

# WATER & SEWER SYSTEM GROWTH AND SYSTEM CAPACITY EVALUATION

**MAY 2015**



WHITMAN, REQUARDT AND ASSOCIATES, LLP



# **WATER SEWER CAPACITY STUDY**

## **Purpose and Approach**

### **Updates to Water Demands and Sewer Flows based on:**

- ❖ **Existing Billing and Treatment Plant Records.**
- ❖ **In-Town Proposed Development Plans (under review and approved)**
- ❖ **In-Town Potential Future Development and Redevelopment**
- ❖ **Out of Town Commitments**
- ❖ **Growth Projections and Buildout**



# WATER SYSTEM CURRENT STATUS

(As of December 2014)

|  |                         |
|--|-------------------------|
| <b>Customers/Accounts</b>                                  | <b>4808</b>             |
| <b>Annual Average Water Demand (2005-2009)</b>             | <b>1.31 MGD</b>         |
| <b>Reservoir Safe Yield</b>                                | <b>2.27 MGD</b>         |
| <b>Wells Safe Yield</b>                                    | <b>0.07 MGD</b>         |
| <b><u>Designated Reserve</u></b>                           | <b><u>-0.30 MGD</u></b> |
| <b>Water Supply Safe Yield</b>                             | <b>2.04 MGD</b>         |
| <b>Percent Of Supply In Use – Average Day</b>              | <b>64%</b>              |
| <b>Maximum Day Water Demand<br/>(Peaking Factor = 1.5)</b> | <b>1.96 MGD</b>         |
| <b>WTP Production Capacity</b>                             | <b>3.0 MGD</b>          |

Water demands based on Plant Finished Water Meter Data and Well Meters

Two existing wells are under evaluation for upgrade and incorporation (0.30MGD)



# SEWER SYSTEM CURRENT STATUS

(As of December 2014)

|  |                        |
|--|------------------------|
| <b>Customers/Accounts</b>                          | <b>4368</b>            |
| <b>Annual Ave. Wastewater Flow (2007-2011)</b>     | <b>1.67 MGD</b>        |
| <b>Average Day Water Demand</b>                    | <b>1.31 MGD</b>        |
| <b>Sewer Cust. 90% and Water to Sewer Flow 90%</b> | <b>1.06 MGD</b>        |
| <b><u>Inflow and Infiltration</u></b>              | <b><u>1.05 MGD</u></b> |
| <b>Planning Wastewater Flow</b>                    | <b>2.11 MGD</b>        |
| <b>Treatment Capacity (95% of Permitted)</b>       | <b>2.38 MGD</b>        |
| <b>Percent Of Wastewater Capacity In Use</b>       | <b>87%</b>             |
| <b>Sewer WWTP Capacity</b>                         | <b>2.5 MGD</b>         |



# FUTURE DEMAND PROJECTIONS

## Methodology and Assumptions

### Planning Values - Water

- 300 gpd per Residential Account (Based on existing demand & account review)
- 700 gpd / Acre for Commercial / Industrial Land

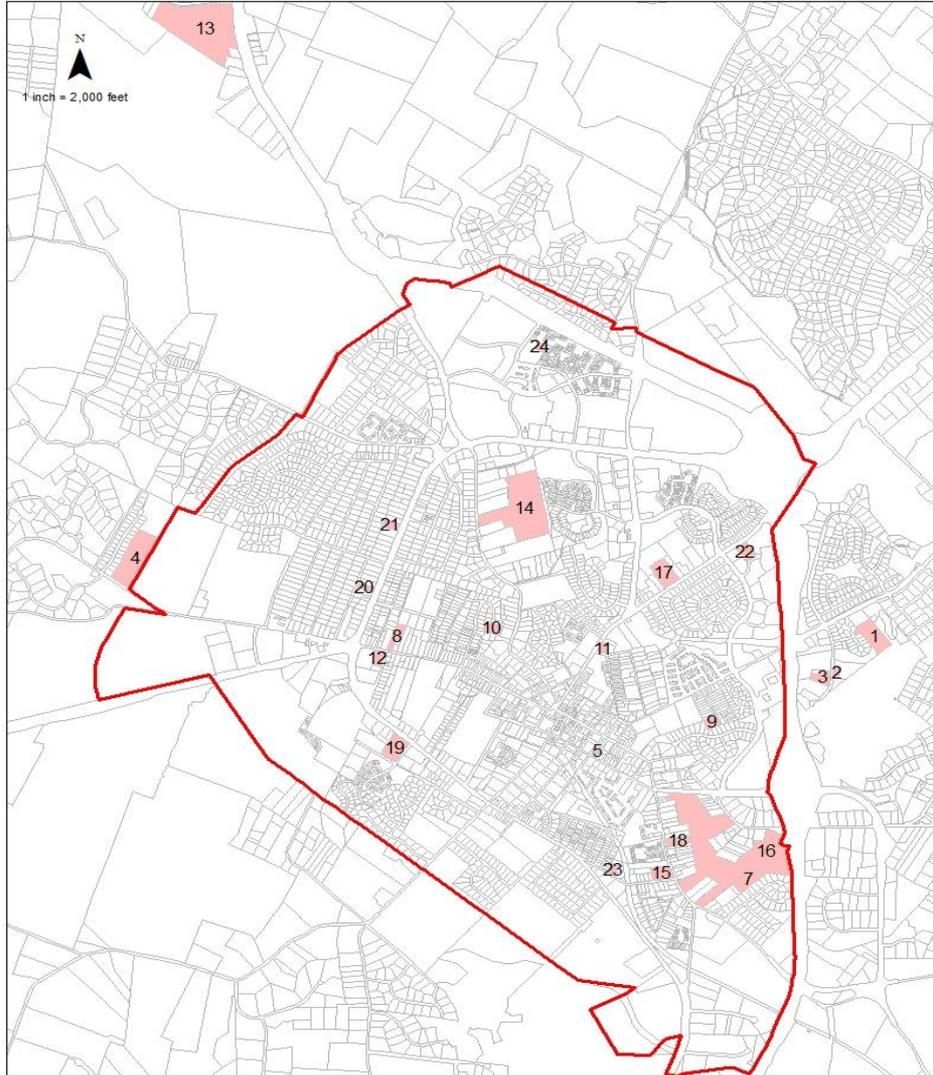
### Planning Values - Sewer

- 270\* gpd per Residential Account
- 630\* gpd / Acre for Commercial / Industrial Land
- *\*Flows Assumed to be 90% of water demands*



# CURRENT DEVELOPMENT INTOWN - SITE PLANS APPROVED OR UNDER REVIEW

2015 Site Plans Approved or Under Review



|    |                  |
|----|------------------|
| 1  | Millfield        |
| 2  | Millfield        |
| 3  | Millfield        |
| 4  | Stonecrest       |
| 5  | J. Tucker        |
| 7  | MONROE EST II    |
| 8  | PENNINGTON GROVE |
| 9  | Habitat          |
| 10 | Brenda Ct        |
| 11 | North Alex Pike  |
| 12 | Middleburg Bank  |
| 13 | Fletcherville    |
| 14 | Winchester Chase |
| 15 | Madison Square   |
| 16 | War Crossing     |
| 17 | Harway           |
| 18 | Falmouth Landing |
| 19 | Fau H Med Of Bld |
| 20 | Oak V Bnk lot    |
| 21 | Advance A Parts  |
| 22 | Lnwvr ph2 lot6   |
| 23 | Nokesville Bldrs |
| 24 | War Manor additn |

**WATER** • TOTAL PROJECTED DEMAND = 0.096 MGD

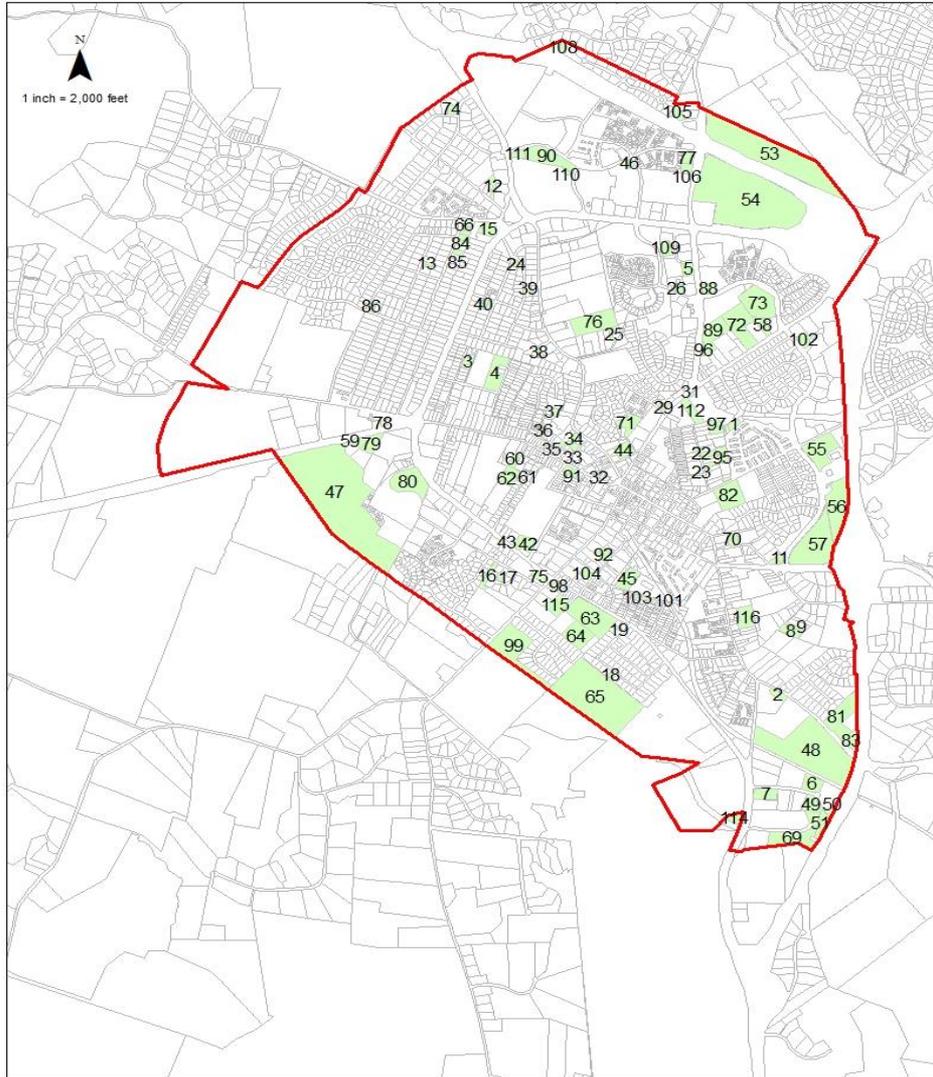
**SEWER** • TOTAL PROJECTED FLOW = 0.097 MGD





# FUTURE DEVELOPMENT IN-TOWN UNDEVELOPED PROPERTY MAP

2015 In-Town Undeveloped Properties



## WATER

- 823 Residential Lots @ 300 gpd/lot
- 168 Acres Comm./Ind. @ 700 gpd/Ac
- 363,600 gpd Avg. Daily Water Demand
- 0.364 MGD Avg. Daily Water Demand

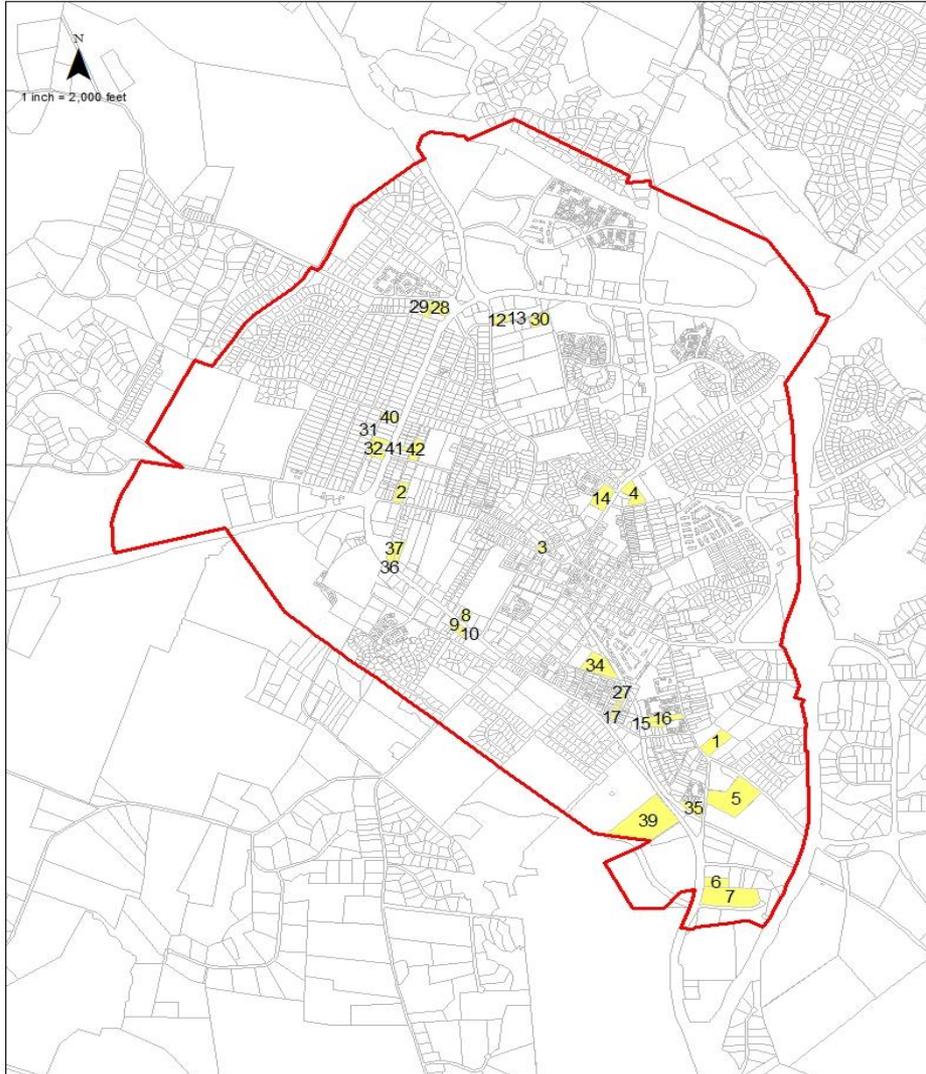
## SEWER

- 823 Residential Lots @ 270 gpd/lot
- 168 Acres Comm./Ind. @ 630 gpd/Ac
- 327,200 gpd Avg. Daily Flow
- 0.327 MGD Avg. Daily Flow



# FUTURE DEVELOPMENT INTOWN - POTENTIAL REDEVELOPMENT PROPERTY MAP

2015 Redevelopment Potential



## WATER

- 66 Residential Lots @ 300 gpd/lot
- 38.5 Acres Comm./Ind. @ 700 gpd/Ac
- 46,800 gpd Avg. Daily Water Demand
- 0.047 MGD Avg. Daily Water Demand

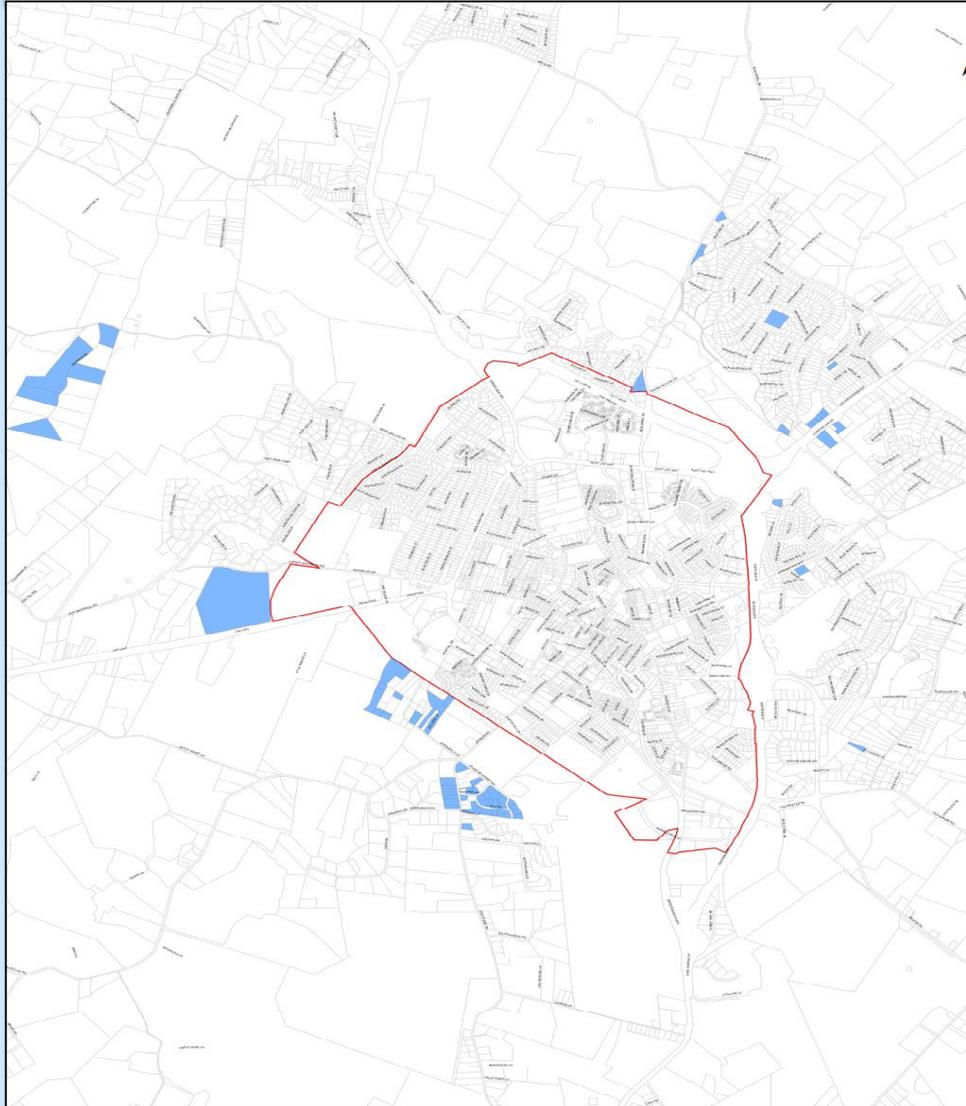
## SEWER

- 66 Residential Lots @ 270 gpd/lot
- 38.5 Acres Comm./Ind. @ 630 gpd/Ac
- 42,100 gpd Avg. Daily Flow
- 0.049MGD Avg. Daily Flow



# FUTURE DEVELOPMENT OUT OF TOWN WATER COMMITMENT MAP

2015 Out of Town Potential Water Customers



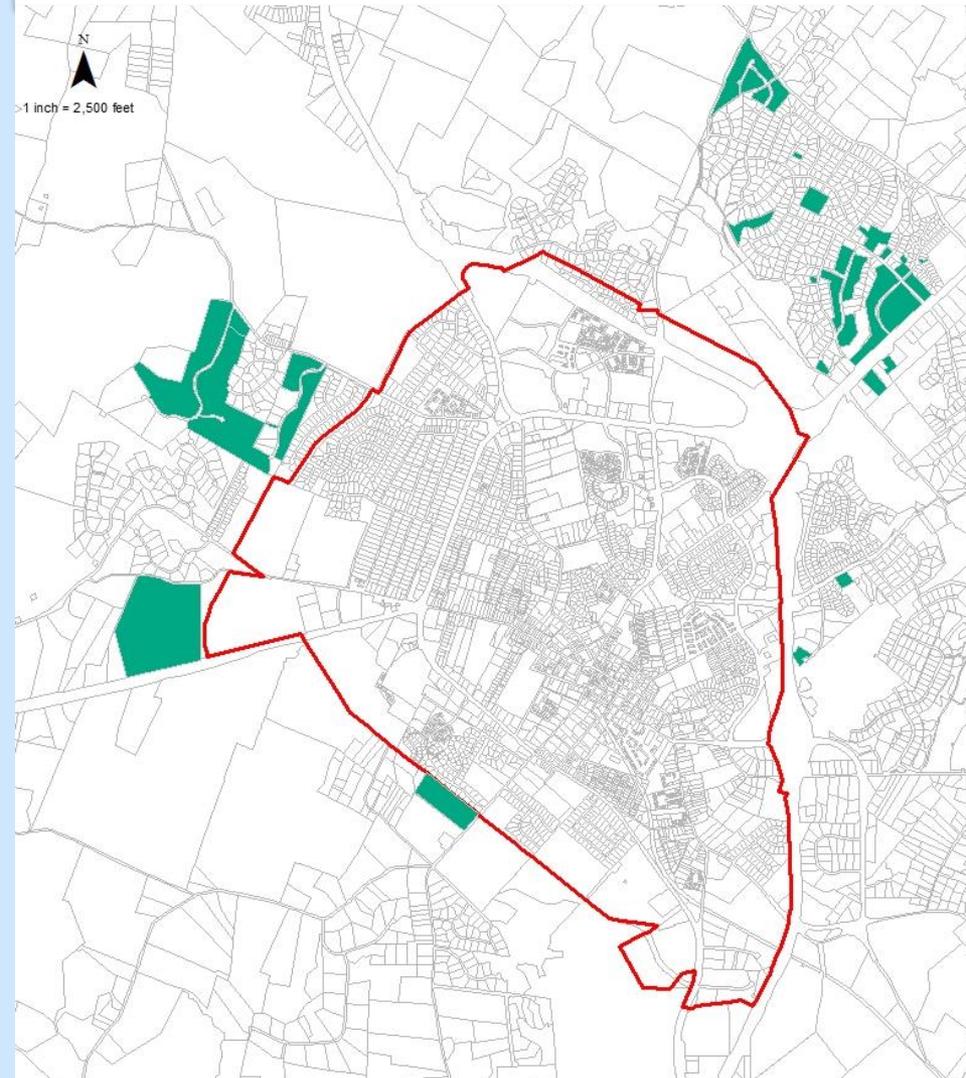
## WATER

- 196 Residential Lots @ 300 gpd/lot
- 4.85 Acres Comm./Ind. @ 700 gpd/Ac.
- 62,200 gpd Avg. Daily Water Demand
- 0.062 MGD Avg. Daily Water Demand



# FUTURE DEVELOPMENT OUT OF TOWN SEWER COMMITMENT MAP

2015 Out of Town Potential Sewer Customers



## SEWER

- 245 Residential Lots @ 270 gpd/lot
- 4.85 Acres Comm./Ind. @ 630 gpd/Ac.
- 69,300 gpd Avg. Daily Flow
- 0.069 MGD Avg. Daily Flow



# PROJECTED BUILDOUT WATER SYSTEM DEMANDS IN TOWN & EXISTING COUNTY COMMITMENTS

## Water System Summary

2015 Calculations

|   |             |
|---|-------------|
| Currently Proposed Development                | 96,000 gpd  |
| In Town - Vacant Lot Development              | 363,000 gpd |
| In Town - Redevelopment Potential             | 46,800 gpd  |
| County - Unserved Lots Within Commitment Area | 62,200 gpd  |

**Buildout Estimated Additional Water Demand 568,600 gpd**

Current Average Day Demand 1,309,432 gpd

**Total Buildout Water Demand gpd 1,878,032**

Available Safe Yield (Average Day from Sources) = 2,046,667 gpd

Buildout Demand is at 92% of the Available Safe Yield



# PROJECTED BUILDOUT SEWER SYSTEM FLOWS IN TOWN & EXISTING COUNTY COMMITMENTS

## Sewer System Summary

2015 Calculations

Currently Proposed Development 97,470 gpd

In Town - Vacant Lot Development 327,200 gpd

In Town - Redevelopment Potential 42,100 gpd

County - Unserviced Lots Within Commitment Area 69,300 gpd

**Buildout Estimated Additional Sewer Flow 536,070 gpd**

Current Average Day Flow 2,110,640 gpd

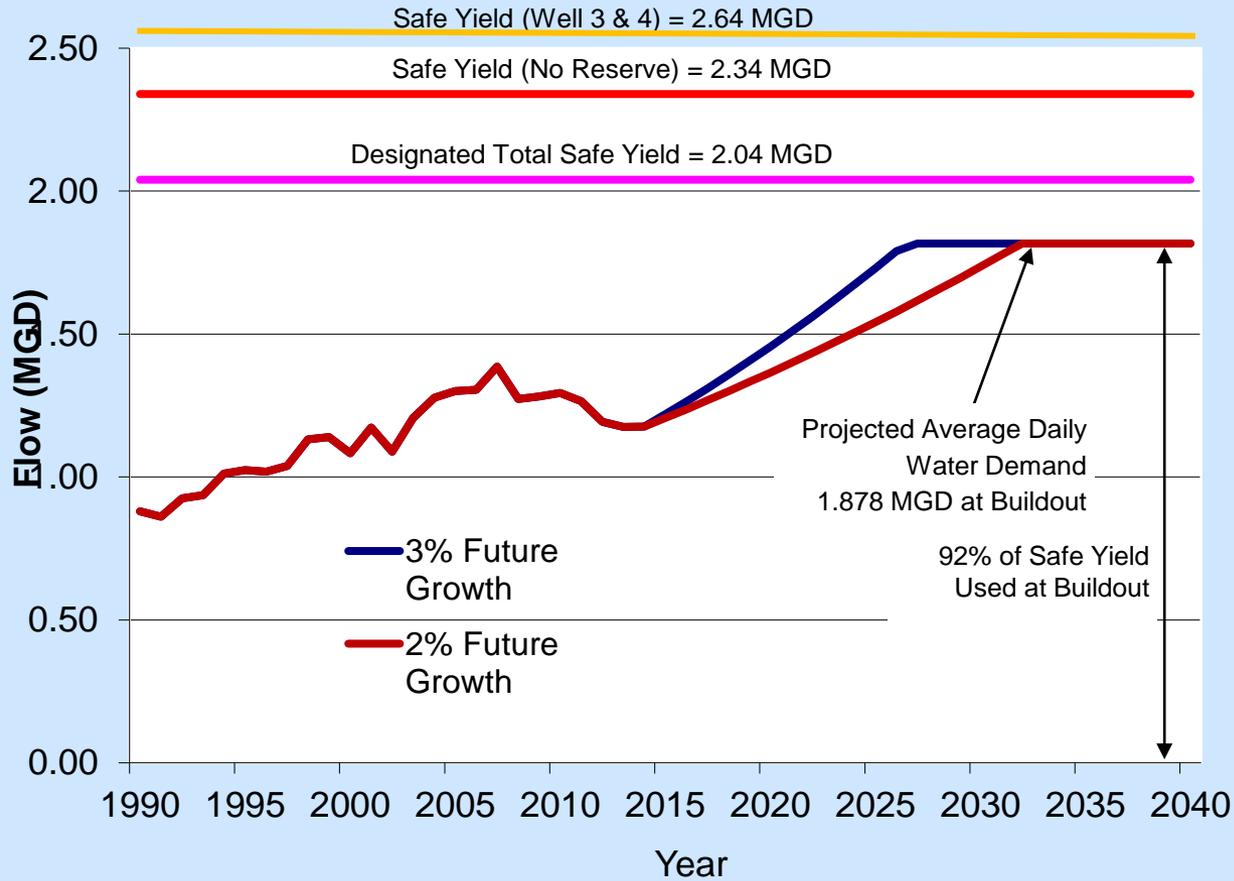
**Total Buildout Sewer Flow 2,646,810 gpd**

WWTP Capacity (95% ADF) = 2,375,000 gpd

Buildout Sewer Flow is at 106% of WWTP Capacity.

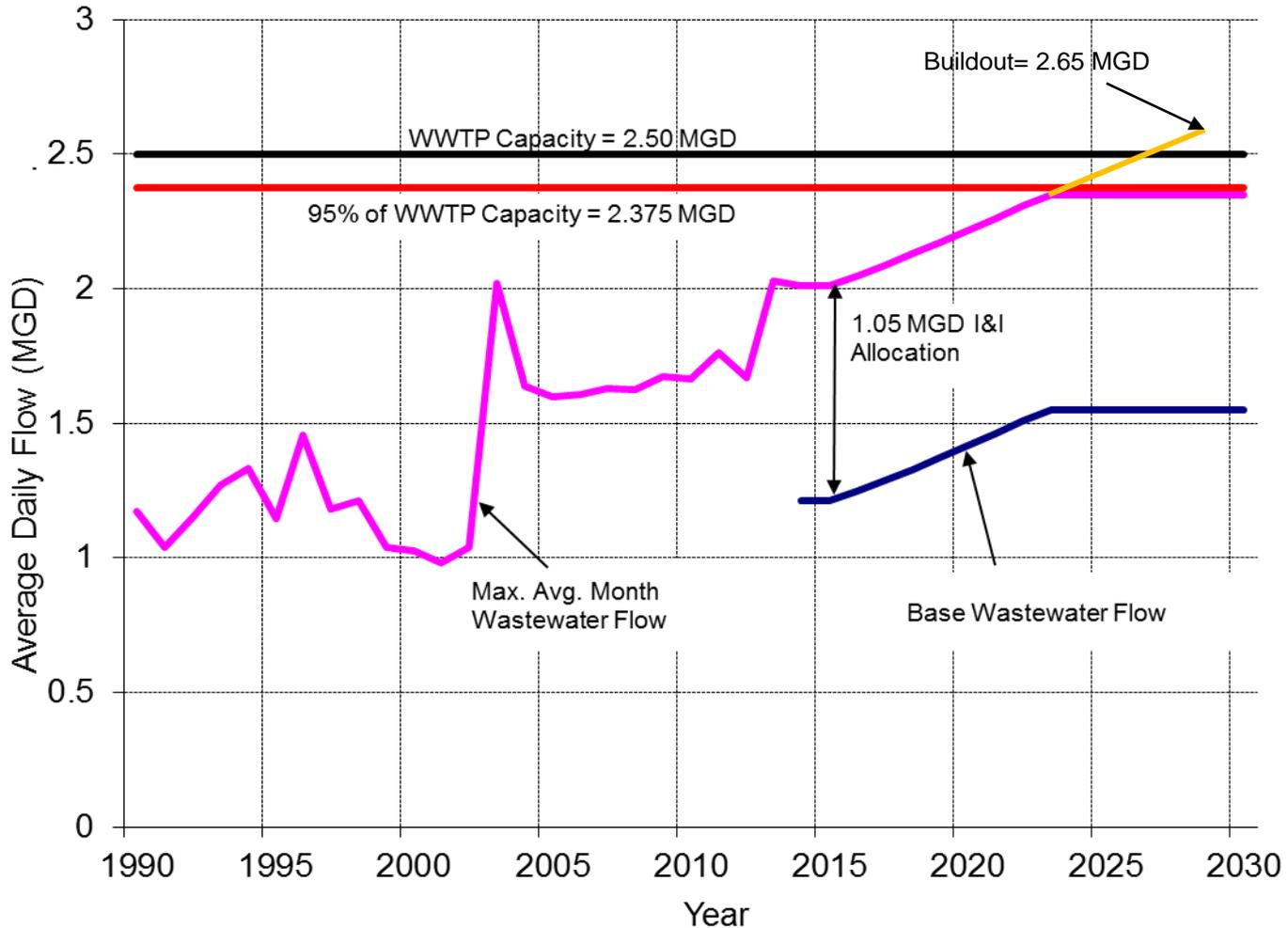


# PROJECTED BUILDOUT WATER SYSTEM DEMANDS





# PROJECTED BUILDOUT SEWER FLOWS





# PROJECTION SUMMARY

## WATER

- Buildout will occur between 2028 (3.0% growth) and 2033 (2.0% growth)
- At Buildout demand is 92% of safe yield (with current assets)

## SEWER

- Buildout will occur in 2029 (3.0% growth)
- Current WWTP Capacity (95%) will occur in 2022-2024



# ADDITIONAL CONSIDERATIONS

## Water - Additional Considerations

- Option to Utilize the Drought Contingency Reserve (80% at Buildout)
- Reactivation of Well #3 and Well #4 (71% at Buildout)



# WATER –RECOMMENDATIONS

## Short Term

- Reactivate Wells #3 and #4 (0.3 MGD)
- Consider Removal of Drought Contingency Reserve, using 80% Commitment of Assets as Objective.



# SEWER –RECOMMENDATIONS

## Short Term

- Reduce I&I (Set a goal of reduction of 0.3 MGD in 3 years). Study already underway.
- Investigate the Potential and Objectives to Wastewater Treatment Plant Capacity Expansion



# GENERAL RECOMMENDATIONS

## Long Term

- Unprogrammed New Development: Outside Commitments will increase Buildout Demands and Flows and will require Capacity Improvements.
- Town should develop a Contingency Plan for future Rezoning, changes to Water and Sewer patterns or other system changes.



# QUESTIONS