REGIONAL WASTEWATER STUDY
FOR THE
TEXAS WATER DEVELOPMENT BOARD

Regional Wastewater Facilities Planning Grant #TRD-201005569
On Behalf of

The Gulf Coast Waste Disposal Authority

SPONSORED BY:
THE GREENS BAYOU CORRIDOR COALITION
HARRIS COUNTY PRECINCT 2
PORT OF HOUSTON
GULF COAST WASTE DISPOSAL AUTHORITY
ECONOMIC ALLIANCE HOUSTON PORT REGION

PREPARED BY
LJA ENGINEERING, INC., JOB NO. 2030-1101
MARCH 2013

1148311258 Final Report

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LIST OF ABBREVIATIONS

CAD	County Assistance Districts
CCN	Certificate of Convenience and Necessity
GBCC	Greens Bayou Corridor Coalition
GCWDA	Gulf Coast Waste Disposal Authority
GPD	Gallons Per Day
H-GAC	Houston-Galveston Area Council
MGD	Million Gallons Per Day
MUD	Municipal Utility District
NHA	North Houston Association
O&M	Operation & Maintenance
PCB	Polychlorinated Biphenyl
PID	Public Improvement District
POHA	Port of Houston
TCEQ	Texas Commission of Environmental Quality
TIRZ	Tax Increment Reinvestment Zone
TWDB	Texas Water Development Board
WCID	Water Control & Improvement District
WWTP	Wastewater Treatment Plant

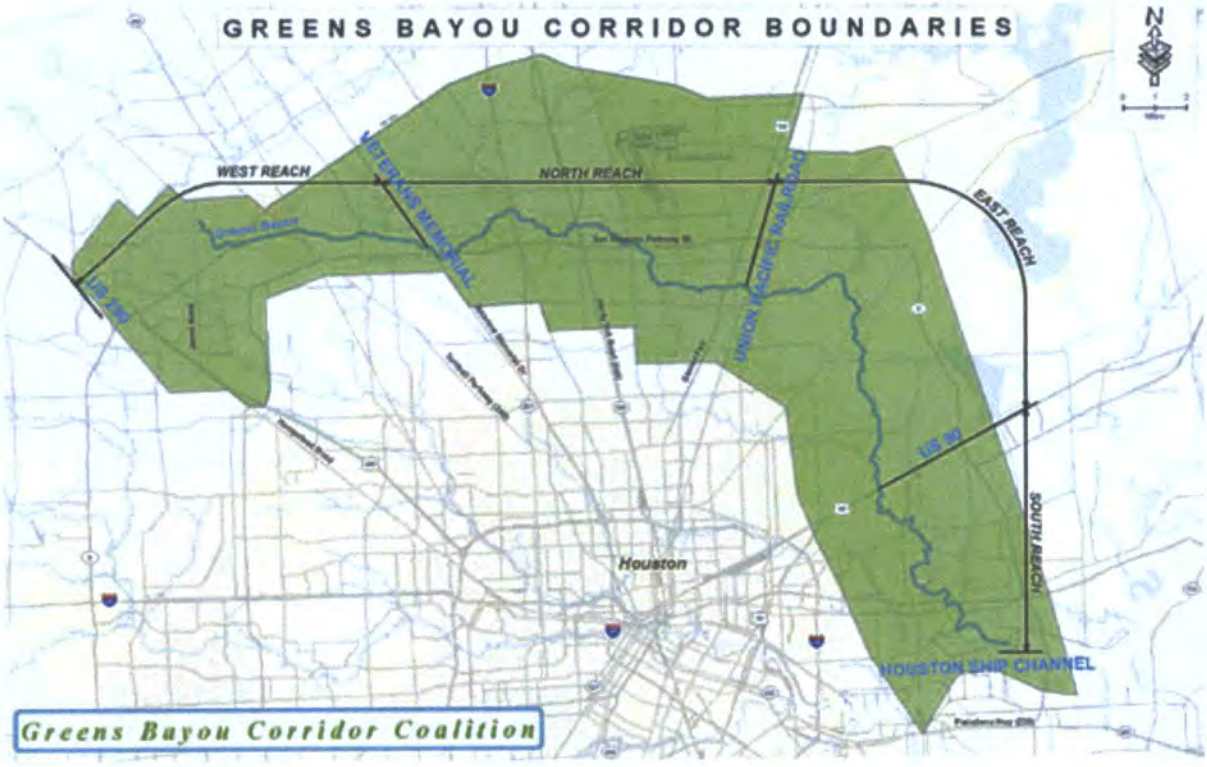
EXECUTIVE SUMMARY

This study shows that a regional wastewater treatment plant could be feasible if participants are committed to the plant, however, at a projected cost of approximately $5.05 per 1,000 gallons of wastewater treated, the cost appears not economical for existing facilities but could be cost effective for new development. Existing facilities that face rehabilitation or expansion due to increased flow, loading, or more stringent regulations make the cost of the regional facility even more affordable. Potential participants must weigh all of the costs associated with operating their own Wastewater Treatment Plant (WWTP) including future rehabs and potentially stricter regulatory requirements. In addition if Gulf Coast Waste Disposal Authority (GCWDA) finances the cost of the proposed WWTP, then any municipality that participates would not have to issue bonds for future repairs of their own facilities and could reserve them for other purposes. Industries benefit from the regional concept because the GCWDA would become responsible for permits and dealing with state and federal regulators regarding the wastewater treatment operation. Industries would also benefit from economy of scale by the sharing the operation and maintance cost of a regional facility. In addition industries would avoid the capital cost of installing an extensive treatment system. The concept of a regional wastewater treatment plant in the study area is feasible, however, it is recommended that a preliminary engineering design be commissioned to better define participants, service area, and costs.

If a major proposed industrial facility were to project a need for significant WWTP capacity, and was willing to secure the funding for such a facility this regional facility could be feasible. In addition existing landowners/developers could construct a regional facility in order to attract tenants and new industrial development to the area.

1.1 Introduction

The Greens Bayou Corridor Coalition (GBCC) is a 501(c)(3) organization developed through the North Houston Association (NHA) in 2007. It seeks to benefit the economy and enhance the quality of life for the 400,000 residents in the Greens Bayou watershed through flood mitigation, parks and trails development, and economic development. To better analyze and manage the needs of the watershed, the GBCC is broken into four geographic sections, called "reaches." The West, North, East and South reaches each have distinctive characteristics, challenges and opportunities. This study was a project of the South Reach which limits are from US Highway 90 south to the Houston Ship Channel along Greens Bayou.



The South Reach committee was approached by a committee member that they were aware of an area near the Port of Houston (POHA) which lacked domestic wastewater treatment. Since the GBCC mission is sensitive to water quality and economic drivers, a sub-committee was formed to investigate the suggestion further. The sub-committee was comprised of representatives from Harris County Precinct 2, the

Economic Alliance for the Port Area, the Gulf Coast Waste Disposal Authority (GCWDA), Senator Mario Gallegos' office, the GBCC and LJA Engineering. Over several meetings, the study area was defined as the area located in southeast Harris County bounded by the Houston Ship Channel on the south, Greens Bayou on the west, the San Jacinto River on the east and Interstate 10 on the north. This area measured approximately 7,000 acres and is wholly located within the City of Houston Extra Territorial Jurisdiction.

Further research by the sub-committee resulted with information from the TCEQ web-site indicating that there are 32 permitted wastewater treatment plants (WWTP's) in the proposed study area and that this area was expecting significant growth. Therefore, the need to combine the facilities for more efficient treatment of both existing and projected development became more apparent. Further research identified that this area was included in a September 2006 Comprehensive Study of the water and wastewater needs for the unincorporated areas of Harris County Pct 2 prepared by CDM Smith. However due to the industrial nature of this particular study area, it was not specifically in the analysis for treatment needs. Verbal conversations with the City of Houston revealed that no plans are in place to extend city services to this area. The local Certificate of Convenience and Necessity (CCN) holder, Aqua Texas, provides water but has no intensions of providing wastewater service. In addition, the subcommittee obtained an historic listing of permit violations to determine the level of compliance in the area. If compliance is an issue, the plant owners may welcome the regional plant concept. The violation summary obtained is presented in **Appendix A.**

Based on this research, the sub-committee agreed to develop a strategy to seek funding through the Texas Water Development Board (TWDB) which offered grant funding for planning studies for regional water and wastewater facilities. A 50% local match would need to be committed for the estimated $100,000 study before applying for the grant. To accomplish this, committee members approached the local Municipal Utility Districts (MUDs), the County, the POHA and other local stakeholders over several months. The GBCC South Reach sub-committee was successful in obtaining the local match and the TWDB grant.

1.2 Background

The proposed study was prepared to investigate the possibility of providing regional wastewater treatment services to the Greens Bayou South Reach area which is anticipated to have significant projected growth. The feasibility study defines a conceptual plan for implementation of a regional wastewater treatment system. It provides an estimate of potential costs and conceptual phasing of a regional treatment system. Existing facilities in the area were analyzed for the potential of becoming a regional system component. This study will be utilized by the participants to

determine a possible plan of action to implement all or portions of the plan. The concept of a single regional wastewater treatment plant to serve the entire study area was developed for both the existing facilities and new development since only 22% of existing generators responded to the survey and fewer yet expressed interest in the regional concept. Therefore, for the purposes of this report, regionalization simply means building a single facility to handle wastewater from several sources in one location.

A strong regional wastewater treatment system would allow participants to meet new and more stringent effluent criteria with minimal wastewater plants and discharge points and also provide potential cost savings for participants in the study area. The need to combine the facilities for more efficient treatment of both existing and projected development becomes more apparent as more stringent effluent standards are anticipated. By combining the multiple small treatment plants and septic systems into one larger system, efficiency, quality of effluent and cost savings should be realized.

Certain information is known about this area on a planning level basis, but further detailed study and cooperation from existing waste generators in the area is imperative to deciphering the needs for this planning area. There are three receiving streams in the study area, the Houston Ship Channel (Stream Segment 1006), Greens Bayou Tidal (Stream Segment 1006-03), and Carpenters Bayou Tidal (Stream Segment 1006-07). All three streams are classified as impaired:

- Houston Ship Channel for Bacteria, Dioxin in Edible Tissue, and Polychlorinated Biphenyl (PCBs) in Edible Tissue
- Greens Bayou for Bacteria, Dioxin in Edible Tissue, and PCBs in Edible Tissue
- Carpenters Bayou for Dioxin in Edible Tissue, and PCBs in Edible Tissue.

Utilizing the data described in the preceding paragraphs, our study will define a plan for implementation of a regional wastewater treatment system. It is possible that the existing 32 permitted facilities could be greatly reduced in number as regionalization is implemented. As previously discussed, this study presents a single regional facility. A list of the 32 permitted facilities obtained through the TCEQ is included in **Appendix B**.

In conclusion, as more detailed plans are provided to the existing waste generators, this study can be advanced and may gain greater support for regionalization. Once additional interest is created, more planning information about the area will become available to determine the efficiency of creating a regional management facility. It is recommended that a Preliminary Engineering Report be initiated to better define participants, service area, and costs.

1.3 Study Objectives

The study objective is to investigate the feasibility of providing regional wastewater treatment services to the Greens Bayou South Reach area. This area has significant projected growth. The feasibility study defined a conceptual plan for implementation of a regional wastewater treatment system. It provided an estimate of potential construction and operational costs and conceptual phasing of a regional treatment system. Known information of the existing facilities in the area were analyzed for the potential of becoming a regional system component. The results of the study will then be utilized by the participants to determine a possible plan of action to implement all or portions of the plan.

1.4 Study Participation

This study was funded by the Texas Water Development Board's Regional Wastewater Facility Planning Grant and matching funds from the following study participants:

- Green Bayou Corridor Coalition
- Harris County Precinct 2
- Port of Houston Authority
- Gulf Coast Waste Disposal Authority
- Economic Alliance Houston Port Region

1.5 Report Contents

This study contains a feasible plan to which a regional wastewater treatment plant could be constructed to serve some or all of the existing wastewater producers in the Greens Bayou South Reach Study Area and be modular in concept to allow for easy expansion to serve future growth.

The limited access to information regarding the existing facilities and their waste streams has made this study uniquely challenging. A survey was sent to each of the

ninety-two businesses in the study area and only twenty one were returned. The survey was sent on two separate occasions and all businesses were called in between each of the mailings, encouraging the business to complete and return the survey. An overwhelming majority of the businesses contacted were positive about the possibility of sending their waste to a regional facility if it were to be cost effective for them to do so. However most of the businesses refused to participate in the survey, with only a 22% response rate. A copy of the two surveys is attached as **Appendix C.**

2.1 Existing and Projected Land Use

The study area consists of parts of several Municipal Utility Districts and numerous industrial and commercial properties. The Municipal Utility Districts include of all of Harris County Fresh Water Supply District No. 6, some of Harris County Water Control and Improvement District No. 21, and a small part of Harris County Water Control and Improvement District No. 36. This area is located in southeast Harris County, and is bounded by the Houston Ship Channel on the south, Greens Bayou on the west, the San Jacinto River on the east and Interstate 10 on the north. The planning area is composed of approximately 7,000 acres and is wholly located within the City of Houston Extra Territorial Jurisdiction. The boundaries of the study area are shown in **Exhibit A.**

The planning area has industrial, residential and commercial components, all of which currently are served by their own treatment systems. The systems range in size from septic systems to package wastewater treatment plants to permanent wastewater treatment plants. Based on information provided by the TCEQ, there are 32 permitted wastewater treatment dischargers in the proposed planning area. Several of these are permitted for deep well injection. There are seven identified facilities actively discharging to surface waters in the study area. The data provided from both the TCEQ and survey results did not clearly identify how many of the remaining 25 permitted wastewater treatment dischargers are deep well injecting or are inactive. The permitted facilities listed as N/A in **Appendix B** are not actively discharging into surface waters.

These permitted facilities serve approximately 50% of the planning area which is comprised of 20% residential and commercial development served by Municipal Utility Districts and 30% industrial development served by individual wastewater treatment plants. **Exhibit B** shows the active, permitted wastewater treatment plant outfalls. The remaining 50% of the planning area is undeveloped or has isolated residences/business served by individual septic systems. The study identifies the existing plants. Based on the number and size of the existing treatment facilities, it appears that a regional system could be effective for the planning area depending on participation.

There are three receiving streams in the planning area, the Houston Ship Channel (Seg006), Greens Bayou Tidal (Seg 1006-03), and Carpenters Bayou Tidal (Seg 1006-07). All three streams are classified as impaired; the Houston Ship Channel for Bacteria, Dioxin in Edible Tissue, and PCBs in Edible Tissue, Greens Bayou for Bacteria, Dioxin in Edible Tissue, and PCBs in Edible Tissue, and Carpenters Bayou

GBCC & GCWDA
REGIONAL WWTP STUDY AREA

EXHIBIT A

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EXHIBIT B

GREENS BAYOU REGIONAL WASTEWATER

PROPOSED SERVICE AREA

TCEQ OUTFALLS

ACTIVE PERMIT 7700 WASTEWATER OUTFALLS

1 inch = 2,000 feet

Date: 10/2/2012

WOODFOREST BLVD

WOODFOREST BLVD

DELL DALE ST

SHELDON RD

10

MARKET ST

MARKET ST

10

S SHELDON RD

8
TEXAS

INDUSTRIAL RD

JACINTO PORT BLVD

TIDAL RD

DATA SOURCE:

CCN/OUTFALLS - TCEQ

Aerial Photograph - HGAC Jan 2010

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

T:\2030\1101\Exhibit\B 11x17.mxd

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for Dioxin in Edible Tissue, and PCBs in Edible Tissue. The impairment classification will make obtaining future discharge permits difficult and possibly lead the TCEQ to place more restrictive effluent limitations on existing discharge permits during the renewal process.

In addition to the existing development, the Economic Alliance Houston Port Region has indicated that significant future industrial development is anticipated which would be most efficiently served by a regional system. The majority of the undeveloped land is centrally located in the study area. The need to combine the facilities for more efficient treatment of both existing and projected development becomes more apparent as more stringent effluent standards are anticipated. By combining the multiple small treatment plants and septic systems into one or several larger systems, efficiency, quality of effluent and cost savings should be realized.

The industries in the study area did not actively provide information. They inherently were not comfortable with sharing information about their processes or their wastewater generation. During the course of this study two public meetings were held and notices were mailed to all of the companies in the study area. There were only four companies represented at the public meetings. In addition two surveys were mailed, three months apart, to over 92 businesses in the study area and only 21 responded (22%). Of those, 10 of the responses stated that they were not interested in sharing any information.

2.2 Identification of Flood Plain/Floodway Issues

An exhibit showing the land within the study area that lies within the Flood Plain and the Floodway is attached as **Exhibit C. Exhibits C-1, C-2, C-3** show individual layers of **Exhibit C** with **Exhibit C-1** showing only Map of Permitted WWTP Outfalls (listed in **Appendix B**); **Exhibit C-2** showing the Map of Active Outfalls with Service Areas(listed in **Table 1**); and **Exhibit C-3** showing the Map of Undeveloped Land(listed in **Table 2**). Although a wastewater treatment plant can not be located in the floodway, it is possible, although potentially not economical, to locate a wastewater treatment plant in the flood plain. If a wastewater treatment plant is located in the flood plain, basins and electrical components must be protected from the flood and the facility must have all weather access.

2.3 Effluent Reuse Potential

The effluent reuse potential is high for the industrial area since a large part of the water usage and resulting wastewater generation is from process cooling water or from wash down water. In many cases, the source water for these activities would not have to be potable and thus could be treated wastewater effluent possibly

EXHIBIT C

GREENS BAYOU REGIONAL WASTEWATER

Property Analysis

1 inch = 2,000 feet

Legend

Outfalls

- Permitted
- Permitted Active Discharges
- Superfund Sites (TCEQ)
- Wells - surface (RRC)
- Existing Service Areas of Active Plants
- Study Area
- Pipeline (RRC)
- Superfund Boundaries (TCEQ)
- Potential Wetlands
- Vacant Land
- Districts (TCEQ)

Harris County MUD 53

Harris County WCID 84

Harris County WCID 21

Harris County FWSD 6

DATA SOURCE:

CCN/OUTFALLS - TCEQ
Superfund Sites - TCEQ
Wells and Pipelines - Texas RRC
Potential Wetlands - NWI
Districts - TCEQ

Aerial Photograph - HGAC Jan 2010

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EXHIBIT C - 1

GREENS BAYOU REGIONAL WASTEWATER

Permitted Outfalls and Study Area Boundary

Legend

Permitted

Study Area

1 inch = 2,000 feet

10

10

A

B

C

D

29

37

39

29

8

8

15

5

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DATA SOURCE:

CCN/OUTFALLS - TCEQ

Aerial Photograph - HGAC Jan 2010

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EXHIBIT C - 2

GREENS BAYOU REGIONAL WASTEWATER

Active Outfalls with Service Area Boundaries and Study Area Boundary

Legend

- Permitted Active Discharges
- Existing Service Areas of Active Plants
- Study Area

1 inch = 2,000 feet

DATA SOURCE:

CCN/OUTFALLS - TCEQ

Aerial Photograph - HGAC Jan 2010

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EXHIBIT C - 3

GREENS BAYOU REGIONAL WASTEWATER

Undeveloped Land and Study Area Boundary

Legend

Study Area

Vacant Land

1 inch = 2,000 feet

10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

DATA SOURCE:

Aerial Photograph - HGAC Jan 2010

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requiring additional treatment to remove Total Dissolved Solids. A reliable, continuous source of reuse water has not been an option for most in the study area, so little planning has taken place regarding the use of reuse water.

2.4 Projected Growth Rate Analysis

Growth rate projections for this study area were obtained from Harris-Galveston Area Council (H-GAC). H-GAC prepares the projection of population, number of households, and the number of jobs for future years (from 2005 through 2035) in a multi-step process. The H-GAC starts by forecasting the total population in the region (eight counties—Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller—combined) using a National population projection from the U.S. Bureau of the Census and applying to it the H-GAC's projection of the region's share in the total U.S. population. In the next step, H-GAC allocates the regional population forecast to the counties using the shares from the two projections (known as "0.5" and "1.0" scenarios) of the county population growth developed by the Texas State Data Center and the Office of the State Demographer. Then, H-GAC derives the forecast for the number of households in each county from the ethnic and age compositions (drawn from the scenarios) of the forecasted county populations and demographic statistical relationships obtained from the 2010 Census data. H-GAC's regional employment forecast is driven by the available future population in the working age labor force. The regional employment forecast is then allocated to the counties using projected shares in the regional employment.

2.5 Projected Growth Rate

The H-GAC projections of the study area are for a steady almost linear growth. The H-GAC shows approximately 68% of the undeveloped area to become developed by the year 2025, 90% of the undeveloped area to be developed by the year 2035 and 100% by the year 2050. The growth is expected to be a mixture of light industrial, heavy industrial & commercial. The portion of the study area that is residential is nearly fully developed and significant additional residential development is not projected to occur in the study area. The undeveloped area is shown in **Exhibit C-3**.

2.6 Projected Flow

The inventory of existing wastewater treatment plants identified with associated permitted flow is shown in Table 1

TABLE 1

GREENS BAYOU REGIONAL WWTP STUDY

INVENTORY OF EXISTING WWTPs

STUDY ID No	TCEQ DIS PERMIT No	PLANT ADDRESS	PERMITTED FLOW (mgd)	SERVICE AREA (acres)
30	00749-000	2239 HADEN RD, HOUSTON TX 77015	0.9	191.75
40	10184-001	117 TOWER ST CHANNELVIEW, TX 77530	0.4	855
23&25	02458-000	16717 JACINTOPORT BLVD, HOUSTON TX 77015	0.2215	80.25
33	14700-001	400 SHELDON RD, CHANNELVIEW TX 77530	0.006	65
D		1914 HADEN RD, HOUSTON, TX 77015	1	52.9
21	12318-001	16530 PENINSULA ST, HOUSTON TX 77015	0.0051	16.77
31	04953-000	16530 PENINSULA ST, HOUSTON TX 77015	0.0105	7.3
	33 Permitted Facilities		**Total Flow 2.543**	**Total Acres 1268.97**

The Total Service Area in acres of the identified wastewater treatment plants is 1,268.97 acres and identified permitted flow is 2.546 million gallons per day. For projection of a yeild of wastewater production from undeveloped land, the following will be used:

2,543,000 gallons per day / 1268.97 acres = 2,004 gallons per acre per day.

TABLE 2

PROJECTION OF YEAR 2025 FLOW w 50% new Development Participation

	Acres		Undeveloped Tract#	Acres	Projected Use	Projected Wastewater mgd
Total Study Area	6,996	Acres	1	25	Heavy Industrial	0.075
Water & Wetlands	425		2	17.7	Retail / Office	0.018
Roads & Pipelines	319		3	24.8	Heavy Industrial	0.074
Developed	4,505		4	32	Heavy Industrial	0.096
Undeveloped	1,747		5	27	Light Industrial	0.041
			6	15	Light Industrial	0.023
			7	58	Light Industrial	0.087
			8	10	Light Industrial	0.015
			9	15	Light Industrial	0.023
			10	31.3	Light Industrial	0.047
			11	325	Light Industrial	0.488
			12	285	Light Industrial	0.428
Total Projected 2025 Flow			13	24.5	Light Industrial	0.037
Total Projected Flow = Existing + Projected			14	10	Office/Light Industrial	0.014
			15	26.4	Light Industrial	0.040
2.543+3.391*(68%)* (50%) =	**3.696 mgd**		16	17.5	Office/Light Industrial	0.024
			17	39.8	Light Industrial	0.060
			18	10	Light Industrial	0.015
			19	33.6	Light Industrial	0.050
projected flow is estimated			20	42.2	Light Industrial	0.063
1,500 gpd/acre		LI	21	86.8	Office/Light Industrial	0.118
1,000 gpd/acre		R/O	22	100	Light Industrial	0.150
3,000 gpd/acre		HI	23	41	Light Industrial	0.062
1,360 gpd/acre		O/LI	24	24	Heavy Industrial	0.072
			25	400	Heavy Industrial	1.200
			26	10	Heavy Industrial	0.030
			27	15	Heavy Industrial	0.045
				1,746.6		3.391

Table 2 above shows the projected development and associated flow for the year 2025. The table lists all of the current undeveloped land in the study area and applies a 68% development rate as discussed in Section 2.5. In addition a 50% participation is applied.

TABLE 3

PROJECTION OF YEAR 2025 FLOW w 100% new Development Participation

	Acres		Undeveloped Tract#	Acres	Projected Use	Projected Wastewater mgd
Total Study Area	6,996	Acres	1	25	Heavy Industrial	0.075
Water & Wetlands	425		2	17.7	Retail / Office	0.018
Roads & Pipelines	319		3	24.8	Heavy Industrial	0.074
Developed	4,505		4	32	Heavy Industrial	0.096
Undeveloped	1,747		5	27	Light Industrial	0.041
			6	15	Light Industrial	0.023
			7	58	Light Industrial	0.087
			8	10	Light Industrial	0.015
			9	15	Light Industrial	0.023
			10	31.3	Light Industrial	0.047
			11	325	Light Industrial	0.488
			12	285	Light Industrial	0.428
Total Projected 2025 Flow			13	24.5	Light Industrial	0.037
Total Projected Flow = Existing + Projected			14	10	Office/Light Industrial	0.014
			15	26.4	Light Industrial	0.040
2.543+3.391*(68%) =	**4.849 mgd**		16	17.5	Office/Light Industrial	0.024
			17	39.8	Light Industrial	0.060
			18	10	Light Industrial	0.015
			19	33.6	Light Industrial	0.050
projected flow is estimated			20	42.2	Light Industrial	0.063
1,500 gpd/acre		LI	21	86.8	Office/Light Industrial	0.118
1,000 gpd/acre		R/O	22	100	Light Industrial	0.150
3,000 gpd/acre		HI	23	41	Light Industrial	0.062
1,360 gpd/acre		O/LI	24	24	Heavy Industrial	0.072
			25	400	Heavy Industrial	1.200
			26	10	Heavy Industrial	0.030
			27	15	Heavy Industrial	0.045
				1,746.6		3.391

Table 3 above shows the projected development and associated flow for the year 2025. The table lists all of the current undeveloped land in the study area and applies a 6% development rate as discussed in Section 2.5. In addition a 100% participation is applied.

TABLE 4

PROJECTION OF YEAR 2035 FLOW w 50% new Development Participation

	Acres		Undeveloped Tract #	Acres	Projected Use	Projected Wastewater mgd
Total Study Area	6996	Acres	1	25	Heavy Industrial	0.075
Water & Wetlands	425		2	17.7	Retail / Office	0.018
Roads & Pipelines	319		3	24.8	Heavy Industrial	0.074
Developed	4505.4		4	32	Heavy Industrial	0.096
Undeveloped	1746.6		5	27	Light Industrial	0.041
			6	15	Light Industrial	0.023
			7	58	Light Industrial	0.087
			8	10	Light Industrial	0.015
			9	15	Light Industrial	0.023
			10	31.3	Light Industrial	0.047
			11	325	Light Industrial	0.488
			12	285	Light Industrial	0.428
Total Projected 2035 ULTIMATE Flow			13	24.5	Light Industrial	0.037
Total Projected Flow = Existing + Projected			14	10	Office/Light Industrial	0.014
			15	26.4	Light Industrial	0.040
2.543+3.391*(90% Dev)*(50%) =	**4.069 mgd**		16	17.5	Office/Light Industrial	0.024
			17	39.8	Light Industrial	0.060
			18	10	Light Industrial	0.015
projected flow is estimated			19	33.6	Light Industrial	0.050
1,500 gpd/acre		LI	20	42.2	Light Industrial	0.063
1,000 gpd/acre		R/O	21	86.8	Office/Light Industrial	0.118
3,000 gpd/acre		HI	22	100	Light Industrial	0.150
1,360 gpd/acre		O/LI	23	41	Light Industrial	0.062
			24	24	Heavy Industrial	0.072
			25	400	Heavy Industrial	1.200
			26	10	Heavy Industrial	0.030
			27	15	Heavy Industrial	0.045
				1,746.6		3.391

Table 4 above shows the projected development and associated flow for the year 2035. The table lists all of the current undeveloped land in the study area and applies a 90% development rate as discussed in Section 2.5. In addition a 50% participation is applied.

TABLE 5

PROJECTION OF YEAR 2035 FLOW w 100% new Development Participation

	Acres		Undeveloped Tract #	Acres	Projected Use	Projected Wastewater mgd
Total Study Area	6996	Acres	1	25	Heavy Industrial	0.075
Water & Wetlands	425		2	17.7	Retail / Office	0.018
Roads & Pipelines	319		3	24.8	Heavy Industrial	0.074
Developed	4505.4		4	32	Heavy Industrial	0.096
Undeveloped	1746.6		5	27	Light Industrial	0.041
			6	15	Light Industrial	0.023
			7	58	Light Industrial	0.087
			8	10	Light Industrial	0.015
			9	15	Light Industrial	0.023
			10	31.3	Light Industrial	0.047
			11	325	Light Industrial	0.488
			12	285	Light Industrial	0.428
Total Projected 2035 ULTIMATE Flow			13	24.5	Light Industrial	0.037
Total Projected Flow = Existing + Projected			14	10	Office/Light Industrial	0.014
			15	26.4	Light Industrial	0.040
2.543+3.391*(90%Dev) =	**5.595 mgd**		16	17.5	Office/Light Industrial	0.024
			17	39.8	Light Industrial	0.060
			18	10	Light Industrial	0.015
projected flow is estimated			19	33.6	Light Industrial	0.050
1,500 gpd/acre		LI	20	42.2	Light Industrial	0.063
1,000 gpd/acre		R/O	21	86.8	Office/Light Industrial	0.118
3,000 gpd/acre		HI	22	100	Light Industrial	0.150
1,360 gpd/acre		O/LI	23	41	Light Industrial	0.062
			24	24	Heavy Industrial	0.072
			25	400	Heavy Industrial	1.200
			26	10	Heavy Industrial	0.030
			27	15	Heavy Industrial	0.045
				1,746.6		3.391

Table 5 above shows the projected development and associated flow for the year 2035. The table lists all of the current undeveloped land in the study area and applies a 90% development rate as discussed in Section 2.5. In addition a 100% participation is applied.

TABLE 6

PROJECTION OF YEAR 2050 FLOW w 50% new Development Participation

	Acres		Undeveloped Tract #	Acres	Projected Use	Projected Wastewater mgd
Total Study Area	6996	Acres	1	25	Heavy Industrial	0.075
Water & Wetlands	425		2	17.7	Retail / Office	0.018
Roads & Pipelines	319		3	24.8	Heavy Industrial	0.074
Developed	4505.4		4	32	Heavy Industrial	0.096
Undeveloped	1746.6		5	27	Light Industrial	0.041
			6	15	Light Industrial	0.023
			7	58	Light Industrial	0.087
			8	10	Light Industrial	0.015
			9	15	Light Industrial	0.023
			10	31.3	Light Industrial	0.047
			11	325	Light Industrial	0.488
			12	285	Light Industrial	0.428
Total Projected 2050 ULTIMATE Flow			13	24.5	Light Industrial	0.037
Total Projected Flow = Existing + Projected			14	10	Office/Light Industrial	0.014
			15	26.4	Light Industrial	0.040
2.543+3.391*(50%) =		**4.239 mgd**	16	17.5	Office/Light Industrial	0.024
			17	39.8	Light Industrial	0.060
			18	10	Light Industrial	0.015
projected flow is estimated			19	33.6	Light Industrial	0.050
1,500 gpd/acre		LI	20	42.2	Light Industrial	0.063
1,000 gpd/acre		R/O	21	86.8	Office/Light Industrial	0.118
3,000 gpd/acre		HI	22	100	Light Industrial	0.150
1,360 gpd/acre		O/LI	23	41	Light Industrial	0.062
			24	24	Heavy Industrial	0.072
			25	400	Heavy Industrial	1.200
			26	10	Heavy Industrial	0.030
			27	15	Heavy Industrial	0.045
				1,746.6		3.391

Table 6 above shows the projected development and associated flow for the year 2050. The table lists all of the current undeveloped land in the study area and applies a 50% participation rate.

TABLE 7

PROJECTION OF YEAR 2050 FLOW w 100% new Development Participation

	Acres		Undeveloped Tract #	Acres	Projected Use	Projected Wastewater mgd
Total Study Area	6996	Acres	1	25	Heavy Industrial	0.075
Water & Wetlands	425		2	17.7	Retail / Office	0.018
Roads & Pipelines	319		3	24.8	Heavy Industrial	0.074
Developed	4505.4		4	32	Heavy Industrial	0.096
Undeveloped	1746.6		5	27	Light Industrial	0.041
			6	15	Light Industrial	0.023
			7	58	Light Industrial	0.087
			8	10	Light Industrial	0.015
			9	15	Light Industrial	0.023
			10	31.3	Light Industrial	0.047
			11	325	Light Industrial	0.488
			12	285	Light Industrial	0.428
Total Projected 2050 ULTIMATE Flow			13	24.5	Light Industrial	0.037
Total Projected Flow = Existing + Projected			14	10	Office/Light Industrial	0.014
			15	26.4	Light Industrial	0.040
2.543+3.391 =		**5.934 mgd**	16	17.5	Office/Light Industrial	0.024
			17	39.8	Light Industrial	0.060
			18	10	Light Industrial	0.015
projected flow is estimated			19	33.6	Light Industrial	0.050
1,500 gpd/acre		LI	20	42.2	Light Industrial	0.063
1,000 gpd/acre		R/O	21	86.8	Office/Light Industrial	0.118
3,000 gpd/acre		HI	22	100	Light Industrial	0.150
1,360 gpd/acre		O/LI	23	41	Light Industrial	0.062
			24	24	Heavy Industrial	0.072
			25	400	Heavy Industrial	1.200
			26	10	Heavy Industrial	0.030
			27	15	Heavy Industrial	0.045
				1,746.6		3.391

Table 7 above shows the projected development and associated flow for the year 2050. The table lists all of the current undeveloped land in the study area and applies a 100% participation rate.

3.1 Regional Service Areas

Table 1 on page 15 shows the existing active, permitted dischargers in the study area. There are many additional permitted dischargers, however only the permittees that are actively discharging to surface receiving streams are considered. Permitted facilities that are permitted to dispose of treated effluent through deep well injection are not included in the study. Unless regulations change, it will not be cost effective for facilities that are currently discharging though deep well injection to send the waste off site to a proposed regional wastewater treatment plant. As regulations increase, an additional study may be initiated to determine the point of cost effectiveness.

Discussions with Gulf Coast Waste Disposal Authority, the proposed provider of wastewater treatment services in this area, confirm that GCWDA provides industrial wastewater treatment utilizing biological treatment processes and that a domestic wastewater component is desirable to provide the nutrients necessary to support optimal biological activity. Some industrial flows that could inhibit the biological treatment process would require pretreatment before discharging to the regional facility.

3.2 Refine Service Areas Based on Wetland & Flood Plain/Floodway Issues

Exhibit C, discussed in Section 2.2, shows the undeveloped land that is possibly affected by wetlands, located in the flood plain or in the floodway. Properties affected by these areas have been removed from the total of developable acreage. It is possible to develop this property, but for the purpose of this study land with possible wetland issues, land located in the flood plain and land located in the floodway were not considered. However the possible site of the proposed regional wastewater treatment plant is partially located in the flood plain. It is possible to locate wastewater treatment plants in the flood plain as long a precautions are taken to protect the facility from flooding. The desired location of any wastewater treatment plant is often located at the lowest surrounding elevation and in close proximity to existing water bodies for effluent disposal.

SECTION 4 PLAN Of WASTEWATER TREATMENT FACILITIES/COLLECTION SYSTEM

4.1 Regional Service Areas

The concept of a single regional wastewater treatment plant to serve the entire study area was developed to serve primarily new development since only 22% of existing generators expressed interest in the regional concept. The major factors in the selection of suitable sites for treatment facilities include the following: topography; availability of a suitable discharge point; and maintaining a reasonable distance from living quarters, working areas and public use areas. The location of the proposed wastewater treatment plant should be as far away from residences as possible to lessen air emission requirements and in order to minimize costs, it should be located in a location central to both existing and new generators in the study area. The siting criteria for the water pollution control facility should consider State wellhead protection requirements for drinking water sources. The proposed wastewater treatment plant will require a minimum distance of 1,000 feet be maintained between a drinking water well. In addition, a location close to a discharge route to a receiving water body will minimize costs associated with disposal of effluent. Ample space must be allocated not only for a suitable layout of the initial units and associated plant piping but also to accommodate future expansion. Future expansion includes the provision of increased capacity for existing processes and the addition of new types of units known to be required for upgrading predesigned systems to the future requirements of more stringent stream and effluent standards. The proposed location, a 20 acre site, was selected to accommodate these criteria, is shown on **Exhibit D.**

4.2 Refine Service Areas Based on Wetland & Flood Plain/Floodway Issues

Exhibit C shows the undeveloped land that is possibly affected by wetlands, located in the flood plain or in the floodway. Property affected by these has been removed from the total of developable acreage. It is possible to develop this property, but for the purpose of this study land with possible wetland issues, land located in the flood plain and land located in the floodway was not considered. However the possible site of the proposed regional wastewater treatment plant is partially located in the flood plain. It is possible to locate wastewater treatment plants in the flood plain as long a precautions are taken to protect the facility from flooding. The desired location of any wastewater treatment plant is often located at the lowest surrounding elevation and in close proximity to existing water bodies for effluent disposal. This leads to many wastewater treatment plants being located in the flood plain.

EXHIBIT D

GREENS BAYOU REGIONAL WASTEWATER

PROPOSED SERVICE AREA

TCEQ OUTFALLS

ACTIVE PERMIT 7700 WASTEWATER OUTFALLS

PROPOSED WWTP LOCATION

PROPOSED COLLECTOR LINE

1 inch = 2,000 feet

Date: 10/2/2012

WOODFOREST BLVD

DELL DALE ST

SHELDON RD

MARKET ST

10

8 TEXAS

JACINTO PORT BLVD

INDUSTRIAL RD

TIDAL RD

PROPOSED COLLECTOR LINE

PROPOSED 20 AC REGIONAL WWTP LOCATION

DATA SOURCE:

CCN/OUTFALLS - TCEQ

Aerial Photograph - HGAC Jan 2010

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

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LJA Engineering, Inc.

SECTION 5 TREATMENT And SEWER NETWORK PLAN

5.1 Collections and Treatment Concepts

This study anticipates that the Gulf Coast Waste Disposal Authority would ultimately construct and operate any wastewater treatment plant and collection system born out of this study. The Gulf Coast Waste Disposal Authority (GCWDA) was created by the Texas Legislature in 1969 as a non-tax supported unit of government dedicated to waste management activities. The GCWDA operates each of their industrial wastewater treatment plants, and would own and operate any proposed plant as a result of this study, under an exemption from federal categorical pretreatment standards for industrial wastewater. This exemption allows GCWDA as a Publicly Owned Treatment Works to treat wastewater from many differing industrial customers without requiring the industrial dischargers to install and operate expensive, redundant pretreatment equipment. The elimination of pretreatment costs cannot be quantified in this study due to lack of information available from the individual dischargers, however it could be substantial. With proposed industrial dischargers developing in the future, there would be the added benefit from foregoing the capital expense in addition to the operating expense of unnecessary pretreatment and/or treatment systems.

The lack of available information regarding the generation of wastewater by the producers in the study area limits the usefulness of any attempt to estimate the cost of a regional collection system. Not knowing characteristics of the wastewater such as the generation duration, intensity, and strength would not allow for a proper sizing and cost estimating of a collection system. **Exhibit F** and **Exhibit G** show the distance from the proposed wastewater treatment plant and the increase in operational costs associated with the longer associated collection system.

The proposed wastewater treatment plant required to treat both domestic and industrial wastewater would be an Activated Sludge process where the treatment facilities make use of microorganisms to clean wastewater then remove the microorganisms before the treated water is released. The microbes are then reused to clean up additional wastewater. The use of the Activated Sludge process will allow the optimization the treatment of the specific waste streams received at the proposed facility.

5.2 Projected Service Areas and Phasing

The projected service area for the study is the area bounded by Interstate 10 to the north, Greens Bayou to the west, Houston Ship Channel to the south, and the San Jacinto River to the east. The phasing would match the projected development of the area as shown in **Table 2** through **Table 7** in section 2.6. The projected development showed an approximate estimated additional 2.3 mgd in wastewater by the year 2025, another estimated 0.8 mgd in wastewater by the year 2035, and an additional 0.4 mgd by the year

2050, for a total of 6.0 mgd. The proposed wastewater treatment plant would be phased to accommodate this projected anticipated flow by designing for a portion of the existing and projected growth in the first phase. The projected phasing follows: Phase 1 - 3.5mgd (existing), Phase 2 – 4.8mgd (2025), Phase 3 – 5.6mgd (2035), and Phase 4 – 6.0 mgd (2050).

5.3 Cost Estimates

The GCWDA, when created by the Texas Legislature, was granted the ability to issue tax-exempt bonds for the use of constructing waste management facilities. The cost estimates shown in **Table 8** through **Table 11** assume the use of GCWDA bonds to fund the construction of the facility and the retirement of the bonds through user fees. This approach would require a contractual commitment from all participants before the sale of bonds in anticipation of construction for initial construction and for any additional phases of expansion.

As discussed above, the lack of available information regarding the generation of wastewater by the producers in the study area such as the wastewater generation duration, intensity, and strength requires proposing a wastewater treatment plant capable treating a hydraulic load estimated at 3.5 million gallons per day based on know permitted discharge flow limits. The organic strength of the influent wastewater is not known, so for that reason a conservative cost of constructing the wastewater treatment plant of $6 per gallon is used in the cost analysis shown in **Table 8** for the initial construction and $7 per gallon used in the cost estimates shown in **Table 9** through **Table 11** for expansion construction. Since the proposed collection system associated with this treatment plant is very minimal, the peaking factor for the proposed plant will be in the 2.0 to 2.5 range. This is due to the low influence of Infiltration and Inflow, a source of increased hydraulic loading in tradition collection and treatment plants.

Table 12 shows the debt service in terms of 1,000 gallons treated for each of the phases of the plant with respect to the debt issued for each phase. As the 20 year debt retires, the debt service reduces. There are no rehab costs in this evaluation since a large yearly Maintenance and Replacement cost is added to the operational cost estimates shown in **Table 13** through **Table 16**.

Table 13 through **Table 16** show the calculation of the operational cost estimates for each of the four phases of the proposed WWTP. **Table 17** is a summary of both the debt service and operational costs in terms of dollars per 1,000 gallons treated. **Table 17** shows the total cost of Phase 1 (3.5 mgd) with a cost of $5.03 per 1,000 gallons treated. It also shows the most expensive as Phase 2, with a cost of $5.07 per 1,000 gallons treated. After the debt is retired from Phase I, occurring after year 2033, the operational cost drop significantly to an estimate low of $2.63 per 1,000 gallons treated.

Table 8 below shows the construction cost estimate for the debt to be issued to construct a proposed 3.5 mgd WWTP.

TABLE 8

SUMMARY OF CONSTRUCTION COSTS PHASE 1

CONSTRUCTION COSTS	UNIT	Unit Quantity	Unit Cost	TOTAL
WWTP LAND	Acre	20	$45,000	$900,000
COLLECTION SYSTEM w EASEMENTS	Linear Foot	5,500	$200	$1,100,000
WWTP 3.5 mgd	Gallon	3,500,000	$6	$21,000,000
SUB-TOTAL CONSTRUCTION COSTS				$23,000,000
Engineering/Testing (18% of CC)				$4,140,000
25% Contingencies on all Items				$6,785,000
TOTAL CONSTRUCTION COSTS				**$33,925,000**
NON-CONSTRUCTION COSTS (SOFT COSTS)				
A) LEGAL FEES (3% OF B.I.R.)				$1,266,000
B) FISCAL AGENT FEES (2% OF B.I.R.)				$844,000
C) BOND DISCOUNT (3% OF B.I.R.)				$1,266,000
D) INTEREST COSTS 1) CAPITALIZED INTEREST (2 YEAR @ 5.5% OF B.I.R.)				$4,642,000
E) BOND APPLICATION PREP AND APPROVAL				$50,000
F) TCEQ BOND ISSUE FEE (0.25%)				$105,500
G) ATTORNEY GENERAL FEE (0.1% UP TO $9,500 PER APPLICATION)				$9,500
TOTAL NON-CONSTRUCTION COSTS				**$8,183,000**
TOTAL BOND ISSUE REQUIREMENT				**$42,200,000**
EXACT B.I.R. CALCULATION				$42,108,000

Table 9 below shows the construction cost estimate for the debt to be issued to construct a proposed 1.3 mgd WWTP expansion.

TABLE 9

SUMMARY OF CONSTRUCTION COSTS PHASE 2

CONSTRUCTION COSTS	UNIT	Unit Quantity	Unit Cost	TOTAL
COLLECTION SYSTEM w EASEMENTS	Linear Foot	5,500	$200	$1,100,000
WWTP 4.8 mgd (1.3 mgd expansion)	Gallon	1,300,000	$7	$9,100,000
SUB-TOTAL CONSTRUCTION COSTS				$10,200,000
Engineering/Testing (18% of CC)				$1,836,000
25% Contingencies on all Items				$3,009,000
TOTAL CONSTRUCTION COSTS				**$15,045,000**
NON-CONSTRUCTION COSTS (SOFT COSTS)				
A) LEGAL FEES (3% OF B.I.R.)				$564,000
B) FISCAL AGENT FEES (2% OF B.I.R.)				$376,000
C) BOND DISCOUNT (3% OF B.I.R.)				$564,000
D) INTEREST COSTS 1) CAPITALIZED INTEREST (2 YEAR @ 5.5% OF B.I.R.)				$2,068,000
E) BOND APPLICATION PREP AND APPROVAL				$50,000
F) TCEQ BOND ISSUE FEE (0.25%)				$47,000
G) ATTORNEY GENERAL FEE (0.1% UP TO $9,500 PER APPLICATION)				$9,500
TOTAL NON-CONSTRUCTION COSTS				**$3,678,500**
TOTAL BOND ISSUE REQUIREMENT				**$18,800,000**
EXACT B.I.R. CALCULATION				$18,723,500

Table 10 below shows the construction cost estimate for the debt to be issued to construct a proposed 0.8 mgd WWTP expansion.

TABLE 10

SUMMARY OF CONSTRUCTION COSTS PHASE 3

CONSTRUCTION COSTS	UNIT	Unit Quantity	Unit Cost	TOTAL
COLLECTION SYSTEM w EASEMENTS	Linear Foot	5,500	$200	$1,100,000
WWTP 5.6 mgd (0.8 mgd exp)	Gallon	800,000	$7	$5,600,000
SUB-TOTAL CONSTRUCTION COSTS				$6,700,000
Engineering/Testing (18% of CC)				$1,206,000
25% Contingencies on all Items				$1,976,500
TOTAL CONSTRUCTION COSTS				**$9,882,500**
NON-CONSTRUCTION COSTS (SOFT COSTS)				
A) LEGAL FEES (3% OF B.I.R.)				$372,000
B) FISCAL AGENT FEES (2% OF B.I.R.)				$248,000
C) BOND DISCOUNT (3% OF B.I.R.)				$372,000
D) INTEREST COSTS 1) CAPITALIZED INTEREST (2 YEAR @ 5.5% OF B.I.R.)				$1,364,000
E) BOND APPLICATION PREP AND APPROVAL				$50,000
F) TCEQ BOND ISSUE FEE (0.25%)				$31,000
G) ATTORNEY GENERAL FEE (0.1% UP TO $9,500 PER APPLICATION)				$9,500
TOTAL NON-CONSTRUCTION COSTS				**$2,446,500**
TOTAL BOND ISSUE REQUIREMENT				**$12,400,000**
EXACT B.I.R. CALCULATION				$12,329,000

Table 11 below shows the construction cost estimate for the debt to be issued to construct a proposed 0.4 mgd WWTP expansion.

TABLE 11

SUMMARY OF CONSTRUCTION COSTS PHASE 4

CONSTRUCTION COSTS	UNIT	Unit Quantity	Unit Cost	TOTAL
COLLECTION SYSTEM w EASEMENTS WWTP 6.0 mgd (0.4 mgd exp)	Linear Foot Gallon	5,500 400,000	$200 $7	$1,100,000 $2,800,000
SUB-TOTAL CONSTRUCTION COSTS				$3,900,000
Engineering/Testing (18% of CC)				$702,000
25% Contingencies on all Items				$1,150,500
TOTAL CONSTRUCTION COSTS				**$5,752,500**
NON-CONSTRUCTION COSTS (SOFT COSTS)				
A) LEGAL FEES (3% OF B.I.R.)				$219,000
B) FISCAL AGENT FEES (2% OF B.I.R.)				$146,000
C) BOND DISCOUNT (3% OF B.I.R.)				$219,000
D) INTEREST COSTS 1) CAPITALIZED INTEREST (2 YEAR @ 5.5% OF B.I.R.)				$803,000
E) BOND APPLICATION PREP AND APPROVAL				$50,000
F) TCEQ BOND ISSUE FEE (0.25%)				$18,250
G) ATTORNEY GENERAL FEE (0.1% UP TO $9,500 PER APPLICATION)				$9,500
TOTAL NON-CONSTRUCTION COSTS				**$1,464,750**
TOTAL BOND ISSUE REQUIREMENT				**$7,300,000**
EXACT B.I.R. CALCULATION				$7,217,250

Table 12 below shows the estimation of the debt service calculatior terms cost per thousand of gallons treated for the life of the facility.

TABLE 12

PRESENT PROJECTED DEBT SERVICE CALCULATION	
Interest Rate =	5.50%
Life of Bonds (Years) =	20
Capital Recovery Factor (A/P) =	0.08368
Phase 1 Years 2013-2025	
Debt Service per Year =	$3,531,268
Debt Service per 1,000 Gallons Treated	$2.76
Assumes full capacity of 3.5 mgd plant	
Phase 1 & 2 Years 2025-2033	
Debt Service per Year =	$5,104,439
Debt Service per 1,000 Gallons Treated	$2.91
Assumes full capacity of 4.8 mgd plant	
Phase 1 & 2 Years 2033-2035	
Debt Service per Year =	$1,573,171
Debt Service per 1,000 Gallons Treated	$1.23
Assumes full capacity of 4.8 mgd plant	
Phase 1, 2, & 3 Years 2035-2045	
Debt Service per Year =	$2,610,795
Debt Service per 1,000 Gallons Treated	$1.28
Assumes full capacity of 5.6 mgd plant	
Phase 1, 2, & 3 Years 2045-2050	
Debt Service per Year =	$1,037,624
Debt Service per 1,000 Gallons Treated	$0.81
Assumes full capacity of 5.6 mgd plant	
Phase 1, 2, 3, & 4 Years 2050-2055	
Debt Service per Year =	$1,648,483
Debt Service per 1,000 Gallons Treated	$1.16
Assumes full capacity of 6.0 mgd plant	
Phase 1, 2, 3, & 4 Years 2055-2070	
Debt Service per Year =	$610,859
Debt Service per 1,000 Gallons Treated	$0.48
Assumes full capacity of 6.0 mgd plant	

Table 13 below shows the calculation of operational costs related to the proposed 3.5 mgd Phase 1 WWTP

TABLE 13

CALCULATION OF DAILY OPERATIONAL COST
Of
3.5 MGD WASTEWATER TREATMENT PLANT

	No.	Unit	Unit Cost per day	Total Cost
Permitting/Regulatory Fees	3.50	$/MGD	$150	$525
Electricity	14,000	Kwh	$0.20	$2,800
Chemicals	3,500	k gallon	$0.12	$420
Sludge transport & Disposal	2.10	ton	$200.00	$420
Admin Staff	80.0	Man Hours	$30	$2,400
Maintenance & Replacement [1]	1	day	$1,394	$1,394
		TOTAL DAILY OPERATIONAL COST		$7,959
		Monthly		$242,091.67
		Annual		$2,905,100.00

Notes:
1. Maintenance & Replacement costs 1.5% of initial construction costs per year

Table 14 below shows the calculation of operational costs related to the proposed 4.8 mgd Phase 2 WWTP

TABLE 14

CALCULATION OF DAILY OPERATIONAL COST
Of
4.8 MGD WASTEWATER TREATMENT PLANT

	No.	Unit	Unit Cost per day	Total Cost
Permitting/Regulatory Fees	4.80	$/MGD	$150	$720
Electricity	19,200	Kwh	$0.20	$3,840
Chemicals	4,800	k gallon	$0.12	$576
Sludge transport & Disposal	2.90	ton	$200.00	$580
Admin Staff	88.0	Man Hours	$30	$2,640
Maintenance & Replacement [1]	1	day	$2,012	$2,012
		TOTAL DAILY OPERATIONAL COST		$10,368
		Monthly		$315,374.17
		Annual		$3,784,490.00

Notes:
1. Maintenance & Replacement costs 1.5% of initial construction costs per year

Table 15 below shows the calculation of operational costs related to the proposed 5.6 mgd Phase 3 WWTP

TABLE 15

CALCULATION OF DAILY OPERATIONAL COST
Of
5.6 MGD WASTEWATER TREATMENT PLANT

	No.	Unit	Unit Cost per day	Total Cost
Permitting/Regulatory Fees	5.60	$/MGD	$150	$840
Electricity	22,400	Kwh	$0.20	$4,480
Chemicals	5,600	k gallon	$0.12	$672
Sludge transport & Disposal	3.40	ton	$200.00	$680
Admin Staff	96.0	Man Hours	$30	$2,880
Maintenance & Replacement [1]	1	day	$2,419	$2,419
		TOTAL DAILY OPERATIONAL COST		$11,971
		Monthly		$364,105.63
		Annual		$4,369,267.50

Notes:
1. Maintenance & Replacement costs 1.5% of initial construction costs per year

Table 16 below shows the calculation of operational costs related to the proposed 6.0 mgd Phase 4 WWTP

TABLE 16

CALCULATION OF DAILY OPERATIONAL COST
Of
6.0 MGD WASTEWATER TREATMENT PLANT

	No.	Unit	Unit Cost per day	Total Cost
Permitting/Regulatory Fees	6.00	$/MGD	$150	$900
Electricity	24,000	Kwh	$0.20	$4,800
Chemicals	6,000	k gallon	$0.12	$720
Sludge transport & Disposal	3.60	ton	$200.00	$720
Admin Staff	104.0	Man Hours	$30	$3,120
Maintenance & Replacement [1]	1	day	$2,655	$2,655
		TOTAL DAILY OPERATIONAL COST		$12,915
		Monthly		$392,831.25
		Annual		$4,713,975.00

Notes:
1. Maintenance & Replacement costs 1.5% of initial construction costs per year

Table 17 below shows the estimation of the debt service calculation in terms cost per thousand of gallons treated for the life of the facility.

PRESENT PROJECTED

TOTAL OPERATIONAL COST	
Interest Rate =	5.50%
Life of Bonds (Years) =	20
Capital Recovery Factor (A/P) =	0.08368
Phase 1 Years 2013-2025	
Debt Service per 1,000 Gallons Treated =	$2.7642
O&M Cost per 1,000 Gallons Treated=	$2.2741
Total Operational Cost per 1,000 Gallons Treated =	$5.0383
Phase 1 & 2 Years 2025-2033	
Debt Service per 1,000 Gallons Treated =	$2.9135
O&M Cost per 1,000 Gallons Treated=	$2.1601
Total Operational Cost per 1,000 Gallons Treated =	$5.0736
Phase 1 & 2 Years 2033-2035	
Debt Service per 1,000 Gallons Treated =	$1.2314
O&M Cost per 1,000 Gallons Treated=	$2.1601
Total Operational Cost per 1,000 Gallons Treated =	$3.3915
Phase 1, 2, & 3 Years 2035-2045	
Debt Service per 1,000 Gallons Treated =	$1.2773
O&M Cost per 1,000 Gallons Treated=	$2.3063
Total Operational Cost per 1,000 Gallons Treated =	$3.5835
Phase 1, 2, & 3 Years 2045-2050	
Debt Service per 1,000 Gallons Treated =	$0.8122
O&M Cost per 1,000 Gallons Treated=	$2.1376
Total Operational Cost per 1,000 Gallons Treated =	$2.9498
Phase 1, 2, 3, & 4 Years 2050-2055	
Debt Service per 1,000 Gallons Treated =	$0.4782
O&M Cost per 1,000 Gallons Treated=	$2.1525
Total Operational Cost per 1,000 Gallons Treated =	$2.6307
Phase 1, 2, 3, & 4 Years 2055-2070	
Debt Service per 1,000 Gallons Treated =	$0.4782
O&M Cost per 1,000 Gallons Treated=	$2.1525
Total Operational Cost per 1,000 Gallons Treated =	$2.6307

EXHIBIT E

OPERATIONAL COST vs. PLANT SIZE

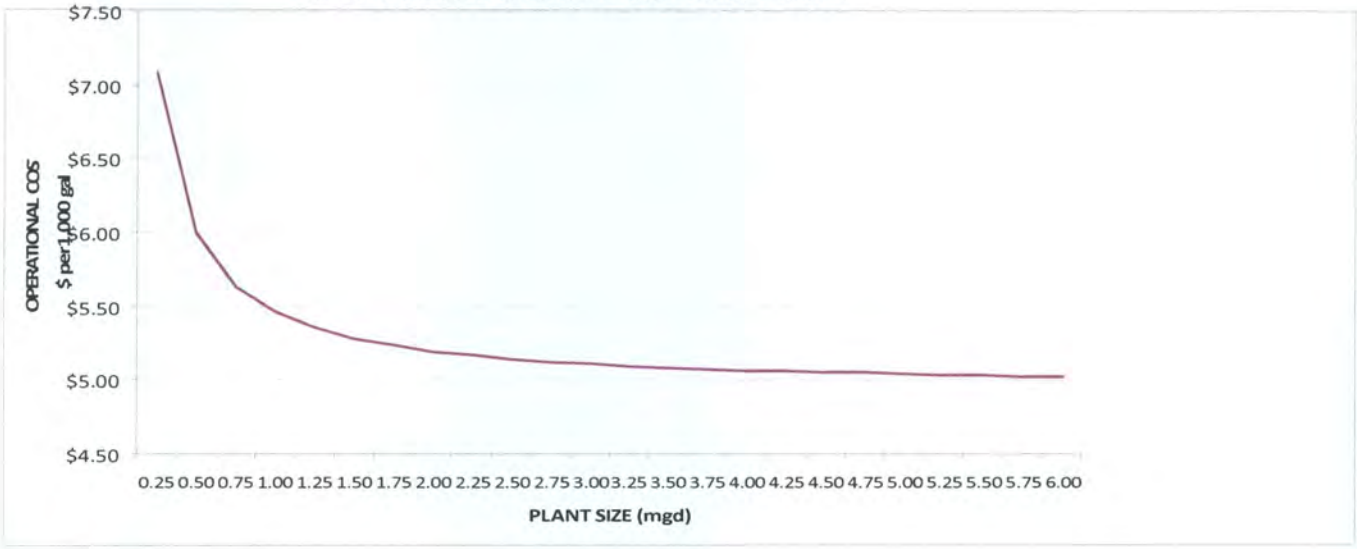

Exhibit E above shows the WWTP plant size versus the operational costs. It must be noted that the proposed limited collection system will not be expansive enough to convey wastewater from each and every generator to the proposed WWTP. With this in mind there will be some additional costs for each generator associated with conveying their wastewater to the proposed WWTP. If this additional cost and the operational costs for each of the producers of wastewater in the study area is more than $5.05 per 1,000 gallons treated, then the proposed 3.5 mgd WWTP is feasible. The more existing industries that join in the regional WWTP, the lower the costs will be to all participants. The additional cost for conveying wastewater from the producer to the proposed wwtp is not something that can be estimated as a whole for the entire study area. This will vary for each of the producers based on distance and volume produced.

Exhibit F show the 1,000 foot distance contours from the proposed wastewater treatment plant and the proposed collection line that extends from the proposed plant north to Jacinto Port Road.

EXHIBIT G
OPERATIONAL COST vs. DISTANCE

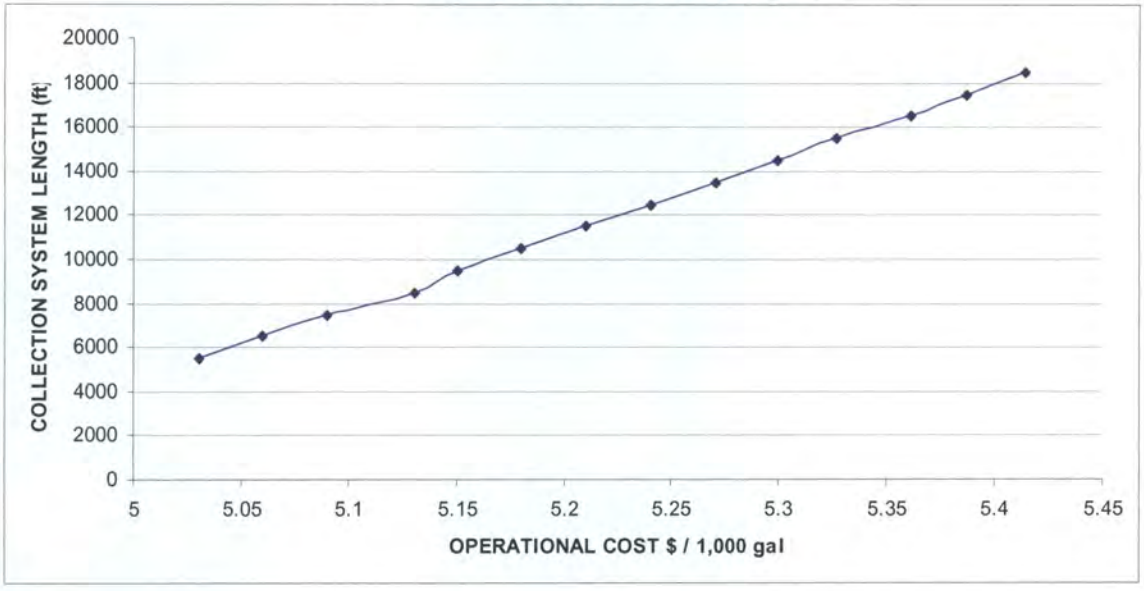

Exhibit G shows the relationship of distance to cost of treating 1,000 gallons of wastewater. Each 1,000 distance away from the proposed wastewater treatment plant increases the cost of treatment by approximately $0.03 per 1,000 gallons. A distance of 18,000 feet includes nearly all of the service area and increases the cost of treating 1,000 gallons of wastewater to approximately $5.40. This is less that the estimated average cost of treating 1,000 gallons of wastewater for most small treatment plant owners when the debt service cost is included. The cost of extending the collection system was derived using $1,000,000 per mile or approximately $200 per foot, which includes right of way, material, lift station, and construction.

EXHIBIT F

GREENS BAYOU REGIONAL WASTEWATER

PROPOSED SERVICE AREA

TCEQ OUTFALLS

ACTIVE PERMIT WASTEWATER OUTFALLS

PROPOSED WWTP LOCATION

PROPOSED COLLECTOR LINE

1 inch = 2,000 feet

Date: 2/8/2013

Distance in Feet

1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000
16000
17000
18000

Existing Service Areas of Active Plants

Vacant Land

PROPOSED COLLECTOR LINE

PROPOSED 20 AC REGIONAL WWTP LOCATION

DATA SOURCE:

CCN/OUTFALLS - TCEQ

Aerial Photograph - HGAC Jan 2010

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries.

T:\20301101\ExhibitF 11x17.mxd

LJA Engineering, Inc.

SECTION 6 SUMMARY

This study shows that a regional wastewater treatment plant could be feasible if participants are committed to the plant, however, at a projected cost of approximately $5.05 per 1,000 gallons of wastewater treated, the cost appears not economical for existing facilities but could be cost effective for new development. Existing facilities that face rehabilitation or expansion due to increased flow or more stringent regulations make the cost of the regional facility even more affordable. Potential participants must weigh all of the costs associated with operating their own WWTP including future rehabs and potentially stricter regulatory requirements. In addition if GCWDA finances the cost of the proposed WWTP, then any municipality that participates would not have to issue bonds for future repairs of their own facilities and could reserve them for other purposes.

Industries benefit from the regional concept because the GCWDA would become responsible for permits and dealing with state and federal regulators regarding the wastewater treatment operation. Industries would also benefit from economy of scale by the sharing the capital cost and on going operating and maintenance costs related to an extensive treatment system. The concept of a regional wastewater treatment plant in the study area is feasible, however, it is recommended that a preliminary engineering design be commissioned to better define participants, service area, and costs.

If a major proposed industrial facility were to project a need for significant WWTP capacity, and was willing to secure the funding for such a regional facility this regional facility could be feasible. In addition existing landowners/developers could construct a regional facility in order to attract tenants and new industrial development to the area.

Financing of a major project such as a regional wastewater treatment plant can also be financed by the use of other special financing districts. The districts provide funding through the issuance of tax revenue bonds or straight revenue bonds or a bonds backed by a combination of taxes and revenue. Districts such as Municipal Utility Districts (MUDs), Water Control & Improvement District (WCIDs), Public Improvement District (PIDs) etc. use property tax revenue to repay the bonds. Districts such as County Assistance Districts (CADs), etc. use sales tax revenue to repay the bonds. Districts such as Certificate of Convenience and Necessity CCNs typically use revenue for the sale of services to repay the bonds. Districts such as management districts and Tax Increment Reinvestment Zone (TIRZ) may use a combination of property and sales tax revenues.

Financing could also be obtained through the Texas Water Development Board (TWDB). The TWDB provides loans and grants for wastewater related projects. One

of the TWDB's program specifically for wastewater treatment plant projects is the Clean Water State Revolving Fund, which makes loans at interest rates typically lower than those offered by commercial markets.

In conclusion, with more detailed plans and projections provided by the existing waste generators, the study can be advanced. As the study is advanced and costs are refined, greater support for regionalization may become available and will help to further determine the efficiency of creating a regional management facility. It is recommended that a Preliminary Engineering Report be initiated to better define participants, service area, and costs.

APPENDIX

APPENDIX A

APPENDIX A

VIOLATION SUMMARY

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
04884000	TX0116076	GREMI	STATE	Minor			9/1/1999	6/30/2004	2869
04884000	TX0116076	GREMI	STATE	Minor			6/29/2004	5/1/2008	2869
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
00445000	TX0007064	MTATES	CORNLS	Major		12	12/19/2003	5/1/2008	2869
00445000	TX0007064	TALLEY	STATE	Major		12	6/26/2008	5/1/2013	2869
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
13203001	TX0099473	GARZA	STATE	Minor		12	9/9/2003	5/1/2008	4225
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
00391000	TX0003531	AGUILA	STATE	Major			10/16/2008	7/1/2013	2869
00391000	TX0003531	GILLEN	STATE	Major			4/28/2006	7/1/2008	2869
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
03324000	TX0106861	GREMI	STATE	Minor		12	2/14/2005	5/1/2008	5093
03324000	TX0106861	GREMI	STATE	Minor		12	1/27/2009	5/1/2013	5093
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
14700001	TX0086100	GARZA	STATE	Minor		12	4/1/2002	12/31/2006	3498
14700001	TX0086100	GARZA	STATE	Minor		12	12/18/2006	5/1/2011	3498
TPDES ID	NPDES ID	Facil	CMC Name	Enf Aut	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
00485000	TX0005584	GRE	GARZA	STATE	Minor			10/9/2003	5/1/2008	2865
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
00749000	TX0007439	AGUILA	STATE	Major			3/13/1995	3/13/2000	2879
00749000	TX0007439	AGUILA	STATE	Major			4/20/2007	4/20/2010	2879
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
10184001	TX0027111	GARZA	STATE	Minor		12	11/5/2003	5/1/2008	4941
10184001	TX0027111	GARZA	STATE	Minor		12	7/22/2008	5/1/2013	4941
TPDES ID	NPDES ID	Facil	CMC Name	Enf Aut	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
10032001	TX0025062	HARF	AGUILA	STATE	Major		12	7/9/2003	5/1/2008	4952
TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC	
12928001	TX0095451	GARZA	STATE	Minor		12	4/2/2003	5/1/2007	4952	
12928001	TX0095451	GARZA	STATE	Minor		12	3/23/2007	5/1/2011	4952	
TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC	
10558001	TX0034428	HARPER	STATE	Major			8/30/2005	5/1/2008	4952	
10558001	TX0034428	HARPER	STATE	Major			8/15/2008	5/1/2013	4952	
TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC	
10105001	TX0022756	AGUILAR	STATE	Major			5/9/2007	5/1/2012	4952	
10105001	TX0022756	WILLIA	STATE	Major			3/18/2003	5/1/2007	4952	
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
02277000	TX0031534	GARZA	STATE	Minor		12	10/24/2003	5/1/2008	4226
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
12122001	TX0079383	GILLEN	STATE	Major		12	11/3/2003	5/1/2008	4952
12122001	TX0079383	GILLEN	STATE	Major		12	6/27/2008	5/1/2013	4952
TPDES ID	NPDES ID	Facil	CMC Name	Enf Aut	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
12318001	TX0117897	JACI	GREMI	STATE	Minor			2/13/2003	5/1/2006	4952
12318001	TX0117897	JACI	GREMI	STATE	Minor			3/8/2006	5/1/2010	4952
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
12874001	TX0094803	GARZA	STATE	Minor		12	6/20/2003	5/1/2008	4952
TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
13365001	TX0101656	GARZA	STATE	Minor		12	6/9/2006	5/1/2009	3511
13365001	TX0101656	GARZA	STATE	Minor		12	10/6/2008	5/1/2013	3511

APPENDIX A

VIOLATION SUMMARY

TPDES ID	NPDES ID	Facility Na	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
02458000	TX0085979	JOHANN I	GARZA	STATE	Minor		12	8/25/2005	5/1/2008	2869
02458000	TX0085979	JOHANN I	GARZA	STATE	Minor		12	6/11/2008	5/1/2013	2869

TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
02927000	TX0069493	HARPER	STATE	Major			1/27/2009	7/1/2013	2865
02927000	TX0069493	WILLIA	STATE	Major			2/24/2004	7/1/2008	2865

TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
02845000	TX0100919	GARZA	STATE	Minor		12	12/7/2004	7/1/2008	4931

TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
03244000	TX0106542	GREMI	STATE	Minor		12	1/14/2005	5/1/2008	4491

TPDES ID	NPDES ID	Facili	CMC Name	Enf Aut	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
04552000	TX0125369	REAC	GREMI	STATE	Minor		12	6/17/2003	3/1/2008	5169

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
00662000	TX0005576	HARPER	STATE	Major			8/24/2004	5/1/2008	2821

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
01922000	TX0065986	GARZA	STATE	Minor		12	1/1/2004	5/1/2008	4789

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
03207000	TX0106062	GREMI	STATE	Minor			11/20/2003	7/1/2008	2821
03207000	TX0106062	GREMI	STATE	Minor			10/30/2008	7/1/2013	2821

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
10541001	TX0020991	GARZA	STATE	Minor			2/13/2004	7/1/2008	4952

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
12386001	TX0087491	GARZA	STATE	Minor		12	12/11/2003	7/1/2008	1389
12386001	TX0087491	GARZA	STATE	Minor		12	7/17/2008	7/1/2012	1389

TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
13316001	TX0065943	GARZA	STATE	Minor		12	5/12/2003	5/1/2008	4952
13316001	TX0065943	GARZA	STATE	Minor		12	9/9/2008	5/1/2013	4952

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
03129000	TX0091855	GILLEN	STATE	Major		12	3/29/2004	5/1/2008	4953
03129000	TX0091855	GILLEN	STATE	Major		12	11/25/2008	5/1/2013	4953

TPDES ID	NPDES ID	CMC Name	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
03540000	TX0087599	GARZA	STATE	Minor		12	8/22/2005	7/1/2008	3317
03540000	TX0087599	GARZA	STATE	Minor		12	10/24/2008	7/1/2013	3317

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
04841000	TX0129917	GREMI	STATE	Minor		12	7/11/2008	7/1/2012	3498

TPDES ID	NPDES ID	CMC Nam	Enf Auth	Major/Minor	92-500	TCEQ Region	Issue Date	Expiration Date	Primary SIC
03787000	TX0088455	GARZA	STATE	Minor		12	4/11/2005	7/1/2008	3498
03787000	TX0088455	GARZA	STATE	Minor		12	5/26/2009	7/1/2013	3498

Major Violation - Effluent water quality violation
Minor Violation - Adminstrative violation

APPENDIX B

APPENDIX B

GREENS BAYOU REGIONAL WWTP STUDY

PERMITTED FACILITIES IN STUDY AREA

ID No	TCEQ DISCHARGE PERMIT No	PLANT ADDRESS	PERMITTED FLOW (mgd)
6	12122-001	3/4MI SE CARPENTER'S BAYOU XNG HOUSTON, TX 00000	NA
27	00445-000	2231 HADEN RD, HOUSTON, TX 77015	NA
42	12874-001	16661 JACINTOPORT BLVD, HOUSTON, TX 77015	NA
30	00749-000	2239 HADEN RD, HOUSTON TX 77015	0.9
5	13365-001	16415 JACINTOPORT BLVD. HOUSTON, TX 77015	NA
B	03944-000 WQ0004884000	1632 HADEN RD HOUSTON TX 77015	Var
40	10184-001	117 TOWER ST CHANNELVIEW, TX 77530	0.4
22	10105-001	228 CEDAR LANE CHANNELVIEW, TX 77530	2.5
15&32	02277-000	16642 JACINTOPORT BLVD, HOUSTON TX 77015	NA
45	WQ0004421000	16203 PENINSULA ST, HOUSTON TX 77015	NA
46	WQ0012375001	16203 PENINSULA ST, HOUSTON TX 77015	NA
23&25	02458-000	16717 JACINTOPORT BLVD, HOUSTON TX 77015	0.2215
38	03244-000	3100 PENN CITY RD, HOUSTON TX 77015	Var
33	14700-001	400 SHELDON RD, CHANNELVIEW TX 77530	0.006
D		1914 HADEN RD, HOUSTON, TX 77015	1
C	12314-001	16730 JACINTOPORT BLVD, HOUSTON TX 77015	NA
26 & 41	04898-000	15602A JACINTOPORT BLVD, HOUSTON TX 77015	Var
43	13203-001	3100 PENN CITY RD, HOUSTON TX 77229	NA
28	WQ0014645001 WQ0003373000	3100 PENN CITY RD, HOUSTON TX 77229	NA
20	WQ0002160000	16402 JACINTOPORT BLVD, HOUSTON TX 77015	NA
A	01801-000	1777 HADEN RD HOUSTON TX 77015	NA
21	12318-001	16530 PENINSULA ST, HOUSTON TX 77015	0.0051
8	04552-000	2710 APPELT DR, HOUSTON TX 77015	N/A
29	00662-000	1503 HADEN RD HOUSTON, TX 77015	NA
44	13316-001	16643 JACINTOPORT BLVD, HOUSTON TX 77015	NA
31	04953-000	16530 PENINSULA ST, HOUSTON TX 77015	0.0105
34-37	03129-000	15602 JACINTOPORT BLVD # A, HOUSTON TX 77015	NA

APPENDIX C

February 23, 2012

Dear Landowner/Wastewater Discharge Permit Holder:

The Greens Bayou Corridor Coalition (GBCC) South Reach Committee was approached with the idea of investigating the possibility of providing Regional Wastewater services to approximately 7000-acre area of land bounded by the Houston Ship Channel on the south, Greens Bayou on the west, the San Jacinto River on the east and Interstate 10 on the north. This area is projected to grow significantly in the near future. This growth will be expedited by proposed major roadway improvements on Jacinto Port Boulevard and South Sheldon Road. The Economic Alliance Houston Port Region has indicated that significant future industrial development is anticipated which could be most efficiently served by a regional system.

Over the last two years, the GBCC South Reach Committee gained support from Harris County Precinct No. 2, the Economic Alliance Houston Port Region, the Port of Houston Authority, the office of Senator Mario Gallegos, Jr., District 6, and the Gulf Coast Waste Disposal Authority (GCWDA) for moving forward with the study. In order to determine basic engineering considerations and costs for implementation of a potential system, a Texas Water Development Board (TWDB) grant was applied for through a partnership between the GBCC and the GCWDA. Local participants provided the 50% match and the TWDB awarded the study grant in March of 2011.

When completed, the study will define a conceptual plan for implementation of a regional wastewater system. It will provide an estimate of potential costs and conceptual phasing of a regional system. Existing facilities in the area will be analyzed for the potential of becoming regional system components. The need to combine facilities for more efficient treatment of both existing and projected development becomes more apparent as more stringent effluent standards are anticipated. By combining the multiple small treatment plants and combining municipal wastewater and industrial wastewater into one or several larger systems, efficiency, quality of effluent and cost savings should be realized. The results of the study will be utilized by the participants to determine a possible plan of action to implement all or portions of the plan. Funding sources for implementation will be investigated in the study.

In an attempt to collect the necessary information regarding existing facilities and projected future needs, we have prepared this short survey. Your help in completing this survey is greatly appreciated.

Once complete, please return via fax to 713-953-5026 or via email to ghaan@ljaengineering.com by **March 5, 2012**.

Or, you can mail survey to:

Greens Bayou Regional WWTP Study
c/o LJA Engineering Inc./Gregg Haan
2929 Briarpark Drive, Suite 600
Houston, Texas 77042

Thank you for participating in this survey. If you would like to discuss this study please give me a call at 713-953-5061.

Gregg B. Haan, P.E.
LJA Engineering, Inc.
Study Coordinator and Project Manager

Greens Bayou Regional Wastewater Treatment Plant Survey

1. Does your facility's wastewater treatment plant have unallocated capacity and/or ability to be expanded? If so what amount in million gallons per day (MGD)?

3. Do you manage your facility's wastewater via deep well injection?

4. Would you be interested in sending your wastewater to a regional treatment plant?

5. Do your future development plans project an increase of wastewater production? If so, by what amount in MGD?

6. Could we contact you regarding your interest in the Regional Wastewater Study? If so,please provide contact information.

Additional comments, suggestions:

Please return survey by:

FAX to 713-953-5026

E-MAIL to ghaan@ljaengineering.com

or Mail TO
Greens Bayou Regional WWTP Study
C/o LJA Engineering Inc.
Attention: Gregg Haan
2929 Briarpark Drive, Suite 600
Houston, Texas 77042

Gulf Coast Waste Disposal Authority
910 Bay Area Boulevard • Houston, Texas 77058
Phone: (281) 488-4115 • Fax: (281) 488-3331

May 1, 2012

Dear Wastewater Discharge Permit Holder/Landowner:

Gulf Coast Waste Disposal Authority (GCA) was approached with the idea of investigating the possibility of providing Regional Wastewater services to approximately 7000-acre area of land bounded by the Houston Ship Channel on the south, Greens Bayou on the west, the San Jacinto River on the east and Interstate 10 on the north. Significant industrial development in the near future is projected for this area where several industrial facilities are already located. This growth will be expedited by proposed major roadway improvements on Jacinto Port Boulevard and south Sheldon Road.

As you may know, GCWDA has extensive success and experience in owning and operating regional industrial and municipal wastewater treatment facilities in the Houston area. Our continued success is a result of the many advantages we provide our customers, which include favorable economies of scale that save money and improve efficiency, industries can avoid the cost of installing and operating costly treatment and pretreatment systems, ability to provide financing for pipelines and pollution control equipment, and are responsible for permits and interfacing with regulators. GCWDA's wastewater monitoring also serve as an early-warning system capable of identifying problems at an industrial facility often before the customer is aware they exist. For more information on the services GCWDA provides, please access our web site at www.gcwda.com.

Over the last two years, GCWDA with support from Harris County Precinct No. 2, the Economic Alliance Houston Port Region, the Port of Houston Authority, Greens Bayou Corridor Coalition and the office of Senator Mario Gallegos, Jr., District 6, were successful in securing a grant from the Texas Water Development Board for conducting a study to determine basic engineering considerations and costs for implementation of a potential treatment system. These local partners provided the 50% match for the grant which was awarded by TWDB in March of 2011.

When completed, the study will define a conceptual plan for implementation of a regional wastewater system. It will provide an estimate of potential costs and conceptual phasing of a regional wastewater treatment system. Existing facilities in the area will be analyzed for the potential of becoming regional system components. The need to combine facilities for more efficient treatment of both existing and projected development becomes more apparent as more stringent effluent standards are anticipated. By combining the multiple small treatment plants and combining municipal wastewater and industrial wastewater into one or several larger systems, efficiency, quality of effluent and cost savings should be realized. The results of the study will be utilized by the participants to determine a possible plan of action to implement all or portions of the plan.

In an attempt to collect the necessary information regarding existing facilities and projected future needs, we have prepared this short survey. Your help in completing this survey is greatly appreciated. Your input is much needed in order to quantify the need for regional services.

Once complete, please return via email to me at ltraweek@gcwda.com or mail to the above address by **May 15, 2012**.

Thank you for participating in this survey. If you would like to discuss this study or have questions, please email me or give me a call at 281.226.1130.

Finest regards,

Lori Traweek

Lori Traweek
Manager of Operations

Greens Bayou Regional Wastewater Treatment Plant Survey

1. Does your facility's wastewater treatment plant have unallocated capacity and/or ability to be expanded? If so what amount in million gallons per day (MGD)? What is the permitted amount in MGD?

2. Does your facility's wastewater treatment plant discharge via a deep well?

3. Would your facility entertain the possibility of receiving wastewater from others for treatment?

4. Would you be interested in sending your wastewater to a regional treatment plant?

5. Do your future development plans project an increase of wastewater production? If so by what amount in MGD?

6. Are you interested in being contacted for additional information including the study results? Please provide contact information.

Additional comments, suggestions:

APPENDIX D

Greens Bayou
CORRIDOR COALITION

WWTP Public Meeting
September 27, 2011

Name	Company	Telephone	E-mail
LEE CASEY	Coastal Water Authority	713-824-4522	lcasey@cwaips.org
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Questions/Comments from WWTP Public Meeting
September 27th, 2011

Will you look at existing MUD facilities and their ability to expand and serve a larger area?

What is the history of regionalization in the area and involvement of utility districts?

Will you look at the possibility of effluent reuse?

Is effluent the same as gray water and water are the uses for that?

Will the anticipated cost of waste water treatment be factored in?

Who will pay for pipelines?

Why is the study area not larger?

How will you capture data from industry?

Contact the local emergency planning committees for their help in getting word out about survey.

There is a new Citizen's Advisory Group in Galena Park.

Greens Bayou CORRIDOR COALITION

WWTP Public Meeting
March 22, 2012

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Omar			
Jill			
Lori			
Greg			

Greens Bayou
CORRIDOR COALITION

WWTP Public Meeting
March 22, 2012

Name	Company	Telephone	E-mail
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Joshua Sonny	Stolthaven Houston	281-678-2993	J.Sonny@Stolt.com

Questions/Comments from WWTP Public Meeting
March 22, 2012

What is the resistance to providing survey data and why? Don't understand benefits?

What is downside to industry of moving to regional wastewater treatment?

How have nearby MUD districts reacted to this study?

We are building to handle more 3rd party waste at our facility. How would this benefit us?

Is this gray water?

Have you calculated the estimated costs of regional plant and to run a line to our facility?

Who would run a potential regional system?

What if only a small number of facilities want to participate?

Can the chamber help with surveying?

How will the resurvey impact study timeline?

Greens Bayou
CORRIDOR COALITION

Waste Water Treatment Plant Study

Public Meeting #3

San Jacinto North Campus
10-Dec-12

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Marie McDermott	Economic Alliance	281 476 9176	marie@alliancepotregion.com	Y
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Omar Escobar	LJA Eng.	713-953-5233	oescobar@ljaengineering.com	
Jill Boullion	GBCC			
Carolyn Pardy	GBCC			
Greg Ham	LJA			

Greens Bayou
CORRIDOR COALITION

Waste Water Treatment Plant Study

Public Meeting #3

San Jacinto North Campus
10-Dec-12

Name	Company	Phone number	E-Mail	Newsletter Y/N
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Ricky Clifton	"	281-226-1136		
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Charles Grant	NCA Chamber	713-450-3600	cgrant@NCAchamber.com	
Gil Smith	Pct two Harris County	281-457-0694		

Questions from 12/10/12 WWTP Public Meeting

Was a particular location looked at for a regional waste water treatment plant?

Would a plant be big enough to bring in users from outside the study area?

Is assumption based on existing plants wanting to participate?

What about growth north of Interstate 10?

Could there be a second regional plant north of Interstate 10?

Is this concept being considered because of a federal mandate?