG/L |
| **MIN** | 6 | MG/L |
| **MAX** | 14 | MG/L |
| **AVG** | 11.5 | MG/L |
| **DWS** | 250 | MG/L |

Table 5. Manganese Concentration.

| SAMPLE DATE | RESULT | Units |
|---|---|---|
| 7/30/1992 | 0.004 | MG/L |
| 7/30/1992 | 0.025 | MG/L |
| 12/21/1994 | 0.006 | MG/L |
| 12/16/1997 | 0.004 | MG/L |
| 7/6/2000 | 0.000 | MG/L |
| 4/28/2003 | 0.010 | MG/L |
| 11/21/2006 | 0.004 | MG/L |
| 9/22/2009 | 0.028 | MG/L |
| 2/8/2012 | 0.009 | MG/L |
| 2/4/2015 | 0.003 | MG/L |
| **MIN** | 0.000 | MG/L |
| **MAX** | 0.028 | MG/L |
| **AVG** | 0.009 | MG/L |
| **DWS** | 0.050 | MG/L |

Table 6. Sulfate Concentration.

| SAMPLE DATE | RESULT | Units |
|---|---|---|
| 7/30/1992 | 8.0 | MG/L |
| 7/30/1992 | 8.0 | MG/L |
| 12/21/1994 | 7.1 | MG/L |
| 12/16/1997 | 5.6 | MG/L |
| 7/6/2000 | 10.1 | MG/L |
| 4/28/2003 | 0.0 | MG/L |
| 11/21/2006 | 3.6 | MG/L |
| 9/22/2009 | 0.0 | MG/L |
| 2/8/2012 | 6.6 | MG/L |
| 2/4/2015 | 3.2 | MG/L |
| **MIN** | 0.0 | MG/L |
| **MAX** | 10.1 | MG/L |
| **AVG** | 5.2 | MG/L |
| **DWS** | 250.0 | MG/L |

Table 7. TDS Concentration.

| SAMPLE DATE | RESULT | Units |
|---|---|---|
| 7/30/1992 | 207 | MG/L |
| 7/30/1992 | 246 | MG/L |
| 12/21/1994 | 260 | MG/L |
| 12/16/1997 | 208 | MG/L |
| 7/6/2000 | 296 | MG/L |
| 4/28/2003 | 240 | MG/L |
| 11/21/2006 | 250 | MG/L |
| 9/22/2009 | 260 | MG/L |
| 2/8/2012 | 290 | MG/L |
| 2/4/2015 | 260 | MG/L |
| **MIN** | 207 | MG/L |
| **MAX** | 296 | MG/L |
| **AVG** | 252 | MG/L |
| **DWS** | 500 | MG/L |

Figure 4. Chloride concentration over time.

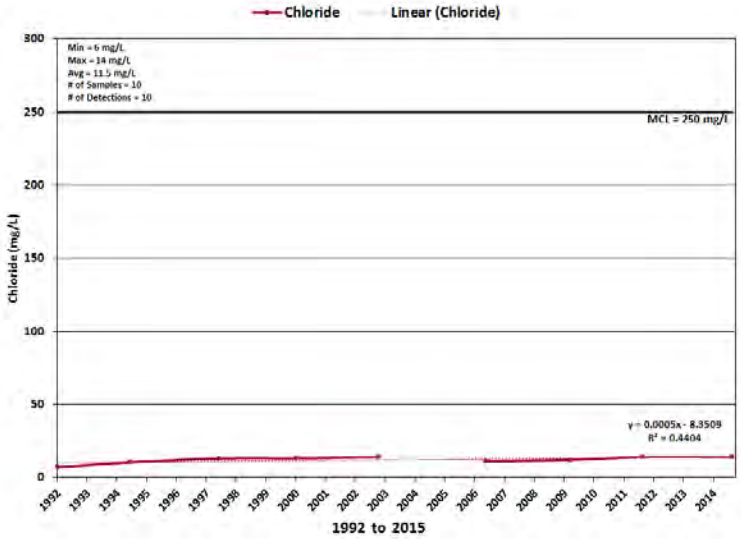



Figure 5. Manganese concentration over time.

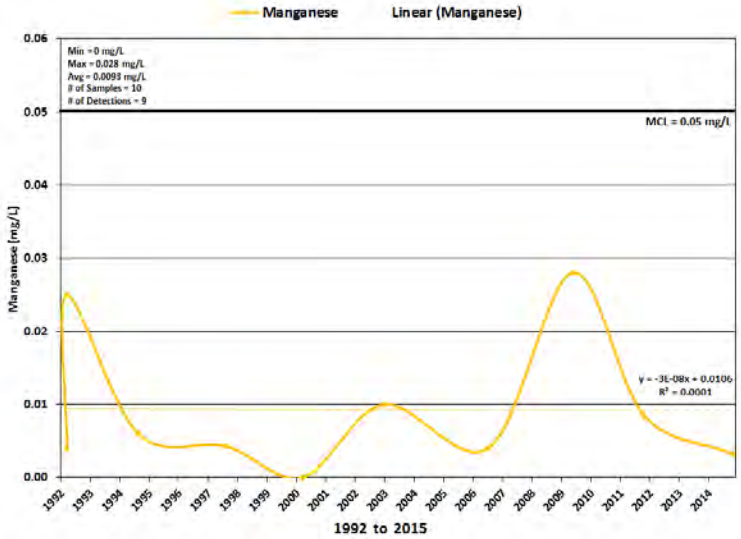



Figure 6. Sulfate concentration over time.

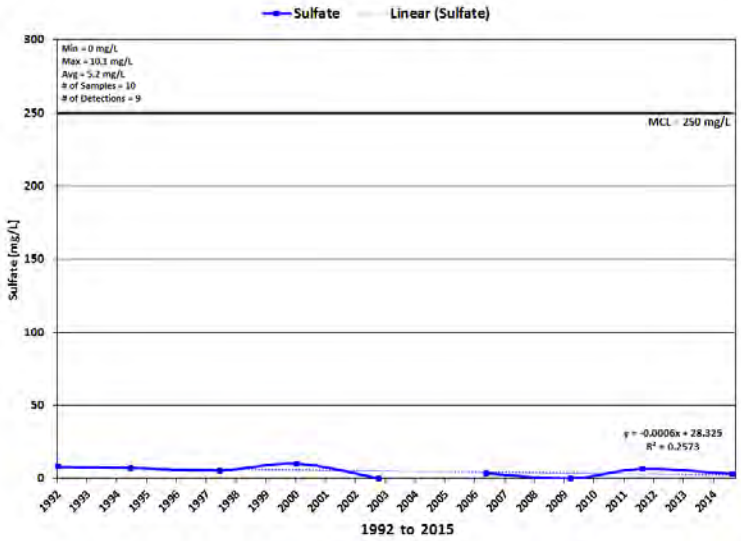
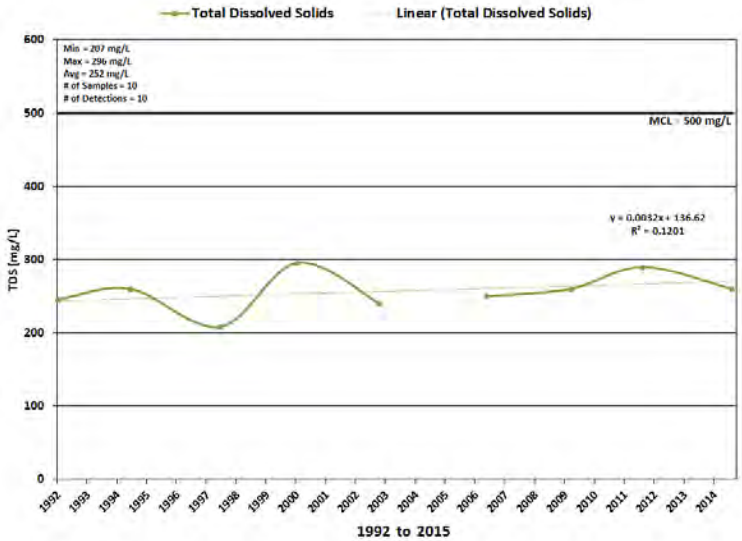



Figure 7. TDS concentration over time.



# 4.0 Groundwater Pumpage

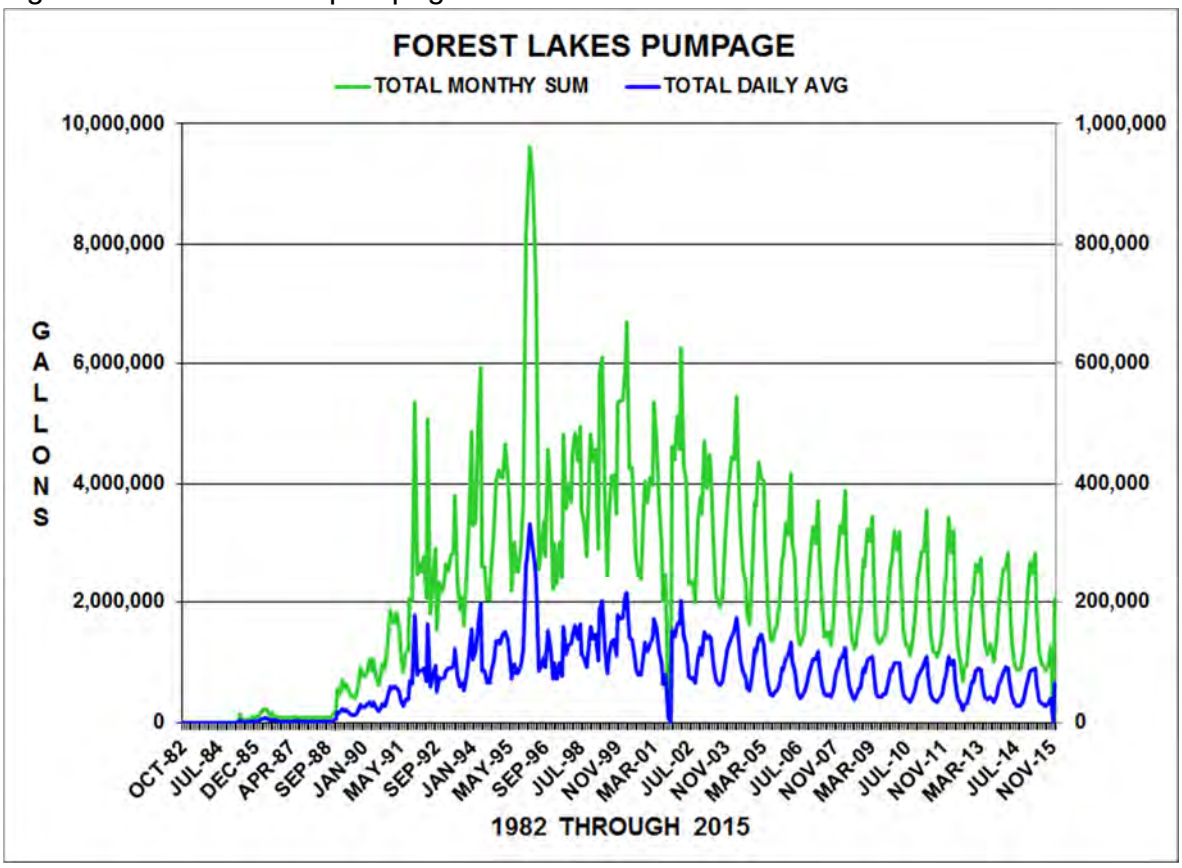
All potable water for this site comes from two (2) Upper Floridan Aquifer wells. There is one 10-inch diameter well (DID #5/Permittee #1) that is completed to a total depth of about 780 ft. below land surface. There is one 6-inch diameter well (DID #4/Permittee #2) that is completed to a total depth of approximately 530 ft. below land surface. Each well can operate individually or simultaneously. Groundwater is pumped into a ground storage tank and is treated prior to delivery to the residents of Forest Lake Estates.

Groundwater levels fluctuate with changes in rainfall. The combined effect of varying rainfall and varying groundwater pumpage can potentially cause alterations in water quality as groundwater moves horizontally and vertically through the Floridan Aquifer.

Groundwater pumpage from Utility's wells is available from 1982 through 2015 from the District's records. During this time period, pumpage has changed over this time period. Groundwater pumpage increased as the community grew with development during the early 1990's and peaked in use during the late 1990's. Groundwater pumpage since that time has generally trended lower, which reflects a tariff change from a flat rate per month to a water rate based on metered consumption.

Figure 8 shows the total monthly sum and the total daily average of groundwater pumpage. The total monthly sum is the total amount of pumped groundwater over the period of one month.

Figure 8. Groundwater pumpage over time.



# 5.0 City of Zephyrhills

A cursory review of the City of Zephyrhills' water quality and groundwater pumpage data was included in the scope of this report. This section briefly discusses the data available to date, the parameters that exceeded the maximum contamination levels (MCL) and historical trends.

## 5.1 Data Review Summary

Data was obtained from the FDEP and the District. The information included the most recent triennial water quality data and historic water quality data. Groundwater pumpage and well construction information was obtained from the District.

## 5.2 Chloride, Sulfate and Total Dissolved Solids

As mentioned previously, chloride, sulfate, and total dissolved solids are three parameters that are primarily evaluated as a determinate for aesthetic purposes.

### 5.2.1 Chloride

Figure 9 shows the concentration values of chloride over time along with a slight upward linear trend line. Chloride was detected in all 87 samples collected with the highest detection having a concentration of 33 mg/l. The average chloride concentration was 14.7 mg/l, which is well below the secondary drinking water standard of 250 mg/l.

### 5.2.2 Sulfate

Figure 10 shows the concentration values of sulfate over time along with a nearly flat linear trend line. Sulfate was detected in all 85 samples collected with the highest detection having a concentration of 85 mg/l in 1996. There was also a spike in 2014 with a value of 71 mg/l. The average sulfate concentration was 25.4 mg/l, which is well below the secondary drinking water standard of 250 mg/l.

### 5.2.3 Total Dissolved Solids (TDS)

Figure 11 shows the concentration values of chloride over time along with a slight upward linear trend line. TDS was detected in all 87 samples collected with the highest detection having a concentration of 370 mg/l in 2015. There were also significant spikes in TDS in 1996, 2009, and 2014. The average TDS concentration was 219 mg/l, which is well below the secondary drinking water standard of 500 mg/l.

Figure 9. Chloride concentration over time for the COZ.

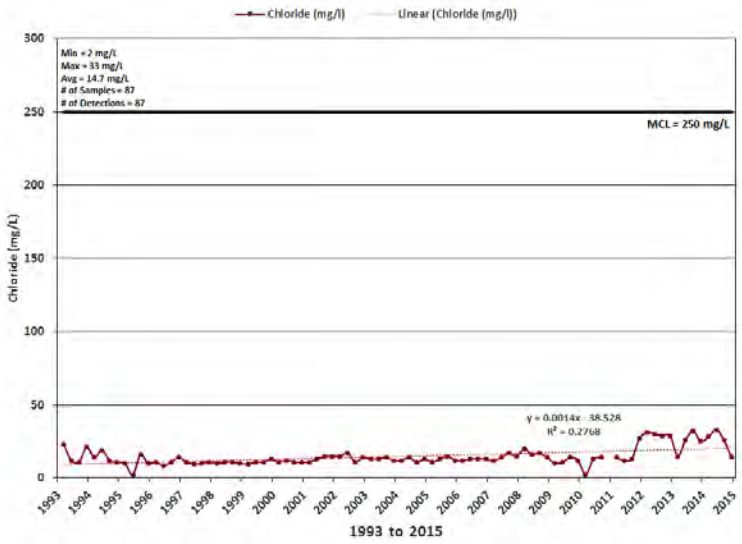



Figure 10. Sulfate concentration over time for the COZ.

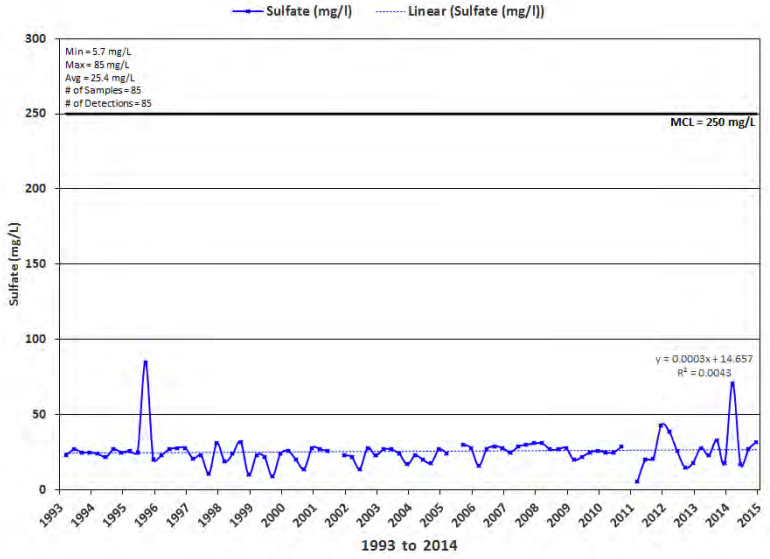
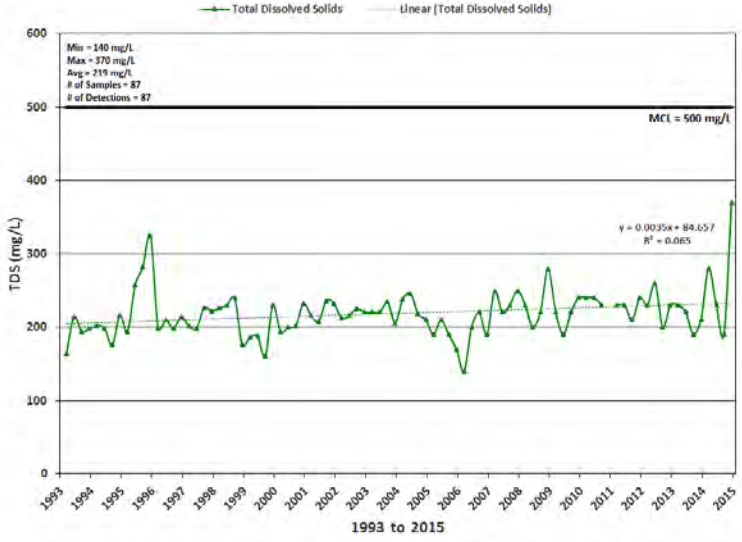


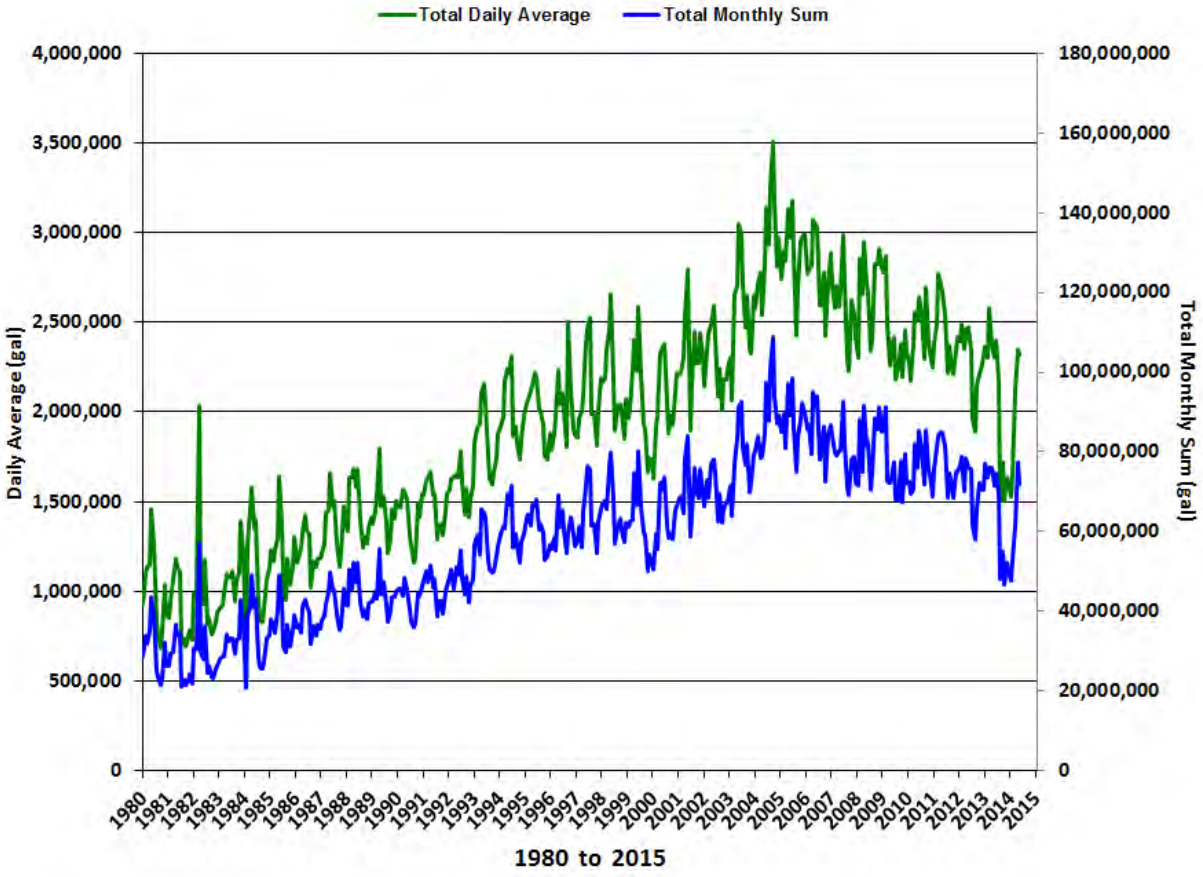

Figure 11. TDS concentration over time for the COZ.



## 5.3 Groundwater Pumpage

Figure 12 shows the total monthly sum and the total daily average of groundwater pumpage. The total monthly sum is the total amount of pumped groundwater over the period of one month. The total daily average is an average as it moves over time. Again, the groundwater pumpage for the City of Zephyrhills increased steadily with population growth through 2006. Over the last ten years, as population has increased and water conservation practices were implemented, overall groundwater pumpage has declined.

Figure 12 Groundwater pumpage over time for the COZ.



# 6.0 Hydrogeological Review

## 6.1 Regional Geology

In Pasco County, the surficial geology is characterized by Pliocene to Holocene quartz sands overlying clayey sands and clays that are thought to be erosional remnants of the Hawthorne Group of upper and lower Miocene age. The surficial geology varies in thickness and where present, may be up to 100 feet thick. The Hawthorne Group is generally absent along the coast, but the unit may be as great as 50 to 60 feet thick in some areas of Hillsborough County. The Hawthorn is typically comprised of green to blue-green clayey sands and sandy clays of low permeability, which overlie the Tampa Member of the Hawthorne Group. The Tampa Member consists of sandy to micritic limestone sometimes capped by a clayey unit that is difficult to distinguish from the overlying Hawthorne clays. Below the Hawthorne Group is a thick sequence of Tertiary-age carbonate rocks. In order of increasing age and depth, the sequence is the Suwannee, Ocala, and Avon Park Formations. The thickness of these units is a least several hundred feet across Pasco County.

## 6.2 Regional Hydrogeology

Groundwater beneath the site is located in three hydrostratigraphic units, the surficial aquifer, the intermediate aquifer with associated confining units, and the Upper Floridan aquifer as defined by the Southwest Florida Water Management District (District, 2000).

The surficial aquifer is the saturated portions of the Pliocene to Holocene age sediments that occur in various thicknesses across Pasco County. Generally, groundwater from the surficial aquifer system is not utilized for drinking water, but it is used for domestic irrigation. Due to the highly variable nature of the surficial aquifer system, hydraulic properties vary widely.

The Intermediate Aquifer is located in the Pliocene to Miocene age sediments and has 3 productive zones, the Upper, the Middle, and the Lower. This aquifer is used for both domestic supplies and irrigation needs and has aquifer values of wide variation. The Intermediate Aquifer is not present at the project site.

The Floridan Aquifer is found from the Oligocene to Paleocene age sediments. The primary freshwater producing zones come from the Suwannee, Ocala, and Avon Park Formations, which make up the Upper Floridan Aquifer. This aquifer is a fundamental source of potable water used for industry, agriculture, and public supplies. This aquifer, like the Surficial and the Intermediate, have a very wide set of values of aquifer characteristics (District, 2000).

## 6.3 General Site Hydrogeology

The site is generally level in topography and ranges in elevation from 84 feet to 87 feet NGVD. The surficial aquifer is the saturated portions of the Pliocene to Holocene age sediments that occur in various thicknesses.

While aquifer values vary widely over Pasco County, no specific values are reported for the surficial aquifer for the project site area. However, the nearest well site with values

for the surficial aquifer is located at the Cypress Creek Well Field. That well's aquifer characteristics are reported in the District's 2000 report. The reported transmissivity value for the site is 8,796 gpd/ft. A storage coefficient value was not available.

The Intermediate Aquifer is not found within the project area.

The Floridan Aquifer has sediments from the Oligocene through the Paleocene. They include the Suwannee, the Ocala, and the Avon Park Formations. The sediments in Pasco County and at the project site vary in thickness and are composed primarily of limestone and dolomite and have some sand, fossils (foraminifera), and intergranular evaporites at depth. There is a lower confining unit separating the Upper and Lower Floridan Aquifer. The Lower Floridan generally contains gypsum and anhydrite and is not a viable source of potable water within the project area.

Date was not available for the project site. However, there are two well sites where values are available. One site is located at the south end of Dade City and the other site is located at the Pasco / Polk County border. Transmissivity values for these sites ranged from 160,000 to 2,200,000 gpd/ft. The storage coefficient value for the Pasco / Polk site was reported to be $1.3 \times 10^{-4}$ (District Report 99-1).

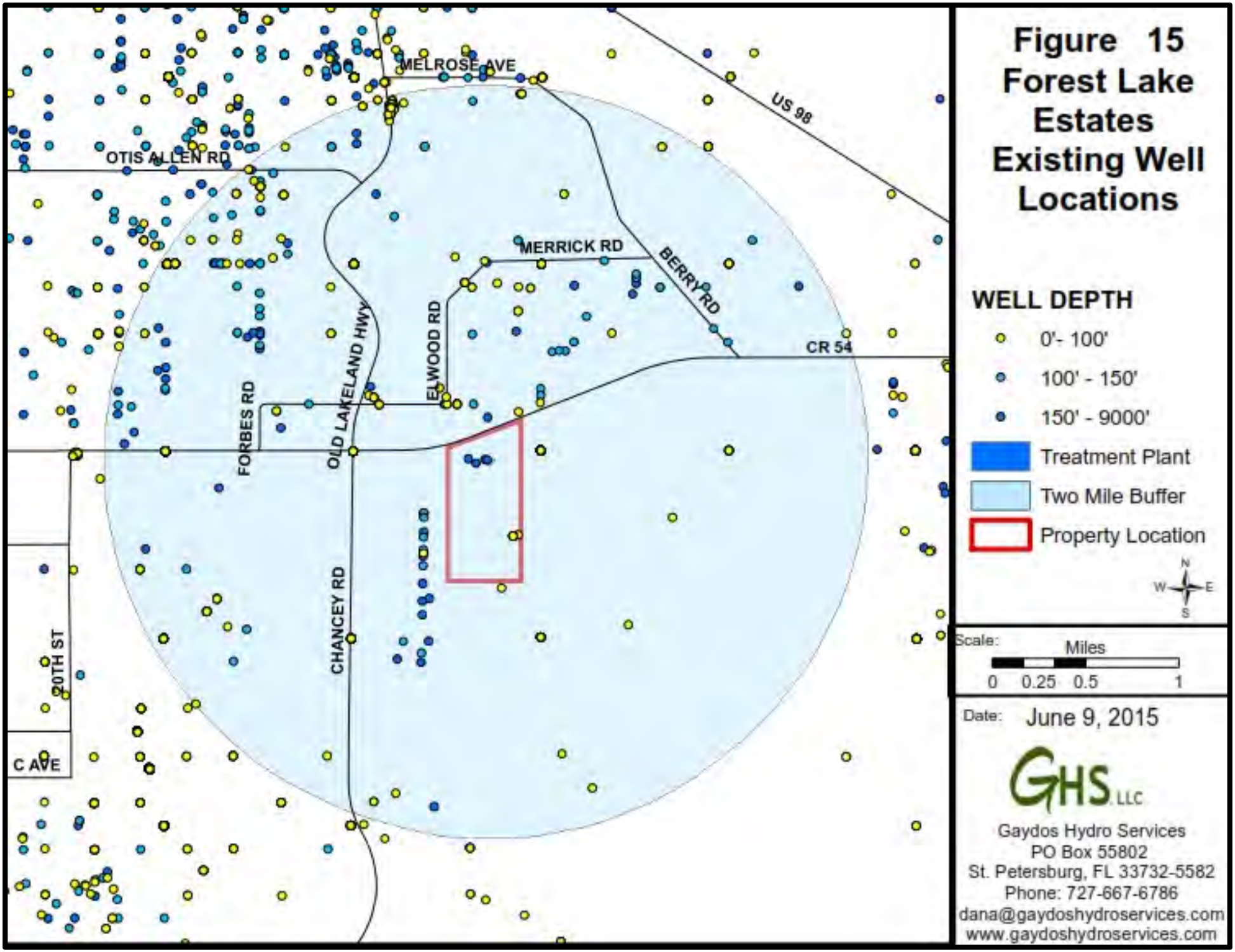
### 6.4 General Site Geology

A review of the District's well construction database yielded a map depicting numerous wells in the immediate vicinity of the project site (Figure 1.4). However, most of these sites do not have well completion reports on file for examination. Nevertheless, well completion reports were found for seven wells in the vicinity of the project site, all of which are located approximately 0.25 miles to 1.5 miles from the project well sites. Well completion reports for Utility's two existing water supply wells are included as Appendix B.

The geological information from the surrounding seven wells sites (highlighted in Figure 15) provided a general lithology for wells in the area and is summarized in approximate depths and terms listed below.

0 - 10 feet: sand and top soil
10 - 40 feet: sandy clay
40 - 70 feet: clay and limestone
70 - 300 feet: limestone

Based on the well / aquifer information derived from the District's files, it can be estimated that Utility's wells have a transmissivity of about 150,000 to 300,000 gpd/ft. which is common and indicates a long term capacity for water supply.




# Figure 15 Forest Lake Estates Existing Well Locations

**WELL DEPTH**

- 0'- 100'
- 100' - 150'
- 150' - 9000'
- Treatment Plant
- Two Mile Buffer
- Property Location

N W E S

Scale: Miles

0 0.25 0.5 1

Date: June 9, 2015

GHS LLC
Gaydos Hydro Services
PO Box 55802
St. Petersburg, FL 33732-5582
Phone: 727-667-6786
dana@gaydoshydroservices.com
www.gaydoshydroservices.com

# 7.0 Water Quality in FLE Wells

Based on the above review, GHS requested that the Utility conduct additional water quality analyses specific to parameters that may cause odor, taste and staining issues. These parameters included:

- Calcium
- Iron
- Manganese
- Odor
- Total Dissolved Solids
- Carbonate Alkalinity
- Total Alkalinity
- Langelier Saturation Index
- pH

The two existing wells are constructed differently in that the casing depths and total depths vary between the two wells. The larger diameter well, DID #5/Permittee #1, has a casing depth of 100 feet below land surface with a total depth of 780 feet below land surface. The smaller diameter well has a casing depth of 77 feet below land surface with a total depth of 530 feet below land surface. The difference in well construction allows for different chemical constituents to be present in different concentrations such as calcium, iron or manganese. Rainfall can also have an impact on parameter concentration. Samples were collected twice within 2015 and a follow up sample was collected in January 2016. One sample was collected during the height of the wet season in July 2015, and the second and third samples were collected during the drier months of November 2015 and January 2016. Table 8 below provides a comparison of the water quality between the two wells.

Table 8. Water Quality Summary in FLE Wells.

| Parameter | Units | DWS Standard | Well #1 (10-inch Diameter) | | | Well #2 (6-inch Diameter) | | |
|---|---|---|---|---|---|---|---|---|
| | | | Jul-15* | Nov-15 | Jan-16 | Jul-15* | Nov-15 | Jan-16 |
| Calcium | mg/L | | 75 | 80 | U | 76 | 85 | U |
| Iron | mg/L | 0.3 | 0.15 | 0.081 (I) | 0.071 | **0.56** | **0.44** | **0.39** |
| Manganese | mg/L | 0.05 | 0.0074 | 0.0041 | U | **0.22** | 0.016 | U |
| Total Dissolved Solids | mg/L | 500 | 240 | 240 | 250 | 230 | 250 | 240 |
| pH | mg/L | 6.5 - 8.5 | 7.4 (Q) | 7.8 (Q) | 7.21 | 7.1 (Q) | 8.1 (Q) | 7.02 |
| Odor | TON | 3 | U | U | 2 | U | U | 2 |
| Carbonate Alkalinity | mg/L | | U | U | | U | I | |
| Total Alkalinity | mg/L | | 190 | 210 | 210 | 150 | 220 | 200 |
| Langelier Saturation Index | mg/L | | -0.3749 | 0.099 | | -0.76755 | 0.444 | |

**Bold** - Exceeds MCL.
I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U - The compound was analyzed for but not detected.
Q - Missed Hold Time.
* Sample identification corrected.

| Parameter | Units | DWS Standard | Well #1 (10-inch Diameter) | | | Well #2 (6-inch Diameter) | | |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Avg | Min | Max | Avg |
| Calcium | mg/L | | 75 | 80 | 52 | 76 | 85 | 54 |
| Iron | mg/L | | 0.071 | 0.15 | 0.10 | **0.39** | **0.56** | **0.34** |
| Manganese | mg/L | | 0.0041 | 0.0074 | 0.0039 | 0.016 | 0.22 | 0.079 |
| Total Dissolved Solids | mg/L | | 240 | 250 | 243 | 230 | 250 | 240 |
| pH | mg/L | | 7.21 | 7.8 (Q) | 7.47 | 7.02 | 7.02 | 7.41 |
| Odor | TON | | U | 2 | 1.3 | U | 2 | 1.3 |
| Carbonate Alkalinity | mg/L | | U | U | U | 0 | 0 | U |
| Total Alkalinity | mg/L | | 190 | 210 | 203 | 150 | 220 | 190 |
| Langelier Saturation Index | mg/L | | -0.3749 | 0.099 | -0.15 | -0.76755 | 0.444 | -0.34 |

# 8.0 Review and Conclusions

After a thorough review of all available water quality data, thirty-five (35) parameters were detected with only three parameters present in concentrations that surpassed its respective maximum contaminant level (MCL). These parameters include iron, lead and total trihalomethane (TTHM's). Please note that lead and total trihalomethane (TTHM's) were not included in this report or discussion since these exceedances were early in the water quality data history and since that time have not been detected in concentrations exceeding the drinking water standards. Also present in the source water and regularly detected are naturally occurring compounds of interest including chloride, manganese, sulfate and total dissolved solids.

The scope of the project includes identifying any groundwater constituents or compounds that may influence odor and taste, which would be the basis in determining potential alternative treatment options. Chloride concentrations were so low that chloride can be eliminated as a cause for odor or taste. However, the presence of iron, manganese, sulfate and total dissolved solids in the source water most closely correlates with negative odor and taste impacts.

## 8.1 Potential Chemical Factors

Iron is known for its metallic taste and reddish brown staining attributes. Manganese pairs as a twin to iron, except taste and staining problems occur at significantly lower concentrations. Sulfate renders a bitter taste at high concentrations. Total dissolved solids contain constituents such as calcium, phosphate, nitrate, sodium and potassium. Some, if not all of these metal salts, can also impact taste and odor. The combination of all these compounds can cause the observed odor and taste issues. However, based on the observed concentrations, it is very unlikely that one of these individual compounds is the primary source of the odor and taste issues.

## 8.2 Potential Biological Factors

In addition to the parameters reviewed above, other biological factors may contribute to the observed taste and odor of the water. The primary purpose of using disinfection in a water supply, beyond regulatory requirements, is to reduce or eliminate the potential for pathogens (harmful bacteria) to cause adverse health effects to the users of the water. That being said, there is almost always some level of non-pathogenic bacteria that can accumulate over time in sufficient quantities or locations that can cause odor problems, most notably iron bacteria. These types of bacteria are likely to reside in warm places like a water heater, where they can reproduce more easily. Flushing the water heater on a regular basis can diminish that possibility. Beyond that, when chemical constituents are present in abundant quantities, odor and taste problems frequently occur.

Sampling for specific parameters on a regular basis such as odor (TON analysis), non-pathogenic bacteria, or parameters that are known to exceed MCL levels (iron, manganese, etc.) is recommended for major areas of the distribution system as well at dead end lines within Forest Lake Estates MHP.

## 8.3 Recommendations

GHS has worked with Stroud Engineering Consultants, Inc. to identify potential technologies and treatment options to reduce the targeted secondary water quality constituents that have been identified as the source of the odor and taste quality issues. Stroud Engineering Consultants, Inc. has prepared a report identifying these options along with preliminary budgetary costs. This report is included as an attachment to this report.

# Appendix A:
# Forest Lakes Estates
# WUP #206867.006

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
*On the Internet at:* WaterMatters.org

An Equal Opportunity Employer

**Bartow Service Office**
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

**Sarasota Service Office**
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

**Tampa Service Office**
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

June 10, 2013

Labrador Utilities Inc. / Attn: Patrick Flynn
200 Weathersfield Avenue
Altamonte Springs, FL 32714

Forest Lake Estates Co-Op Inc
6429 Forest Lake Drive
Zephyrhills, FL 33540

Subject: **Notice of Intended Agency Action Letter**
Small General Water Use Permit
Permit No.: 20 006867.006
Project Name: Forest Lake Estates
County: Pasco

Dear Permittee(s):

Your Water Use Permit has been approved contingent upon no objection to the District's action being received by the District within the time frames described in the enclosed Notice of Rights.

The information received by the District will be kept on file to support the District's determination regarding your application. This information is available for viewing or downloading through the District's Application and Permit Search Tools located at www.WaterMatters.org/permits.

The District's action in this matter only becomes closed to future legal challenges from members of the public if such persons have been properly notified of the District's action and no person objects to the District's action within the prescribed period of time following the notification. The District does not publish notices of intended agency action. If you wish to limit the time within which a person who does not receive actual written notice from the District may request an administrative hearing regarding this action, you are strongly encouraged to publish, at your own expense, a notice of intended agency action in the legal advertisement section of a newspaper of general circulation in the county or counties where the activity will occur. Publishing notice of intended agency action will close the window for filing a petition for hearing. Legal requirements and instructions for publishing notice of intended agency action, as well as a noticing form that can be used is available from the District's website at www.WaterMatters.org/permits/noticing. If you publish notice of intended agency action, a copy of the affidavit of publishing provided by the newspaper should be sent to the District's Tampa Service Office, for retention in the File of Record for this agency action.

Please be advised that the Governing Board has formulated a water shortage plan referenced in a Standard Water Use Permit Condition (Exhibit A) of your permit, and will implement such a plan during periods of water shortage. You will be notified during a declared water shortage of any change in the conditions of your Permit or any suspension of your Permit, or of any restriction on your use of water for the duration of any declared water shortage. Please further note that water conservation is a condition of your Permit and should be practiced at all times.

If you have any questions or concerns regarding your permit or any other information, please contact the Water Use Permit Bureau in the Tampa Service Office.

Sincerely,

Darrin Herbst, P.G.
Bureau Chief
Water Use Permit Bureau
Regulation Division

Enclosures: Approved Permit
Notice of Rights
cc: Forest Lake Estates Co-Op Inc

**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT**
**WATER USE PERMIT**
**SMALL GENERAL**
**PERMIT NO. 20 006867.006**

**PERMIT ISSUE DATE:** **June 10, 2013** **EXPIRATION DATE:** **February 17, 2031**

The Permittee is responsible for submitting an application to renew this permit no sooner than one year prior to the expiration date, and no later than the end of the last business day before the expiration date, whether or not the Permittee receives prior notification by mail. Failure to submit a renewal application prior to the expiration date and continuing to withdraw water after the expiration date is a violation of Chapter 373, Florida Statutes, and Chapter 40D-2, Florida Administrative Code, and may result in a monetary penalty and/or loss of the right to use the water. Issuance of a renewal of this permit is contingent upon District approval.

**TYPE OF APPLICATION:** Letter Modification

**GRANTED TO:** Labrador Utilities Inc. / Attn: Patrick Flynn
200 Weathersfield Avenue
Altamonte Springs, FL 32714

Forest Lake Estates Co-Op Inc
6429 Forest Lake Drive
Zephyrhills, FL 33540

**PROJECT NAME:** Forest Lake Estates

**WATER USE CAUTION AREA(S):** Northern Tampa Bay

**COUNTY:** Pasco

**TOTAL QUANTITIES AUTHORIZED UNDER THIS PERMIT (in gallons per day)**

| | |
|---|---|
| ANNUAL AVERAGE | 99,785 gpd |
| PEAK MONTH [1] | 160,650 gpd |

1 Peak Month: Average daily use during the highest water use month.

**WATER USE TABLE (in gpd)**

| USE | ANNUAL AVERAGE | PEAK MONTH |
|---|---|---|
| Public Supply | 99,785 | 160,650 |

**USE TYPE**

Residential Mobile Home

**PUBLIC SUPPLY:**

Population Served: 1,791

Per Capita Rate: 56 gpd/person

## WITHDRAWAL POINT QUANTITY TABLE

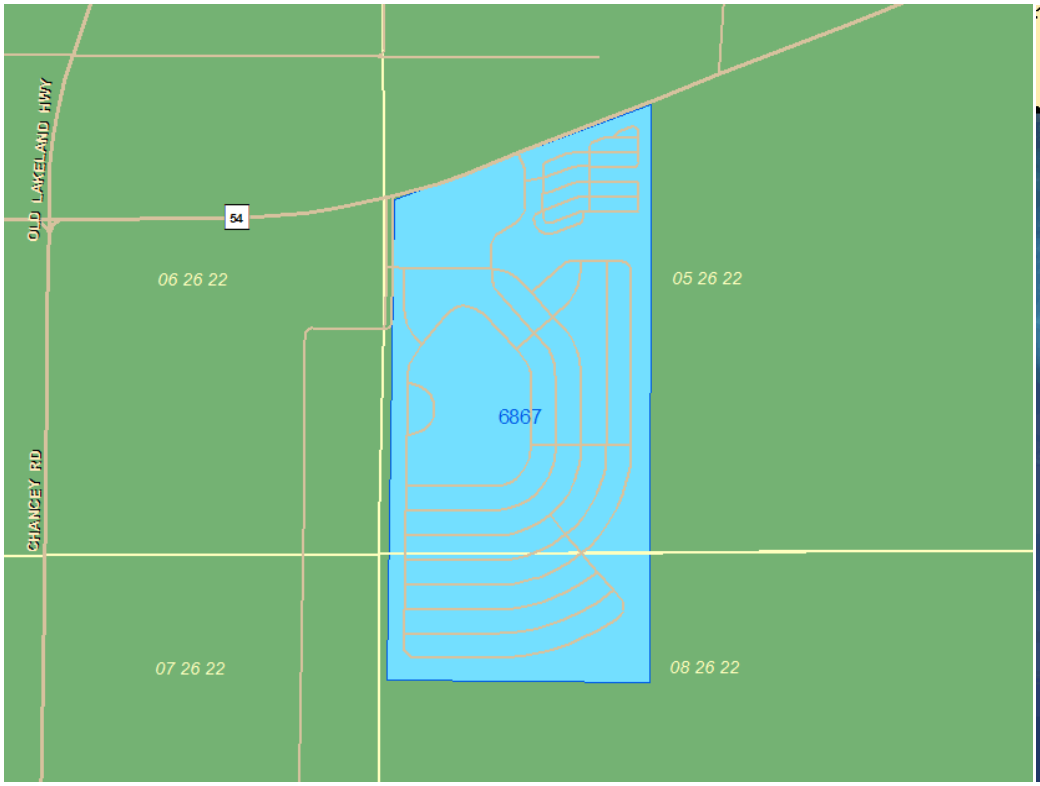
Water use from these withdrawal points are restricted to the quantities given below:

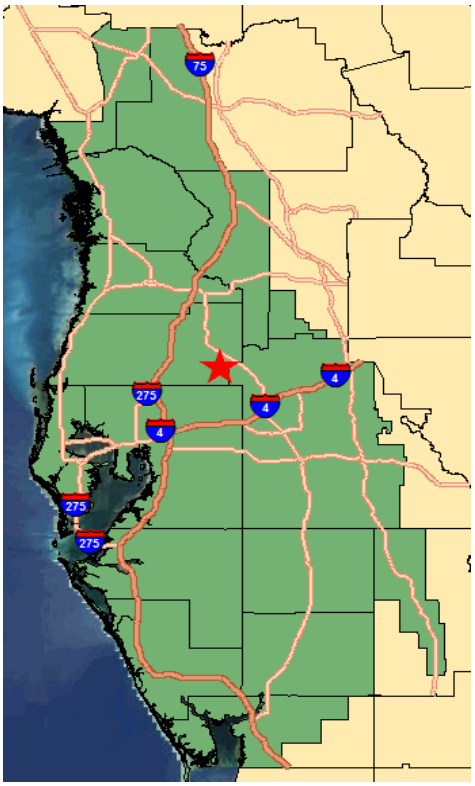
| I.D. NO. PERMITTEE/ DISTRICT | DIAM (in.) | DEPTH TTL./CSD.FT. (feet bls) | USE DESCRIPTION | AVERAGE (gpd) | PEAK MONTH (gpd) |
|---|---|---|---|---|---|
| 2 / 4 | 6 | 530 / 77 | Public Supply | 58,000 | 115,000 |
| Standby | | | | | |
| 1 / 5 | 10 | 780 / 100 | Public Supply | 99,785 | 160,650 |

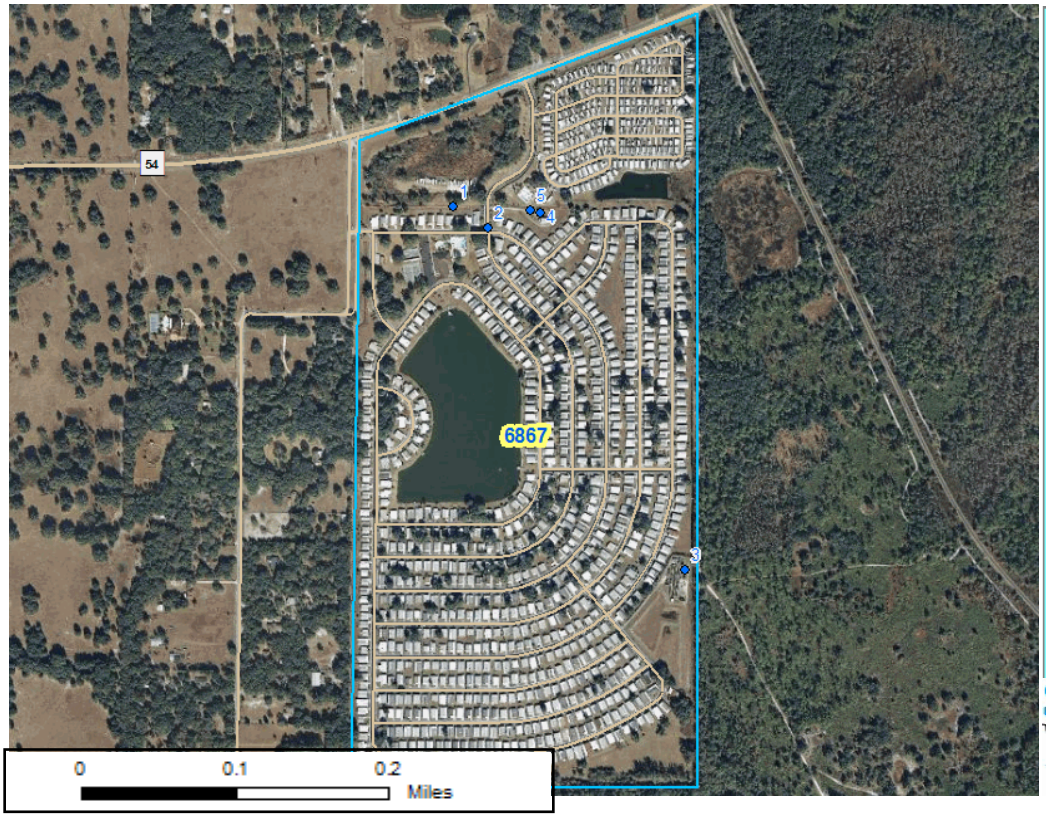
## WITHDRAWAL POINT LOCATION TABLE

| DISTRICT I.D. NO. | LATITUDE/LONGITUDE |
|---|---|
| 4 | 28° 15' 04.30"/82° 08' 06.10" |
| 5 | 28° 15' 04.50"/82° 08' 06.80" |

**Location Map**
**Labrador Utilities Inc. / Attn: Patrick Flynn**
**WUP No. 20 006867.006**




**Legend**

DIDs

WUP Boundary

2011 Natural Color Imagery

**PASCO COUNTY**

N
W E
S

Southwest Florida Water Management District

**STANDARD CONDITIONS:**

The Permittee shall comply with the Standard Conditions attached hereto, incorporated herein by reference as Exhibit A and made a part hereof.

**SPECIAL CONDITIONS:**

1. The Permittee shall incorporate all economically, technically and environmentally feasible water conserving measures into all processes, including reducing water losses, recycling and reuse. The Permittee shall promote water conservation in all components of water use, including water conservation among their customers, use water-efficient irrigation practices, and use of drought-tolerant landscaping.(285)

2. Any wells not in use, and in which pumping equipment is not installed shall be capped or valved in a water tight manner in accordance with Chapter 62-532.500(3)(a)(4), F.A.C.(568)

40D-2
Exhibit A

**WATER USE PERMIT STANDARD CONDITIONS**

1. The Permittee shall provide access to an authorized District representative to enter the property at any reasonable time to inspect the facility and make environmental or hydrologic assessments. The Permittee shall either accompany District staff onto the property or make provision for access onto the property.

2. When necessary to analyze impacts to the water resource or existing users, the District shall require the Permittee to install flow metering or other measuring devices to record withdrawal quantities and submit the data to the District.

3. The District shall collect water samples from any withdrawal point listed in the permit or shall require the permittee to submit water samples when the District determines there is a potential for adverse impacts to water quality.

4. A District identification tag shall be prominently displayed at each withdrawal point that is required by the District to be metered or for which withdrawal quantities are required to be reported to the District, by permanently affixing the tag to the withdrawal facility.

5. The Permittee shall mitigate to the satisfaction of the District any adverse impact to environmental features or off-site land uses as a result of withdrawals. When adverse impacts occur or are imminent, the District shall require the Permittee to mitigate the impacts. Adverse impacts include the following:

   A. Significant reduction in levels or flows in water bodies such as lakes, impoundments, wetlands, springs, streams or other watercourses; or
   B. Damage to crops and other vegetation causing financial harm to the owner; and
   C. Damage to the habitat of endangered or threatened species.

6. The Permittee shall mitigate, to the satisfaction of the District, any adverse impact to existing legal uses caused by withdrawals. When adverse impacts occur or are imminent, the District shall require the Permittee to mitigate the impacts. Adverse impacts include the following:

   A. A reduction in water levels which impairs the ability of a well to produce water;
   B. Significant reduction in levels or flows in water bodies such as lakes, impoundments, wetlands, springs, streams or other watercourses; or
   C. Significant inducement of natural or manmade contaminants into a water supply or into a usable portion of an aquifer or water body.

7. Notwithstanding the provisions of Rule 40D-1.6105, F.A.C., persons who wish to continue the water use permitted herein and who have acquired ownership or legal control of permitted water withdrawal facilities or the land on which the facilities are located must apply to transfer the permit to themselves within 45 days of acquiring ownership or legal control of the water withdrawal facilities or the land.

8. If any of the statements in the application and in the supporting data are found to be untrue and inaccurate, or if the Permittee fails to comply with all of the provisions of Chapter 373, Florida Statutes (F.S.), Chapter 40D, Florida Administrative Code (F.A.C.), or the conditions set forth herein, the Governing Board shall revoke this permit in accordance with Rule 40D-2.341, F.A.C., following notice and hearing.

9. Issuance of this permit does not exempt the Permittee from any other District permitting requirements.

10. The Permittee shall cease or reduce surface water withdrawal as directed by the District if water levels in lakes fall below the applicable minimum water level established in Chapter 40D-8, F.A.C., or rates of flow in streams fall below the minimum levels established in Chapter 40D-8, F.A.C.

11. The Permittee shall cease or reduce withdrawal as directed by the District if water levels in aquifers fall below the minimum levels established by the Governing Board.

12. The Permittee shall not deviate from any of the terms or conditions of this permit without written approval by the District.

13. The Permittee shall practice water conservation to increase the efficiency of transport, application, and use, as well as to decrease waste and to minimize runoff from the property. At such time as the Governing Board adopts specific conservation requirements for the Permittee's water use classification, this permit shall be subject to those requirements upon notice and after a reasonable period for compliance.

14. The District may establish special regulations for Water-Use Caution Areas. At such time as the Governing Board adopts such provisions, this permit shall be subject to them upon notice and after a reasonable period for compliance.

15. In the event the District declares that a Water Shortage exists pursuant to Chapter 40D-21, F.A.C., the District shall alter, modify, or declare inactive all or parts of this permit as necessary to address the water shortage.

16. This permit is issued based on information provided by the Permittee demonstrating that the use of water is reasonable and beneficial, consistent with the public interest, and will not interfere with any existing legal use of water. If, during the term of the permit, it is determined by the District that the use is not reasonable and beneficial, in the public interest, or does impact an existing legal use of water, the Governing Board shall modify this permit or shall revoke this permit following notice and hearing.

17. All permits issued pursuant to these Rules are contingent upon continued ownership or legal control of all property on which pumps, wells, diversions or other water withdrawal facilities are located.

**Darrin Herbst, P.G.**

Authorized Signature
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

This permit, issued under the provision of Chapter 373, Florida Statues and Florida Administrative Code 40D-2, authorizes the Permittee to withdraw the quantities outlined above, and may require various activities to be performed by the Permittee as described in the permit, including the Special Conditions. The permit does not convey to the Permittee any property rights or privileges other than those specified herein, nor relieve the Permittee from complying with any applicable local government, state, or federal law, rule, or ordinance.

## Notice of Rights

**ADMINISTRATIVE HEARING**

1. You or any person whose substantial interests are or may be affected by the District's intended or proposed action may request an administrative hearing on that action by filing a written petition in accordance with Sections 120.569 and 120.57, Florida Statutes (F.S.), Uniform Rules of Procedure Chapter 28-106, Florida Administrative Code (F.A.C.) and District Rule 40D-1.1010, F.A.C. Unless otherwise provided by law, a petition for administrative hearing must be filed with (received by) the District within 21 days of receipt of written notice of agency action. "Written notice" means either actual written notice, or newspaper publication of notice, that the District has taken or intends to take agency action. "Receipt of written notice" is deemed to be the fifth day after the date on which actual notice is deposited in the United States mail, if notice is mailed to you, or the date that actual notice is issued, if sent to you by electronic mail or delivered to you, or the date that notice is published in a newspaper, for those persons to whom the District does not provide actual notice.

2. Pursuant to Subsection 373.427(2)(c), F.S., for notices of intended or proposed agency action on a consolidated application for an environmental resource permit and use of sovereignty submerged lands concurrently reviewed by the District, a petition for administrative hearing must be filed with (received by) the District within 14 days of receipt of written notice.

3. Pursuant to Rule 62-532.430, F.A.C., for notices of intent to deny a well construction permit, a petition for administrative hearing must be filed with (received by) the District within 30 days of receipt of written notice of intent to deny.

4. Any person who receives written notice of an agency decision and who fails to file a written request for a hearing within 21 days of receipt or other period as required by law waives the right to request a hearing on such matters.

5. Mediation pursuant to Section 120.573, F.S., to settle an administrative dispute regarding District intended or proposed action is not available prior to the filing of a petition for hearing.

6. A request or petition for administrative hearing must comply with the requirements set forth in Chapter 28.106, F.A.C. A request or petition for a hearing must: (1) explain how the substantial interests of each person requesting the hearing will be affected by the District's intended action or proposed action, (2) state all material facts disputed by the person requesting the hearing or state that there are no material facts in dispute, and (3) otherwise comply with Rules 28-106.201 and 28-106.301, F.A.C. Chapter 28-106, F.A.C. can be viewed at www.flrules.org or at the District's website at www.WaterMatters.org/permits/rules.

7. A petition for administrative hearing is deemed filed upon receipt of the complete petition by the District Agency Clerk at the District's Tampa Service Office during normal business hours, which are 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding District holidays. Filings with the District Agency Clerk may be made by mail, hand-delivery or facsimile transfer (fax). The District does not accept petitions for administrative hearing by electronic mail. Mailed filings must be addressed to, and hand-delivered filings must be delivered to, the Agency Clerk, Southwest Florida Water Management District, 7601 Highway 301 North, Tampa, FL 33637-6759. Faxed filings must be transmitted to the District Agency Clerk at (813) 987-6746. Any petition not received during normal business hours shall be filed as of 8:00 a.m. on the next business day. The District's acceptance of faxed petitions for filing is subject to certain conditions set forth in the District's Statement of Agency Organization and Operation, available for viewing at www.WaterMatters.org/about.

**JUDICIAL REVIEW**

1. Pursuant to Sections 120.60(3) and 120.68, F.S., a party who is adversely affected by District action may seek judicial review of the District's action. Judicial review shall be sought in the Fifth District Court of Appeal or in the appellate district where a party resides or as otherwise provided by law.

2. All proceedings shall be instituted by filing an original notice of appeal with the District Agency Clerk within 30 days after the rendition of the order being appealed, and a copy of the notice of appeal, accompanied by any filing fees prescribed by law, with the clerk of the court, in accordance with Rules 9.110 and 9.190 of the Florida Rules of Appellate Procedure (Fla. R. App. P.). Pursuant to Fla. R. App. P. 9.020(h), an order is rendered when a signed written order is filed with the clerk of the lower tribunal.

Labrador Utilities Inc. / Attn: Patrick Flynn
200 Weathersfield Avenue
Altamonte Springs, FL 32714

Forest Lake Estates Co-Op Inc
6429 Forest Lake Drive
Zephyrhills, FL 33540

# Appendix B:
# Forest Lakes Estates
# Well Construction Logs

| | | | | | |
|---|---|---|---|---|---|
| **Permit #:** | 476097 | **Status:** | Completed | **Application Received:** | 02/22/1989 |
| **Reference #:** | | **Type:** | New Construction | **Issue Date:** | 02/22/1989 |
| **Well Use:** | PUBLIC SUPPLY | **Const. Date:** | | **Suspense Date:** | 08/21/1989 |

**Owner Information: 476097**

| Name | Address | City/State/Zip |
|---|---|---|
| Labrador Utilities Inc. / Attn: Patrick Flynn | 200 Weathersfield Avenue | Altamonte Springs, FL 32714 |

**Contractor Information: 476097**

| Name | License # | Address | City/State/Zip |
|---|---|---|---|
| Edmund Allen | 2871 | POST OFFICE BOX 323 | TRILBY, FL 33593 |

**Well Information: 476097**

| Diameter | Drill Method | Depth | Primary Casing Material | Casing Depth | Casing Diameter | Contamination |
|---|---|---|---|---|---|---|
| 10 | NOT ENTERED | | 10 | | | |

**Well Location: 476097**

| Site ID | Address | City/State | Lat | Long | Section | Township | Range |
|---|---|---|---|---|---|---|---|
| 212593 | 200 WEATHERSFIELD AVE | | 0° 0" 0.00' | 0° 0" 0.00' | 5 | 26 | 22 |

**Well Completion Information: 476097**

| Completion Date | Static Water Level | Finish Code | Drill Method | Status | Well Depth | Casing Diameter | Casing From Depth | Casing To Depth | Casing Material |
|---|---|---|---|---|---|---|---|---|---|
| 08/31/1989 | 15.00 | Open Hole | CABLE TOOL | | 770 | | | | NOT ENTERED |
| 08/31/1989 | 15.00 | Open Hole | CABLE TOOL | | 770 | | | | NOT ENTERED |
| 08/31/1989 | 15.00 | Open Hole | CABLE TOOL | | 770 | 10 | | 185 | BLACK STEEL |

| | | | | | |
|---|---|---|---|---|---|
| **Permit #:** | 376330 | **Status:** | Completed | **Application Received:** | 08/10/1982 |
| **Reference #:** | | **Type:** | New Construction | **Issue Date:** | 08/10/1982 |
| **Well Use:** | PUBLIC SUPPLY | **Const. Date:** | | **Suspense Date:** | 02/06/1983 |

## Owner Information: 376330

| Name | Address | City/State/Zip |
|---|---|---|
| Village Tampa Inc | 8730 49TH ST N | PINELLAS PARK, FL 337825330 |

## Contractor Information: 376330

| Name | License # | Address | City/State/Zip |
|---|---|---|---|
| Paul Pope | 1817 | 17610 US HWY 41 NORTH | LUTZ, FL 33549 |

## Well Information: 376330

| Diameter | Drill Method | Depth | Primary Casing Material | Casing Depth | Casing Diameter | Contamination |
|---|---|---|---|---|---|---|
| 6 | NOT ENTERED | | 6 | | | |

## Well Location: 376330

| Site ID | Address | City/State | Lat | Long | Section | Township | Range |
|---|---|---|---|---|---|---|---|
| 112838 | 8730 49TH ST N | | 28° 15" 4.97' | 82° 8" 5.38' | 5 | 26 | 22 |

## Well Completion Information: 376330

| Completion Date | Static Water Level | Finish Code | Drill Method | Status | Well Depth | Casing Diameter | Casing From Depth | Casing To Depth | Casing Material |
|---|---|---|---|---|---|---|---|---|---|
| 09/16/1982 | 12.00 | NOT ENTERED | CABLE TOOL | | 530 | | | | NOT ENTERED |
| 09/16/1982 | 12.00 | NOT ENTERED | CABLE TOOL | | 530 | | | | NOT ENTERED |
| 09/16/1982 | 12.00 | NOT ENTERED | CABLE TOOL | | 530 | 6 | | 147 | NOT ENTERED |

## *WELL COMPLETION REPORT* (Please complete in black ink or type.)

PERMIT # 714922.01 CUP/WUP # 000000.000 DID # 0000

If permit is for multiple wells, indicate the number of wells drilled 1

Indicate remaining wells to be cancelled 0

WATER WELL CONTRACTOR'S

SIGNATURE Digitally Signed Llicense # 2871

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | | | |
| Bentonite: | 33 | 0 | 84 |

WELL LOCATION: County Pasco

3 1/4 of 4 1/4 of Section 6 Twp: 26 Rge: 22

Latitude _____ Longitude _____

SWFWMD Rec'd Date: 06/21/2005

Official Use Only

Sketch of well location on property N

Give distances from septic tank and house or other reference points

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ ppm Sulfate: ____ ppm

Chlorides: ____ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [✔] Submersible [ ] Turbine

Horsepower 1 Capacity _____ G.P.M. _____

Pump Depth 42 Ft. Intake Depth _____ Ft.

Form 41.10-410(2) Rev. 8/96

OWNER'S NAME GENERAL HOME DEVELOPMENT

COMPLETION DATE 03/27/2005 Florida Unique I.D. _____

WELL USE: DEP/Public ____ Irrigation ____ Domestic ✔

Monitor ____ HRS Limited ____ 62-524 ____ Other ____

DRILL METHOD [ ] Rotary [ ] Cable Tool [✔] Combination

[ ] Jet [ ] Auger Other _____

Measured Static Water Level 13 Measured Pumping Water Level ____

After ____ Hours at ____ G.P.M. Measuring Pt. (Describe): _____

Which is ____ Ft. [ ] Above [ ] Below Land Surface

Casing: [✔] Black Steel [ ] Galv. [ ] PVC Other _____

[✔] Open Hole
[ ] Screen

Casing Diameter & Depth (Ft.)

Diameter 4
From 0
To 84

Diameter ____
From ____
To ____

Liner [ ] *or*
Casing [ ]
Diameter ____
From ____
To ____

| Depth (Ft.) From | To | DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. *Color \| Grain Size \| Type of Material* |
|---|---|---|
| 0 | 3 | TOP SOIL |
| 3 | 9 | TAN SAND |
| 9 | 13 | TAN SANDY CLAY |
| 13 | 18 | GRAY SANDY CLAY |
| 18 | 25 | GRAY CLAY |
| 25 | 27 | WHITE SANDY CLAY |
| 27 | 29 | WHITE CLAY & ROCK |
| 29 | 44 | RED SANDY CLAY & ROCK |
| 44 | 47 | WHITE CLAY & ROCK |
| 47 | 140 | ROCK & WATER |
| | | |
| | | |
| | | |
| | | |
| | | |

Driller's Name:
*(print or type)* _____

## *WELL COMPLETION REPORT* (Please complete in black ink or type.)

PERMIT # 728421.01 CUP/WUP # 000000.000 DID # 0000

If permit is for multiple wells, indicate the number of wells drilled 1

Indicate remaining wells to be cancelled 0

WATER WELL CONTRACTOR'S

SIGNATURE Digitally Signed License # 2871

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | | | |
| Bentonite: | 6 | 0 | 52 |

WELL LOCATION: County Pasco

2 1/4 of 1 1/4 of Section 5 Twp: 26 Rge: 22

Latitude _____ Longitude _____

SWFWMD Rec'd Date: 01/27/2006

Official Use Only

Sketch of well location on property N

Give distances from septic tank and house or other reference points

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ ppm Sulfate: ____ ppm

Chlorides: ____ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [✔] Submersible [ ] Turbine

Horsepower 1 Capacity _____ G.P.M. _____

Pump Depth _____ Ft. Intake Depth _____ Ft.

Form 41.10-410(2) Rev. 8/96

OWNER'S NAME DEBBIE OGRADY

COMPLETION DATE 11/19/2005 Florida Unique I.D. _____

WELL USE: DEP/Public ____ Irrigation ____ Domestic ✔

Monitor ____ HRS Limited ____ 62-524 ____ Other ____

DRILL METHOD [ ] Rotary [ ] Cable Tool [✔] Combination

[ ] Jet [ ] Auger Other _____

Measured Static Water Level 12 Measured Pumping Water Level _____

After ____ Hours at ____ G.P.M. Measuring Pt. (Describe): _____

Which is ____ Ft. [ ] Above [ ] Below Land Surface

Casing: [✔] Black Steel [ ] Galv. [ ] PVC Other _____

[✔] Open Hole
[ ] Screen

Casing Diameter & Depth (Ft.)

Diameter 4
From 0
To 52

Diameter ____
From ____
To ____

Liner [ ] or Casing [ ]
Diameter ____
From ____
To ____

| Depth (Ft.) From | To | DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. *Color \| Grain Size \| Type of Material* |
|---|---|---|
| 0 | 3 | top soil |
| 3 | 8 | yellow clay |
| 8 | 15 | tan clay |
| 15 | 32 | white clay |
| 32 | 35 | white clay & rock |
| 35 | 38 | rock |
| 38 | 120 | rock & water |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Driller's Name:

*(print or type)* _____

## WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT # 647472 CUP/WUP # _____ DID # _____

If permit is for multiple wells indicate the number of wells drilled _____.

Indicate remaining wells to be cancelled _____.

WATER WELL CONTRACTOR'S SIGNATURE _____ License # 2671

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | | | |
| Bentonite: | 3 | 0 | 68' |

WELL LOCATION: County PASCO

3 1/4 of 4 1/4 of Section 7 Twp: 26 Rge: 22

Latitude _____ Longitude _____

DATE STAMP: Received FEB 6 2001 PERMITS DATA Brooksville, Florida

Official Use Only

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ ppm Sulfate: ____ ppm

Chloride: ____ ppm

[ ] Lab Test [ ] Field Test Kit

Sketch of well location on property N

Give distances from septic tank and house or other reference points

Pump Type

[ ] Centrifugal [ ] Jet [✓] Submersible [ ] Turbine

Horsepower 1 Capacity _____ G.P.M. 20

Pump Depth _____ Ft. Intake Depth 42' Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Keith VandoBrink

COMPLETION DATE 1-29-01 Florida Unique I.D. _____

WELL USE: DEP/Public ___ Irrigation ___ Domestic ✓ Monitor ___

HRS Limited ___ 62-524 ___ Other _____

DRILL METHOD [ ] Rotary [ ] Cable Tool [✓] Combination

[ ] Jet [ ] Auger Other _____

Measured Static Water Level 28' Measured Pumping Water Level ____

After ____ Hours at ____ G.P.M. Measuring Pt. (Describe): _____

Which is ____ Ft. [ ] Above [ ] Below Land Surface

Casing: [✓] Black Steel [ ] Galv. [ ] PVC Other _____

[✓] Open Hole [ ] Screen

Casing Diameter & Depth (Ft.)

Diameter 4" From 0 To 68'

Liner [ ] or Casing [ ] Diameter ____ From ____ To ____

| Depth (Ft.) From | To | DRILL CUTTINGS LOG — Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color \| Grain Size \| Type of Material |
|---|---|---|
| 0 | 2 | Top Soil |
| 2 | 5 | Gray Sand |
| 5 | 25 | Gray Yellow Clay & Sand |
| 25 | 45 | Yellow & Gray Clay & Rock |
| 45 | 140' | Rock & Water |

Already Plugged

Driller's Name: (print or type) Dale Jordan

# WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT # 559548.04 CUP/WUP # _____ DID # _____ (.01)

If permit is for multiple wells indicate the number of wells drilled 3

Indicate remaining wells to be cancelled 1

WATER WELL CONTRACTOR'S SIGNATURE Greg Campbell License # 2613

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | 19 | 58 | 0 |
| Bentonite: ~~Fine~~ Chip | 1/4 | 51 | 58 |

WELL LOCATION: County Pasco

NW 1/4 of NW 1/4 of Section 5 Twp: 26S Rge: 22E

Latitude _____ Longitude _____

DATE STAMP

Received NOV 8 2001 PERMITS DATA

Official Use Only

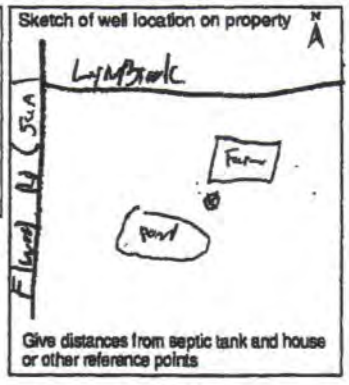
CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ ppm Sulfate: ____ ppm

Chloride: ____ ppm

[ ] Lab Test [ ] Field Test Kit

Sketch of well location on property




Give distances from septic tank and house or other reference points

Pump Type

[ ] Centrifugal [ ] Jet [ ] Submersible [ ] Turbine

Horsepower _____ Capacity _____ G.P.M. _____

Pump Depth _____ Ft. Intake Depth _____ Ft.

Form 41.10-410(2) - Rev. 6/95

OWNER'S NAME Zephyrhills Eggs

COMPLETION DATE 10-5-01 Florida Unique I.D. _____

WELL USE: DEP/Public ____ Irrigation ____ Domestic ____ Monitor X

HRS Limited ____ 62-524 ____ Other _____

DRILL METHOD [ ] Rotary [ ] Cable Tool [ ] Combination

[ ] Jet [X] Auger Other _____

Measured Static Water Level _____ Measured Pumping Water Level _____

After ____ Hours at ____ G.P.M. Measuring Pt. (Describe): _____

Which is ____ Ft. [ ] Above [ ] Below Land Surface

Casing: [ ] Black Steel [ ] Galv. [X] PVC Other _____

[ ] Open Hole
[X] Screen

Casing Diameter & Depth (Ft.)

Diameter 2"
From 65
To 60

Diameter 2"
From 60
To 0

Liner [ ] or Casing [X]
Diameter 4"
From 0
To 50

| Depth (Ft.) From | To | DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color \| Grain Size \| Type of Material |
|---|---|---|
| 0 | 4 | Tannish med Sand |
| 4 | 7 | Lt Brownish Sand |
| 7 | 23 | Lt whitish to tan Sandy Clay |
| 23 | 37 | Tan brn med Sand |
| 37 | 50 | Reddish tan Sandy Clay |
| 50 | 55 | Clay / limestone Limest Lt Brn |
| 55 | 56 | Limestone / Pebble mange |
| 56 | 58 | Very hard Clay w Rock |
| 58 | 61 | Limestone, Hard soft mix Mottled Greyish |
| 61 | 62 | Loamy Sand, Greyish green |
| 62 | 65 | Very Pebble grange to greenish weathered Limestone (clay) |
| | | 1401 @ 20mm |
| | | |

Driller's Name: (print or type) Greg Campbell

## WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT # 09526.01 CUP/WUP # _____ DID # _____

If permit is for multiple wells indicate the number of wells drilled _____.

Indicate remaining wells to be cancelled _____.

WATER WELL CONTRACTOR'S SIGNATURE _____ License # 2871

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | | | |
| Bentonite: | 2 | 0' | 92' |

WELL LOCATION: County PASCO

NW 1/4 of NW 1/4 of Section 11 Twp: 26 Rge: 21

Latitude _____ Longitude _____

Received SEP 9 1998 PERMITS DATA Southwest Florida Water Management District Brooksville, Florida Official Use Only

Sketch of well location on property N

Give distances from septic tank and house or other reference points

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ ppm Sulfate: ____ ppm

Chloride: ____ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [✓] Submersible [ ] Turbine

Horsepower 5 Capacity _____ G.P.M. 70

Pump Depth _____ Ft. Intake Depth 65' Ft.

New

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Sundance

COMPLETION DATE 8-24-98 Florida Unique I.D. _____

WELL USE: DEP/Public ___ Irrigation ___ Domestic ✓ Monitor ___

HRS Limited ___ 62-524 ___ Other _____

DRILL METHOD [ ] Rotary [ ] Cable Tool [✓] Combination

[ ] Jet [ ] Auger Other _____

Measured Static Water Level 23' Measured Pumping Water Level _____

After ___ Hours at ___ G.P.M. Measuring Pt. (Describe): _____

Which is ___ Ft. [ ] Above [✓] Below Land Surface

Casing: [✓] Black Steel [ ] Galv. [ ] PVC Other _____

| [✓] Open Hole [ ] Screen | Depth (Ft.) | | DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. |
|---|---|---|---|
| Casing Diameter & Depth (Ft.) | From | To | Color \| Grain Size \| Type of Material |
| Diameter 4" | 0 | 2' | topsoil |
| From 0' | 2' | 9' | yellow sand |
| To 92' | 9' | 13' | red clay |
| | 13' | 38' | white clay |
| Diameter ___ | 38' | 57' | yellow clay |
| From ___ | 57' | 74' | yellow clay & rock |
| To ___ | 74' | 300' | Recpd water |
| | | | |
| Liner [ ] or Casing [ ] | | | |
| Diameter ___ | | | |
| From ___ | | | |
| To ___ | | | |
| | | | |
| | | | |

Driller's Name: (print or type) Lester E. Fry

SEP 09 1998

## WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT # 573685.01 CUP/WUP # _____ DID # _____

If permit is for multiple wells indicate the number of wells drilled _____.

Indicate remaining wells to be cancelled _____.

WATER WELL CONTRACTOR'S SIGNATURE Ed Allen License # 2811

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | | | |
| Bentonite: | 2 | 0 | 55 |

WELL LOCATION: County Manatee

¼ of ¼ of Section 5 Twp: 36 Rge: 20

Latitude _____ Longitude _____

DATE STAMP: Southwest Florida Water Management District Received DEC 4 1995 Official

Sketch of well location on property

Give distances from septic tank and house or other reference points

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ___ ppm Sulfate: ___ ppm

Chloride: ___ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [✓] Submersible [ ] Turbine

Horsepower 1 Capacity _____ G.P.M. 25

Pump Depth _____ Ft. Intake Depth _____ Ft.

Form 41.10-410(2) Rev. 8/96

OWNER'S NAME H & I Interstate

COMPLETION DATE 11-21-95 Florida Unique I.D. _____

WELL USE: DEP/Public ___ Irrigation ___ Domestic ___ Monitor ✓

HRS Limited ___ 62-524 ___ Other _____

DRILL METHOD [ ] Rotary [ ] Cable Tool [✓] Combination

[ ] Jet [ ] Auger Other _____

Measured Static Water Level 6 Measured Pumping Water Level ____

After ___ Hours at ___ G.P.M. Measuring Pt. (Describe): _____

Which is ___ Ft. [ ] Above [ ] Below Land Surface

Casing: [✓] Black Steel [ ] Galv. [ ] PVC Other _____

[ ] Open Hole [ ] Screen

Casing Diameter & Depth (Ft.)

Diameter 4
From 0
To 55

Diameter ___
From ___
To ___

Liner [ ] or Casing [ ]
Diameter ___
From ___
To ___

| Depth (Ft.) From | To | DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. Color / Grain Size / Type of Material |
|---|---|---|
| 0 | 8 | Sand |
| 8 | 20 | Clay |
| 20 | 40 | Clay |
| 40 | 60 | Limerock |
| 60 | 80 | Light |
| 80 | 102 | Limerock w/ water |

Driller's Name: (print or type) Dale Gilbert

## WELL COMPLETION REPORT (Please complete in black ink or type.)

PERMIT # 5862625 CUP/WUP # _____ DID # _____

If permit is for multiple wells indicate the number of wells drilled _____.

Indicate remaining wells to be cancelled _____.

WATER WELL CONTRACTOR'S SIGNATURE _____ License # 2871

*I certify that the information provided in this report is accurate and true.*

| Grout | No. of Bags | From (Ft.) | To (Ft.) |
|---|---|---|---|
| Neat Cement: | | | |
| Bentonite: | 1 | 0 | 78 |

WELL LOCATION: County PASCO

3 1/4 of S 1/4 of Section 5 Twp: 26 Rge: 22

Latitude _____ Longitude _____

DATE STAMP

Southwest Florida Water Management District Received JAN 15 1997 Official Use Only

Sketch of well location on property

N

RD

well

Give distances from septic tank and house or other reference points

CHEMICAL ANALYSIS WHEN REQUIRED

Iron: ____ ppm Sulfate: ____ ppm

Chloride: ____ ppm

[ ] Lab Test [ ] Field Test Kit

Pump Type

[ ] Centrifugal [ ] Jet [X] Submersible [ ] Turbine

Horsepower 1/2 Capacity _____ G.P.M. 25

Pump Depth 42 Ft. Intake Depth _____ Ft.

Form 41.10-410(2) Rev. 6/95

OWNER'S NAME Security III II

COMPLETION DATE 12-13-96 Florida Unique I.D. _____

WELL USE: DEP/Public ___ Irrigation ___ Domestic ___ Monitor ___

HRS Limited ___ 62-524 ___ Other _____

DRILL METHOD [ ] Rotary [ ] Cable Tool [X] Combination

[ ] Jet [ ] Auger Other _____

Measured Static Water Level 16 Measured Pumping Water Level 20

After ___ Hours at ___ G.P.M. Measuring Pt. (Describe): _____

Which is ___ Ft. [ ] Above [ ] Below Land Surface

Casing: [X] Black Steel [ ] Galv. [ ] PVC Other _____

[X] Open Hole [ ] Screen

Casing Diameter & Depth (Ft.)

Diameter 4" From 0 To 78

Liner [ ] or Casing [ ] Diameter ___ From ___ To ___

| Depth (Ft.) From | To | DRILL CUTTINGS LOG — Examine cuttings every 20 ft. or at formation changes. Note cavities, depth to producing zones. *Color \| Grain Size \| Type of Material* |
|---|---|---|
| 0 | 10 | Sandy clay |
| 10 | 50 | Clay & rock |
| 50 | 78 | limestone |
| 78 | 120 | limestone & Flint |
| 120 | 160 | limestone & water |

Driller's Name: *(print or type)* M. Lee Burke

# Appendix C:
# Stroud Engineering Consultants
# Forest Lakes Estates
# Water System Evaluation

# FOREST LAKE ESTATES
# WATER SYSTEM EVALUATION

Prepared for:


Prepared by:

STROUD ENGINEERING CONSULTANTS, INC.
1519 Dale Mabry Highway, Suite 201
Lutz, Florida 33548

Certificate of Authorization #29607

Stroud Engineering Project No. 950-15-01

February 2016

STROUD
Engineering Consultants

## TABLE OF CONTENTS



LIST OF FIGURES

# 1. INTRODUCTION

## 1.1. AUTHORIZATION

At the request of Utilities Inc. of Florida, formerly Labrador Utilities, Inc. (Labrador Utilities), Gaydos Hydro Services, LLC (GHS) and Stroud Engineering Consultants, Inc. prepared a Scope of Services Proposal and issued a Contract in May 2015 to investigate the source of odor and taste quality issues within the potable water system for the Forest Lake Estates community.

## 1.2. PURPOSE

This project includes an investigation of the source of the metals causing periodic exceedance of the secondary drinking water quality parameters within the Forest Lake Estates community and an evaluation of options available to reduce the parameters affecting color, taste, and odor. Labrador Utilities has been receiving complaints from residents within the Community related to the aesthetic quality of the potable water.

The Environmental Protection Agency (EPA) has established National Secondary Drinking Water Regulations (NSDWR) that set non-mandatory water quality standards for 15 contaminants. The secondary standards are established only as guidelines for managing water systems for aesthetic considerations and are not considered a risk to human health. The water system recommendations will be geared to meet the requirements of the Florida Department of Environmental Protection (FDEP) Rule 62-555. The recommended maximum contaminant level (MCL) is 0.3 mg/l for iron and 0.05 mg/l for manganese.

Labrador Utilities is requesting an evaluation of their potable water system to determine water treatment plant (WTP) infrastructure improvements to address the secondary drinking water quality parameters of color, taste, and odor within their distribution system. This report consists of the following tasks:

1. Conduct an evaluation of the Community's existing water supply, piping, treatment, and pumping system.
2. Provide a review of the water quality analyses related to secondary standards.
3. Identify potential technologies and treatment options to reduce the targeted secondary water quality constituents.
4. Develop budgetary costs for the proposed treatment, infrastructure, or operational options.
5. Provide written recommendations for the consideration of proposed system improvements.

## 1.3. BACKGROUND

The Forest Lakes Estates is a retirement residential community consisting of 894 mobile home lots and 274 RV lots located in eastern Pasco County, Florida. Of the 274 RV lots within the community, approximately half now contain mobile homes. The community's population is highly seasonal with a significant amount of residents from northern portions of the United States and Canada that limit their

stay to six months or less. There are two (2) on-site wells and a water treatment plant (WTP) that together supply the Community with potable water.

The water system owner, Labrador Utilities, has been receiving complaints from residents within the Community about taste and odor problems of the supplied potable water. Sampling results for numerous testing periods over the past 20 years showed exceedances of the secondary water quality limits for total iron in the water system. Manganese was also present, although at concentrations below the MCL. These minerals will impart metallic taste and odor to the water. Iron is a naturally occurring metal found in the soils of Florida and can cause a rusty color to water, reddish to orange staining, and impart a metallic taste to the water. Manganese can cause water coloration of black to brown, black staining, and create a bitter metallic taste.

The analytical results showed concentrations of iron above the MCL values of 0.3 mg/l. A maximum iron concentration of 0.88 mg/l was recorded with concentrations averaging 0.28 mg/l. While testing did not show any MCL exceedances for manganese, this contaminant was still detected. The maximum concentration recorded was 0.028 mg/l and the average concentration was 0.011 mg/l.

## 2. WATER SYSTEM INVESTIGATION

### 2.1. EXISTING WATER SYSTEM

The Forest Lake Estates water treatment plant (FDEP PWS #6514842) is located at 6429 Forest Lake Drive. The WTP consists of the following major components:

- Raw water is provided by two water supply wells – a 200 gallon per minute (GPM) submersible well pump and an 875 GPM vertical turbine well pump.
- A sodium hypochlorite storage and chemical feed pump system delivers the disinfectant to the raw water header pipe prior to entering the ground storage tank.
- The ground storage tank is a glass-fused to steel vessel with a 35,000 gallon capacity. The tank was installed in 2015.
- A high-service finished water pump station, consisting of four (4) 275 GPM horizontal end suction centrifugal pumps, delivers water from the storage tank to the Community's distribution system. A nominal system pressure of 65 PSI is maintained at the pump station discharge.

In addition to the treatment components listed above, a polyphosphate chemical injection system is currently in operation for corrosion control of lead and copper. This system was originally added as water sampling results from the mid 1990's showed the presence of lead at the tap of a couple of residences, which was caused by leaching of the metal from household piping and plumbing fixtures. Polyphosphate was added to limit the potential corrosion of lead into the water. In addition, the polyphosphate can sequester iron and keep the metal in solution if the application is made prior to exposing iron to oxygen or an oxidizing agent. However, polyphosphates can be broken down and lose their ability to sequester iron by the application of heat, such as in a water heater.

Labrador Utilities has initiated discussions with FDEP regarding the efficacy of continuing the use of polyphosphate. Should a treatment process be selected to remove the iron in the water supply and

sampling results show the presence of lead at residential tap locations in concentrations greater than 0.015 mg/l, additional treatment options may be required for corrosion control.

The location and layout of the existing water system is shown on Figure 1.

FDEP regulates the water treatment system components and permits the facility on a Maximum-Day flow (MDF) basis. A water capacity analysis was conducted in 2004 which calculated the permitted water treatment system capacity of 288,000 GPD for MDF. This capacity was limited by the system having the largest well out of service.

In addition, the Southwest Florida Water Management District regulates the amount of water the community is able to withdraw from the groundwater wells by issuance of a Water Use Permit (WUP). The WUP limits total groundwater withdrawal quantities to 99,785 GPD on an Annual Average basis and 160,650 GPD on a Peak Month basis.


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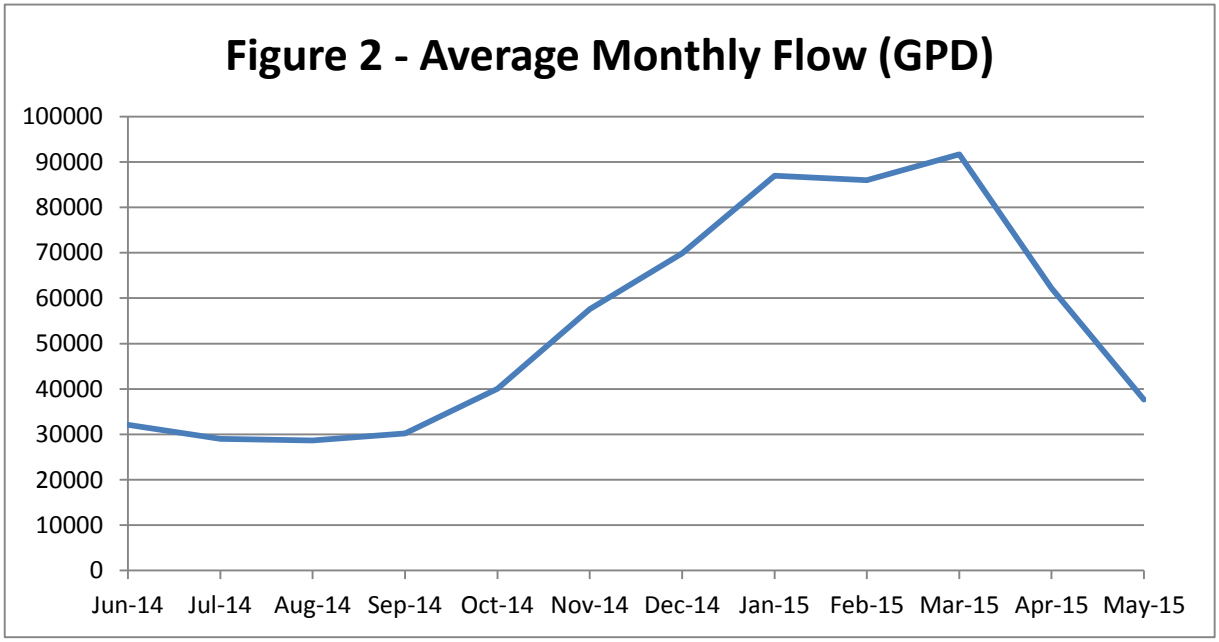
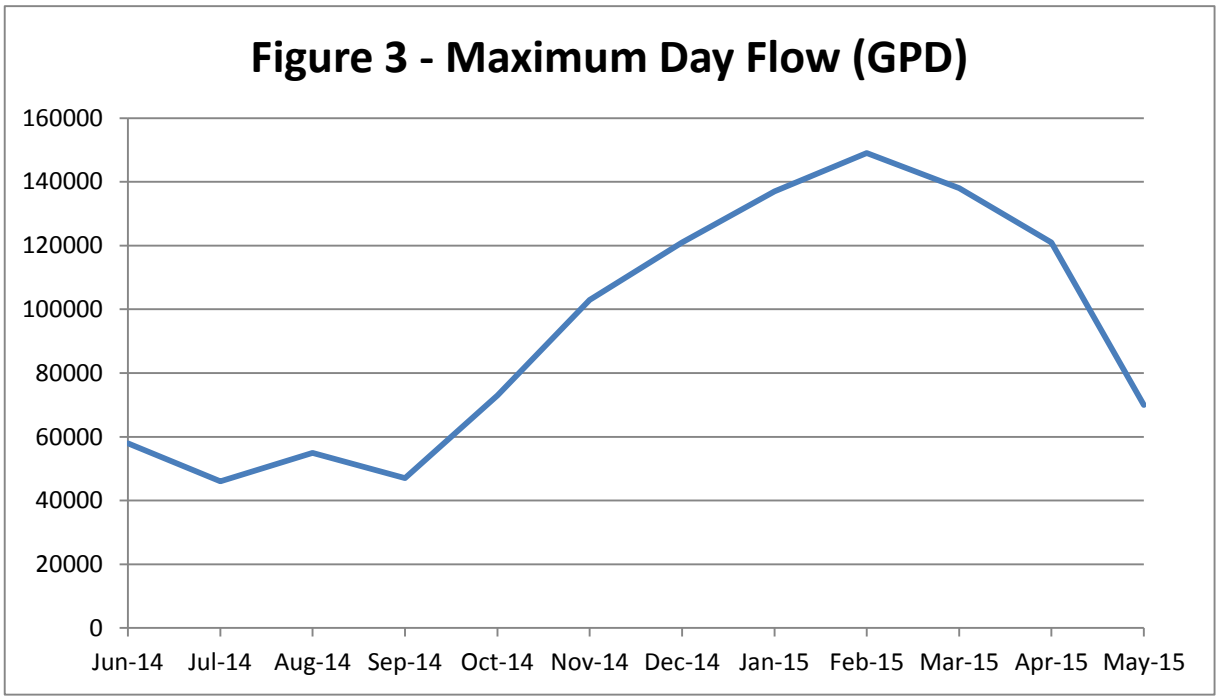
FIGURE 1 - FOREST LAKE ESTATES WATER TREATMENT SYSTEM

The water system demand for the 12 month period of June 2014 through May 2015 averaged 54,300 GPD (Annual Average), with a peak month demand of 2,842,000 gallons (91,677 GPD) in March 2015. The maximum daily flow of 149,000 GPD occurred in February 2015. Based upon the flow data, the maximum daily water use compared to the yearly average flow calculated as a 2.75:1 flow ratio. Additionally, a seasonal fluctuation of the water use due to residency rates showed a high flow season (winter months) to low flow season (summer months) of over a 2:1 flow ratio. Figures 2 and 3 show the Average Monthly Flows and the Maximum Day Flows for each month.



## 2.2. WATER QUALITY ANALYSIS

A detailed water quality analysis of the Forest Lake Estates' well water is provided in the Water Quality Review Report submitted by GHS (January 2016). The analytical results showed concentrations of iron above the MCL values of 0.3 mg/l. A maximum iron concentration of 0.88 mg/l was recorded with concentrations averaging 0.28 mg/l. While testing did not show any MCL exceedances for manganese, this contaminant was still detected. The maximum concentration recorded was 0.028 mg/l and the average concentration was 0.011 mg/l.

As mentioned in the Water Quality Review Report, subsequent testing of each water supply well yielded significantly different concentrations of iron and manganese. The analysis results for iron and manganese sampled at each well is shown below.

| | Well #1 (10-inch Diameter) | | Well #2 (6-inch Diameter) | |
|---|---|---|---|---|
| Sample Date | Iron (mg/l) | Manganese (mg/l) | Iron (mg/l) | Manganese (mg/l) |
| July 2015 | 0.15 | 0.0074 | **0.56** | **0.22** |
| Nov 2015 | 0.081 | 0.0041 | **0.44** | 0.016 |
| Jan 2016 | 0.071 | U | **0.39** | U |
| Average | 0.10 | 0.0038 | **0.46** | 0.079 |

The sample analysis data showed much higher concentrations of iron and manganese at the smaller production Well No. 2. The values shown in bold font for Well No. 2 exceed the MCL values for the respective parameter.

# 3. WATER SYSTEM EVALUATION

## 3.1. ALTERNATIVES ANALYSIS

Based upon water quality data, the Forest Lake Estates system showed elevated levels of iron. This metal compound, while not a primary health threat, will produce negative aesthetic issues affecting color, taste, and odor. To address these issues, a number of alternatives specific to the Forest Lake Estates water system have been developed for evaluation and are discussed in detail below.

1) Well Rehabilitation
2) Well Replacement
3) Connection to City of Zephyrhills potable water system
4) Multimedia Filtration Water Treatment System
5) Ion Exchange Water Treatment System
6) Maintain current operational status

### 3.1.1. WELL REHABILITATION

Because the available water quality data demonstrates that the Forest Lake Estates' supply Well No. 2 has some water quality issues, namely iron, rehabilitation of the well was conceptually explored. Since the water quality for Well No. 1 showed acceptable values, the methods discussed in this section and Section 3.1.2 below only focus on Well No. 2. FDEP regulations require the presence of two or more water supply wells, which negates the possibility of removing Well No. 2 from service altogether.

Based on the available geological information, water quality data, and well construction records, the option of well rehabilitation does exist. The identification of problem zones in an already open borehole entails the installation of a liner into the existing well casing to block off the iron producing zones. To identify the potential iron producing zones would require in-situ sampling for both water quality and flow. While the testing can identify the problem zones it does not necessarily identify the full extent of each or all zones because there is always some "bleed through" and a thorough mixing of the entire borehole is already present. By comparison to the installation of a new well, testing a borehole as you drill helps to identify each zone before opening up (drilling deeper) another one.

Therefore, the physical circumstances, logistical problems, and cost make this option, in our opinion, susceptible to unforeseen consequences with reduced chance of success. Such conditions include, but are not limited to:

1. Close proximity of the existing wells
2. Potential for interference with existing well operation – hence service interruptions
3. Potential for reduced flow in one well
4. Added cost for geophysical logging & downhole camera logs
5. In-situ water quality testing before drilling (pumping, non-pumping, & zone sampling)
6. Iron reduction possible but more problematic
7. Because of these conditions, cost estimates are uncertain.

### 3.1.2. WELL REPLACEMENT

Based on the available geological information, water quality data, and well construction records, the option of well replacement does exist. Locating new wells in the immediate area but of sufficient distance from the existing wells has advantages that in our opinion maximize the chances of success with reduced potential for problems. Such advantages include but are not limited to:

1. Increased distance from existing wells
2. Minimal potential to interfere with existing well operation – no service interruptions
3. No geophysical logging needed
4. No pre-drilling water quality testing needed
5. No reduced well capabilities
6. Identical well sizing maximizes water supply capability & provides more reliable well sequencing operation ability
7. Construction costs are estimated to be approximately $100,000.

With this option to replace the well, it is important to state that absolute values for supply water quantity and quality cannot be guaranteed. In order to maximize the potential for developing a successful water supply well, a pilot hole should be drilled to identify the zones the well would penetrate. The available information and data that would be collected from the pilot hole would be used during the well construction to better assess the groundwater quality and which zone(s) to case off or avoid.

The Water Quality Review Report (GHS) contains the discussion of the site geology for the area surrounding Forest Lake Estates and the well completion reports for the existing wells. Well abandonment costs are included in the capital cost shown in Section 3.2.

### 3.1.3. CONNECTION TO ZEPHYRHILLS WATER SYSTEM

The City of Zephyrhills is planning to extend a 12-inch water main to the intersection of CR 54 and Chancey Road in 2016. This intersection is approximately 4,200 feet from the Forest Lake Estates water treatment plant. Information provided by the City indicates the system pressure will be near 65 PSI at that intersection. To accommodate the water demands of the community and maintain fire flow capabilities, the minimum size of the water main should be a minimum 12-inch diameter.

The proposed water main will consist of a 12-inch PVC or HDPE pipe from the City connection at Chancey Road, along the southern right-of-way of CR 54 to Forest Lake Drive. The pipe will continue south along Forest Lakes Drive to the Labrador WTP. The total length of pipe to be installed is approximately 4,200-ft. Twelve inch gate valves will be included at each connection point, and at 6000-ft intervals along the pipeline. Air release valve assemblies and fire hydrant assemblies will be installed as necessary.

The Forest Lake Estates Community is located outside of the City limits. Based on the current 2017 fiscal year water use rate structure, the volumetric rate charged by Zephyrhills is anticipated to be $2.42 per 1000 gallons of metered water. The volumetric rate charged by Labrador would be in addition to the rate charged by Zephyrhills and is not included in this evaluation. The monthly base rate for Labrador water service is $4.13 per mobile home lot and $2.75 per RV lot. The yearly water costs are included in Section 3.2 of this Report. In addition to the water use costs, an initial impact fee amount will be required. The current impact fee for water service is $400.62 per mobile home lot. This cost is included in the capital cost line item in Section 3.2. Well abandonment costs are also included in the capital cost.

From preliminary discussions with the City, the Community would be required to install the water main to the proposed connection point. In addition, an impact fee for the water service would be required. However, final costs would be dependent on negotiations with the City, whether the City has future plans for water system expansion eastward along CR 54, and potential transfer of the community's Water Use Permit quantities to the City. In addition, the cost of recovery for the WTP components due to early retirement would need to be determined in a future rate case filed by Labrador with the Florida Public Service Commission (PSC).

### 3.1.4. MULTIMEDIA FILTRATION

Multimedia filtration involves the use of sand and anthracite media inside steel pressure vessels to remove soluble iron from treated groundwater. The sizing of the treatment system is dependent on the water supply well feed rate. The filtration vessels would be placed downstream of the disinfection injection point to accept the oxidized water.

To clean the sand/anthracite media, a backwash system is used with filtered water to treat one vessel at a time. The backwash system is controlled by an operator interface PLC controller. For a daily treatment volume of 60,000 GPD, the backwash quantity will be approximately 2,400 gallons. Water used for the backwash process must be disposed of by sending to a wastewater treatment plant (WWTP). The effect of the additional flow to the WWTP would be minimal regarding the treatment capacity or costs, as the backwash volume is a small percentage of the overall WWTP flow, the iron would be in an oxidized state, would not impact the biological treatment process, and the iron would predominantly precipitate in the waste sludge/residuals. However, additional yearly electrical and chemical costs to treat the additional flow are included in the O&M costs in Section 3.2.

Flow rates to the filtration vessels are dependent on the concentrations of iron. High concentrations require lower flow rates, while lower concentrations will allow a higher flow rate. To best optimize the system sizing and reduce initial capital costs, pilot plant testing is recommended. Nevertheless, based upon the available water quality sampling data, the proposed system was sized for a maximum iron concentration level of 1.0 mg/l and a feed rate of 5 gpm/sf of filter area. The proposed system is based on a treatment system provided by Wigen Water Technologies and consists of the following:

- Four 96” diameter by 60” sideshell height epoxy lined carbon steel pressure vessels and sand/anthracite media
- One Allen Bradley Compact Logix PLC controller with PVP color touchscreen operator interface for mounting in the building
- Preassembled piping for filter tanks
- Yard piping modifications.

Treatment of additional water pollutant parameters, such as manganese, arsenic, or hydrogen sulfide, would require greensand media be used in place of the sand/anthracite media to provide effective removal. Greensand filtration involves the use of Greensand Plus media placed inside steel pressure vessels to provide a Catalytic Oxidation method of operation. This type of operation is used to remove soluble iron and manganese from treated groundwater. Greensand media is a silica sand core substrate with manganese dioxide coating. Once the media is charged, the coating acts as a catalyst in the oxidation reduction reaction of iron and manganese. The use of this type of media would increase the capital cost for this option by approximately $100,000 above the multimedia.

### 3.1.5. ION EXCHANGE SYSTEM

The ion exchange process (resin softening) involves removing soluble forms of iron and manganese by ion exchange resin media in pressure vessels. The sizing of the ion exchange unit is also dependent on the water supply feed rate. Since the iron present in the raw water supply must remain only in the soluble ferrous state prior to its passage through the ion exchange unit, the resin vessels would be placed upstream of the disinfection injection point. As the resin becomes exhausted, the media requires backwashing to remove the accumulated ions and then the application of a sodium regeneration process from a salt brine vessel. The backwash water must be disposed to a wastewater treatment facility. With an average treatment flow of 60,000 GPD, the backwash quantities would be approximately 1,000 gallons. To clean the filter media, a backwash process is used to treat one vessel at a time. A system controller operates the backwash control valves. Water used for the backwash process must be disposed of by sending to a wastewater treatment facility.

As with the Multimedia Filtration system, an assumed level of iron along with the water supply feed rate was used to provide a proposed system size. The proposed system is based on an Aquarius Quad 3900NXT14 treatment system provided by Aquarius Water Refining and consists of the following:

- Four 48” diameter by 72” high mineral tanks
- Four 50” diameter by 60” high brine tanks
- Four 3” high volume control valves
- 3200NXT network controller
- System piping
- Yard piping modifications

In addition to the capital costs for equipment and installation, a significant use of salt crystals is required each month that will generate an increase in annual chemical expense.

### 3.1.6. MAINTAIN CURRENT OPERATIONS

The current operational process to minimize taste and odor issues in the potable water system revolves around a monthly hydrant flushing protocol. In this process, the hydrants at five locations within the Community are opened, allowing the water within the distribution pipes to be flushed and thus reduce the water age in the pipes. Iron and manganese compounds that have precipitated and are creating taste and odor conditions are flushed from the system. The intent is to remove the longest aged water from the distribution system as well as any minerals that have become deposited within the pipes.

An improvement to this process may be the increase in frequency of hydrant flushing, particularly during the lower water use season.

## 3.2. ESTIMATED COSTS

Estimated costs of each alternative presented above were determined and are listed in the table below. The costs for each alternative were based on budget quotes provided by equipment suppliers, estimation of quantities and unit prices from projects of similar construction elements, and use of material unit prices from Pasco County's most recent As-Needed Miscellaneous Pipeline Construction bid table. The level of accuracy of the cost estimates is expected to be between +/- 25%. Table 1 presents the total capital costs and the yearly operation and maintenance (O&M) costs for each option.

**Table 1 – Capital and O&M Costs**

| Option No. | Description | Estimated Cost |
|---|---|---|
| 1 | Well Rehabilitation | |
| | Capital Cost | $77,600 |
| | O&M – Yearly | $0 |
| | | |
| 2 | Well Replacement | |
| | Capital Cost | $116,500 |
| | O&M – Yearly | $0 |
| | | |
| 3 | Connection to City of Zephyrhills | |
| | Capital Cost | $954,000 |
| | O&M – Yearly | $127,200 |
| | | |
| 4 | Multimedia Filtration Treatment System | |
| | Capital Cost | $788,700 |
| | O&M – Yearly | $88,500 |
| | | |
| 5 | Ion Exchange Treatment System | |
| | Capital Cost | $325,000 |
| | O&M – Yearly | $142,600 |
| | | |
| 6 | Maintain Current Operations | |
| | Capital Cost | $0.00 |
| | O&M – Yearly | $0.00 |

Capital costs include engineering, permitting, equipment/material purchase, and construction of the improvements. A 25% contingency amount was included in the capital costs.

The O&M costs included for each option are only those costs that are in addition to the current WTP process operations. The O&M categories include power cost, chemical and/or material cost, and a 25% contingency amount. Therefore, Option 1 and 6 will have minimal to no additional O&M costs. Also, Option 3 O&M costs would replace the existing WTP costs and should not be considered additive.

Options 4 and 5 include additional labor and transportation costs reflecting the need for additional manpower to operate the new treatment processes. Overall, Option 5 has the most significant O&M costs due to the salt requirement for the treatment process.

As each option has differing operational life span and replacement costs, a present worth (PW) analysis was calculated. This analysis assumes that the cost of power is $0.08/kWh and the PW uses a 7 percent interest rate. Inflation costs of 2.4% have been included in this calculation, based upon the past 10-year historical Consumer Price Index (CPI) changes for all urban consumers (Bureau of Labor Statistics). Table 2 presents the PW for each option.

**Table 2 – Summary of PW Cost**

| Option No. | Description | Estimated Cost |
|---|---|---|
| 1 | Well Rehabilitation | $79,000 |
| | | |
| 2 | Well Replacement | $118,000 |
| | | |
| 3 | Connection to City of Zephyrhills | $2,293,000 |
| | | |
| 4 | Multimedia Filtration Treatment System | $1,804,000 |
| | | |
| 5 | Ion Exchange Treatment System | $1,861,000 |
| | | |
| 6 | Maintain Current Operations | $0 |

## 3.3. REVIEW AND RECOMMENDATIONS

As identified in the Alternatives Analysis section of this Report, there are a number of options available to Forest Lake Estates to remove iron and manganese from the water supply.

From a purely cost perspective, the Well Rehabilitation option has the lowest PW cost. However, there is a risk that this option may not reduce or eliminate the presence of iron or manganese to acceptable levels. Should this condition occur, additional treatment would be required. However, the Well Replacement option has a greater level of assurance regarding the ability to minimize the use of aquifer zones with unacceptable iron and manganese concentrations. With this in mind, we recommend a well survey be conducted of area water supply wells surrounding Forest Lake Estates to identify well size, well depth, well withdrawal depth and rate, and available water quality data in order to further evaluate the viability of this option.

Even though the option to connect to Zephyrhills water system shows the highest PW cost, this does not take into account the removal of the O&M costs for the Forest Lake Estates WTP, or the salvage value of the existing equipment. In reference to the existing equipment, recent infrastructure additions to the WTP include a new water storage tank (2015) and high-service pump station (2013). Alternately, there is the potential option to have Zephyrhills supplied water directed to the water storage tank and then re-pump the water into the Forest Lake Estates distribution system. This would allow for the continued use of the capital investments at the WTP and offer a buffer in demand that would allow for a smaller diameter supply pipeline (6-inch or 8-inch) at reduced cost. The main component of yearly costs is due to the need to purchase water from the City. Additional cost savings for this option may be possible should Utilities Inc. pursue negotiations with the City for the transfer of the community's Water Use Permit quantities.

Options 3 and 4 were close in total PW cost. However, the Multimedia Filtration System had a significantly greater capital cost with lower O&M costs, while the Ion Exchange System had high O&M costs due to the need for large quantities of salt addition.

While the goal of this Report was to identify potential options to remove or reduce the iron and manganese compounds from the water supply, these compounds do not present a health risk to the Community's residents. Should the residents object to the costs for the proposed improvements, the Community can continue the current water system operation.

Based on the options presented within this Report and the associated costs estimated for each option, we recommend Forest Lake Estates move forward with the selection of Option No. 2 to replace the existing 6-inch well with a new 8-inch or 10-inch diameter well. A new well would provide the ability to construct the well with a focus on identifying the aquifer zones that would be low in iron and manganese, and properly case the well to exclude the zones containing higher concentrations of iron and manganese. The use of a larger well casing diameter will allow the installation of a higher flow pump to provide improved operational use and flexibility for the WTP. With the inclusion of a higher flow well pump, the water system could be permitted at a higher capacity, if desired, since the current system limiting factor is the Well No. 2 pump capacity.