Planning The Growth Of The City's Roadway, Water, Stormwater, And Wastewater Systems

TACWA

Jake Powell, PE and Kim Keefer, PE
January 27, 2023

Water Resources | Transportation | Land Development | Surveying | Environmental

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Agenda

- A Brief History
- System Requirements
- Growth
- Transportation
- Water
- Wastewater
- Stormwater
- Next Steps

A Brief History

A brief history- Funding

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Roads	Water	Wastewater	Stormwater
• Bond Projects • Reimbursements to Developers	• Trust Fund- reimbursement to developers • Revenue-backed bonds	• Trust Fund- reimbursement to developer • Revenue-backed bonds	• Developer only

System Requirements

A brief history- Improvements

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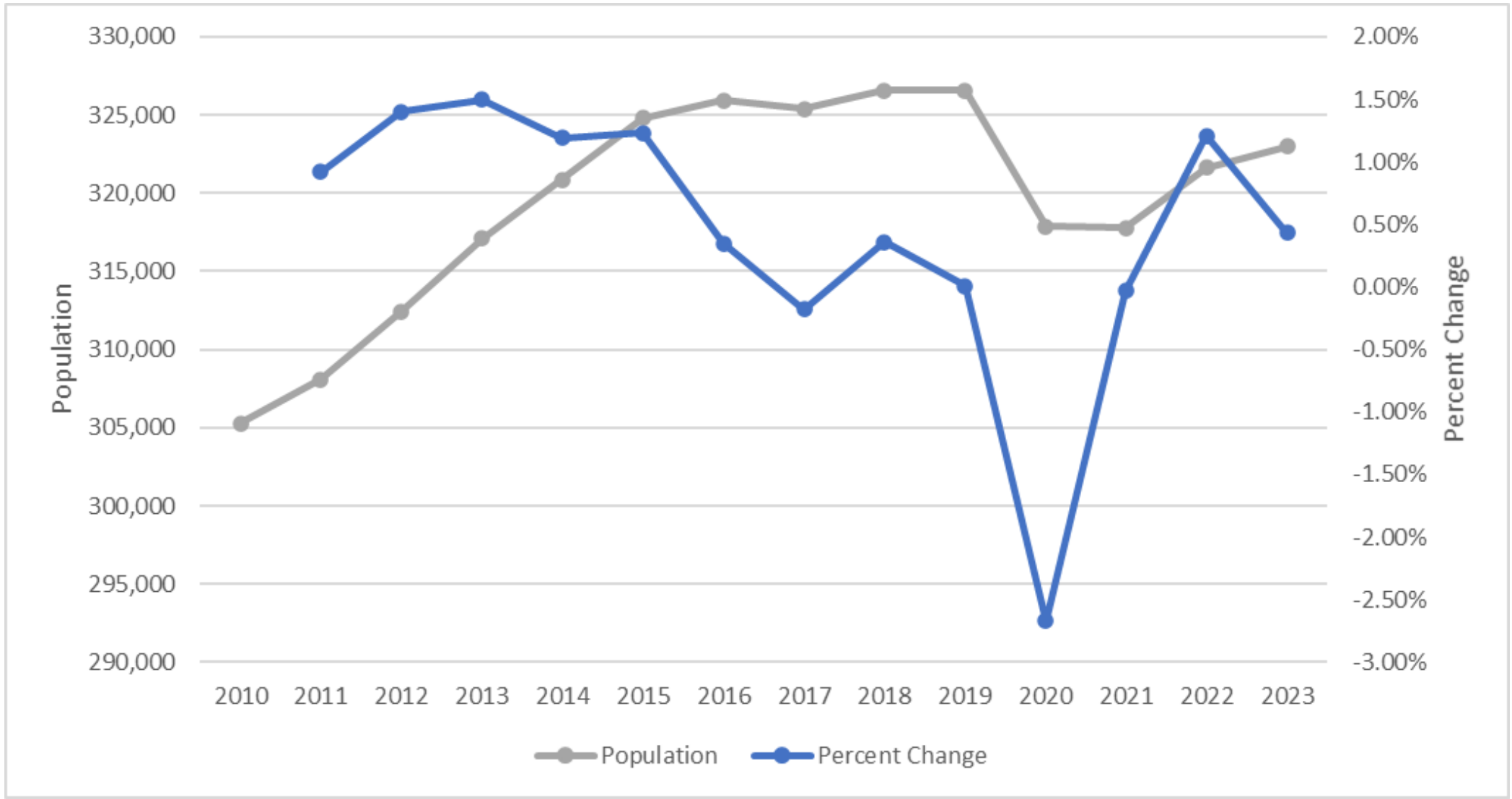
Roads	Water	Wastewater	Stormwater
• Inside City Limits	• Inside ETJ	• Inside ETJ	• Inside Service Area (drainage basin)

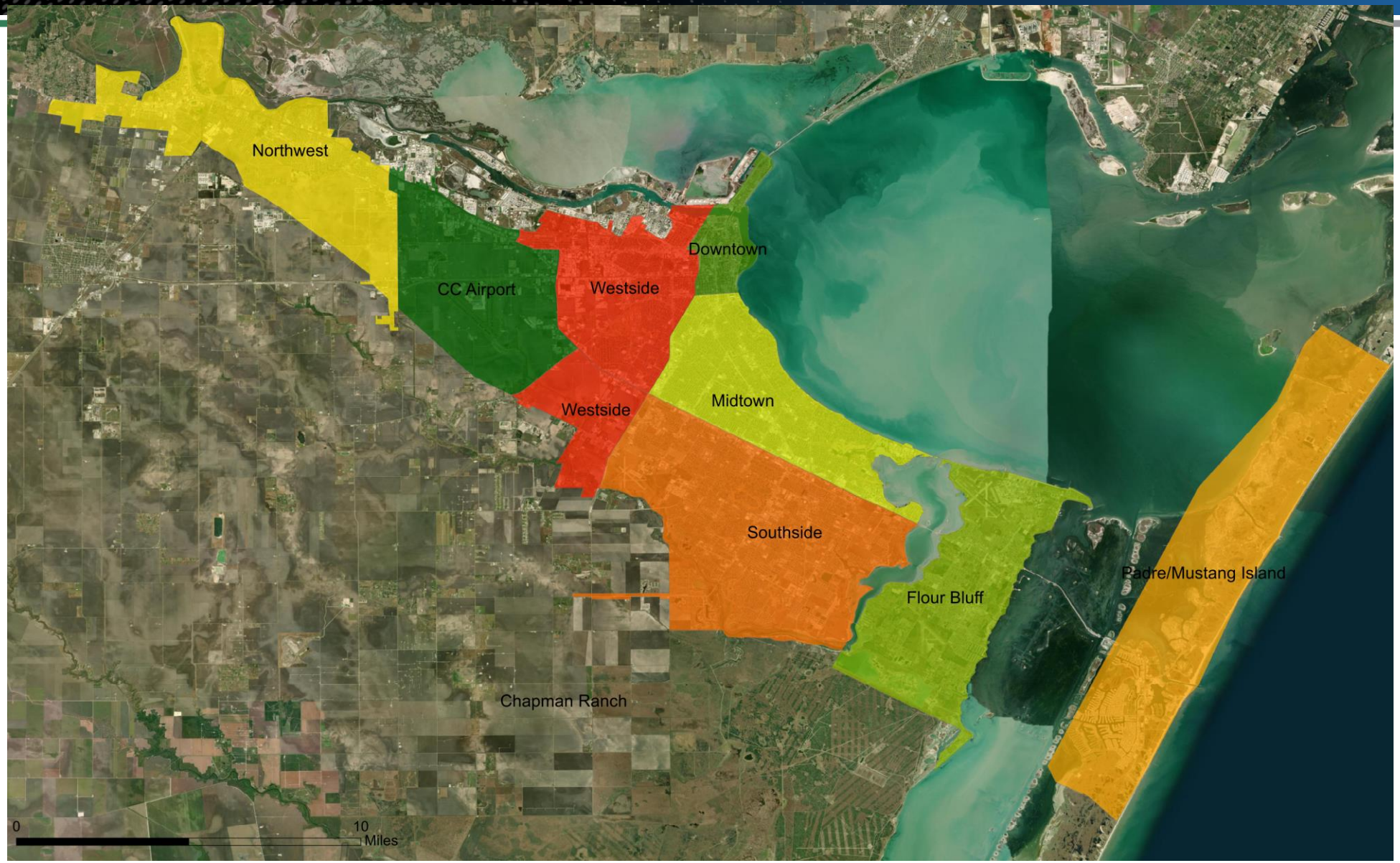
Growth

Growth- Historical



Source : Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2019, 2020 US Census & 2021 estimates updated

Area Development Plans (ADPs)



Traffic Analysis

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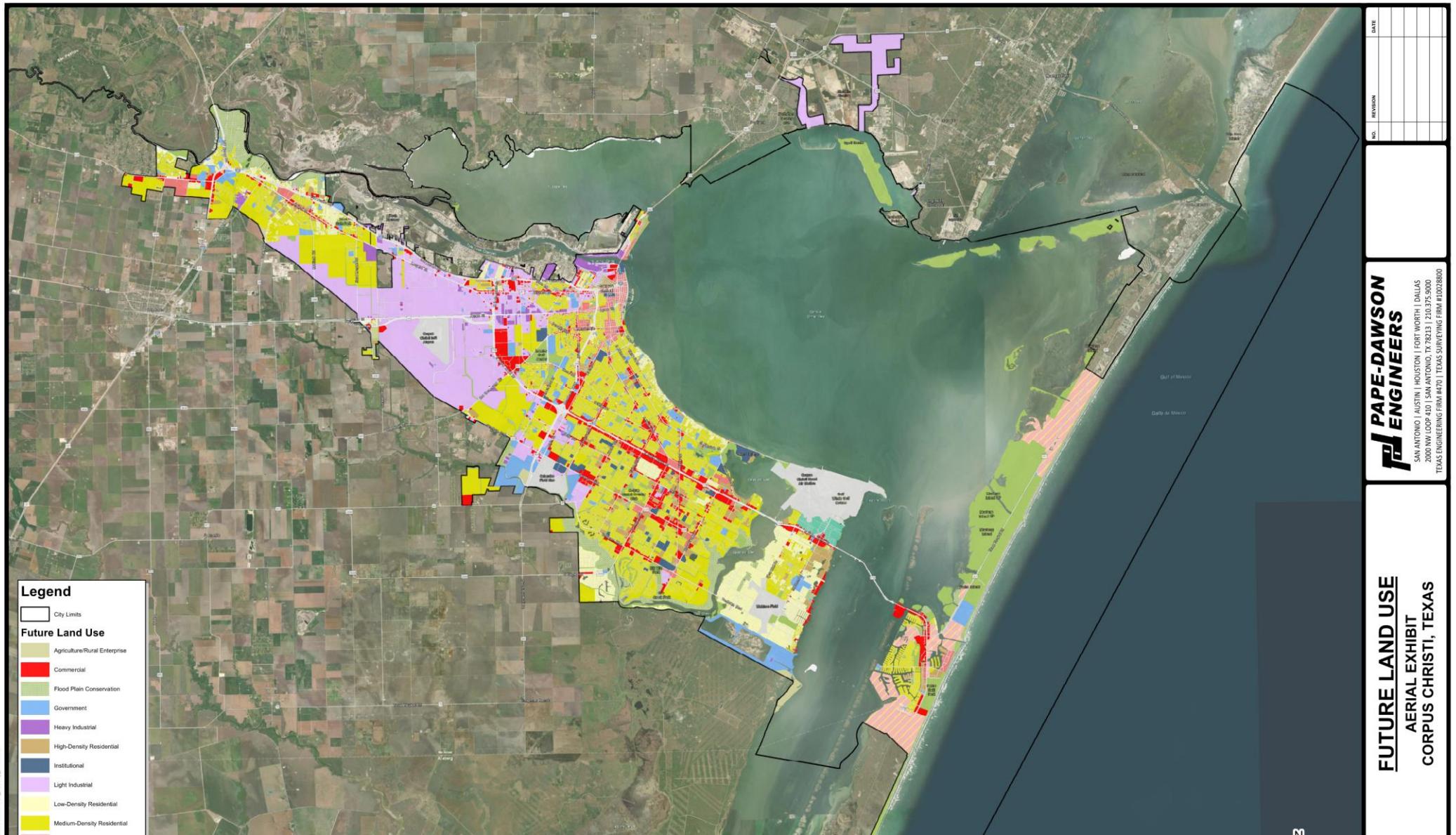
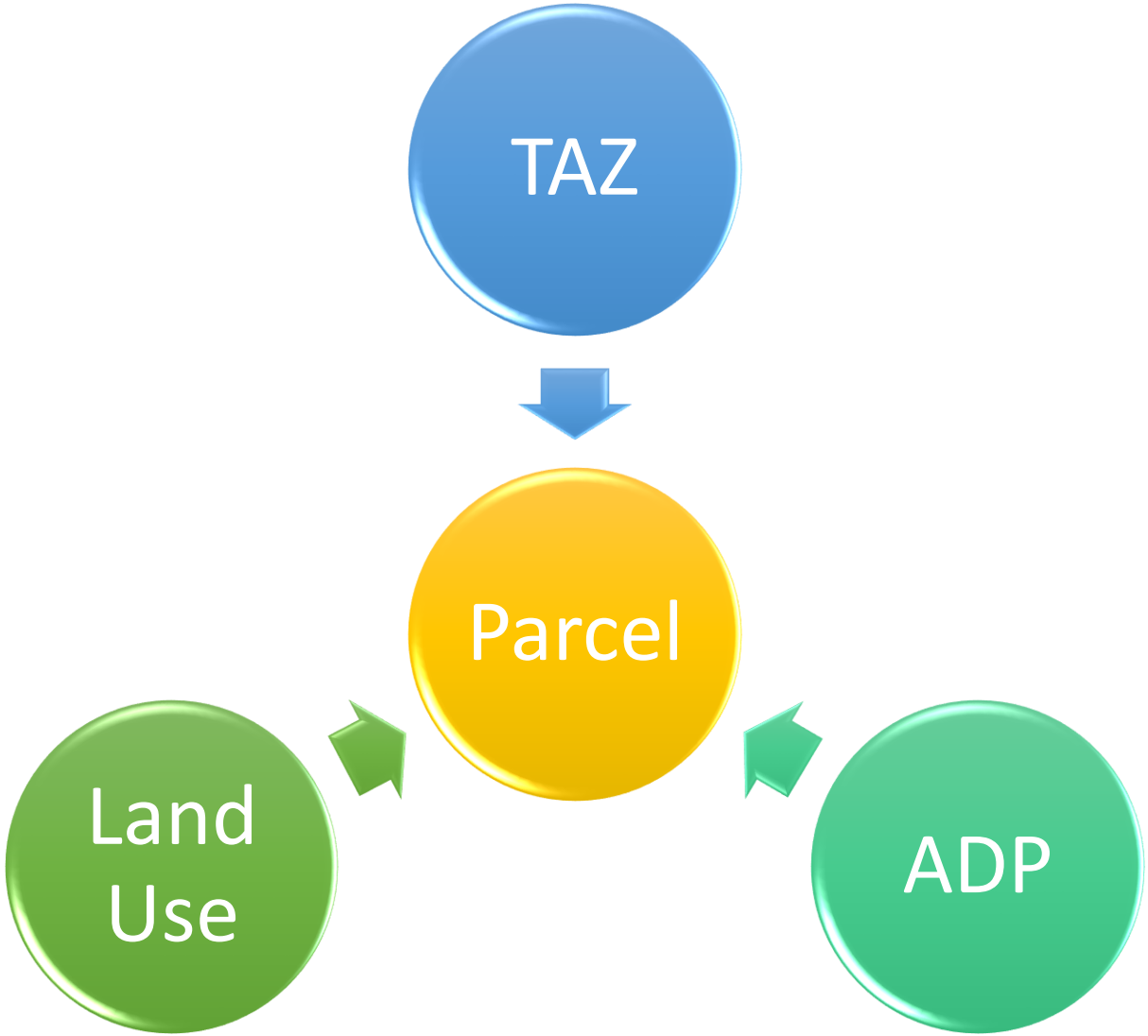
Land Use


Legend
City Limits
Future Land Use
Agriculture/Rural Enterprise
Commercial
Flood Plain Conservation
Government
Heavy Industrial
High-Density Residential
Institutional
Light Industrial
Low-Density Residential
Medium-Density Residential
NO.
REVISION
DATE
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800
FUTURE LAND USE
AERIAL EXHIBIT
CORPUS CHRISTI, TEXAS

Every Parcel



Growth- Near Term

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ADP	2021 Households	Assumed Growth Rate	2031 Households
CC Airport	1,582	0%	1,582
Downtown	3,794	2.0%	4,625
Flour Bluff	8,006	1.0%	8,844
Bayside	31,508	0.2%	32,144
Northwest	12,152	1.5%	14,103
Padre/Mustang Island	5,987	2.4%	7,589
Southside	41,601	2.0%	50,711
Westside	18,533	0.4%	19,288
London	5,012	7.2%	10,045
Calallen	1,310	1.5%	1,520
Total	129,485	1.6%	151,127

Growth- Near Term

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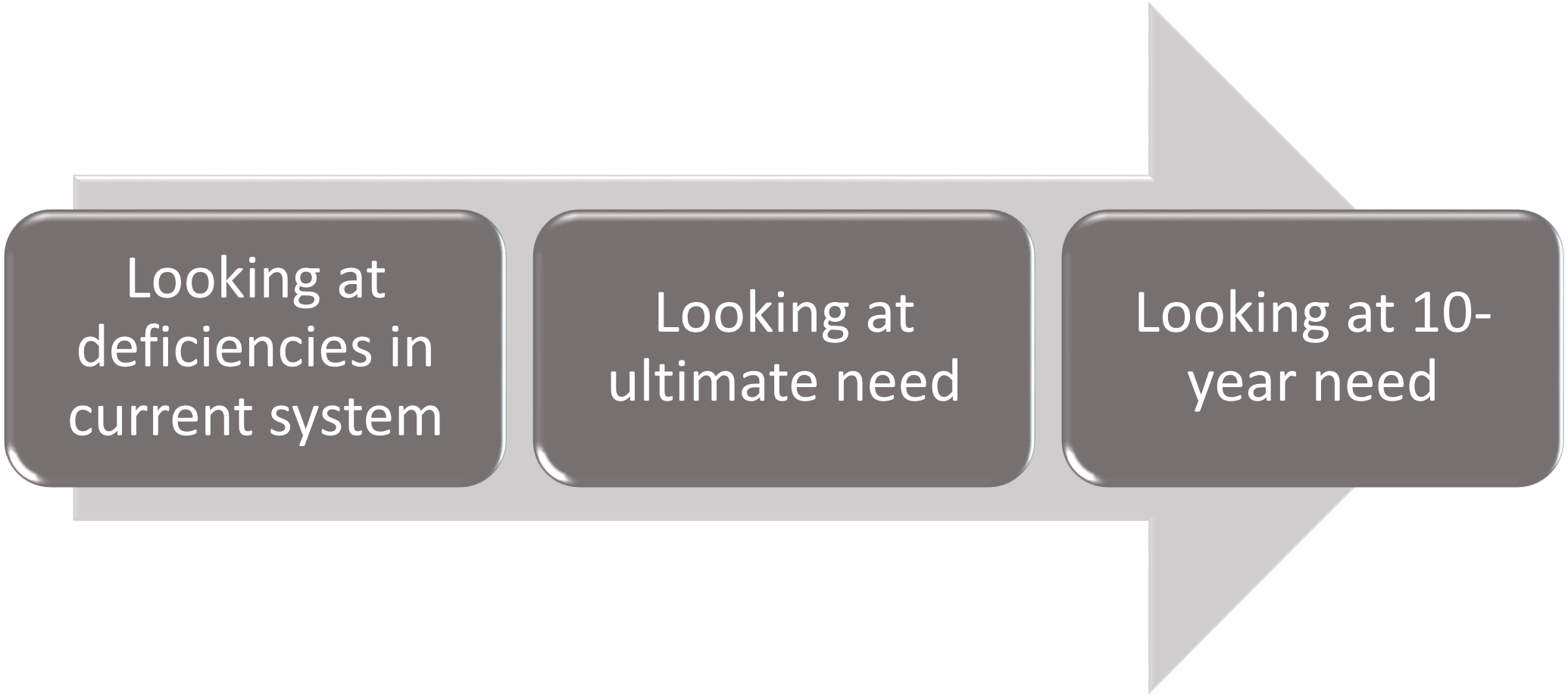
ADP	2021 Employees	2031 Employees	2031 Less 2021	Annual Growth in Employees
CC Airport	8,927	10,755	1,828	1.9%
Downtown	17,328	17,450	122	0.1%
Flour Bluff	11,725	12,077	352	0.3%
Bayside	25,887	26,342	455	0.2%
Northwest	11,536	13,307	1,771	1.4%
Padre/Mustang Island	2,666	3,431	765	2.6%
Southside	26,898	30,226	3,328	1.2%
Westside	31,253	33,767	2,514	0.8%
London	2,492	3,716	1,224	4.1%
Calallen	3,502	4,093	591	1.6%
Total	142,214	155,164	12,950	0.9%

Transportation

Transportation



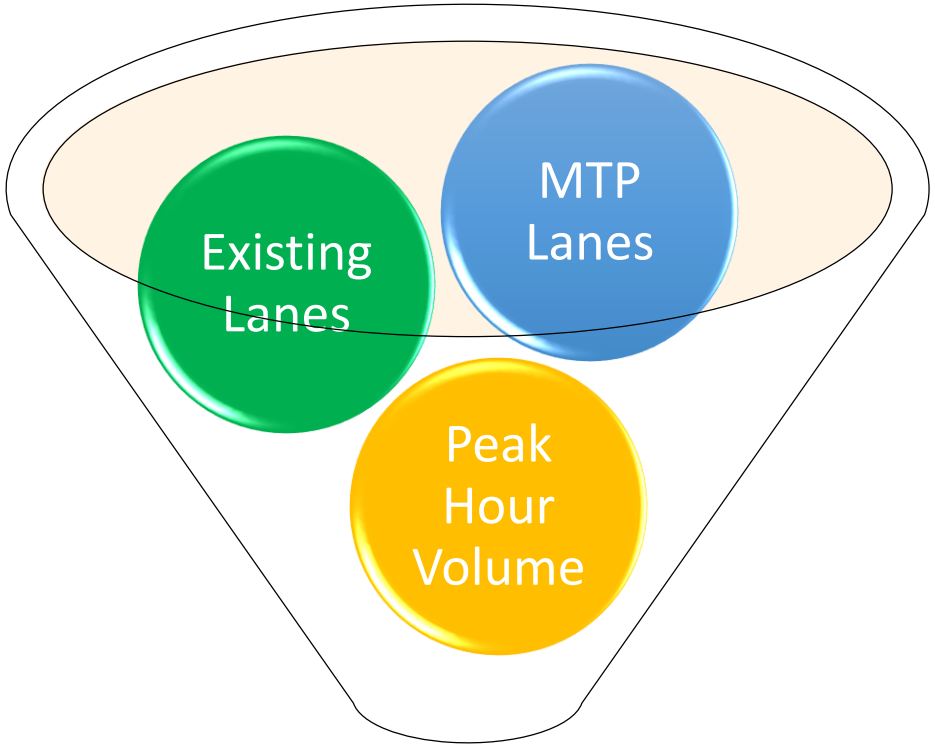
Transportation

- Roadways
  - → Capacities
  - → Cross-sections
  - → Trip Counts
- Intersections
- Conformance across all City documents
- Total service areas = 21

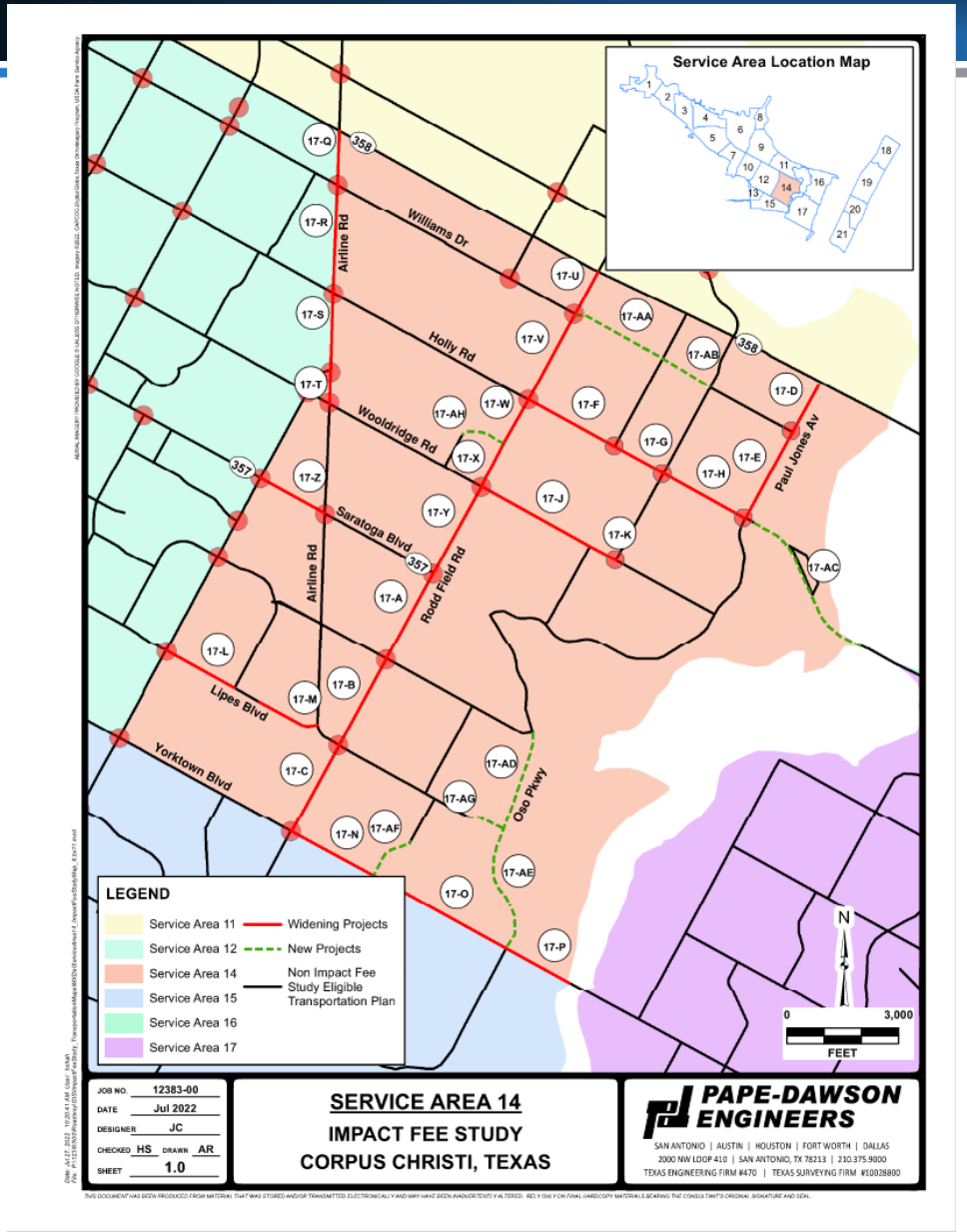
Transportation

- Improvements combined into subservices areas
- Subservice areas cannot be larger than 6 miles

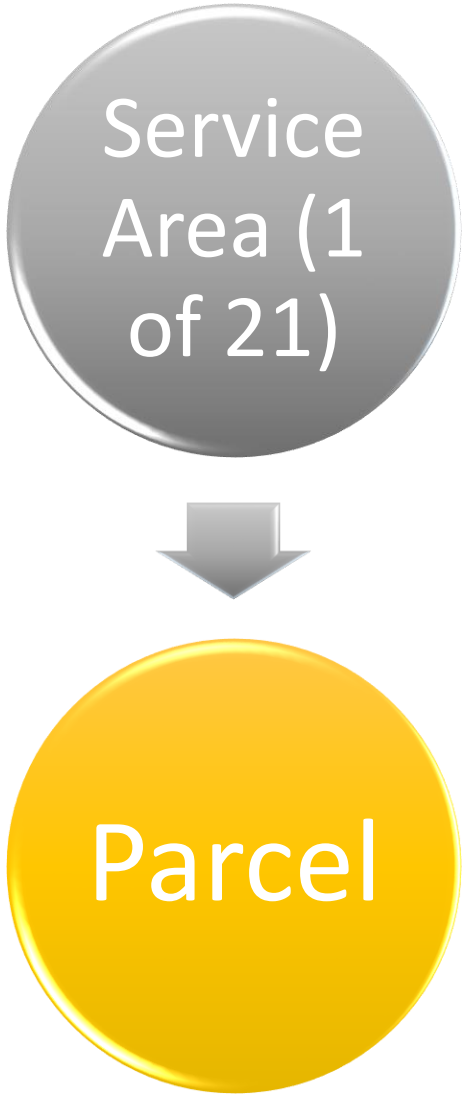
Transportation



Projects



Every Parcel



Water

Water

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Looking at deficiencies in current system

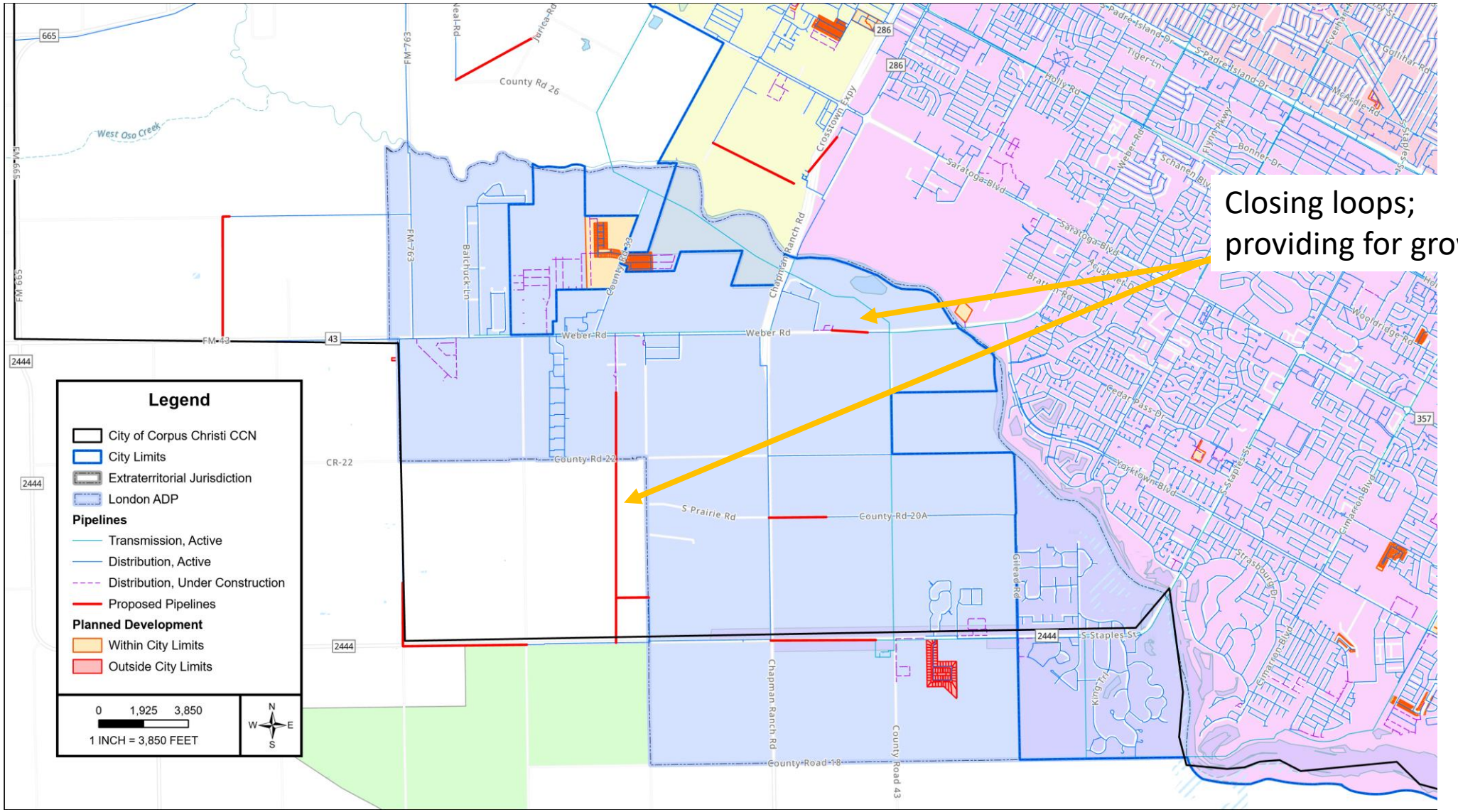
Looking at additive deficiencies with 10-year growth

Looking at how to serve future areas

Water

- Compliance with TCEQ Chapter 290 requirements
  - → Pipes
  - → ESTs
  - → Storage
  - → Pressure
- Closing Loops (reducing water loss due to pipe flushing)
- Adding new areas
- Total service areas= 2

Water



Closing loops;
providing for growth

Every Parcel

Wastewater

Wastewater

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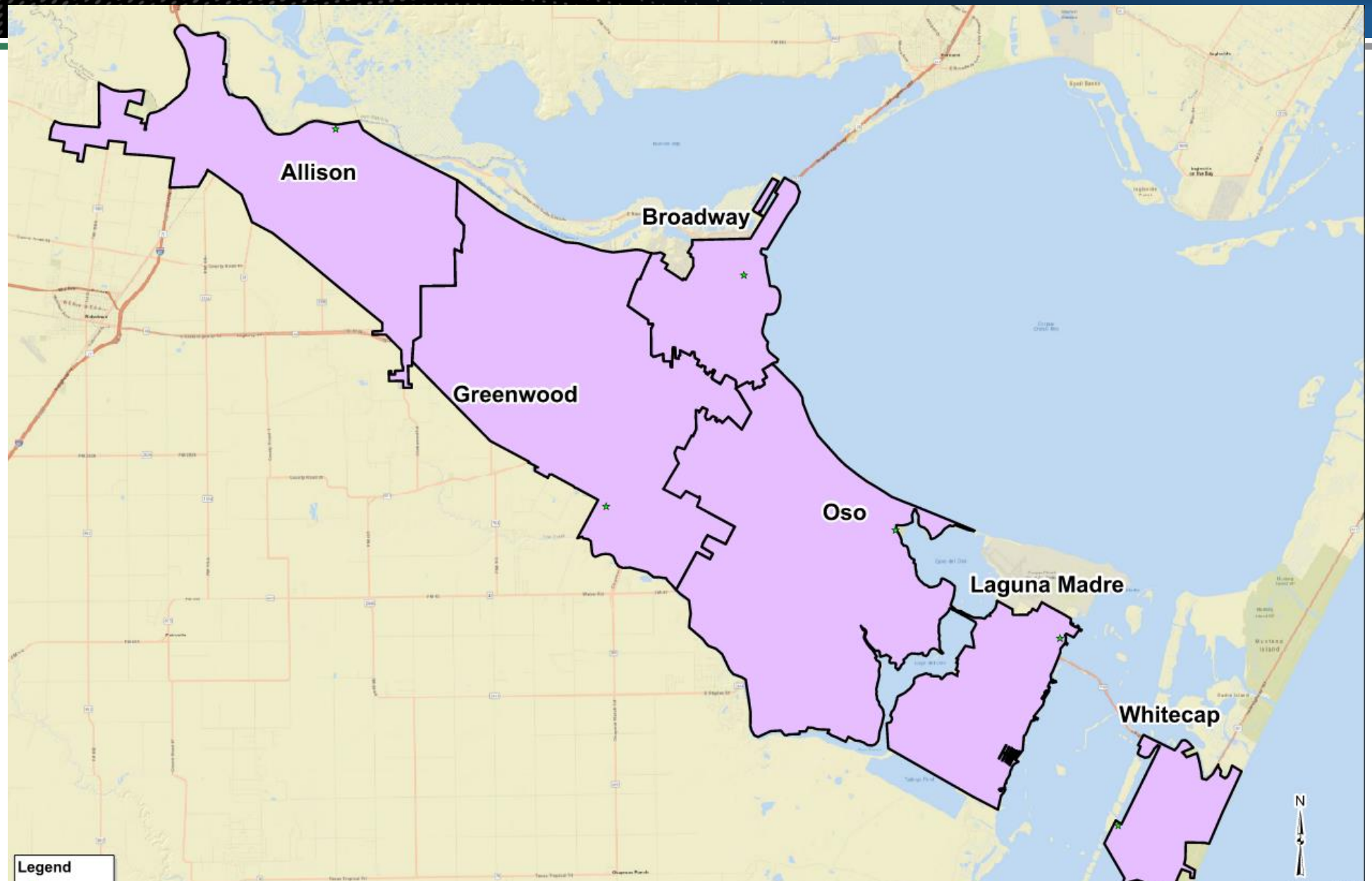
- Looking at deficiencies in current system
- Looking at additive deficiencies with 10-year growth
- Looking at how to serve future areas

Wastewater

- Compliance with TCEQ Chapter 217 requirements
  - → Timing of new plant capacity
  - → Lift stations and force mains
  - → Gravity lines/manholes
- Consent Order projects (I/I, SSO)
- Adding new areas
- Total service areas= 6

Wastewater


Allison
Broadway
Greenwood
Oso
Laguna Madre
Whitecap
Legend
N

Wastewater

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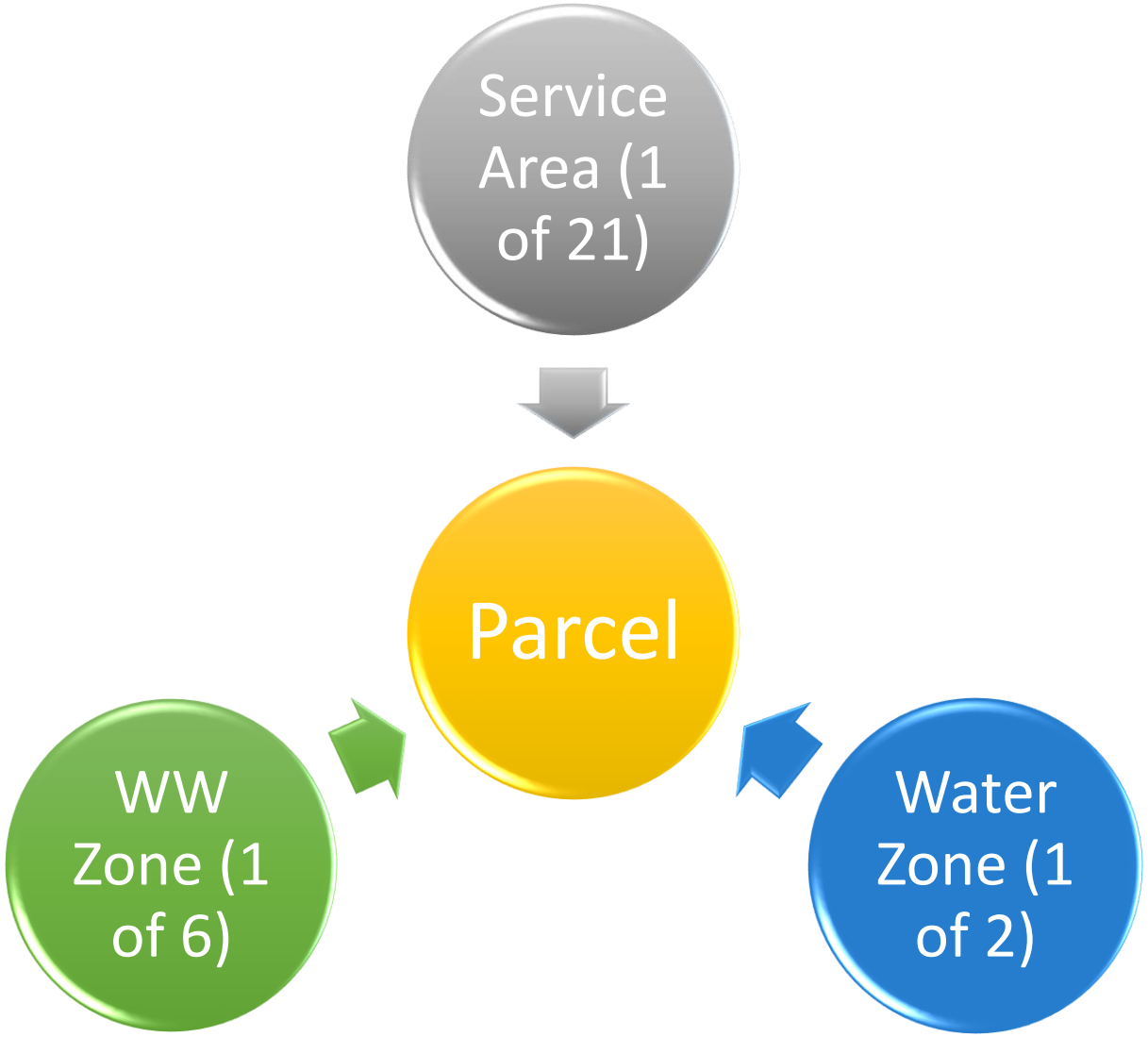
CONCLUSIONS: CURRENT FLOW

Lift Station	Current Flows		Pump			Force Main			Wet Well				
	Average Flow (gpm)	Peak Flow (gpm)	Modeled Pump Flow	Pump Capacity (gpm)	Upsize Pump?	Force Main Diameter (in)	Calculated FM Velocity (ft/s)	Upsize Force Main?	Current Diameter (ft)	Current Wet Well Volume (ft^3)	Minimum Wet Well Volume Required	Upsize Wetwell ?	Wet Well Diameter Needed (ft)
Clarkwood North	609	991	991	2570	NO	12	2.8	NO	8	101	331	YES	15
Clarkwood South	52	217	217	606	NO	4	5.5	YES	8	302	73	NO	
Cynthia	8	78	78	132	NO	2	8.0	YES	4	4	26	YES	10
Lakes Northwest	2	14	14	625	NO	8	0.1	NO	8	176	5	NO	
Northwest Crossing	88	485	485	1250	NO	12	1.4	NO	12	283	162	NO	
Nueces Acres	28	114	114	410	NO	6	1.3	NO	8	50	38	NO	

CONCLUSIONS: ULTIMATE FLOW

Lift Station	Ultimate Flows		Pump			Force Main			Wet Well				
	Average Flow (gpm)	Peak Flow (gpm)	Modeled Pump Flow (gpm)	Pump Capacity (gpm)	Upsize Pump?	Force Main Diameter (in)	Calculated FM Velocity (ft/s)	Upsize Force Main?	Current Diameter (ft)	Current Wet Well Volume (ft^3)	Minimum Wet Well Volume Required (ft^3)	Upsize Wetwell ?	Wet Well Diameter Needed (ft)
Clarkwood North	1115	1814	1814	2570	NO	12	5.1	NO	8	101	856	YES	20
Clarkwood South	318	1315	1270	606	YES	4	33.6	YES	8	302	805	YES	10
Cynthia	8	82	47	132	NO	2	8.4	YES	4	4	2	YES	10
Lakes Northwest	5	45	25	625	NO	8	0.3	NO	8	176	24	NO	
Northwest Crossing	317	1756	1267	1250	YES	12	5.0	NO	12	283	921	YES	17
Nueces Acres	98	406	392	410	NO	6	4.6	NO	8	50	222	YES	13

Every Parcel



Stormwater

Stormwater

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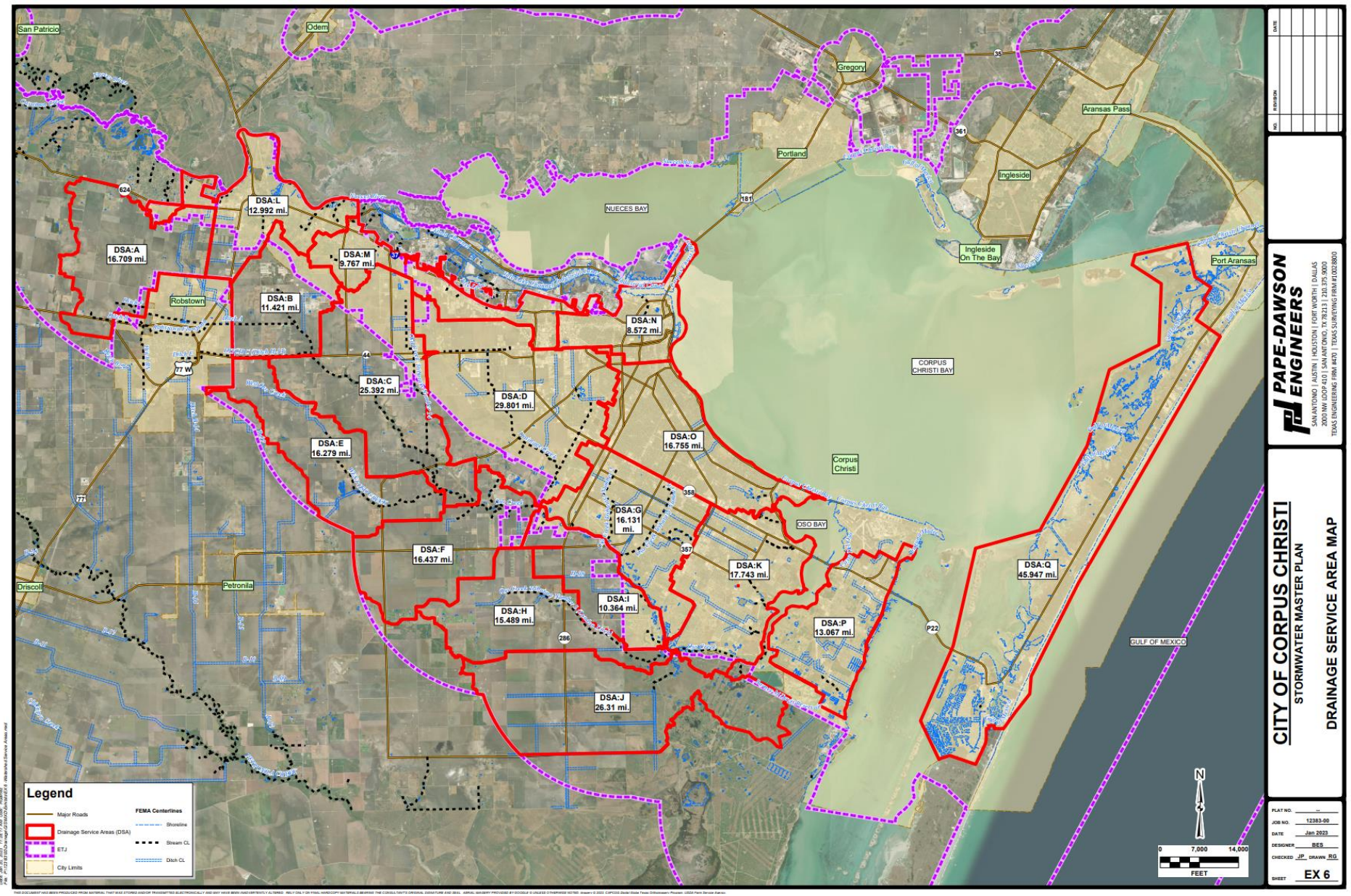
Define Potential Mitigation Areas (PMAs)

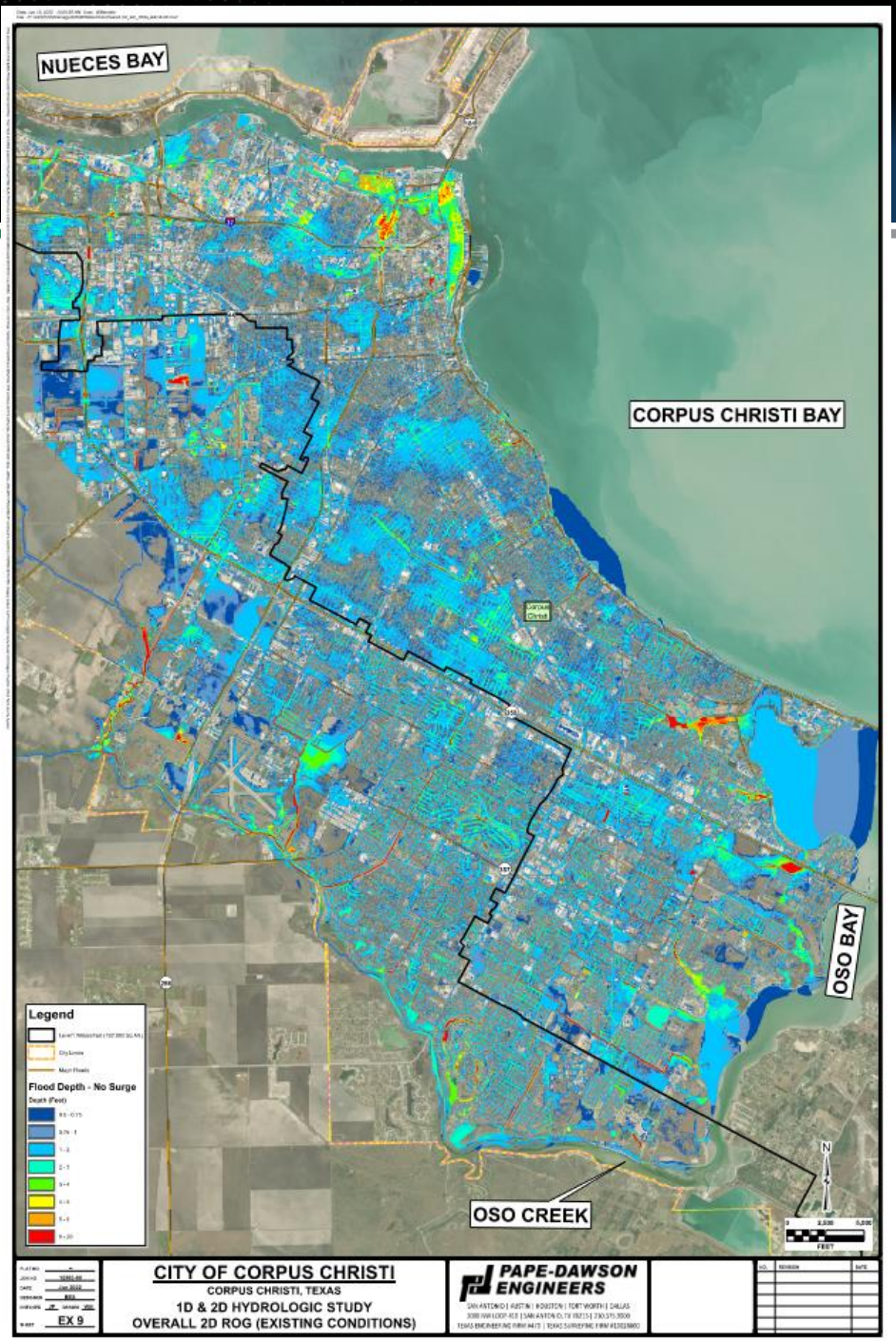
Prioritize PMAs to determine project locations

Define and scope projects to inform CIP

Stormwater


San Patricio
Odem
Gregory
Aransas Pass
Portland
Ingleside
NUECES BAY
Ingleside On The Bay
Port Aransas
Robstown
CORPUS CHRISTI BAY
Corpus Christi
OSO BAY
GULF OF MEXICO
Petronila
Driscoll
DSA:A 16.709 mi.
DSA:B 11.421 mi.
DSA:C 25.392 mi.
DSA:D 29.801 mi.
DSA:E 16.279 mi.
DSA:F 16.437 mi.
DSA:G 16.131 mi.
DSA:H 15.489 mi.
DSA:I 10.364 mi.
DSA:J 26.31 mi.
DSA:K 17.743 mi.
DSA:L 12.992 mi.
DSA:M 9.767 mi.
DSA:N 8.572 mi.
DSA:O 16.755 mi.
DSA:P 13.067 mi.
DSA:Q 45.947 mi.
Legend
Major Roads
Drainage Service Areas (DSA)
ETJ
City Limits
FEMA Centerlines
Shoreline
Stream CL
Ditch CL
0 7,000 14,000
FEET
CITY OF CORPUS CHRISTI
STORMWATER MASTER PLAN
DRAINAGE SERVICE AREA MAP
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800
PLAT NO. --
JOB NO. 12383-00
DATE Jan 2023
DESIGNER BES
CHECKED JP DRAWN RG
SHEET EX 6

Stormwater


NUECES BAY
CORPUS CHRISTI BAY
OSO BAY
OSO CREEK
Legend
Flood Depth - No Surge
Depth (Feet)
CITY OF CORPUS CHRISTI
CORPUS CHRISTI, TEXAS
1D & 2D HYDROLOGIC STUDY
OVERALL 2D ROG (EXISTING CONDITIONS)
EX 9
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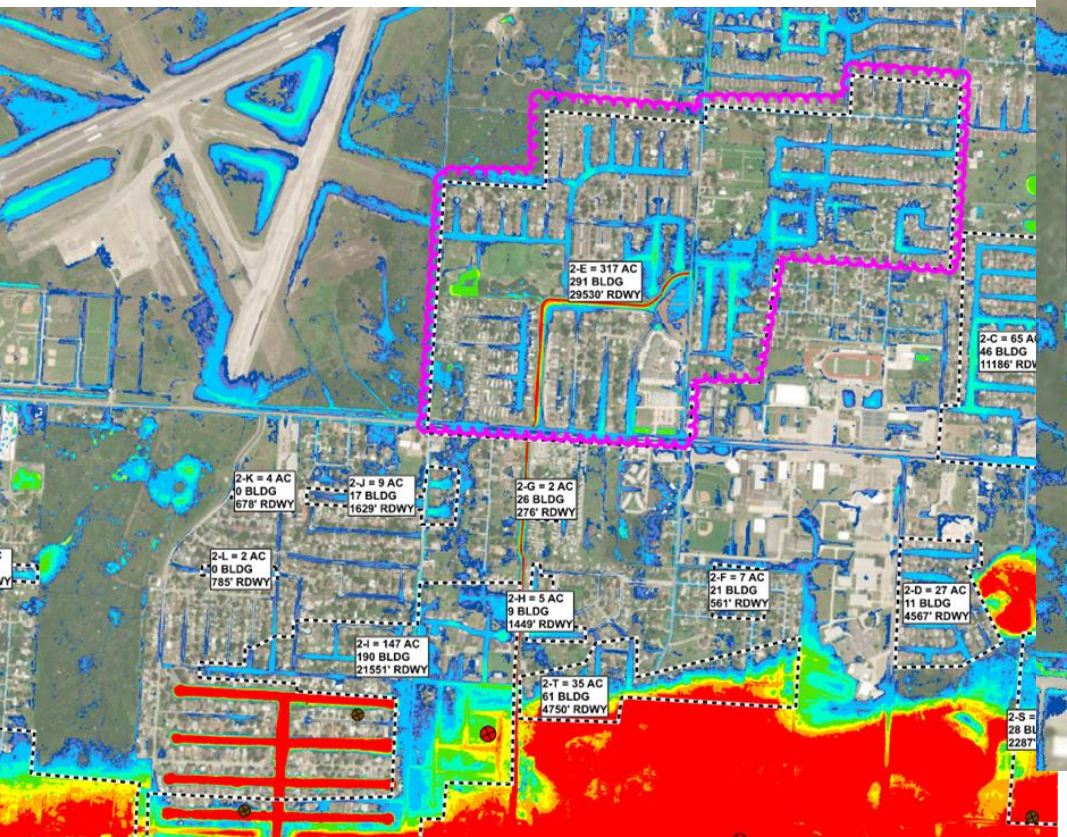
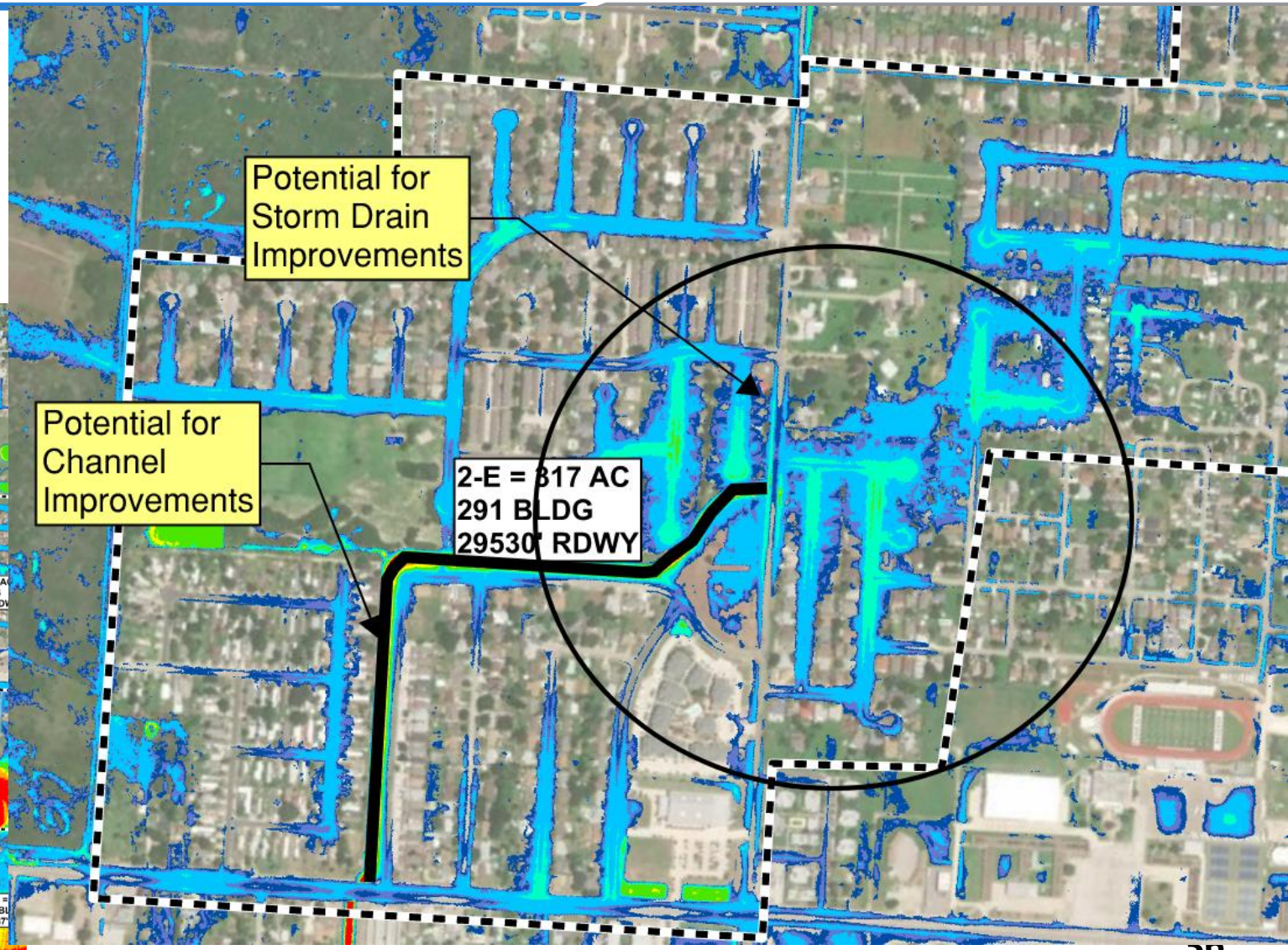
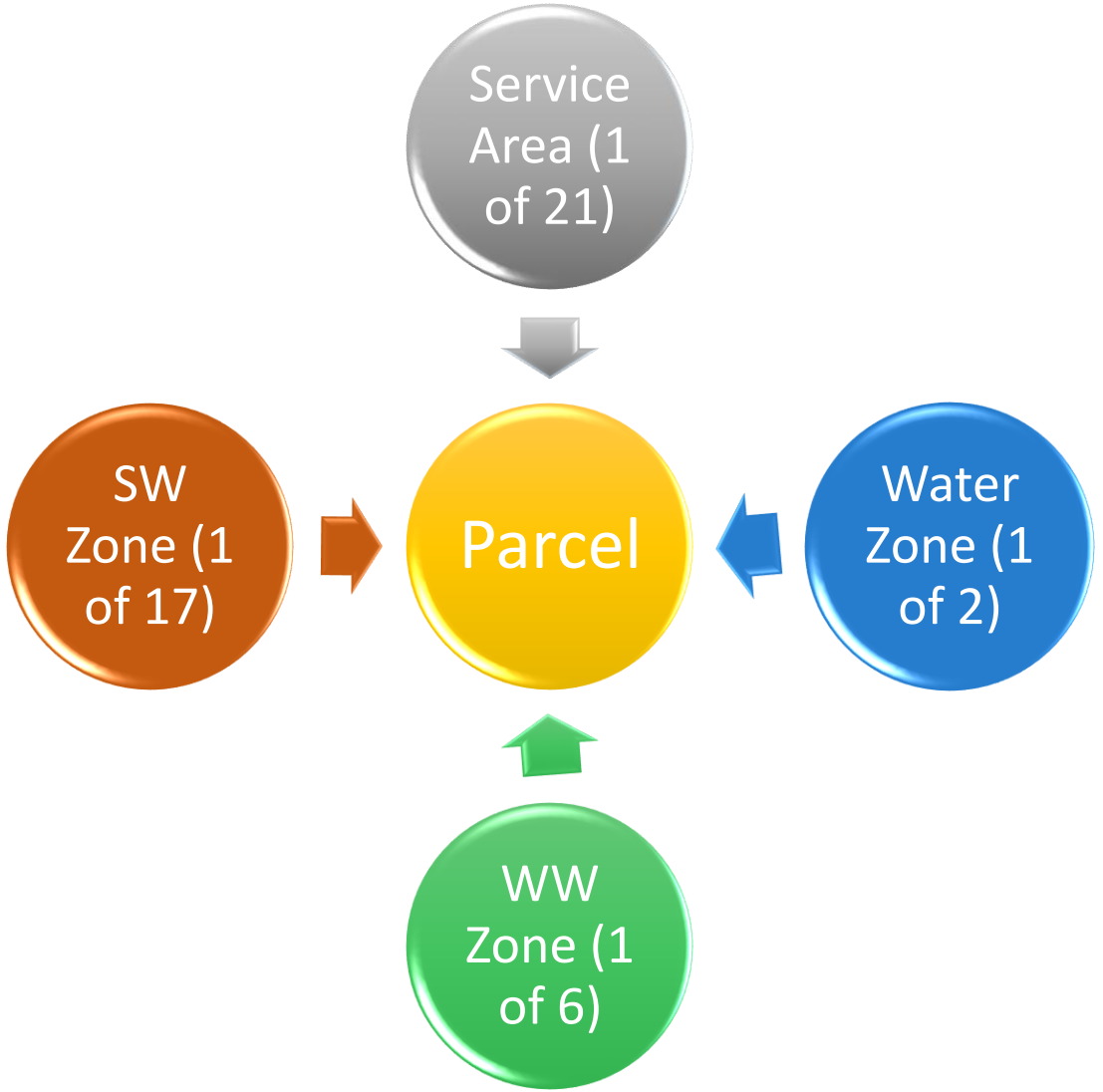
Stormwater


2-E = 317 AC
291 BLDG
29530' RDWY
2-K = 4 AC
0 BLDG
678' RDWY
2-J = 9 AC
17 BLDG
1629' RDWY
2-G = 2 AC
26 BLDG
276' RDWY
2-L = 2 AC
0 BLDG
785' RDWY
2-H = 5 AC
9 BLDG
1449' RDWY
2-F = 7 AC
21 BLDG
561' RDWY
2-D = 27 AC
11 BLDG
4567' RDWY
2-I = 147 AC
190 BLDG
21551' RDWY
2-T = 35 AC
61 BLDG
4750' RDWY


Potential for Storm Drain Improvements
Potential for Channel Improvements
2-E = 317 AC
291 BLDG
29530' RDWY

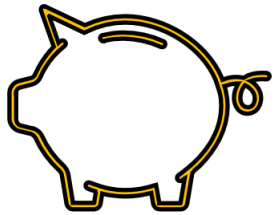
Every Parcel



Next Steps

Next Steps

- Identifying costs for each improvement
- Identifying type of improvement
  - → Replacement
  - → Upgrade
  - → New
- Identifying users for each improvement
  - → Existing Users Number
  - → Future Users Number
- Review Funding Alternatives



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Thank you

Jake Powell, P.E. and Kim Keefer, P.E.