Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

6800 Park Ten Blvd., Suite 180S
San Antonio, Texas 78213
210 296-2000
Fax 210 296-2025

March 1, 2002

TC&B Job No. 31-80001-001
Regional Water and Wastewater Master Plan

Mr. Robert Flores
Texas Water Development Board
1700 N. Congress Avenue
Austin, Texas 78711-3231

Re: Brownsville Regional Water and Wastewater Master Plan
Final Report Submittal

Dear Mr. Flores:

Enclosed for your use is the final submittal of the Brownsville Regional Water and Wastewater Master Plan report including:

- 1 - Report original – unbound (camera ready)
- 9 - Reports (bound double-sided)
- 1 - CD containing electronic report and project files (will be sent at a later date)

Please note the report includes ***Revised Draft Report*** review comments we received from the Texas Water Development Board (TWDB) and El Jardin WSC, and TC&B's response for each.

We appreciate the opportunity to have conducted this water and wastewater master plan for the TWDB and the other study partners. If you have any questions or need additional information, please call me at 210-296-2009.

Very truly yours,

John A. Espinoza

John A. Espinoza, P.E., N.C.F.M.
Project Manager

Enclosures

cc: Mr. Michael Myers, P.E., Brownsville Public Utilities Board
Mr. Mark Lowry, P.E., TC&B
File

Brownsville Regional Water and Wastewater Master Plan

for the

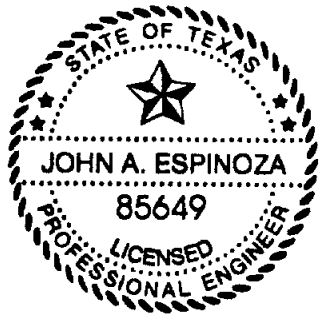
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Water Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Prepared by:

Turner Collie & Braden Inc.

TC&B Job No. 37-80001-001
February 2002

Brownsville Regional Water and Wastewater Master Plan



John A. Espinoza 2/25/02

John A. Espinoza, P.E., N.C.F.M.
Project Manager

Mark V. Lowry

Mark V. Lowry, P.E.
Associate Vice President

TC&B Job No. 37-80001-001
February 2002

The Brownsville Public Utilities Board (BPUB), El Jardin Water Supply Corporation (El Jardin), Brownsville Navigation District (Navigation District), Olmito Water Supply Corporation (Olmito), Military Highway Water Supply Corporation (Military Highway), and Valley Municipal Utility District No. 2 (Valley MUD) desired to invest the costs and benefits of a regionalized water and wastewater facilities plan. BPUB served as the contracting agency for the study partners to administer a matching grant from the Texas Water Development Board (TWDB) to perform the study.

Water and wastewater system models were developed to determine the requirements to expand existing facilities for water distribution, wastewater collection, and treatment to meet the current needs of the study partners. Four alternatives were investigated to meet projected growth that would occur by year 2005, 2015 and 2025. Alternative 1 (*Independent Alternative*), assumed all of the study partners would continue to serve their existing service areas individually, with BPUB continuing to provide water to the Navigation District and El Jardin and treat wastewater flows from El Jardin. Alternative 2 (*Regional Alternative*) was the single regional system for both wholesale water supply and wastewater treatment. Alternative 3 (*Multi- Regional Alternative*) was a multiple regional concept with BPUB serving the wholesale water supply and wastewater treatment needs of Olmito, Military Highway, and Valley MUD. In addition for Alternative 3, El Jardin would develop their own source of water supply and wastewater treatment capacity, and serve their expanded needs as well as the Navigation District's current needs and its needs for development of an additional 4,000 acres. Alternative 4 (*Emergency Interconnection Alternative*) concepts are those as proposed for Alternative 1 plus necessary modifications to connect to BPUB systems during emergency situations, if not already connected.

Probable annual cost was determined for each planning period and alternative. For year 2025, probable annual costs were estimated to be $183,861,200 for the *Independent Alternative*, $197,774,900 for the *Regional Alternative*, $189,625,500 for the *Multi-Regional Alternative*, and $187,603,000 for the *Emergency Interconnection Alternative*. Report ***Tables 8, 9 and 10 – Probable Costs Summary*** summarizes alternative costs for each planning period.

The following summarizes the regional water and wastewater master plan evaluation considerations, conclusions, and recommendations.

Evaluation Considerations

Development and evaluation of the regional water and wastewater master plan considered the following:

- Most of the service areas in the study contain existing water distribution and wastewater collection systems. For areas where these utilities do not exist, homeowners obtain water from on-site water wells and wastewater flows are treated by a septic system.
- The BPUB supplies water for El Jardin and the Navigation District and wastewater treatment for El Jardin. Military Highway, Olmito, and Valley MUD supply water and treat wastewater for their service areas.
- Some of the existing systems currently experience problems including low water pressures, sewer blockages, and deteriorating lines and pump stations.
- Some of the study partners have had recent studies conducted to evaluate their individual water and/or wastewater systems. These results include proposed modifications to meet their requirements.
- The project study area's water and wastewater service demands have increased during the past 20 years. This additional growth has put a strain on existing water and wastewater systems.
- A new desalination water treatment plant has been proposed to be located within the study area. The new water treatment plant is currently proposed to provide 9.0 mgd of treated water to the study area's water suppliers.
- Existing urbanized development areas within the study area were determined using customer information supplied by the study partners. Future development considered planned areas identified by the study partners and a projected population growth rate of 1.7 percent per year (TWDB Senate Bill 1 criteria).
- Additional future commercial development was incorporated for the BPUB to result in an overall growth rate of 5.0 percent, rather than the TWDB's 1.7 percent.
- Future populations are not projected for the Brownville Navigation District service area; however, an additional 4,000 acres to be developed for industrial use is projected for this area.

Conclusions

The following are the conclusions made from the results from the regional water and wastewater master plan.

1.) System Models - Sufficient information was assembled to build water and wastewater system models of the BPUB systems to evaluate different scenarios of demand and degree of regionalization, and to test various alternative system configurations.

2.) Calibration - Calibration of the existing conditions water system model was within 10 percent variance from observed conditions.

3.) Proposed Capital Improvements – Capital improvements were proposed to meet water and wastewater system requirements for three planning periods and four alternatives. ***Table 7*** summarizes capital improvements proposed for the Year 2005, 2015, and 2025 planning periods and ***Exhibits 5*** through ***10*** present the locations of proposed improvements.

4.) Probable Cost - Regional water and wastewater capital improvements probable costs were determined for each alternative. Probable costs were developed considering capital unit cost rates for similar projects, annualized capital costs, annual operation and maintenance costs, 15 percent for engineering fees, and 17 percent for contingencies. ***Tables 8, 9,*** and ***10*** summarize probable costs.

Recommendations

The following are the recommendations being made for the regional water and wastewater master plan.

1.) Prior to final design of any of the proposed regional master plan water distribution and wastewater collection system capital improvements, a preliminary engineering report should be prepared to verify all regional master plan assumptions and all existing system data including pipe diameters, elevations, pressures, pumps, storage capacities, etc.

2.) Further refinement of the water system model is recommended to include the transfer pumps from the water treatment plants and to model the fluctuation of the clear well levels during the simulation. Addition of these elements would increase the accuracy of the model and make it a more useful tool for diagnosing operational issues. This calibration would also allow the use of water quality modeling required in assessing the impacts of a contamination incident, whether accidental or intentional.

3.) Further investigation of the desalination plant and the manner in which it would be connected to the BPUB system is needed in order to better define its impact on the water distribution system. Water quality issues should also be evaluated to ensure that there are no adverse consequences with the mixing of waters of differing chemical qualities in the distribution system.

4.) The proposed method of operation of the desalination facilities maximizes the efficient utilization of the desalination plant. However, the use of the desalination plant for the base load in the system requires that the existing BPUB plants be put on and taken off line as the demand varies. This operational method has the potential to cause significant operational problems with these plants and an increasingly difficult task in meeting federal and state standards. Once the operational parameters and pressures from the proposed desalination plant are better defined, a more thorough study of low demand conditions should be performed with the computer model to more accurately determine the impact of using the desalination plant as the base load plant. The models used in this study are more reflective of peak day conditions for the purpose of determining maximum sizes needed and the desalination plant is much more readily integrated into the system when all of the treatment capacity is being used.

5.) The selection of the alternative preferred is up to the study partners. The estimated probable costs show that the *Independent Alternative* provides a lesser-cost alternative, and would be recommended as a means of providing economics of scale in the treatment of surface water and the treatment of wastewater. However, there may be other considerations that are equally important to the study partners such that the choice is not based on economics alone.

SECTION VII PROPOSED CAPITAL IMPROVEMENTS

SECTION VIII CONCLUSIONS AND RECOMMENDATIONS

TABLES

EXHIBITS

APPENDICES

PURPOSE OF PROJECT

The Texas Lower Rio Grande Valley, including the City of Brownsville and surrounding areas, has been experiencing rapid growth over the past 20 years. This growth has been documented in results from the U.S. Census for year 2000 and from studies conducted for the project areas. This growth along with aging water distribution systems and wastewater collection systems has put a strain on existing utilities. To address the existing and future system needs, six independent water and/or wastewater service providers (study partners) serving the greater Brownsville metropolitan area authorized the development of a 25-year regional water and wastewater master plan (*Regional Master Plan*). This *Regional Master Plan* was prepared in conjunction with the Texas Water Development Board (TWDB). The project study partners include:

- Brownsville Public Utilities Board (BPUB)
- Brownsville Navigation District (Navigation District)
- El Jardin Water Supply Corporation (El Jardin)
- Olmito Water Supply Corporation (Olmito)
- Military Highway Water Supply Corporation (Military Highway)
- Valley Municipal Utility District No. 2 (Valley MUD)

The purpose of this *Regional Master Plan* was to evaluate water distribution and wastewater collection systems to determine existing capacities and deficiencies, as well as future modifications required to meet the area's projected growth between the years 2000 and 2025. Incremental planning periods included 5-year (2005), 15-year (2015), and 25-year (2025). For each incremental planning period, proposed modifications were determined assuming four system configuration alternatives. The four alternatives evaluated are summarized below.

Alternative 1 - Independent Alternative

The *Independent Alternative* assumes that all existing water distribution and wastewater collection systems will remain as independent systems, as they currently are. Proposed modifications will include those for distribution and collection systems that would be required to meet future growth within the current BPUB service area. This alternative assumes that the BPUB will continue to supply water and provide treatment of wastewater flows for El Jardin and continue to provide water to the Navigation District. Olmito, Valley MUD, and Military Highway will continue to provide water and

wastewater services to their own service areas, and the Navigation District will continue to treat their wastewater flows.

Alternative 2 - Regional Alternative

The *Regional Alternative* evaluated water and wastewater system requirements assuming that an overall regional plan integrating all existing systems will be developed. This alternative investigated future BPUB system requirements assuming that the other water providers will connect to BPUB facilities, if they are not currently connected. However, the connections are only for the purpose of providing wholesale water service and wholesale wastewater treatment services to the study partners. The project assumed that the individual study partners would continue to provide wastewater collection and water storage, pumping, and distribution facilities for their respective areas.

Alternative 3 - Multi-Regional Alternative

The *Multi-Regional Alternative* evaluated water and wastewater system requirements assuming that multiple regional plans will be developed to serve the study area. For this project, the *Multi-Regional Alternative* assumes that all El Jardin service areas will be disconnected from the BPUB system, and wholesale water supply, and water and wastewater treatment needs for the Military Highway, Olmito, and Valley MUD service areas will be provided by BPUB facilities. This alternative assumes that sources of future demands for the Navigation District will be provided by El Jardin facilities.

The *Multi-Regional Alternative* could have considered other scenarios such as having Military Highway to provide wholesale water supply needs for Olmito and Valley MUD, instead of connecting into the BPUB system. In addition, subsequent conversations with Gale Armstrong with El Jardin determined El Jardin's intent to keep service from BPUB for their existing connections and use the new plant primarily for the growth areas. The purpose of the analysis was the cost comparisons, however, which are still valid even if there are some modifications over time. Due to project budget constraints, evaluation of other scenarios for the *Multi-Regional Alternative* was limited to one option.

Alternative 4 – Emergency Interconnection Alternative

The *Emergency Interconnection Alternative* evaluated water and wastewater system requirements

assuming proposed *Independent Alternative* (Alternative 1) modifications plus necessary changes to connect to BPUB systems during emergency situations, if not already connected. This alternative assumes that the intermediate line sizes leading to the interconnection are sized to meet the individual system's peak hour or peak day plus fire demand, and that the receiving system needing the additional supply can be supplied under most conditions where the demand is peak hour or less. However, the realization is that if the outage occurs at a peak hour, the system needing water will only be able to receive water if some demand management occurs within the supplying system. Such interconnects will be usable for a large percentage of the time, and could be useful even for routine maintenance that causes an interruption in the plant throughput, or line maintenance for the main lines leaving the receiving entity's plant.

This *Regional Master Plan* assumes that future raw water source requirements will be able to be provided to the study area and that the cost of such additional raw water will be the same whether purchased by a regional system or by the individual study partners. This project addresses only water and wastewater treatment plant capacity requirements and not necessarily required plant design modifications, unless previously evaluated as was done for some of the study partners. Additional descriptions of proposed water and wastewater system requirements for each planning period and alternative are included in other sections of this report.

STUDY AREA

The project study area is located in southern Cameron County, Texas including the City of Brownsville and some of the adjacent areas. The *Regional Master Plan* evaluated water distribution and wastewater collection systems located within the BPUB, Navigation District, El Jardin, Olmito, Military Highway, and Valley MUD service areas. ***Exhibit 1, Planning Boundary and Service Area Map,*** presents the general location of the study area and service area boundary for each project water provider. Topography for the study area is generally flat with only small changes in natural ground elevations ranging from 10 to 40 feet, based on U.S. Geological Survey topographic maps. A description of each service area follows:

Brownsville PUB

The BPUB water certification area contains approximately 97,400 acres and extends approximately 20 miles in an east-west direction and 10 miles in a north-south direction. The service area is bounded on the south by the Rio Grande, and on the north by the San Martin Lake, Loma Alta Lake, Palo Alto Battlefield, and Resaca Del Rancho Viejo areas. The western boundary of the area is F.M. 1421 and the Rancho Viejo Ditch. The eastern boundary is the Rio Grande and a line east of the Palmito Hill area. The BPUB service area includes the majority of the City of Brownsville.

Brownsville Navigation District

The Navigation District service area overlaps the east end of the BPUB certification area and extends to the Boca Chica area along the Gulf of Mexico coastline. State Highway 48 (International Boulevard) is located north of the Navigation District. The Navigation District provides water and wastewater service to the Port of Brownsville, which includes industrial facilities with no permanent residential population.

El Jardin WSC

El Jardin service area boundary overlaps the BPUB service area east and northeast of the City of Brownsville. El Jardin is split into two main service areas that are approximately one mile apart, the Northern Area and the Southern Area, and one one-line system. El Jardin currently provides only water service within the service area.

Olmito WSC

The Olmito service area includes the old Olmito town site and is bounded by State Highway 100 to the north, Valley MUD No. 2 to the west, Merryman Road to the south, and F.M. 1847 to the east. The Olmito service area extends north on the northeast side of the BPUB service area.

Valley MUD No. 2

The Valley MUD service area provides water and wastewater to the Rancho Viejo and the River Bend Resorts. Valley MUD is located west of Olmito and Brownsville with U.S. Highway 77/83 providing the northern boundary and the Rio Grande being the southern boundary. Rancho Viejo lies in the

northern section of the Valley MUD service area. This area is along U.S. Highway 77/83 and continues south. River Bend Resorts is located in the southern portion of the Valley MUD service area and on the banks of the Rio Grande approximately 5 miles west of the City of Brownsville.

Military Highway WSC

Military Highway has a large service area that spans east-west across Cameron and Hidalgo counties. For this *Regional Master Plan*, only the most eastern section located in Cameron County was evaluated. Within the study area, Military Highway is divided into two general areas, which are separated by the Valley MUD service boundary. The majority of its service area is located west of the Valley MUD service boundary, east of F.M. 1577, south of U.S. Highway 77/83, and extends to the Rio Grande.

AUTHORIZATION

The Texas Water Development Board, Brownsville Public Utilities Board, Brownsville Navigation District, El Jardin Water Supply Corporation, and the Olmito Water Supply Corporation jointly funded the regional water and wastewater master plan project. Military Highway Water Supply Corporation and the Valley Municipal Utility District No. 2 also participated in the project. Turner Collie and Braden Inc. (TC&B) was authorized to conduct this project with an agreement with Brownsville Public Utilities Board in a contract dated May 10, 2000.

EXISTING SYSTEMS

Brownsville PUB, Navigation District, El Jardin WSC, Military Highway WSC, Olmito WSC, and Valley MUD each distribute water and/or collect wastewater flows within their service areas. ***Table 1, Existing Water and Wastewater Systems Summary,*** summarizes existing water distribution and wastewater collection facilities for each study partner. ***Exhibit 3, Existing Water System Map*** and ***Exhibit 4, Existing Wastewater System Map,*** presents a layout of water and wastewater systems. A description of water and wastewater systems for each study partner follows.

Brownsville Public Utilities Board

BPUB Water System - The BPUB supplies water to most of the City of Brownsville, El Jardin, and the Navigation District service areas. The BPUB has two water treatment plants having a total treatment capacity of 40 million gallons per day (mgd), ground storage tanks (clear wells) with a total storage capacity of 4.84 million gallons (MG), and four elevated water storage tanks with a total storage capacity of 4.5 MG. The BPUB water distribution system consists of approximately 487 linear miles of water pipes with diameters ranging from 1 inch to 30 inches.

BPUB Wastewater System – The BPUB treats wastewater flows for most of the City of Brownsville and El Jardin service areas. The BPUB has two wastewater treatment plants (WWTP), the Robindale WWTP (North Plant) and the South WWTP. The Robindale WWTP has a treatment capacity of 10 mgd and the South WWTP has a treatment capacity of 12.8 mgd. The BPUB wastewater collection system consists of approximately 379 linear miles of gravity lines, 60 linear miles of force mains, and 140 lift stations. Gravity line pipe diameters range from 3 to 36 inches and force main diameters range from 4 to 24 inches.

Brownsville Navigation District

Navigation District Water System – The Navigation District purchases water from the BPUB. Water is measured at a meter located near the intersection of State Highway 48 and F.M. 511. The water distribution system consists of approximately 10.6 linear miles of pipe with diameters ranging from 10 to 16 inches.

Navigation District Wastewater System – The Navigation District has three wastewater treatment plants, including the Northside WWTP, Fishing Harbor WWTP, and the Turning Basin WWTP. The total treatment capacity is 0.45 mgd. The wastewater collection system consists of approximately 15 linear miles of pipe with diameters ranging from 4 to 30 inches.

El Jardin Water Supply Corporation

El Jardin WSC Water System - El Jardin water system is divided into three systems, the South, the North, and a one-line system along Milpa Verde. The BPUB currently supplies water to El Jardin at eight meters with five for the South System, one for the one-line system, and two meters for the North System. El Jardin's water distribution system consists of approximately 82 linear miles of water lines with pipe diameters ranging from 2 to 8 inches.

El Jardin WSC Wastewater System – El Jardin currently does not have any wastewater collection or treatment facilities. Wastewater flow is either collected by BPUB sewer lines or treated by on-site septic systems.

Olmito Water Supply Corporation

Olmito WSC Water System - Olmito WSC currently owns approximately 700 acre-ft of raw water rights, which is delivered by Cameron County Irrigation District Number 6. Additional treated water can be pumped from Valley MUD when needed. Olmito has a water treatment plant having a capacity of 1.1 mgd that includes a 2-acre forebay, a raw water pump station, a modular treatment unit, a 0.5 MG ground storage tank, a 0.2 MG elevated storage tank, waste lagoons, a chlorine building, and a control building. Olmito currently has approximately 37 linear miles of water pipe with diameters ranging from 2 to 12 inches.

Olmito WSC Wastewater System – Olmito WSC has one wastewater treatment plant having a treatment capacity of 0.75 mgd. Olmito's wastewater collection system consists of a combination of 45 linear miles of gravity lines, 7 linear miles of force mains, and 16 lift stations. Sewer pipe diameters range from 6 to 12 inches.

Military Highway Water Supply Corporation

Military Highway Water System – Water for the Military Highway project service area is supplied from a water treatment plant located west of the study area. The water distribution system consists of approximately 30 linear miles of water lines having pipe diameters ranging from 2 to 12 inches.

Military Highway Wastewater System – One of the six wastewater treatment systems operated by Military Highway is located within the study service area and provides wastewater service to 320 households in the study area. The San Pedro WWTP has a treatment capacity of 0.16 mgd. The collection system consists of six (6) lift stations, approximately 10 linear miles of 6 and 8 inch sewer pipe, and 320 service connections.

Valley Municipal Utility District Number 2

Valley MUD currently provides water and wastewater services to two main areas, town of Rancho Viejo and the River Bend Resorts.

Valley MUD Water System - Valley MUD's raw water supply source is the Rio Grande. Water is diverted from the river to a pump station located at the River Bend Resorts. Valley MUD has two water treatment plants, a 1 mgd conventional treatment plant and a 0.25 mgd reverse osmosis water plant. River Bend Resorts has one 15,000 gallon ground storage tank and a 75,000 gallon elevated storage tank. The Rancho Viejo area has two 150,000-gallon clear wells, and a 0.3 MG elevated storage tank. Valley MUD's water distribution system consists of approximately 25.4 linear miles of water lines having pipe diameters ranging from 1 to 12 inches.

Valley MUD Wastewater System – Valley MUD has two wastewater treatment plants, one located in Rancho Viejo having a treatment capacity of 0.4 mgd and the other at the River Bend Resorts having a treatment capacity of 0.046 mgd. Valley MUD has approximately 16 linear miles of wastewater collection lines with pipe diameters ranging from 2 to 12 inches. The wastewater collection system also includes 17 lift stations.

EXISTING PROBLEM AREAS

Within the project study areas, various problems have been reported concerning the water and wastewater systems. Some of the reported problems are as follows.

Old Systems – Within most of the study areas, in particular for the BPUB and El Jardin service areas, water main breaks, sewer flow blockages, and other type of problems have been reported. Some of these problems have occurred in areas where the existing pipe is old. At the time problems were reported, it was not clear if these problems were being caused by overloaded systems or by deteriorated pipes.

Rapid Growth – New residential and commercial developments have been occurring throughout the project study area. These new developments have put a strain on existing water and wastewater system capacities by overloading undersized systems.

El Jardin WSC Low Water Pressures - In a letter addressed to the Board of Directors of El Jardin WSC dated October 23, 2000, Gale Armstrong, General Manager with El Jardin WSC documented incidences of low water pressures on the El Jardin side of the water system. Dates and locations in which low pressures occurred were described in the letter. This letter also mentioned that a Boil Water Notice was issued July 20, 2000, and described how incidences led to this issuance. Most of the incidences of low pressures occurred in the southeastern part of the South System. Since these occurrences, El Jardin has doubled the number of test sites and has increased the site visits from weekly to daily. Note: Due to a lack of additional information regarding water systems from both BPUB and El Jardin systems, we were not able to attribute the cause for low water pressures, as part of this *Regional Master Plan* project.

DEVELOPMENT TRENDS

The Lower Rio Grande of Texas including the City of Brownsville and surrounding areas have been experiencing rapid growth the past 20 years. This growth has been documented in results from the U.S. Census for year 2000 and studies conducted for the study area including the TWDB Senate Bill 1 state water plan project.

In addition to these rapid growth trends, this *Regional Master Plan* considered proposed developments that were identified while the project was being conducted. New developments included several new residential subdivisions, a retail mall, a golf course, a birding center, commercial areas, and approximately 4,000 acres proposed for the Brownsville Navigation District.

STUDY PLANNING PERIODS

The *Regional Master Plan* evaluated water and wastewater system requirements for four study-planning periods. Planning periods were for existing conditions and projected 5-year, 15-year, and 25-year time periods. Existing conditions is defined as developmental conditions that existed during year 2000, the same year this project was authorized. Each planning period considered existing and projected populations, which are discussed in more detail in ***Section III*** of this report. Descriptions of project planning periods are as follows.

- Existing Conditions – Existing conditions reflect water and wastewater systems including system design, configuration, and demands as existed for the year 2000.
- 5-Year (Year 2005) – The 5-year planning period reflects development conditions projected by the year 2005.
- 15-Year (Year 2015) – The 15-year planning period reflects development conditions projected by the year 2015.
- 25-Year (Year 2025) – The 25-year planning period reflects development conditions projected by the year 2025.

INTERVIEW QUESTIONNAIRE

Water and wastewater system information can generally be obtained from various sources including previous study reports and design or record drawings. If a problem is occurring within the system, this information would not be found in these data sources. As part of this *Regional Master Plan*, interviews of each study partner were conducted to inquire about system information that may not be documented in these other sources. The interview process was conducted in two-phases, first a written interview questionnaire was sent out to each water provider, and then a personal interview was conducted.

The written interview questionnaire included questions concerning known problem areas, the process of reporting problems, problems corrected, and inquired about any new reports or maps that may have been prepared. Interview questionnaires were sent to study partners during August 2000.

Questionnaires were returned from study partner staff including BPUB department of water/wastewater engineering, plant manager, and customer service; El Jardin, Military Highway, Valley MUD, and Olmito. A questionnaire was also returned from the City of Brownsville planning department. After the questionnaires were returned, the personal interview was conducted with staff from all study partners. During the personal interview any unanswered questionnaire questions were resolved and any new information was obtained if available.

Table 2 - Interview Questionnaire Results summarizes interview questionnaire results that were returned, and ***Appendix A*** includes copies of the returned questionnaires.

OTHER CONSIDERATIONS

Development of the *Regional Master Plan* project also considered the following.

Proposed Water Treatment Plant - During a project progress meeting, TC&B learned that a desalination water treatment plant was being proposed for the study area. The proposed desalination water treatment plant was considered for the regional water system requirements.

System Changes – When the project was initiated, system configurations were those as existed as of year 2000. Due to the on-going dynamics (new developments, system problems, etc.) occurring within the project study areas, system configurations changed. Some of the changes that occurred in the BPUB system included:

- Dismantling of two elevated water storage tanks (EST) including the Zoo EST and the Expressway EST.
- Addition of a 16-inch water main located in the western part of the BPUB system.
- Realignment of a wastewater force main located near Lift Station No. 41 (Thomas) and Lift Station 63 (Robindale and 802).

Model Calibration - Some uncertainties in the available data were experienced during the development of the water and wastewater system models. These uncertainties related to the configuration of systems and required that assumptions be made in order to proceed with the work. These water and wastewater system uncertainties and assumptions are discussed in ***Sections V*** and ***VI*** of this report.

Data sources used for the evaluation of water distribution and wastewater collection systems for this *Regional Master Plan* included previous study reports, geographic information system, design and record drawings, population records, and field measurement of water pressures. A description of each data source follows.

PREVIOUS STUDIES

The last comprehensive water and wastewater study conducted for the BPUB service area was conducted over 14 years ago. Water and wastewater studies were conducted in 2000 for El Jardin WSC and Valley MUD service areas. A water study was conducted for the Olmito service area in 2000. Previous water and wastewater studies were not found for the Navigation District or for the Military Highway service areas.

Copies of previous prepared water and wastewater study reports that included the project service area were obtained and evaluated. Previous reports range in date from 1982 to November 2000. The following summarizes some of the more pertinent studies evaluated as part of the *Regional Master Plan*. ***Appendix A*** contains a detailed summary of all previous water and wastewater project reports obtained and evaluated as part of this *Regional Master Plan*.

Olmito Water Supply Corporation, Preliminary Engineering Report (Olmito PER), prepared by Cruz-Hogan Consultants, Inc., dated February 2000. The **Olmito PER** presents an evaluation of Olimito's water system and proposed waterline modifications that include an additional 44,000 linear feet of water lines. These additions and modifications were based on the evaluation and projection of environmental resources, growth areas, and population trends. **Olmito PER** results included a recommendation that additional raw water be purchased, that new water lines and fire hydrants be installed, that the existing 200,000 gallon elevated storage tank be repainted, that 200 gate valves be replaced, and that a new wastewater truck be purchased.

Valley Municipal Utility District No. 2, Comprehensive Plan for Water and Wastewater Facilities Draft (Valley MUD Plan), prepared by NRS Consulting Engineers, dated March 1, 2000. The **Valley MUD Plan** identified capital improvements necessary to meet projected water and

wastewater treatment demands for the year 2020 (20 year planning period). This study investigated historical growth, projected future growth, and current and future deficiencies in water source, treatment, storage, distribution, and wastewater collection and treatment. The **Valley MUD Plan** recommended rehabilitation for the conventional water treatment plant to improve water quality. The water system was proposed to be enlarged to accommodate future demands. A recommendation was made to televise the Rancho Viejo wastewater system to investigate the condition of existing clay pipes. The pipes may need to be replaced, depending on the condition. It was also recommended that the **Valley MUD Plan** be updated in five years to re-evaluate future needs.

Brownsville Public Utilities Board, Update of Water Distribution Model, Evaluation of Elevated and Ground Storage Requirements (BPUB Water Update), prepared by NRS Consulting Engineers, dated June 2000. The **BPUB Water Update** presented results of water modeling conducted for the BPUB's water system. The **BPUB Water Update** report considered the removal and addition of two elevated storage tanks. The report noted that BPUB would need to consider the cost of tank repair and maintenance, the TNRCC regulations for water storage, the impact on the water system, future needs, and the fire rating requirements in considering the removal of a tank. However, the addition of a storage tank requires consideration of the TNRCC regulations on the location of the tank. Another consideration is the soil type, which would influence the cost of the tank. An alternative was not chosen, but a recommendation was made that ground water storage not be an option for replacing the elevated storage tanks.

El Jardin Water Supply Corporation, Water and Wastewater Study (El Jardin Study), prepared by Cruz-Hogan Consultants, Inc., dated November 2000. **El Jardin Study** report presented results of an analysis of existing water distribution facilities and identified necessary actions to accommodate future demands to year 2020 for El Jardin's service area. The plan is to bring the current water system up to date and accommodate future water demands proposed for three phases. Phase 1 proposes the construction of a 4 mgd water treatment plant, a 500,000 gallon elevated storage tank, and distribution mains. Phase II proposes to expand the water treatment plant by 2 mgd, construct another 500,000 gallon elevated storage tank, and add more water distribution lines. Phase III expands the water treatment plant by another 4 mgd and builds the remaining water distribution lines. **El Jardin Study** report recommended building a new wastewater collection system and pumping flows to BPUB

wastewater treatment plants. This report also presented a layout of a proposed wastewater collection system for El Jardin's service area.

BPUB GEOGRAPHIC INFORMATION SYSTEM

The BPUB has an existing geographic information system (GIS) of their water and wastewater systems. When the *Regional Master Plan* project was authorized (year 2000), the BPUB received initial versions of the GIS. As part of the *Regional Master Plan*, the GIS was used as a source to evaluate water and wastewater systems. The obtained GIS included the following features:

Base Map
- City of Brownsville street alignments and names
- Lots (parcels)

Water System
- Water line alignment and pipe diameters
- Fire hydrants (location)
- Water valves (location)
- Water meters (identification number and location)
- Water storage tanks (location)
- Water treatment plants (location)

Wastewater System
- Gravity sewer line alignment and pipe diameters
- Force main alignment and pipe diameters
- Manholes (location)
- Lift stations (location)
- Wastewater treatment plants (location)

Evaluation of the GIS revealed several problems including the following:

- Water and wastewater pipes were originally entered (digitized) as segmented pipe segments, instead of one pipe segment between nodes (manholes). As part of developing the water and wastewater models, a single line segment between nodes is required.
- Wastewater pipes were digitized to flow in the wrong direction
- Manholes were shown at the wrong physical location
- Wastewater pipe flow line elevations were missing
- Some wastewater pipe diameters were missing
- Manholes were missing top of rim elevations
- Pipes that appeared to be connected at intersections in the system were found to not be connected when "zoomed" in for a closer inspection

In order to use the GIS to develop system models, most of the GIS problems were corrected and the GIS data was modified to reflect corrected problems. A copy of the modified GIS was delivered to the BPUB as part of this *Regional Master Plan*.

MAPPING SOURCES

The following mapping sources were used for this *Regional Master Plan*.

Design and Record Drawings – BPUB wastewater systems were analyzed using a computer model consisting of sewer pipes having a pipe diameter of 6 inches or greater. For these modeled systems, pipe flow line elevations were determined using existing design and record drawings, wherever available. Design and record drawings were obtained from BPUB files. For pipe systems where drawings were not available, flow line elevations were interpolated using either other flow line elevations from connecting systems or were assumed considering standard engineering standards. These drawings were also used to determine wastewater manhole rim elevations.

U.S. Geological Survey Maps – For wastewater manhole rim elevations where above-referenced design and record drawings were not available, manhole rim elevations were determined using a digital version of U.S. Geological Survey topographic quadrangle maps.

POPULATION

It is critical to determine accurate existing and projected water demands and wastewater flow rates to evaluate water and wastewater systems. *Regional Master Plan* water demands and wastewater flows were determined considering known water demands, flow from water billing records, recorded flows, and estimated populations within each service area. ***Table 3 – Regional Master Plan Populations*** shows the population projections for the following years: 2000, 2005, 2015, and 2025. For the *Regional Master Plan*, there are no permanent residential populations for the Brownsville Navigation District, since it consists mainly of industrial facilities. The following describes the data sources and methodology used to determine existing and projected populations.

State Water Plan Project – A project was conducted for the Texas Water Development Board to evaluate water requirements for the State of Texas, including this *Regional Master Plan* project service areas. The TWDB project included an evaluation of existing and projected population trends. The TWDB water project results that included the *Regional Master* Plan project study area were presented in the **Region M Report** dated January 2001. The **Region M Report** included overall populations for the City of Brownsville and Rancho Viejo areas for the years 2000, 2010, 2020, 2030, 2040, and 2050. Results from the **Region M Report** concluded that for the project service areas, the growth rate would have a 1.7 percent increase per year.

U.S. Census – The U.S. Census Bureau determined and published City of Brownsville and Rancho Viejo populations for 2000. The census population determined for the City of Brownsville was 139,700 and 1,754 for Rancho Viejo. When compared to populations determined for 1990, the City of Brownsville population increased by 41 percent and Rancho Viejo's population increased by 98 percent during this 10-year time period. This increase equates to a 3.5 percent annual growth rate for Brownsville, and an approximately 7 percent growth rate for Rancho Viejo. The general consensus of City and County officials is that the U.S. Census populations for year 2000 are too low.

WATER BILLING RECORDS

A digital copy of BPUB's water customers billing records was obtained. Water billing records included monthly water usage amounts for BPUB customers during a two-year time period starting from October 1998 through September 2000. For most of the BPUB billing records, a customer identification number matched with an identification number assigned for the GIS water meter data. Not all water customers had identification numbers that matched with GIS water meter identification numbers. In addition, not all water customers had monthly water usage amounts for the entire two-year time period. Water billing data was considered in developing water demands and wastewater flows for system sub-areas.

WATER PRESSURE MONITORING

Water pressures were measured at six fire hydrants located throughout the BPUB service area. Water pressures were not measured in the other project study partner's service areas. Pressures were

recorded for a seven-day time period from November 7 to November 14, 2000. During these tests, five-minute interval pressure readings were recorded at the various fire hydrants. Six of the seven days were under normal daily water usage conditions. Fire flows were simulated on the seventh-day by opening fire hydrants for a set time period. ***Table 4 – Water Pressure Monitoring Summary*** presents the location of flow meters and average flow measurement amounts. ***Appendix A*** includes a detailed summary of the results.

Additional water pressures were also taken at three of the BPUB elevated water storage tanks. Flow meters at the two BPUB water treatment plants were expected to provide an additional check on the accuracy of the plant meters, but the meters at one of the plants were inoperative at the time of the testing and a comparison of readings was not possible. Results of all of water pressure monitoring were compared with predicted model results to calibrate the computer water system model of the distribution system.

EXISTING CONDITIONS

Regional Master Plan existing development (urbanized) conditions represent conditions for the year 2000, the same year that this project was authorized. Existing development conditions for the Brownsville PUB service area was based considering information presented in the BPUB's GIS for parcels (lots) and locations of existing water meters. The GIS parcel information and water meter locations generally reflect areas where there is development, including residential and commercial land use types.

For the other project study areas, including El Jardin WSC, Olmito WSC, and the Valley MUD service areas, existing development conditions were those as presented in previous studies conducted for those areas. Existing development conditions for the Military Highway service area were based on the location of existing water distribution systems and street patterns. The Brownsville Navigation District is considered as an industrial land use type.

PROJECT POPULATIONS

Existing Conditions (Year 2000) – For the City of Brownsville including most of the BPUB's service area, overall populations developed from the 2000 U.S. Census were used for the *Regional Master Plan.* For El Jardin WSC, Olmito WSC, and Valley MUD service areas, populations developed from previous reports were used for this *Regional Master Plan.* For the Military Highway service area, population estimations were based on the number of water service connections assuming 4.6 persons per connection. Populations within the BPUB internal systems were determined considering the number of water meters within the internal system boundary and assuming the 4.6 persons per meter relation.

Projected Populations (Year 2005, 2015, and 2025) – For El Jardin service area, previous project results projected populations for the year 2005. For the Olmito service area, previous project results projected populations for the years 2005 and 2015.

For the *Regional Master Plan* projected populations for all three study-planning periods were developed considering existing populations and the projected values as previously determined for El Jardin and

Olmito. The populations were projected for the future planning period assuming a 1.7 percent growth rate, which is the rate developed as part of the Senate Bill 1 **Region M Report**.

FUTURE DEVELOPMENTS

After providing draft information on demands and meeting with study partners to discuss the results of the study, it was determined by the study partners that the 1.7 percent growth rate was low. They requested that a 5 percent growth rate be used to better reflect the growth they anticipate. Locating areas for commercial growth accommodated this request.

A consideration was also given for areas that were identified to develop within the next five years. These areas were identified through individual interviews with the study partners. These identified future developments included several residential subdivisions, a retail mall, a golf course, a birding center, and other commercial areas.

These identified and projected commercial development plus the 1.7 percent population growth rate result in water demands and wastewater flows that would be equivalent to an overall 5 percent population growth rate.

For the Brownville Navigation District service area, 4,000 acres have been identified as possible future development. It is anticipated that this area will be developed as an "industrial" land use type, with no specifics known at this time.

Exhibit 2 – Land Use Map presents *Regional Master Plan* existing and projected future development areas.

The *Regional Master Plan's* goal for the water distribution system is to determine existing capacities and deficiencies, as well as future modifications required to meet the area's projected growth during the following planning periods: 5-year (2005), 15-year (2015), and 25-year (2025). For each planning period, proposed modifications were determined assuming three different regional system configuration alternatives: the existing independent water supply corporations (WSCs) continue to supply their existing service areas (Independent Alternative 1); a single regional system that will service all of the study partners together (Regional Alternative 2); and, a multi-regional system that groups the existing WSCs into two major supply service areas (Multi-Regional Alternative 3). The development of a separate water system model was not required to evaluate the proposed Alternative 4 (Emergency Interconnection Alternative). Data for this alternative was extrapolated from the Alternative 1 water system model. A description of each alternative is presented in ***Section I*** of this report. All pertinent input and output PIPE2000 water system model data can be found in ***Appendix B*** of this report.

EVALUATION PARAMETERS

Existing water distribution systems and the infrastructure improvements needed to meet future water demand during this project's 25-year planning period (2000 – 2025) were developed and analyzed by the project team. Evaluation of both existing and future water distribution system configurations for the study partners was accomplished through a combination of computer modeling and the use of results from previous studies. The PIPE2000 computer program, developed by the Civil Engineering Software Center at the University of Kentucky, was used for water distribution system model analyses. The extent of computer modeling was limited by the scope of services for developing an overall regional model. The Brownsville Public Utility Board's (BPUB's) water distribution system was used as the base model and water demands for each of the study partners were added at specific exit point locations along the BPUB's major flow path transmission lines. It was assumed that the study partners will continue to maintain the storage, pumping, and pressure maintenance facilities within their own distribution systems, and will receive wholesale water service from existing sources of treated water. The project team constructed the base PIPE2000 water distribution system model using the following sources of information:

- Water treatment plant flow records
- Digital pipe network data from the BPUB's GIS data
- Digital U.S. Geological Survey topographic information

- Blue line prints of the existing waterlines from the BPUB; sketches of waterlines from the Navigation District, El Jardin, Olmito, and Valley MUD
- Actual water amounts used by BPUB customers with locations based on the GIS data
- Results from water plant flow monitoring efforts conducted for the BPUB's water system
- BPUB water treatment plant pump data including number of pumps, start/stop parameters
- BPUB water elevated storage tank information including location, storage capacity, water levels, and elevations
- Projection of water loss within the BPUB water system
- Existing and projected populations
- Results from water pressure readings taken at three of four existing BPUB ESTs (Alton Gloor EST was shut down for maintenance and could not be tested)
- State and federal drinking water and water system criteria

SYSTEM CRITERIA

To describe how water is used in the system, the BPUB provided an average day to peak day factor of 1.54; however, a peak day to peak hour factor of 1.28 was assumed. This peak factor was based on the proportionality between peak day and peak hour factors from previous TC&B water system modeling projects. The Hazen-Williams equation was used in the model to calculate pipe flow velocities; and the friction loss factors (C-factors) were assumed for the various existing pipe materials. These friction loss factors are based on standard published table values and are dependent on the roughness of the pipes. The initial elevated storage tank water levels for the static and extended period simulation models have also been assumed. The BPUB provided customer water use meter data and a system loss factor of 1.356 was estimated to account for the volume of water that the BPUB must supply from their water treatment facilities. Meters that were missing confirmed water-use values were assumed to have a water use equal to the average water use of meters in the surrounding area.

The Texas Natural Resource Conservation Commission (TNRCC) has established minimum standards for all public water systems in Texas. These standards must be met by each public facility for pumping, storage, distribution layout, supply, and flow within the water system. However, the TNRCC does allow deviation from the criteria if operational data demonstrates that the system is capable of meeting the intent of the rules, particularly when computer modeling provides reinforcement of the ability of the system to meet the necessary minimum pressures specified.

The following is a list of the water system criteria that were applicable to the *Regional Master Plan*:

Per capita use	134 gallons per capita per day – BPUB data
Persons per connection	4.6 – Census data
Use/connection	616 gallons per day, average daily water use – calculated
Average day to peak day factor	2.4 – TNRCC minimum unless data is available
Average day to peak day factor	*1.54 – BPUB analysis of existing data*
Peak day to peak hour factor	1.25 – TNRCC minimum for systems with elevated storage
Peak day to peak hour factor	*1.28 – for BPUB using existing data and TC&B experience*
Maximum peak hour velocity	5 feet per second (fps) – TC&B criteria
Maximum peak hour head loss	5 feet per 1,000 feet – TC&B criteria
Minimum peak hour pressure	35 psi – TNRCC requirements
Max. peak day plus fire velocity	10 fps – TC&B criteria
Max. peak day plus fire head loss	10 feet per 1,000 feet – TC&B criteria
Min. peak day plus fire pressure	20 psi – TNRCC criteria
Capacity of source of supply	0.6 gpm per connection or able to meet peak day, whichever is greater – TNRCC criteria
Capacity of source of supply	*Flow required to meet the larger peak day demand*
Capacity of pumps	Able to meet peak hour with largest unit out of service in each pressure plane – TNRCC criteria
Total storage capacity	200 gallons per connection – TNRCC requirements
Elevated storage capacity	100 gallons per connection – TNRCC requirements
Distribution line capacity	Line size requirements for peak day plus fire or for peak hour, whichever is greater – ISO criteria
Distribution line capacity	*Line size requirements for the larger peak hour demand*

WATER DEMANDS

Water demands were initially based on existing populations from the year 2000 census data along with projections of future populations for the years 2005, 2015, and 2025. ***Section IV*** of this report discusses development of the annual population growth rate of 1.7 percent utilized to determine future population projections. Water demands were then calculated on a per-capita usage basis. Previous reports, including the **BPUB Water Update** report were also consulted. The **BPUB Water Update** report indicated a total BPUB service area for year 2000 water demand of 20 mgd, which includes the City of Brownsville, a portion of El Jardin, and the Navigation District. The existing (year 2000) water demands extrapolated from these various sources were then used to determine a per capita water-use

rate of 134 gallons per day (gpd) for the BPUB and El Jardin service areas within the study area. Per capita water-use rates for the other study partners were taken from the previous reports mentioned above. These per capita water-use rates were held constant throughout the planning period for this study. It should be noted that the TWDB's planning period water demands are different than those used in the current study due to updated year 2000 census population data now available and a difference in the per capita water use factors used by the TWDB, which vary by decade. The Navigation District was assumed to have a residential population of zero; therefore, water demands were obtained from previous BPUB master meter billing records for their commercial/industrial area water consumption.

Water demands for the intermediate planning years were calculated for the BPUB, El Jardin, Olmito, Valley MUD, and Military Highway service areas by multiplying the projected population by the appropriate per capita water-use rate. The Navigation District water demand for intermediate planning years was the same as for the year 2000.

To address concerns that the projections of future development in the BPUB's service area were not adequate, additional future water demand projections were developed and designated as commercial development. This increase for commercial areas allows the BPUB service area to have the equivalent of an overall five percent average annual growth rate while still using the TWDB's projected population growth rate of 1.7 percent. All of the PIPE2000 water distribution models were revised to show the additional growth requested.

SYSTEM MODELS

Currently, the raw water supply for the BPUB service area is treated and distributed by two water treatment plants (WTPs) that are located in the south central and southwest areas of the City of Brownsville. Water is stored in four elevated storage tanks that are located throughout the City. For simplicity in the static PIPE2000 computer model, the water treatment plants were modeled as elevated storage tanks. This representation is adequate because the static model provides a picture of how the water distribution system is operating at a single moment in time. Additional plant information was utilized for the 24-hour extended period simulation (EPS) models to represent the WTPs as water supply

reservoirs and continuous system operation data is compiled on an hourly basis during these simulations.

In order to create the PIPE2000 water distribution base model, the digital water distribution system pipeline/end node base network included in the BPUB's GIS was simplified and connections completed within the Arcview software. The data for individual meter water demands were then grouped into larger area end node demands with units of gallons per minute (gpm), combined with the pipeline/end node network and imported from Arcview into the PIPE2000 software. The demands for approximately 20 percent of the water meters (where data was not available) were assumed, based on the average demand of meters in the surrounding area. The remaining input data (such as EST information, system loss factors, average day to peak day factors, etc.) were added to the PIPE2000 static water models for Average Day, Peak Day, and Peak Hour demands and the models exercised. The static model results are used to evaluate the adequacy of the pipeline diameters used in the water distribution system in order to deliver the water demand needed while meeting the required criteria for minimum line pressures, EST water levels, and maximum velocities and head losses under the various use conditions.

As previously discussed in ***Section III*** of this report, water pressure tests were conducted at six locations throughout the existing BPUB service area during the time period from November 7-14, 2000, which represents average day water use conditions. The PIPE2000 static model results were compared to these measured water pressures. Two of the six test locations recorded pressures very near those calculated in the model. Results from the other locations showed that the pressures predicted by the model were within ten percent of the pressures that were actually measured during the tests. Typically, results within five percent accuracy are desired in model calibration. In this case however, it was decided that the various assumptions that were required to model this water distribution system prohibited the use of the test data for further reduction of the model's variation of results.

Next, a series of Peak Day EPS models were created by modifying the static model's combined average day to peak hour factor into a series of hourly factors to represent how water use varies in the water distribution system over a 24-hour period. This series of hourly demand factors is referred to as a diurnal curve and one of the hours within this curve describes the Peak Hour demand. The results from the EPS models are used to evaluate the adequacy of the WTP and EST storage capacities. Adequate

storage capacities are needed to provide the water supply required to meet the specified demand conditions while maintaining minimum line pressures and EST water-level criteria; and maximum line velocity and head loss criteria. The EPS model was then used to test alternative scenarios designed to improve service within the existing water distribution system, as well as to determine the infrastructure improvements needed to meet the increasing water demands during the 25-year planning period.

EVALUATION RESULTS

As discussed above, water distribution system models were developed and executed for each of the three system configuration alternatives, both for existing Year 2000 conditions, as well as ultimate Year 2025 projected conditions. In addition, the models for each alternative were modified to determine the necessary intermediate modifications for years 2005 and 2015. The entire set of results generated for a single PIPE2000 program model is quite extensive. Therefore, one set of model results is presented in ***Appendix B***. Result sets from all remaining PIPE2000 models are provided on a CD Rom.

The overall strategy for each of the system configuration alternatives considered the following:

- Enlarging existing major pipeline flow paths and adding new flow paths in order to transfer the needed water from the treatment facilities to the demand locations.
- Enlargement and redistribution of the water storage facilities to efficiently move the water around within the system.
- Enlarging and/or adding additional raw water treatment facilities to meet the growing needs of the region.

For all alternatives, water system model results indicate that two of the older existing BPUB elevated storage tanks (Southmost and Texas Southmost) are not contributing significantly to the operation of the existing water distribution system. This is probably due to the relatively short distances that exist between each of these two tanks and the WTP No. 1 pump station; and that both ESTs are connected to the distribution system along a major pipeline flow path. As a result, these tanks actually behave as a water demand rather than a supply by removing water from the system until they have filled up and only occasionally releasing small amounts of this volume back to the system. Follow-up discussions with BPUB staff confirmed stagnation was indeed an ongoing problem at these storage facilities. A number of alternatives were evaluated to try to increase the contribution of the existing tanks. Ultimately the need for increased flows into and out of the tanks, as well as the need for increased tank volumes to

meet TNRCC minimum storage criteria required the use of new larger tanks at other locations and abandonment of these two smaller non-participating tanks. In addition, a third small existing elevated storage tank required replacement with a much larger tank at the same location.

It is also noted that the TNRCC criteria for minimum storage tank sizing are for systems without fire protection. However, these PIPE2000 models were designed such that modifications made to the water distribution system would allow the elevated storage tanks to supply the peak day/peak hour water demand while maintaining a minimum 50 percent combined elevated tank volume. The significance of the 50 percent capacity limitation is to allow at least half of the storage capacity to be available for the purpose of fighting fires within the service area. In addition, the overall elevated tank storage capacity must at least return to the initial total storage volume by the end of the 24-hour simulation period. As previously noted, meeting the water system's Peak Hour water demand is more stringent than meeting peak day plus fire requirements. With respect to ground storage facilities, the project team was unable to simulate the fluctuations in the WTP clear well levels during the 24-hour EPS model runs since all of the necessary information on the clear well transfer pumps was not available. As a result, it is not known whether or not their available combined volumes would have fallen below this 50 percent mark.

To meet the ultimate 2025 water demands and the TNRCC elevated storage criteria, all three alternatives also required that the (0.5 MG) F.M. 802 EST be replaced with a much larger 5.0 MG EST and that two new 5.0 MG ESTs be constructed within the northern half of BPUB's service area. In addition, all alternatives require that the two existing WTPs obtain major system upgrades to supply a much larger volume of water to the various service areas. They will also all require a number of pipeline replacement upgrades along major flow paths and the creation of new flow paths. Finally, with regards to water treatment facilities, all alternatives will utilize the proposed brackish water WTP to be located northwest of the City of Brownsville. Alternative 2 will require the construction of new (fourth) WTP in the northeast portion of the BPUB's service area in order to adequately service the new future Navigation District water demands.

Evaluation of both the existing and future configurations of the wastewater collection systems of the study partners was done through a combination of computer modeling and results from previous studies. The extent of computer modeling was limited by the scope of services to developing an overall regional model using the BPUB wastewater system as the base model and adding wastewater flows from the study partners at specific nodes and with flow paths from the BPUB system to the other study partners' systems. It was assumed that the study partners would continue to maintain their own internal collection system and treatment facilities, if applicable depending on the study alternative. Sources of information used to develop the computer simulation models included the following:

- Water and wastewater treatment plant flow records
- Digital pipe network data from the BPUB GIS data
- Actual water amounts used by customers with locations based on the GIS data
- Design and record drawings
- Lift station flow charts
- Existing and projected populations
- Personal interview with plant operators and engineering staff

SYSTEM CRITERIA

The Texas Natural Resource Conservation Commission has established minimum standards for municipal wastewater collection and treatment systems. Minimum standards are established for the minimum slope, manhole spacing, lift station pumping capacity, etc. The following criteria were used in evaluating wastewater systems where applicable.

Minimum Gravity Pipe Size - TNRCC states that no sewer shall be less than six inches in diameter with service laterals and force mains being the exceptions.

Pipe Slope - Pipes should be designed with slopes sufficient to give a flow velocity of not less than 2 feet per second (fps). Slopes for pipe diameters greater than 39 inches should be determined using Manning's formula and should maintain a minimum flow velocity of greater than 2 fps and a maximum of less than 10 fps when flowing full.

Manholes - Manholes shall be placed at all points of change in the alignment, grade, or size of sewer, at intersections of sewers, and at the end of all sewer lines that will be extended in the future. The inside of a manhole shall not be less than 48 inches. Manholes should be spaced according to the following:

Pipe diameter (inches)	Maximum Manhole Spacing (feet)
6 – 15	500
18 – 30	800
36 – 48	1,000
54 or larger	2,000

Lift Stations - TNRCC states that whenever a lift station handles waste flow from two or more residential housing units, or from any public establishment, standby pumps should be provided.

Wet Wells – Wet well sizes should be based on the design flow. Wet well capacity should provide a pump cycle time of not less than six minutes for those lift stations using submersible pumps.

Pumps - All raw water sewage pumps shall be of a non-clog design, capable of passing 2 ½ - inch diameter spheres, and shall have no less than 3-inch diameter suction and discharge openings.

Lift Station Pumping Capacity - The firm pumping capacity of all lift stations shall be such that the expected peak flow can be pumped to its desired destination. Firm pumping capacity is defined as the total station maximum pumping capacity with the largest pumping unit out of service.

Force Mains - Force mains should be a minimum of 4 inches in diameter, unless justified. In no case shall the velocity be less than 2 fps with only the smallest pump operating, unless special facilities are provided for cleaning the line at specified interval, or it can be shown that a flushing velocity of 5 fps or greater will occur one or more times per day.

Assumptions and other Considerations – The following are assumptions and other considerations used to evaluate wastewater systems.

- Free Board - A free board of 2 feet in manholes was used as a guideline in the modeling of the wastewater collection system. For this analysis, freeboard is defined as the distance between the top of manhole elevation and the calculated water surface elevation. The value of using a dynamic model is that it calculates the increased flows in a gravity line that are cause by surcharging of the line. A pipe with even one to two feet of head in a surcharged condition will convey significantly more flow than a gravity line flowing full. Allowing the lines to surcharge gives increased capacity to the system, and the minimum freeboard criteria allows the model to maintain an adequate margin of safety to prevent overflow at the critical manholes.
- Manhole Storage Capacity - A 4-foot diameter was assumed for all existing manholes in creation and evaluation of the wastewater models.
- Modeled Lines - Gravity lines having a diameter of 6-inches or greater were modeled.
- Lift Station - Lift station locations and pump configurations were based on existing BPUB information and lift station flow charts. The BPUB provided pump types, and start and stop depths for each lift station. Pump flow rates and dynamic heads were obtained from manufacturer pump curves.
- Wet Wells - Lift station wet well elevations were obtained from record drawings.
- Missing Flow Line Elevations - Pipe flow line and manhole rim elevations were not originally provided as part of this project. Therefore, the manhole rim elevations were determined from U.S.G.S. quadrangle maps and pipe flow line elevations were determined using either design or record drawings, if found to be available. If the drawings were not available, missing flow lines were interpolated using either other flow lines from connecting systems or calculated using TNRCC regulations with slopes maintaining a velocity of 2 fps.

WASTEWATER FLOWS

Section V of this report discusses methodology and considerations to develop water demands for existing and future conditions. Wastewater flows were developed in a manner similar to that used to determine water demands. Wastewater flows were based on population projections, previous reports, and a three-year average of recorded wastewater treatment plant data obtained from the BPUB. The three-year average of plant flow data, which includes the BPUB and part of El Jardin service areas, was calculated at 11 mgd. A per capita wastewater use factor was then determined by dividing the average plant flow by the projected population. The Navigation District was assumed to have a residential population of zero; and flow values were obtained from recorded wastewater treatment plant reports. Valley MUD values were obtained from the previously referenced **Valley MUD Plan**.

The **Valley MUD Plan** report numbers were much larger than TC&B projections; therefore, it was concluded that their flows would be used as presented in the Valley MUD report.
The intermediate planning years were computed for BPUB, El Jardin, Olmito, and Military Highway by multiplying the projected population by the per capita wastewater use factor. The demand used for the Navigation District for the planning years was the same as for the year 2000. Valley MUD wastewater flow values for 2005 and 2015 were obtained from the same report as referenced above. Because this study's planning period ended in 2020, projected year 2025 Valley MUD wastewater demands for *Regional Master Plan* were estimated using the same percent increase as the report used between year 2015 and 2020.

SYSTEM MODELS

Wastewater systems were evaluated using the XP-SWMM 2000 Version 7.0 computer software, developed by XP Software. XP-SWMM combines a graphical user interface (GUI) with an analysis engine that is based on the EPA SWMM Version 4.3.1 software. The XP-SWMM GUI allows the user to view and edit the sewer network graphically, reducing error. The XP-SWMM GUI also allows the user to review hydrographs and hydraulic grade line (HGL) elevations graphically for any section in the sewer network. To help visualize flow conditions, the user has the option to view a dynamic simulation of the HGL superimposed on the system profile. This option is helpful in quickly determining when, to what extent, and for what duration an area of interest surcharges or overflows.

Two XP-SWMM base models of the BPUB wastewater system were created, one for the Robindale wastewater treatment plant (WWTP) service area and one for the South WWTP service area. The base models included BPUB existing sewer trunk lines (6-inch diameter or greater), lift station pumps, force mains, and peak daily flows for the study period (year 2000, 2005, 2015, and 2025). Modeled sewer pipe systems reflect sewer pipe diameters, roughness coefficients, pipe flow line elevations, and manholes and manhole rim elevations. Input data for these models was obtained from the sources previously described including the GIS of the wastewater system. The GIS-LINK computer software, also developed by XP Software, was used to convert GIS data directly into a format that can be used by XP-SWMM.

EVALUATION RESULTS

XP-SWMM models were developed and executed for systems reflecting projected flows for each planning period, including existing conditions, and the three alternatives (Alternative 1, 2, and 3). XP-SWMM models were not developed for Alternative 4. XP-SWMM computer model output are included in ***Appendix C*** and the remaining model outputs are provided on a CD Rom, in the interests of conserving space. A summary of results of the models are shown in ***Exhibits 8***, ***9***, and ***10*** which show the scenario being modeled and the improvements that are required to meet the needs of each time period.

Wastewater system model results indicate that most of the problems within the BPUB's wastewater systems are attributed to existing lift stations. The flat topography in the project study area requires the use of many lift stations to convey the collected wastewater to the treatment plants. For example, the BPUB service area has 140 lift stations. Model results indicate that at many list station locations, the pumps do not have enough pumping capacity to move incoming flows at an adequate rate. This lack of capacity results in either flow overflowing the wet well or backing-up into the system and causing additional problems in upstream segments. Model results also indicate that some of the BPUB's existing gravity lines and force mains are undersized.

Alternatives evaluated included modifying lift stations, which involves enlarging pump sizes and wet wells, and removing and replacing undersized gravity and force mains with adequate diameters for the 2025 year flows. Proposed modifications also considered the sealing of various manhole rims. Proposed changes to the existing configurations determined as a result of the modeling process are presented in ***Section VII*** along with estimated costs for the improvements.

The *Regional Master Plan* evaluated water distribution and wastewater collection systems to determine capacities, deficiencies, and modifications required to meet projected growth by the year 2005 (5-year), year 2015 (15-year), and year 2025 (25-year) planning periods. For each planning period, capital improvements were proposed for four system configuration alternatives. A description of each alternative follows.

Alternative 1 - Independent Alternative

The *Independent Alternative* assumes that all existing water distribution and wastewater collection systems will remain as independent systems, as they currently are. Proposed modifications will include those for distribution and collection systems that would be required to meet future growth within the current BPUB service area. This alternative assumes that the BPUB will continue to supply water and provide treatment of wastewater flows for El Jardin and continue to provide water to the Navigation District. Olmito, Valley MUD, and Military Highway will continue to provide water and wastewater services to their own service areas, and the Navigation District will continue to treat their wastewater flows.

Alternative 2 - Regional Alternative

The *Regional Alternative* evaluated water and wastewater system requirements assuming that an overall regional plan integrating all existing systems will be developed. This alternative investigated future BPUB system requirements assuming that the other water providers will connect to BPUB facilities, if they are not currently connected. However, the connections are only for the purpose of providing wholesale water service and wholesale wastewater treatment services to the study partners. The project assumed that the individual study partners would continue to provide wastewater collection and water storage, pumping, and distribution facilities for their respective areas.

Alternative 3 - Multi-Regional Alternative

The *Multi-Regional Alternative* evaluated water and wastewater system requirements assuming that multiple regional plans will be developed to serve the study area. This alternative assumes that all El Jardin service areas will be disconnected from the BPUB system and wholesale water supply and wastewater treatment needs for the Military Highway, Olmito WSC, and Valley MUD service areas

will be provided by BPUB facilities. This alternative also assumes that any demands for the Navigation District will be provided by El Jardin facilities. The development of the *Multi-Regional Alternative* is three-fold: (1) El Jardin continues to reach out to and serve colonia areas that are currently not associated with any water supplier; (2) El Jardin recently had a study completed that provided updated cost estimates for providing additional water treatment and wastewater collection facilities to serve the needs of its customers as an alternative to continuing to rely on the BPUB for these services; (3) The other study partners appear to be experiencing growth in a corridor that is between their existing service areas and the BPUB service area – a development trend that will result in a single continuous demand area.

Alternative 4 – Emergency Interconnection Alternative

The study participants are currently operating their systems as individual entities, with the exception of the El Jardin WSC and Brownsville Navigation District who are currently connected to the Brownsville PUB system and receive water under direct pressure. With these exceptions, there are not currently any interconnections between/among the systems for providing any increased reliability to any of the participants. As a result of discussions with the participants, a fourth alternative was proposed for inclusion in the project, with the understanding that this alternative would be developed from information that has already been developed in the course of the other three alternatives.

System reliability is now an even more critical issue given the September 11, 2001 attacks on New York and Washington, D.C. All of the study participants have a heightened awareness of the need for analysis of their system response under emergency conditions. The addition of connections between the study partners that allow for flow in either direction increases the reliability of each system to the extent that more facilities must be taken out of service before a total system outage will occur. These connections would be normally closed interconnect type connections that would function in the event of an emergency and allow water to flow to a utility with a water supply or pressurization problem and the diversion of wastewater flows. For the purposes of this study, it is assumed that the intermediate line sizes leading to the interconnection are sized to meet the individual system's peak hour or peak day plus fire demand. Under this assumption, the receiving system needing the additional supply can be supplied under most conditions where the demand is peak hour or less. However, the realization is that if the outage occurs at a peak hour, the system needing water will only be able to receive water if

some demand management occurs within the supplying system. Such interconnects will be usable for a large percentage of the time, and could be useful even for routine maintenance that causes an interruption in the plant throughput, or line maintenance for the main lines leaving the receiving entity's plant. It would also function in the event of a catastrophic event at the receiving entity's plant or main pumping facilities.

Even with the above plan in place, an alternative plan for making drinking water available to people needing amounts for drinking and cooking only should also be developed. In the event of a contamination incident with an unknown substance, the interconnection between the systems should not be activated until it can be assured that there is no risk of the contamination migrating to the supplying system. Under this scenario, areas should be designated where individuals and groups can come to pick up water in containers and take it back to their residences.

The water system model developed for the overall regional system (Alternative 2) and for the Brownsville PUB system by itself is of particular value in assessing the impacts of a contamination incident, whether accidental or intentional. The model can be used to determine the impacts of shutting down various portions of the system and determining how to minimize the outages. The model could also be useful in determining the amount and type of flushing needed to clear the lines of a contaminant, as well as determining the impacts of a contaminant introduced at a specific point in the line or in a reservoir. In order to have maximum utilization, the model will have to be expanded to include the supply facilities and pumping equipment, and further calibration would be needed. This calibration would allow the use of water quality modeling in addition to the hydraulic modeling capability already present.

Table 7 summarizes capital improvements proposed for the Year 2005, 2015, and 2025 planning periods for each alternative evaluated. ***Exhibits 5***, ***6***, and ***7*** present the locations of proposed water system capital improvements for each alternative and ***Exhibits 8***, ***9***, and ***10*** present locations of proposed wastewater system capital improvements. The following summarizes proposed capital improvements for water and wastewater systems for each alternative. ***Tables A25 – A36***, included in ***Appendix A***, present a detailed listing of proposed capital improvements.

WATER SYSTEM

Alternative 1 – Independent Alternative Water Capital Improvements

The *Independent Alternative* assumes that all existing water distribution systems will remain as independent systems, as they currently are.

Brownsville PUB – Capital improvements for the BPUB service area include enlargement of existing water mains throughout the service area, modification of existing elevated water storage tanks, and expansion of water treatment plants. This alternative also includes modification of water meters connecting to El Jardin's water system.

Brownsville Navigation District – There were no capital improvements proposed for the Navigation District for this alternative for year 2005. However, the introduction of the 4,000 acre area will require a new water treatment plant in year 2015. The Navigation District would continue to obtain water from the BPUB.

El Jardin WSC – Previous proposed capital improvements referenced in **El Jardin Study** dealing only with the water distribution system were considered for this alternative. El Jardin would continue to purchase water from the BPUB. Previous proposed improvements considered new water distribution mains to provide better circulation within the entire system and new storage tank to bring the system into compliance with TNRCC requirements. Improvements also include new fire hydrants.

Military Highway WSC – Previous proposed capital improvements referenced in JF Fontaine and Associates' Preliminary Engineering Report were considered for this alternative. This report proposes capital improvements to enlarge the existing 2.125 mgd water treatment plant to a 4.25 mgd treatment capacity. The study area water demand represents approximately 10.76 percent of this enlarged capacity. Military Highway's Long-Range Comprehensive Water Plan also proposes a 750 gpm Ground Water Treatment Plant in the San Pedro area dedicated to providing a water supply to the study service area. By the year 2025 the water treatment plant will have to be expanded. Modifications to water distribution lines were not addressed in the Preliminary Engineering Report.

Olmito WSC – Previous proposed capital improvements referenced in the **Olmito PER** were considered for this alternative. Proposed capital improvements include purchasing additional water rights from the Brownsville Irrigation and Drainage District, installing new water lines, repainting the elevated storage tank, and replacing valves. The pipe system would be sized to increase the capacity and pressure in the system. This involves installing new larger water lines and placing fire hydrants at appropriate intervals. Recommended maintenance items to be completed involve painting the existing 200,000-gallon elevated storage tank and replacing 200 valves throughout the distribution system. With the projected demands for year 2005, additional water treatment capacity is also required.

Valley MUD – Previous proposed capital improvements referenced in the **Valley MUD Plan** were considered for this alternative. The **Valley MUD Plan** proposed modifications to the raw water supply, delivery system, water treatment, storage, and high service pumping facilities. Major components included dredging of the delivery canal, repair of the delivery gate, and provision of additional well capacity to supply raw ground water to the proposed 0.25 mgd reverse osmosis treatment plant. Modifications also include rehabilitation of the conventional water treatment plant, and expansion of the reverse osmosis plant. The distribution system needs an 8-inch altitude valve, 1,000 linear feet of 8-inch line, 2,000 linear feet of 8-inch water line to loop the River Bend Resorts distribution lines, and the replacement of distribution isolation valves. The future improvements include additional 1 mgd surface raw water pumping capacity, a 2 mgd ground water pumping capacity, expansion of the conventional water plant by 1 mgd, and a reverse osmosis water plant expansion of 1.5 mgd.

Alternative 2 – Regional Alternative Water Capital Improvements

The *Regional Alternative* evaluated water system requirements assuming that an overall regional plan integrating all systems will be developed. This alternative investigated future BPUB system requirements assuming that the other water providers will connect to BPUB facilities, if they are not currently connected.

Brownsville PUB - Capital improvements for the BPUB service area include enlargement of existing water mains throughout the service area, modification of existing elevated water storage tanks, and the expansion of water treatment plants.

Brownsville Navigation District - There were no capital improvements proposed for the Navigation District for this alternative. The Navigation District would continue to obtain water from the BPUB.

El Jardin WSC – Capital improvements proposed maintenance facilities including water line modifications, new storage tank, and new fire hydrants as proposed for the *Independent Alternative* would also be used for this *Regional Alternative*.

Military Highway WSC – The Military Highway service area would obtain water from the BPUB for the *Regional Alternative*. For this alternative, a water line and meter to connect to the BPUB system would be required. An evaluation of water distribution system requirements to meet projected water demands within the service area was not conducted as part of this *Regional Master Plan*.

Olmito WSC – The Olmito service area would obtain their additional water requirements from the BPUB. However, the existing water treatment plant is not large enough to treat the existing (year 2000) water demands. Therefore, the water treatment plant needs to be enlarged to meet existing demands. Water distribution capital improvements proposed for the *Independent Alternative* were also considered for this *Regional Alternative*.

Valley MUD No. 2- The Valley MUD service area would obtain their water requirements from the BPUB. Water distribution capital improvements proposed for the *Independent Alternative* were also considered for this *Regional Alternative*.

Alternative 3 – Multi-Regional Alternative Water Capital Improvements

The *Multi-Regional Alternative* evaluated water system requirements assuming that multiple regional plans will be developed to serve the study area. This alternative assumes that El Jardin service areas will be disconnected from the BPUB system and water needs for the Military Highway, Olmito WSC,

and Valley MUD service areas will be provided by BPUB facilities. This alternative also assumes that any requirements for the Navigation District will be provided by El Jardin facilities.

Brownsville PUB - Capital improvements for the BPUB service area include enlargement of existing water mains throughout the service area, modification of existing elevated water storage tanks, and the expansion of the water treatment plants.

Brownsville Navigation District – The Navigation District would obtain water from a proposed El Jardin water treatment plant. Connections to the new system would be required.

El Jardin WSC – The *Multi-Regional Alternative* assumes that a new water treatment plant would be constructed in this service area. Previously proposed distribution, pumping, and pressure maintenance improvements for *the Independent Alternative* would also be implemented.

Military Highway WSC – Previous proposed capital improvements for the *Regional Alternative* would also be implemented for the *Multi-Regional Alternative*.

Olmito WSC – Previous proposed capital improvements for the *Regional Alternative* would also be implemented for the *Multi-Regional Alternative*. The Olmito service area would obtain their additional water requirements from the BPUB since the existing water treatment plant is not large enough to treatment the existing (year 2000) water demands. Therefore, the water treatment plant needs to be enlarged to meet existing demands.

Valley MUD No. 2- Previous proposed capital improvements for the *Regional Alternative* would also be implemented for the *Multi-Regional Alternative*.

Alternative 4 – Emergency Interconnection Alternative Water Capital Improvements

The *Emergency Interconnection Alternative* assumes proposed *Independent Alternative* (Alternative 1) modifications plus necessary requirements to connect to BPUB systems during emergency situations,

if not already connected. This alternative assumes water lines will be constructed to connect Olmito, Military Highway, and Valley MUD systems to the BPUB system.

WASTEWATER SYSTEM

Alternative 1 – Independent Alternative Wastewater Capital Improvements

The *Independent Alternative* assumes that all existing wastewater collection systems will remain as independent systems, as they currently are.

Brownsville PUB – The *Independent Alternative* wastewater capital improvements for the BPUB service area include a combination of removal and replacement of gravity sewers, force mains, modification of existing lift stations, and the expansion of wastewater treatment plants. The BPUB would continue to treat flows from EL Jardin service area.

Brownsville Navigation District – The *Independent Alternative* assumes that the Navigation District would continue to collect and treat their wastewater flows. The existing wastewater treatment plants are undersized for the existing flows; therefore the plants need to be expanded. In years 2015 and 2025, a new wastewater treatment plant is required to treat the flows from the proposed 4,000 acre area.

El Jardin WSC – For the *Independent Alternative* it is assumed that previous proposed wastewater capital improvements proposed in the **El Jardin Study** report would be implemented. Wastewater improvements assumed that flows would be treated at BPUB treatment plants and a new wastewater collection system would be constructed. The proposed collection system would have 76 lift stations placed at every ½ mile, at major intersections, and wherever force mains are to intersect.

Military Highway WSC – For the *Independent Alternative*, two wastewater treatment plant modifications were considered. Plant modifications included a 0.51 mgd extended aeration mechanical wastewater treatment plant, based on a JF Fontaine and Associates' Preliminary Engineering Report, is proposed at the present WWTP site or an adjacent site to supplement or replace the existing facultative lagoon treatment plant in order to treat the anticipated 367,400 gallon per day wastewater average daily flow from the study area. These modifications were proposed for the year

2015 and do not contain enough capacity for the projected flows. Therefore, the treatment plant will need to be enlarged.

Olmito WSC – The *Independent Alternative* assumes that previous proposed wastewater capital improvements referenced in the **Olmito PER** would be implemented. Based on *Regional Master Plan* results, Olmito would require collection and treatment of 3,991,200 gallons per day of wastewater flow (average daily) in the 2025 planning year. Therefore, the proposed capital improvements should also include the expansion of the wastewater treatment plant.

Valley MUD – The *Independent Alternative* assumes that previous proposed wastewater capital improvements referenced in the **Valley MUD Plan** would be implemented. Improvements included an upgrade to wastewater treatment plants, installation of sewer line, and replacement of several lift stations. The proposed improvements to the wastewater treatment plants were not enough, so the costs were adjusted to include the additional expansion.

Alternative 2 – Regional Alternative Wastewater Capital Improvements

The *Regional Alternative* evaluated wastewater system requirements assuming that an overall regional plan integrating all systems will be developed. This alternative investigated future BPUB system requirements assuming that the other wastewater providers will connect to BPUB wastewater treatment facilities for combined wastewater treatment, if they are not currently connected.

Brownsville PUB – Proposed capital improvements for the *Regional Alternative* include treating flows from all project study service areas and removing and replacement of gravity sewers, force mains, modification of existing lift stations, and the expansion of the wastewater treatment plants.

Brownsville Navigation District – Wastewater flows from the Navigation District would be treated by the BPUB for the *Regional Alternative*. Capital improvements include a new force main and lift station that would connect into the BPUB's system.

El Jardin WSC – Previous proposed *Independent Alternative* wastewater capital improvements would also be implemented as part of the *Regional Alternative*.

Military Highway WSC – Wastewater flows from the Military Highway service area would be treated by the BPUB. Capital improvements include a new force main and lift station that would connect into the BPUB's system.

Olmito WSC – Wastewater flows from the Olmito service area would be treated by the BPUB. Capital improvements include a new force main and lift station that would connect into the BPUB's system.

Valley MUD No. 2- Wastewater flows from the Valley MUD service area would be treated by the BPUB. Previous proposed collection system improvements would also be implemented plus a new force main and lift station that connects into the BPUB system.

Alternative 3 – Multi-Regional Alternative Wastewater Capital Improvements

The *Multi-Regional Alternative* evaluated wastewater system requirements assuming that multiple regional plans will be developed to serve the study area. This alternative assumes that El Jardin will be disconnected from the BPUB system and wastewater treatment needs for the Military Highway, Olmito WSC, and Valley MUD service areas will be provided by BPUB wastewater treatment facilities. This alternative also assumes that any requirements for the Navigation District will be provided by El Jardin facilities.

Brownsville PUB – Capital improvements for the *Multi-Regional Alternative* include treating wastewater flows from Military Highway, Olmito, and Valley MUD service areas. Improvements include removal and replacement of gravity sewers, force mains, modification of existing lift stations, and expansion of the wastewater treatment plants.

Brownsville Navigation District - Wastewater flows from the Navigation District would be treated by El Jardin for the *Multi-Regional Alternative.* Capital improvements include a new force main that would connect into the new El Jardin's system.

El Jardin WSC – For the *Multi-Regional Alternative*, a proposed wastewater treatment plant would be constructed in El Jardin's service area. Additional capital improvements as proposed for the *Independent Alternative* would also be constructed.

Military Highway WSC – For the *Multi-Regional Alternative*, proposed wastewater capital improvements for the Military Highway service area are the same as proposed for the *Regional Alternative*.

Olmito WSC – For the *Multi-Regional Alternative*, proposed wastewater capital improvements for the Olmito WSC service area are the same as proposed for the *Regional Alternative*.

Valley MUD No. 2 - For the *Multi-Regional Alternative*, proposed wastewater capital improvements for the Valley MUD service area are the same as proposed for the *Regional Alternative*.

Alternative 4 – Emergency Interconnection Alternative Wastewater Capital Improvements

The *Emergency Interconnection Alternative* assumes proposed *Independent Alternative* (Alternative 1) modifications plus necessary requirements to connect to BPUB systems during emergency situations, if not already connected. This alternative assumes wastewater lines will be constructed to connect Olmito, Military Highway, and Valley MUD systems to the BPUB system.

IMPLEMENTATION PLAN

Proposed capital improvements for the water and wastewater systems have been developed to meet projected water demands and wastewater flows for the years of 2005, 2015, and 2025 and for each alternative. ***Table 7*** summarizes proposed capital improvements. Improvements should be implemented as presented on **Exhibits 5** through **10** starting with year 2005.

PROBABLE COST

Probable costs were determined for each proposed capital improvement alternative. Costs include design and construction, treatment of flows, source of water, and operation and maintenance. Design and construction costs consider unit costs rates for similar projects constructed in the Lower Rio

Grande Valley and include 15 percent for design/engineering fees, and 17 percent for contingencies. Water and wastewater treatment costs were developed using treatment cost rates provided by BPUB staff. Operation and maintenance costs consider rates developed as part of the **Region M Report** prepared for the TWDB. Capital improvement costs previously developed from studies for El Jardin, Olmito, and Valley MUD service areas were also considered as part of development of cost for the *Regional Master Plan*. Previous study costs were adjusted to 3rd quarter 2001 costs. ***Tables 8, 9, and 10*** summarize probable costs for each alternative and planning period. ***Tables A25 – A 36***, included in ***Appendix A***, presents a detailed listing and cost for proposed capital improvements.

FUNDING PLAN

Implementation of proposed capital improvements requires funding. Funding sources evaluated included state, federal, and other sources. The following is a summary of funding sources evaluated.

State Funding Sources

State Loan Program/Development Fund II

The State Loan Program/Development Fund II program is administered by the Texas Water Development Board. It is a state loan program that does not receive any Federal subsidies and issues loans for water supply, water quality enhancement, flood control, and municipal solid waste. The State Loan Program separates the Loan Programs from the State Participation Program and EDAP. This program allows for the funding of multiple eligible components in one loan. Financial assistance may include pumping facilities, storage tanks, treatment plants, wholesale transmission lines for water supply, and wastewater treatment plants and collection systems for wastewater. The maximum financing life of the project facilities being constructed is 50 years with the average financing being 20 to 23 years.

Drinking Water State Revolving Fund Program

The Drinking Water State Revolving Fund (DWSRF) program is also administered by the TWDB that is available to finance projects related to public drinking water systems. These systems must be in compliance with primary drinking water regulations and the federal Safe Drinking Water Act. Financial assistance may include planning, design, and construction of projects involving

improvements/upgrades or replacement of water supply infrastructure. This fund provides long-term loans at the interest-lending rate of 1.2 percent below the rate of the open market. However, the applicant must adopt a water conservation and drought contingency plan for loans over $500,000. The DWSRF loan's maximum repayment period is 20 years from the completion of construction.

Clean Water State Revolving Fund Program

The Clean Water State Revolving Fund (CLWSR) program is administered by the TWDB and is a loan program that provides loans for planning, design, and construction of wastewater facilities and collection systems. These loans are at interest rates lower than what is available through commercial markets. Like the DWSRF, the applicant must adopt a water conservation and drought contingency plan for loans over $500,000 and the maximum repayment period is 20 years from the completion of construction.

State Participation Program

The State Participation Program is another source of funds administered by the Texas Water Development Board. This program allows for optimization of regional projects through limited State participation. This program enables the TWDB to assume temporary ownership interest of the property and treatment works in a regional project when the local sponsors are unable to assume the debt for the optimally sized facility. The cost of the funding is repaid based on purchase payments which are made when the applicant grows into the additional facilitated capacity. This allows the TWDB to recover its principal and interest costs on a deferred timetable. This program allows for the optimal sizing of facilities and systems while considering future growth. The State Participation Program is available to Water Supply Corporations and any Political Subdivision that is sponsoring a regional water or wastewater construction project. The maximum financing life of this program is 34 years.

EDAP

The Economically Distressed Areas Program (EDAP) was established by the 71st Texas Legislature and is administered by the Texas Water Development Board. This program provides financial assistance in either a grant, loan, or a combination of the two and is available to update water and

wastewater services in economically distressed areas. These areas already have water and wastewater facilities, however, they are inadequate to meet the minimal needs of the residents. An economically distressed area is defined as: (1) an area where water supply or wastewater systems are not capable of meeting minimum state requirements, (2) an area where financial resources are not available to provide services to meet the requirements, and (3) an area where there was an established residential subdivision on June 1, 1989. To qualify under EDAP, projects must be located in counties with a per capita income of 25 percent below the state average and an unemployment rate 25 percent above the state average for the last three years, or are next to an international border. The maximum financing life of the project facilities being constructed is 50 years with the average financing being 20 to 23 years.

Colonias Wastewater Treatment Assistance Program

The Colonias Wastewater Treatment Assistance Program is similar to EDAP, but its financial assistance is limited to wastewater facilities. It is administered by TWDB, however, funded through EPA grants. This program was established by the Environmental Protection Agency in 1992 to provide federal funding for wastewater treatment to areas located within 100 kilometers of the border with Mexico.

Federal Funding Sources

Rural Utilities Services

The United States Department of Agriculture administers funding for water and wastewater facilities for rural areas through its Rural Utilities Services (RUS). This group provides funding through a combination of grants and loans, with the amount of grant funding based on the impact of the combined utilities services bills on the average household income. Maximum repayment length for RUS funds is 30 years. Funds are dedicated to the improvement of the conditions for existing residences, not for the development of areas of additional concentration. As a result, there is limited oversizing of lines to accommodate additional growth, and funds for any such oversizing must come from another source. However, those funds cannot be grant funds from any other federal or state program.

Community Development Block Grants

The U.S. Department of Housing and Urban Development makes grants available to eligible grantees for the purpose of improving conditions in communities, including the provision of water supply and wastewater collection and treatment facilities for unserved areas. These grants are primarily targeted to lower income areas.

Other Funding Sources

North American Development Bank (NADB)

The North American Development Bank provides at least two financial programs to assist with the financial responsibility for water and wastewater infrastructure. These programs are available for projects located within 100 kilometers of the international border between the United States and Mexico.

The **Loan and Guaranty Program** provides direct financial assistance for infrastructure projects and also provides partial repayment protection against commercial risks for loans. Eligible projects must be certified by the Border Environment Cooperation Commission (BECC) and involve potable water, water pollution, and wastewater treatment. Financial assistance that is available includes direct loans, interim financing, participation in municipal bond issues, and partial loan guaranties.

The **Border Environment Infrastructure Fund** receives grants from other institutions and combines them with loans and guaranties to finance projects. The objective of this program is to make infrastructure projects affordable for communities throughout the United States and Mexico border region. Eligible projects are also required to be certified by the BECC. This program provides technical assistance that eases the community's adjustment to higher fees over time, and construction assistance which covers construction costs not funded by other sources.

Zions Bank

Zions Bank, part of Zions Bancorporation, offers a credit line that was created specifically for public entities. Loans are available for financing projects that include purchasing equipment, and maintaining

existing facilities. Benefits of this credit line include flexible terms, penalty free prepayments, issuance at no cost and an attractive interest rate.

CONCLUSIONS

The following are the conclusions made from the results from the regional water and wastewater master plan.

1.) System Models - Sufficient information was assembled to build water and wastewater system models of the BPUB systems to evaluate different scenarios of demand and degree of regionalization, and to test various alternative system configurations.
2.) Calibration - Calibration of the existing conditions water system model was within 10 percent variance from observed conditions.
3.) Proposed Capital Improvements – Capital improvements were proposed to meet water and wastewater system requirements for three planning periods and four alternatives. ***Table 7*** summarizes capital improvements proposed for the Year 2005, 2015, and 2025 planning periods and ***Exhibits 5*** through ***10*** present the locations of proposed improvements.
4.) Probable Cost - Regional water and wastewater capital improvements probable construction costs were determined for each alternative. Probable construction costs were developed considering unit cost rates for similar projects and include 15 percent for engineering fees and 17 percent for contingencies. ***Tables 8, 9,*** and ***10*** summarize probable costs.

RECOMMENDATIONS

The following are the recommendations being made for the regional water and wastewater master plan.

1.) Prior to final design of any of the proposed regional master plan water distribution and wastewater collection system capital improvements, a preliminary engineering report should be prepared to verify all regional master plan assumptions and all existing system data including pipe diameters, elevations, pressures, pumps, storage capacities, etc.
2.) Further refinement of the water system model is recommended to include the transfer pumps from the water treatment plants and to model the fluctuation of the clear well levels during the simulation. Addition of these elements would increase the accuracy of the model and make it a more useful tool for diagnosing operational issues. This calibration would also allow the use of water quality modeling required in assessing the impacts of a contamination incident, whether accidental or intentional.
3.) Further investigation of the desalination plant and the manner in which it would be connected to the BPUB system is needed in order to better define its impact on the water distribution system. Water quality issues should also be evaluated to ensure that there are no adverse consequences with the mixing of waters of differing chemical qualities in the distribution system.
4.) The proposed method of operation of the desalination facilities maximizes the efficient utilization of the desalination plant. However, the use of the desalination plant for the base load in the system requires that the existing BPUB plants be put on and taken off line as the demand varies. This operational method has the potential to cause significant operational problems with these plants and an increasingly difficult task in meeting federal and state standards. Once the operational parameters and pressures from the proposed desalination plant are better defined, a more thorough study of low demand conditions should be performed with the computer model to more accurately determine the impact of using the

desalination plant as the base load plant. The models used in this study are more reflective of peak day conditions for the purpose of determining maximum sizes needed and the desalination plant is much more readily integrated into the system when all of the treatment capacity is being used.

5.) The selection of the alternative preferred is up to the study partners. The estimated probable costs show that the *Independent Alternative* provides a lesser-cost alternative, and would be recommended as a means of providing economics of scale in the treatment of surface water and the treatment of wastewater. However, there may be other considerations that are equally important to the study partners such that the choice is not based on economics alone.

IMPLEMENTATION PLAN

Proposed capital improvements have been categorized for Year 2005, Year 2015, and Year 2025 planning periods and are summarized in ***Table 7***. Improvements should be implemented as described in the tables starting with year 2005, as presented on **Exhibits 5** through **10**.

Table 1
Existing Water and Wastewater Systems Summary

	Water System					Wastewater System			
Service Area	Treatment Facilities	Storage Tanks		Diameter of Pipes (in)	Lengths of Pipes (ft)	Treatment Facilities	Lift Stations	Diameter of Pipes (in)	Lengths of Pipes (ft)
Brownsville Public Utilities Board	**2 Water Treatment Plants -**	**Elevated Storage**		1	806	**2 Wastewater Treatment Plants -**	140	**Force main**	
	Treatment Plant No. 1	F.M. 802	0.5 MG	2	55,735	Robindale WWTP 10 mgd		4	5,345
	Treatment Plant No. 2	Southmost Road	1.0 MG	3	4,485	South WWTP 12.8 mgd		6	63,724
	Total 40 mgd	Texas Southmost College	1.0 MG	4	216,819			8	58,931
		Alton Gloor Road	2.0 MG	6	822,385			10	22,793
				8	783,822			12	65,205
		Ground Storage		10	53,832			15	6,242
		WTP No. 1	1.37 MG	12	330,709			16	31,273
		WTP No. 2	3.47 MG	15	7,208			18	7,615
				16	247,918			20	32,554
				18	2,811			24	20,196
				24	852			**Gravity**	
				30	43,749			3	2,105
				Total	**2,571,131**			4	1,711
								6	526,970
								8	885,457
								10	255,240
								12	192,047
								15	84,276
								18	35,970
								21	12,690
								24	168
								30	3,840
								36	1,095
								Total	**2,315,447**
El Jardin WSC	None	None		2-3	184,800	None		--	--
				4-6	205,920				
				8	42,240				
				Total	**432,960**				

Table 1
Existing Water and Wastewater Systems Summary

	Water System					Wastewater System			
Service Area	Treatment Facilities	Storage Tanks		Diameter of Pipes (in)	Lengths of Pipes (ft)	Treatment Facilities	Lift Stations	Diameter of Pipes (in)	Lengths of Pipes (ft)
Brownsville Navigation District	None	Elevated Storage Tank	1.0 MG	10	45,350	**3 Wastewater Plants -**	24	4	3,000
		Elevated Storage Tank	0.5 MG	14	6,500	Northside Plant 0.1 mgd		6	13,000
				16	3,900	Fishing Harbor Plant 0.25 mgd		8	9,350
				Total	**55,750**	Turning Basin Plant 0.1 mgd		10	28,200
								12	1,200
								15	6,800
								18	4,000
								24	8,100
								30	5,200
								Total	**78,850**
Olmito WSC	1.1 mgd Plant	Ground Storage Tank	0.5 MG	2	8,100	0.75 mgd Wastewater Plant	16	6	3,000
		Elevated Storage Tank	0.2 MG	3	19,000			8	113,300
				4	40,000			12	6,700
				5	12,900			**Total**	**123,000**
				6	75,000				
				8	28,500				
				10	8,800				
				12	1,000				
				Total	**193,300**				
Valley MUD No. 2	**2 Water Treatment Plants -**	East Clearwell	0.15 MG	1	11,400	**2 Wastewater Plants -**	17	2	860
	1 mgd Conventional Plant	West Clearwell	0.15 MG	2	1,500	Rancho Viejo 0.4 mgd		4	3,900
	0.25 mgd Reverse Osmosis Plant	Elevated Storage Tank	0.3 MG	3	1,000	River Bend Resorts 0.046 mgd		6	14,580
		Ground Storage Tank	0.015 MG	4	8,300			8	50,680
		Elevated Storage Tank	0.075 MG	6	40,000			10	14,220
				8	53,000			12	120
				12	19,000			**Total**	**84,360**
				Total	**134,200**				

Table 1
Existing Water and Wastewater Systems Summary

	Water System					Wastewater System			
Service Area	Treatment Facilities	Storage Tanks		Diameter of Pipes (in)	Lengths of Pipes (ft)	Treatment Facilities	Lift Stations	Diameter of Pipes (in)	Lengths of Pipes (ft)
Military Highway WSC	2.125 mgd Plant	Elevated Storage Tank	0.1 MG	2	32,000	San Pedro WWTP 0 .16 mgd	6	6	14,900
				3	26,500			8	38,000
				6	32,000			**Total**	**52,900**
				8	52,900				
				12	14,000				
				Total	**157,400**				

Table 2
Interview Questionnaire Results

	Question	Brownsville Public Utilities Board			City of Brownsville	Olmito WSC	Military Highway WSC	El Jardín WSC	Valley MUD No. 2
		BPUB Departments	Water Plants Department	Customer Service					
1a	Are you aware of any known water problem areas?	Yes	Yes	No	Yes	No	Yes	Yes	No
1b	If yes, provide address/location, problem type, date/time problem occurred, was problem corrected?	North side of town by Alton Gloor	Low pressure on north side near Valley Regional Hospital	N/A	Lakeway Sub began distributing black water about 2 yrs age. It was caused by construction and fixed within a few days.	N/A	Low pressure on and east of FM 1421	System pipes are undersized. We have experienced chronic pressure problems, as recently as July, severe enough to publish a Boil Water Notice in the South System. Several miles of A/C pipe that experience water losses.	N/A
2a	Are you aware of any known wastewater problem areas?	Yes	N/A	Yes	No	No	No	No	No
2b	If yes, provide address/location, problem type, date/time problem occurred, was problem corrected?	LS#16 needs new wet well. LS#26-eliminate station & tie into LS#25 or redo station.	N/A	Number of calls for sewer problems	N/A	N/A	N/A	N/A	N/A
3a	Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution, in your area?	No	Yes	No	Yes	Yes	Yes	Yes	Yes
3b	If yes, can a copy be provided?	N/A	See Engineering Dept.	N/A	Yes	Yes	Yes, expansion of Las Rusias WTP. PER enclosed	Yes	Compre-hensive plan attached
4a	Do you have any existing report, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment, in your area?	Yes	N/A	No	Yes	Yes	Yes	Yes	Yes
4b	If yes, can a copy be provided?	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Compre-hensive plan attached
5a	Do you have an existing GIS or digital files for the water and wastewater systems in your area?	Yes	See Engineering Dept.	No	No	Yes	No	Yes	No
5b	If yes, can a copy be provided?	N/A	N/A	N/A	N/A	No	N/A	Yes	N/A
5c	What type of data is stored in GIS?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5d	What type of software is used in GIS?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6a	Do you have copies of water billing records for your area?	Yes	BPUB customer service has records	No	No	Yes	Yes	Yes	Yes
6b	If yes, is it in a digital format?	No	N/A	N/A	N/A	No	No	Yes	Yes
6c	Can a copy be provided?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Billing records attached.

Table 2
Interview Questionnaire Results

	Question	Brownsville Public Utilities Board			City of Brownsville	Olmito WSC	Military Highway WSC	El Jardín WSC	Valley MUD No. 2
		BPUB Departments	Water Plants Department	Customer Service					
7a	Do you have SCADA data of the existing system in your area?	No	Yes	No	No	Yes, WW only	Yes	No	No
7b	If yes, is it in digital format?	N/A	No	N/A	N/A	No	No	N/A	N/A
7c	Can a copy be provided?	N/A	Yes, a hard copy	N/A	N/A	Yes	N/A	N/A	N/A
8a	Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in you area?	Yes	N/A	No	No	Yes	Yes	No	No
8b	If yes, is it in digital format?	No	N/A	N/A	N/A	No	No	N/A	N/A
8c	Can a copy be provided?	Yes	N/A	N/A	N/A	Yes	Yes	N/A	Compre-hensive plan attached
9a	Do you have future land use projections for your area?	Yes, District 14; District 21; District 10; District 20	BPUB W/WW Engineering Dept.	No	Yes	No	No	Yes	No
9b	If yes, is it in digital format?	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A
9c	Can a copy be provided?	N/A	N/A	N/A	Yes, some is a hard copy and some is digitized	N/A	N/A	Yes	N/A
10a	Do you have maps that delineate the following:								
	Water and Wastewater Service Area Boundaries?	Yes	BPUB W/WW Engineering Dept.	No	Yes	Yes	Yes	Yes	Yes
	Water Pressure Plane Maps?	No	BPUB W/WW Engineering Dept.	No	No	No	No	No	No
10b	If yes, is it in digital format?	No	N/A	N/A	No	N/A	N/A	I will see if we can provide digitized data.	No
10c	Can a copy be provided?	Yes	N/A	N/A	Yes	N/A	Yes	N/A	CCN map attached.
11	Who are your wholesale customers for water and wastewater in your area?	1.) EJWSC 2.) BND 3.) U.S. Filter 4.) Municipal Pipe	1.) EJWSC 2.) BND	1.) Billing	We are not involved in the retail side of W/WW distribution.	None	Valley MUD No. 2-Water Emergency Connection	None	None
12	Do you have additional concerns with existing water and wastewater systems?	Water system is at 75% capacity. Upgrade old design LS to new design	Brownsville is growing so fast that maximum water production is approaching	No	Yes, the local water districts and PUB need to resolve issues regarding new subs and colonias.	No	No	Yes, I will need to give some thought to the issues before I can expand on this question.	No

Table 3
Regional Master Plan Populations

	Populations (persons)			
	Year 2000	**Year 2005**	**Year 2015**	**Year 2025**
Brownsville PUB Service Area				
City of Brownsville (1)	139,700	151,985	179,891	212,921
El Jardin WSC	9,762	10,620	12,571	14,879
Brownsville Navigation District	0	0	0	0
Total Brownsville PUB Service Area	149,462	162,605	192,462	227,800
Olmito WSC	5,072	5,518	6,531	7,730
Valley MUD No. 2	2,289	2,490	2,948	3,489
Military Highway WSC	3,257	3,544	4,194	4,964
Total	**160,080**	**174,157**	**206,135**	**243,983**
El Jardin WSC (2)				
Total Population Projection	12,316	16,573	--	--
Inside Brownsville City Limits Population Projection	2,554	--	--	--
Outside Brownsville City Limits Population Projection	9,762	--	--	--
Olmito WSC (2)				
Population Projections	5,072	6,320	8,360	--
Valley MUD No. 2 (2)				
Population Projections	2,289	--	--	--
Military Highway WSC (2)				
Population Projections	3,257	--	--	--
Brownsville Navigation District (3)				
Population Projections	0	0	0	0

Notes:
(1) Population based on U.S. Census data
(2) Population as presented in previous reports/studies conducted for service area
(3) No population associated with Brownsville Navigation District

Table 4
Water Pressure Monitoring Summary

	7-Day Avg Pressure (psi) (1)					
	1	2	3	4	5	6
Time	Alton Gloor - 7283	Russell @ Del Mar Ct. - 7164	FM 511 @ Harbour - 7483	Iowa @ Les Maudlin - 6161	East 9th @ St. Charles - 7552	Alton Gloor Elevated Storage Tank
3:00 PM	56.06	60.59	62.72	58.69	60.89	58.39
4:00 PM	56.19	60.49	62.66	57.83	60.03	54.46
5:00 PM	55.39	61.55	61.72	56.09	58.76	58.29
6:00 PM	55.20	62.34	62.65	57.17	59.89	58.29
7:00 PM	56.14	62.65	64.93	60.12	61.16	58.30
8:00 PM	56.99	62.26	65.59	60.55	61.51	58.30
9:00 PM	57.83	62.80	66.04	60.98	61.30	58.30
10:00 PM	58.62	63.70	66.43	62.01	61.18	58.29
11:00 PM	60.47	61.95	69.33	65.80	62.66	58.31
12:00 AM	61.31	60.99	69.66	66.35	61.86	58.36
1:00 AM	58.20	61.23	69.56	66.59	61.50	58.68
2:00 AM	53.80	61.78	67.59	64.93	59.48	59.10
3:00 AM	53.38	61.68	67.43	64.72	59.51	59.07
4:00 AM	59.14	61.01	68.52	65.99	61.25	58.80
5:00 AM	60.50	61.39	67.69	64.47	60.51	58.81
6:00 AM	59.38	60.97	64.75	59.02	60.03	58.84
7:00 AM	57.04	61.44	62.06	55.47	59.46	58.85
8:00 AM	56.41	60.60	62.55	57.14	60.26	58.83
9:00 AM	55.35	60.46	61.27	56.54	59.65	58.78
10:00 AM	53.06	61.05	60.43	56.64	59.69	58.73
11:00 AM	52.13	61.49	60.15	56.30	59.58	58.66
12:00 PM	54.08	62.02	60.92	57.34	60.19	58.59
1:00 PM	54.64	62.21	59.63	57.86	60.67	58.53
2:00 PM	54.52	61.34	63.18	59.62	61.48	56.95

(1) Water pressures conducted from November 7 through November 14, 2001.

Table 5
Projected Water Demands and Wastewater Flows

	Average Daily Water Demands (gpd)			
(1) Growth Rate 1.7%	**Year 2000**	**Year 2005**	**Year 2015**	**Year 2025**
Brownsville PUB Service Area Total	20,027,908	21,789,153	25,789,913	30,525,263
Olmito WSC	786,160	855,290	1,012,305	1,198,150
Valley MUD No. 2	535,626	460,526	619,008	631,661
Military Highway WSC	504,835	549,165	650,070	769,420
Total	**21,854,529**	**23,654,134**	**28,071,296**	**33,124,494**
(2) Growth Rate 1.7% plus Commercial				
Brownsville PUB Service Area Total (3)	20,027,908	25,561,250	41,636,582	67,821,605
Olmito WSC	786,160	979,755	1,295,800	1,707,945
Valley MUD No. 2	◆ 402,940	◆ 580,150	◆ 1,236,340	2,000,500
Military Highway WSC	504,851	579,545	763,995	1,006,880
Total	**21,721,859**	**27,700,700**	**44,932,717**	**72,536,930**
	Average Daily Wastewater Flows (gpd)			
(1) Growth Rate 1.7%	**Year 2000**	**Year 2005**	**Year 2015**	**Year 2025**
Brownsville PUB Service Area Total	11,060,200	12,032,800	14,242,200	16,857,200
Brownsville Navigation District	◆ 198,641	◆ 198,641	◆ 198,641	◆ 198,641
Olmito WSC	375,300	408,300	483,300	572,100
Valley MUD No. 2	◆ 233,917	◆ 345,298	◆ 680,336	◆ 1,287,482
Military Highway WSC	241,000	262,200	310,400	367,400
Total	**12,109,058**	**13,247,239**	**15,914,877**	**19,282,823**
(2) Growth Rate 1.7% plus Commercial				
Brownsville PUB Service Area Total	11,060,200	13,976,600	22,099,144	32,233,970
Brownsville Navigation District	◆ 198,641	◆ 198,641	◆ 198,641	◆ 198,641
Olmito WSC	375,300	602,272	1,550,706	3,991,175
Valley MUD No. 2	◆ 233,917	◆ 345,298	◆ 680,336	◆ 1,287,482
Military Highway WSC	241,000	262,200	310,400	367,400
Total	**12,109,058**	**15,385,011**	**24,839,227**	**38,078,668**

◆ Values obtained from their respective entities.

(1) Calculated using an average annual growth rate of 1.7% per year

(2) Calculated using an average annual growth rate of 1.7% per year plus a commercial annual growth rate of 3.3% per year

(3) Does not include requirements for the Navigational District's projected 4000-acres

Table 6
Lift Station Summary

	Lift Station Number	Location	GPM	Pump Manufacturer	Pump Power HP	Pump Model Number
BPUB						
	1	14th St. & Resaca	400	Flygt	5	CS 3102.180 MT
	2	Minnesota & 14th St.	300	Flygt	5	CS-3102.180 MT
	3	Palm Gardens	2,250	Davis Emu	20	FA 152/245T
	4	Central Ave. & Boca Chica	1,500	Ebara	60	200 DLY 6454
	5	Iowa Estates	300	Flygt	5	CS 3102.180 MT
	6	Billy Mitchell & Iowa (Trico)	450	Flygt	7.5	CP 3127.180
	7	Billy Mitchell & Central Ave.	300	Flygt	5	CS 3102.180 MT
	8	La Villita	3,400	Flygt	60	C-3300
	9	Coolidge & International	5,200	Flygt	100	CP 3306
	10	13th St. & Roosevelt	850	Davis Emu	10	FA 107/260T
	11	Grant & 12th Street	300	Flygt	5	CP 3102.180
	12	Roosevelt St.	2,000	Flygt	30	C-3201
	13	El Pedregal	350	Flygt	5	CS 3102.180 MT
	14	Lincoln Park	150	Peabody Barnes	2	3SE201
	15	Fort Brown	4,000	Ebara	295	300 DSC3
	16	12th St. & River Levee	600	Peabody Sp	15	--
	17	6th St. & Calle Amistosa	750	Ebara	10	200 DLU 67.52
	18	Roosevelt Estates	1,500	Flygt	5	C 3101.180
	19	Dew Bates (La Muralla)	300	Flygt	5	CP 3102.180
	20	6th St. & East Harrison	1,500	Ebara	25	250 DLFU6184
	21	Central Park	750	Flygt	20	CP-3152
	22	Villa Maria	1,300	Flygt	15	3140.18
	23	Riverside	300	Flygt	5	CS-3102.180 MT
	24	Lakeside & West Monroe	300	Flygt	5	CS-3102.180 MT
	25	Central Blvd. & Lakeside	150	Davis Emu	4	FA 101/147
	26	Central Blvd. & Boca Chica	300	Flygt	5	CS-3102.180 MT
	27	Boca Chica & Coria St.	500	Davis Emu	7.5	FA 1041/203
	28	Camino Del Rey & 281	350	Flygt	5	CS -3102.180 MT
	29	La Lomita	204	Ebara	5	100 DL 63.7
	30	East Drive & Los Ebanos	500	Flygt	20	CP-3152.181
	31	El Paso Road	300	Fairbanks	7.5	K2V1073247-9
	32	H & H	150	Peabody Barnes	2	3SE-201
	33	Beacon	1,000	Crown	30	PO8LA-14X
	34	Brownsville C.C. (East)	300	Flygt	5	CS 3102.180 MT
	35	Brownsville C.C. (North)	750	Flygt	20	CP 3152.181
	36	Brownsville C.C. (West)	300	Flygt	5	CS 3102.180 MT
	37	Hacienda Lane	250	Flygt	5	CP-3102.180
	38	Old Alice Road & Expressway	800	Ebara	30	200 DLU 62.24
	39	Loma Linda	500	Flygt	10	CP-3127
	40	Poinsetta	500	Flygt	10	CP-3127
	41	Thomas	3,250	Ebara	200	250 DSC3
	42	Galveston Road	300	Flygt	5	CS-3102.180 MT
	43	Candlewick Apts.	300	Flygt	5	CS-3102.180 MT
	44	Palo Verde	350	Flygt	5	CS-3102.180 MT
	45	Price Rd. & Eagle Drive	550	Flygt	7.5	CP-3127
	46	Hackberry & Old P.I. Rd.	450	Flygt	7.5	CP-3127
	47	Land "O" Lakes & East Price Rd.	500	Flygt	5	CS 3102.180 MT
•	48	Robin Hood & Land "O" Lakes	600	Flygt	7.5	CS 3127.180 MT

Table 6
Lift Station Summary

	Lift Station Number	Location	GPM	Pump Manufacturer	Pump Power HP	Pump Model Number
	49	Las Ventanas	500	Flygt	9.4	CP 3126
	50	Esperanza Road	250	Peabody Barnes	2	3SE-201
	51	Kings Highway	300	Fairbanks	7.5	--
	52	La Plaza Apts.	300	Flygt	5	CS-3102.180 MT
	53	Fox Fire	200	Flygt	5-3	CS -3102.180 MT
	54	Weslaco Road	350	Flygt	5	CS -3102.180 MT
	55	Chachalaca & 802	450	Peabody Barnes	25	6SCUE-89
	56	McAllen Road	730	Flygt	10	CP-3127
	57	Pablo Kisel Blvd(Sunrise Mall)	300	Flygt	5	CS 3102.180 MT
	58	Jefferson Property	200	Peabody Barnes	2	3SE-201
	59	Vermillion & 802	500	Gorman Rupp	15	--
	60	La Posada Sect I	300	Flygt	5	CS 3102.180 MT
	61	Leon Gardens	300	Flygt	5	CP 3101.180
	62	Quail Hollow	300	Flygt	5	CP-3101.180
	63	Robindale & 802	4,000	Flygt	100	CP 3306
	64	Old 77 & 802	3,000	Flygt	30	C-3201
	65	Paredes Line Rd & 802	3,000	Flygt	60	CP 3300
	66	Old Court House	800	Gorman Rupp	30	T8A3-B
	67	East Industrial Park	300	Flygt	5	3101.180-970017
	68	El Chaparral	750	Flygt	20	CP 3152.181
	69	La Posada Sect II	250	Peabody Barnes	2	3SE-201
	70	La Posada Sect III	900	Ebara	25	100 DLU-618
	71	Model Laundry	350	Flygt	15	3140.18
	72	Quail Hollow 10	300	Flygt	20	CP-3152.181
	73	Town North	350	Flygt	5	CP 3101.180
	74	Palmas Del Sur	500	Flygt	9.4	CP 3126
	75	Lakeway	600	Flygt	9.4	CP 3126
	76	Palacio Del Sol	500	Flygt	9.4	CP 3126
	77	Robindale Estates	350	Ebara	7.5	80 DLU 65.5
	78	Lazy Acres	200	Myers	3	WG-30-23-25
	79	Valle Del Oro	300	Flygt	5	CS 3102.180 MT
	80	Industrial Park West	300	Flygt	5	CS-3102.180 MT
	81	El Lago Subdivision	750	Flygt	10	CP-3127
	82	Colonia Galaxia (281)	300	Ebara	5	100 DLU-63.72
	83	Rio Del Sol	608	Ebara	20	200 DLU 6152
	84	Calle Amistosa (Amigo Land Mall)	--	--	--	--
	85	Riverview	250	Ebara	3	100 DLU 62.22
	86	Wild Rose Estates	100	Myers	3	CW50-21D
	87	Brownsville C.C. XI	300	Ebara	3	100 DLU 62.22
	88	Aldridge Street	300	Flygt	5	C3101.180-4250153
	89	Brownsville Health Clinic	150	Ebara	3	80 DVCU 62.22
	90	Bates Circle	870	Ebara	15	150 DLU 61.12
	91	Foreign Trade Zone	300	Flygt	5	CS 3102.180
	92	Paso Real	450	Flygt	9.4	CP-3126
	93	Mauldin Field (Old Hwy 77)	300	Flygt	5	CP-3102.180
	94	B.I.S.D. (Dana Lane)	250	Ebara	3	100 DLU 62.22
	95	Winter Haven	510	Flygt	9.4	CP 3126
	96	Villa Verde	300	Goulds	5	WS-5032 DXS
	97	Town East Apts.(Boca Chica)	200	Ebara	5	100 DLU 63.72

Table 6
Lift Station Summary

	Lift Station Number	Location	GPM	Pump Manufacturer	Pump Power HP	Pump Model Number
	98	Oklahoma	800	Ebara	10	150 DLU 67.5
	99	Hidden Meadows	320	Ebara	5	100 DLU 63.72
	100	"C" Street & East 8th	350	Davis Emu	7.4	FA 101/187
	101	Coffee Port Road	300	Ebara	5	80 DLU 63.72
	102	Las Palmas	300	Ebara	3	100 DLU 62.22
	103	Paredes Road & Hidalgo (Luby's)	300	Goulds	5	WS-5032 DXS
	104	International Industrial Park	350	Ebara	7.5	80 DLU 65.52
	105	Southmost & Dakota	200	Davis Emu	7.4	FA 104/180T
	106	511 & Dakota	1,500	Davis Emu	20	FA 152/245T
	107	Pedro Morales (281)	100	Flygt	2	CP-3085.181
	108	Neil Palmer (281)	300	Flygt	5	CP-3102.180
	109	Military North (281 & 3248)	750	Flygt	10	CP-3127.180
	110	Duncan Rd. & Cameron	250	Flygt	5	CP 3102.180
	111	Cameron Park & Paredes Line Rd.	750	Flygt	20	CP 3152.181
	112	Morrison Rd. & Robindale	750	Flygt	14.8	CP 3152.181
	113	Okland & Beechway	300	Ebara	10	80 DLU 67.52
	114	La Posada Sect V	300	Ebara	15	100 DL 622
	115	Flor De Mayo	550	Ebara	15	100 DLBM 611
	116	Southmost & Maverick Road	300	Ebara	15	100 DL 622
	117	Four Points Hotel (Old Hwy 77)	200	Ebara	3	--
	118	Briarwyck Subdivision	545	Flygt	10	CP 3127
	119	Sunset Lake Subdivision	545	Flygt	10	CP 3127
	120	Resaca Grande Subdivision	750	Flygt	10	CP-3127
	121	Villa Pancho (511)	200	Flygt	4	CP-3102
	122	Winwood Subdivision	550	Flygt	7.5	CP 3127
	123	Rio Del Sol Sub. II	608	Ebara	30	150 DMLU62.24
	124	California Estates	300	Flygt	5	CS3102.180
	125	Highway 48	800	Flygt	20	CP-3152
	126	Resaca Grande Subdivision	360	Flygt	5	CP-3102
	127	Vermillion Estates & Houston Rd.	340	Ebara	5	100 DLM63.7
	128	El Naranjal Sub. -Boca Chica & 511	650	Ebara	15	100DLU6112
	129	Honeydale - Honey Drive	250	Flygt	5	CP-3102.180 MT
	130	Emerald Valley	700	Ebara	15	100 DLFU611
	131	Titan	380	Ebara	7.5	100 DLFU65.5
	132	Forest North Subdivision	300	Ebara	5	100 DLFU63.7
	133	Sunny Skies & 511	200	Flygt	3	CP3085
	134	V.I.C.C. - McFadden Drive	375	Ebara	10	80 DLFU67.52
	135	Power Plant	200	Flygt	3	CP3085
	136	El Hardin Sub.- 802 & Central Ave.	360	Ebara	7.5	100 DLFU65.5
	137	Veterans International Bridge	200	Ebara	7.5	80DLU65.5
	138	Siesta Mobile Home Park	150	Peabody Barnes	2	3SE-3101
	139		150	--	2	--
	140		150	--	2	--

Table 6
Lift Station Summary

	Lift Station Number	Location	GPM	Pump Manufacturer	Pump Power HP	Pump Model Number
Brownsville Navigation District						
Turning Basin WTP						
	1	R.L. Ostos Road near Inter-Transfer	--	--	--	--
	2	R.L. Ostos Road near U.S. Clay L.P.	--	--	--	--
	3	R.L. Ostos Road near water tank	--	--	--	--
	4	R.L. Ostos Road at Dock 13 Road	--	--	--	--
	5	Milo Road at R.L. Ostos Road	--	--	--	--
	6	Windhaus Road	--	--	--	--
	7	Oil Dock Road at Oil Dock No. 1	--	--	--	--
	8	SH 48 at Levee Road	--	--	--	--
	9	Oil Dock Road between Oil Dock 2 & 5	--	--	--	--
	10	South Port Road	--	--	--	--
	11	South Port Road	--	--	--	--
	12	South Port Road	--	--	--	--
	13	South Port Road	--	--	--	--
	14	South Port Road	--	--	--	--
	15	South Port Road	--	--	--	--
	16	South Port Road	--	--	--	--
	17	At Dock 13	--	--	--	--
Fishing Harbor WTP						
	1 FH	Fishermans Place at Everglades Road	--	--	--	--
	2 FH	Anglers Place at Everglades Road	--	--	--	--
	3 FH	Bayou Court	--	--	--	--
	4 FH	North of SH 48	--	--	--	--
	5 FH	South of SH 48	--	--	--	--
	6 FH	South of SH 48	--	--	--	--
Northside WTP						
	1 N	North of SH 48	--	--	--	--
	2 N	At Liberty Engineering	--	--	--	--
	3 N	At Coast Guard Dock	--	--	--	--
Military Highway WSC						
	1	Longoria Subdivision	--	--	--	--
	2	San Pedro School	--	--	3	--
	3	Cemetary Road	--	--	5	--
	4	Red Barn	--	--	5	--
	5	Villa Cavazos	--	--	5	--
	6	Sladek	--	--	5	--

Table 6
Lift Station Summary

	Lift Station Number	Location	GPM	Pump Manufacturer	Pump Power HP	Pump Model Number
Valley MUD No. 2						
Rancho Viejo						
	1	Intersection of Carmen & Moralos	800	Goulds	15	--
	2	Intersection of Alvarado & Carmen	550	Goulds	5	--
	3	30 yards from Intersection of Zapata & Carmen	550	Goulds	5	--
	4	10 yards from administration building on Pizarro	550	Goulds	5	--
	5	In front of 32 Pizarro	550	Goulds	5	--
	6	In front of 74 Pizarro	550	Goulds	5	--
	7	5 yards from Intersection of Cortez & Pizarro	550	Goulds	5	--
	8	5 yards from Intersection of Casa Grande & Bolivar	550	Goulds	5	--
	9	100 yards from Hidalgo Street	550	Goulds	5	--
	10	Intersection of Rancho Viejo Drive & Zapata	550	Goulds	5	--
	11	Corner of 500 Balboa	550	Goulds	5	--
	12	20 yards from Lot #24 Morelos	550	Goulds	5	--
	13	Intersection of Tesoro & Santa Ana	550	Goulds	5	--
	14	40 yards from house #1708 Santa Ana	550	Goulds	5	--
	15	100 yards from house #817 Santa Ana	550	Goulds	5	--
Valley MUD No. 2						
River Bend						
	1	Sacramento & Kansas River Drive	550	Goulds	5	--
	2	Mississippi & Missouri Drive	550	Goulds	5	--
Olmito WSC						
	1	Katherine Dr.	100	Ebara	2	80DLU61.5
	2	La Feria Dr.	100	Ebara	2	80DLU61.5
	3	Moyse St.	860	Ebara	20	200DLU61.5
	4	W. Lakeside	110	Ebara	2	80DLU61.5
	5	S. Lomax	175	Ebara	2	80DLU61.5
	6	Papaya Dr.	185	Ebara	5	100DLMU63.7
	7	E. Highway 100	290	Ebara	10	100DLBU67.5
	8	W. Highway 100	170	Ebara	2	80DLU61.5
	9	Melon Dr.	125	Ebara	5	80DLMF63.7
	10	SH 1732	140	Ebara	2	80DLMF61.5
	11	S. Anderson	115	Ebara	2	80DLMF61.5
	12	Abrego Rd.	250	Ebara	7.5	80DLFU65.52
	13	N. Lomax	120	Ebara	7.5	80DLFU85.5
	14	N. Old Alice Rd.	120	Ebara	7.5	80DLMF61.5
	15	S. Old Alice Rd.	350	Ebara	10	80DLF67.5
	16	Lemon Dr.	125	Ebara	5	80DLMU63.7

Table 7
Project Capital Improvement Descriptions

	Alternative 1 - Independent		Alternative 2 - Regional		Alternative 3 - Multi-Regional		Alternative 4 - Emergency Interconnection	
	Water System Description	Wastewater System Description	Water System Description	Wastewater System Description	Water System Description	Wastewater System Description	Water System Description	Wastewater System Description
Capital Improvements								
Brownsville PUB	Water line modifications, pump upgrades, storage, WTPs expansion	Lift station upgrades, gravity line enlargement, force mains, WWTPs expansion	Water line modifications, pump upgrades, storage, WTPs expansion	Lift station upgrades, gravity line enlargement, force mains, WWTPs expansion	Water line modifications, pump upgrades, storage, WTPs expansion	Lift station upgrades, gravity line enlargement, force mains, WWTPs expansion	Water line modifications, pump upgrades, storage, WTPs expansion	Lift station upgrades, gravity line enlargement, force mains, WWTPs expansion
Navigation District	New WTP	WWTP expansion or new plant		Lift station and force main to connect to BPUB	Line connection to El Jardin	Lift station and force main to connect to El Jardin	New WTP	WWTP expansion, lift station and force main to
El Jardin WSC	Water line modifications, storage tank	Lift stations, force mains, gravity lines	Water line modifications, storage tank	Lift stations, force mains, gravity lines	New 4 mgd plant with 6 mgd expansion, water line modifications, storage	Lift stations, force mains, gravity lines, new WWTP	Water line modifications, storage	Lift stations, force mains, gravity lines
Military Highway WSC	WTP expansion	WWTP expansion	Water line and meter to connect to BPUB	Lift station and force main to connect to BPUB	Water line and meter to connect to BPUB	Lift station and force main to connect to BPUB	WTP expansion, water line and meter to connect to BPUB	WWTP expansion, lift station and force main to connect to BPUB
Olmito WSC	WTP expansion, storage, water line modifications, WTP expansion	WWTP expansion	WTP expansion, storage, meter and water line to connect to BPUB	Lift station and force main to connect to BPUB	WTP expansion, water line modifications, meter and water line to connect to BPUB, storage	Lift station and force main to connect to BPUB	WTP expansion, storage, water line modifications, water line and meter to connect to BPUB	WWTP expansion, lift station and force main to connect to BPUB
Valley MUD No. 2	Raw water supply & delivery, storage, high service pumping, water line modifications, plant upgrade, expansion, treatment	Collection system improvements, rerouting outfall line, WWTP expansion/improvements	Raw water supply & delivery, storage, high service pumping, water line modifications, meter to connect to BPUB	Collection system improvements, rerouting outfall line, lift station and force main to connect to BPUB	Raw water supply & delivery, storage, high service pumping, water line modifications, meter to connect to BPUB	Collection system improvements, rerouting outfall line, lift station and force main to connect to BPUB	Raw water supply & delivery, storage, high service pumping, water line modifications, plant upgrade, expansion, treatment, meter to connect to BPUB	Collection system improvements, rerouting outfall line, WWTP expansion, lift station and force main to connect to BPUB

Table 8
Probable Costs Summary - Year 2005

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater
Brownsville Public Utilities Board								
Capital Improvement Costs	$111,419,300	$197,107,500	$87,513,000	$250,797,400	$111,182,100	$225,639,100	$111,419,300	$197,107,500
Annualized Capital Improvement Costs	$9,714,000	$17,184,700	$7,629,800	$21,865,700	$9,693,400	$19,672,200	$9,714,000	$17,184,700
Annual Operation and Maintenance Costs	$9,150,000	$4,948,500	$9,823,800	$5,615,500	$8,841,900	$5,103,100	$9,150,000	$4,948,500
Payments from Regional Partners	$1,677,300	$967,800	$2,843,100	$2,435,100	$1,165,800	$1,307,800	$1,677,300	$967,800
Total Annual Costs	**$17,186,700**	**$21,165,400**	**$14,610,500**	**$25,046,100**	**$17,369,500**	**$23,467,500**	**$17,186,700**	**$21,165,400**
Brownsville Navigation District								
Capital Improvement Costs	$1,309,600	$1,206,000	$1,309,600	$29,507,100	$1,309,600	$25,338,600	$1,309,600	$30,713,100
Annualized Capital Improvement Costs	$114,200	$105,100	$114,200	$2,572,600	$114,200	$2,209,100	$114,200	$2,677,700
Annual Operation and Maintenance Costs	$347,800	$72,500	$347,800	$159,500	$347,800	$159,500	$347,800	$72,500
Total Annual Costs	**$462,000**	**$177,600**	**$462,000**	**$2,732,100**	**$462,000**	**$2,368,600**	**$462,000**	**$2,750,200**
El Jardin Water Supply Corporation								
Capital Improvement Costs	$7,421,600	$8,530,100	$7,421,600	$8,530,100	$13,523,300	$28,183,500	$7,421,600	$8,530,100
Annualized Capital Improvement Costs	$647,100	$743,700	$647,100	$743,700	$1,179,000	$2,457,200	$647,100	$743,700
Annual Operation and Maintenance Costs	$1,329,500	$967,800	$1,329,500	$967,800	$981,900	$512,400	$1,329,500	$967,800
Payments from Regional Partners	-	-	-	-	$347,800	$159,500	-	-
Total Annual Costs	**$1,976,600**	**$1,711,500**	**$1,976,600**	**$1,711,500**	**$1,813,100**	**$2,810,100**	**$1,976,600**	**$1,711,500**
Military Highway Water Supply Corporation								
Capital Improvement Costs	$2,311,300	$3,110,800	$1,341,300	$1,179,000	$1,341,300	$1,179,000	$2,354,300	$4,289,800
Annualized Capital Improvement Costs	$201,500	$271,200	$116,900	$102,800	$116,900	$102,800	$205,300	$374,000
Annual Operation and Maintenance Costs	$211,500	$167,500	$366,000	$210,500	$366,000	$210,500	$211,500	$167,500
Total Annual Costs	**$413,000**	**$438,700**	**$482,900**	**$313,300**	**$482,900**	**$313,300**	**$416,800**	**$541,500**
Olmito Water Supply Corporation								
Capital Improvement Costs	$5,634,800	$11,672,000	$3,556,500	$6,801,700	$3,556,500	$6,801,700	$5,670,800	$18,473,700
Annualized Capital Improvement Costs	$491,300	$1,017,600	$310,100	$593,000	$310,100	$593,000	$494,400	$1,610,600
Annual Operation and Maintenance Costs	$537,500	$372,700	$720,400	$820,000	$720,400	$820,000	$537,500	$372,700
Total Annual Costs	**$1,028,800**	**$1,390,300**	**$1,030,500**	**$1,413,000**	**$1,030,500**	**$1,413,000**	**$1,031,900**	**$1,983,300**
Valley MUD No. 2								
Capital Improvement Costs	$2,855,500	$4,390,000	$1,803,700	$5,871,500	$1,803,700	$5,871,500	$2,870,500	$9,728,100
Annualized Capital Improvement Costs	$249,000	$382,700	$157,300	$511,900	$157,300	$511,900	$250,300	$848,100
Annual Operation and Maintenance Costs	$211,800	$126,000	$366,300	$277,300	$366,300	$277,300	$211,800	$126,000
Total Annual Costs	**$460,800**	**$508,700**	**$523,600**	**$789,200**	**$523,600**	**$789,200**	**$462,100**	**$974,100**
TOTAL ANNUAL COSTS	$21,527,900	$25,392,200	$19,086,100	$32,005,200	$21,681,600	$31,161,700	$21,536,100	$29,126,000
GRAND TOTAL ANNUAL COSTS	**$46,920,100**		**$51,091,300**		**$52,843,300**		**$50,662,100**	

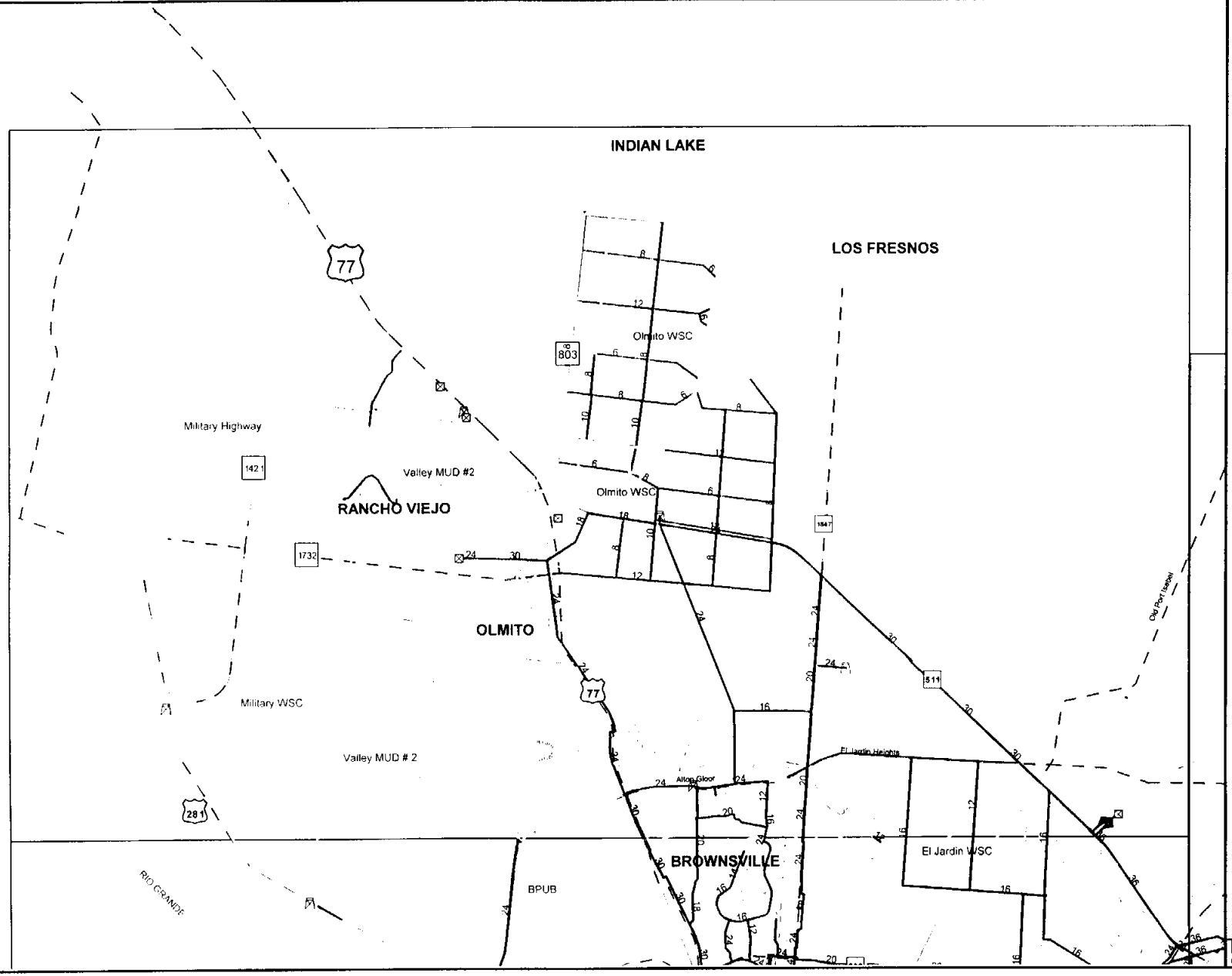
Table 9
Probable Costs Summary - Year 2015

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater
Brownsville Public Utilities Board								
Capital Improvement Costs	$200,407,800	$311,368,700	$313,043,400	$529,179,500	$203,264,900	$347,497,300	$200,407,800	$311,368,700
Annualized Capital Improvement Costs	$17,472,500	$27,146,500	$27,292,600	$46,136,300	$17,721,600	$30,296,400	$17,472,500	$27,146,500
Annual Operation and Maintenance Costs	$14,349,600	$7,345,600	$21,247,600	$12,280,500	$13,794,800	$7,727,000	$14,349,600	$7,345,600
Payments from Regional Partners	$3,990,100	$2,787,000	$15,410,300	$13,643,900	$3,051,600	$3,626,100	$3,990,100	$2,787,000
Total Annual Costs	**$27,832,000**	**$31,705,100**	**$33,129,900**	**$44,772,900**	**$28,464,800**	**$34,397,300**	**$27,832,000**	**$31,705,100**
Brownsville Navigation District								
Capital Improvement Costs	$76,145,400	$124,490,900	$32,821,700	$29,507,100	$32,821,700	$25,338,600	$73,145,400	$153,998,100
Annualized Capital Improvement Costs	$6,638,700	$10,853,700	$2,861,500	$2,572,600	$2,861,500	$2,209,100	$6,638,700	$13,426,300
Annual Operation and Maintenance Costs	$5,481,900	$3,286,700	$8,716,400	$7,230,800	$8,716,400	$7,230,800	$5,481,900	$3,286,700
Total Annual Costs	**$12,120,600**	**$14,140,400**	**$11,577,900**	**$9,803,400**	**$11,577,900**	**$9,439,900**	**$12,120,600**	**$16,713,000**
El Jardin Water Supply Corporation								
Capital Improvement Costs	$28,475,700	$17,060,300	$28,475,700	$17,060,300	$92,864,000	$191,716,800	$28,475,700	$17,060,300
Annualized Capital Improvement Costs	$2,482,600	$1,487,400	$2,482,600	$1,487,400	$8,096,300	$16,714,700	$2,482,600	$1,487,400
Annual Operation and Maintenance Costs	$3,642,300	$2,787,000	$3,642,300	$2,787,000	$7,452,900	$4,553,500	$3,642,300	$2,787,000
Payments from Regional Partners	-	-	-	-	$8,716,400	$7,230,800	-	-
Total Annual Costs	**$6,124,900**	**$4,274,400**	**$6,124,900**	**$4,274,400**	**$6,832,800**	**$14,037,400**	**$6,124,900**	**$4,274,400**
Military Highway Water Supply Corporation								
Capital Improvement Costs	$2,724,600	$4,482,100	$1,754,600	$1,179,000	$1,754,600	$1,179,000	$2,767,600	$5,661,100
Annualized Capital Improvement Costs	$237,500	$390,800	$153,000	$102,800	$153,000	$102,800	$241,300	$493,600
Annual Operation and Maintenance Costs	$278,900	$198,300	$482,400	$249,300	$482,400	$249,300	$278,900	$198,300
Total Annual Costs	**$516,400**	**$589,100**	**$635,400**	**$352,100**	**$635,400**	**$352,100**	**$520,200**	**$691,900**
Olmito Water Supply Corporation								
Capital Improvement Costs	$18,695,200	$46,724,400	$10,007,700	$6,801,700	$10,007,700	$6,801,700	$18,731,200	$53,526,100
Annualized Capital Improvement Costs	$1,629,900	$4,073,600	$872,500	$593,000	$872,500	$593,000	$1,633,100	$4,666,700
Annual Operation and Maintenance Costs	$1,320,700	$1,286,600	$2,075,400	$2,830,500	$2,075,400	$2,830,500	$1,320,700	$1,286,600
Total Annual Costs	**$2,950,600**	**$5,360,200**	**$2,947,900**	**$3,423,500**	**$2,947,900**	**$3,423,500**	**$2,953,800**	**$5,953,300**
Valley MUD No. 2								
Capital Improvement Costs	$8,636,600	$8,320,700	$4,844,700	$6,236,800	$4,844,700	$6,236,800	$8,651,600	$13,658,800
Annualized Capital Improvement Costs	$753,000	$725,400	$422,400	$543,800	$422,400	$543,800	$754,300	$1,190,800
Annual Operation and Maintenance Costs	$451,300	$248,300	$780,700	$546,300	$780,700	$546,300	$451,300	$248,300
Total Annual Costs	**$1,204,300**	**$973,700**	**$1,203,100**	**$1,090,100**	**$1,203,100**	**$1,090,100**	**$1,205,600**	**$1,439,100**
TOTAL ANNUAL COSTS	$50,748,800	$57,042,900	$55,619,100	$63,716,400	$51,661,900	$62,740,300	$50,757,100	$60,776,800
GRAND TOTAL ANNUAL COSTS	**$107,791,700**		**$119,335,500**		**$114,402,200**		**$111,533,900**	

Table 10
Probable Costs Summary - Year 2025

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Water	Wastewater	Water	Wastewater	Water	Wastewater	Water	Wastewater
Brownsville Public Utilities Board								
Capital Improvement Costs	$382,468,200	$439,079,500	$573,213,400	$844,747,400	$375,017,300	$509,781,000	$382,468,200	$439,079,500
Annualized Capital Improvement Costs	$33,345,300	$38,281,000	$49,975,400	$73,648,900	$32,695,700	$44,445,000	$33,345,300	$38,281,000
Annual Operation and Maintenance Costs	$23,239,300	$10,477,100	$36,457,300	$20,327,100	$22,259,500	$11,709,100	$23,239,300	$10,477,100
Payments from Regional Partners	$6,776,800	$4,657,700	$28,617,200	$26,327,800	$5,103,100	$7,368,000	$6,776,800	$4,657,700
Total Annual Costs	**$49,807,800**	**$44,100,400**	**$57,815,500**	**$67,648,200**	**$49,852,100**	**$48,786,100**	**$49,807,800**	**$44,100,400**
Brownsville Navigation District								
Capital Improvement Costs	$150,981,300	$247,775,900	$64,333,900	$29,507,100	$64,333,900	$25,338,600	$150,981,300	$277,283,000
Annualized Capital Improvement Costs	$13,163,200	$21,602,200	$5,608,900	$2,572,600	$5,608,900	$2,209,100	$13,163,200	$24,174,800
Annual Operation and Maintenance Costs	$10,616,100	$6,500,900	$17,085,100	$14,302,100	$17,085,100	$14,302,100	$10,616,100	$6,500,900
Total Annual Costs	**$23,779,300**	**$28,103,100**	**$22,694,000**	**$16,874,700**	**$22,694,000**	**$16,511,200**	**$23,779,300**	**$30,675,700**
El Jardin Water Supply Corporation								
Capital Improvement Costs	$38,362,400	$25,590,400	$38,362,400	$25,590,400	$151,664,900	$356,147,300	$38,362,400	$25,590,400
Annualized Capital Improvement Costs	$3,344,600	$2,231,100	$3,344,600	$2,231,100	$13,222,800	$31,050,500	$3,344,600	$2,231,100
Annual Operation and Maintenance Costs	$6,429,000	$4,657,700	$6,429,000	$4,657,700	$14,197,800	$8,618,100	$6,429,000	$4,657,700
Payments from Regional Partners	-	-	-	-	$17,085,100	$14,302,100	-	-
Total Annual Costs	**$9,773,600**	**$6,888,800**	**$9,773,600**	**$6,888,800**	**$10,335,500**	**$25,366,500**	**$9,773,600**	**$6,888,800**
Military Highway Water Supply Corporation								
Capital Improvement Costs	$3,295,300	$5,280,100	$2,298,700	$1,179,000	$2,298,700	$1,179,000	$3,338,300	$6,459,100
Annualized Capital Improvement Costs	$287,300	$460,300	$200,400	$102,800	$200,400	$102,800	$291,000	$563,100
Annual Operation and Maintenance Costs	$367,500	$234,700	$635,800	$295,000	$635,800	$295,000	$367,500	$234,700
Total Annual Costs	**$654,800**	**$695,000**	**$836,200**	**$397,800**	**$836,200**	**$397,800**	**$658,500**	**$797,800**
Olmito Water Supply Corporation								
Capital Improvement Costs	$30,622,900	$102,665,300	$15,030,300	$6,801,700	$15,030,300	$6,801,700	$30,658,900	$109,467,000
Annualized Capital Improvement Costs	$2,669,800	$8,950,900	$1,310,400	$593,000	$1,310,400	$593,000	$2,673,000	$9,543,800
Annual Operation and Maintenance Costs	$2,139,000	$2,745,100	$3,491,100	$6,039,200	$3,491,100	$6,039,200	$2,139,000	$2,745,100
Total Annual Costs	**$4,808,800**	**$11,696,000**	**$4,801,500**	**$6,632,200**	**$4,801,500**	**$6,632,200**	**$4,812,000**	**$12,288,900**
Valley MUD No. 2								
Capital Improvement Costs	$10,348,600	$16,645,700	$6,556,700	$6,236,800	$6,556,700	$6,236,800	$10,363,600	$21,983,800
Annualized Capital Improvement Costs	$902,200	$1,451,300	$571,600	$543,800	$571,600	$543,800	$903,500	$1,916,600
Annual Operation and Maintenance Costs	$730,200	$469,900	$1,263,200	$1,033,800	$1,263,200	$1,033,800	$730,200	$469,900
Total Annual Costs	**$1,632,400**	**$1,921,200**	**$1,834,800**	**$1,577,600**	**$1,834,800**	**$1,577,600**	**$1,633,700**	**$2,386,500**
TOTAL ANNUAL COSTS	$90,456,700	$93,404,500	$97,755,600	$100,019,300	$90,354,100	$99,271,400	$90,464,900	$97,138,100
GRAND TOTAL ANNUAL COSTS	**$183,861,200**		**$197,774,900**		**$189,625,500**		**$187,603,000**	

Proposed Water Capital Improvements (Alternative 2)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

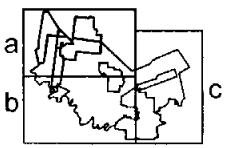
Legend

- Elevated Storage Tank Modified
- Elevated Storage Tank
- Water Treatment Plant
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

N

4000 0 4000 Feet

Map Location

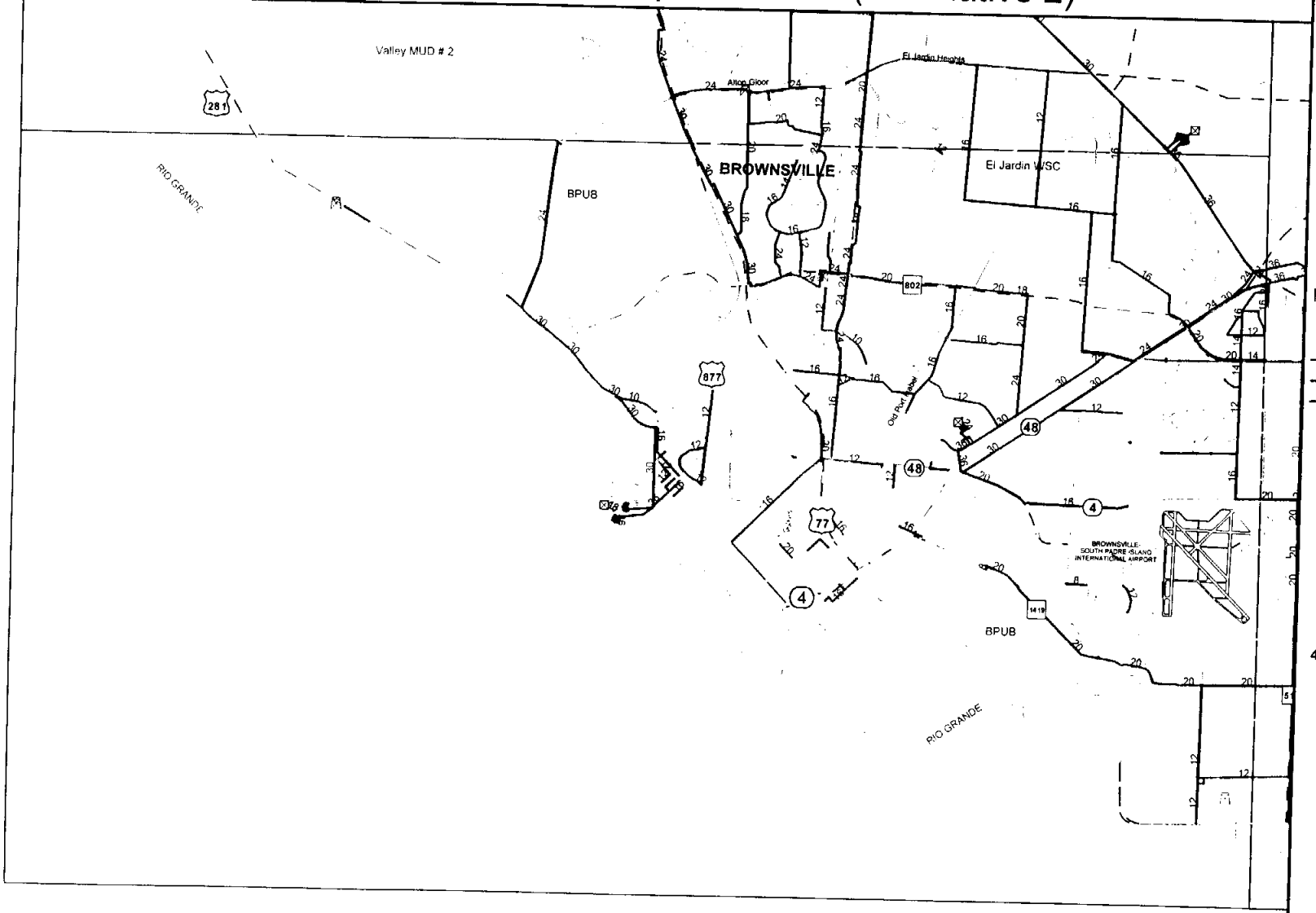


February 2002

EXHIBIT 6a

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Water Capital Improvements (Alternative 2)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

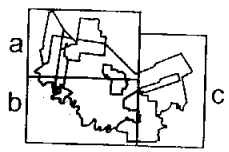
Legend

- Elevated Storage Tank Modified
- Elevated Storage Tank
- Water Treatment Plant
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

N

4000 0 4000 Feet

Map Location

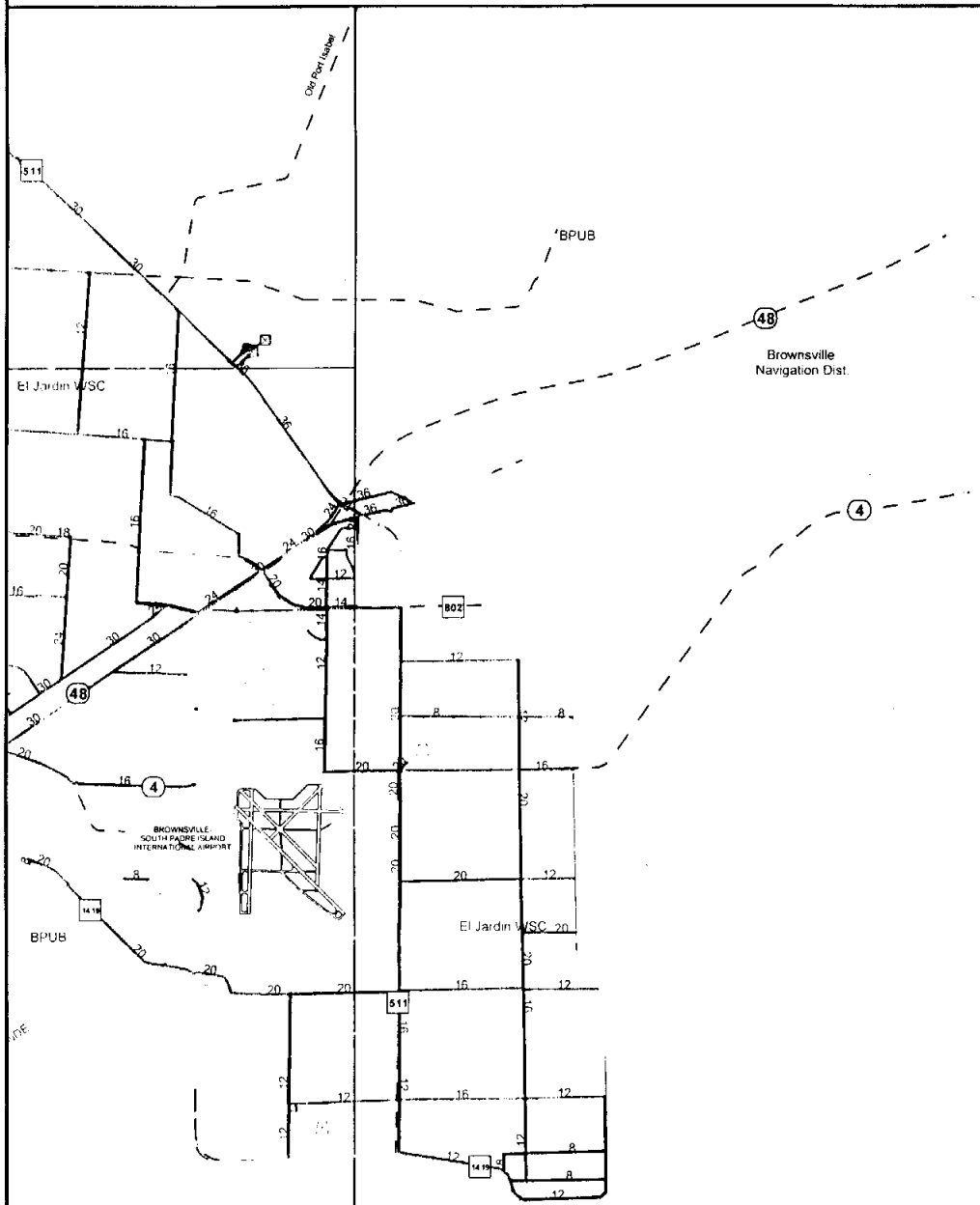


February 2002

EXHIBIT 6b

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Water Capital Improvements (Alternative 2)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

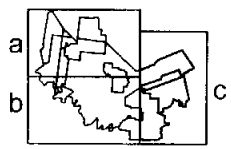
Legend

- Elevated Storage Tank Modified
- Elevated Storage Tank
- Water Treatment Plant
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

N

4000 0 4000 Feet

Map Location

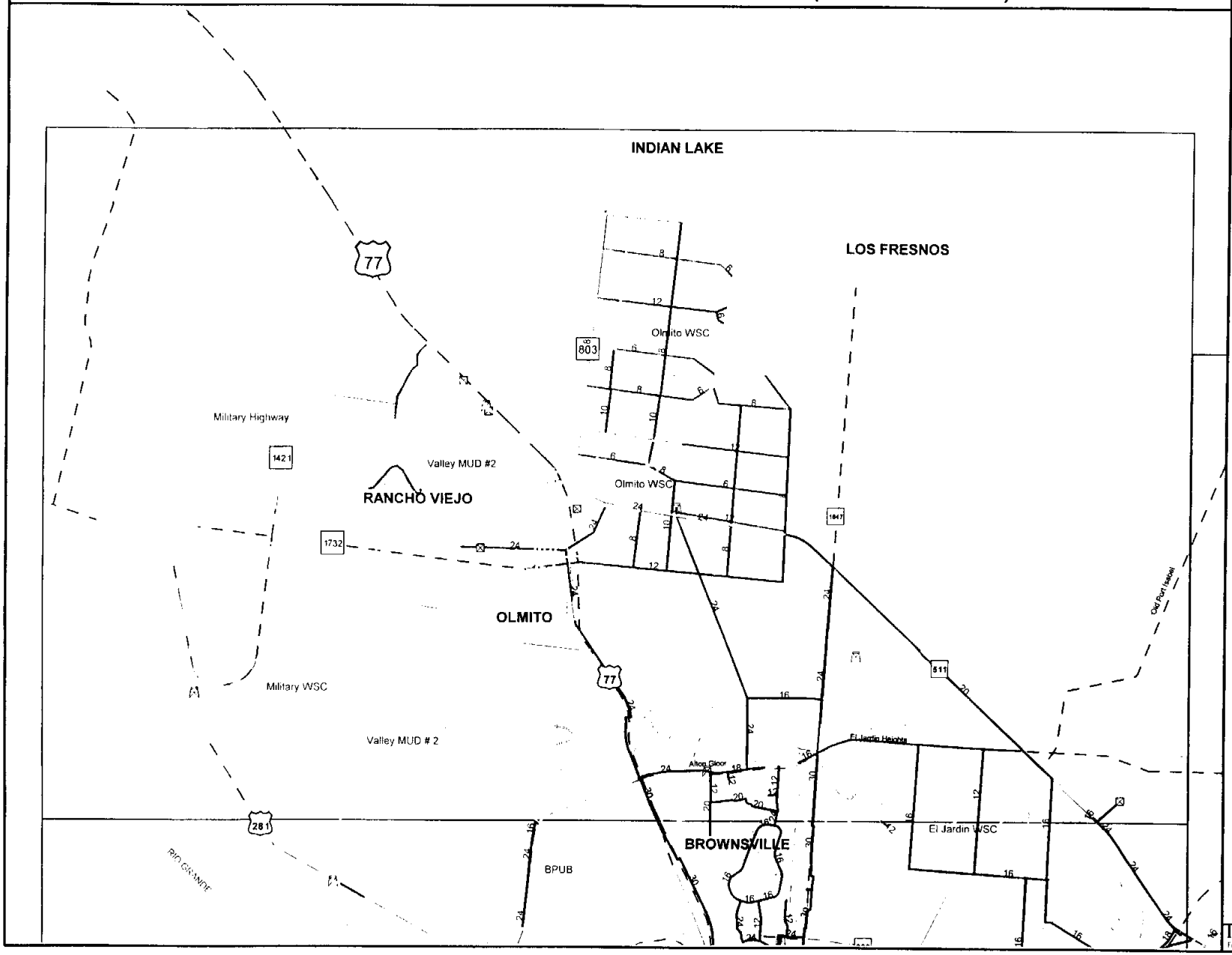


February 2002

EXHIBIT 6c

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Water Capital Improvements (Alternative 3)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

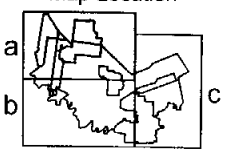
Legend

- Elevated Storage Tank
- Modified Elevated Storage Tank
- Water Treatment Plant
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

N

4000 0 4000 Feet

Map Location

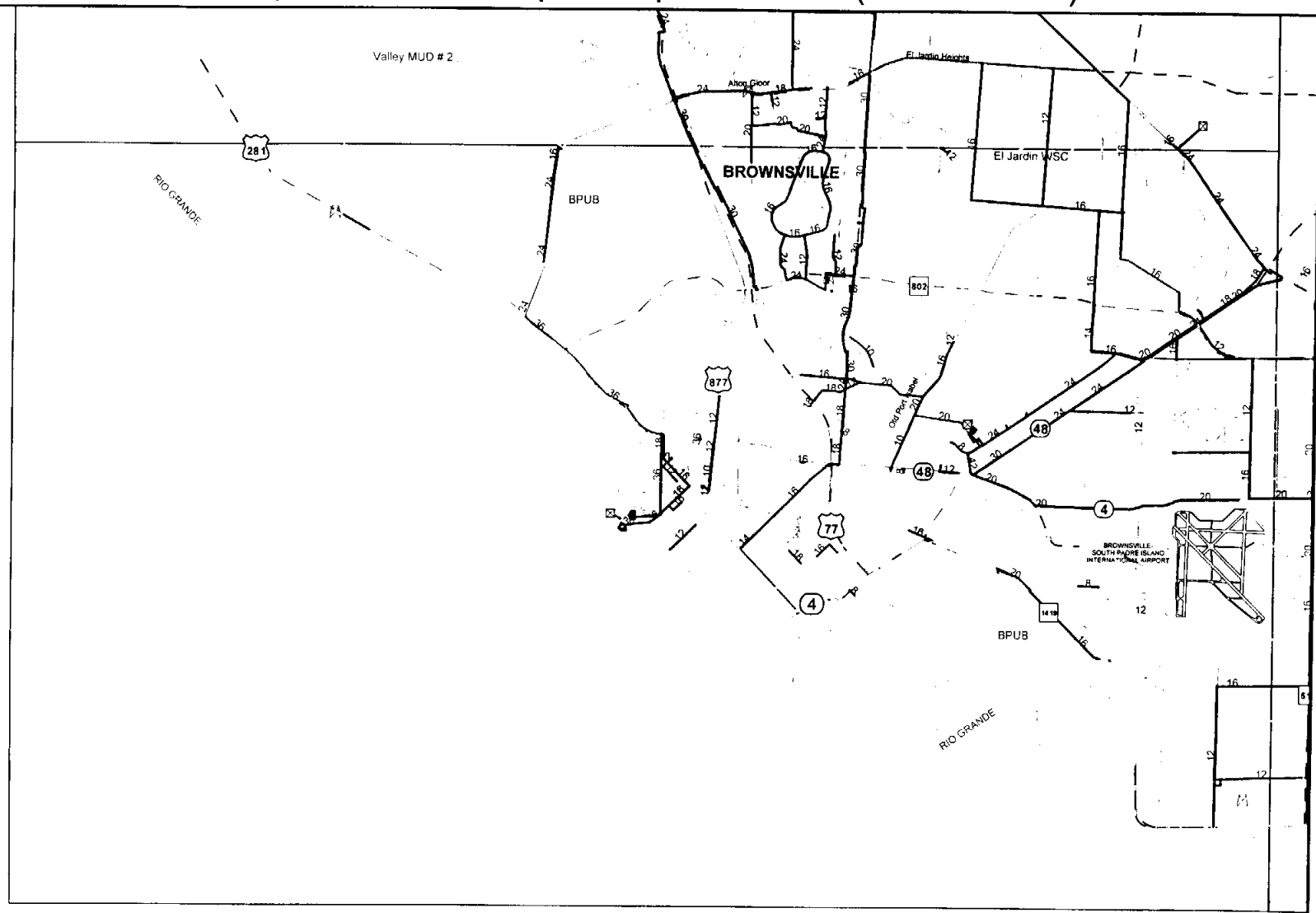


February 2002

EXHIBIT 7a

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Water Capital Improvements (Alternative 3)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

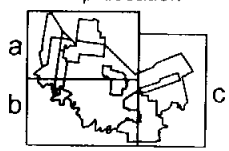
Legend

- Elevated Storage Tank Modified
- Elevated Storage Tank
- Water Treatment Plant
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

N

4000 0 4000 Feet

Map Location

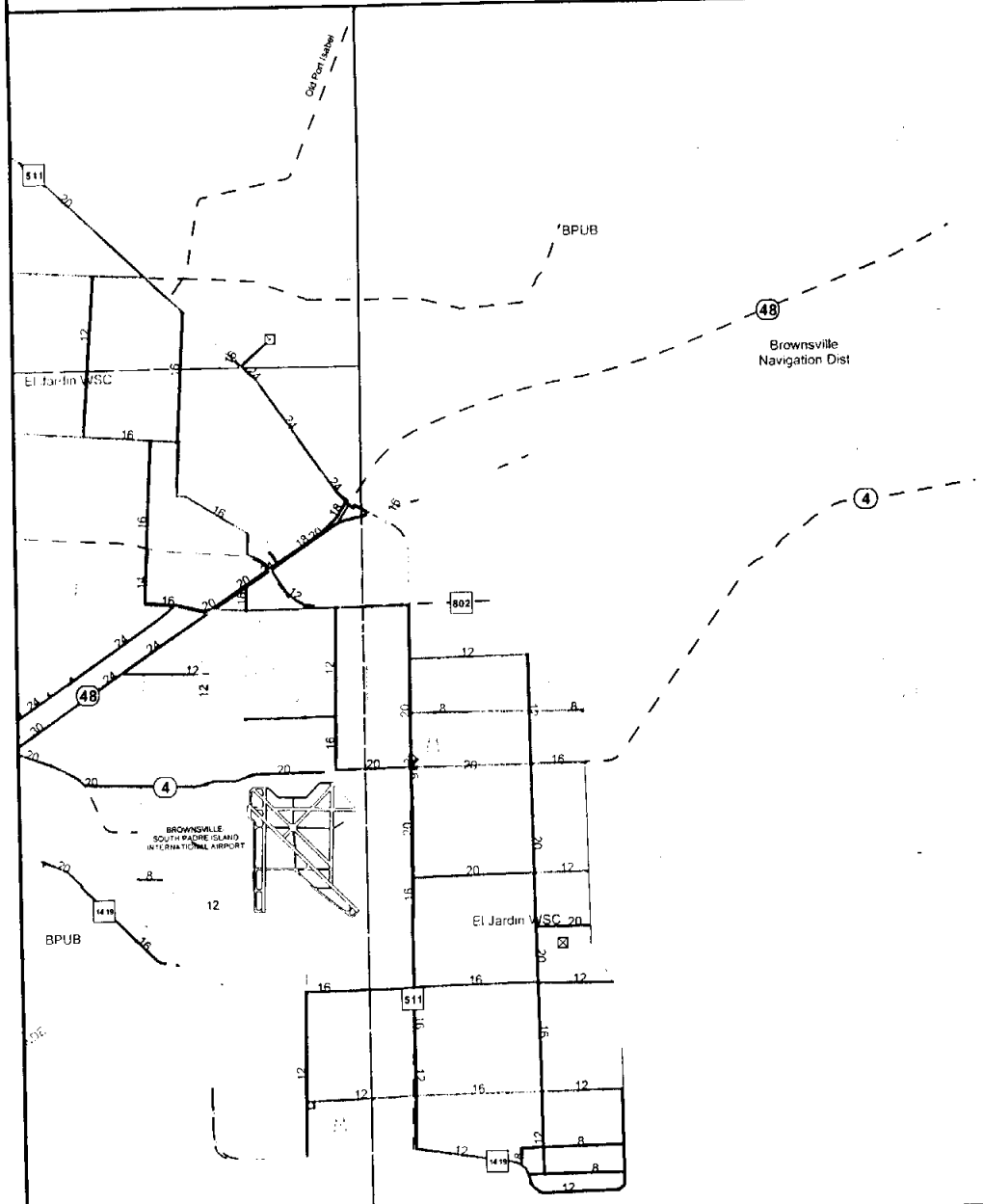


February 2002

EXHIBIT 7b

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Water Capital Improvements (Alternative 3)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

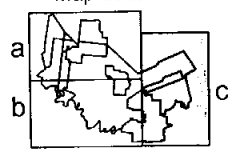
Legend

- Elevated Storage Tank Modified
- Elevated Storage Tank
- Water Treatment Plant
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

N

4000 0 4000 Feet

Map Location

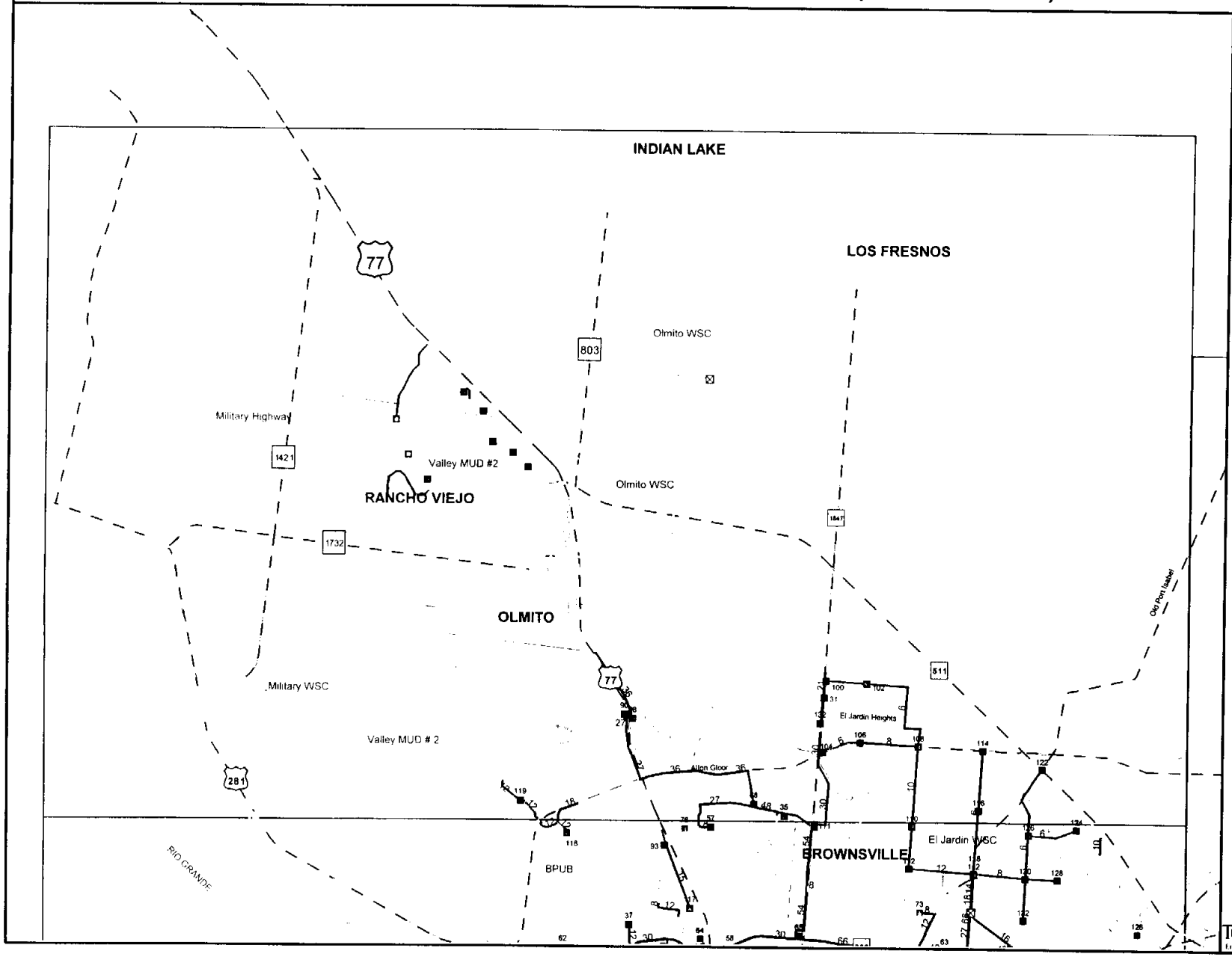


February 2002

EXHIBIT 7c

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 1)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

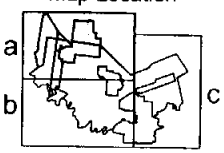
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

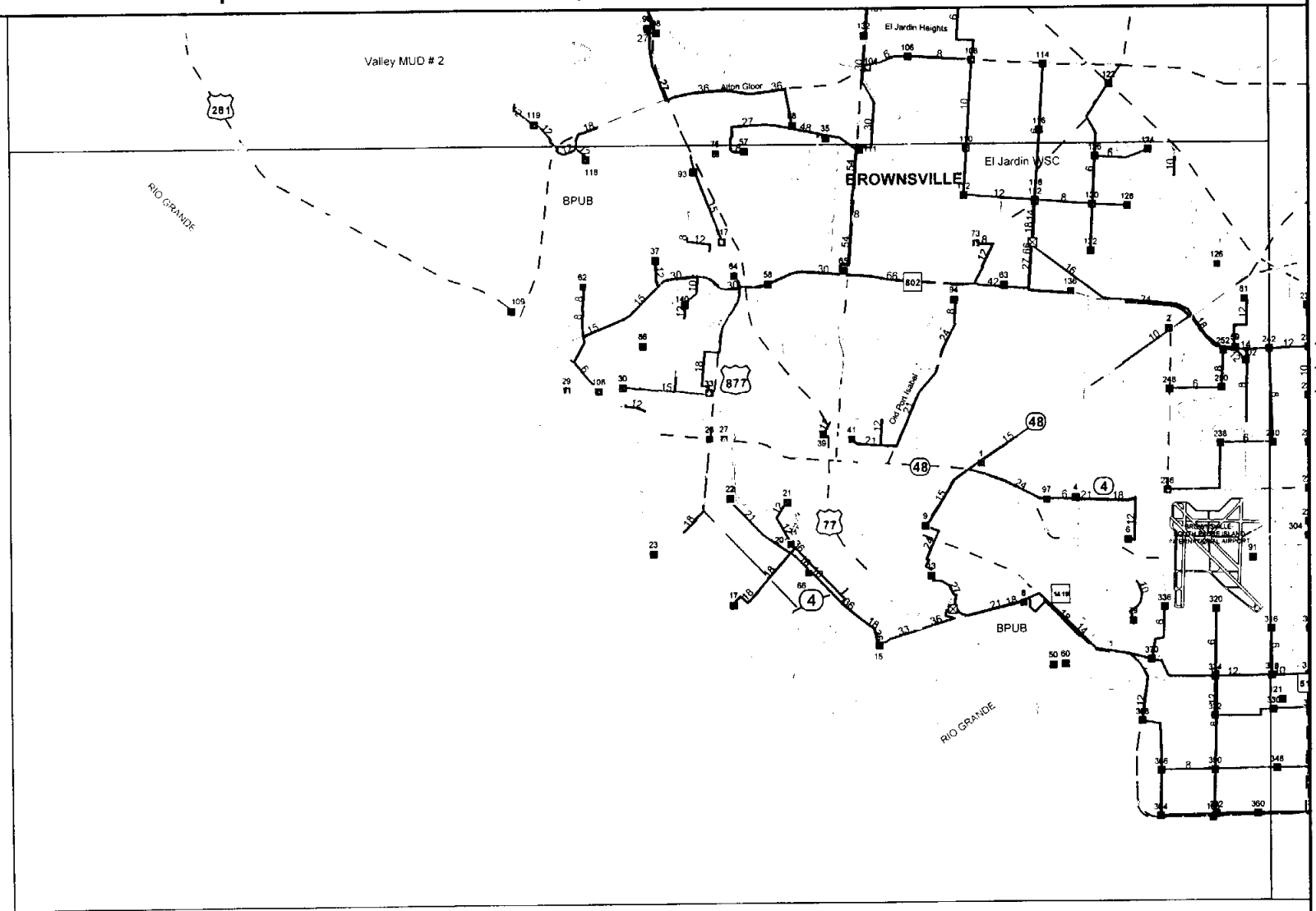


February 2002

EXHIBIT 8a

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 1)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

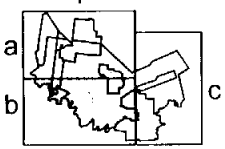
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

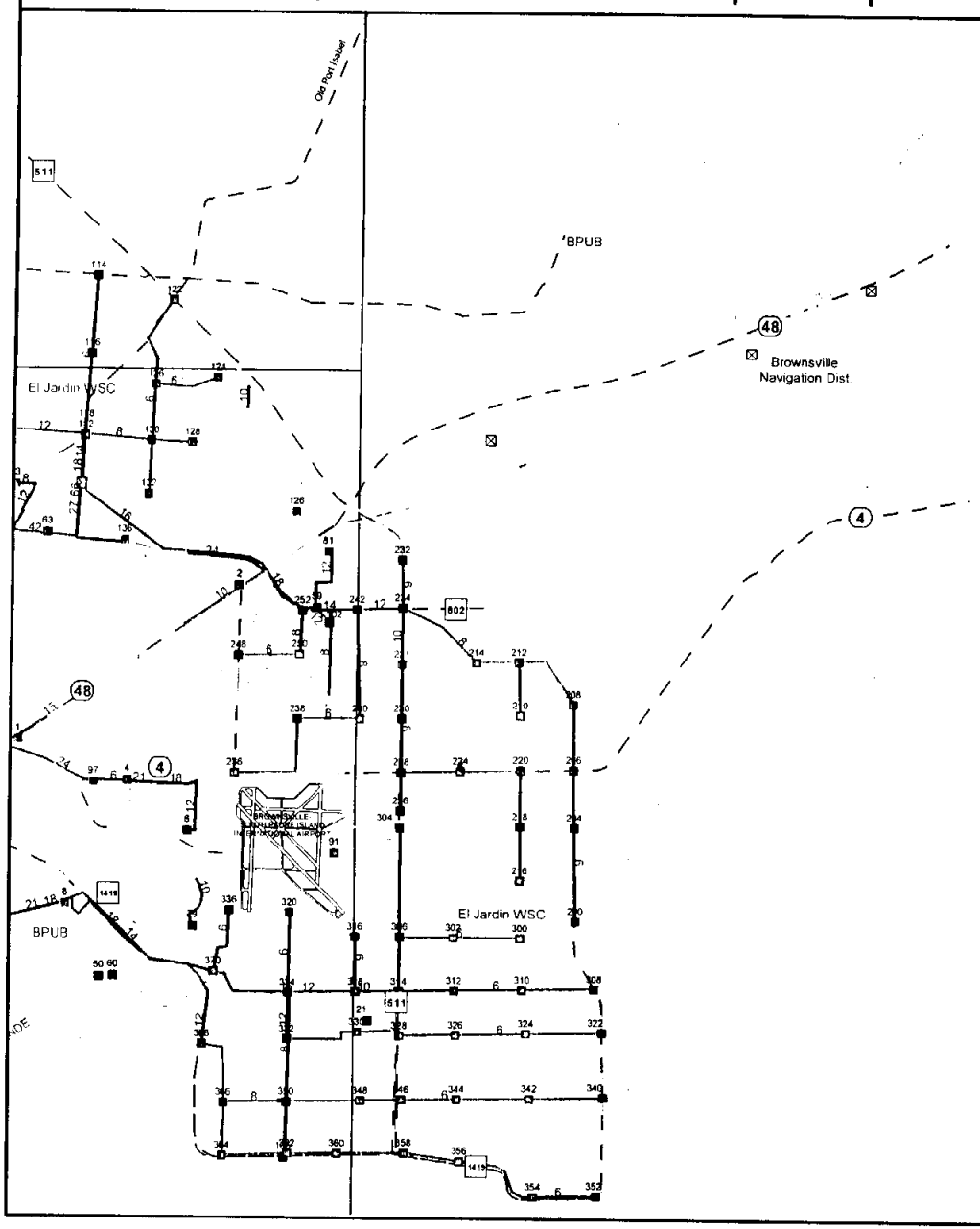


February 2002

EXHIBIT 8b

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 1)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

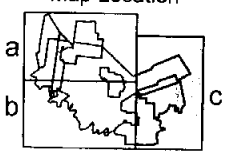
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

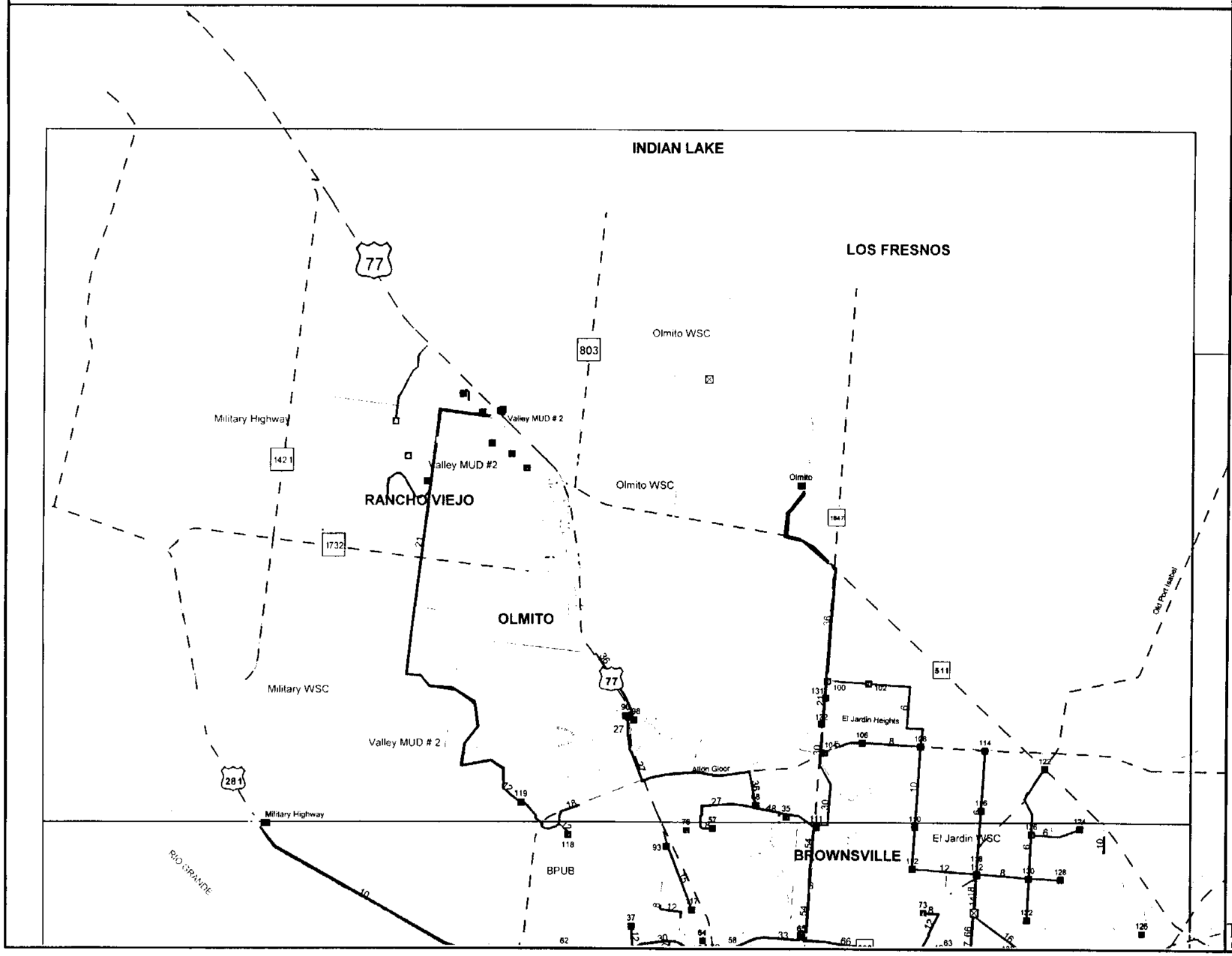


February 2002

EXHIBIT 8c

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 2)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

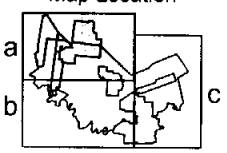
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

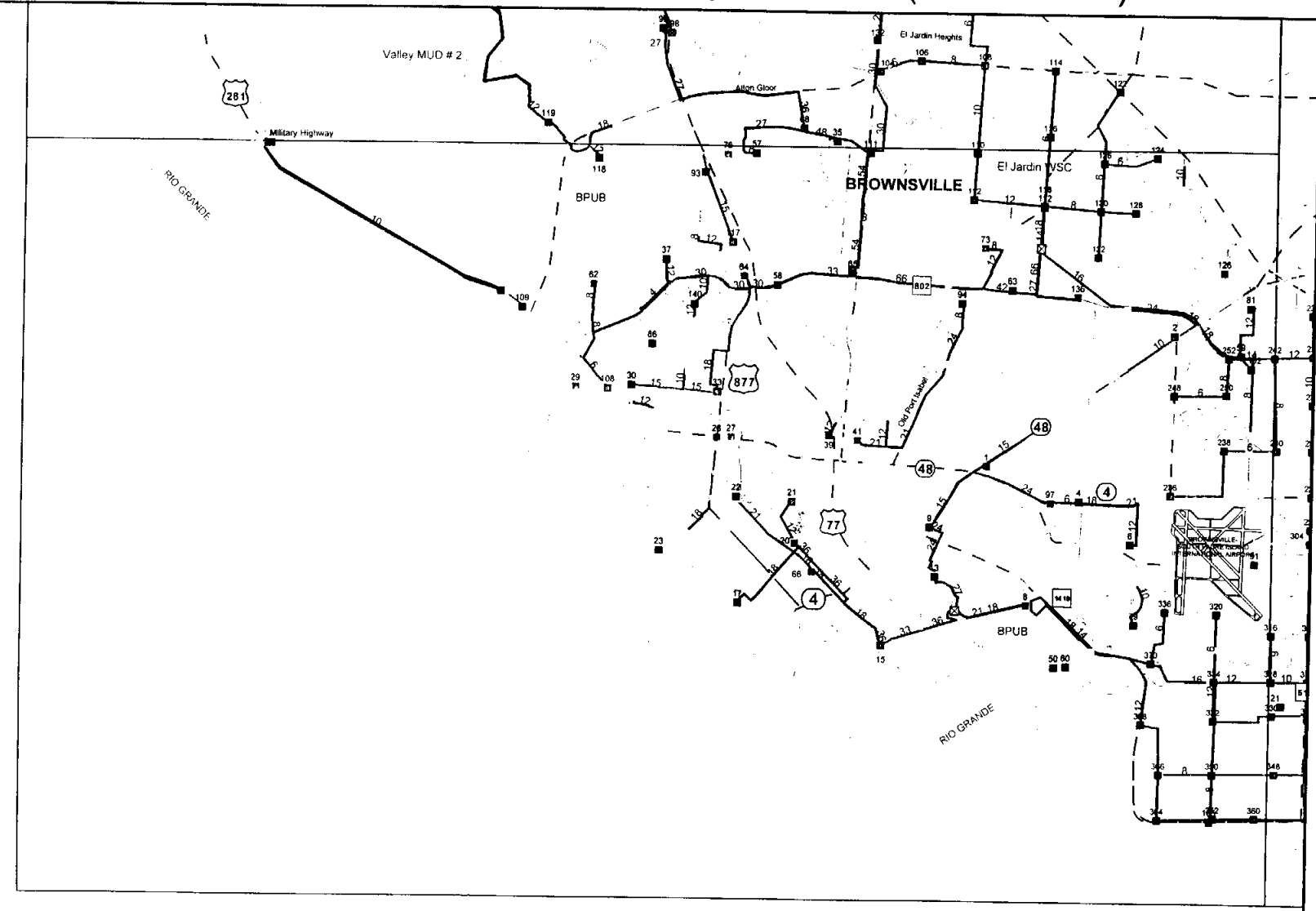


February 2002

EXHIBIT 9a

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 2)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

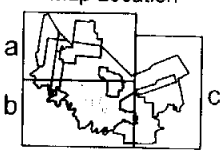
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

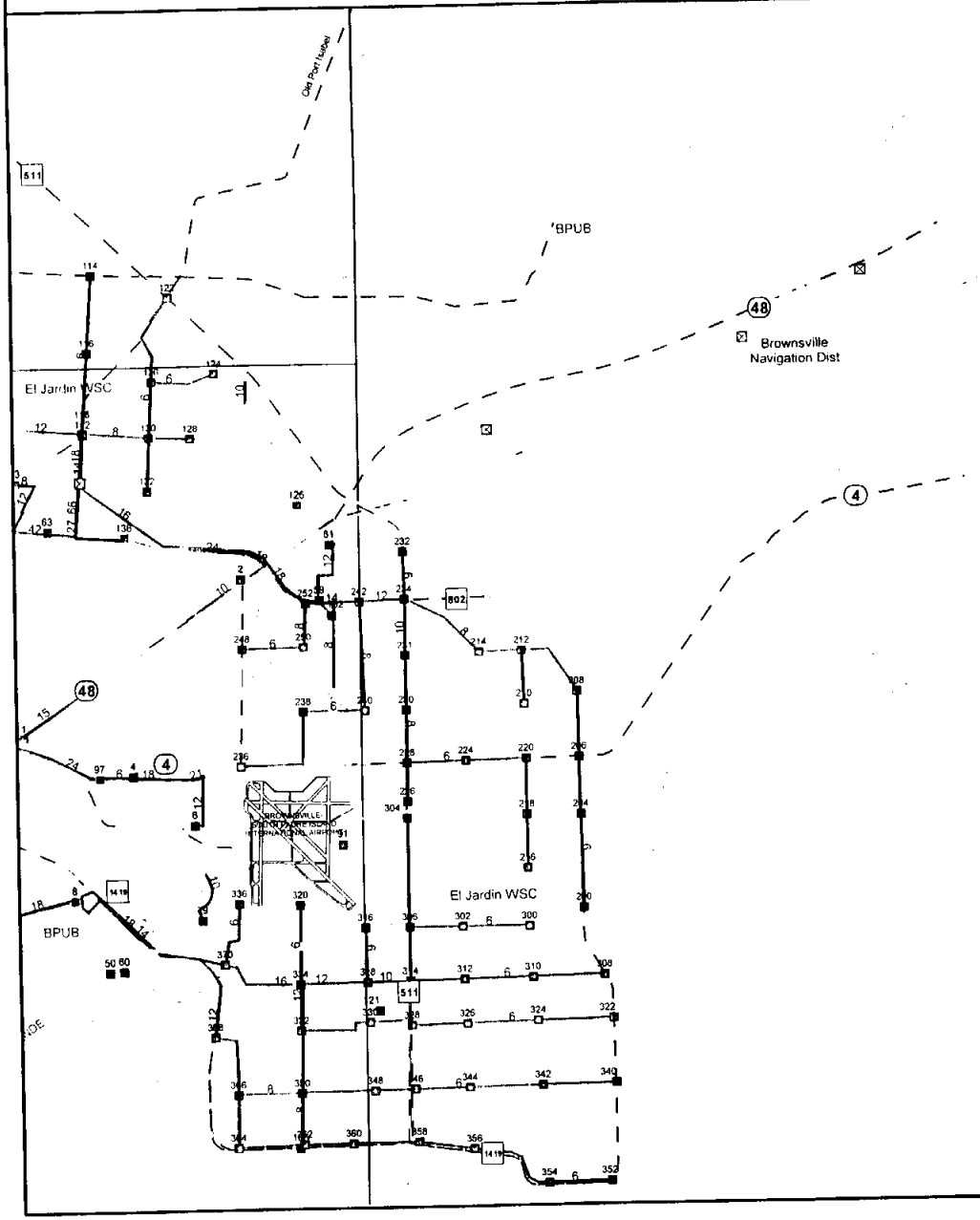


February 2002

EXHIBIT 9b

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 2)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

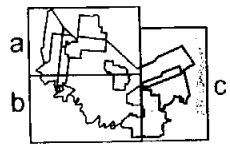
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

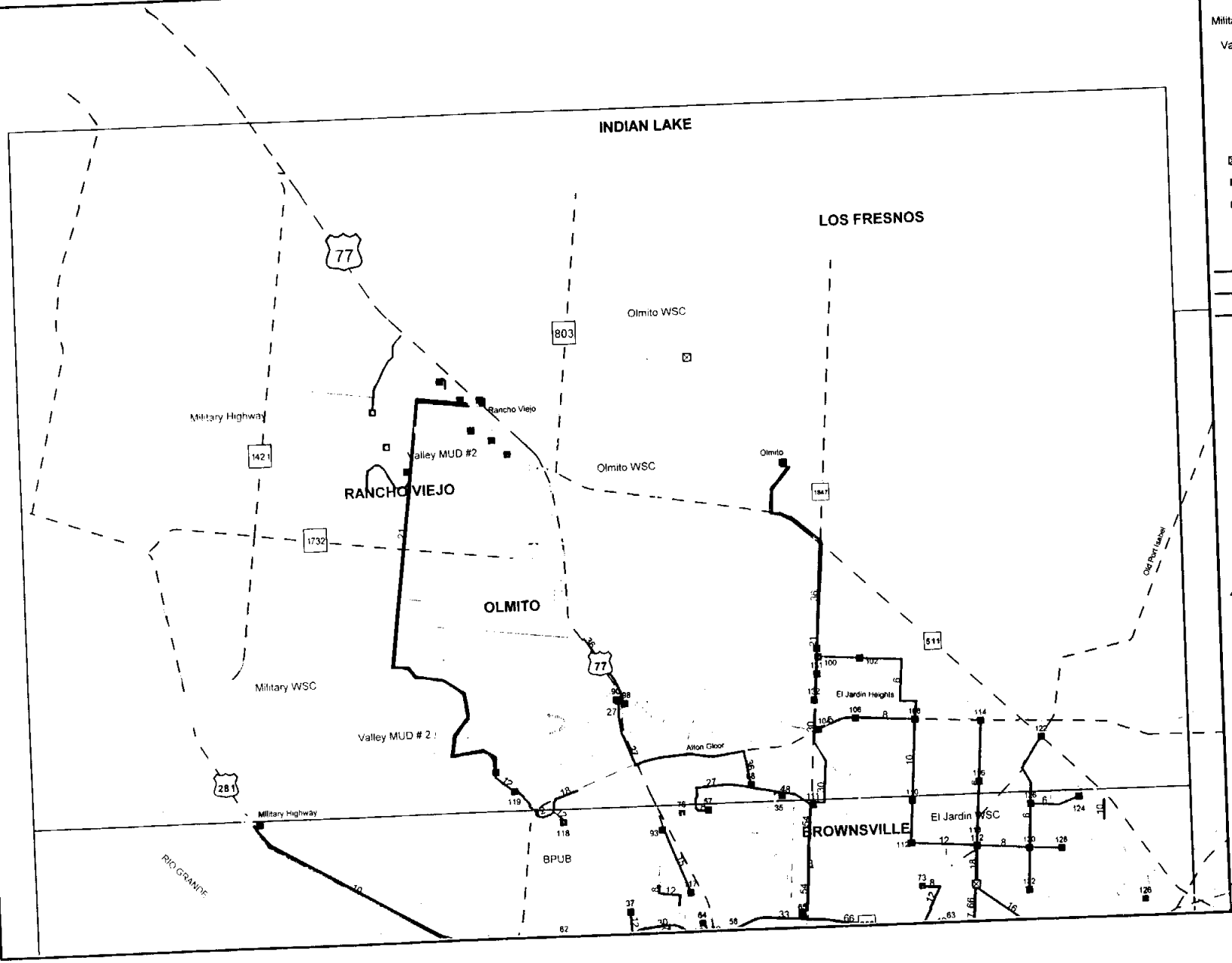


February 2002

EXHIBIT 9c

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 3)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

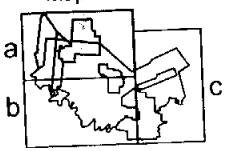
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

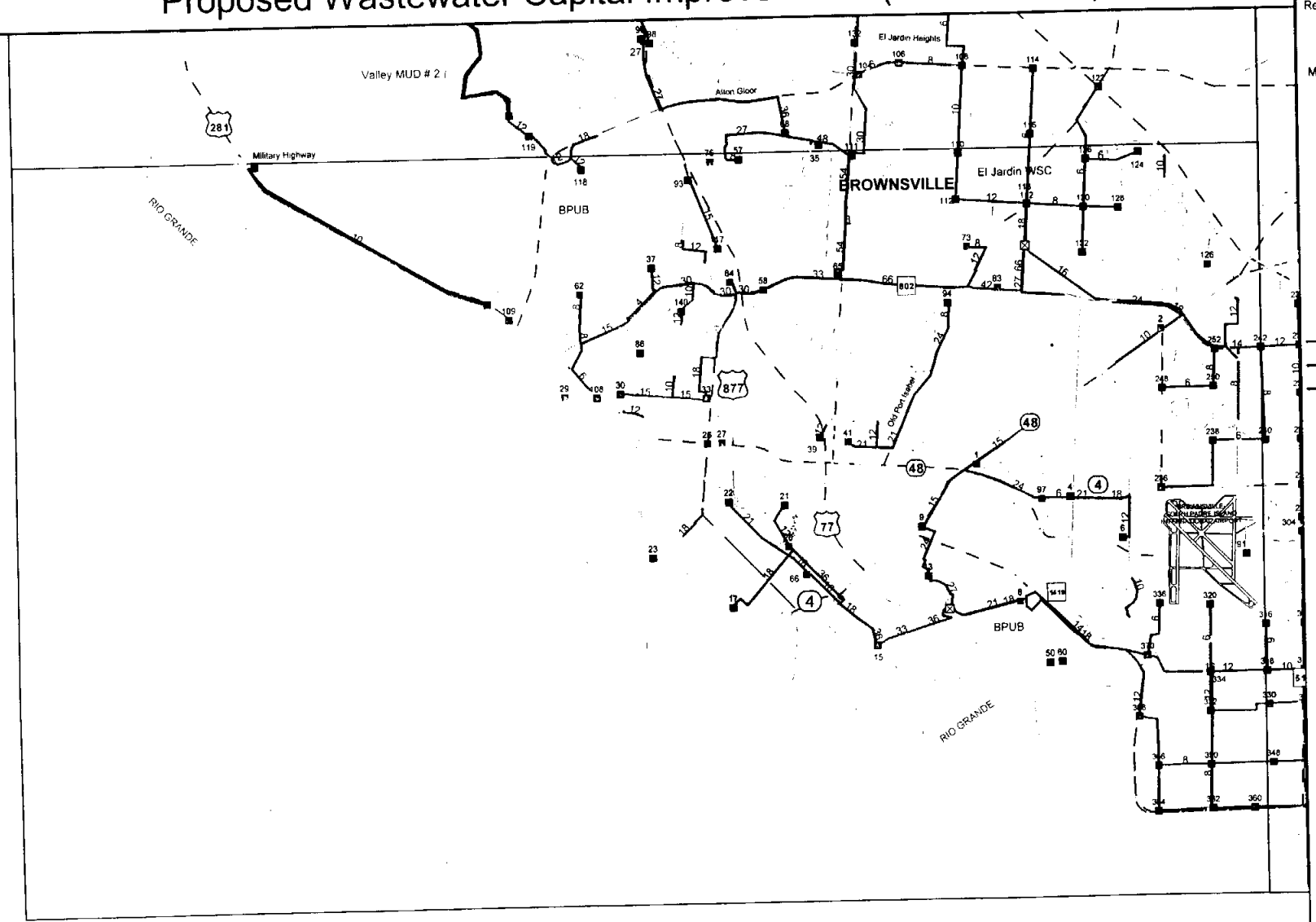


February 2002

EXHIBIT 10a

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 3)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

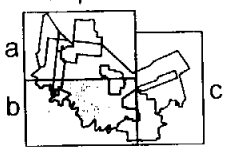
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location

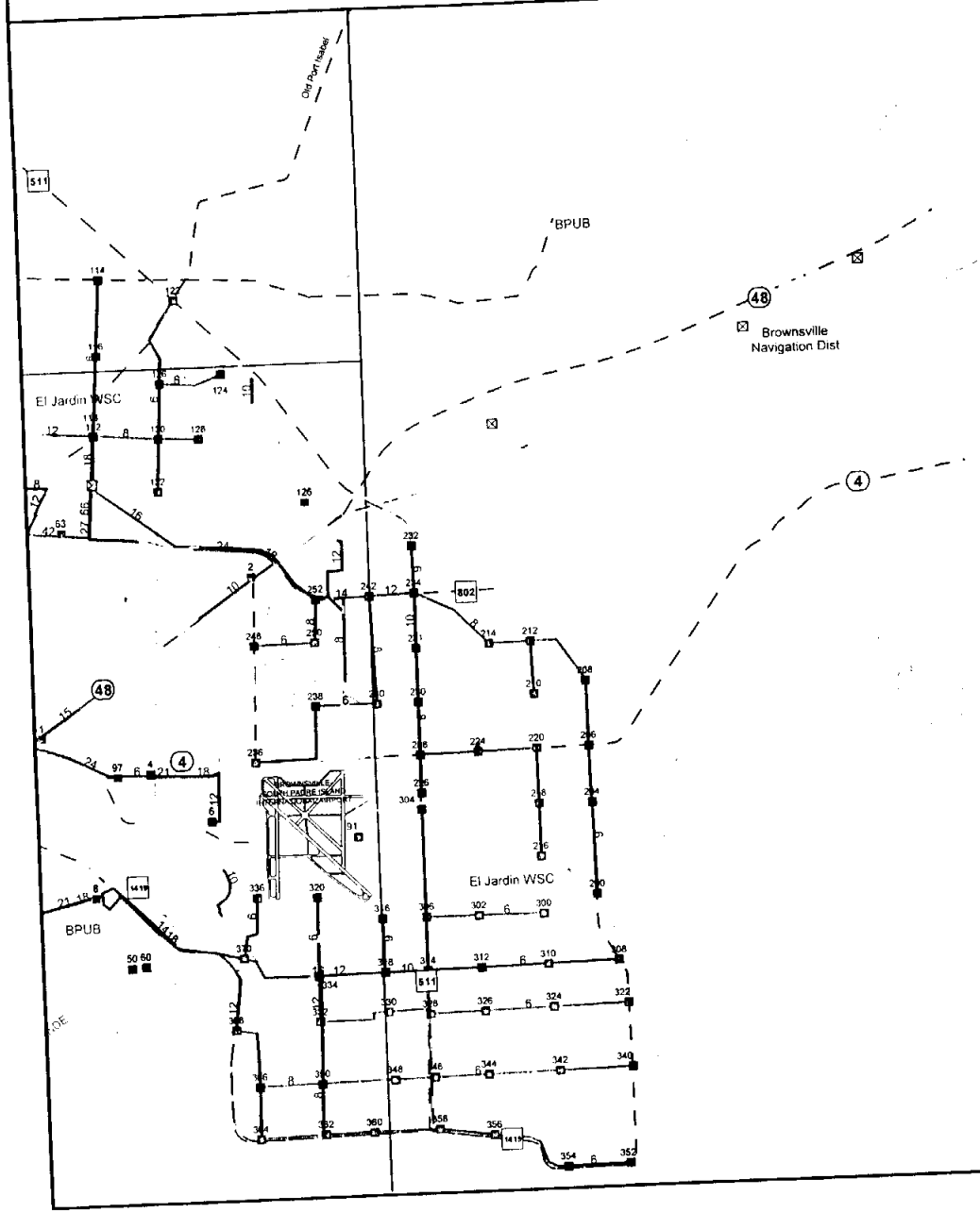


February 2002

EXHIBIT 10b

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

Proposed Wastewater Capital Improvements (Alternative 3)



Regional Water and Wastewater Master Plan
for the
Brownsville Public Utilities Board
Brownsville Navigation District
El Jardin Water Supply Corporation
Military Highway Waster Supply Corporation
Olmito Water Supply Corporation
Valley Municipal Utility District Number 2

Legend

- Treatment Plant
- 2005 Lift Station
- 2015 Lift Station
- 2025 Lift Station
- Existing Lift Station
- 2005 Pipes
- 2015 Pipes
- 2025 Pipes
- Existing Pipes
- Service Areas

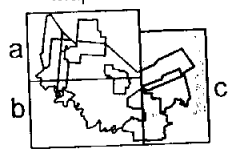
Pipe Diameter

Lift Station No.

N

4000 0 4000 Feet

Map Location



February 2002

EXHIBIT 10c

TurnerCollie&Braden Inc.
Engineers • Planners • Project Managers

INTERVIEW QUESTIONNAIRES

PUB

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? YES / (NO)

   _____
   _____
   _____
   _____

4. ~~Do you have any existing~~ reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / NO
   If YES, can a copy be provided? YES / NO

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

6. Do you have copies of water billing records for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

9. Do you have future land use projections for your area? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? YES / NO
- Water Pressure Plane Maps? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

11. Who are your wholesale customers for water and wastewater in your area?
Lucy Kinnamberg has that information.

12. Do you have additional concerns with existing water and wastewater systems? YES / NO
We are at 75% Capacity with water system.

(2

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   Northside of Town by Alton Gloor at Valley Reg. Hospital

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES (NO)

   If YES, can a copy be provided? YES / NO

   W/WW Engineer has plans and drawings in file

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / NO
   If YES, can a copy be provided? YES / NO

W/WW Engineering has plans and drawings on file

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

W/WW engineering has this data

6. Do you have copies of water billing records for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

Billing records are managed by Custom Service Dept.

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

Water plants monitor the SCADA system at Both Water Plants.

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

This info is at W/WW Engineering

9. Do you have future land use projections for your area? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? YES / NO
- Water Pressure Plane Maps? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

11. Who are your wholesale customers for water and wastewater in your area?

1) EL Jardin Water Dist
2) Brownsville Navg Dist.

12. Do you have additional concerns with existing water and wastewater systems? YES / NO

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? (YES) / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   LS #16 - 12th St. & River Level - Eliminate Can Station Needs New wet well - Deteriorating.

   LS #26 - Eliminate Station & Tie in to LS #25 or Redo station. This has only 1 pump - 5 HP.

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? YES / NO ✓

   _____
   _____
   _____
   _____

Post-it® Fax Note 7671	Date 8-16-00	# of pages ▶ 3
To John Espinoza	From Kelvin Hinrichs	
Co./Dept.	Co. Brownsville PUB	
Phone #	Phone # 956-983-6215	
Fax #	Fax # 956-983-6220	

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? (YES) / NO
   If YES, can a copy be provided? (YES) / NO Engineering Dept.

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

6. Do you have copies of water billing records for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? (YES) / NO

   If YES, is it in a digital format? YES /(NO)
   Can a copy be provided? (YES) / NO

9. Do you have future land use projections for your area? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? YES / NO
- Water Pressure Plane Maps? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

11. Who are your wholesale customers for water and wastewater in your area?
U-S Filter, Municipal pipe.

12. Do you have additional concerns with existing water and wastewater systems? YES / NO

(1.) Upgrade US #61 – Leon Gardens – Hudson property
Need Bigger pumps.

Need to upgrade old design Lift Stations to New design. At Lift stations No. 75, 79, 76, 73, 49, And 74. (Discharge piping, Values, Pumps and wet well deteriorating)

D.P

From I. URBANO (Isidoro Urbano Water Plants Manager

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   Low pressure on North Side of Brownsville, Texas near Valley Regional Hospital on Alton Gloor Blvd.

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? YES / NO

   By BPUB W/WW Engineering Dept.

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / NO

If YES, can a copy be provided? YES / NO

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

If YES, can a copy be provided? YES / NO
What type of data is stored in GIS?
What type of software is used in GIS?
Maybe Brownsville PUB W/WW Engineering Dept.

6. Do you have copies of water billing records for your area? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO
Brownsville PUB Customer Service has records

7. Do you have SCADA data of the existing system in your area? YES / NO

If YES, is it in a digital format? YES /NO
Can a copy be provided? YES / NO
A hard Copy

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / NO

If YES, is it in a digital format? YES /NO
Can a copy be provided? YES / NO

9. Do you have future land use projections for your area? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO
Maybe Brownsville PUB W/WW Engineering Dept.

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? YES / NO
- Water Pressure Plane Maps? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO
Probably Brownsville PUB W/WW Engineering Dept.

11. Who are your wholesale customers for water and wastewater in your area?
El Jardin Water Supply
Brownsville Navigation District

12. Do you have additional concerns with existing water and wastewater systems? YES / NO
Brownsville is growing so fast we are approaching maximum production water by Water Plants

customer service

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? (YES) / ~~NO~~

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   Number of calls for sewer problems are higher than electric and water. For details of certain areas a review should be done ~~yes~~ of the trouble calls.

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? YES / (NO)

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / (NO)
   If YES, can a copy be provided? YES / (NO)

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / (NO) NOT IN CUSTOMER SERVICE
   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

6. Do you have copies of water billing records for your area? YES (NO) not kept in this dept.
   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

7. Do you have SCADA data of the existing system in your area? YES (NO)
   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES (NO)
   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

9. Do you have future land use projections for your area? YES / (NO)

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

    - Water and Wastewater Service Area Boundaries? YES / (NO)
    - Water Pressure Plane Maps? YES / (NO)

    If YES, is it in a digital format? YES / NO
    Can a copy be provided? YES / NO

11. Who are your wholesale customers for water and wastewater in your area? — Billing.

12. Do you have additional concerns with existing water and wastewater systems? YES / (NO)

(6)

PUB

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   Calls are received at main switchboard and transferred to Dispatch.

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   Calls are received at main switchboard and transferred to dispatch.

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? YES / NO

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / NO

   If YES, can a copy be provided? YES / NO

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

6. Do you have copies of water billing records for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

   Billing Book copy of June, 2000 and to date copy of July, 2000.

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

9. Do you have future land use projections for your area? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

District 14 Fm Rd 802 East of Burger King. District 21 Fm Rd 802 passing Alton Gloor towards Olmito. District 10 Southmost Rd to Dakota Rd. (Villa Pancho) District 20 El Valle west Section II & III.

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? YES / NO
- Water Pressure Plane Maps? YES / NO

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

See Map Attached

11. Who are your wholesale customers for water and wastewater in your area?

Wholesale Customers:
Brownsville Navigation District (Billed District 13)
El Jardin Water District (Billed District 01)

12. Do you have additional concerns with existing water and wastewater systems? YES / NO

6800 Park Ten Blvd.
Suite 180S
San Antonio, TX 78213
210.296.2000
Fax: 210-296-2025

Turner Collie & Braden Inc.

Engineers • Planners • Project Managers

FAX COVER

DATE: July 27, 2000	# OF PAGES (including this page): 5
TO: Larry Brown	FAX NUMBER: 956-548-6144
FROM: Shannon L. Best	PHONE NUMBER: 210-296-2017 *(If transmittal is incomplete or unclear, please call sender at this number directly.)*

REMARKS:

Attached is the Interview Questionnaire that we sent out. If you have any questions please call me at 210-296-2017. Thanks

Shannon L. Best

To: Shannon Best

From: Larry A. Brown

Date: 7-28-00

Re: Survey

Please find attached the filled out survey. The data will follow as I discussed with you on the phone. Should you have any other questions please call. Sorry for the delay.

Larry A. Brown 7-28-00

Turner Collie & Braden Inc.
Engineers • Planners • Project Managers

6800 Park Ten Blvd., Suite 180S
San Antonio, Texas 78213
210 296-2000
Fax 210 296-2025

July 7, 2000

Larry Brown
City of Brownsville
Planning & Community Development Director
1150 East Adam Street
Brownsville, Texas 78521

Re: Regional Water and Wastewater Master Plan
Interview Questionnaire
Turner Collie & Braden Inc. Job No. : 37-80001-001

Attached is an interview questionnaire that was designed to gather information to facilitate the regional water and wastewater master plan. Please fill out and return. If you should have any questions or concerns please call me at 210-296-2017.

Sincerely,

Shannon L. Best
Graduate Engineer

Copy:
File
Brownsville Navigation District - Dick Berry
Brownsville Public Utilities Board - Kelvin Hinrichs
City of Brownsville - Larry Brown
El Jardin Water Supply Corporation - Gale Armstrong
Military Highway Water Supply Corporation - Amado Salinas
Olmito Water Supply Corporation - James Elium
Turner Collie & Braden Inc. - John Espinoza
Valley MUD No. 2 - Robert Burkhart

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? (YES) / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?
   THE WATER LINES IN THE LAKEWAY SUBDIVISION BEGAN DISTRIBUTING BLACK WATER ABOUT TWO YEARS AGO. THE PROBLEM WAS CAUSED BY CONSTRUCTION. THE PROBLEM WAS FIXED IN A FEW DAYS.

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?
   NONE RECENTLY THAT ARE VERIFIABLE

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? (YES) / NO
   YES

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? (YES) / NO
   If YES, can a copy be provided? (YES) / NO

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

   NO

6. Do you have copies of water billing records for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

   NO

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

   NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / NO

   If YES, is it in a digital format? YES /NO
   Can a copy be provided? YES / NO

   NO

9. Do you have future land use projections for your area? (YES) / NO

If YES, is it in a digital format? YES (NO)
Can a copy be provided? (YES) / NO
Some of the DATA we have is hard copy And some of it is Digitized - we will give you copies of both.

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? (YES) / NO
- Water Pressure Plane Maps? YES / (NO)

If YES, is it in a digital format? YES (NO)
Can a copy be provided? (YES) / NO

11. Who are your wholesale customers for water and wastewater in your area?
We are not involved in retail side of water / wastewater distribution.

12. Do you have additional concerns with existing water and wastewater systems? (YES) / NO
- There is a need to resolve issues between the local water districts and PUB regarding service to colonias and new subdivisions.

OLMITO

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? (YES) / NO

   If YES, can a copy be provided? (YES) / NO

   _____
   _____
   _____
   _____

RECEIVED
JUL 2 6 2000
BY:

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / NO
   If YES, can a copy be provided? YES / NO

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / NO

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

6. Do you have copies of water billing records for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

WASTEWATER ONLY

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

9. Do you have future land use projections for your area? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

   - Water and Wastewater Service Area Boundaries? YES / NO
   - Water Pressure Plane Maps? YES / NO

   If YES, is it in a digital format? YES / NO
   Can a copy be provided? YES / NO

11. Who are your wholesale customers for water and wastewater in your area?

   NONE

12. Do you have additional concerns with existing water and wastewater systems? YES / NO

MILITARY

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? (YES) / NO

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   Low pressure on FM 1421 and area east of FM 1421

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? (YES) / NO

   If YES, can a copy be provided? (YES) / NO

   Expansion of Las Rusias Water Treatment Plant

   Enclosed is copy of preliminary engineer report for RUS funding application

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? (YES) / NO
   If YES, can a copy be provided? (YES) / NO

as built plans of San Pedro Waste Water Collection System & Waste Water Treatment Plant

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / (NO)

   If YES, can a copy be provided? YES / NO
   What type of data is stored in GIS?
   What type of software is used in GIS?

6. Do you have copies of water billing records for your area? (YES) / NO

   If YES, is it in a digital format? YES / (NO)
   Can a copy be provided? YES / NO

7. Do you have SCADA data of the existing system in your area? YES / NO

   If YES, is it in a digital format? YES / (NO)
   Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? (YES) / NO

   If YES, is it in a digital format? YES / (NO)
   Can a copy be provided? (YES) / NO

9. Do you have future land use projections for your area? YES / (NO)

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? (YES) / NO
- Water Pressure Plane Maps? YES / (NO)

If YES, is it in a digital format? YES / NO
Can a copy be provided? (YES) / NO

11. Who are your wholesale customers for water and wastewater in your area?

Valley MUD # 2 - Water Emergency Connection

12. Do you have additional concerns with existing water and wastewater systems? YES / (NO)

EL JARDIN

INTERVIEW QUESTIONNAIRE
FOR THE
REGIONAL WATER & WASTEWATER MASTER PLAN

1. Are you aware of any known water problems areas in EJWSC service area?
   Yes.
   A. **We have a large portion of our system residing in undersized pipelines e.g. 2", 3"& 4" water mains.**
   B. **We have experienced chronic pressure problems in the past and, as recently as July, severe enough to publish a Boil Water Notice in the South System.**
   C. **We have several miles of 6" and 8" Asbestos/Concrete pipe that are a constant source of water losses through leaks from current breaks and numerous leaking patches from repairs made over the years.**
2. Are you aware of any known wastewater problems areas in EJWSC service area? **No. We have no CCN for wastewater and do not collect or treat wastewater.**
3. Do you have any existing reports, plans or drawings concerning water systems that pertain to the production, treatment and distribution in your area?
   Yes. We will provide copies of what we have.
4. Do you have any existing reports, plans or drawings concerning wastewater systems that pertain to the production, treatment and distribution in your area?
   Yes. We will provide copies of what we have.
5. Do you have an existing GIS or digital files for the water and wastewater systems for your area?
   Yes. We will provide copies of what we have. I will have to speak with our consultant to define the context within which the information is stored.
6. Do you have copies of water billing records for your area?
   Yes. We will provide copies of what we have. I will have to determine if we can provide the information in a digital format.
7. We do not have SCADA data for our system
8. We have no Wastewater Lift Stations.
9. Do you have future land use projections for your area? **Yes. We will provide copies of what we have.**
10. Do you have maps that delineate the following:
    A. Water and Wastewater Service Area Boundaries? **Yes**
    B. Water Pressure Plane Maps? **No**
    C. **I will see if we can provide digitized data**
11. Who are your Wholesale customers for water and wastewater in your area?
    We have none
12. **Do you have additional concerns with existing water and wastewater systems? Yes; I will need to give some thought to the issues before I can expand on this question.**

Valley

INTERVIEW QUESTIONNAIRE

for the

Brownsville Public Utilities Board, Brownsville Navigation District, City of Brownsville, El Jardin WSC, Olmito Water Supply Corporation, Military Highway WSC, and Valley MUD No. 2

REGIONAL WATER AND WASTEWATER MASTER PLAN

As part of conducting this project we have the following questions and are requesting information. Please read the following questions and answer them to the best of your knowledge. If you answer YES to any of the questions, please specify more information.

1. Are you aware of any known water problem areas (Ex: low pressures, lack of chlorine residual, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

2. Are you aware of any known wastewater problem areas (Ex: manhole overflows, recurring blockages, failure of the wet wells, etc.)? YES / (NO)

   If YES, please provide the following: address/location, type of problem, date/time problem occurred, was the problem corrected?

   _____
   _____
   _____
   _____

3. Do you have any existing reports, plans, or drawings concerning water systems that pertain to the production, treatment, and distribution in your area? YES / NO

   If YES, can a copy be provided? (YES) / NO
   ATTACHED DRAFT COMPREHENSIVE PLAN PREPARED BY NRS ENGINEERS
   _____
   _____
   _____
   _____

4. Do you have any existing reports, plans, or drawings concerning wastewater systems that pertain to collection, lift stations, and treatment in your area? YES / NO

If YES, can a copy be provided? (YES) / NO

SAME AS #3

5. Do you have an existing GIS or digital files for the water and wastewater systems for your area? YES / (NO)

If YES, can a copy be provided? YES / NO
What type of data is stored in GIS?
What type of software is used in GIS?

6. Do you have copies of water billing records for your area? (YES) / NO

If YES, is it in a digital format? (YES) / NO
Can a copy be provided? YES / NO

COPIES OF COMMA DELINEATED BILLING RECORDS ATTACHED

7. Do you have SCADA data of the existing system in your area? YES / (NO)

If YES, is it in a digital format? YES /NO
Can a copy be provided? YES / NO

8. Do you have wastewater lift station data including pump size, number of pumps, on/off times of pumps, pump replacement, have pumps been replaced, are pump curves available, and depth/elevation of wet wells in your area? YES / (NO)

If YES, is it in a digital format? YES /NO
Can a copy be provided? YES / NO

SEE COMPREHENSIVE PLAN

9. Do you have future land use projections for your area? YES / (NO)

If YES, is it in a digital format? YES / NO
Can a copy be provided? YES / NO

10. Do you have maps that delineate the following:

- Water and Wastewater Service Area Boundaries? (YES) / NO
- Water Pressure Plane Maps? YES / (NO)

If YES, is it in a digital format? YES / (NO)
Can a copy be provided? YES / NO

SEE ATTACHED CCN MAP

11. Who are your wholesale customers for water and wastewater in your area?

NONE

12. Do you have additional concerns with existing water and wastewater systems? YES / (NO)

WATER PRESSURE MONITORING RESULTS

Water Pressure Monitoring Results

Fire Hydrant Test: #1 - Alton Gloor-7283 Pressures (very near the EST-6)

	Time	Hourly Fire Hydrant Line Pressure (psi)								7-Day Average *
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
1	3pm	55.59	58.78	54.22	56.69	51.92	54.21	61.05	0.22	56.06
2	4pm	55.78	58.91	55.10	56.51	52.41	53.54	61.09	0.24	56.19
3	5pm	54.89	58.51	54.35	55.83	51.86	51.54	60.79	0.21	55.39
4	6pm	53.71	57.92	54.52	56.17	52.51	51.02	60.52	0.27	55.20
5	7pm	54.13	58.61	55.71	58.25	54.22	51.76	60.34	0.31	56.14
6	8pm	54.89	59.22	56.39	59.43	55.99	52.50	60.50	0.37	56.99
7	9pm	56.29	60.08	57.15	59.90	56.75	53.93	60.68	0.42	57.83
8	10pm	57.42	60.04	58.54	59.53	58.07	55.28	61.48	0.48	58.62
9	11pm	59.80	61.66	60.62	60.55	60.12	57.96	62.59	0.53	60.47
10	12am	60.81	62.67	61.76	60.92	60.82	59.28	62.88	0.57	61.31
11	1am	57.11	59.51	58.76	57.89	57.74	57.12	59.27	0.60	58.20
12	2am	52.01	55.44	53.51	54.02	53.92	53.29	54.41	0.60	53.80
13	3am	51.39	55.15	53.42	53.79	53.20	52.89	53.82	0.61	53.38
14	4am	57.63	61.38	59.31	60.17	57.90	58.78	58.79	0.63	59.14
15	5am	59.01	62.78	60.91	61.49	59.32	60.56	59.43	0.62	60.50
16	6am	58.24	60.58	58.98	60.15	60.59	59.30	57.84	0.61	59.38
17	7am	56.63	57.29	55.99	56.99	58.79	57.84	55.77	0.59	57.04
18	8am	57.97	56.09	54.95	55.61	55.83	58.80	55.60	0.49	56.41
19	9am	59.32	53.71	53.28	53.51	53.91	58.68	55.06	0.29	55.35
20	10am	60.03	45.81	53.13	51.91	52.99	58.43	***49.12***	0.25	53.06
21	11am	59.60	41.29	53.86	51.17	52.01	58.96	***48.03***	0.18	52.13
22	Noon	59.43	49.84	54.75	51.01	52.02	59.76	***51.75***	0.09	54.08
23	1pm	59.28	51.50	55.40	50.93	52.85	60.45	***52.05***	0.02	54.64
24	2pm	58.84	53.25	56.04	51.36	53.45	61.02	47.71	0.01	54.52
	Nov.	7th/8th	8th/9th	9th/10th	10th/11th	11th/12th	12th/13th	13th/14th	14th/15th	

Fire hydrant is connected to a 16" pipeline

* 7-Day Average excludes day 8 - outliers

Fire Flow Test
Nov. 14th
10:40am-1:55pm

Water Pressure Monitoring Results

Fire Hydrant Test: #2 - Russell at Del Mar Ct. - # 7164 - Line Pressures (north of WTP-1)

	Time	Hourly Fire Hydrant Line Pressure (psi)								7-Day Average *
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
	1pm	62.43	----	----	----	----	----	----	----	----
	2pm	62.17	----	----	----	----	----	----	----	----
1	3:00 PM	60.85	59.73	58.87	60.35	61.12	60.16	63.08	0.44	60.59
2	4:00 PM	61.69	60.78	61.59	59.69	58.85	57.95	62.85	0.41	60.49
3	5:00 PM	62.60	62.11	60.36	62.04	60.52	60.50	62.70	0.43	61.55
4	6:00 PM	62.79	62.38	60.88	64.94	62.08	60.24	63.10	0.44	62.34
5	7:00 PM	62.03	62.33	62.55	64.71	62.97	60.36	63.60	0.45	62.65
6	8:00 PM	63.20	62.23	62.29	62.50	60.96	60.93	63.67	0.43	62.26
7	9:00 PM	64.36	62.69	62.70	61.58	62.53	61.16	64.58	0.41	62.80
8	10:00 PM	64.92	64.10	62.15	63.57	63.99	62.98	64.22	0.41	63.70
9	11:00 PM	60.87	62.48	59.67	61.58	63.17	61.46	64.42	0.42	61.95
10	12:00 AM	58.01	61.47	59.56	62.02	63.05	61.48	61.31	0.38	60.99
11	1:00 AM	60.93	61.52	62.80	61.48	61.90	61.95	58.04	0.38	61.23
12	2:00 AM	61.37	62.97	65.97	61.41	59.90	61.51	59.32	0.36	61.78
13	3:00 AM	59.17	62.66	64.52	63.38	60.07	63.24	58.69	0.35	61.68
14	4:00 AM	62.12	61.60	60.37	62.03	60.62	61.90	58.43	0.34	61.01
15	5:00 AM	62.26	62.94	60.78	59.26	61.94	62.15	60.43	0.31	61.39
16	6:00 AM	63.98	59.99	60.78	59.51	60.44	62.63	59.42	0.28	60.97
17	7:00 AM	65.43	59.96	60.49	61.09	59.43	64.36	59.32	0.22	61.4
18	8:00 AM	63.85	59.24	60.10	59.64	59.51	62.76	59.11	0.22	60.60
19	9:00 AM	62.96	59.15	61.16	58.61	60.59	62.85	57.95	0.21	60.46
20	10:00 AM	61.86	61.13	61.87	60.01	59.73	63.68	***59.07***	0.23	61.05
21	11:00 AM	61.38	61.93	62.36	60.44	61.78	64.34	***58.18***	0.24	61.49
22	12:00 PM	61.45	61.93	62.31	60.93	62.87	65.23	***59.41***	0.21	62.02
23	1:00 PM	61.74	61.17	62.44	61.37	63.52	63.58	***61.68***	0.18	62.21
24	2:00 PM	60.52	58.61	61.18	61.37	62.59	63.78	0.43	0.20	61.34
	Nov.	7th/8th	8th/9th	9th/10th	10th/11th	11th/12th	12th/13th	13th/14th	14th/15th	

Fire hydrant is connected to a 30" pipeline

* 7-Day Average excludes day 8 - outliers

Fire Flow Test
Nov. 14th
10:40am-1:55pm

Water Pressure Monitoring Results

Fire Hydrant Test: #3 - FM511 at Harbour - # 7483 - Line Pressures (near the Port of Brownsville)

	Time	Hourly Fire Hydrant Line Pressure (psi)								7-Day Average *
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
	2pm	41.25	----	----	----	----	----	----	----	----
1	3:00 PM	60.92	62.02	63.05	63.97	60.26	63.16	65.63	0.82	62.72
2	4:00 PM	61.11	65.65	62.70	62.63	60.35	61.46	64.71	0.75	62.66
3	5:00 PM	60.22	64.95	60.50	62.17	59.43	59.08	65.68	0.69	61.72
4	6:00 PM	59.22	64.57	62.06	64.25	61.82	60.57	66.08	0.75	62.65
5	7:00 PM	60.98	66.76	64.68	68.56	64.38	62.69	66.44	0.84	64.93
6	8:00 PM	62.51	66.99	64.93	68.64	66.52	62.54	67.02	0.90	65.59
7	9:00 PM	64.03	68.27	66.00	66.93	64.76	64.60	67.70	0.97	66.04
8	10:00 PM	64.44	66.09	67.26	66.32	66.65	65.11	69.13	1.05	66.43
9	11:00 PM	68.87	69.39	69.81	69.00	69.16	68.08	70.97	1.14	69.33
10	12:00 AM	70.26	71.67	69.60	68.38	68.42	67.47	71.81	1.18	69.66
11	1:00 AM	69.48	71.62	70.18	69.37	68.44	68.30	69.52	1.22	69.56
12	2:00 AM	65.11	70.06	67.49	68.73	67.14	68.73	65.85	1.27	67.59
13	3:00 AM	64.99	69.51	68.33	68.69	65.17	68.50	66.80	1.24	67.43
14	4:00 AM	67.96	70.77	69.29	70.50	64.61	69.86	66.68	1.24	68.52
15	5:00 AM	66.42	69.76	68.45	69.52	65.36	68.57	65.73	1.24	67.69
16	6:00 AM	64.78	64.63	64.32	64.95	66.97	64.79	62.79	1.25	64.75
17	7:00 AM	61.62	62.38	61.31	61.42	63.78	63.93	59.98	1.26	62.06
18	8:00 AM	64.51	62.45	61.49	60.22	60.45	67.13	61.60	1.12	62.55
19	9:00 AM	67.31	59.45	60.07	57.98	59.06	65.55	59.50	0.81	61.27
20	10:00 AM	66.27	59.46	61.00	57.03	59.16	64.32	55.80	0.75	60.43
21	11:00 AM	63.80	57.93	61.80	57.31	57.96	65.33	56.91	0.66	60.15
22	12:00 PM	64.39	60.42	63.37	58.16	60.08	65.31	54.74	0.52	60.92
23	1:00 PM	64.80	60.84	62.38	58.84	61.80	65.89	42.85	0.43	59.63
24	2:00 PM	64.90	62.67	63.56	58.85	62.95	66.14	6.70	0.42	63.18
	3pm	----	----	----	----	----	----	----	0.45	----
	Nov.	7th/8th	8th/9th	9th/10th	10th/11th	11th/12th	12th/13th	13th/14th	14th/15th	

Fire hydrant is connected to a 16" pipeline

* 7-Day Average excludes day 8 - outliers

Fire Flow Test
Nov. 14th
10:40am-1:55pm

Water Pressure Monitoring Results

Fire Hydrant Test: #4 - Iowa@Les Maudlin - #6161 - Line Pressures (near Airport and East of EST-4)

	Time	Hourly Fire Hydrant Line Pressure (psi)								7-Day Average *
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
	2pm	54.05	----	----	----	----	----	----	----	----
1	3:00 PM	55.27	61.03	59.52	58.86	55.05	57.39	63.74	0.59	58.69
2	4:00 PM	54.24	60.83	58.24	58.49	55.27	55.74	62.03	0.59	57.83
3	5:00 PM	52.18	59.30	54.64	57.12	54.42	52.94	62.03	0.58	56.09
4	6:00 PM	51.33	59.03	56.08	59.32	57.67	55.38	61.37	0.55	57.17
5	7:00 PM	54.58	61.69	59.39	64.35	60.78	58.27	61.80	0.52	60.12
6	8:00 PM	56.10	61.22	59.35	64.17	62.93	57.95	62.10	0.51	60.55
7	9:00 PM	57.97	62.19	60.56	62.52	61.14	60.04	62.47	0.50	60.98
8	10:00 PM	59.13	61.35	62.79	61.94	63.18	61.20	64.46	0.45	62.01
9	11:00 PM	65.61	65.48	66.23	65.08	66.22	65.11	66.90	0.42	65.80
10	12:00 AM	67.09	68.16	65.99	64.73	65.60	64.59	68.32	0.39	66.35
11	1:00 AM	66.71	68.22	66.85	66.17	66.01	65.77	66.37	0.37	66.59
12	2:00 AM	62.58	66.94	64.45	66.09	65.05	66.46	62.94	0.36	64.93
13	3:00 AM	62.38	66.32	65.34	66.12	62.82	66.13	63.92	0.34	64.72
14	4:00 AM	65.53	67.72	66.68	68.07	62.23	67.83	63.89	0.30	65.99
15	5:00 AM	62.91	65.86	64.58	66.98	62.81	65.70	62.45	0.29	64.47
16	6:00 AM	58.82	52.64	58.67	61.71	63.88	59.73	57.71	0.31	59.02
17	7:00 AM	53.68	54.08	54.09	57.19	59.24	56.93	53.10	0.31	55.47
18	8:00 AM	59.69	56.85	56.09	54.41	54.01	62.22	56.70	0.32	57.14
19	9:00 AM	63.65	55.74	55.77	51.22	52.79	61.05	55.61	0.39	56.54
20	10:00 AM	62.73	56.31	57.95	50.58	53.68	61.14	***54.07***	0.45	56.64
21	11:00 AM	60.08	55.15	58.61	51.16	51.62	61.84	***55.63***	0.45	56.30
22	12:00 PM	60.95	56.96	59.78	52.51	54.40	62.69	***54.13***	0.46	57.34
23	1:00 PM	61.45	57.84	58.93	53.31	56.49	63.01	***53.99***	0.45	57.86
24	2:00 PM	62.16	60.18	60.02	54.07	57.72	63.59	22.94	0.39	59.62
	3pm	----	----	----	----	----	----	----	0.39	----
	4pm	----	----	----	----	----	----	----	0.40	----
	Nov.	7th/8th	8th/9th	9th/10th	10th/11th	11th/12th	12th/13th	13th/14th	14th/15th	

Fire hydrant is connected to a 8" pipeline

* 7-Day Average excludes day 8 - outliers

Fire Flow Test
Nov. 14th
10:40am-1:55pm

Water Pressure Monitoring Results

Fire Hydrant Test: #5 - E. 9th @ St. Charles - #7552 - Line Pressures (west of EST-5)

	Time	Hourly Fire Hydrant Line Pressure (psi)								7-Day Average *
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
	2pm	60.00	----	----	----	----	----	----	----	----
1	3:00 PM	60.92	60.70	60.04	60.16	60.11	61.59	62.72	0.21	60.89
2	4:00 PM	60.86	59.98	58.82	59.28	60.09	59.21	62.00	0.20	60.03
3	5:00 PM	60.20	59.24	56.79	58.65	57.61	56.93	61.89	0.19	58.76
4	6:00 PM	60.32	59.12	59.41	60.57	59.25	58.95	61.64	0.20	59.89
5	7:00 PM	60.90	61.10	60.09	63.80	60.79	59.44	62.02	0.20	61.16
6	8:00 PM	62.15	61.39	59.75	63.65	62.07	59.09	62.51	0.20	61.51
7	9:00 PM	61.67	62.61	60.68	61.44	59.74	60.29	62.65	0.21	61.30
8	10:00 PM	60.89	59.73	61.06	62.07	61.20	59.76	63.54	0.20	61.18
9	11:00 PM	63.63	61.59	62.53	62.63	62.86	61.98	63.40	0.21	62.66
10	12:00 AM	63.49	63.01	60.64	60.44	61.98	60.05	63.40	0.19	61.86
11	1:00 AM	62.27	62.69	60.64	61.30	62.02	60.58	61.01	0.17	61.50
12	2:00 AM	57.57	61.06	58.15	60.64	60.81	60.85	57.30	0.15	59.48
13	3:00 AM	58.10	60.44	59.86	60.58	58.93	60.52	58.17	0.14	59.51
14	4:00 AM	61.05	61.98	64.25	62.43	58.72	62.30	58.06	0.14	61.25
15	5:00 AM	59.04	61.24	63.67	61.60	59.28	61.16	57.60	0.13	60.51
16	6:00 AM	60.41	61.27	60.34	58.25	60.81	60.55	58.61	0.13	60.03
17	7:00 AM	59.63	60.76	59.66	57.69	59.23	61.22	58.03	0.11	59.46
18	8:00 AM	62.05	60.23	59.81	60.15	58.16	63.22	58.17	0.09	60.26
19	9:00 AM	64.12	58.41	59.02	58.47	58.14	61.57	57.82	0.07	59.65
20	10:00 AM	63.70	58.88	60.08	57.62	59.30	61.54	56.73	0.07	59.69
21	11:00 AM	61.73	57.61	60.77	58.57	58.36	62.30	57.73	0.06	59.58
22	12:00 PM	60.87	59.60	61.17	59.24	60.29	63.11	57.06	0.04	60.19
23	1:00 PM	60.68	60.15	61.02	59.65	61.51	63.81	57.85	0.02	60.67
24	2:00 PM	61.05	61.29	61.36	60.09	62.26	62.83	57.31	0.00	61.48
	Nov.	7th/8th	8th/9th	9th/10th	10th/11th	11th/12th	12th/13th	13th/14th	14th/15th	

Fire hydrant is connected to a 8" pipeline

* 7-Day Average excludes day 8 - outliers

Fire Flow Test
Nov. 14th
10:40am-1:55pm

Water Pressure Monitoring Results

EST-6: Alton Gloor Elevated Storage Tank Pressures (this tank is the tallest and is farthest from both WTPs)

	Time	Hourly Pressure (psi)								7-Day Average *
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	
1	3pm	0.44	58.51	58.39	58.35	58.14	58.11	58.85	0.75	58.39
2	4pm	*31.03*	58.48	58.36	58.32	58.13	58.07	58.85	0.74	54.46
3	5pm	57.79	58.50	58.37	58.33	58.09	58.07	58.88	0.72	58.29
4	6pm	57.80	58.53	58.39	58.31	58.08	58.05	58.86	0.71	58.29
5	7pm	57.84	58.58	58.40	58.29	58.07	58.03	58.87	0.68	58.30
6	8pm	57.83	58.61	58.43	58.28	58.06	58.03	58.87	0.69	58.30
7	9pm	57.81	58.63	58.43	58.29	58.04	58.01	58.88	0.67	58.30
8	10pm	57.78	58.66	58.43	58.28	58.02	57.99	58.89	0.66	58.29
9	11pm	57.80	58.68	58.44	58.28	58.01	57.98	58.97	0.63	58.31
10	12am	57.89	58.74	58.46	58.29	58.08	57.96	59.07	0.62	58.36
11	1am	58.27	59.10	58.77	58.57	58.44	58.26	59.36	0.59	58.68
12	2am	58.67	59.39	59.27	58.99	58.92	58.93	59.54	0.56	59.10
13	3am	58.65	59.38	59.21	58.94	58.87	58.93	59.52	0.53	59.07
14	4am	58.46	59.06	58.93	58.66	58.57	58.65	59.24	0.53	58.80
15	5am	58.55	59.09	58.89	58.64	58.54	58.72	59.25	0.53	58.81
16	6am	58.62	59.12	58.89	58.62	58.54	58.81	59.25	0.51	58.84
17	7am	58.67	59.11	58.89	58.63	58.56	58.87	59.22	0.52	58.85
18	8am	58.69	59.05	58.84	58.58	58.53	58.90	59.20	0.52	58.83
19	9am	58.70	58.98	58.74	58.53	58.46	58.91	59.14	0.51	58.7[illegible]
20	10am	58.71	58.88	58.65	58.45	58.40	58.93	***59.09***	0.52	58.7[illegible]
21	11am	58.68	58.78	58.56	58.37	58.33	58.93	***58.99***	0.52	58.66
22	Noon	58.65	58.66	58.45	58.30	58.26	58.92	***58.89***	0.50	58.59
23	1pm	58.62	58.55	58.40	58.24	58.20	58.90	***58.79***	0.50	58.53
24	2pm	58.55	58.46	58.37	58.17	58.13	58.89	*48.10*	0.41	56.95
	Nov.	7th/8th	8th/9th	9th/10th	10th/11th	11th/12th	12th/13th	13th/14th	14th/15th	

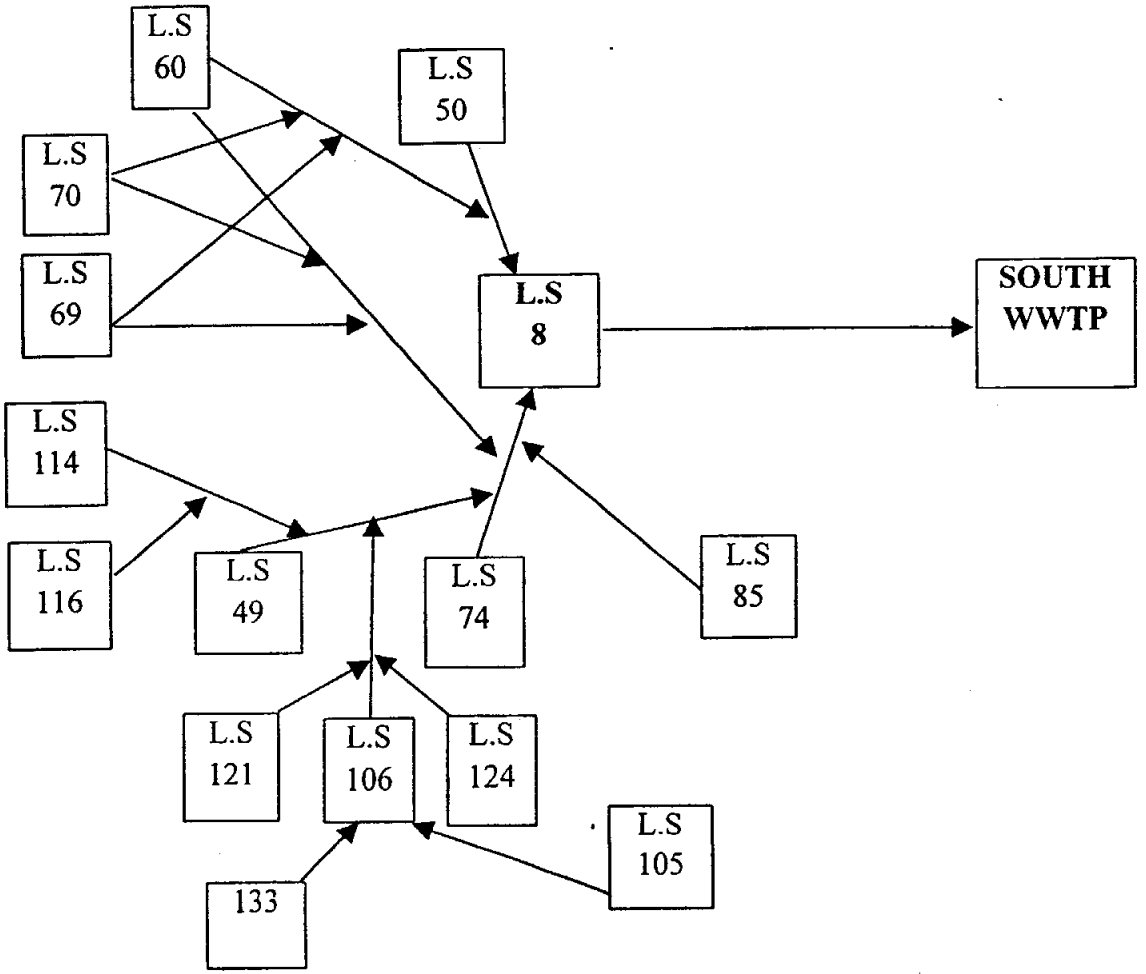
(unknown how these tank readings were taken)

* 7-Day Average excludes day 8 - outliers

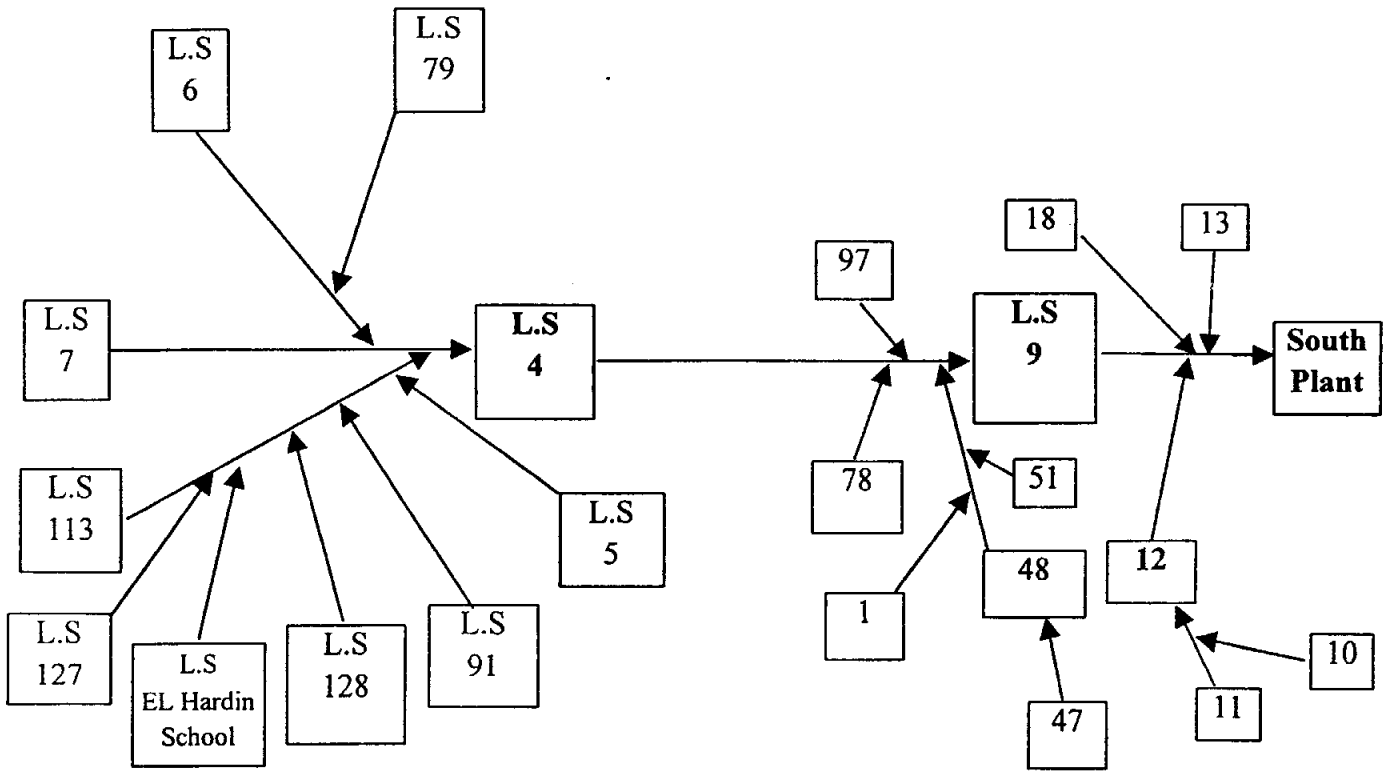
Fire Flow Test
Nov. 14th
10:40am-1:55pm

WASTEWATER LIFT STATION FLOW DIAGRAMS

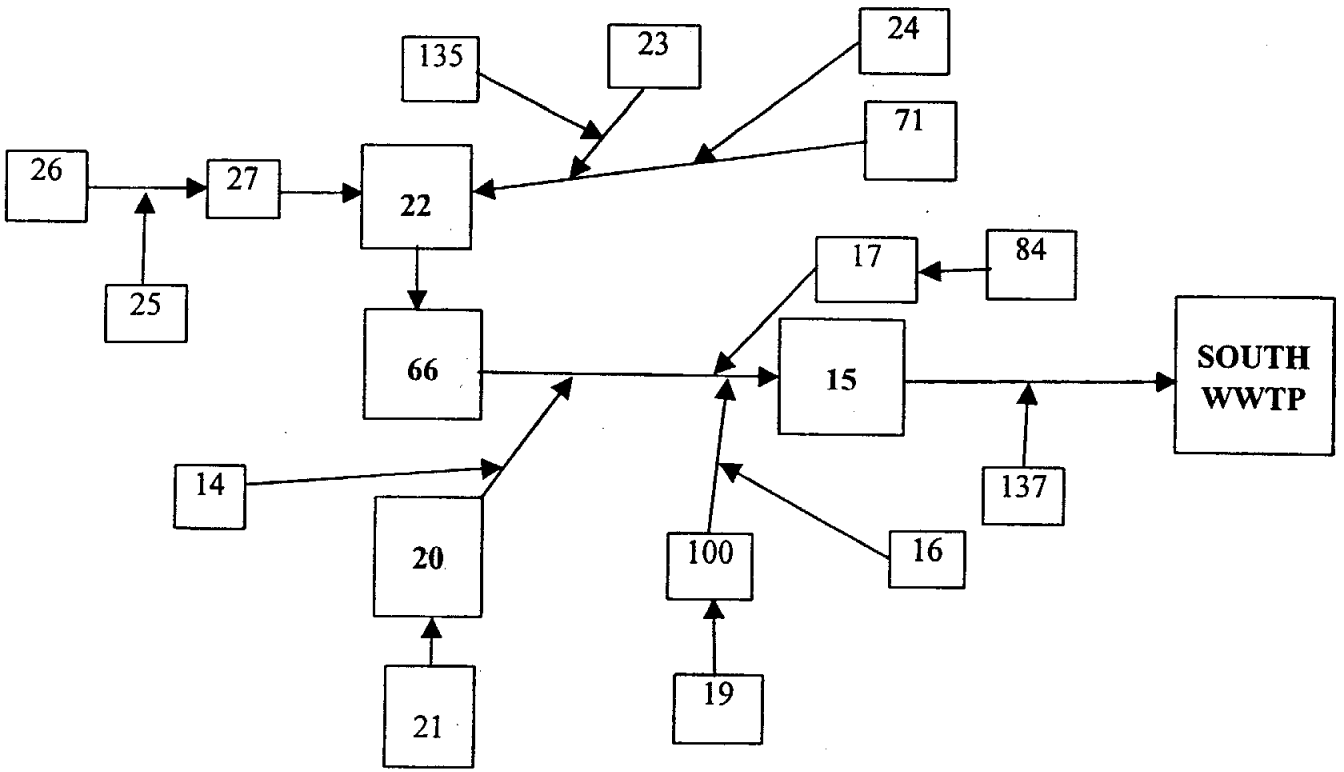
SOUTH WASTEWATER TREATMENT PLANT
LIFT STATION FLOW CHART



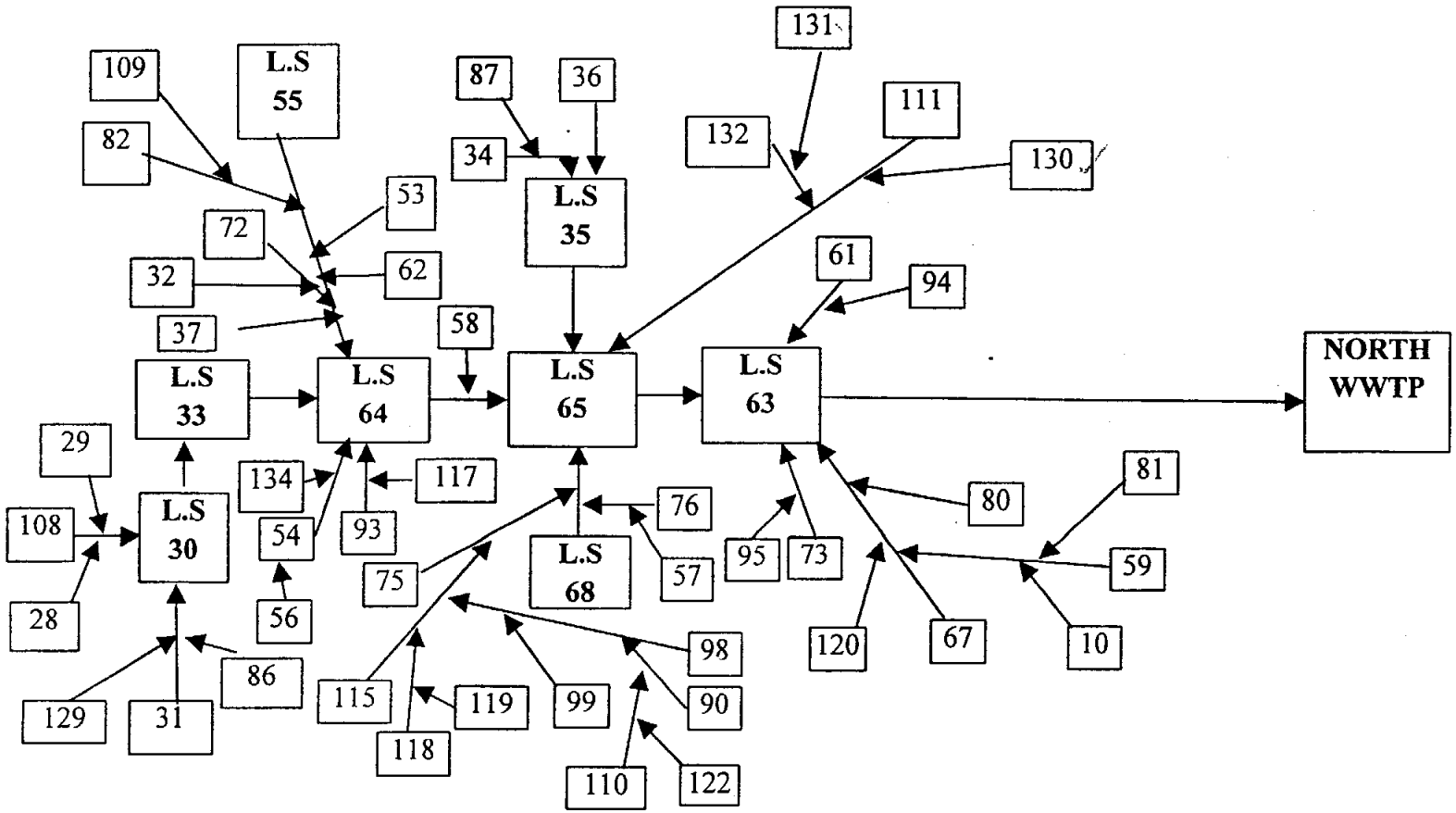
SOUTH WASTEWATER TREATMENT PLANT
LIFT STATION FLOW CHART



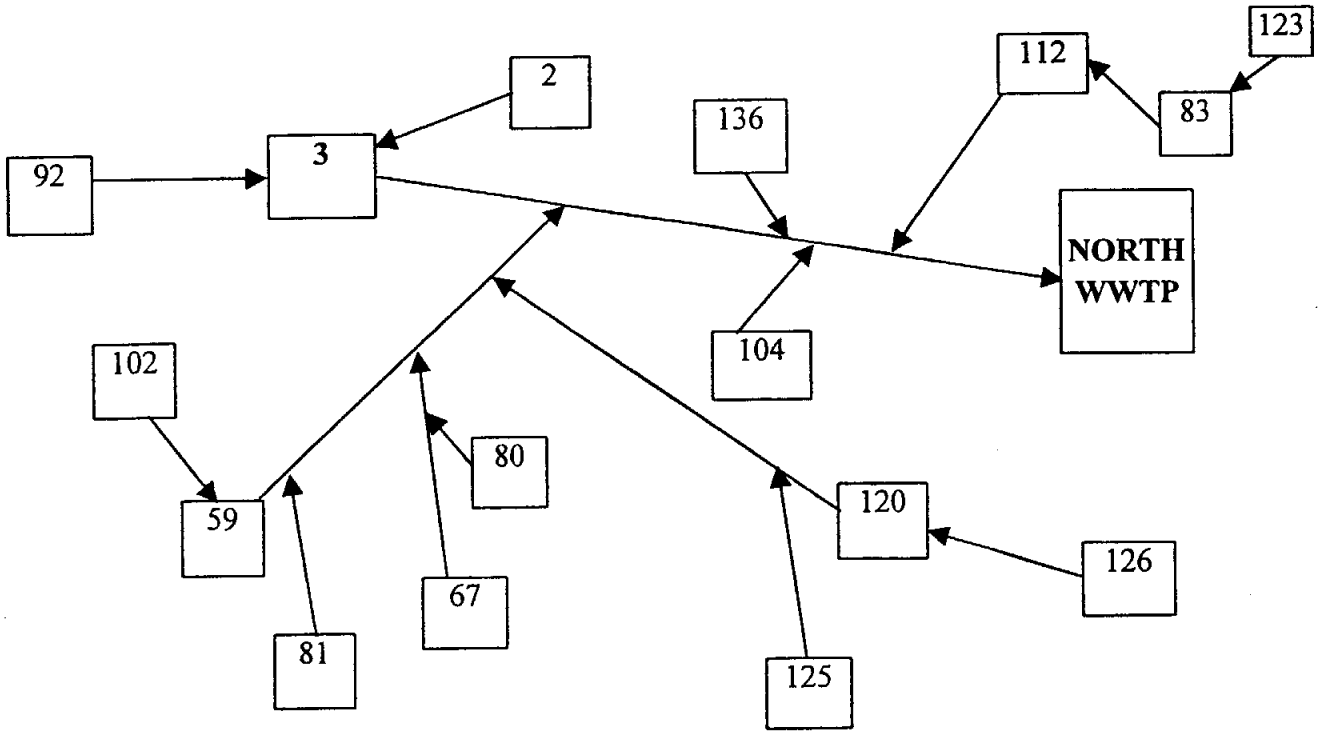
SOUTH WASTEWATER TREATMENT PLANT
LIFT STATION FLOW CHART



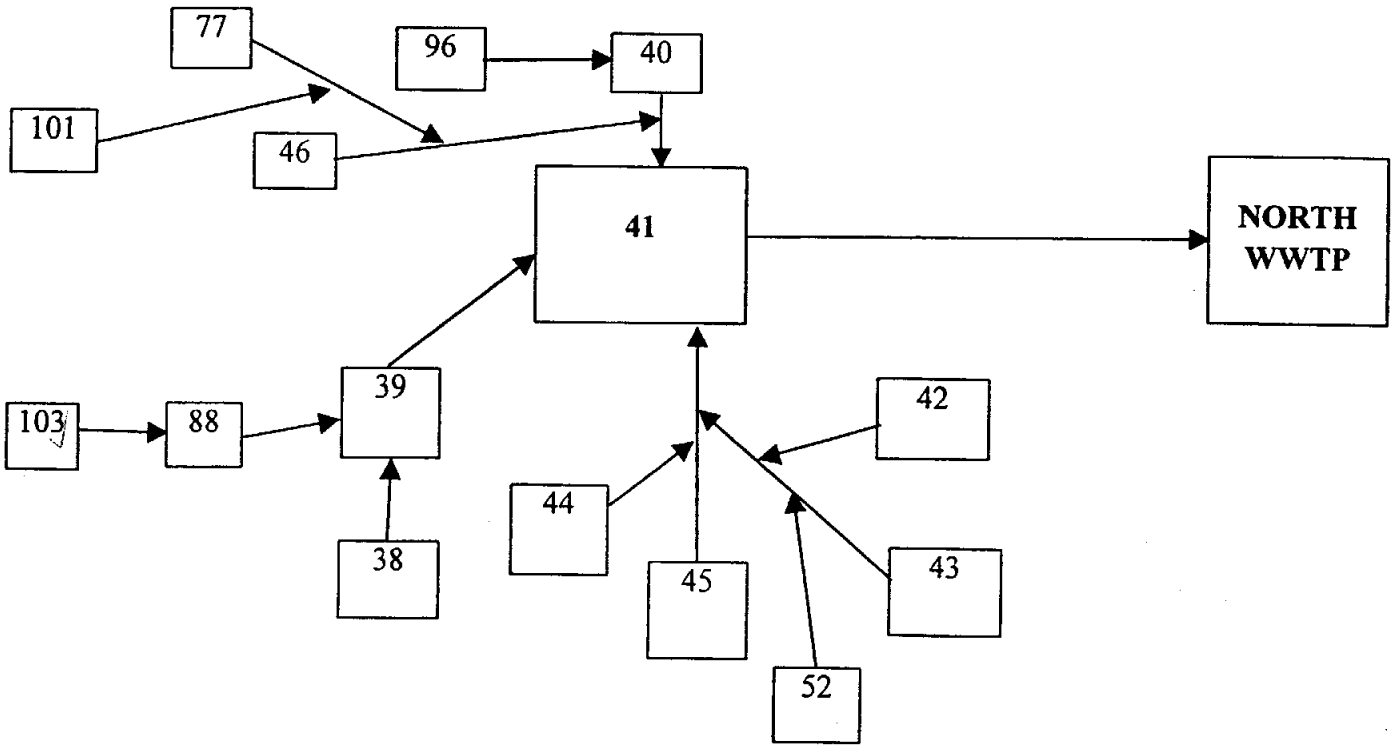
NORTH WASTEWATER TREATMENT PLANT
LIFT STATION FLOW CHART



NORTH WASTEWATER TREATMENT PLANT
FLOW CHART



NORTH WASTEWATER TREATMENT PLANT
FLOW CHART



PREVIOUS STUDIES

PREVIOUS STUDIES

Sewer System Evaluation Survey Final Report, Prepared by McCullough Associates, Inc., Dated 1982

The **Sewer System Evaluation Survey** isolates sources of inflow and infiltration in the sanitary collection system in Brownsville. This report breaks the plans of rehabilitating the Brownsville Sewer System into three stages. This report is part of Step 1 that prepares plans to select the type of wastewater treatment facility needed and conducts physical inspections and tests to list what exists. The recommendations of this report are to submit an application for Step 2, undertake cost effective rehabilitation as presented in this study, and obtain solutions to the trouble areas. Step 2 involves preparing the construction drawings and specifications for rehabilitation of the sewer collection system. Unattached to this report are five appendices that include television inspection results, flow monitoring results, infiltration/inflow problems by priority and rehabilitation method, physical inspection results, and smoke testing results, respectively.

Facility Plan for the Wastewater System, Prepared by Bovay Engineers, Inc., Dated March 1986

The **Facility Plan for the Wastewater System** is a 1986 report that provides for sufficient wastewater treatment plant capacity and the possibility for reasonable sewer hook-up for all residents within the Brownsville extra territorial jurisdiction. This plan includes projects to eliminate many of the health-related problems owing to the improper use of septic tanks, rehabilitate aging and/or obsolete existing lines and lift stations, and provide for additional standby pumps and reserve capacity for peak flows to improve efficiency, reliability, and eliminate collection system overflows. The wastewater collection and treatment system will be expanded to serve unsewered areas of the City.

Ordinance No. 86-1134, Emergency Water Conservation, Prepared by City of Brownsville, Dated October 21, 1986

This **Ordinance** establishes the City of Brownsville Emergency Water Conservation Plan to be implemented by the PUB. It also institutes restriction on the indoor and outdoor use of water, establishes penalties for the violation and provisions for enforcement of these restrictions, and creates a water review committee to consider hardship and special cases.

1988 Water Master Plan, Prepared by R. W. Beck and Associates and L. L. Rodriguez and Associates, Dated February 1989

The **Water Master Plan** is a final report that summarizes then-current information on the PUB's system, analyzes future requirements for system improvements, and presents a capital improvement program for construction to meet growing water demands. This report recommends a channel dam, a raw water pipeline between water treatment plants 1 and 2, renovation of the water treatment plants, and completion of the cast iron replacement program. All of the above-mentioned improvements except the channel dam have since been implemented.

Ground Water Study Northwest of Brownsville, Texas, Prepared by Gonzalez Engineering & Surveying, Inc. and R.W. Harden & Associates, Inc., Dated February 1991

The **Ground Water Study** investigates the ground water quality and availability near the City of Brownsville. Drilling tests and water samples were collected to establish the depths of the primary and secondary zones. It is concluded that a conveyance system be constructed to use the large quantities of suitable quality ground water that is available. This study recommends the most costly element of this project: a closed system to convey water from its source to its area of use.

Assessment of Water Treatment Plants Relative of the Safe Drinking Water Act and Hydraulic Study, Prepared by NRS Consulting Engineers, in association with Chiang, Patel and Associates, Inc., Dated April 1992

The **Assessment of Water Treatment Plants** provides a detailed evaluation of the two PUB water treatment plants and their abilities to comply with the Safe Drinking Water Act. Volumes II and III provide explicit details on Water Treatment Plant No. 1 and Water Treatment Plant No. 2, respectively. This investigation recommends upgrading plants to reach 20 mgd capacity while maintaining compliance with the Safe Drinking Water Act. The report outlines major improvements required to maintain plant reliability and their related costs.

Resaca Raw Water Metering Study, Prepared by NRS Consulting Engineers, Dated February 10, 1993

The **Resaca Metering Study** evaluates the need for and practical implementation of raw water metering of inflows and outflows of the Resaca system within the PUB's water system. This report identifies an implementation plan addressing the location of new meters and their estimated cost.

Water Reuse Study, Robindale Wastewater Treatment Plant, Brownsville, Texas, Permit No. 10397-05, Prepared by NRS Consulting Engineers, Dated March 1993

The **Water Reuse Study** evaluates the water reuse option within a 3-mile radius of the Robindale Wastewater Treatment Plant. This study presents options that substitute reclaimed water from the treatment plant for potable and/or fresh water in such areas where appropriate. Such locations include country clubs, cemeteries, and nurseries.

Water Treatment Plant Improvements, Final Engineering Design Report, Prepared by NRS Consulting Engineers, Dated July 1993

The **Water Treatment Plant Improvements Report** presents design modifications for the upgrading of the PUB's water treatment plants to achieve a 20 mgd capacity as reported in the **Assessment of Water Treatment Plants Relative of the Safe Drinking Water Act and Hydraulic Study.** One of the major goals of this project is to stay in compliance with the Surface Water Treatment Rule. The information in this report is to be used by the appropriate regulatory agencies for approval.

Report of Water Distribution Audit, Prepared for PUB of the City of Brownsville, Prepared by JBS Associates, Inc., Dated August 1993

The **Water Distribution Audit** presents the results of the water distribution system audit including analyses of production and sales of water ending July 1993, and of individually metered water utility customer accounts through March 1993. This study was conducted to determine causes of unaccounted-for water in the distribution system, and to develop recommendations for recovery in a cost-effective manner. Recommendations made in this report include replacing meters, installing new meters, monitoring accounts more closely, and conducting a leak detection survey.

Hydrology Report, Brownsville Weir and Reservoir Project, Prepared by R.J. Brandes Company and D. G. Rauschuber & Associates, Inc., Dated September 1994

Hydrologic evaluation of proposed channel dam project on the Rio Grande.

Environmental Assessment, Brownsville Weir and Reservoir Project, Prepared by Horizon Environmental Services, Inc., in association with R. J. Brandes Company, Michael Sullivan & Associates, Inc., and Donald G. Rauschuber & Associates, Inc., Dated August 1994

Environmental assessment of proposed channel dam project on the Rio Grande.

PUB, City of Brownsville, Texas, Water Supply and Conservation Report, Prepared by Public Utilities Board, Engineering and Planning Department, Dated December 1994

Latest edition of biennial Water Supply and Conservation Reports prepared by PUB staff. The latest edition conforms to Texas Natural Resource Conservation Commission recommendations on water conservation. Addresses raw water supply, future projections of need, water conservation and reuse measures, and options and recommendations.

Engineering Feasibility Report for Improvements to the Southside Wastewater Treatment Plant, Prepared by Turner, Collie and Braden, Inc., Dated May 1995

The **Engineering Feasibility Report** presents the results of studies undertaken to establish wastewater treatment system improvements required at the Brownsville Southside Wastewater Treatment Plant. It is intended to satisfy the guidelines of the Texas Water Development Board for an Engineering Feasibility Report of a wastewater related project seeking financial assistance from the Board. This report addresses four major areas: the Facility Plan, a wastewater discharge permit amendment, an Environmental Assessment of the facility, and a Long-Range Residual Management Plan. The Environmental Assessment, the wastewater discharge permit applications, and the Long-Range Residuals Management Plan were submitted under separate cover. The Facility Plan evaluates the existing collection system and wastewater treatment plant, projects future population and wastewater flow values, and proposes modifications to the existing facilities. This report identifies and evaluates eight wastewater treatment options, one collection system option and seven sludge treatment processes.

Leak Detection Survey, Prepared by Rust Environment and Infrastructure, Dated 1995

The **Leak Detection Survey** was conducted on the entire PUB water distribution system that contains approximately 400 miles of main. Through May 12, 1995, 396 miles of system lines have been inspected; resulting in 103 leaks being found and approximately 1.197 mgd of leakage, representing an annual operating loss of about $375,740. Recommendations include repairing all leaks, conduct leak detection activities as part of ongoing system maintenance, and investigate the causes for the main and service leaks.

Development of Brackish Groundwater Resources in the Brownsville Area, Prepared by NRS Consulting Engineers in association with Boyle Engineering Corporation and R. W. Harden & Associates, Inc., Dated November 25, 1996

The **Development of Brackish Groundwater** study was funded by the PUB and the Texas Water Development Board to evaluate the availability and treatment feasibility of brackish ground water in and around the Brownsville area. The study indicates that the PUB could reduce its dependency on the Rio Grande and improve its overall water quality in an economically feasible manner. This report recommends and outlines a three-phase implementation plan to treat the brackish ground water in and around Brownsville.

Aquifer Storage and Recovery System, Step 1 and 2, Prepared by CH2M HILL, Dated September 1997

The **Aquifer Storage and Recovery System** study is funded by the Texas Water Development Board and the PUB. The goal of this project is to determine the feasibility of utilizing underground aquifer storage of surface water in the Brownsville area to store unutilized water of the Rio Grande for future use. This project is divided into three phases: the feasibility investigation, the test drilling program and the ASR prototype facility construction and testing.

Step 1 of this project suggests that ASR may be a feasible alternative for the Brownsville PUB to meet future water demands. It may be possible for an ASR facility to work with the PUB's recently expanded water treatment facilities, existing water rights, and recently acquired Permit 1838, to meet projected mid-level water demands through the year 2012. Without this alternative, projected water demands exceed supplies by the year 2003, and demands exceed treatment capacity by the year 2005.

Step 2 of this project investigates three potential aquifer zones in Brownsville. Soil borings were taken and wells were monitored to identify the potential for underground storage of treated drinking water. The results of the drilling indicate that the gravel zone, suitable for ASR applications, is present within the PUB service area. The recommendation is to proceed with Step 3 and to construct a model ASR well within this gravel zone.

Integrated Water Plan, Phase I for the Lower Rio Grande Valley Development Council, Prepared by Turner, Collie and Braden, Inc., Dated October 1997

The **Integrated Water Plan** is funded by the Texas Water Development Board and the Lower Rio Grande Valley Development Council. It examines how the water in the study area is currently being

used, and determines how the increasing municipal and industrial demands can be met without limiting agricultural irrigation. This report compiles information needed to develop mechanisms for evaluating alternative components of an integrated resource plan. Phase II will determine alternatives for the Valley to conserve and evaluate new sources of water for the future.

Brownsville Land Use Assumptions 1996 to 2006, Prepared by Wilbur Smith Associates, Dated January 20, 1998

The **Brownsville Land Use Assumptions** report analyzes the land use assumptions for the current year (1996) and projects land use assumptions for the year 2006. Also included in this study is the existing and future populations, density, land use, and intensity characteristics of the PUB service area.

Update of Water Model for Proposed 8" El Jardín Meter, Prepared by NRS Consulting Engineers, Dated February 9, 1998

The **Update of Water Model** study updates the existing model to determine the effects of the addition of an 8-inch meter to serve the El Jardín Water Supply Corporation. As the model indicates, this additional meter will provide better pressure within the PUB and benefit the El Jardín system tremendously. The primary recommendation is to improve the distribution system within the PUB system on the east side. However, if these improvements are impossible, the additional meter and pressure sustaining valve will serve as an interim solution.

Water Supply Alternatives, Prepared by R.W. Beck and Associates, Dated November 16, 1998

The **Water Supply Alternatives** letter report is a follow-up study to compare the Weir and Reservoir Alternative with other similar water supply options. Seven alternatives evaluated are as follow: 1) Weir and Reservoir with 0% Financial Subsidy, 2) Weir and Reservoir with 10% Financial Subsidy, 3) Weir and Reservoir with 25% Financial Subsidy, 4) Weir and Reservoir with 50% Financial Subsidy, 5) Off Channel Reservoir, 6) Combination of Aquifer Storage and Recovery, Groundwater, Brackish Groundwater and Treatment, and Desalinization, and 7) Combination of Aquifer Storage and Recovery, Brackish Groundwater and Treatment, Groundwater, and Weir and Reservoir. After review and investigation, it is recommended that the Weir and Reservoir Alternative has the lowest cost and is sufficient to meet forecasted water demands for approximately 20 years.

Valley Inn and Country Club, Water and Wastewater Utilities Analysis and Evaluation, Prepared by Carter Burgess, Dated January 1999

The **Valley Inn and Country Club** report evaluates the existing water and wastewater utilities absorbed by the PUB by the annexation of VMUD No. 1 and to make recommendations for the upgrading of these systems, to bring them up to the standards required by the PUB and TNRCC. This report recommends to embark on a five-year replacement program to upgrade the water and wastewater systems so that it will be consistent with State and PUB standards. It also recommends "Band-Aid" type improvements to temporarily increase pressures within the VICC area.

Reuse Study for the South Wastewater Treatment Plant, Preliminary Engineering Report, Prepared by NRS Consulting Engineers, Dated February 12, 1999

The **Reuse Study** is a preliminary engineering report that describes the treatment, equipment, and estimated capital and operating costs necessary to reuse treated effluent wastewater from the South Wastewater Treatment Plant. The reuse of this water will be for non-potable use only.

This report evaluates four alternatives to achieve its goal of presenting the cost and feasibility of using wastewater effluent from the PUB's South Wastewater Treatment Plant for non-potable purposes. The four alternatives are as follow: 1) Delivery of Secondary Effluent for Golf Course Irrigation, 2) Delivery of Advanced Secondary Effluent under low pressure to Resaca System, 3) Delivery of Advanced Secondary Effluent under pressure to non-potable distribution system, and 4) Delivery of Advanced Secondary Effluent under pressure to non-potable distribution system to include supply to Mexico. This report recommends Alternative 3 and illustrates an economic analysis of its related costs.

Brownsville-Matamoros Weir and Reservoir Project, Prepared by Brownsville Public Utilities Board, Dated September 15, 1999

The **Brownsville Weir and Reservoir Project** is proposed as a surface water supply development project on the Lower Rio Grande in Cameron County, Texas, near the City of Brownsville. This report presents a brief overview of this ongoing project of 20 years. Currently the PUB has been permitted 40,000 acre-feet of water per year from the Rio Grande. However, the problem is a lack of storage. This project is intended to provide an additional dependable supply of surface water for municipal and industrial users located primarily within the PUB service area and in southwestern Cameron County, although, as a result of the overall water savings provided by the project, all water

users in the Lower Rio Grande Basin will benefit because of the increased amount of water left stored in Falcon Reservoir.

2000-2025 Brownsville Metropolitan Transportation Plan, Prepared by Alliance-Texas Engineering, Co. in cooperation with Brownsville Metropolitan Planning Organization, Texas Department of Transportation, and U.S. Department of Transportation, Federal Highway Administration, Dated December 1999

The **Metropolitan Transportation Plan** is a guide for the Brownsville Transportation System that prioritizes the potential transportation improvement projects. These projects must accommodate the projected growth expected to occur in the Brownsville MPO area through the year 2024. The goal of this update is to identify and meet the important needs for mobility for the Brownsville community. A list of the prioritized projects is included in this report.

Olmito Water Supply Corporation, Preliminary Engineering Report, Prepared by Cruz-Hogan Consultants, Inc., Dated February 2000

The **Preliminary Engineering Report** evaluates and proposes waterline improvements and the addition of 44,000 linear feet of waterline. These additions and improvements are based on the evaluation and projection of the location of the project, environmental resources present, growth areas, and population trends. It is recommended that additional raw water be purchased from the Brownsville Irrigation and Drainage District, new water lines and fire hydrants be installed, the existing 200,000 gallon elevated storage tank be repainted, replacement of 200 gate valves, and a new wastewater truck be purchased.

Valley Municipal Utility District No. 2, Comprehensive Plan for Water and Wastewater Facilities Draft, Prepared by NRS Consulting Engineers, Dated March 1, 2000

The **Comprehensive Plan** identifies capital improvements necessary to meet the projected water and wastewater treatment demands for the next 20 years. This report investigates historical growth, projected future growth, and current and future deficiencies in water source, treatment, storage, distribution, and wastewater collection and treatment. It is recommended that the conventional water treatment plant be rehabilitated to improve the quality of the water. The water system must also be enlarged to accommodate future demands. The wastewater system for Rancho Viejo needs to be televised to investigate the condition of the clay pipes. Depending on the condition of these pipes,

they may need to be replaced. It is recommended that this plan be updated in five years to re-evaluate the future needs.

Brownsville Public Utilities Board, Update of Water Distribution Model, Evaluation of Elevated and Ground Storage Requirements, Prepared by NRS Consulting Engineers, Dated June 2000

The **Update of Water Distribution Model** evaluates the water system of the PUB and updates its water model. This report considers the removal and addition of two elevated storage tanks and the most cost effective alternative. Considering the removal of the tank, the PUB must take into account the cost of tank repair and maintenance, the TNRCC regulations for water storage, the impact on the water system, future needs, and the fire rating. However, the addition of a storage tank requires the TNRCC regulations on the location of the tank. Another consideration is the type of soil; this factor can influence the cost of the tank. An alternative is not chosen, but it is recommended that ground storage not be an option of replacing the elevated storage tanks.

El Jardín Water Supply Corporation, Water and Wastewater Study, Prepared by Cruz-Hogan Consultants, Inc., Dated November 2000

The **Water and Wastewater Study** analyzes the existing water distribution facilities and identifies what needs to be employed to accommodate for future demands. This report also lays out a wastewater collection system within the service area. There are three phases to bring the current system up to date and accommodate the future water demands. Phase 1 proposes the construction of a 4 mgd plant, a 500,000 gallon elevated storage tank and distribution mains to connect the two to each other. The second phase expands the plant by 2 mgd, constructs another 500,000 gallon elevated storage tank, and more distribution lines. Phase 3 expands the plant by another 4 mgd and builds the remaining distribution lines. The EJWSC currently has no wastewater collection system. It is proposed that the EJWSC join with the PUB and have the PUB treat its wastewater. This report contains a preliminary wastewater collection system layout based on the proposed idea.

Table A 2005
2005 Costs for Alternatives

	Alternative 1			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-25, WTP expansion	$61,285,455	Table A-26, A-27, A-28, WWTP expansion	$197,107,451
El Jardin	Distribution system and storage	$2,704,640	Lift stations, force mains, and gravity lines	$8,530,133
Navigation District	-	-	New WWTP	$1,205,974
Olmito	WTP expansion	$2,335,700 ◆	WWTP expansion	$11,672,024 ◆
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system, plant upgrade, expansion, and treatment	$1,555,750 ◆	Collection system improvements, rerouting outfall line, WWTP expansion	$4,390,022 ◆
Military Highway	WTP expansion	$1,013,000	WWTP expansion	$3,110,800
	Alternative 1 Subtotal	**$68,894,545**		**$226,016,404**
Source of Water Costs				
BPUB	25,066.91 ac-ft of water @ $2,000/ac-ft	$50,133,820	-	-
El Jardin	2,358.50 ac-ft of water @ $2,000/ac-ft	$4,717,000	-	-
Navigation District	654.78 ac-ft of water @ $2,000/ac-ft	$1,309,560	-	-
Olmito	1,649.56 ac-ft of water @ $2,000/ac-ft	$3,299,120	-	-
Valley MUD	649.85 ac-ft of water @ $2,000/ac-ft	$1,299,700	-	-
Military Highway	649.17 ac-ft of water @ $2,000/ac-ft	$1,298,340	-	-
	Alternative 1 Subtotal	**$62,057,540**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	768,518,815 gpy of flow @ $1.73/1000 gal	$1,329,538	439,888,510 gpy of flow @ $2.20/1000 gal	$967,755
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	-	-
Olmito	-	-	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 1 Subtotal	**$1,677,315**		**$967,755**
Operating & Maintenance				
BPUB	9,149,956,875 gpy @ $1.00/1000 gal	$9,149,957	4,948,544,440 gpy @ $1.00/1000 gal	$4,948,544
El Jardin	-	-	-	-
Navigation District	-	-	72,503,965 gpy @ $1.00/1000 gal	$72,504
Olmito	537,509,950 gpy @ $1.00/1000 gal	$537,510	372,743,840 gpy @ $1.00/1000 gal	$372,744
Valley MUD	211,754,750 gpy @ $1.00/1000 gal	$211,755	126,033,770 gpy @ $1.00/1000 gal	$126,034
Military Highway	211,533,925 gpy @ $1.00/1000 gal	$211,534	95,703,000 gpy @ $1.75/1000 gal	$167,480
	Alternative 1 Subtotal	**$10,110,756**		**$5,687,306**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2005
2005 Costs for Alternatives

	Alternative 2			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-29, WTP expansion	$37,379,163	Table A-30, A-31, A-32, WWTP expansion	$250,797,385
El Jardin	Distribution system and storage	$2,704,640	Lift stations, force mains, and gravity lines	$8,530,133
Navigation District	-	-	Lift station and force main	$29,507,148
Olmito	WTP expansion, meter, water line	◆ $257,373	Lift station, force main	◆ $6,801,696
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system and meter	◆ $503,950	Collection system improvements and rerouting outfall line, lift station and force main	◆ $5,871,480
Military Highway	Meter and water line	$43,000	Lift station, force main	$1,178,958
	Alternative 2 Subtotal	**$40,888,126**		**$302,686,800**
Source of Water Costs				
BPUB	25,066.91 ac-ft of water @ $2,000/ac-ft	$50,133,820	-	-
El Jardin	2,358.50 ac-ft of water @ $2,000/ac-ft	$4,717,000	-	-
Navigation District	654.78 ac-ft of water @ $2,000/ac-ft	$1,309,560	-	-
Olmito	1,649.56 ac-ft of water @ $2,000/ac-ft	$3,299,120	-	-
Valley MUD	649.85 ac-ft of water @ $2,000/ac-ft	$1,299,700	-	-
Military Highway	649.17 ac-ft of water @ $2,000/ac-ft	$1,298,340	-	-
	Alternative 2 Subtotal	**$62,057,540**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	768,518,815 gpy of flow @ $1.73/1000 gal	$1,329,538	439,888,510 gpy of flow @ $2.20/1000 gal	$967,755
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	72,503,965 gpy of flow @ $2.20/1000 gal	$159,509
Olmito	250,561,550 gpy of additional flow @ $1.73/1000 gal	$433,471	372,743,840 gpy of flow @ $2.20/1000 gal	$820,036
Valley MUD	211,754,750 gpy of flow @ $1.73/1000 gal	$366,336	126,033,770 gpy of flow @ $2.20/1000 gal	$277,274
Military Highway	211,533,925 gpy of flow @ $1.73/1000 gal	$365,954	95,703,000 gpy of flow @ $2.20/1000 gal	$210,547
	Alternative 2 Subtotal	**$2,843,076**		**$2,435,121**
Operating & Maintenance				
BPUB	9,823,807,100 gpy @ $1.00/1000 gal	$9,823,807	5,615,529,015 gpy @ $1.00/1000 gal	$5,615,529
El Jardin	-	-	-	-
Navigation District	-	-	-	-
Olmito	286,948,400 gpy @ $1.00/1000 gal	$286,948	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 2 Subtotal	**$10,110,756**		**$5,615,529**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2005
2005 Costs for Alternatives

	Alternative 3			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-33	$61,048,276	Table A-34, A-35, A-36, WWTP expansion	$225,639,138
El Jardin	New 4 mgd plant , storage and distribution system	$8,806,342	Lift stations, force mains, gravity lines, new WWTP	$28,183,543
Navigation District	-	-	Lift station and force main	$25,338,606
Olmito	WTP expansion, meter, water line	◆ $257,373	Lift station, force main	◆ $6,801,696
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system and meter	◆ $503,950	Collection system improvements and rerouting outfall line, lift station, force main	◆ $5,871,480
Military Highway	Meter and water line	$43,000	Lift station and force main	$1,178,958
	Alternative 3 Subtotal	**$70,658,941**		**$293,013,421**
Source of Water Costs				
BPUB	25,066.91 ac-ft of water @ $2,000/ac-ft	$50,133,820	-	-
El Jardin	2,358.50 ac-ft of water @ $2,000/ac-ft	$4,717,000	-	-
Navigation District	654.78 ac-ft of water @ $2,000/ac-ft	$1,309,560	-	-
Olmito	1,649.56 ac-ft of water @ $2,000/ac-ft	$3,299,120	-	-
Valley MUD	649.85 ac-ft of water @ $2,000/ac-ft	$1,299,700	-	-
Military Highway	649.17 ac-ft of water @ $2,000/ac-ft	$1,298,340	-	-
	Alternative 3 Subtotal	**$62,057,540**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	-	-	-	-
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	72,503,965 gpy of flow @ $2.20/1000 gal	$159,509
Olmito	250,561,550 gpy of additional flow @ $1.73/1000 gal	$433,471	372,743,840 gpy of flow @ $2.20/1000 gal	$820,036
Valley MUD	211,754,750 gpy of flow @ $1.73/1000 gal	$366,336	126,033,770 gpy of flow @ $2.20/1000 gal	$277,274
Military Highway	211,533,925 gpy of flow @ $1.73/1000 gal	$365,954	95,703,000 gpy of flow @ $2.20/1000 gal	$210,547
	Alternative 3 Subtotal	**$1,513,538**		**$1,467,366**
Operating & Maintenance				
BPUB	8,841,927,900 gpy of flow @ $1.00/1000 gal	$8,841,928	5,103,136,540 gpy of flow @ $1.00/1000 gal	$5,103,137
El Jardin	981,879,200 gpy of flow @ $1.00/1000 gal	$981,879	512,392,475 gpy of flow @ $1.00/1000 gal	$512,392
Navigation District	-	-	-	-
Olmito	286,948,400 gpy of flow @ $1.00/1000 gal	$286,948	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 3 Subtotal	**$10,110,756**		**$5,615,529**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2005
2005 Costs for Alternatives

	Alternative 4			
	Water System		Wastewater System	
	Description	Costs	Description	Cost
Capital Improvements				
BPUB	Table A-25, WTP expansion	$61,285,455	Table A-26, A-27, A-28, WWTP expansion	$197,107,451
El Jardin	Distribution system and storage	$2,704,640	Lift stations, force mains, and gravity lines	$8,530,133
Navigation District	-	-	WWTP, lift station, force main	$30,713,122
Olmito	WTP expansion, meter, water line	$2,371,700 ◆	WWTP expansion, lift station, force main	$18,473,720 ◆
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system, plant upgrade, expansion, treatment, meter	$1,570,750 ◆	Collection system improvements, rerouting outfall line, WWTP expansion, lift station, force main	$9,728,102 ◆
Military Highway	WTP expansion, meter, water line	$1,056,000	WWTP expansion, lift station, force main	$4,289,758
	Alternative 4 Subtotal	**$68,988,545**		**$268,842,286**
Source of Water Costs				
BPUB	25,066.91 ac-ft of water @ $2,000/ac-ft	$50,133,820	-	-
El Jardin	2,358.50 ac-ft of water @ $2,000/ac-ft	$4,717,000	-	-
Navigation District	654.78 ac-ft of water @ $2,000/ac-ft	$1,309,560	-	-
Olmito	1,649.56 ac-ft of water @ $2,000/ac-ft	$3,299,120	-	-
Valley MUD	649.85 ac-ft of water @ $2,000/ac-ft	$1,299,700	-	-
Military Highway	649.17 ac-ft of water @ $2,000/ac-ft	$1,298,340	-	-
	Alternative 4 Subtotal	**$62,057,540**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	768,518,815 gpy of flow @ $1.73/1000 gal	$1,329,538	439,888,510 gpy of flow @ $2.20/1000 gal	$967,755
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	-	-
Olmito	-	-	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 4 Subtotal	**$1,677,315**		**$967,755**
Operating & Maintenance				
BPUB	9,149,956,875 gpy @ $1.00/1000 gal	$9,149,957	4,948,544,440 gpy @ $1.00/1000 gal	$4,948,544
El Jardin	-	-	-	-
Navigation District	-	-	72,503,965 gpy @ $1.00/1000 gal	$72,504
Olmito	537,509,950 gpy @ $1.00/1000 gal	$537,510	372,743,840 gpy @ $1.00/1000 gal	$372
Valley MUD	211,754,750 gpy @ $1.00/1000 gal	$211,755	126,033,770 gpy @ $1.00/1000 gal	$126,034
Military Highway	211,533,925 gpy @ $1.00/1000 gal	$211,534	95,703,000 gpy @ $1.75/1000 gal	$167,480
	Alternative 4 Subtotal	**$10,110,756**		**$5,687,306**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2015

2015 Costs for Alternatives

	Alternative 1			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-25, WTP expansion	$126,565,181	Table A-26, A-27, A-28, WWTP expansion	$311,368,708
El Jardin	Distribution system and storage	$15,553,408	Lift stations, force mains, and gravity lines	$17,060,267
Navigation District	New WTP	$43,323,696	New WWTP	$124,490,926
Olmito	Storage, distribution system, water rights, WTP expansion ◆	$10,588,815	WWTP expansion ◆	$46,724,426
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system, plant upgrade, expansion, and treatment ◆	$5,866,880	Collection system improvements and rerouting outfall line ◆	$8,320,679
Military Highway	WTP expansion	$1,013,000	New WWTP and expansion	$4,482,100
	Alternative 1 Subtotal	**$202,910,980**		**$512,447,106**
Source of Water Costs				
BPUB	36,921.32 ac-ft of water at $2,000/ac-ft	$73,842,640	-	-
El Jardin	6,461.17 ac-ft of water at $2,000/ac-ft	$12,922,340	-	-
Navigation District	16,410.87 ac-ft of water at $2,000/ac-ft	$32,821,740	-	-
Olmito	4,053.19 ac-ft of water at $2,000/ac-ft	$8,106,380	-	-
Valley MUD	1,384.88 ac-ft of water at $2,000/ac-ft	$2,769,760	-	-
Military Highway	855.78 ac-ft of water at $2,000/ac-ft	$1,711,560	-	-
	Alternative 1 Subtotal	**$132,174,420**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	2,105,376,940 gpy of flow @ $1.73/1000 gal	$3,642,302	1,266,825,575 gpy of flow @ $2.20/1000 gal	$2,787,016
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	-	-
Olmito	-	-	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 1 Subtotal	**$3,990,080**		**$2,787,016**
Operating & Maintenance				
BPUB	14,349,584,815 gpy @ $1.00/1000 gal	$14,349,585	7,345,585,215 gpy @ $1.00/1000 gal	$7,345,585
El Jardin	-	-	-	-
Navigation District	5,134,139,275 gpy @ $1.00/1000 gal	$5,134,139	3,286,718,785 gpy @ $1.00/1000 gal	$3,286,719
Olmito	1,320,734,615 gpy @ $1.00/1000 gal	$1,320,735	1,286,610,035 gpy @ $1.00/1000 gal	$1,286,610
Valley MUD	451,264,100 gpy @ $1.00/1000 gal	$451,264	248,322,640 gpy @ $1.00/1000 gal	$248,323
Military Highway	278,858,175 gpy @ $1.00/1000 gal	$278,858	113,296,000 gpy @ $1.75/1000 gal	$198,268
	Alternative 1 Subtotal	**$21,534,581**		**$12,365,505**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2015

2015 Costs for Alternatives

	Alternative 2			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-29, WTP expansion	$239,200,774	Table A-30, A-31, A-32, WWTP expansion	$529,179,519
El Jardin	Distribution system and storage	$15,553,408	Lift stations, force mains, and gravity lines	$17,060,267
Navigation District	-	-	Lift station and force main	$29,507,148
Olmito	Storage, distribution system, water rights, meter, water line, WTP expansion ◆	$1,901,357	Lift station, force main ◆	$6,801,696
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system and meter ◆	$2,074,955	Collection system improvements and rerouting outfall line, lift station and force main ◆	$6,236,830
Military Highway	Meter and water line	$43,000	Lift station, force main	$1,178,958
	Alternative 2 Subtotal	**$258,773,494**		**$589,964,418**
Source of Water Costs				
BPUB	36,921.32 ac-ft of water at $2,000/ac-ft	$73,842,640	-	-
El Jardin	6,461.17 ac-ft of water at $2,000/ac-ft	$12,922,340	-	-
Navigation District	16,410.87 ac-ft of water at $2,000/ac-ft	$32,821,740	-	-
Olmito	4,053.19 ac-ft of water at $2,000/ac-ft	$8,106,380	-	-
Valley MUD	1,384.88 ac-ft of water at $2,000/ac-ft	$2,769,760	-	-
Military Highway	855.78 ac-ft of water at $2,000/ac-ft	$1,711,560	-	-
	Alternative 2 Subtotal	**$132,174,420**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	2,105,376,940 gpy of flow @ $1.73/1000 gal	$3,642,302	1,266,825,575 gpy of flow @ $2.20/1000 gal	$2,787,016
Navigation District	5,347,499,660 gpy of flow @ $1.63/1000 gal	$8,716,424	3,286,718,785 gpy of flow @ $2.20/1000 gal	$7,230,781
Olmito	1,033,786,215 gpy of additional flow @ $1.73/1000 gal	$1,788,450	1,286,610,035 gpy of flow @ $2.20/1000 gal	$2,830,542
Valley MUD	451,264,100 gpy of flow @ $1.73/1000 gal	$780,687	248,322,640 gpy of flow @ $2.20/1000 gal	$546,310
Military Highway	278,858,175 gpy of flow @ $1.73/1000 gal	$482,425	113,296,000 gpy of flow @ $2.20/1000 gal	$249,251
	Alternative 2 Subtotal	**$15,410,288**		**$13,643,901**
Operating & Maintenance				
BPUB	21,247,632,580 gpy @ $1.00/1000 gal	$21,247,633	12,280,532,675 gpy @ $1.00/1000 gal	$12,280,533
El Jardin	-	-	-	-
Navigation District	-	-	-	-
Olmito	286,948,400 gpy @ $1.00/1000 gal	$286,948	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 2 Subtotal	**$21,534,581**		**$12,280,533**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2015
2015 Costs for Alternatives

	Alternative 3			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-33, WTP expansion	$129,422,300	Table A-34, A-35, A-36, WWTP expansion	$347,497,259
El Jardin	New 4 mgd plant with 2 mgd expansion, storage and distribution system	$79,941,692	Lift stations, force mains, gravity lines, new WWTP	$191,716,763
Navigation District	-	-	Lift station and force main	$25,338,606
Olmito	Storage, distribution system, water rights, meter, water line, WTP expansion ◆	$1,901,357	Lift station, force main ◆	$6,801,696
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system and meter ◆	$2,074,955	Collection system improvements and rerouting outfall line, lift station, force main ◆	$6,236,830
Military Highway	Meter and water line	$43,000	Lift station and force main	$1,178,958
	Alternative 3 Subtotal	**$213,383,304**		**$578,770,112**
Source of Water Costs				
BPUB	36,921.32 ac-ft of water at $2,000/ac-ft	$73,842,640	-	-
El Jardin	6,461.17 ac-ft of water at $2,000/ac-ft	$12,922,340	-	-
Navigation District	16,410.87 ac-ft of water at $2,000/ac-ft	$32,821,740	-	-
Olmito	4,053.19 ac-ft of water at $2,000/ac-ft	$8,106,380	-	-
Valley MUD	1,384.88 ac-ft of water at $2,000/ac-ft	$2,769,760	-	-
Military Highway	855.78 ac-ft of water at $2,000/ac-ft	$1,711,560	-	-
	Alternative 3 Subtotal	**$132,174,420**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	-	-	-	-
Navigation District	5,347,499,660 gpy of flow @ $1.63/1000 gal	$8,716,424	3,286,718,785 gpy of flow @ $2.20/1000 gal	$7,230,781
Olmito	1,033,786,215 gpy of additional flow @ $1.73/1000 gal	$1,788,450	1,286,610,035 gpy of flow @ $2.20/1000 gal	$2,830,542
Valley MUD	451,264,100 gpy of flow @ $1.73/1000 gal	$780,687	248,322,640 gpy of flow @ $2.20/1000 gal	$546,310
Military Highway	278,858,175 gpy of flow @ $1.73/1000 gal	$482,425	113,296,000 gpy of flow @ $2.20/1000 gal	$249,251
	Alternative 3 Subtotal	**$11,767,986**		**$10,856,884**
Operating & Maintenance				
BPUB	13,794,755,980 gpy of flow @ $1.00/1000 gal	$13,794,756	7,726,988,315 gpy of flow @ $1.00/1000 gal	$7,726,988
El Jardin	7,452,876,600 gpy of flow @ $1.00/1000 gal	$7,452,877	4,553,544,360 gpy of flow @ $1.00/1000 gal	$4,553,544
Navigation District	-	-	-	-
Olmito	286,948,400 gpy of flow @ $1.00/1000 gal	$286,948	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 3 Subtotal	**$21,534,581**		**$12,280,533**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2015

2015 Costs for Alternatives

	Alternative 4			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-25, WTP expansion	$126,565,181	Table A-26, A-27, A-28, WWTP expansion	$311,368,708
El Jardin	Distribution system and storage	$15,553,408	Lift stations, force mains, and gravity lines	$17,060,267
Navigation District	New WTP	$43,323,696	WWTP, lift station, force main	$153,998,074
Olmito	Storage, distribution system, water rights, meter, water line, WTP expansion	$10,624,815 ◆	WWTP expansion, lift station, force main	$53,526,122 ◆
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system, plant upgrade, expansion, treatment, meter	$5,881,880 ◆	Collection system improvements, rerouting outfall line, WWTP expansion, force main, lift station	$13,658,759 ◆
Military Highway	WTP expansion, meter, water line	$1,056,000	New WWTP, expansion, lift station, force	$5,661,058
	Alternative 4 Subtotal	**$203,004,980**		**$555,272,988**
Source of Water Costs				
BPUB	36,921.32 ac-ft of water at $2,000/ac-ft	$73,842,640	-	-
El Jardin	6,461.17 ac-ft of water at $2,000/ac-ft	$12,922,340	-	-
Navigation District	16,410.87 ac-ft of water at $2,000/ac-ft	$32,821,740	-	-
Olmito	4,053.19 ac-ft of water at $2,000/ac-ft	$8,106,380	-	-
Valley MUD	1,384.88 ac-ft of water at $2,000/ac-ft	$2,769,760	-	-
Military Highway	855.78 ac-ft of water at $2,000/ac-ft	$1,711,560	-	-
	Alternative 4 Subtotal	**$132,174,420**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	2,105,376,940 gpy of flow @ $1.73/1000 gal	$3,642,302	1,266,825,575 gpy of flow @ $2.20/1000 gal	$2,787,016
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	-	-
Olmito	-	-	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 4 Subtotal	**$3,990,080**		**$2,787,016**
Operating & Maintenance				
BPUB	14,349,584,815 gpy @ $1.00/1000 gal	$14,349,585	7,345,585,215 gpy @ $1.00/1000 gal	$7,345,585
El Jardin	-	-	-	-
Navigation District	5,134,139,275 gpy @ $1.00/1000 gal	$5,134,139	3,286,718,785 gpy @ $1.00/1000 gal	$3,286,719
Olmito	1,320,734,615 gpy @ $1.00/1000 gal	$1,320,735	1,286,610,035 gpy @ $1.00/1000 gal	$1,286
Valley MUD	451,264,100 gpy @ $1.00/1000 gal	$451,264	248,322,640 gpy @ $1.00/1000 gal	$248,323
Military Highway	278,858,175 gpy @ $1.00/1000 gal	$278,858	113,296,000 gpy @ $1.75/1000 gal	$198,268
	Alternative 4 Subtotal	**$21,534,581**		**$12,365,505**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2025
2025 Costs for Alternatives

	Alternative 1			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-25, WTP expansion	$263,949,484	Table A-26, A-27, A-28, WWTP expansion	$439,079,528
El Jardin	Distribution system and storage	$15,553,408	Lift stations, force mains, and gravity lines	$25,590,400
Navigation District	New WTP	$86,647,392	New WWTP	$247,775,864
Olmito	Storage, distribution system, water rights, WTP expansion	$17,493,931 ◆	WWTP expansion	$102,665,332 ◆
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system, plant upgrade, expansion, and treatment	$5,866,880 ◆	Collection system improvements and rerouting outfall line, WWTP expansion	$16,645,723 ◆
Military Highway	WTP expansion	$1,039,590	New WWTP and expansion	$5,280,100
	Alternative 1 Subtotal	**$390,550,685**		**$837,036,947**
Source of Water Costs				
BPUB	59,259.35 ac-ft of water @ $2,000/ac-ft	$118,518,700	-	-
El Jardin	11,404.51 ac-ft of water @ $2,000/ac-ft	$22,809,020	-	-
Navigation District	32,166.97 ac-ft of water @ $2,000/ac-ft	$64,333,940	-	-
Olmito	6,564.46 ac-ft of water @ $2,000/ac-ft	$13,128,920	-	-
Valley MUD	2,240.85 ac-ft of water @ $2,000/ac-ft	$4,481,700	-	-
Military Highway	1,127.85 ac-ft of water @ $2,000/ac-ft	$2,255,700	-	-
	Alternative 1 Subtotal	**$225,527,980**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	3,716,170,850 gpy of flow @ $1.73/1000 gal	$6,428,976	2,117,158,410 gpy of flow @ $2.20/1000 gal	$4,657,749
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	-	-
Olmito	-	-	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 1 Subtotal	**$6,776,753**		**$4,657,749**
Operating & Maintenance				
BPUB	23,239,249,970 gpy @ $1.00/1000 gal	$23,239,250	10,477,108,555 gpy @ $1.00/1000 gal	$10,477,109
El Jardin	-	-	-	-
Navigation District	10,268,278,550 gpy @ $1.00/1000 gal	$10,268,279	6,500,933,240 gpy @ $1.00/1000 gal	$6,500,933
Olmito	2,139,035,780 gpy @ $1.00/1000 gal	$2,139,036	2,745,069,370 gpy @ $1.00/1000 gal	$2,745,069
Valley MUD	730,182,500 gpy @ $1.00/1000 gal	$730,183	469,930,930 gpy @ $1.00/1000 gal	$469,931
Military Highway	367,511,200 gpy @ $1.00/1000 gal	$367,511	134,101,000 gpy @ $1.75/1000 gal	$234,677
	Alternative 1 Subtotal	**$36,744,258**		**$20,427,719**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2025
2025 Costs for Alternatives

	Alternative 2			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-29, WTP expansion	$454,694,694	Table A-30, A-31, A-32, WWTP expansion	$844,747,370
El Jardin	Distribution system and storage	$15,553,408	Lift stations, force mains, and gravity lines	$25,590,400
Navigation District	-	-	Lift station and force main	$29,507,148
Olmito	Storage, distribution system, water rights, meter, water line, WTP expansion	◆ $1,901,357	Lift station, force main	◆ $6,801,696
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system and meter	◆ $2,074,955	Collection system improvements and rerouting outfall line, lift station and force main	◆ $6,236,830
Military Highway	Meter and water line	$43,000	Lift station, force main	$1,178,958
	Alternative 2 Subtotal	**$474,267,414**		**$914,062,402**
Source of Water Costs				
BPUB	59,259.35 ac-ft of water @ $2,000/ac-ft	$118,518,700	-	-
El Jardin	11,404.51 ac-ft of water @ $2,000/ac-ft	$22,809,020	-	-
Navigation District	32,166.97 ac-ft of water @ $2,000/ac-ft	$64,333,940	-	-
Olmito	6,564.46 ac-ft of water @ $2,000/ac-ft	$13,128,920	-	-
Valley MUD	2,240.85 ac-ft of water @ $2,000/ac-ft	$4,481,700	-	-
Military Highway	1,127.85 ac-ft of water @ $2,000/ac-ft	$2,255,700	-	-
	Alternative 2 Subtotal	**$225,527,980**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	3,716,170,850 gpy of flow @ $1.73/1000 gal	$6,428,976	2,117,158,410 gpy of flow @ $2.20/1000 gal	$4,657,749
Navigation District	10,481,638,935 gpy of flow @ $1.63/1000 gal	$17,085,071	6,500,933,240 gpy of flow @ $2.20/1000 gal	$14,302,053
Olmito	1,852,087,380 gpy of additional flow @ $1.73/1000 gal	$3,204,111	2,745,069,370 gpy of flow @ $2.20/1000 gal	$6,039,153
Valley MUD	730,182,500 gpy of flow @ $1.73/1000 gal	$1,263,216	469,930,930 gpy of flow @ $2.20/1000 gal	$1,033,848
Military Highway	367,511,200 gpy of flow @ $1.73/1000 gal	$635,794	134,101,000 gpy of flow @ $2.20/1000 gal	$295,022
	Alternative 2 Subtotal	**$28,617,168**		**$26,327,824**
Operating & Maintenance				
BPUB	36,457,309,600 gpy @ $1.00/1000 gal	$36,457,310	20,327,143,095 gpy @ $1.00/1000 gal	$20,327,143
El Jardin	-	-	-	-
Navigation District	-	-	-	-
Olmito	286,948,400 gpy @ $1.00/1000 gal	$286,948	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 2 Subtotal	**$36,744,258**		**$20,327,143**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2025
2025 Costs for Alternatives

	Alternative 3			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-33, WTP expansion	$256,498,589	Table A-34, A-35, A-36, WWTP expansion	$509,780,995
El Jardin	New 4 mgd plant with 6 mgd expansion, storage and distribution system	$128,855,840	Lift stations, force mains, gravity lines, new WWTP	$356,147,340
Navigation District	-	-	Lift station and force main	$25,338,606
Olmito	Storage, distribution system, water rights, meter, water line, WTP expansion	$1,901,357 ◆	Lift station, force main	$6,801,696 ◆
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system and meter	$2,074,955 ◆	Collection system improvements and rerouting outfall line, lift station, force main	$6,236,830 ◆
Military Highway	Meter and water line	$43,000	Lift station and force main	$1,178,958
	Alternative 3 Subtotal	**$389,373,741**		**$905,484,425**
Source of Water Costs				
BPUB	59,259.35 ac-ft of water @ $2,000/ac-ft	$118,518,700	-	-
El Jardin	11,404.51 ac-ft of water @ $2,000/ac-ft	$22,809,020	-	-
Navigation District	32,166.97 ac-ft of water @ $2,000/ac-ft	$64,333,940	-	-
Olmito	6,564.46 ac-ft of water @ $2,000/ac-ft	$13,128,920	-	-
Valley MUD	2,240.85 ac-ft of water @ $2,000/ac-ft	$4,481,700	-	-
Military Highway	1,127.85 ac-ft of water @ $2,000/ac-ft	$2,255,700	-	-
	Alternative 3 Subtotal	**$225,527,980**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	-	-	-	-
Navigation District	10,481,638,935 gpy of flow @ $1.63/1000 gal	$17,085,071	6,500,933,240 gpy of flow @ $2.20/1000 gal	$14,302,053
Olmito	1,852,087,380 gpy of additional flow @ $1.73/1000 gal	$3,204,111	2,745,069,370 gpy of flow @ $2.20/1000 gal	$6,039,153
Valley MUD	730,182,500 gpy of flow @ $1.73/1000 gal	$1,263,216	469,930,930 gpy of flow @ $2.20/1000 gal	$1,033,848
Military Highway	367,511,200 gpy of flow @ $1.73/1000 gal	$635,794	134,101,000 gpy of flow @ $2.20/1000 gal	$295,022
	Alternative 3 Subtotal	**$22,188,193**		**$21,670,076**
Operating & Maintenance				
BPUB	22,259,499,815 gpy of flow @ $1.00/1000 gal	$22,259,500	11,709,051,445 gpy of flow @ $1.00/1000 gal	$11,709,051
El Jardin	14,197,809,785 gpy of flow @ $1.00/1000 gal	$14,197,810	8,618,091,650 gpy of flow @ $1.00/1000 gal	$8,618,092
Navigation District	-	-	-	-
Olmito	286,948,400 gpy of flow @ $1.00/1000 gal	$286,948	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 3 Subtotal	**$36,744,258**		**$20,327,143**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A 2025
2025 Costs for Alternatives

	Alternative 4			
	Water System		Wastewater System	
	Description	Costs	Description	Costs
Capital Improvements				
BPUB	Table A-25, WTP expansion	$263,949,484	Table A-26, A-27, A-28, WWTP expansion	$439,079,528
El Jardin	Distribution system and storage	$15,553,408	Lift stations, force mains, and gravity lines	$25,590,400
Navigation District	New WTP	$86,647,392	WWTP, lift station, force main	$277,283,012
Olmito	Storage, distribution system, water rights, WTP expansion, meter, water line ◆	$17,529,931	WWTP expansion, lift station, force main ◆	$109,467,028
Valley MUD	Raw water supply and delivery, storage, high service pumping, distribution system, plant upgrade, expansion, treatment, meter ◆	$5,881,880	Collection system improvements, rerouting outfall line, WWTP expansion, lift station, force main ◆	$21,983,803
Military Highway	WTP expansion, meter, water line	$1,082,590	New WWTP, expansion, lift station, force ma	$6,459,058
	Alternative 4 Subtotal	**$390,644,685**		**$879,862,829**
Source of Water Costs				
BPUB	59,259.35 ac-ft of water @ $2,000/ac-ft	$118,518,700	-	-
El Jardin	11,404.51 ac-ft of water @ $2,000/ac-ft	$22,809,020	-	-
Navigation District	32,166.97 ac-ft of water @ $2,000/ac-ft	$64,333,940	-	-
Olmito	6,564.46 ac-ft of water @ $2,000/ac-ft	$13,128,920	-	-
Valley MUD	2,240.85 ac-ft of water @ $2,000/ac-ft	$4,481,700	-	-
Military Highway	1,127.85 ac-ft of water @ $2,000/ac-ft	$2,255,700	-	-
	Alternative 4 Subtotal	**$225,527,980**		**$0**
Treatment Costs Paid by Others				
BPUB	-	-	-	-
El Jardin	3,716,170,850 gpy of flow @ $1.73/1000 gal	$6,428,976	2,117,158,410 gpy of flow @ $2.20/1000 gal	$4,657,749
Navigation District	213,360,385 gpy of flow @ $1.63/1000 gal	$347,777	-	-
Olmito	-	-	-	-
Valley MUD	-	-	-	-
Military Highway	-	-	-	-
	Alternative 4 Subtotal	**$6,776,753**		**$4,657,749**
Operating & Maintenance				
BPUB	23,239,249,970 gpy @ $1.00/1000 gal	$23,239,250	10,477,108,555 gpy @ $1.00/1000 gal	$10,477,109
El Jardin	-	-	-	-
Navigation District	10,268,278,550 gpy @ $1.00/1000 gal	$10,268,279	6,500,933,240 gpy @ $1.00/1000 gal	$6,500,933
Olmito	2,139,035,780 gpy @ $1.00/1000 gal	$2,139,036	2,745,069,370 gpy @ $1.00/1000 gal	$2,745,069
Valley MUD	730,182,500 gpy @ $1.00/1000 gal	$730,183	469,930,930 gpy @ $1.00/1000 gal	$469
Military Highway	367,511,200 gpy @ $1.00/1000 gal	$367,511	134,101,000 gpy @ $1.75/1000 gal	$234,677
	Alternative 4 Subtotal	**$36,744,258**		**$20,427,719**

◆ Obtained from report and is for year 2020, thus no pipe info from 2020-2025 is included.

Table A-25
Water System Capital Improvements for Alternative 1

Pipe and Tank Names	Length feet	Description	Estimated Quantity	Unit	Unit Price	2005 Construction Cost	2015 Construction Cost	2025 Construction Cost
1004WMN	555	24-Inch PVC	555	LF	84	$46,620	$46,620	$46,620
1005WMN	37	30-Inch PVC	37	LF	105	$3,885	$3,885	$3,885
1008aWMN	26	24-Inch PVC	26	LF	84		$2,184	$2,184
1008WMN	323	24-Inch PVC	323	LF	84			$27,132
1019WMN	2,400	24-Inch PVC	2,400	LF	84	$201,600	$201,600	$201,600
1063aWMN	1,721	12-Inch PVC	1,721	LF	42	$72,282	$72,282	$72,282
1099WMN	784	24-Inch PVC	784	LF	84			$65,856
1101aWMN	3,880	24-Inch PVC	3,880	LF	84			$325,920
1101WMN	658	24-Inch PVC	658	LF	84			$55,272
1118WMN	493	20-Inch PVC	493	LF	70	$34,510	$34,510	$34,510
1127WMN	530	12-Inch PVC	530	LF	42	$22,260	$22,260	$22,260
1137WMN	921	20-Inch PVC	921	LF	70	$64,470	$64,470	$64,470
1161WMN	1,865	20-Inch PVC	1,865	LF	70	$130,550	$130,550	$130,550
1202WMN	709	18-Inch PVC	709	LF	63	$44,667	$44,667	$44,667
1210WMN	582	18-Inch PVC	582	LF	63	$36,666	$36,666	$36,666
1211WMN	992	18-Inch PVC	992	LF	63	$62,496	$62,496	$62,496
1214aWMN	374	12-Inch PVC	374	LF	42	$15,708	$15,708	$15,708
1230WMN	671	24-Inch PVC	671	LF	84	$56,364	$56,364	$56,364
1237WMN	755	18-Inch PVC	755	LF	63	$47,565	$47,565	$47,565
1243WMN	322	18-Inch PVC	322	LF	63	$20,286	$20,286	$20,286
1261WMN	1,031	12-Inch PVC	1,031	LF	42	$43,302	$43,302	$43,302
1262WMN	1,754	12-Inch PVC	1,754	LF	42	$73,668	$73,668	$73,668
1415aWMN	337	24-Inch PVC	337	LF	84			$28,308
1415WMN	2,849	24-Inch PVC	2,849	LF	84			$239,316
1423aWMN	460	24-Inch PVC	460	LF	84			$38,640
1423bWMN	1,184	24-Inch PVC	1,184	LF	84			$99,456
1423WMN	2,741	24-Inch PVC	2,741	LF	84			$230,244
1424aWMN	91	24-Inch PVC	91	LF	84			$7,644
1485WMN	151	18-Inch PVC	151	LF	63	$9,513	$9,513	$9,513
1791WMN	2,493	12-Inch PVC	2,493	LF	42		$104,706	$104,706
179WMN	2,564	16-Inch PVC	2,564	LF	56	$143,584	$143,584	$143,584
1829aWMN	694	30-Inch PVC	694	LF	105	$72,870	$72,870	$72,870
1829WMN	726	30-Inch PVC	726	LF	105	$76,230	$76,230	$76,230
1854WMN	315	12-Inch PVC	315	LF	42		$13,230	$13,230
1874WMN	645	16-Inch PVC	645	LF	56		$36,120	$36,120
1897WMN	40	16-Inch PVC	40	LF	56	$2,240	$2,240	$2,240
1898WMN	40	18-Inch PVC	40	LF	63		$2,520	$2,520
1908WMN	280	30-Inch PVC	280	LF	105		$29,400	$29,400
1913WMN	280	16-Inch PVC	280	LF	56	$15,680	$15,680	$15,680
1924WMN	1,999	12-Inch PVC	1,999	LF	42	$83,958	$83,958	$83,958
2001WMN	495	12-Inch PVC	495	LF	42		$20,790	$20,790
2031WMN	116	24-Inch PVC	116	LF	84	$9,744	$9,744	$9,744
2032WMN	154	20-Inch PVC	154	LF	70	$10,780	$10,780	$10,780
2050WMN	169	16-Inch PVC	169	LF	56	$9,464	$9,464	$9,464
2057WMN	1,758	16-Inch PVC	1,758	LF	56			$98,448
2071WMN	1,120	16-Inch PVC	1,120	LF	56			$62,720
2086WMN	1,496	16-Inch PVC	1,496	LF	56			$83,776
2092WMN	1,356	14-Inch PVC	1,356	LF	49			$66,444
20WMN	1,160	30-Inch PVC	1,160	LF	105	$121,800	$121,800	$121,800
2148WMN	49	12-Inch PVC	49	LF	42	$2,058	$2,058	$2,058
2166WMN	20	36-Inch PVC	20	LF	126	$2,520	$2,520	$2,520
2169WMN	713	12-Inch PVC	713	LF	42		$29,946	$29,946
2233WMN	135	18-Inch PVC	135	LF	63	$8,505	$8,505	$8,505
2266aWMN	432	8-Inch PVC	432	LF	28	$12,096	$12,096	$12,096
230aWMN	576	24-Inch PVC	576	LF	84	$48,384	$48,384	$48,384
230WMN	554	16-Inch PVC	554	LF	56	$31,024	$31,024	$31,024
2683aWMN	1,607	16-Inch PVC	1,607	LF	56	$89,992	$89,992	$89,992
2767WMN	1,008	18-Inch PVC	1,008	LF	63			$63,504

Note: Costs are construction costs for pipes and tanks only. Meter, valve, tee and other related costs are not included.

Table A-25
Water System Capital Improvements for Alternative 1

Pipe and Tank Names	Length feet	Description	Estimated Quantity	Unit	Unit Price	2005 Construction Cost	2015 Construction Cost	2025 Construction Cost
2962WMN	956	14-Inch PVC	956	LF	49			$46,844
2WMN	2,628	16-Inch PVC	2,628	LF	56	$147,168	$147,168	$147,168
3342WMN	2,087	10-Inch PVC	2,087	LF	35		$73,045	$73,045
3346WMN	317	30-Inch PVC	317	LF	105		$33,285	$33,285
3348WMN	683	16-Inch PVC	683	LF	56	$38,248	$38,248	$38,248
3419WMN	359	24-Inch PVC	359	LF	84	$30,156	$30,156	$30,156
3421WMN	1,562	24-Inch PVC	1,562	LF	84	$131,208	$131,208	$131,208
3422WMN	134	24-Inch PVC	134	LF	84	$11,256	$11,256	$11,256
3423WMN	196	18-Inch PVC	196	LF	63	$12,348	$12,348	$12,348
3478WMN	2,027	30-Inch PVC	2,027	LF	105	$212,835	$212,835	$212,835
3486aWMN	81	8-Inch PVC	81	LF	28	$2,268	$2,268	$2,268
3914aWMN	312	24-Inch PVC	312	LF	84	$26,208	$26,208	$26,208
3914bWMN	5,548	24-Inch PVC	5,548	LF	84	$466,032	$466,032	$466,032
3914WMN	31	24-Inch PVC	31	LF	84	$2,604	$2,604	$2,604
3915WMN	2,015	24-Inch PVC	2,015	LF	84	$169,260	$169,260	$169,260
3917WMN	3,376	18-Inch PVC	3,376	LF	63			$212,688
3918aWMN	247	24-Inch PVC	247	LF	84			$20,748
3918WMN	5,274	20-Inch PVC	5,274	LF	70			$369,180
3919WMN	1,365	24-Inch PVC	1,365	LF	84			$114,660
3937aWMN	3,813	20-Inch PVC	3,813	LF	70			$266,910
3937WMN	61	20-Inch PVC	61	LF	70			$4,270
3938aWMN	1,665	20-Inch PVC	1,665	LF	70			$116,550
3938WMN	151	20-Inch PVC	151	LF	70			$10,570
3940WMN	624	12-Inch PVC	624	LF	42	$26,208	$26,208	$26,208
4005WMN	109	20-Inch PVC	109	LF	70	$7,630	$7,630	$7,630
4007WMN	96	20-Inch PVC	96	LF	70			$6,720
4041WMN	3,968	16-Inch PVC	3,968	LF	56	$222,208	$222,208	$222,208
4322WMN	2,049	20-Inch PVC	2,049	LF	70	$143,430	$143,430	$143,430
4370aWMN	717	16-Inch PVC	717	LF	56	$40,152	$40,152	$40,152
4372WMN	1,088	16-Inch PVC	1,088	LF	56	$60,928	$60,928	$60,928
4498aWMN	3,832	20-Inch PVC	3,832	LF	70	$268,240	$268,240	$268,240
4500WMN	1,911	20-Inch PVC	1,911	LF	70	$133,770	$133,770	$133,770
4647WMN	3,237	20-Inch PVC	3,237	LF	70	$226,590	$226,590	$226,590
4669aWMN	1,224	16-Inch PVC	1,224	LF	56	$68,544	$68,544	$68,544
4714aWMN	2,418	12-Inch PVC	2,418	LF	42	$101,556	$101,556	$101,556
4714cWMN	3	12-Inch PVC	3	LF	42	$126	$126	$126
4714WMN	322	12-Inch PVC	322	LF	42	$13,524	$13,524	$13,524
4715WMN	2,189	12-Inch PVC	2,189	LF	42	$91,938	$91,938	$91,938
474WMN	963	24-Inch PVC	963	LF	84			$80,892
477aWMN	51	24-Inch PVC	51	LF	84			$4,284
477WMN	50	24-Inch PVC	50	LF	84			$4,200
4836WMN	3,185	24-Inch PVC	3,185	LF	84			$267,540
483WMN	654	24-Inch PVC	654	LF	84	$54,936	$54,936	$54,936
4843WMN	1,023	16-Inch PVC	1,023	LF	56	$57,288	$57,288	$57,288
484WMN	241	24-Inch PVC	241	LF	84	$20,244	$20,244	$20,244
487WMN	1,587	16-Inch PVC	1,587	LF	56			$88,872
4953aWMN	747	16-Inch PVC	747	LF	56	$41,832	$41,832	$41,832
4953WMN	736	16-Inch PVC	736	LF	56	$41,216	$41,216	$41,216
4963aWMN	786	16-Inch PVC	786	LF	56	$44,016	$44,016	$44,016
4963WMN	281	16-Inch PVC	281	LF	56	$15,736	$15,736	$15,736
496aWMN	1,034	24-Inch PVC	1,034	LF	84	$86,856	$86,856	$86,856
496WMN	224	30-Inch PVC	224	LF	105	$23,520	$23,520	$23,520
4971aWMN	66	8-Inch PVC	66	LF	28	$1,848	$1,848	$1,848
4971bWMN	66	8-Inch PVC	66	LF	28	$1,848	$1,848	$1,848
4WMN	1,947	18-Inch PVC	1,947	LF	63	$122,661	$122,661	$122,661
502WMN	1,123	24-Inch PVC	1,123	LF	84	$94,332	$94,332	$94,332
5053WMN	925	16-Inch PVC	925	LF	56	$51,800	$51,800	$51,800
5132WMN	3,268	10-Inch PVC	3,268	LF	35	$114,380	$114,380	$114,380
5145aWMN	63	12-Inch PVC	63	LF	42	$2,646	$2,646	$2,646

Note: Costs are construction costs for pipes and tanks only. Meter, valve, tee and other related costs are not included.