

Organic Waste to Fuel Study Conclusion Workshop

**North Central Texas Organic Waste to
Fuel Feasibility Study**

**Project Advisory Group
September 20, 2022**



AGENDA



Project Status Update



Overview of POWER Tool



Dallas Southside WWTP



Denton Landfill Complex



Funding and Incentive Opportunities



Feasibility Study Key Findings and
Recommendations

Virtual Workshop Reminders

1

Please leave your microphone muted unless speaking

2

Use the chat box or raise hand button to ask a question or provide a comment

3

Please state your name prior to asking a question or making a comment

4

Please note that the presentation is being recorded

Anaerobic Digestion (AD)

Water Resource Recovery Facility (WRRF)

Landfill Gas (LFG)

Landfill Gas to Energy (LFGTE)

Renewable Natural Gas (RNG)

Natural Gas Vehicle (NGV)

Renewable Fuel Standard (RFS)

Environmental Credits

Key Terms and Acronyms

WELCOME & INTRODUCTIONS

Introductions

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NCTCOG
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NCTCOG
- ▶ **Lori Clark**
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NCTCOG
- ▶ **Soria Adibi**
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Introductions



Scott Pasternak

Project Manager
Burns & McDonnell



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Deputy Project Manager
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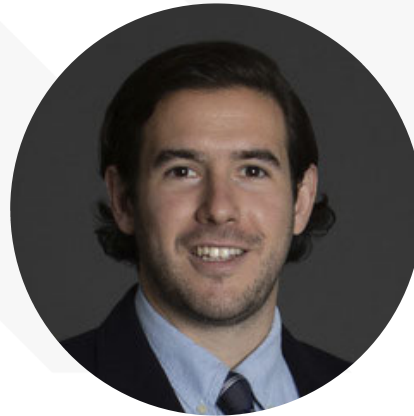
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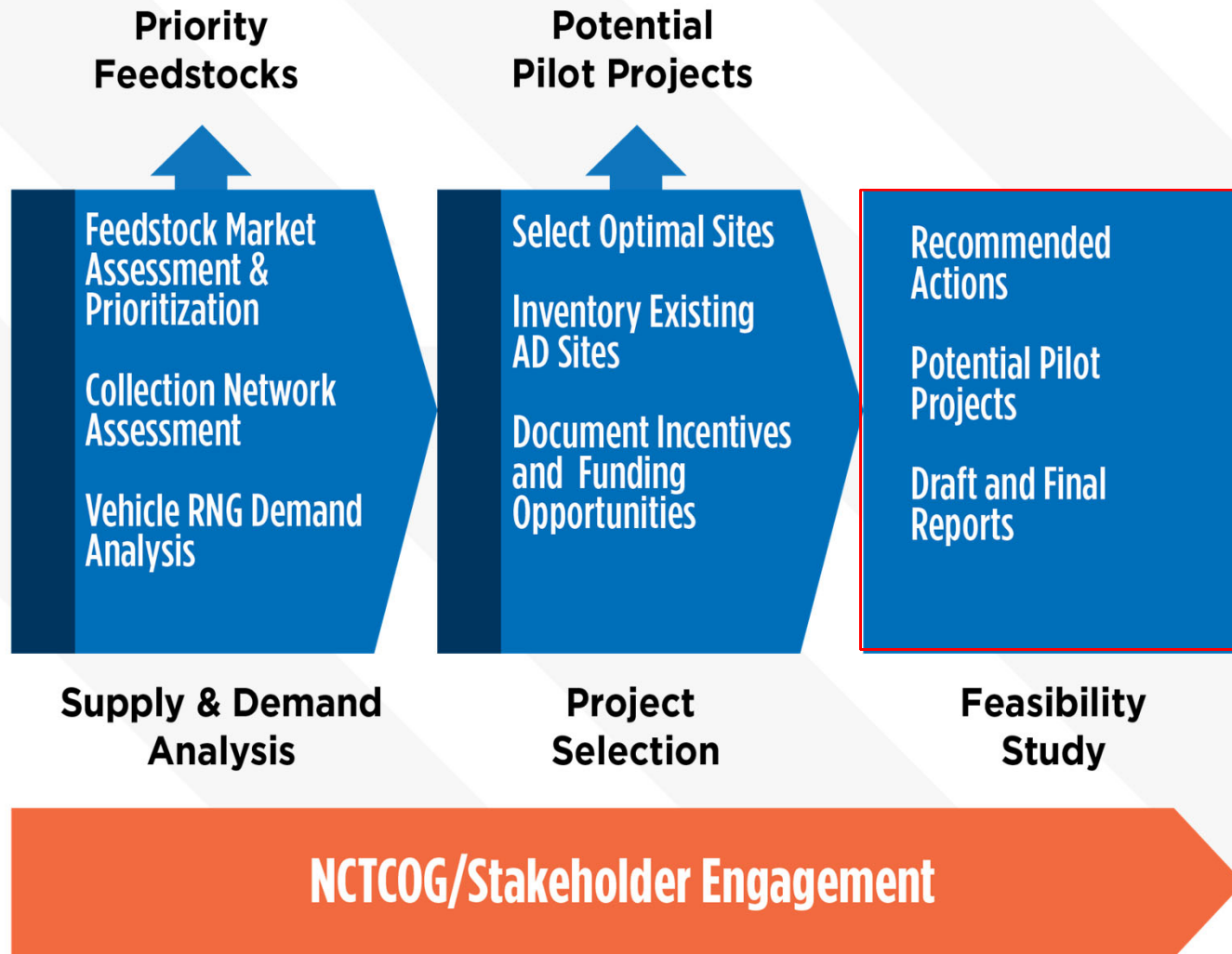
PROJECT STATUS UPDATE

Project Background

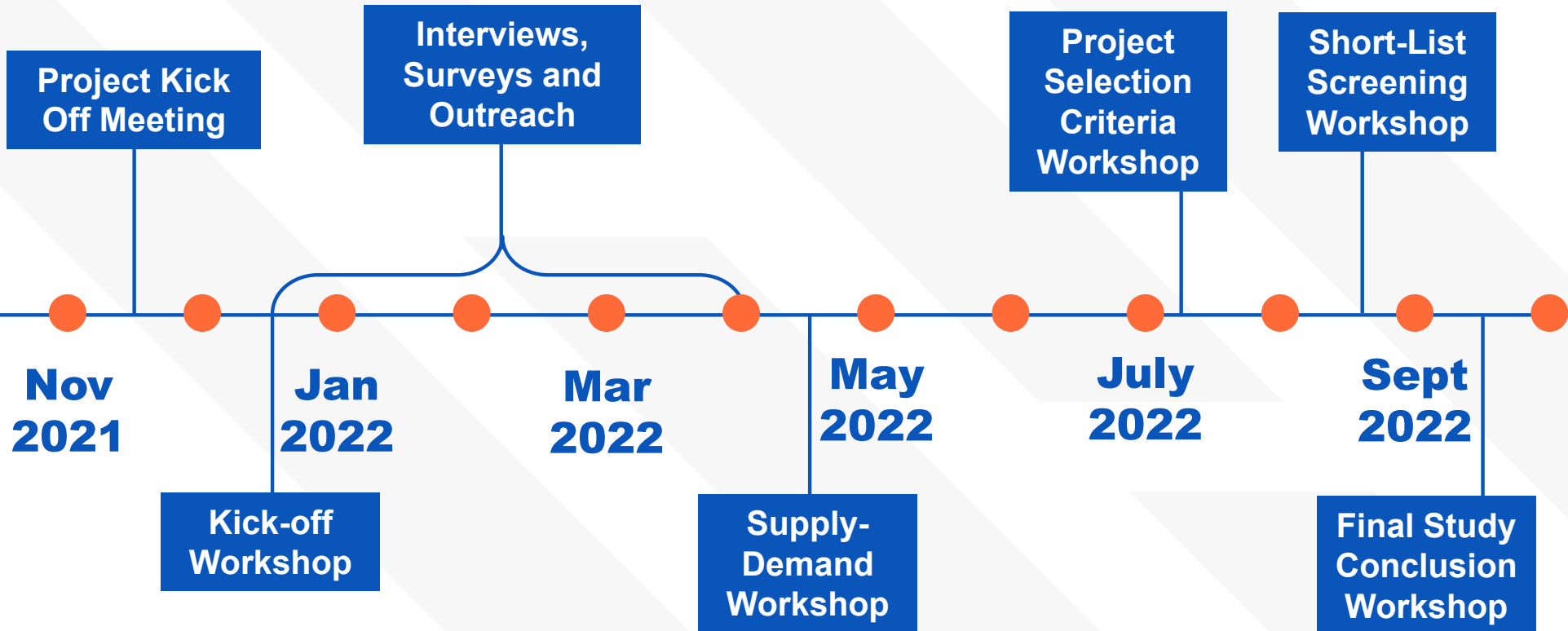


- ▶ Study assesses the feasibility of collecting and transporting organic wastes to produce renewable natural gas (RNG) for use as a transportation fuel.
- ▶ NCTCOG and UTA partnering on the study which is supported by a grant from the U.S. Environmental Protection Agency (U.S. EPA).
- ▶ Prior to the study, NCTCOG conducted regional waste characterizations and a series of virtual roundtables to share organic waste management efforts and challenges in the region.
- ▶ Key considerations for the evaluation include determining the most critical organic wastes to divert (e.g., sludge and biosolids, food waste, FOG) from disposal at MSW landfills (e.g., Type I Landfills) or in sanitation piping.
- ▶ Workshops and stakeholder engagement provide key input on preliminary results to collaboratively identify feasible pilot projects based on a series of minimum technical, operational and financial criteria.

Project Approach



Stakeholder Engagement



Key Findings Support Selection of Pilot Projects



Feedstock



- ▶ Significant available feedstock to divert from disposal
- ▶ Sludge management key challenge among WWTPs in region
- ▶ High priority feedstocks identified as food waste, FOG, and existing biogas resources

Collection Network



- ▶ Commercial collection comparatively more cost effective than residential
- ▶ Collection via vacuum truck supports combined FOG and food waste collection
- ▶ Food waste would be delivered by roll-off or vacuum truck

NGV Fueling



- ▶ Key fleet types identified for adoption include solid waste, buses, and long-haul vehicles
- ▶ Buses include both transit buses and charter buses
- ▶ Currently more demand for RNG than supply

PILOT PROJECT EVALUATION OVERVIEW

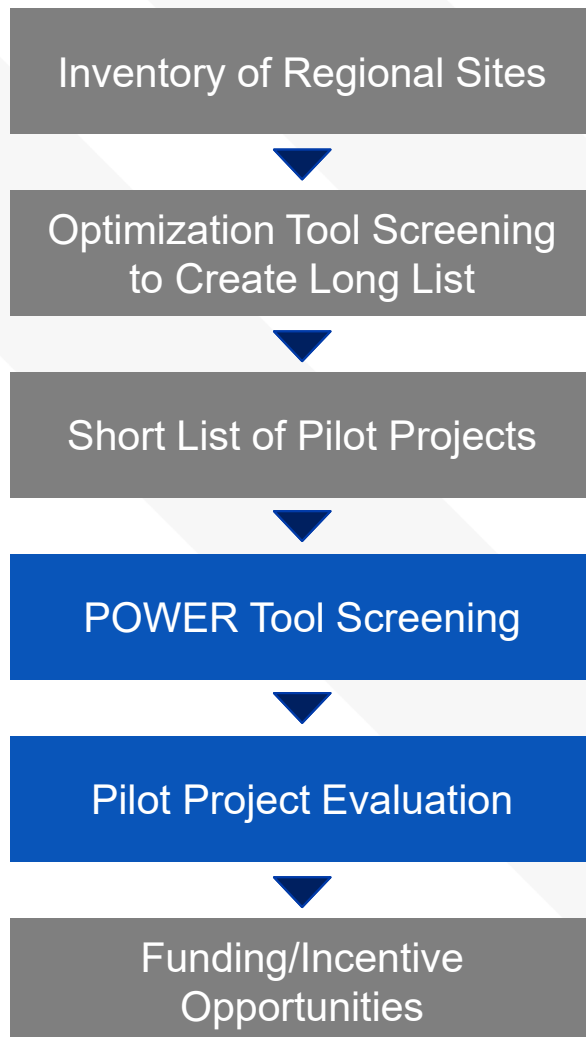
Review of Short-Listed Locations



Facility	Facility Type	County	AD (Y/N)
City of Dallas Southside WWTP	WWTP	Dallas	Y
City of Denton Landfill Complex	Multiple Facilities	Denton	Y
Village Creek Water Reclamation Facility	WWTP	Tarrant	Y
Central Regional WWTP	WWTP	Dallas	Y
Fort Worth Brewery	WWTP	Tarrant	Y
Peach Street WWTP	WWTP	Tarrant	N
City of Dallas Bachman Transfer Station	Transfer Station	Dallas	N
City of Garland Rowlett Creek WWTP	WWTP	Dallas	N
City of Garland Transfer Station	Transfer Station	Dallas	N
City of Mesquite Recycling/Waste	Composting/WWTP	Dallas	N

- ▶ Short-list screening process and results determined as part of Workshop 3B
- ▶ Selected facilities provide “north” and “south” pilot projects for opportunities in multiple areas of the metroplex region

Pilot Project Evaluation Overview



- ▶ Dallas Southside WWTP and Denton Landfill Complex selected for further evaluation
- ▶ POWER Tool estimates technical, environmental impacts by comparing the existing system to preliminary co-digestion pilot project scenarios
- ▶ The evaluation utilizing the POWER Tool is provided for discussion purposes only, and is subject to change based on the outcomes of the workshop
- ▶ Additional analysis includes GIS screening of existing infrastructure, byproduct management, environmental permitting and environmental justice considerations
- ▶ Key findings and next steps developed to advance pilot projects

Feedstock Volumes and Delivery Vehicles



Feedstock (Annual Tons)	Southside WWTP	Denton Landfill Complex
Commercial pre-consumer food waste	43,320	10,350
Fats, oils, and greases	9,300	1,640
Residential post-consumer food waste	0	2,060
Total Additional Material	52,620	14,050

- ▶ Commercial pre-consumer food waste
 - ▶ Assumes 50 percent capture rate county-wide from correctional facilities, healthcare facilities, hospitality locations, institutions and food waste manufacturers and processors.
 - ▶ Material delivered via vacuum trucks and roll off trucks, as applicable
- ▶ Fat, oils and greases
 - ▶ Assumes 75 percent capture rate of material county-wide from restaurants and food service location
 - ▶ Material delivered via vacuum and tanker trucks
- ▶ Residential post-consumer food waste
 - ▶ Assumes 20 percent capture rate from City of Denton only
 - ▶ Includes only food waste from Denton residents as feedstock for AD for comparison purposes only

Material Acceptance, Screening and Pre-Processing



Equipment	Dallas Southside WWTP	Denton Landfill Complex
Receiving area	Unable to receive increased vehicle traffic	Facility designed to receive collection vehicles
Pre-processing and screening equipment	Unable to process and screen solid waste	In the process of procuring processing equipment (channel grinder)
Storage tank	Unable to store materials on site to meter into AD system.	Unable to store materials on site to meter into AD system.
Gas cleaning equipment	Scrubs gas for use in electricity but does not purify for RNG usage.	Scrubs gas for use in electricity but does not purify for RNG usage.

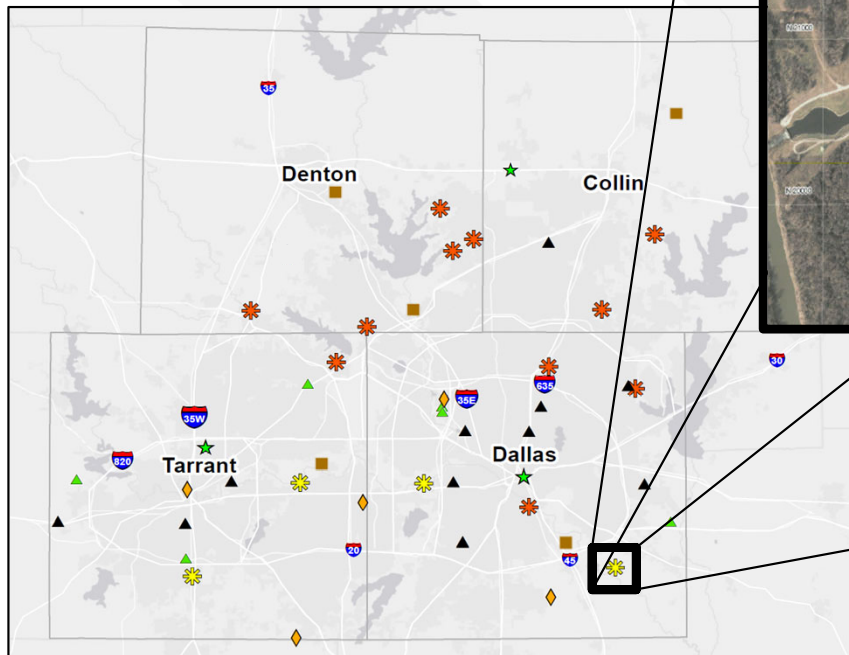
- ▶ Additional acceptance, screening and pre-processing infrastructure required
- ▶ Additional engineering assessment and cost estimates required to advance both potential pilot projects

DALLAS SOUTHSIDE WWTP



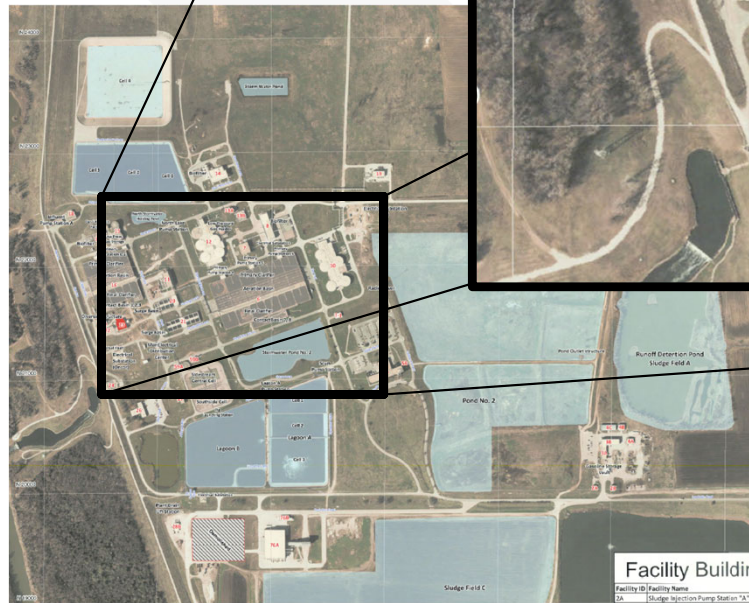
Dallas Southside WWTP Pilot Project Overview

- ▶ Available AD capacity, sludge disposal capacity
- ▶ Baseline comparison to disposal of feedstock at McCommas Bluff
- ▶ Look at emissions on a lifecycle perspective



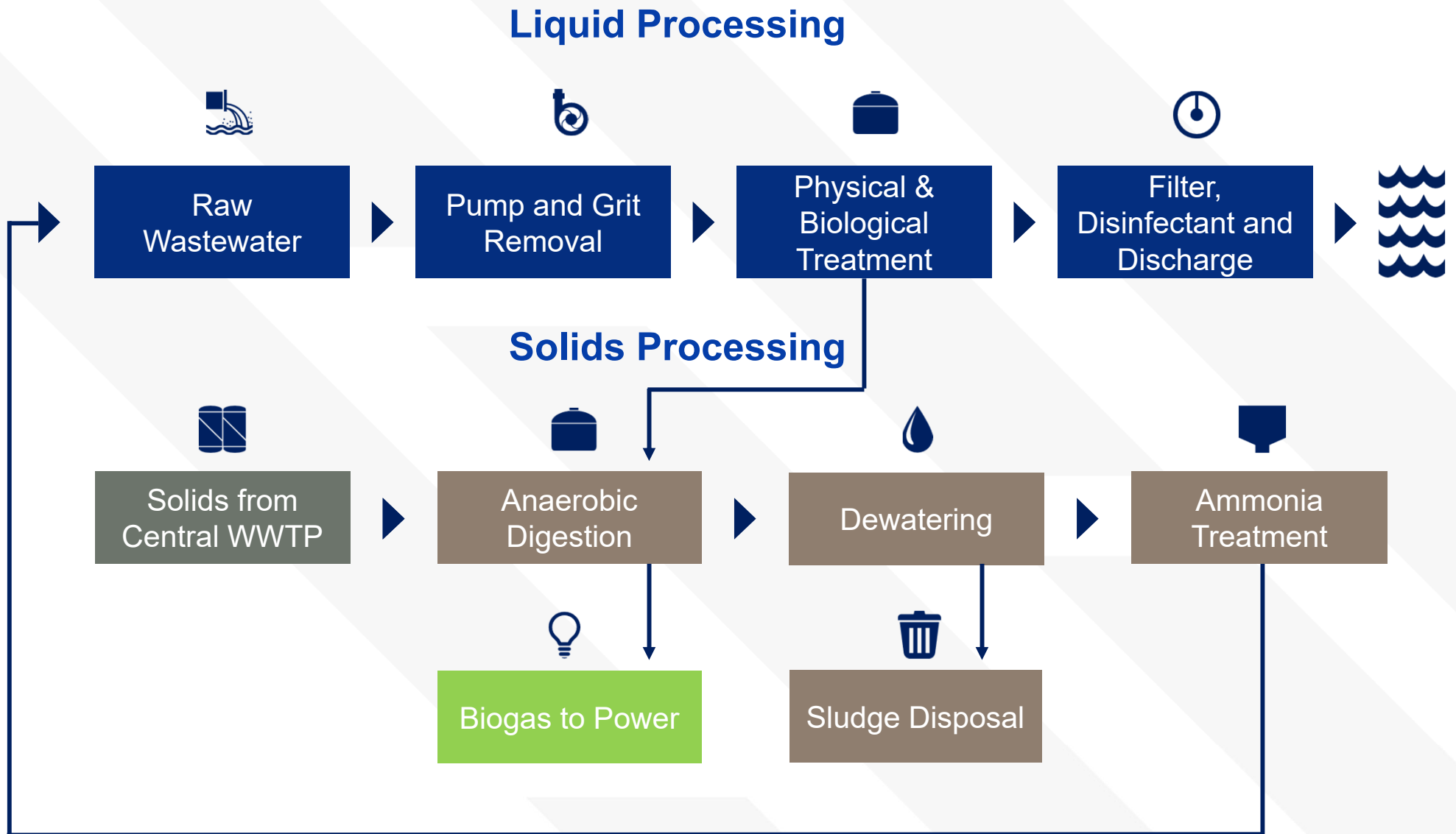


Dallas Southside WWTP Facility Description



- ▶ 55 Million Gallons per Day (MGD) excess capacity
- ▶ 11 mesophilic anaerobic digestion units
- ▶ Available capacity at sludge monofill

Dallas Southside WWTP Liquids and Solids Processing (current process)



POWER Tool Potential Biogas Production Comparison



	Potential Biogas Production (m ³ /day)		
Feedstock	Anaerobic Digestion	Landfill	Difference
Food Waste	9,800	4,400	5,400
Commercial FOG	17,800	6,400	11,400
Total	27,500	10,700	16,800

- ▶ POWER Tool assumes co-digestion at Southside WWTP is running at full projected capacity
- ▶ POWER Tool provides a planning level estimate of pipeline quality biogas generation
- ▶ Yield rates for FOG disposed at Southside WWTP are much higher than landfill

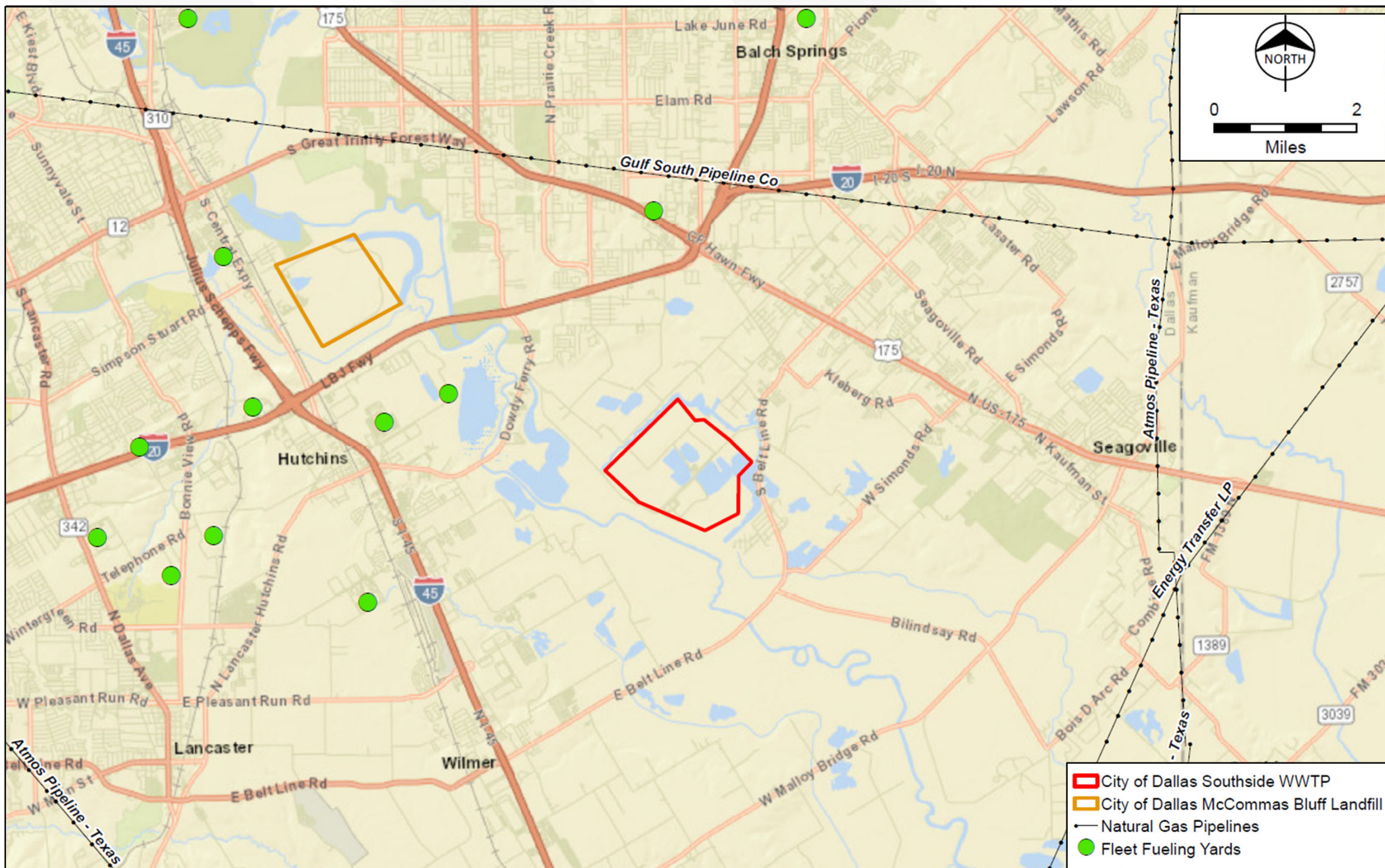
POWER Tool Results Emissions Comparison



Emissions	Potential Emissions (kg/year)		Difference
	Anaerobic Digestion	Landfill	
Volatile Organic Compounds (VOC)	860	1,100	(240)
Nitrous Oxide (NO _x)	(3,430)	5,160	(8,590)
Particulate Matter (PM ^{2.5})	(160)	210	(370)
Sulphur Dioxide (SO ₂)	(172,080)	80	(172,160)
Carbon Dioxide Equivalents (CO ₂ -E)	(2,399,760)	279,500	(2,679,260)

- ▶ Significant emissions savings by processing material at Southside WWTP compared to McCommas Bluff
- ▶ Represents incremental emission from processing additional feedstock
 - ▶ Includes waste transport, storage, pre-processing, digestion/disposal, gas cleaning, digestate management, fueling
- ▶ Significant reductions in NO_x and SO_x emissions utilizing AD instead of landfill disposal

Dallas SS WWTP Existing Infrastructure





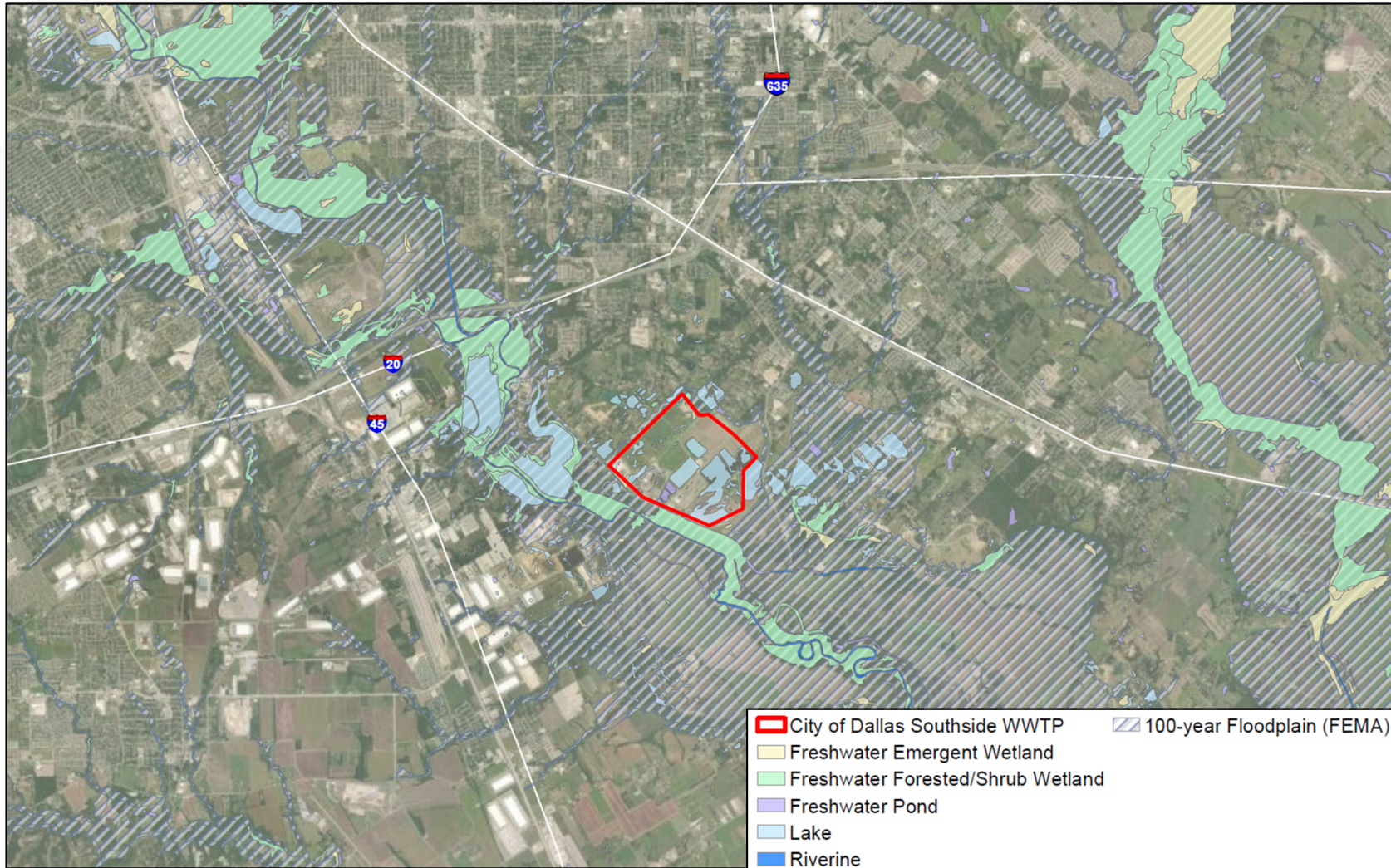
Dallas County WWTP Sludge Generators

- ▶ 11 WWTPs in Dallas County managing about 136,000 tons of sludge annually
- ▶ Dallas Central WWTP currently transfers material to Southside WWTP
- ▶ Sludge from other facilities could be delivered for processing and/or disposal capacity for secondary treatment
- ▶ Processing requirements (e.g., direct to disposal, processed as influent) would depend on level of treatment at each facility

Facility Name	Generation Tons
Central Regional WWTP	68,597
Central WWTP	23,571
City of Garland Rowlett Creek WWTP	1,570
Dallas County Park Cities MUD WWTP	1,568
Dallas Southside WWTP	24,178
Floyd Branch Regional WWTP	387
Muddy Creek Regional WWTP	2,071
Rowlett Creek Regional WWTP	5,122
South Mesquite Creek WWTP	7,515
Ten Mile Creek Plant	1,941
Total	136,518

Source: U.S EPA National Pollutant Discharge Elimination System (NPDES) Biosolids Program reporting

Dallas Southside WWTP Environmental Permitting

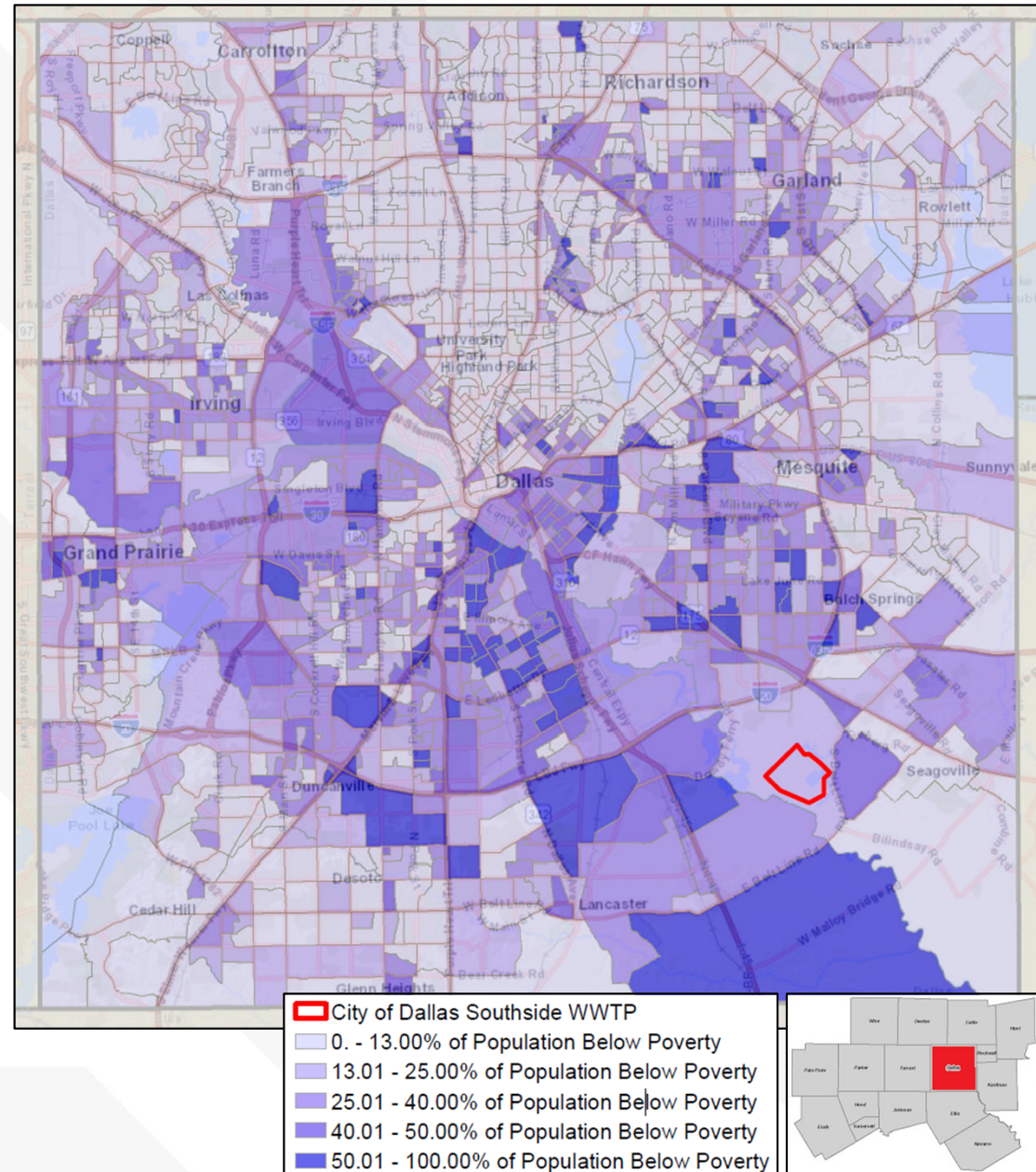


- ▶ No changes to facility footprint minimize challenge with floodplain and wetland locations
- ▶ Upgrades to storage and receiving infrastructure may require TCEQ permit modification depending if facility is considered storing waste or feedstock

Dallas Southside WWTP Population Below Poverty Threshold



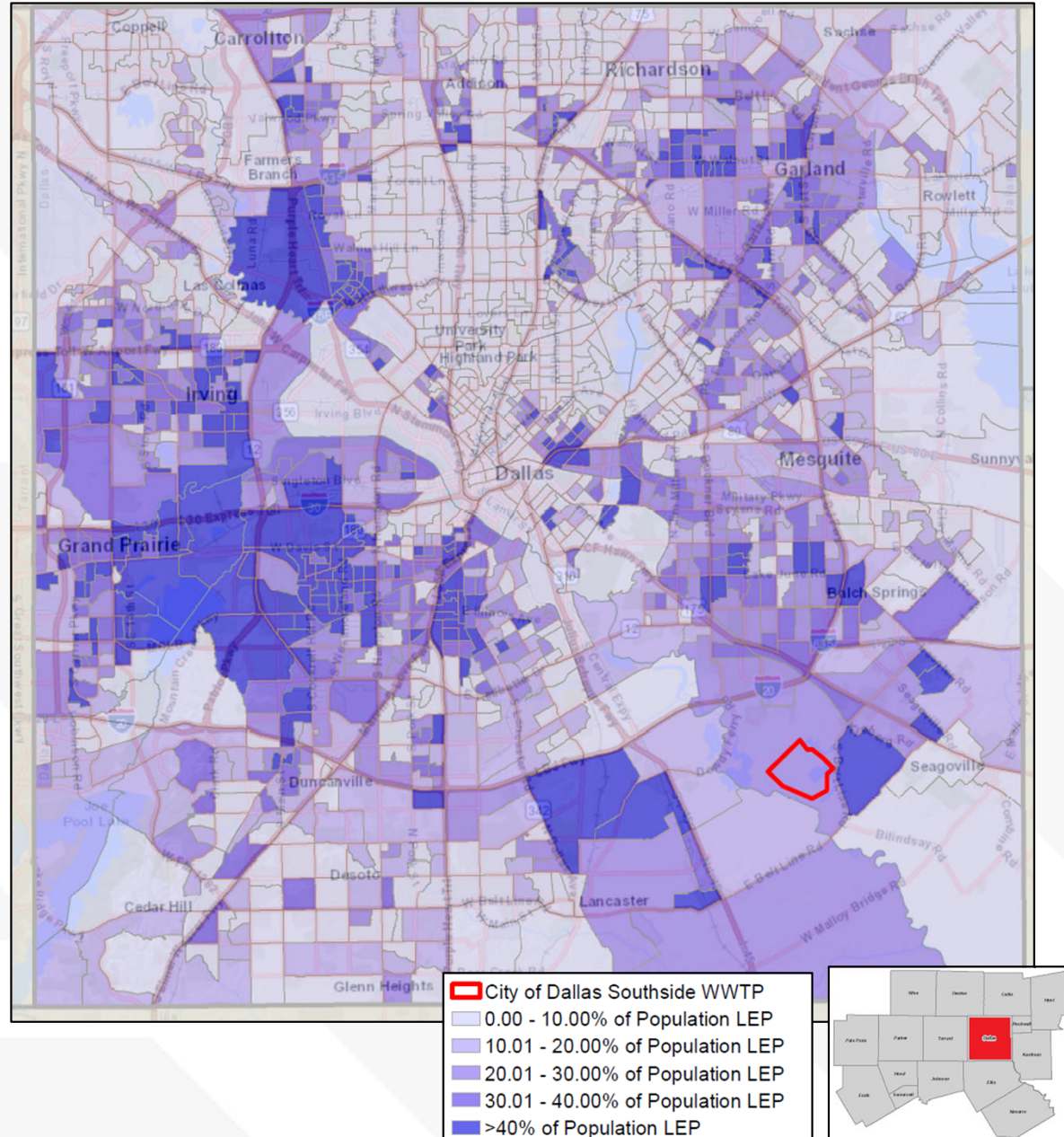
- ▶ Southside WWTP located in industrial area between 13-25 percent below poverty
- ▶ Impact on residential areas small, since area consists of industrial operations rather than single- or multi-family homes
- ▶ Opportunity to displace diesel as part of pilot project would minimize emissions
- ▶ Shifting location of collection vehicles to dispose at Southside WWTP would minimize vehicle traffic at Landfill



Dallas Southside WWTP Limited English Proficiency



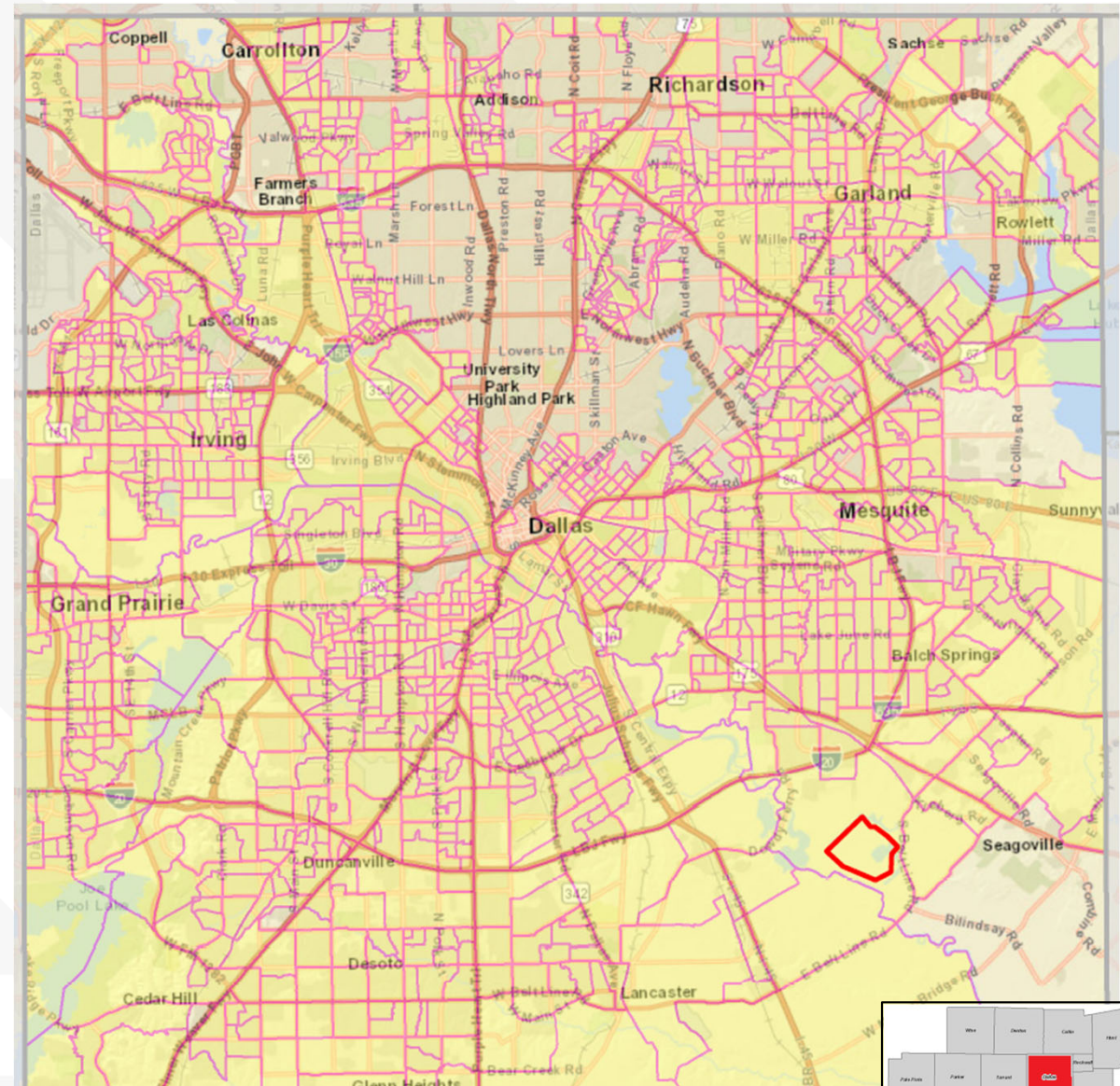
- ▶ 20-30 percent identified as limited English proficiency
- ▶ Limited residential housing in this area of Dallas County
- ▶ Outreach plan should be developed to ensure communications are provided on a bilingual basis to support needs of local community



Dallas Southside WWTP Minority Population



- ▶ Located within and near surrounding communities with >50% minority population
- ▶ Provided as a planning-level understanding of minority population
- ▶ Further environmental justice evaluations may support funding opportunities to support pilot project (e.g., equipment to minimize odors/vectors)
- ▶ Emissions reductions from usage of RNG would have a beneficial impact on all surrounding community

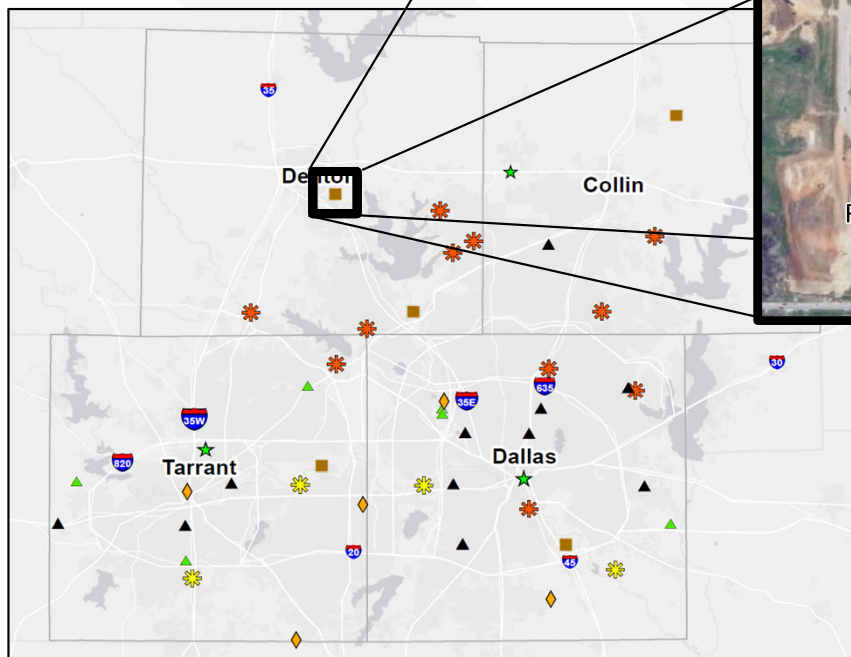


City of Dallas Southside WWTP
2020 Census Block Group Minority Population \geq 50%



DENTON LANDFILL COMPLEX

Denton Landfill Complex Pilot Project Overview



- ▶ Limited AD capacity, sludge disposal capacity
- ▶ Co-located composting, biogas-to-electricity generation, and CNG fueling facilities
- ▶ Baseline comparison to composting feedstock at City of Denton DynoDirt facility

Denton Landfill Complex Facility Description



POWER Tool Potential Biogas Production Comparison



	Potential Biogas Production (m ³ /day)	
Feedstock	Anaerobic Digestion	Composting
Food Waste	2,800	0
Commercial FOG	3,130	0
Total	5,930	0

- ▶ POWER Tool assumes co-digestion processing all estimated annually collected tons to achieve biogas yields presented
- ▶ No biogas production from composting facility
- ▶ POWER Tool provides a planning level estimate of vehicle fuel quality biogas generation

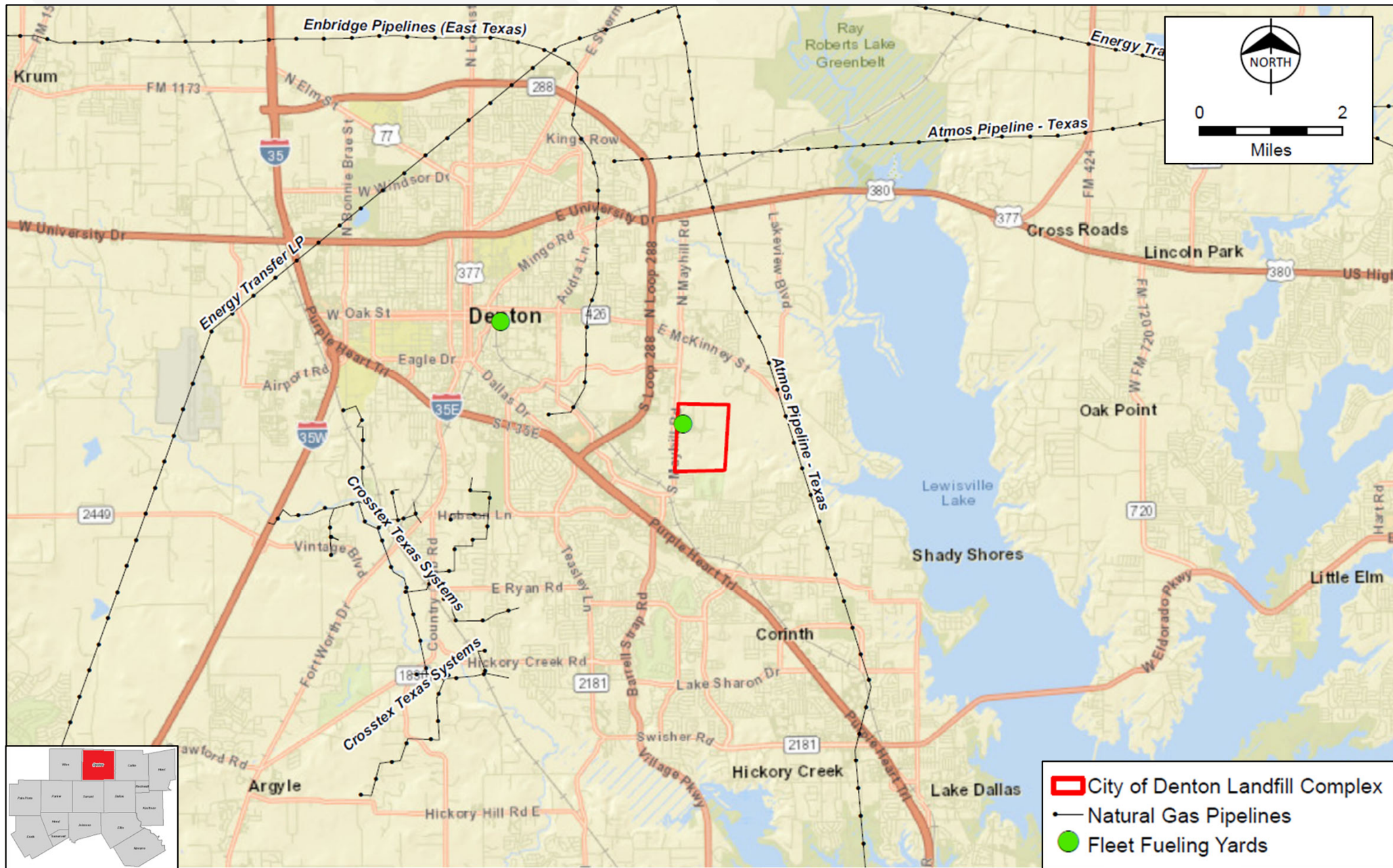
POWER Tool Results Emissions Comparison



Emissions	Potential Emissions (kg/year)		Difference
	Anaerobic Digestion	Composting	
Volatile Organic Compounds (VOC)	70	30	40
Nitrous Oxide (NO _x)	(580)	190	(770)
Particulate Matter (PM ^{2.5})	(40)	4	(44)
Sulphur Dioxide (SO ₂)	720	70	(650)
Carbon Dioxide Equivalents (CO ₂ e)	(651,140)	481,260	(1,132,400)

- ▶ Some savings from anaerobic digestion compared to composting, but not as significant as scenario one
- ▶ Represents incremental life-cycle emissions from processing additional feedstock
 - ▶ Includes waste transport, storage, pre-processing, digestion/disposal, gas cleaning, digestate management, fueling

Denton Landfill Complex Existing Infrastructure



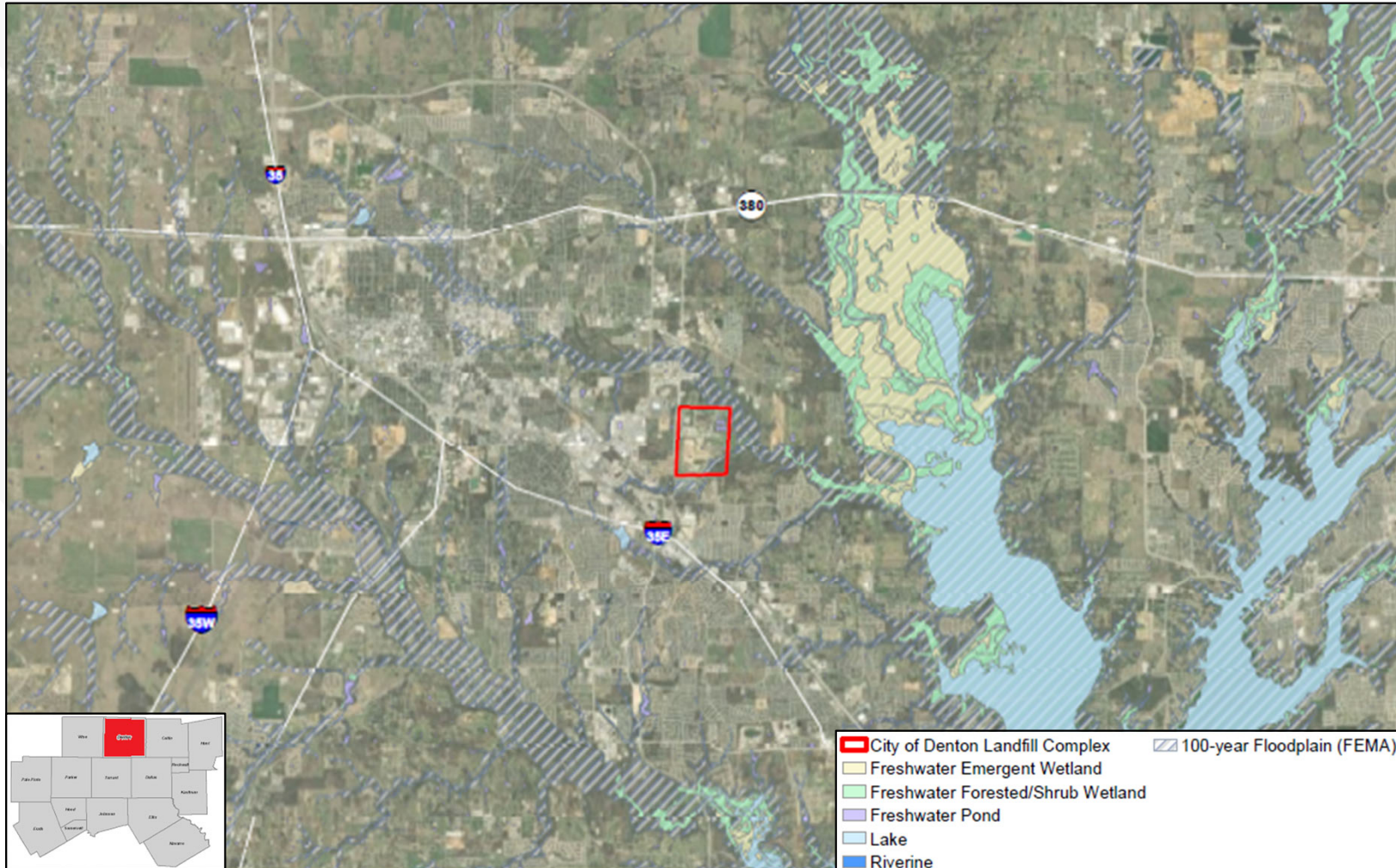


Denton Landfill Complex Sludge Generators

- ▶ 23 other WWTPs in Denton County managing about 36,000 tons of sludge annually
- ▶ Smaller WWTPs have limited storage/disposal capacity on-site
- ▶ Denton Landfill Complex could consider accepting sludge from other facilities by developing ILA for disposal
- ▶ Ability to process sludge from other facilities depends on Pecan Creek WWTP capacity and treatment level at other facilities
- ▶ Potential opportunity for to pursue hydrogen manufacturing pilot

Facility Name	Generation Tons
Aubrey WWTF	29
Brairwood Retreat WWTP	1
City of Hackberry WWTP	1,218
City of Justin WWTP	337
City of Krum WWTF	80
City of Sanger WWTP	793
Denton Creek Regional WWTF	2,729
Doe Branch Reg Water Rec Plant	578
Hidden Cove Park WWTP	18
Lakeview Regional Water Reclamation	1,257
Northlake Village MHP WWTP	2
Panther Creek WWTP	1
Pecan Creek Water Reclamation Plant	2,174
Peninsula Reg Water Rec Plant	4,668
Prairie Creek WWTP	260
Riverbend Reg Water Reclamation Facility	17,330
Robson Ranch WWTP	1,035
Stewart Creek West WWTP	57
Stewart Creek WWTP	1,536
Town of Flower Mound WWTP	914
Town of Ponder WWTP	1,644
Trophy Club MUD 1	80
Total	36,891

Denton Landfill Complex Environmental Permitting

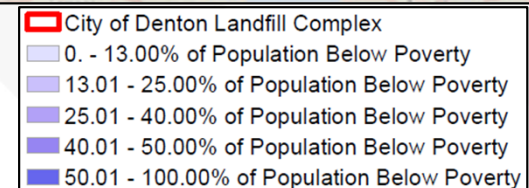
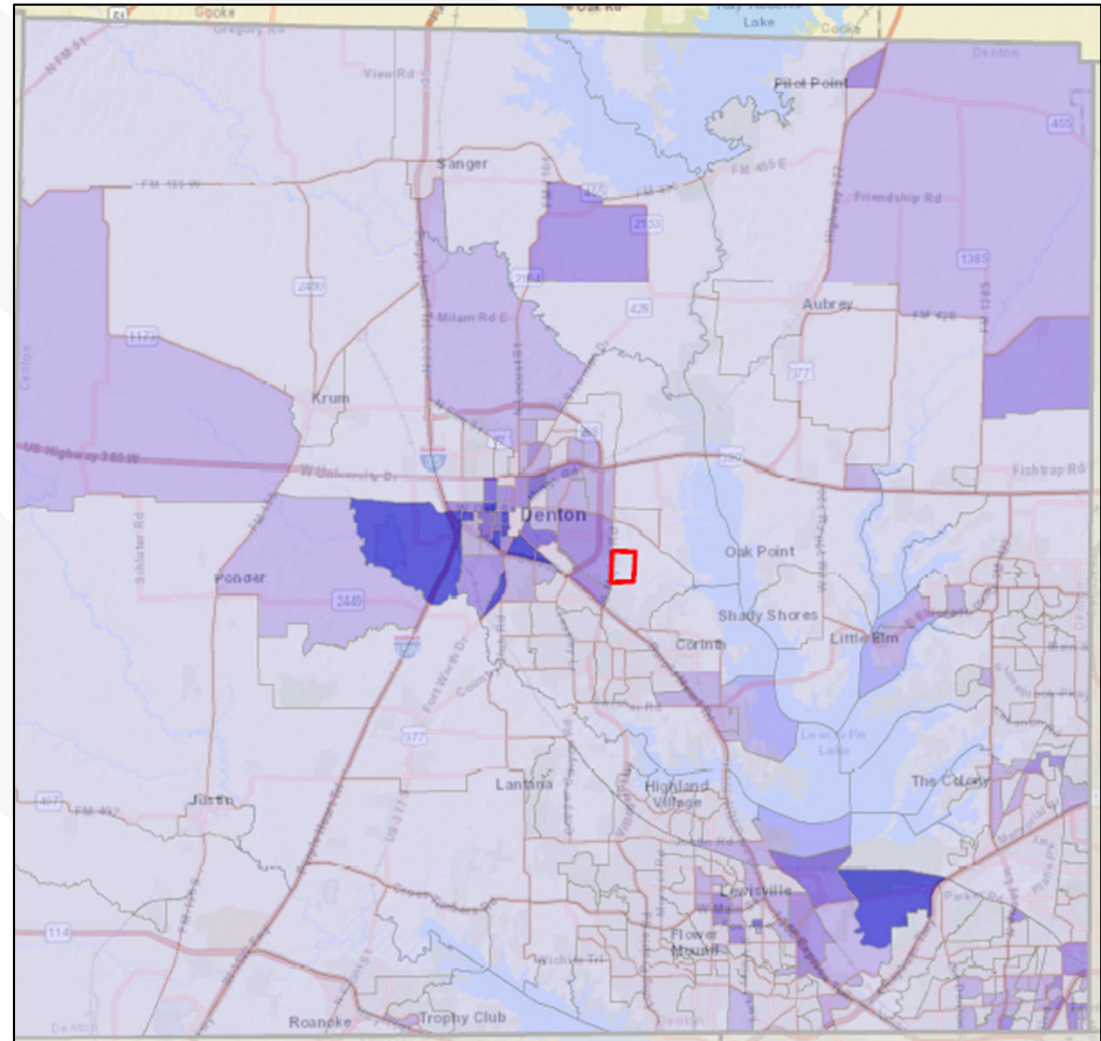


- ▶ Upgrades to facility may require changes to discharge permit if pollutant loading changes
- ▶ Storing and receiving solid waste may require additional permitting by TCEQ, depending where storage and processing occurs in Landfill Complex

Denton Landfill Complex Population Below Poverty Threshold



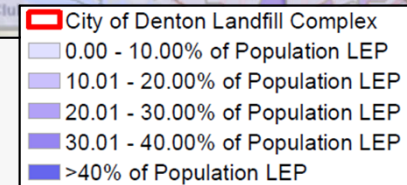
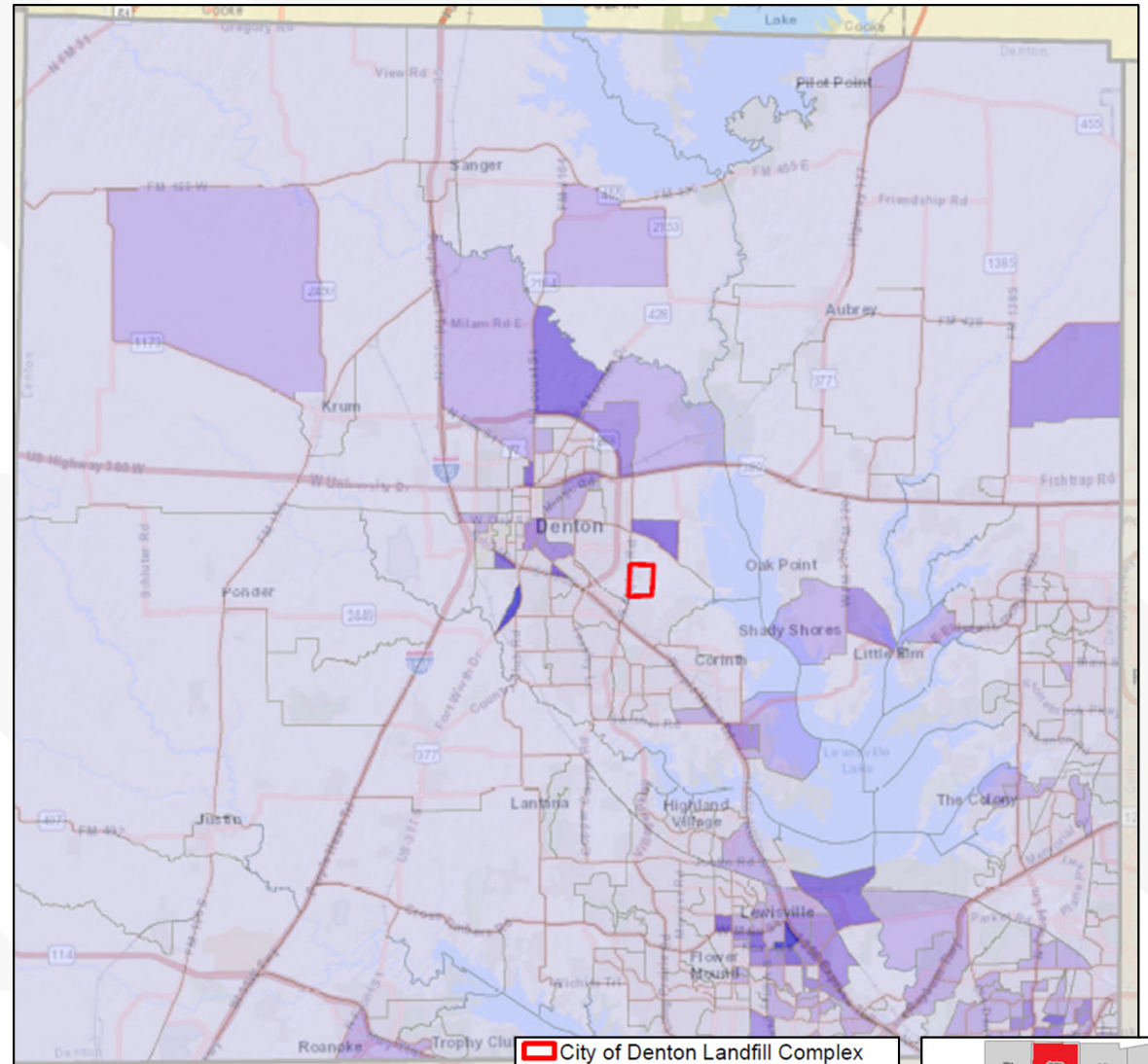
- ▶ Located in industrial area between 13-25 percent below poverty threshold
- ▶ Landfill Complex adjacent to sensitive area
- ▶ Increased odors/vectors could be a significant challenge
- ▶ Opportunity to explore funding to minimize negative impact to areas with environmental justice concerns (e.g., storage equipment to minimize odors/vectors)



Denton Landfill Complex Limited English Proficiency



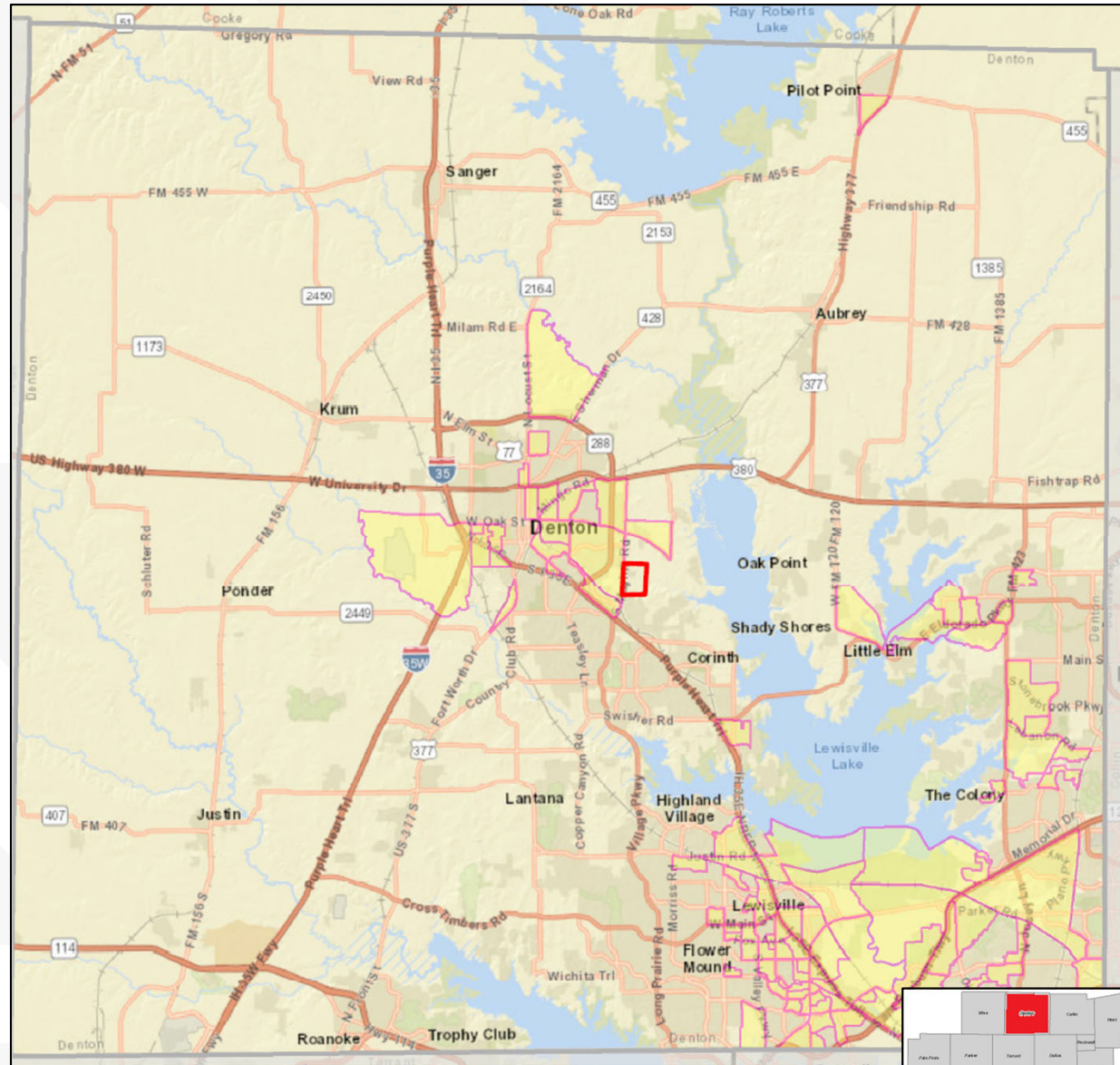
- ▶ 0-10 percent identified as limited English proficiency
- ▶ Pockets of Denton County have limited English proficiency
- ▶ Multi-language communications should be developed to engage community related to potential pilot
- ▶ Cooperative effort with other municipalities in County should consider multi-language communications





Denton Landfill Complex Minority Population

- ▶ Denton Landfill Complex adjacent to communities with minority population greater than 50 percent
- ▶ Pilot project should may require further environmental justice evaluations
- ▶ Deeper dive on odor, traffic and emissions reductions impacts of minority populations adjacent to the Denton Landfill Complex
- ▶ Critical pilot project prioritize needs of underserved communities



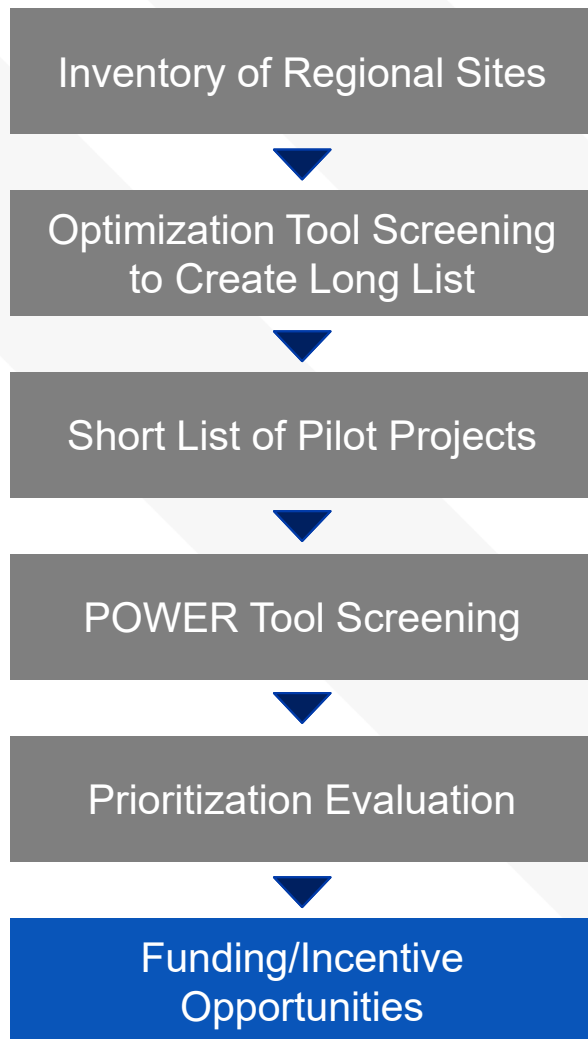
City of Denton Landfill Complex
2020 Census Block Group Minority Population \geq 50%



FUNDING AND INCENTIVES OPPORTUNITIES



Funding Incentives and Opportunities



- ▶ Funding/Incentives
 - ▶ Environmental credits (RFS, LCFS, etc.)
 - ▶ Federal policy and legislation (Inflation Reduction Act, Bipartisan Infrastructure Bill, etc.)
 - ▶ Infrastructure development grants/loans
 - ▶ Public-Private Partnerships
 - ▶ Alternative fuel transportation incentives
- ▶ There are many funding incentives and opportunities available
- ▶ Status of funding incentives is constantly in flux, and funding availability is subject to change based on a wide variety of reasons



Environmental Credits

Environmental Credit	Description	Value
Renewable Fuel Standard (RFS)	U.S. EPA categorizes RINs based on how alternative fuels (RNG, hydrogen) are manufactured including D3 RINs (derived from cellulosic sources) and D5 RINs (derived from other biomass, food waste material).	D3 RINs: \$3.00 - \$3.30 per credit D5 RINs \$1.50 – \$1.75 per credit (GGE basis)
California Low Carbon Fuel Standard (LCFS)	The Carbon Intensity (CI) score is a key component of the LCFS, ultimately determining the value that can be realized from environmental credits.	\$86.50 per credit (metric ton basis)
Oregon Clean Fuels Program (CFS)	Similar to California’s LCFS, credits are issued in a compliance-based market.	Credits trading at a value ranging between \$110-\$115 per credit (metric ton basis)
Forthcoming CFS	The State of Washington and Canada are each developing CFS frameworks intended to be enacted in 2023.	TBD

- ▶ Credits shown are directly applicable to organics to fuel projects utilizing RNG.
- ▶ Other environmental credits available as part of separate pathways or mechanisms (e.g., Renewable Energy Credit, Carbon Offset Credits). These are further discussed in the draft report.



Federal Policy/Legislation

- ▶ **Inflation Reduction Act** provides new and expanded tax credits for biogas projects and extends an alternative fuel tax credit for all biogas sectors
- ▶ **Infrastructure Investment and Jobs Act of 2021** provides new and expanded funding opportunities and appropriations for AD and associated infrastructure.
- ▶ **Volkswagen Clean Air Act Civil Settlement** supports the Texas Volkswagen Environmental Mitigation Program (TxVEMP), which provides grant opportunities to replace or upgrade older vehicles or equipment, or install alternative fueling equipment.
- ▶ **Justice40 Initiative** sets the goal of allocating 40 percent of the federal investments to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.
- ▶ **Alternative Fuel Excise Tax Credit** provides \$0.50 per gallon is available for the following alternative fuels: natural gas, liquefied hydrogen, propane, P-Series fuel, liquid fuel derived from coal through the Fischer-Tropsch process, and compressed or liquefied gas derived from biomass.
- ▶ **Alternative Fuel Tax Exemption** provides tax exemption from alternative fuels used in a manner that the Internal Revenue Service (IRS) deems as nontaxable are exempt from federal fuel taxes.



Inflation Reduction Act

- ▶ Provides new and expanded tax credits for biogas and hydrogen projects
 - ▶ Up to 30 percent rate of Investment Tax Credit (ITC) and Production Tax Credit (PTC) for facilities which begin construction before 2034
 - ▶ Additional 10 percent tax credit for domestic content bonus (e.g., for projects utilizing materials fabricated and manufactured in the U.S.)
 - ▶ Additional 10 percent tax credit for energy community bonus (e.g., for projects located in communities located on brownfield sites, high industrial activity, or high unemployment rates)
 - ▶ Extends alternative fuel tax credit of \$0.20 per gallon up to \$1.00 per gallon if prevailing wage and apprenticeship requirements are met



Public-Private Partnerships

Stakeholder	City-Owned and Operated	City-Owned with Private Operations	Privately Owned and Operated on City Land	Operating Services Agreement
Land Ownership	City	City	City	Private
Capital Investment	City	City	Private	Private
Operations	City	Private	Private	Private

- ▶ Key stakeholders for RNG projects include the biogas producer, gas distributor and vehicle fleet operator
- ▶ Stakeholders must collaborate to develop long-term projects to realize the financial benefits of environmental credits
 - ▶ Producers and distributors must provide biogas reliably to fleets
 - ▶ Fleets must use RNG for environmental credits to be recognized
- ▶ Revenue sharing is typical among the stakeholders to develop equitable long-term contractual relationships for RNG projects



RNG Offtake Management Companies

- ▶ RNG offtake management companies and other end users of RNG were engaged to determine level of interest and anticipated cost of services.
- ▶ A brief description of each company and a summary of each discussion is below.
 - ▶ U.S. Gain has fueling stations in the region and is a project developer offering services for RNG credit management.
 - ▶ Element Markets is an RNG marketing and environmental commodities company.
 - ▶ Clean Energy has fueling stations in the region and is a project developer.



Grants, Loans and Cost Sharing

- ▶ **Sustainable Materials Management Grants** are released by the U.S. EPA specific to supporting AD as an alternative to landfill disposal. Funding may vary by region.
- ▶ **Equipment/Consulting Grants** are released by NCTCOG from funding provided by the TCEQ supported by landfill disposal surcharges in Texas
- ▶ **Environmental Quality Incentives Program (EQIP)** is a cost-sharing program, sometimes referred to as cash reimbursement, that allows project owners to purchase and construct AD systems, and then apply for cost-sharing funds after the project is completed.
- ▶ **Hydrogen Demonstration Project Grants** fund hydrogen demonstration projects that can help lower the cost of hydrogen, reduce carbon emissions and local air pollution, and provide benefits to disadvantaged communities
- ▶ **Regional Clean Hydrogen Hubs** fund the development of at least four regional networks of hydrogen producers, potential hydrogen consumers, and connective infrastructure located in close proximity.



Alternative Fuel Transportation Incentives

Alternative Fuel Transportation Incentive	Administrator	Description
Alternative Fuel Corridor (AFC)	U.S. DOT	Deploy publicly accessible electric vehicle charging and hydrogen, propane, and natural gas fueling infrastructure along designated AFCs.
Electric Vehicle Charging and Clean Transportation Grants	U.S. DOE	Support transportation decarbonization research projects.
Clean School Bus program	U.S. EPA; TCEQ	Provide funding for the replacement of existing school buses with clean, alternative fuel school buses or zero-emission school buses. TCEQ administers a similar grant program for school bus retrofits or up to 80 percent of the cost to replace a school bus.
Congestion Mitigation and Air Quality (CMAQ) Improvement Program	U.S. EPA	Provide funding to state departments of transportation, local governments, and transit agencies for projects and programs that help meet the requirements of the Clean Air Act by reducing mobile source emissions and regional congestion on transportation networks.

Alternative Fuel Transportation Incentives (cont'd)



Alternative Fuel Transportation Incentive	Administrator	Description
Texas Clean Fleet Program (TCFP)	TCEQ	Incentivize owners of large fleets in Texas (75 or more vehicles) to replace diesel-powered vehicles with alternative fuel or hybrid vehicles.
Texas Natural Gas Vehicle Grant Program (TNGVGP).	TCEQ	Provides grants to encourage an entity that owns and operates a heavy-duty or medium-duty motor vehicle to retrofit the vehicle with a natural gas engine or replace the vehicle with a natural gas vehicle.
Alternative Fueling Facilities Program (AFFP)	TCEQ	Provides grants for eligible alternative fuel fueling facility projects in Texas' Clean Transportation Zone including \$6 million for CNG and/or LNG.

FEASIBILITY STUDY KEY FINDINGS AND RECOMMENDATIONS

Dallas Southside WWTP Pilot Project Key Findings



1. Facility has capacity to accept additional material without developing additional AD processing capacity
 - Limited ability to accept solid waste material continuously or store and pre-processing feedstock
2. Processing additional food waste and FOG would result in significant biogas yield increases
 - Limited ability to process surplus biogas
3. Location near McCommas Bluff Landfill and industrial trucking yards presents opportunity for biogas offtake
4. Shifting vehicle traffic from McCommas Bluff Landfill to Southside WWTP would reduce traffic congestion at disposal site
5. Although there are limited residents near the project location, increasing adoption of CNG/RNG to displace diesel would minimize airborne pollutants in the area

Dallas Southside WWTP Pilot Project Next Steps



1. Conduct further engineering and financial analysis to determine feasibility of transporting biogas to the gas processing facility at McCommas Bluff Landfill
2. Capital upgrades for pre-processing and biogas processing/transportation
 - Tipping area, preprocessing, storage tank
 - Gas processing infrastructure to support increased gas yield (thermal processor, gas scrubbing unit, etc.)
3. Develop contracts with future feedstock suppliers and offtake customers to support capital investment in facility upgrades
4. Identify applicable environmental credits, tax credits, and grant funding incentives and opportunities to support project
5. Develop testing protocol for increasing volume of solid waste and wastewater
6. Reach out to RNG offtake management firms to determine approach to generating environmental credits

Applicable Environmental Credits and Incentives



Environmental Credit	Applicable	Description
Renewable Fuel Standard (RFS)	Yes	If the additional biogas is utilized as vehicle fuel the Southside WWTP could generate D5 RINs at a value of \$1.50 – \$1.75 per credit
California Low Carbon Fuel Standard (LCFS)	No	Projects with CI scores that are not well below zero (e.g., landfill biogas projects) will not be able to compete with other projects that have more beneficial environmental impacts (e.g., dairy digester to RNG).
Renewable Energy Credits (REC)	No	Electricity generated would need to be sold to the grid rather than used on site.

- ▶ Consider federal incentives including Inflation Reduction Act and Justice40 Initiative
- ▶ Leverage grants including sustainable materials management grants, equipment/consulting grants, and hydrogen demonstration project grants.
- ▶ Support alternative fuel incentives such as the Congestion Mitigation and Air Quality (CMAQ) Improvement Program based on the facility location and Alternative Fueling Facilities Program (AFFP)

Denton Landfill Complex Pilot Project Key Findings



1. Pecan Creek WWTP and Dyno Dirt composting facility have some, but limited, existing capacity to accept additional material
2. There is a need for sludge disposal and processing capacity to support smaller WWTPs in Denton County
3. The Landfill Complex co-locates several facilities that increase the viability of an organics to fuel project (e.g., landfill, fueling station, scalehouse)
4. The City of Denton is currently planning and pursuing several projects related to organic waste processing and biogas utilization
 - Procuring a channel grinder to pre-process food waste
 - Pursuing landfill gas to RNG project
 - Considering development of third AD unit
5. Coordination between the City's solid waste, wastewater, and transportation groups is critical to pursuing organics to fuel project

Denton Landfill Complex Pilot Project Next Steps



1. Advance procurement of channel grinder and development of landfill biogas to RNG project
2. Determine most appropriate AD technology and potential location for installation at Pecan Creek WWTP or Dyno Dirt composting facility
 - New high-solids modular food waste and FOG digester
 - Expanded low-solids continuous flow digester for sludge management as part of hub-and-spoke system
3. Pursue capital upgrades for material storage and surplus biogas processing to process food waste and FOG while minimizing negative impacts of odors and vectors to nearby communities with environmental justice sensitivities
4. Develop contracts with future additional feedstock suppliers to support capital investment in facility upgrades
5. Pursue applicable environmental credits, tax credits, and grant funding incentives and opportunities to support acceptance of food waste, FOG and sludge from the nearby WWTPs as part of an ILA
6. Reach out to RNG offtake management firms to determine approach to generating environmental credits

Applicable Environmental Credits and Incentives



Environmental Credit	Applicable	Description
Renewable Fuel Standard (RFS)	Yes	If the additional biogas is utilized as vehicle fuel the Southside WWTP could generate D5 RINs at a value of \$1.50 – \$1.75 per credit.
California Low Carbon Fuel Standard (LCFS)	No	Projects with CI scores that are not well below zero (e.g., landfill biogas projects) will not be able to compete with other projects that have more beneficial environmental impacts (e.g., dairy digester to RNG).
Renewable Energy Credits (REC)	No	Electricity generated would need to be sold to the grid rather than used on site.

- ▶ Explore PFAS and pathogen mitigation funding available through the Infrastructure Investment and Jobs Act of 2021
- ▶ Leverage grants including sustainable materials management grants, and equipment/consulting grants
- ▶ Take advantage of federal tax credits, exemptions and grant funding related to alternative fuel usage
- ▶ Explore hydrogen demonstration projects related to alternative sludge management

THANK YOU!



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