AGENDA STATEMENT

City of Bellaire

MEETING: City Council - Apr 21 2025
PREPARED BY: Beth Jones
DEPARTMENT: City Manager's Office

ITEM TITLE:

Presentation of the Cost Estimate Refinement Technical Memorandum prepared by HDR Engineering, Inc. for the City of Bellaire's Wastewater Treatment Plant and Bellaire Lift Station - Submitted by Beth Jones, Assistant City Manager and City Engineer.

RECOMMENDATION:

Beth Jones, Assistant City Manager/City Engineer, recommends that City Council receive the report and provide feedback as appropriate.

BACKGROUND/SUMMARY:

On December 9, 2024, HDR Engineering, Inc. ("HDR") presented its Final Report for the Facilities Condition Assessment of the Wastewater Treatment Plant and Lift Stations dated October 24, 2024. The presentation addressed the condition of the City's wastewater facilities, facility needs, alternative paths to meeting those needs, and the estimated costs associated with each alternative. After receiving feedback from City Council, staff proposed, and City Council authorized, a second scope of work ("Work Order No. 2") to further refine cost estimates for several wastewater treatment options and the Bellaire Lift Station. Pursuant to Work Order No. 2, HDR explored and provided refined cost estimates for design and construction of the following wastewater treatment options:

Option 1: rehab/rebuild the existing wastewater treatment plant ("WWTP") on the existing site
Option 2: build a new WWTP on the adjacent site
Option 3: decommission the existing WWTP and tie into Houston's Southwest WWTP

HDR will present its refined cost estimates for all three options, and staff will present additional information for City Council's consideration when evaluating each option. A table summarizing the estimated costs and additional information recommended for consideration is below.

	Option 1	Option 2	Option 3
Project scope	Rehab/replace on existing site	New construction on adjacent site	Decommission and connect to COH
Estimated time to complete project	3.5 years	3.5 years	2.5 years
Investment needed in existing WWTP until project complete	$1.6M	$1.6M	$655K
Engineering + construction cost	$105.4M	$130.1M	$4.77M
One-time impact fee	N/A	N/A	$6.04M

Total initial cost	**$107M**	**$131.7M**	**$11.48M**
Capital set-aside (annual)	$3.16M/year	$3.90M/year	N/A
Treatment Cost	$14.52/1,000 gallons	$16.78/1,000 gallons	$1.95/1,000 gallons
Stormwater detention	10 acre-feet	32 acre-feet	50 acre-feet + 110 acre-feet
Odor mitigation & TCEQ variance	Required	Required	N/A
Greenspace/parks	2.1 acres	4.4 acres	6.6 acres + 10.4 acres

Table notes:

- One-time impact fee is calculated as follows: $11,176,480.16 (fee) - $5,140,000 (Ruffino credit) = $6,036,480.16.
- Capital set-aside is based on 3% of the initial capital cost. Three percent is industry best practice as confirmed by HDR and Willdan Services.
- Cost estimates are based on the HDR report, City of Bellaire budget, and City of Houston published fee schedule.
- Stormwater detention volumes are estimated to increase by 117 ac-ft with the acquisition of three parcels owned by the City of Houston (to become the "South Basin"). The total maximum volume for detention with the City of Bellaire's WWTP and PW parcels (to become the "North Basin") and South Basin is estimated to be 160-170 ac-ft.

PREVIOUS COUNCIL ACTION:

On December 9, 2024, City Council received the Final Report for the Facilities Condition Assessment of the Wastewater Treatment Plant and Lift Stations dated October 24, 2024, presented by HDR.

CITY ATTORNEY REVIEW:

☐ **Yes** ☑ **No**

Wastewater Treatment Options

APRIL 21, 2025

Agenda

1. Scope of HDR Work Order #2
2. Assumptions in Cost Estimates
3. Cost Factors
4. Refined Cost Estimates and Discussion
5. Other Considerations
6. Houston Southwest Wastewater Treatment Plant
7. Summary and Discussion of Treatment Options

HDR Work Order No. 2 Scope

Provide refined Class 5 cost estimates for:

Option 1: Rehabilitate/replace WWTP on existing site

Option 2: Build new WWTP on adjacent site

Option 3: Decommission WWTP, build force main, and connect to City of Houston WWTP

Required: New Bellaire Lift Station

Assumptions

Capacity: Average Daily Flow 2.5 MGD - Two Hour Peak Flow 6.25 MGD

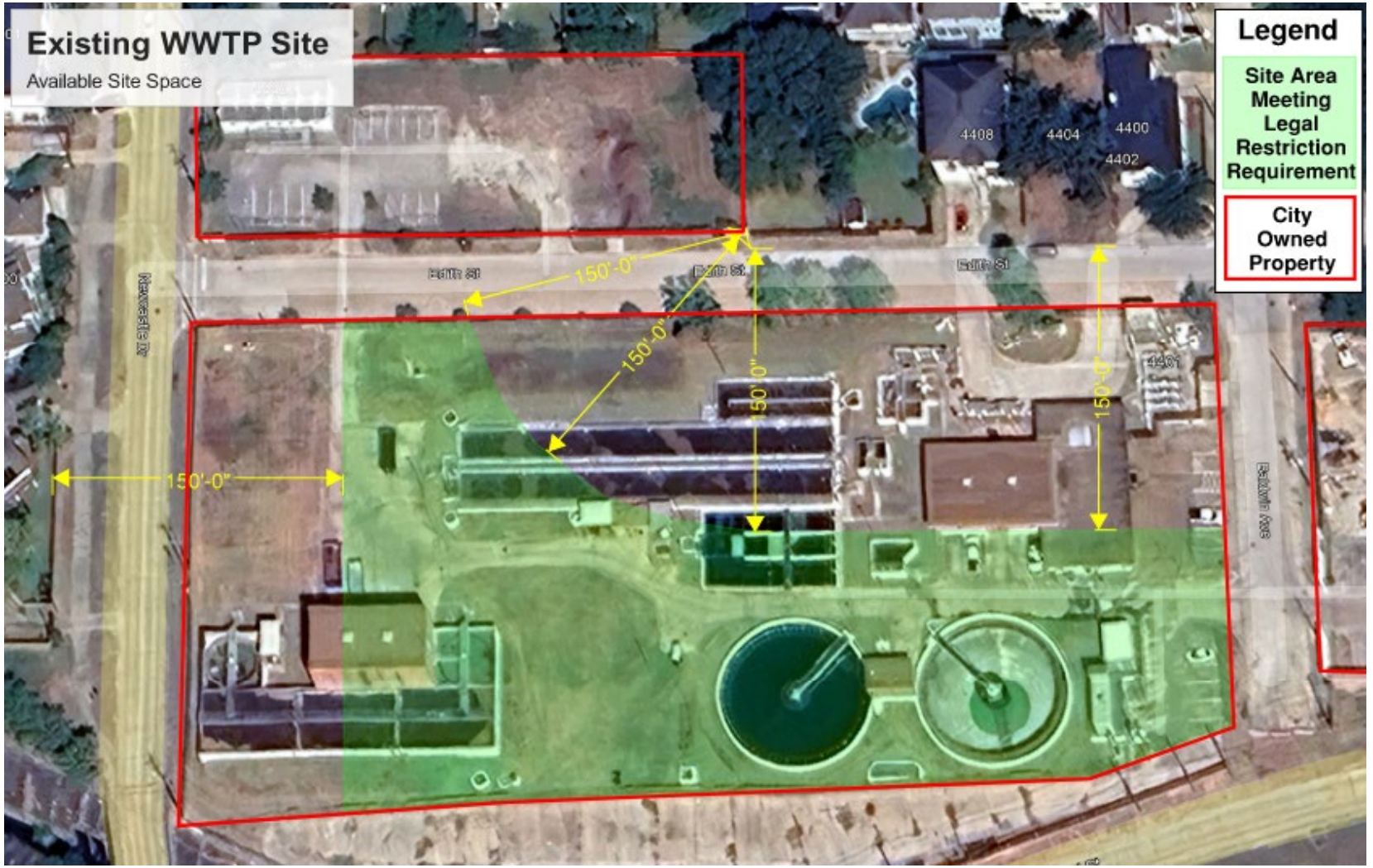
Major project components include:

- New headworks with odor control system
- Conventional activated sludge (MLE process) including new concrete basins
- Major upgrades to secondary clarifiers
- New disinfection system including new concrete basin
- Major upgrades to solids handling system

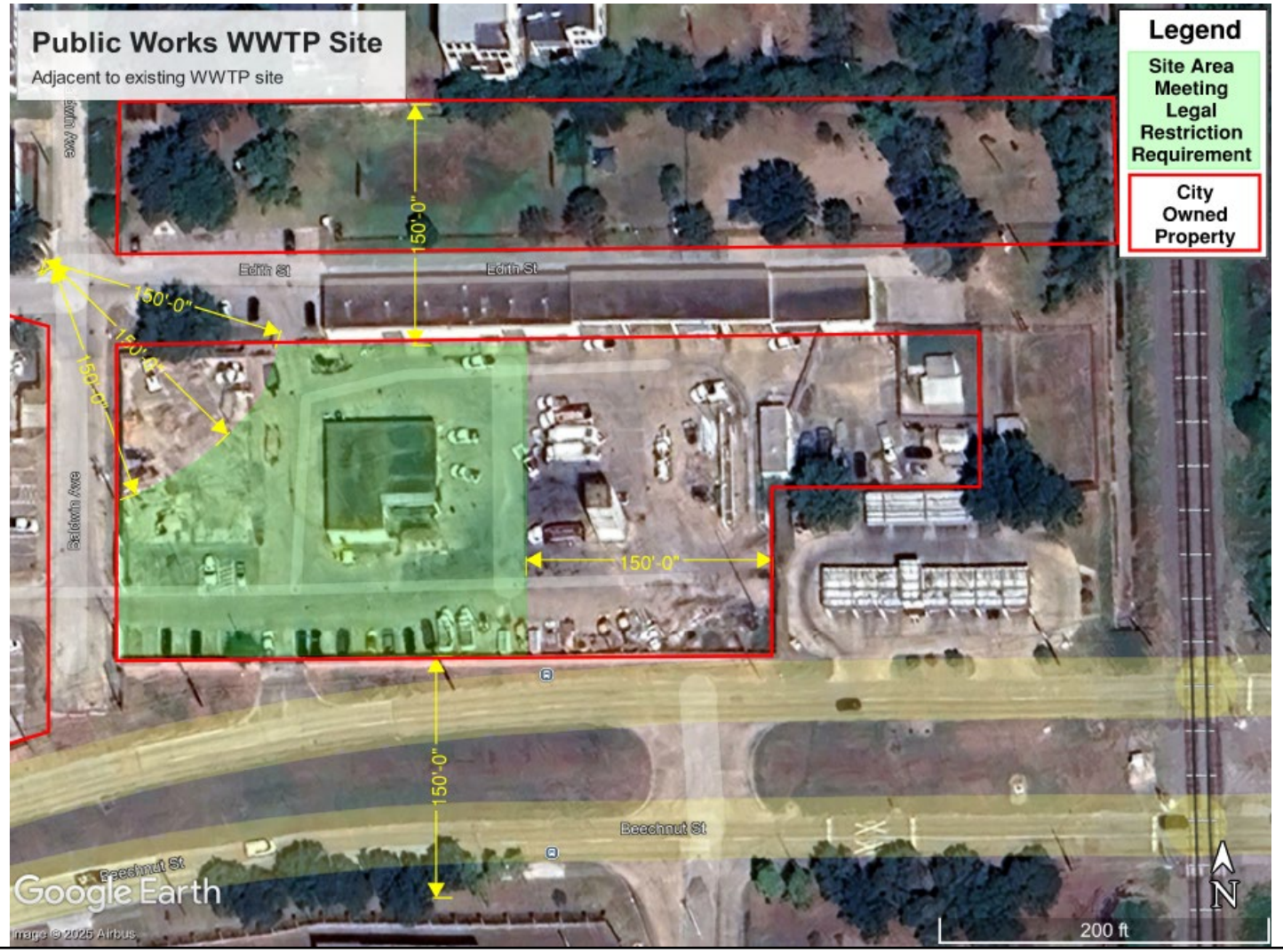
Cannot meet TCEQ buffer requirement of 150’ to property line, so must have:

- Odor Control Plan
- Variance approved by TCEQ

TCEQ 150 Foot Buffer Zone – Option 1



TCEQ 150 Foot Buffer Zone – Option 2



Cost Factors

Both existing site and adjacent site are constrained

- Limited space
- TCEQ buffer requirement
- Floodplain covers most of the sites

Result: Increases in construction cost and timeline due to staging

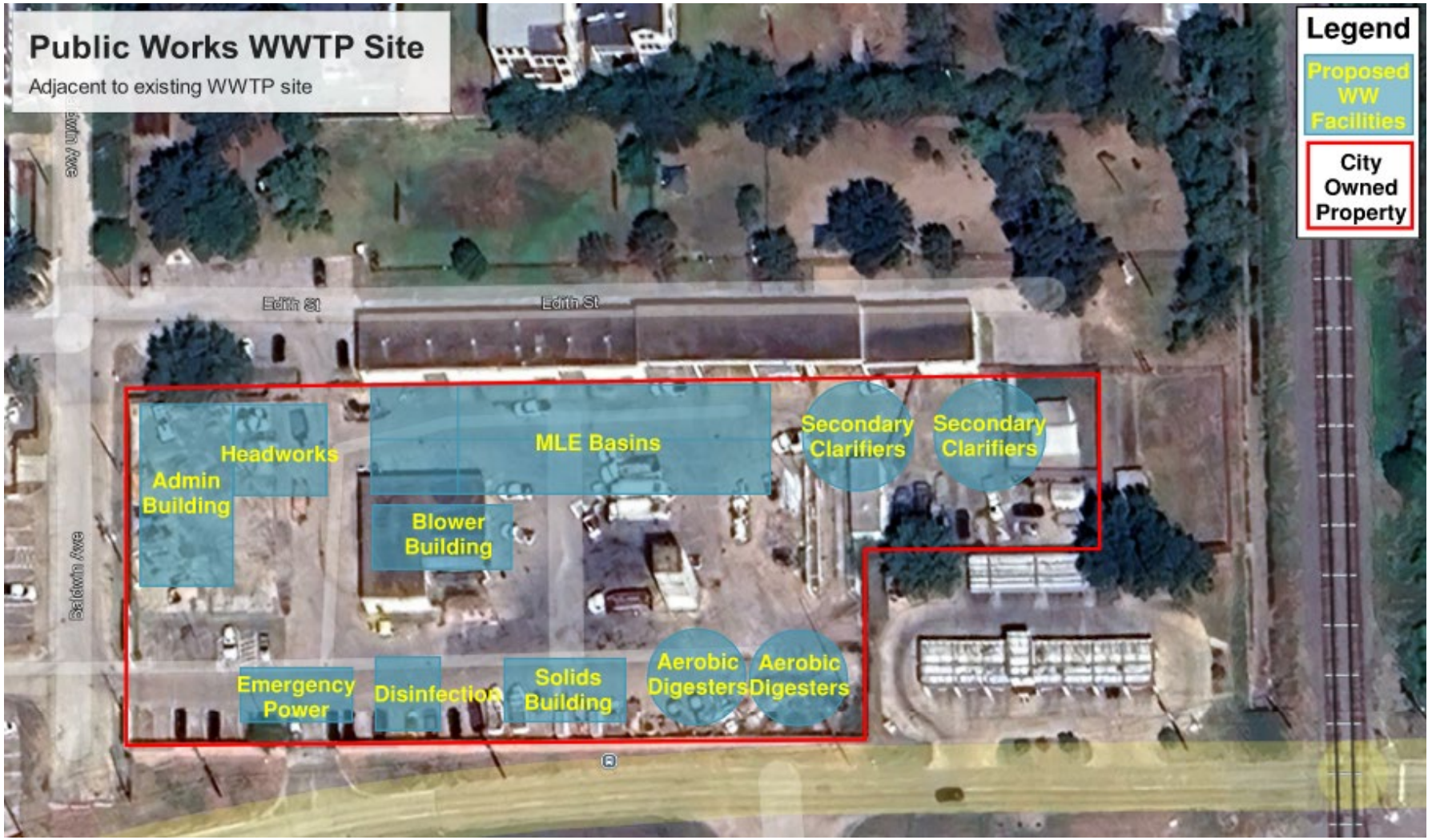
The WWTP is small when compared with others

- Less opportunity for economy of scale
- Potential for fewer construction bids

Result: Increases construction cost on a unit basis ($ per million gallons)

Recommended Capital Improvements – Option 1

Recommended Capital Improvements – Option 2



Updated Installed Construction Costs (Construction plus Engineering)

Option 1 – Rehabilitate/replace WWTP on existing site

- $105.4 million

Option 2 – Build new WWTP on adjacent site

- $130.1 million

Option 3 – Decommission WWTP, new force main, connect to City of Houston WWTP

- $4.8 million (does not include impact fees)

Required: Replace Bellaire Lift Station

- $2.1 million (does not include land or easement acquisition)

Discussion of Items Impacting Refined Cost Estimates

Adjacent site is more expensive

- Existing site to reuse digesters, solids handling building, clarifier structures

Updated cost estimates are slightly higher than in initial report

- Due primarily to more precise costs for temporary plant and odor control facilities

Higher Unit Cost ($/MGD) comparison to other projects

- Mainly due to 1) small site adjacent to residential, 2) raising above floodplain, 3) temporary plant, 4) replacement of old concrete basins, and 5) odor control facilities

- **Cost analysis: Decommission and connect to City of Houston is the least expensive.**

Discussion of Results of Work Order #2

Option 1 – Rehabilitate/replace WWTP on existing site

- $105.4 million

Option 2 – Build new WWTP on adjacent site

- $130.1 million

Option 3 – Decommission WWTP, new force main, connect to City of Houston WWTP

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Required: Replace Bellaire Lift Station

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Option 1: Other Considerations

- 3.5 years to design and construct
- $1.6M repairs to existing WWTP (estimated)
- $3.16M annual capital set aside
- 10 ac-ft of detention available for Cypress Ditch (challenges hydraulicly)
- Creates uncertainty re: viability of Houston land swap and associated 110 ac-ft of detention
- Units will be elevated several feet above the existing units

Option 2: Other Considerations

- 3.5 years to design and construct
- $1.6M repairs to existing WWTP (estimated)
- $3.90M annual capital set aside
- 32 ac-ft of detention available for Cypress Ditch
- Creates uncertainty re: viability of Houston land swap and associated 110 ac-ft of detention
- Units will be elevated several feet above the existing units

Option 3: Other Considerations

- 2.5 years to design and construct
- $665k repairs to existing WWTP (estimated)
- 50 ac-ft of detention available for Cypress Ditch
- Allows for Houston land swap and associated 110 ac-ft of detention
- Allows for maximum Cypress Ditch capacity
- 6.6 acres of greenspace

Additional Factors

Operator Market

- Hiring/retaining in-house staff
- Cost of contract operations

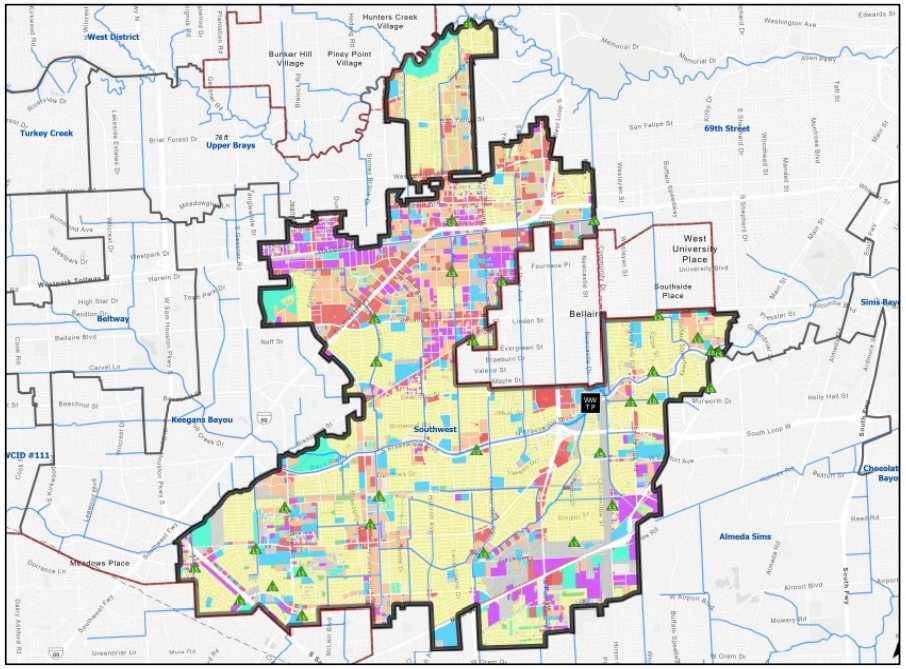
Regulatory liability with WWTP

- Permit requirements only getting more stringent

Aesthetics of new or rehabbed WWTP

Improving drainage in the City

City of Houston Southwest WWTP



- Permitted to 60MGD, operating at 41MGD
- Constructed in 1960s, major rehab in 1986, major rehab scheduled for the next 5-7 years will return plant to 60MGD ($250-350M)
- Expenditures already in existing rates
- Consent Decree ensures investment
- Bellaire flows negligible

Conceptual Comparison of Treatment Costs

Bellaire

- FY 2025 cost = $2.44/1,000 gal
- Issuing $105.4M in debt will increase cost to $14.52/1,000 gal (estimated)
- Issuing $130.1M in debt will increase cost to $16.78/1,000 gal (estimated)

Houston

FY 2025 cost = $1.90/1,000 gal

- Escalates by CPI; adopted annually in Houston Master Fee Schedule
- Cost for major rehab of Southwest WWTP already considered in current rate structure
- Rate will be updated following cost of service study

Summary and Discussion of Treatment Options

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- Capital set-aside is based on 3% of the initial capital cost and is industry best practice as confirmed by HDR and Willdan Services
- All costs estimated based on HDR report, City of Bellaire budget, City of Houston published fee schedule
- Stormwater detention volumes will be increased by approx. 110 ac-ft with acquisition of City of Houston parcels that would become the South Basin. The total maximum volume for detention with the North Basin and South Basin is between 160-170 ac-ft.

Wastewater Treatment Options

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