

The Woodlands Wastewater Consolidation Feasibility Study

Texas Association of Clean Water Agencies

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Introductions



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Agenda

- Introduction

- Teams and Roles
- Background
- Goals

- Approach

- Program Phasing
- Phase I Tasks
- Important Project Aspects

- Conclusion

- Schedule
- Key Take-aways
- Q&A



Introduction

Background and Project Goals

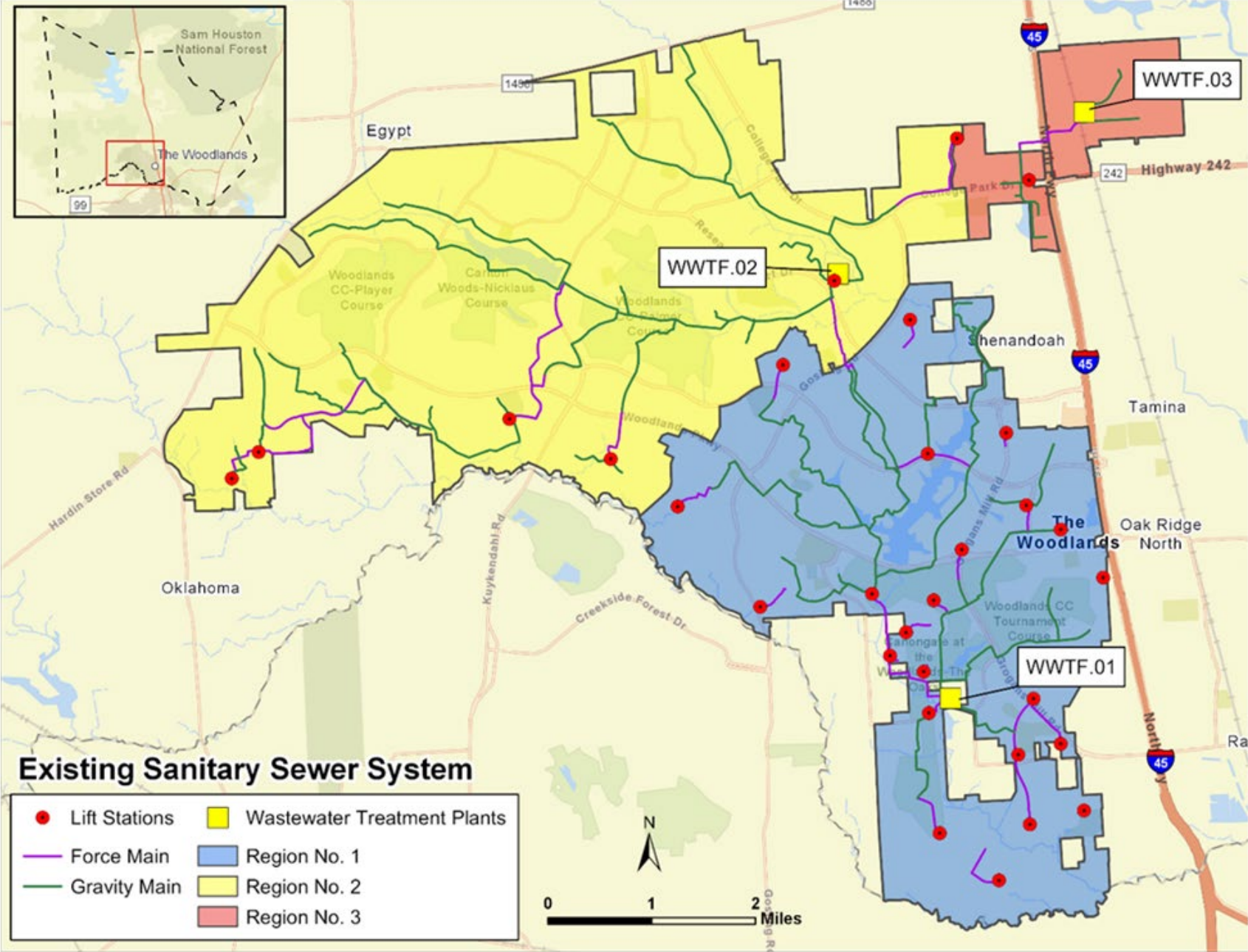
Team and Roles



11 Municipal Utility Districts



Existing System



Existing WWTF Assets



**WWTF 1 - 46 Years Old
17 Acres, None Available
Est. Start of Renewal 2021**



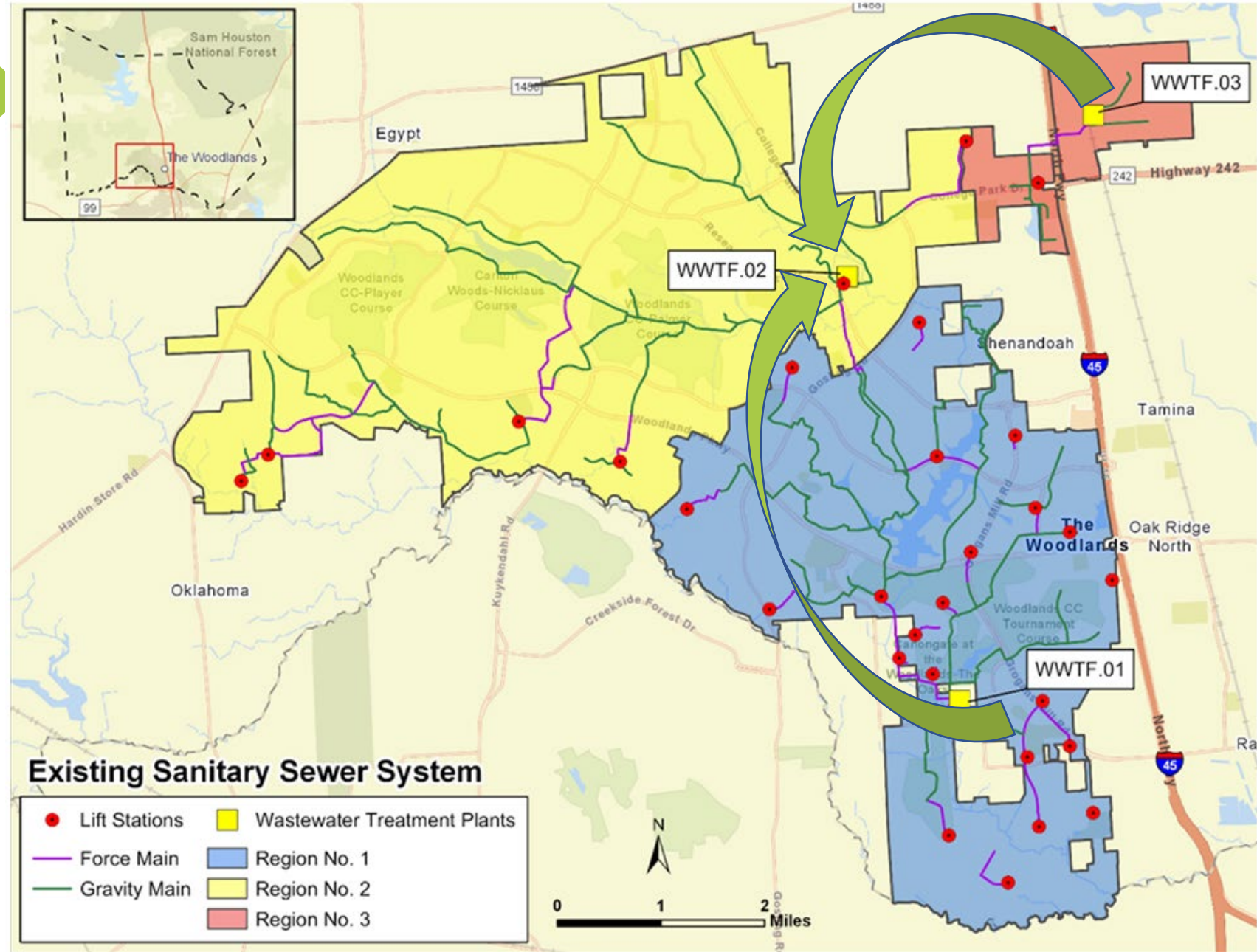
**WWTF 2 - 22 Years Old
25 Acres, 12.5 Available
Est. Start of Renewal 2045**



**WWTF 3 - 17 Years Old
3 Acres, None Available
Est. Start of Renewal 2055**

Purpose

Provides a high-level overview to determine feasibility of consolidating two or more existing wastewater treatment plants *or* to retain the current system of operating and maintaining three separate facilities.



Driving Forces

Age of Facilities

- 17 – 46 years old

Estimated cost to renew

- \$400M - \$500M

Estimated cost to consolidate (no conveyance)

- \$300M - \$400M

Potential Ancillary Benefits

- Lower O&M costs
- Increased efficiency
- Improved effluent
- Reuse
- Bio-gas
- Sludge reuse
- Odor control
- Aesthetics



Approach

Program Phasing, Phase I Tasks, Unique
Project Aspects

Project Process



We are here

Phase I Project Goal is to Answer:
Should we continue investing in a consolidation in the next phase?

Important Project Aspect: Feasibility Study

Our Project Goal is to Answer:
Should we continue investing in a consolidation in the next phase?

- Right-sizing the level of analysis

Challenge

Best Practices

- Limit scope, necessary to answer the primary question
- Allowance for Owner directed services



Phase 1 - Feasibility Study Scope Overview

Task 01

Coordination and Progress
Review Meetings

Assess Infrastructure and
Evaluate Flows

Task 02

Task 03

Define Alternatives

Analyze Alternatives

Task 04

Task 05

Report Development

Task 1 – Coordination and Progress Review Meetings



Goal

- Engage stakeholders
- Understanding their definitions of success



Approach

- 14 stakeholder representatives
- Six workshops



Output

- Selection criteria
- Final alternative selection

Stakeholder Representatives

- Paul Brown – MUD 47
- Bruce Cunningham – MUD 6
- Scott Haynes – MUD 36
- J. J. Hollie – Woodlands Chamber
- Emil Jacobs – MUD 386
- Dan Kolkhorst – Howard Hughes Corp.
- Bob Leilich – MUD 1
- Paul Martin – MUD 67
- George Newman – MUD 46
- Bruce Reiser – Woodlands Township
- Don Sarich – MUD 7
- Jim Stinson – Woodlands Water
- Richard Stromatt – MUD 60
- Ron Wilson – Metro MUD
- Vacant – MUD 39

Important Project Aspect: Aligning Stakeholder Goals and Visions



- Multiple stakeholders, different visions and definitions of success

Challenge

Best Practices

- Workshops
- Establish rules of engagement
- Mission statement
- Level of service



Stakeholder Coordination Meetings



Project Kickoff



Evaluation Criteria Weighting



Condition Assessment



Alternatives Shortlist



Initial Alternatives Scoring



Final Alternative Selection

Task 2 - Assess Infrastructure and Evaluate Flows



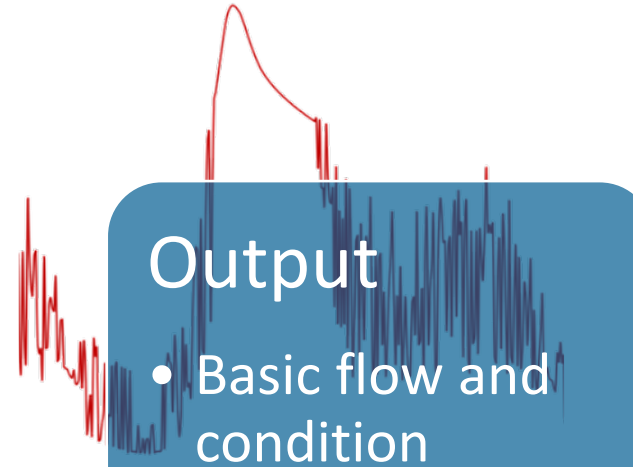
Goal

- Establish existing infrastructure and future flow conditions



Approach

- Combine existing models
- Risk-based assessment



Output

- Basic flow and condition criteria on which to base alternatives

- Build upon existing work
- Review of recently updated data
- Utilize existing risk-based assessment (RBA) scores
- Multi-discipline, visual field inspection of WWTFs 1 and 2



Condition Assessment



Hydraulic Model Update

SSTAR Program Hydraulic Model

- Flow Monitoring Data
- Wet Weather Hydrology



Optimization Study Model

- Spatially applied 2027 SFDUEs

Updated Model

- Combines best wet-weather and dry-weather features of two existing models
- Incorporates NOAA Atlas 14 data
- Updates design storm hyetographs

Task 3 – Define Alternatives



Goal

- Define alternatives that meet stakeholders' level of service



Approach

- Narrow alternatives via workshops



Output

- One Renew/Replace alternative
- One Consolidation Alternative

Analysis of Alternative Sites

- Property Size
- TPDES Limits
- Wetlands
- Flood plain
- Sensitive neighbors
- Conveyance length



Conveyance Options

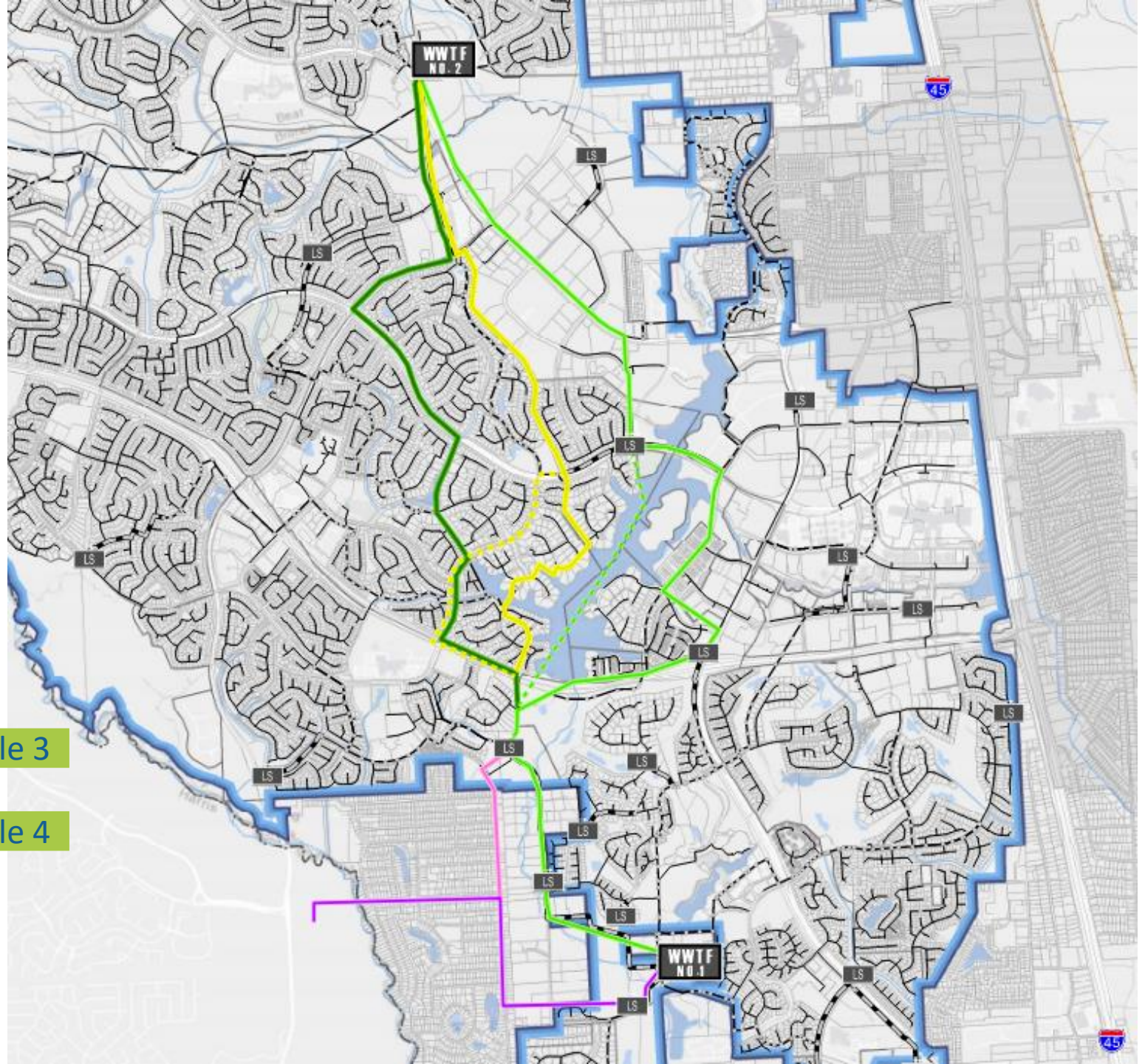
- Alignments
- Conveyance Methods
 - Force Main
 - Gravity Sewer
- Construction Methods
 - Open Cut
 - Tunnels/Trenchless

← Example 1

← Example 2

← Example 3

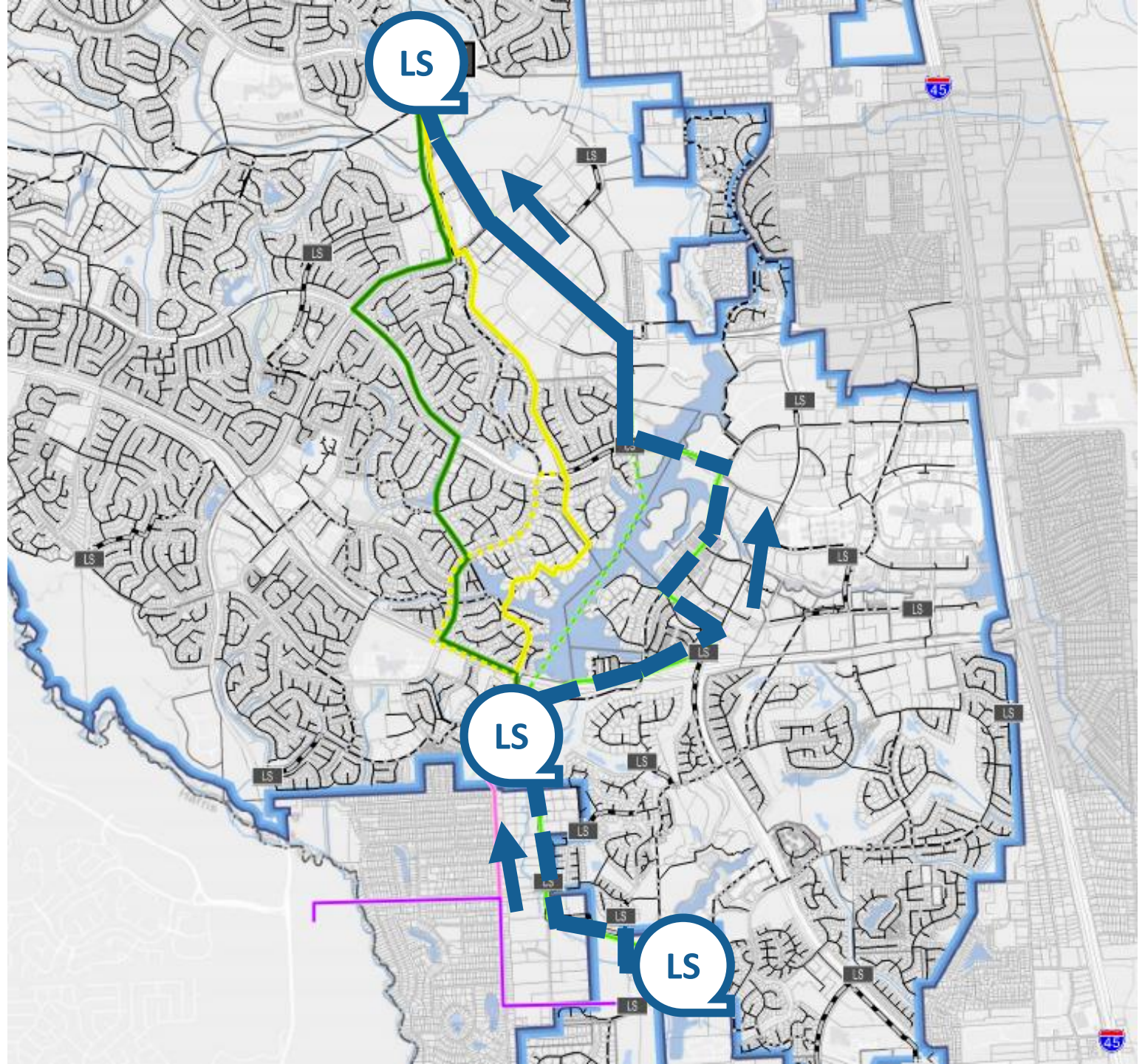
← Example 4



Pros/Cons of Conveyance Options

FORCE MAINS

- Reduced Cover
- Reduced Pipe Diameter
- Utilize Existing Infrastructure

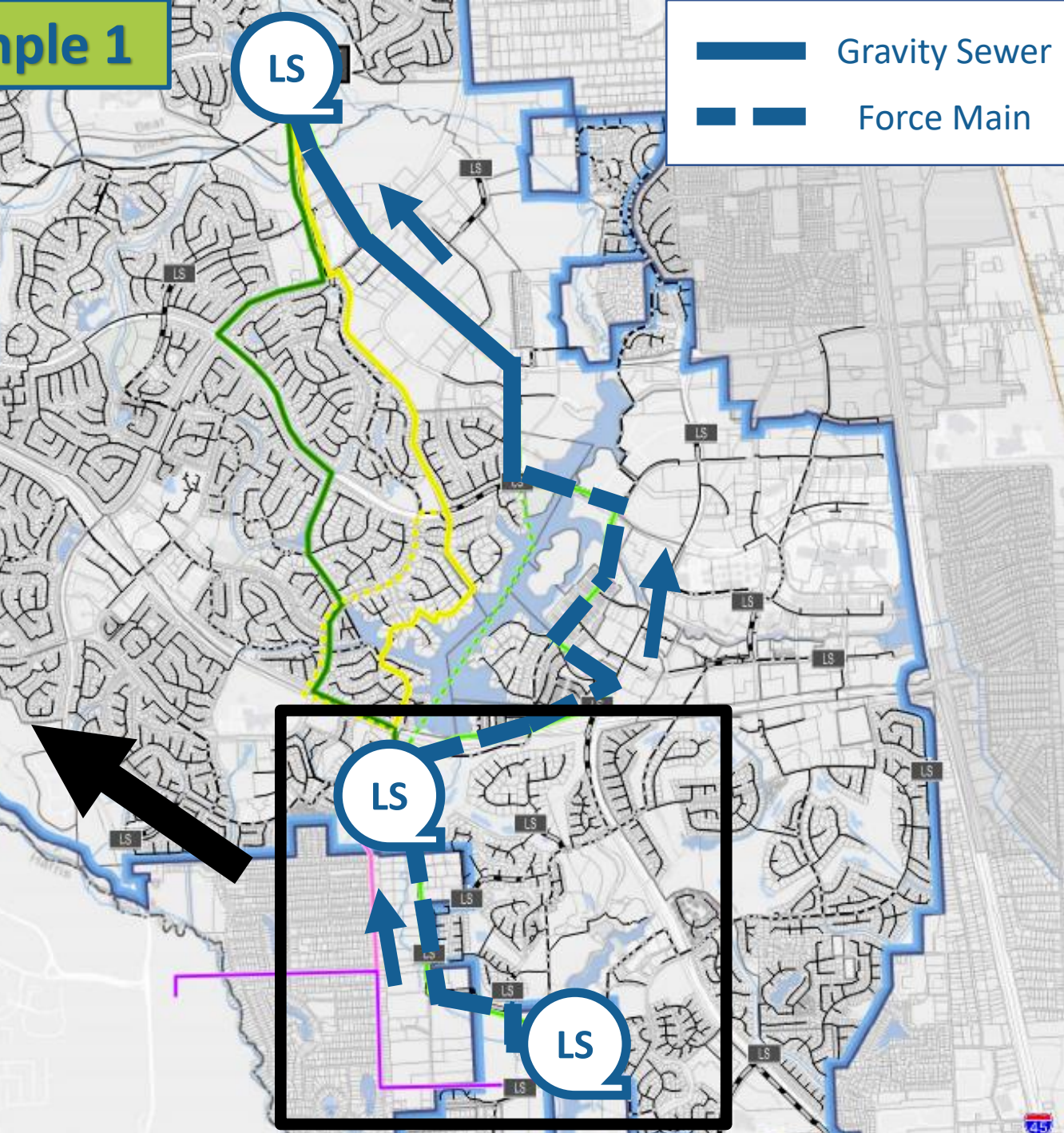
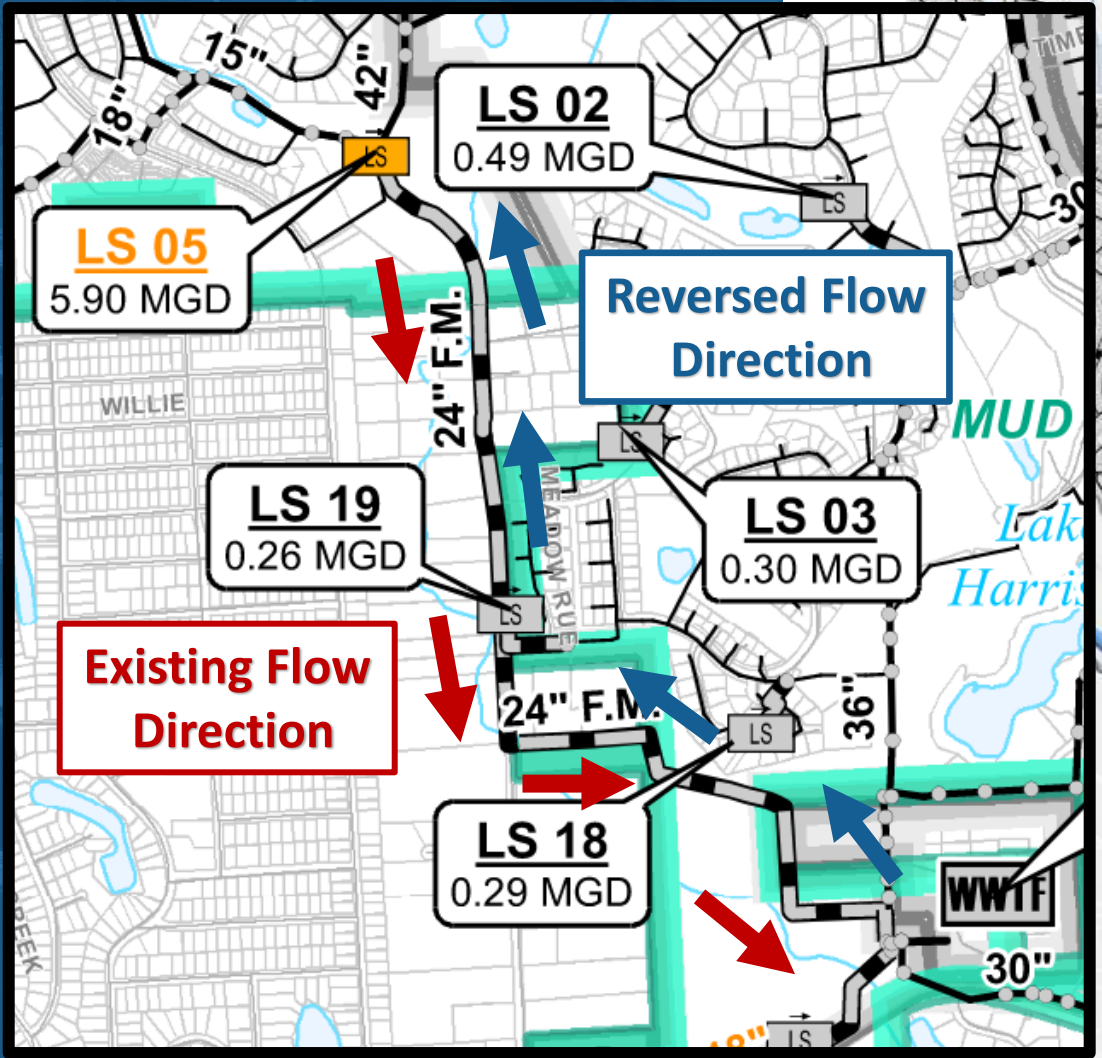


Pros/Cons of Conveyance Options

Example 1

Legend:

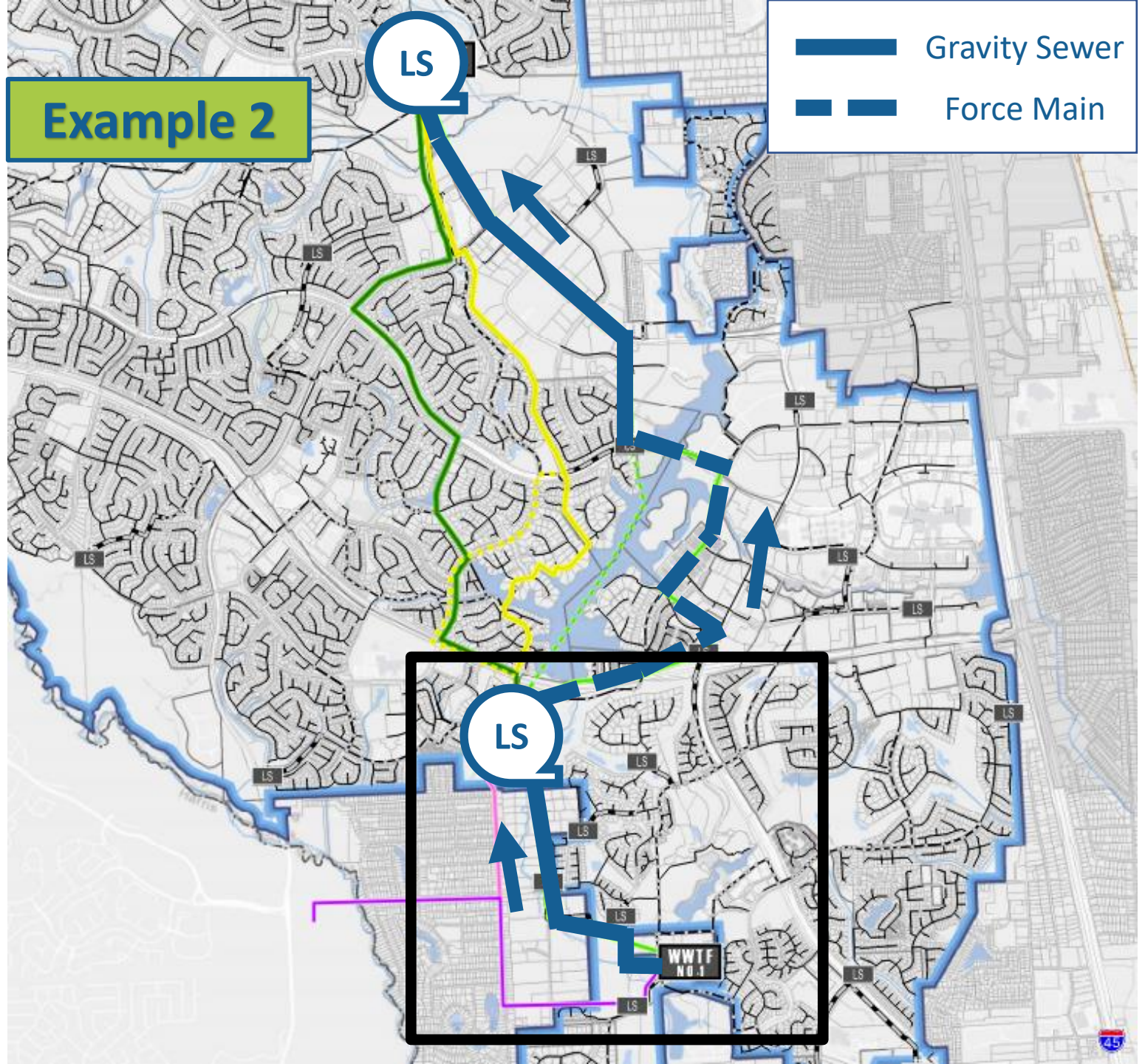
- Gravity Sewer
- - - Force Main



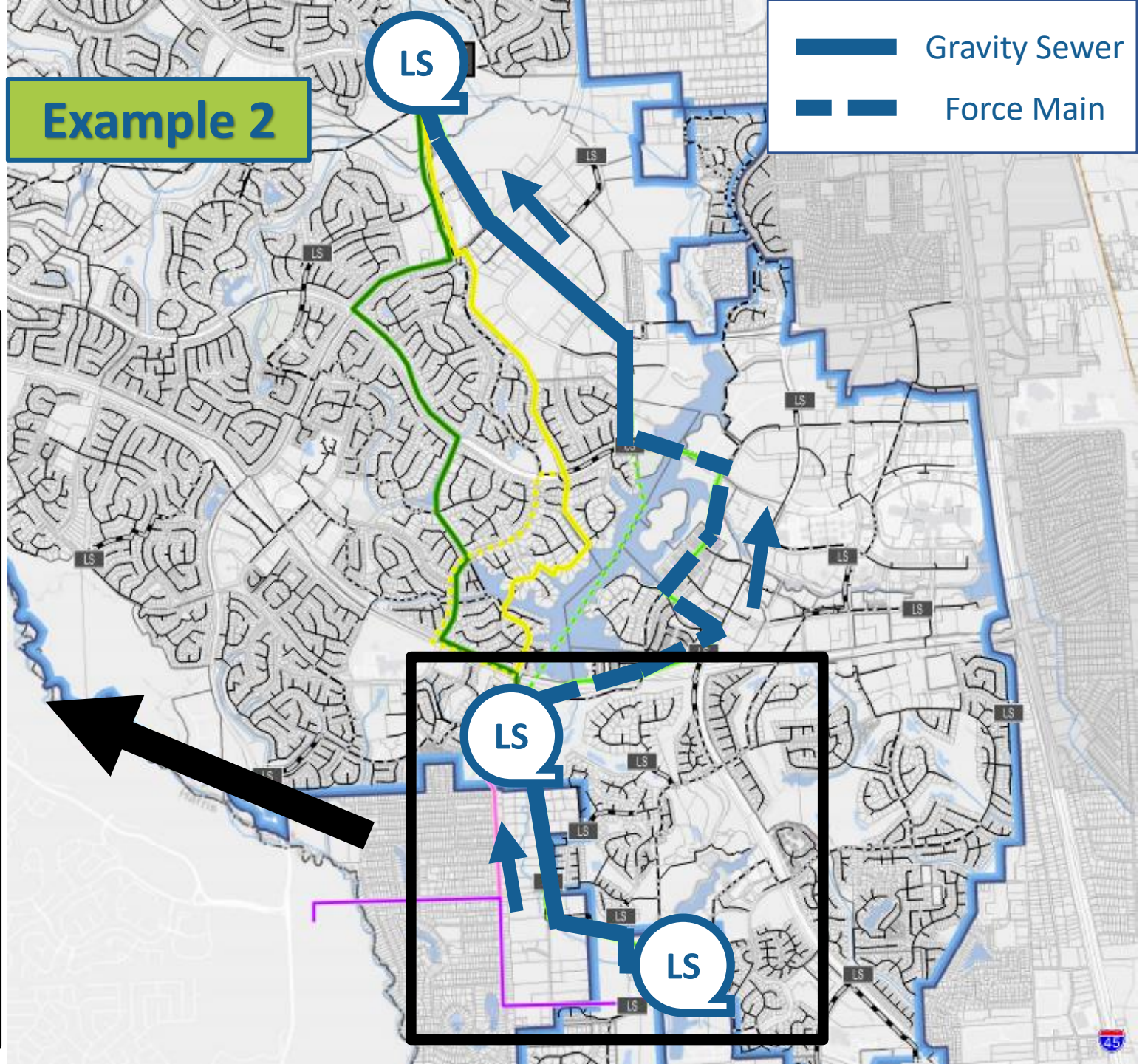
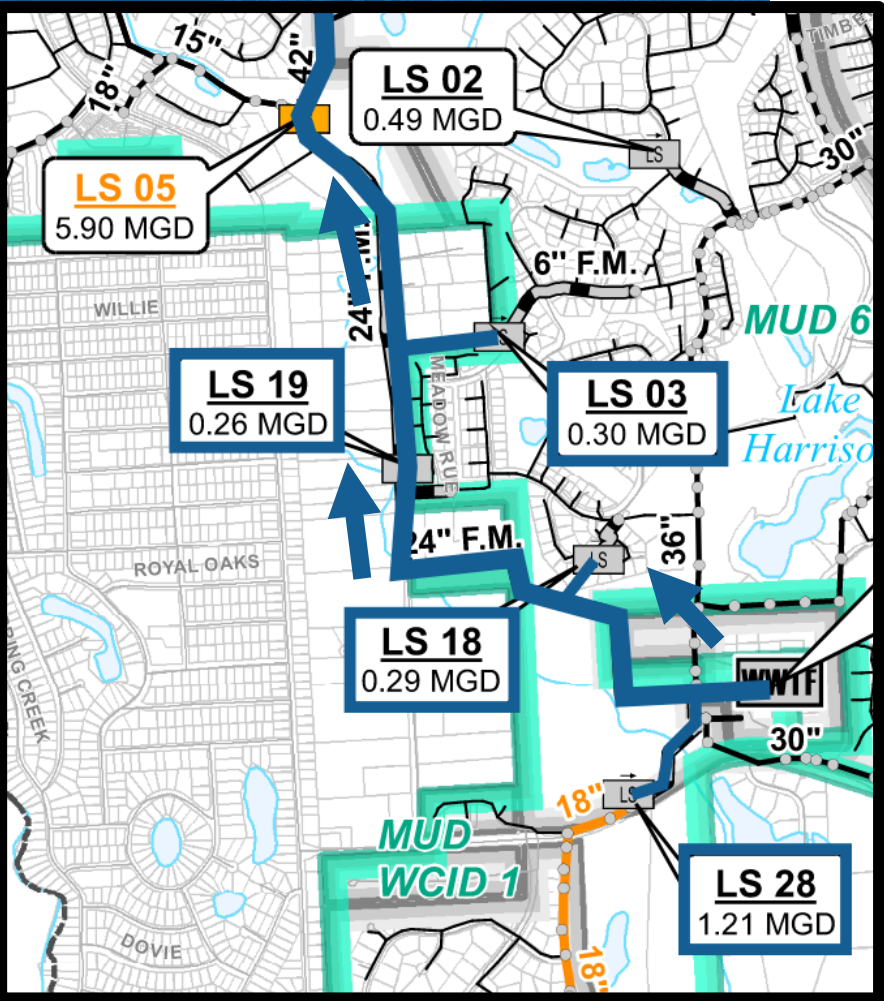
Pros/Cons of Conveyance Options

GRAVITY SEWER

- Reduced O&M Costs
- Lift Station Consolidation



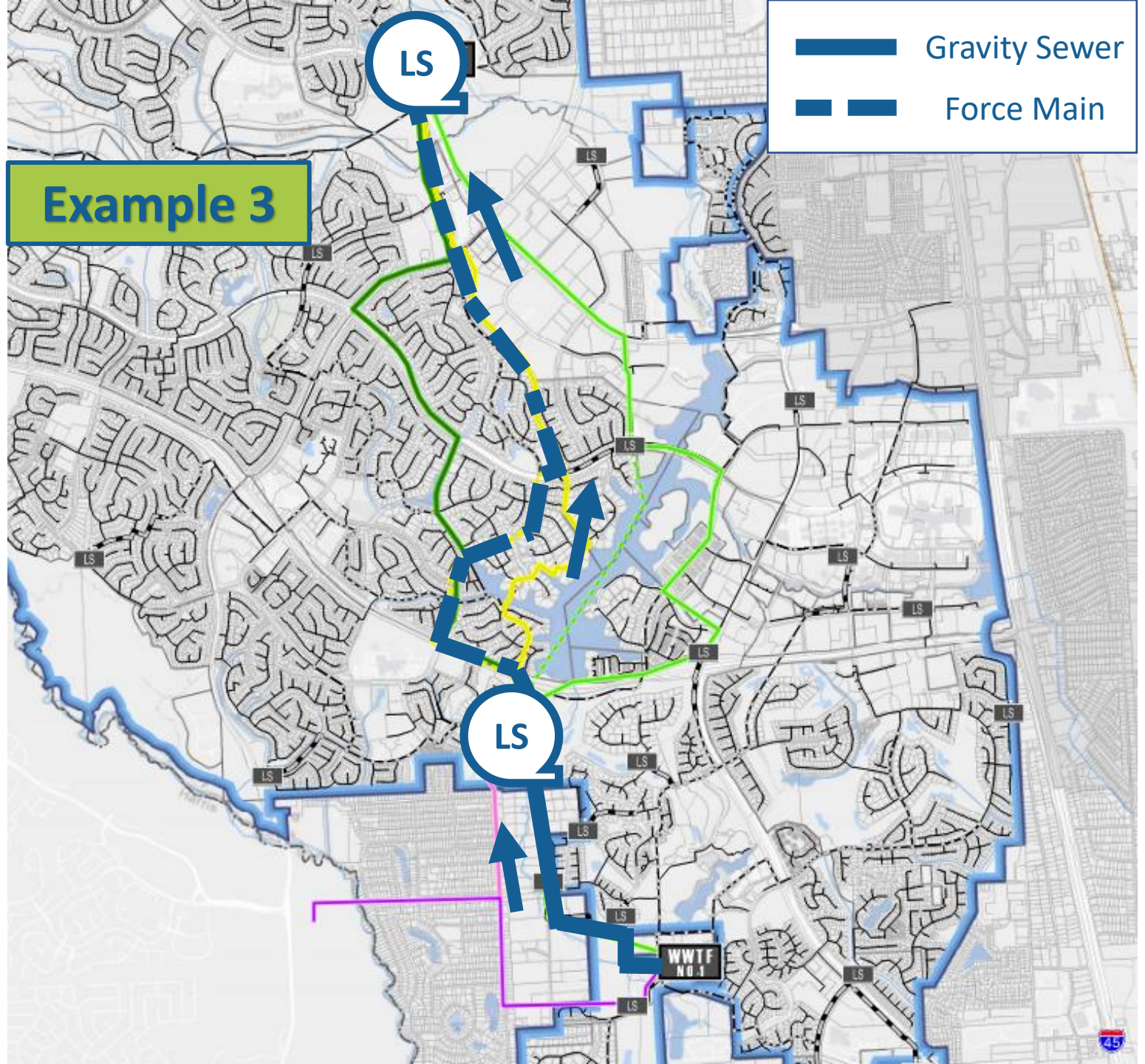
Pros/Cons of Conveyance Options



Pros/Cons of Conveyance Options

OPEN CUT

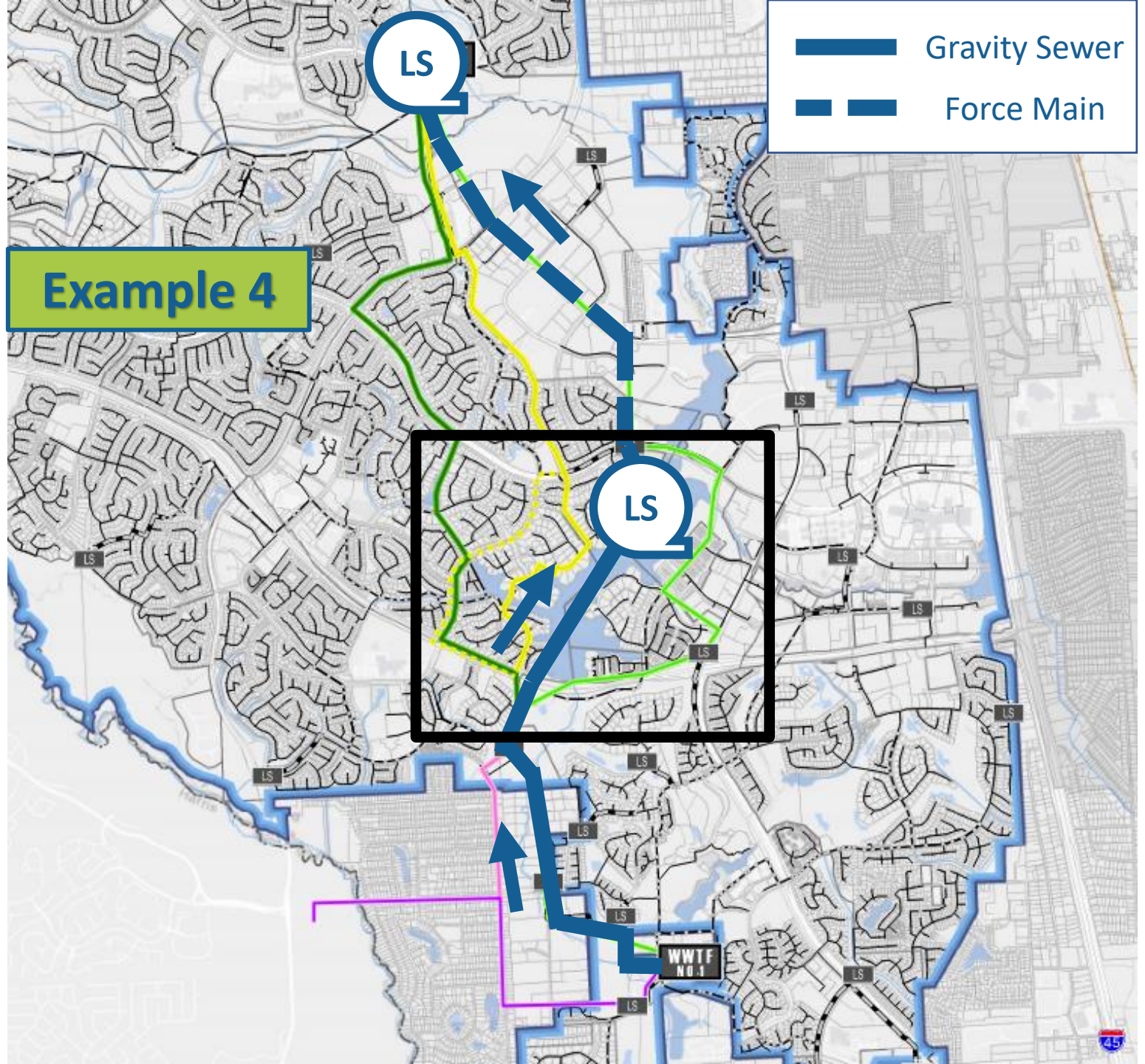
- Lower linear foot costs
- Accessibility
- Traffic impacts



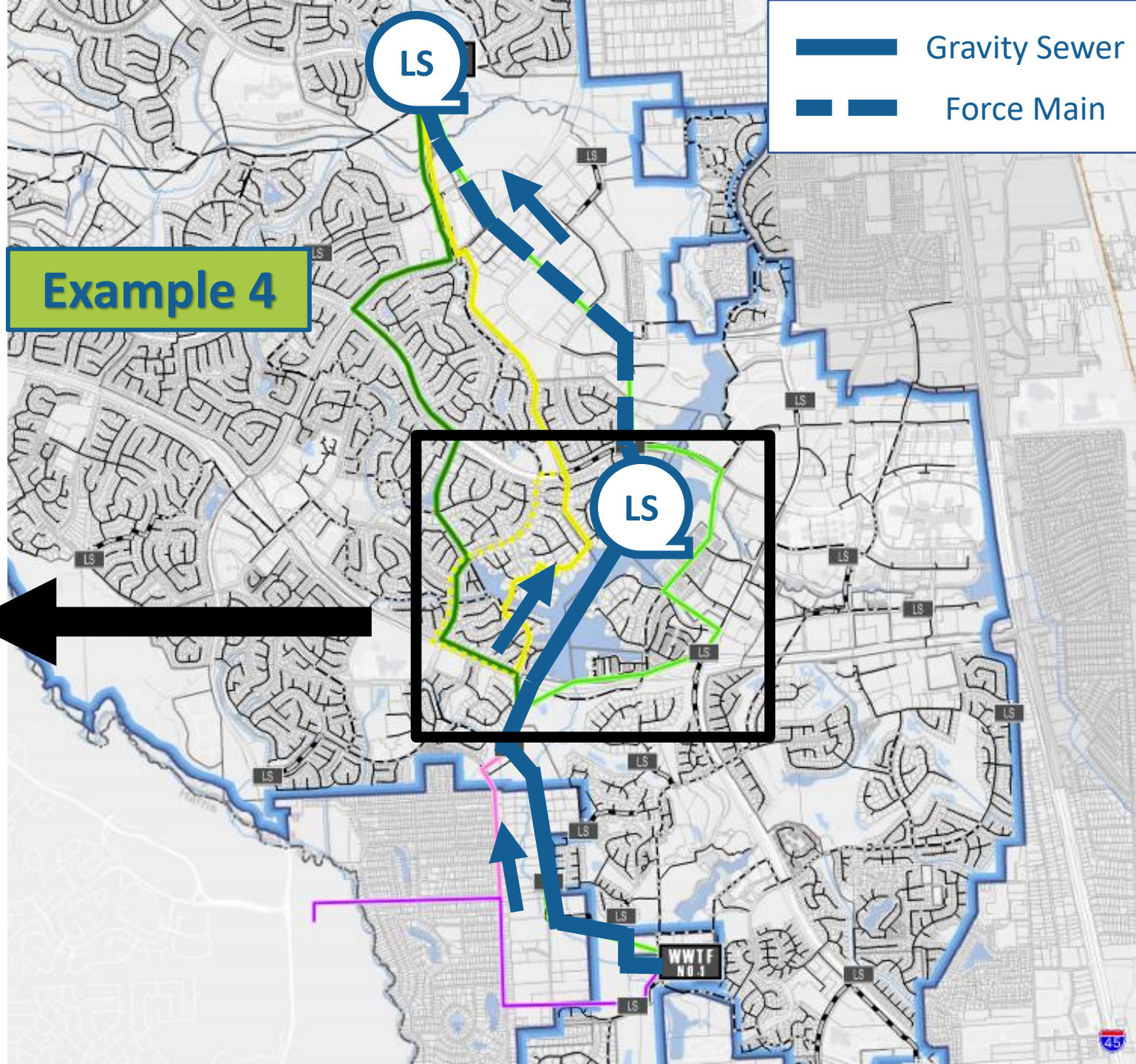
Pros/Cons of Conveyance Options

Tunnels

- Lift Station Consolidation
- Reduced Length
- Fewer Easements



Pros/Cons of Conveyance Options



Example 4

Approach to Treatment Alternatives

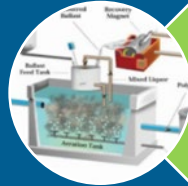
- Determine consolidated design loads
- Confirm capacity of existing basins
- Determine additional capacity required
- Assume conventional treatment
- Contract includes contingency for owner directed services for additional analysis when necessary



BNR



SBR



Ballasted Floc



IFAS



MBR



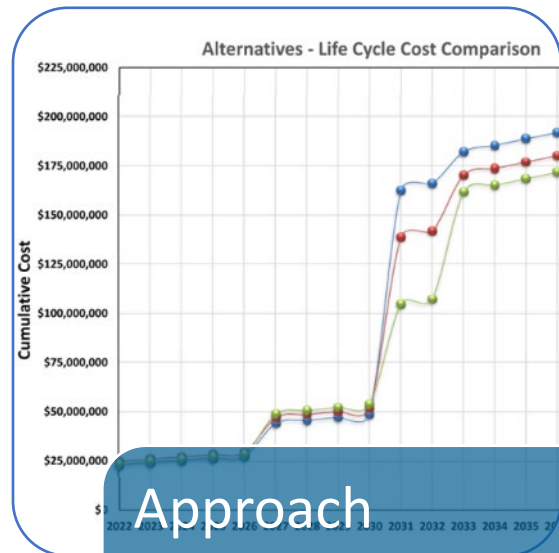
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Task 4 – Analyze Alternatives



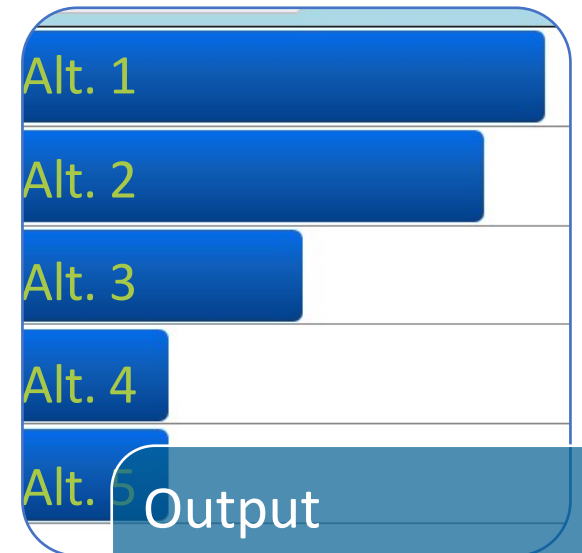
Goal

- Deeper dive into costs and benefits of short-listed alternatives



Approach

- Life-cycle cost analysis
- Weighted analysis of non-cost factors



Output

- Preliminary scoring of alternatives based on best overall value

Important Project Aspect: Determining best overall value



- Best overall value may have higher capital cost

Challenge

Best Practices

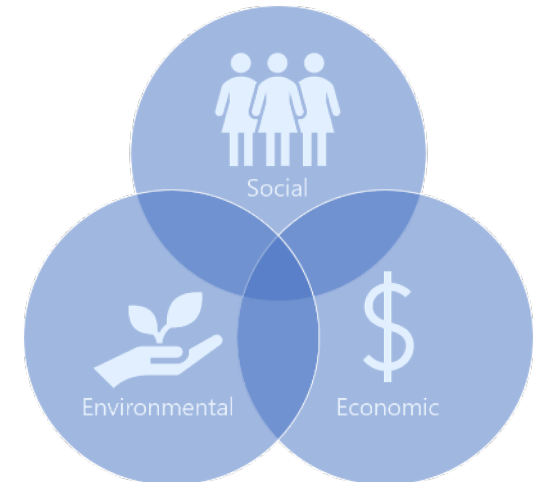
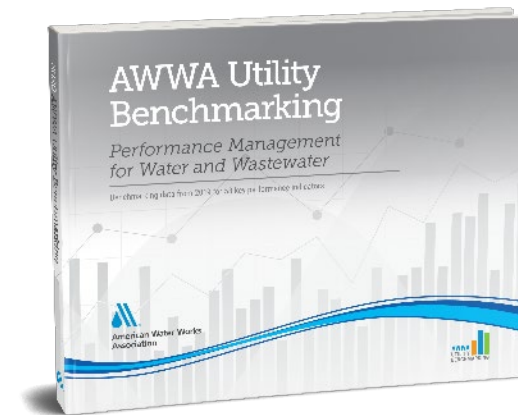
- Incorporate non-cost factors
- Develop Weighted Selection Criteria



Available Resources for Alternatives Analysis

- Metrics
 - AWWA Utility Benchmarking
 - Envision™
- Tools
 - Triple Bottom Line Analysis
 - Envision™ Rating System
- Technology
 - Metroquest
 - PowerBI

THE ENVISION™ RATING SYSTEM



Triple Bottom Line



Consideration of Non-cost Factors

- Possible Factors:

- Noise and odor nuisance reduction
- Traffic disruptions
- Resiliency and reliability
- Ease of use and operation
- Effluent quality and adaption to future reuse

Weighted Decision Matrix - Example

Criteria	Weighting	Alternative 1	Alternative 2
Cost	0.5	8	6
Odor reduction	0.1	4	8
Traffic Disruption	0.1	3	9
Resiliency	0.2	6	7
Ease of Use	0.05	7	6
Effluent Quality	0.05	6	8
Total Score		6.55	6.8

Example

Task 5 – Report Development and Finalization



Goal

- Achieve final buy-in from stakeholders and document results



Approach

- Workshops
- Incorporate feedback



Output

- Final scoring of alternatives
- Phase 1 Report

Project Process



We are here

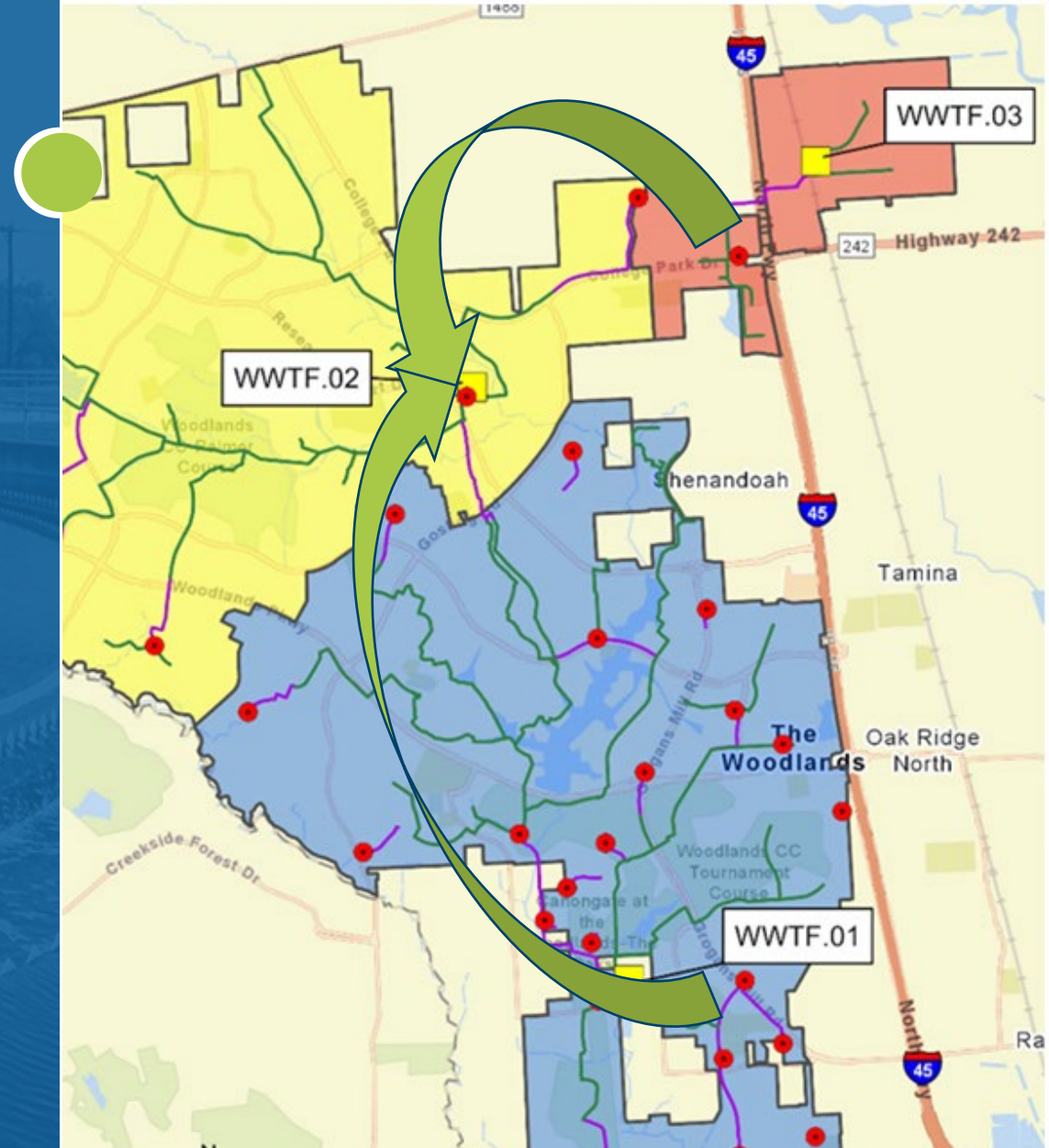


Conclusion

Schedule, Key Take-aways, Q&A

Key Take-Aways

1. SJRA is committed to developing the most sustainable vision for serving The Woodlands
2. A phased approach will be used to “right-size” the level of analysis
3. Strategies may include:
 - Renewal in place and/or consolidation,
 - Traditional and/or innovative conveyance and treatment methods
4. Stakeholder engagement will be critical to success
5. >\$100M investment will be required to maintain service regardless of the alternative selected



Questions?