County Service Area 7A
Oak Shores, California

Interceptor Bypass Study
2004

County of San Luis Obispo
Public Works Department
July 12, 2004

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Executive Summary

The County of San Luis Obispo operates the County Service Area 7A (CSA 7A) wastewater treatment and collection facilities in the Oak Shores village on the north shore of Lake Nacimiento. The sewer system serves approximately 513 homes now, with an additional 340 vacant lots within the existing service area. Occupancy of the lakeside homes is seasonal, with the majority (estimated at 70%) of homes occupied during the summer months only. According to the County's Nacimiento Area Plan, build-out of the Oak Shores Village will include up to 528 additional residential units in the East Village and 405 additional residential units lots in the West Village, all of which lie outside of the current CSA 7A service area boundary. However, the boundary was recently revised to include approximately 60 dwelling units for Phase 1 of Tract 2162 in the East Village. The remaining East and West Village neighborhoods are included within the Village Reserve Line but are not yet developed.

Remarkably, sewage from all of the developed lots within CSA 7A drains into the "Interceptor sewer" which is a nearly 10,000 foot long gravity sewerline that lies below the high water line of the lake. The Interceptor drains into Lift Station #3, which is approximately 60 feet deep (with the bottom of the wet well about 55 feet below the lake high water line).

The fact that raw sewage from over 500 homes now drains beneath the lake and is pumped from an excessively deep wet well to the sewage treatment plant is cause for concern. The Interceptor sewer is dye-tested each year to establish that it is not leaking. Nonetheless, the potential for sewage to seep into the lake (or for lake water to seep into the collection system) exists. Further, accessing such a deep wet well for maintenance and repair of the pumps poses significant safety hazards associated with confined space entry. For these reasons, Public Works Department staff examined what it would take to abandon the Interceptor and Lift Station #3 in exchange for a collection system that would drain *above the lake level* to the existing sewage plant. This report describes the modifications that would be required to accomplish this. While the report includes discussion of the existing treatment and disposal system, evaluation of capacity or recommendation for future expansion is beyond the scope of this report.

Collection system data was gathered from available record drawings, consultation with operators, and site review. Existing and projected flow estimates were developed based on information presented in the County Planning Department's *Nacimiento Area Plan* and a report prepared by the County Public Works Department Water Quality Lab entitled "Oak Shores Disposal Area Expansion Project" (January 2001), assuming full occupancy and build-out of properties within the current CSA 7A boundary.

The Oak Shores terrain proved to be challenging from the perspective of providing sewer service. We found that to eliminate the Eastside Interceptor sewer, four lift stations; would be needed plus the construction of new gravity sewerlines, manholes, two steel

pipe bridges, and eight individual sewer packaged pump systems. The total estimated project cost to eliminate the Eastside Interceptor is estimated to be $2.35 million.

To eliminate the Westside Interceptor, four additional lift stations would be needed along with new sewerlines, manholes, one steel pipe bridge, and construction of fourteen individual sewer packaged pump systems. The total estimated project cost to eliminate the Westside Interceptor is estimated to be an additional $3.65 million.

In other words, to eliminate the Interceptor sewer and the deep Lift Station No. 3 would require millions of dollars and would require the installation of eight lift stations. The end result would be elimination of the line that lies in the lake, but the tradeoff would be the ongoing maintenance (and potential for raw sewage spill) at numerous lift stations adjacent to the lake.

For these reasons, we do not recommend that the Interceptor or Lift Station No. 3 be abandoned at this time. Rather, we recommend that we 1) continue to check and maintain the integrity of the interceptor sewer; 2) provide a budget mechanism to authorize a thorough inspection and cleaning of the Interceptor in years when the lake level declines to the point where it is accessible; and 3) that steps be taken to make Lift Station No. 3 safer to maintain.

Background on these recommendations follows.

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1.0 Introduction

1.1 Background

Much of the background information in this section was taken from the Nacimiento Area Plan prepared by the County Department of Planning and Building (rev 11/7/96). Lake Nacimiento was constructed in 1960 by the Monterey County Flood Control and Water Conservation District. Land surrounding Lake Nacimiento ranges in character from gently sloping savannah woodlands and meadows to the rugged chaparral-covered terrain of the Santa Lucia foothills.

Oak Shores is a community intended primarily for retirement and second homes, originally planned for 4000 dwelling units on the north shore of the lake. Specific plans were adopted to guide the continuing development of those projects. It is difficult to determine whether "second homes" at Lake Nacimiento will actually remain part-time residences, and for purposes of long range planning, these homes should be considered potential permanent residences. Originally, 1,100 acre-feet per year of the County's entitlement of Lake Nacimiento water was allocated to Oak Shores, which was projected to allow development of a maximum of 1,786 residential units. Oak Shores is served by a private water company and water use is currently covered by a separate agreement between the water company and the Monterey County Water Resources Agency. However, the Nacimiento Area Plan still projects build-out of the land within the Oak Shores Village Reserve Line to be 1,786 residential units.

The County of San Luis Obispo operates the County Service Area 7A (CSA 7A) wastewater treatment and collection facilities in the Oak Shores village on the north shore of Lake Nacimiento. As shown in Exhibit 1, these facilities serve the Central Village of the Oak Shores development. As described later in the report, the existing Interceptor sewer serving the community was constructed below the lake high water level (HWL) of approximately 800', and flows are conveyed to the treatment plant through a lift station which is approximately 60' deep. The CSA 7A boundary includes Tracts 378, 379, 380 and 381 of the Central Village. There are approximately 513 existing homes in the community, with an additional 340 homes approved for build-out of the Central Village. The population is seasonal, with the majority of the system demand occurring during the summer months. The historic year-round occupancy is approximately 30%. The Nacimiento Area Plan refers to potential future development of an additional 528 residential units in the East Village and 405 units in the West Village. These neighborhoods are included within the Village Reserve Line but have not yet been subdivided. The CSA 7A boundary was recently expanded to include the first phase of Tract 2162, a proposed development in the East Village. Tract 2162 is planned for development in six phases with 60 parcels to be constructed in the first phase and build-out of the tract estimated at 345 parcels. The County of San Luis Obispo Public Works Department has granted to the developer a conditional intent to provide sewer service for Phase I of Tract 2162.

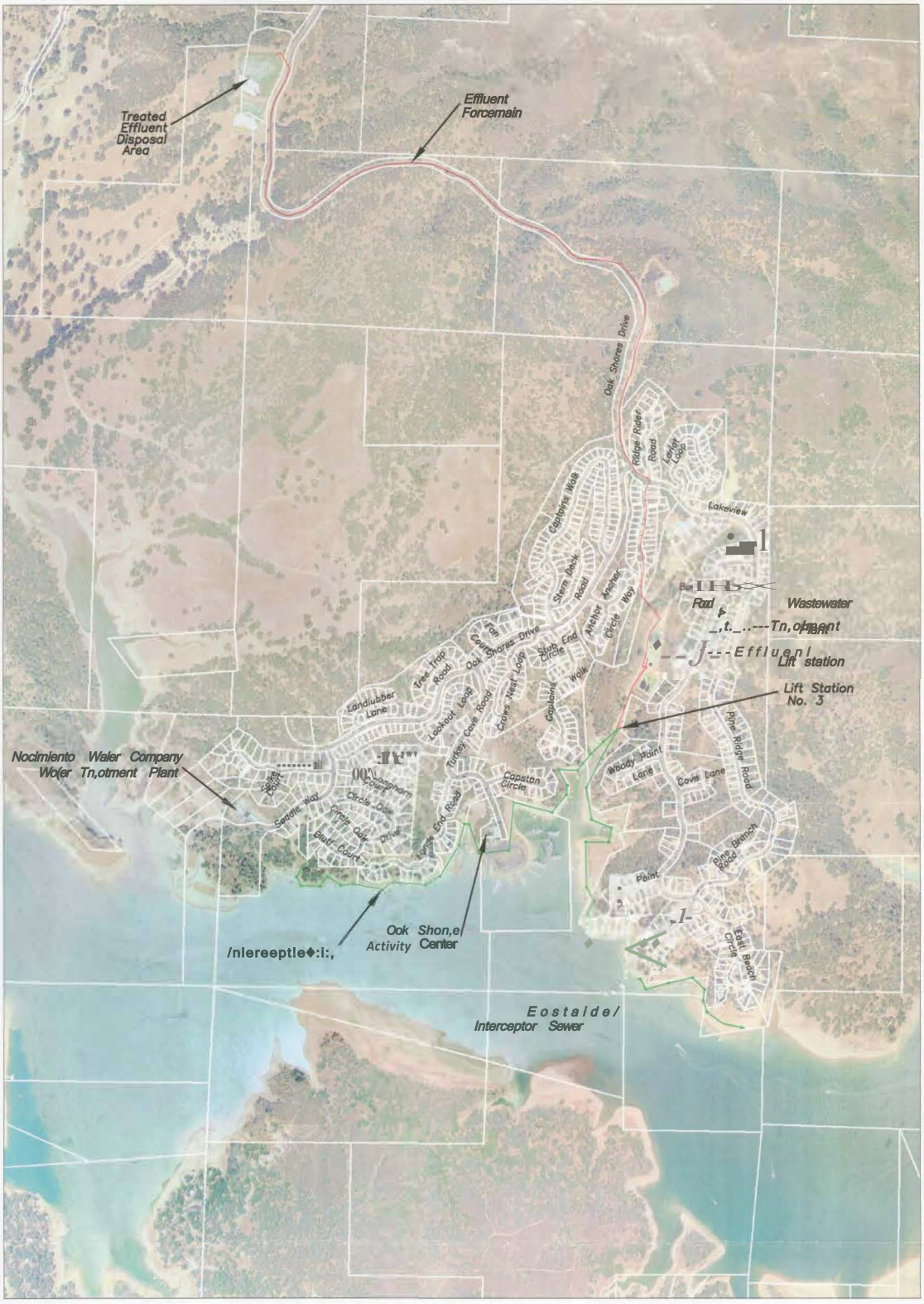
1.2 Oak Shores Development and Phasing Plan

The Land Use Element, Nacimiento area plan serves as the specific plan for development of Oak Shores. The maximum allowable number of dwelling units within the Oak Shores village reserve line is 1,786, including RV sites and all tracts existing and recorded as of the effective date of the Land Use Element. See Exhibit 2 for the allocation of units. The number of allowed units is further allocated to individual properties by the adopted Oak Shores Phasing Plan.

1.3 Goals and Assumptions

The goal of this study is to review the existing wastewater collection system and to identify improvements which will allow elimination and abandonment of the Interceptor sewer system constructed below the HWL and the 60' deep Lift Station No. 3. In order to accomplish this goal, as-built improvement plans were reviewed to evaluate the existing collection system. Site reviews were performed and County Utilities Division employees who operate the system were consulted. Conceptual capital improvement projects with estimated construction and project costs were identified.

At the time this report was prepared, no plans or Tentative Maps were available for undeveloped parcels in the East and West Villages, outside of the current CSA 7A boundary. Furthermore, it is not known whether the existing facilities and/or land available at the current treatment plant site will be able to accommodate full build out of all properties within the Oak Shores Village Reserve Line. Future growth may require development of new treatment and disposal facilities in an alternate location. These issues will need to be evaluated prior to annexation of additional properties into the CSA. Therefore, this study primarily considered build-out of property within the existing CSA 7A boundary. However, evaluation of flows resulting from full build-out of properties within the Village Reserve Line were considered for certain conceptual improvements immediately upstream of the existing wastewater treatment plant: replacement lift station No. 3 (Westside Improvement No. 16); Westside pipe bridge and gravity sewer (Westside Improvement No. 15); Eastside pipe bridges and gravity sewer (Eastside Improvements No. 10 and 12).



LEGEND

Existing Interceptor Sewer
Existing Forcemain
Existing Sewer Lift Station

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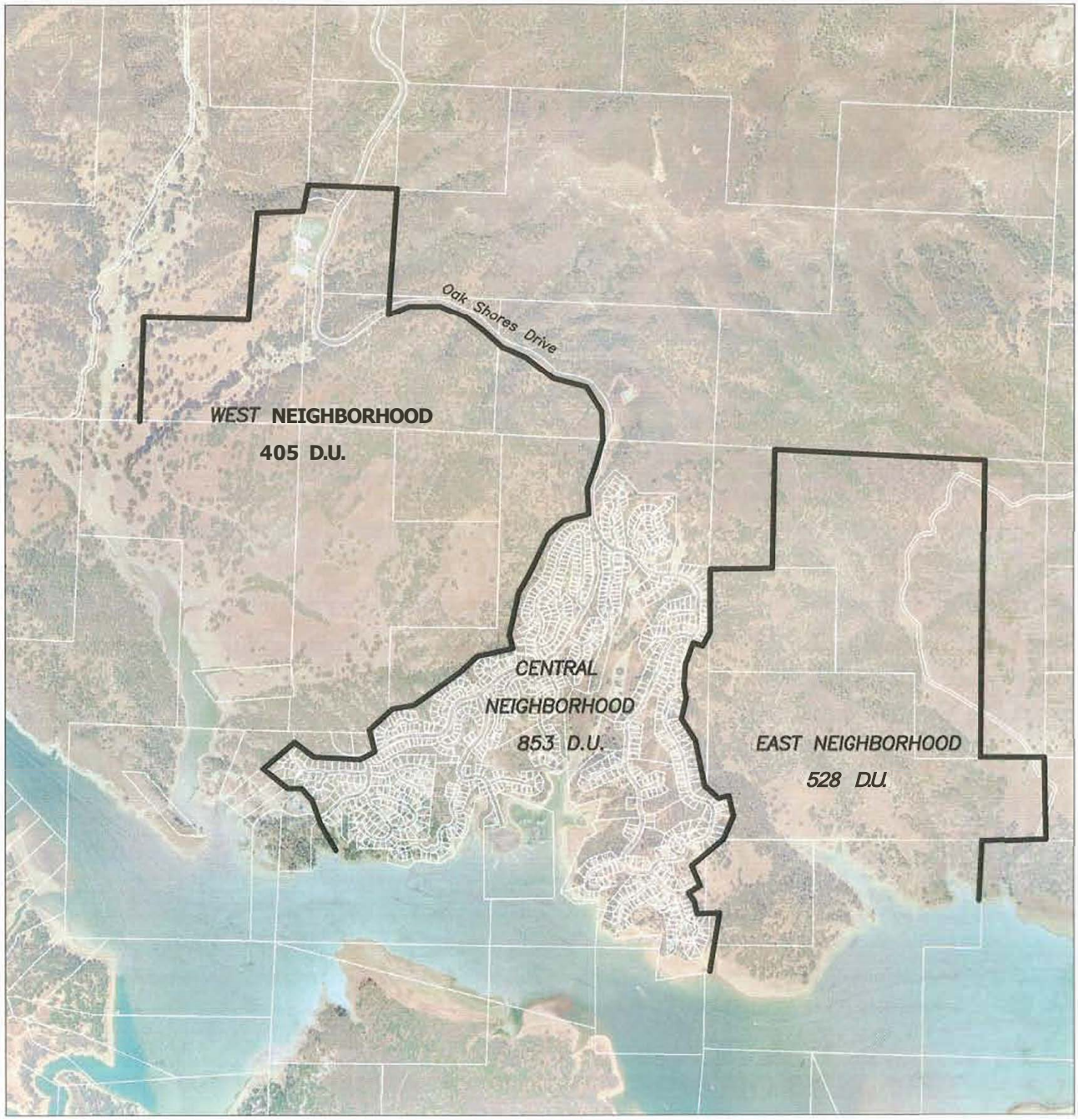
SCALE
0 500 1000

EXHIBIT 1

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY
EXISTING SEWER COLLECTION, TREATMENT AND DISPOSAL SYSTEM

(Rev 7/12/04)



LEGEND

- Neighborhood Boundary •

D.U. Dwelling Unit

• Per Figure 8-4 of the Nocimiento Area Pion, revised November 7, 1996

N

SCALE

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REVISIONS

mo/day/yr	By name	comments

EXHIBIT 2

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY

OAK SHORES NEIGHBORHOODS
DWELLING UNIT ALLOCATIONS

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2.0 Existing Facilities

2.1 Collection System

The East Branch sewer interceptor line (Exhibit 3) is a gravity collector which serves Tract 381 of the Central Neighborhood. There are 298 approved building lots in this tract. All of these lots are served by the interceptor, which has approximately 7 tributary collectors from Tract 381. The East Branch sewer interceptor is approximately 4,700 feet long, and the entire length is buried beneath the lake high water line (HWL). There are 24 manholes along the length of the interceptor. All of these manholes are below the HWL, the lowest being 19 feet below the HWL. The manholes are sealed with rubber gaskets, which were originally tested to a pressure of 20 psi.

The West Branch sewer interceptor line (Exhibit 4) is also a gravity collector, serving 555 approved building lots in Tracts 378-380 of the Central Neighborhood through approximately 13 tributary collectors. The West Branch sewer interceptor is approximately 5,050 feet long, with 25 manholes and is also buried beneath the lake HWL.

As shown in Exhibit 2, the Eastside and Westside interceptors empty into Lift Station #3 (LS #3) which is approximately 60 feet deep. The bottom of the wetwell is approximately 55 feet below the HWL.

There have been operational and safety problems with the interceptor collection system in the past. Manholes have become unsealed, while below the lake, and the sewer line and lift station have been flooded. A leak could potentially cause serious contamination to the lake, and the infiltration of lake water into the interceptor could overwhelm the lift station, potentially rendering the entire system inoperable until repairs are made. Utilities Division personnel currently conduct annual dye testing to detect leaks in the interceptor. If a leak is detected, repairs can only be made after the lake level drops below the interceptor.

There are a number of other safety concerns associated with the interceptor collection system. Boats sometimes collide with submerged sewer lines or manholes and tie up to exposed sewer lines on the shore. Much of the interceptor and its manholes and tributary collector lines are located in steep, inaccessible terrain, making access for maintenance difficult. In addition, Lift Station No. 3 in its current configuration is a confined space and presents a safety hazard to maintenance workers. It should be noted that the lift station is tentatively scheduled to be retrofitted with retractable pumps on slide rail assemblies in the Spring of 2005.

2.2 Treatment and Disposal System

Evaluation of the existing wastewater treatment and disposal system is beyond the scope of this report. Information in this section is provided as background only, and has been excerpted from a report prepared by the County Public Works Department Water Quality Lab entitled "Oak Shores Disposal Area Expansion Project" (January 2001).

LEGEND

- Existing Interceptor Sewer
- Existing Gravity Sewermoin
- Existing Forcemoin
- Existing Sewer Manhole
- Existing Sewer Cleanout
- Existing Sewer Lift Station

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SCALE

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Date mo/day/yr	By name	Comments comments

EXHIBIT 3

SAN LUIS OBISPO COUN7Y
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY

EXISTING SEWER COLLECTION SYSTEM
EASTS/DE

(Rev 7/12/04)

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- Existing Interceptor Sewer
- Existing Gravity Sewermain
- Existing Forcemcin
- Existing Sewer Manhole
- Existing Sewer Cleanout
- Existing Sewer Lift Station

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SCALE

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EXHIBIT 4

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHOR£S
/NTERC£PTOR BYPASS STUDY

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W£STSID£

(Rev 7/12/04)

The existing treatment facility (Exhibit 9) provides secondary treatment with disposal accomplished through percolation basins and spray fields. The current waste discharge requirements of the California Regional Water Quality Control Board (RWQCB) are contained in Order No. 01-130, which is included in this report as Appendix E. Current waste discharge requirements allow the plant to treat a monthly daily average flow of 100,000 gpd of wastewater. Solids are digested in two circular aeration ponds with a capacity of 400,000 gallons each. According to Rick Meeks, the supervising operator of the plant, the ponds were cleaned out and Hypalon liner installed in the past 11 years. Additional settling of the treated wastewater takes place two rectangular lagoons with a combined capacity of 1.62 million gallons.

From the lagoons, effluent is pumped through a 12", 9500-foot long ACP sewer forcemain into two ponds at the spray field. The ponds and spray field area are located on 8.15 acres near Oak Shores Drive, as shown on Exhibit 1. Reclaimed water is pumped from the ponds and dispersed using spray irrigation onto 3.8 acres of disposal fields at this site. The treated effluent then percolates into the soil. The disposal fields are designed so that any excess water on the fields will return to the spray field ponds.

During the winter months, the disposal site becomes saturated causing surface ponding. Because additional disposal area is needed during the winter months, the County of San Luis Obispo, with RWQCB approval, constructed two temporary percolation ponds at the nearby Kavanaugh site. During the winter, treated wastewater is pumped from the existing spray field ponds to the Kavanaugh ponds approximately 1700 feet away. The County has identified a project to purchase an easement and construct permanent facilities at the Kavanaugh site.

3.0 Evaluation and Design Criteria

It should be noted that limited topographic and/or record drawing data was available for both the existing collection system and locations for conceptual improvement facilities. County maintenance personnel have identified inconsistencies with record drawings of the collection system. For this reason, minimum grades were assumed for most of the proposed gravity sewer lines and higher contingency and other adjustment factors were included in the cost estimates.

The criteria used to evaluate retrofit alternatives and the ability of the CSA 7A collection system to meet build-out demand after abandonment of the existing Interceptor sewers are outlined below.

3.1 Build-out Wastewater Flows

This study looked primarily at build-out of property within the existing CSA 7A boundary only, which includes the Central Village and Phase 1 of Tract 2162. For the purpose of this study, it was assumed that build-out wastewater flows included 100% occupancy, with 250 gpd per dwelling unit (100gal/day/capita, 2.5 people per residence), as described in the County Planning Department's Nacimiento Area Plan and the report prepared by the County Public Works Department Water Quality Lab entitled "Oak Shores Disposal Area Expansion Project" (January 2001). The existing Activity Center (adjacent to the boat launch facility) was assumed to have a wastewater demand equivalent to approximately 10 residential dwelling units, based upon annual water meter records obtained by Patty McPhee.

For evaluating the existing collection system and sizing new pipes and lift stations, a peaking factor of 2.0 times the average daily flow was assumed, as prescribed in Section 11-351.1611 of the SLO County Standard Improvement Specifications. Build-out demand at key points in the Eastside and Westside collection system are provided in Exhibits 7 and 8, respectively. Demand is represented on the basis of equivalent dwelling units tributary to the manholes shown, and the Exhibits illustrate the proposed collection system (i.e. with recommended modifications).

3.2 Gravity Collection System

As described in Section 11-351.1611 of the SLO County Standard Improvement Specifications, it was assumed that new and existing gravity sewer pipes would be evaluated based on a maximum flow with the pipe flowing half full (d/D = 0.5). The peak flow condition was assumed to be the average daily flow tributary to the sewer pipe with a peaking factor of 2.0. As described in the County Standard Specifications, a minimum pipe size of 8" was considered for new or replacement sewers. Using Manning's equation and these criteria, rating tables were developed to identify the flow capacity for various types and sizes of pipes with varying slope. The rating tables are

included in Appendix F. The rating tables were used to evaluate the ability of the existing collection to meet build-out flow conditions.

3.3 Lift Stations and Forcemains

Concept plan lift stations were generally sited in locations which would provide access for operation and maintenance, including connection of backup generators or portable pumps. It was assumed that these lift stations would include submersible, non-clog pumps with the ability to pass 3" solids, with similar construction to the existing lift stations at the site. Since the pumps will handle 3" solids, it was assumed that the minimum size of new forcemains would be 4", which is the size of the majority of the existing forcemains at the site. In order to keep solids in suspension and provide self-cleaning through scouring, the minimum velocity of flow in the proposed forcemains was assumed to be 2.0 feet per second. For a 4" pipe, this velocity is equivalent to a flowrate of approximately 100 gpm, which appears to be the selected operating point for most of the existing pumps in the Oak Shores collection system. It is worth noting that, assuming a peaking factor of 2.0 and average flow of 250 gpd per residence, 100 gpm is equivalent to an average daily flow of 72,000 gpd, or approximately 288 equivalent dwelling units.

It appears that the existing lift stations at Oak Shores were designed as duplex (two pump) installations and intended to meet projected demands with simplex (single pump) operation. In this way, redundancy is provided at each lift station. The system controls typically alternate each pump operating in the lead or lag position to provide uniform operation and wear. Given the remoteness of the community and number of lift stations to be maintained, it is felt that this is a prudent design concept, and it was therefore assumed that proposed lift stations be designed as duplex facilities with the ability for peak demands to be met by a single pump.

4.0 Evaluation Results and Concept Plan Capital Improvements

The improvements proposed as part of a concept plan to allow elimination of the existing Eastside and Westside interceptor sewers were developed using the criteria described in the previous section. The build-out wastewater flows were assumed tributary to the existing and proposed collection system in accordance with the equivalent dwelling unit concentrations illustrated in Exhibits 7 and 8. Results of the evaluation of the existing collection system and proposed improvements are described below.

4.1 Gravity Collection System

As described in the previous section, rating tables were used to evaluate the ability of the existing collection to meet build-out flow conditions. Detailed modeling of each sewer pipeline of the existing collection system was beyond the scope of this study. Instead, limiting (i.e. small pipe diameter and/or minimum slope) pipeline reaches within individual collector systems were evaluated. The results of the evaluation for the existing collection system at build-out are presented in Tables 1 and 2.

The concept plan improvements to the Eastside and Westside collection system are illustrated in Exhibits 5 and 6, respectively. As shown on the Exhibits, there are certain existing residences or undeveloped lots that will apparently require private on-site sewage pump stations. According to preliminary research into such systems, 110volt pumps have a lifting capacity of 20' or less, while a majority of the houses needing pumps will require lifts between 25 and 100' in order to convey sewage to the nearest gravity sewerline. Therefore, alternative 230volt systems may be required. Detailed descriptions of the improvements to the collection system are included in Appendices A and B.

As part of the process to evaluate the existing collection system and to identify proposed improvements, input was received from Patty McPhee and Rick Meeks, the operators of the wastewater system, regarding known problems with the existing collection facilities. Problem areas they identified and proposed remedies can be summarized as follows:

A. Bluff Court. There have been a number of flow stoppages in the gravity main running between the Bluff Court cul-de-sac and the Westside Interceptor. County maintenance staff recently performed a video survey of the line and determined that the stoppages were due to an improperly installed service lateral connection leading to root intrusion. Staff subsequently repaired the connection and removed the roots, and the line has been functioning well since. It should be noted that the line would be abandoned after construction of the Bluff Court Lift Station (Westside Improvement No. 4).

B. Captains Walk / Oak Shores Drive Intersection. According to the as-built drawings for Tract 379, the existing sewer manhole at the intersection of Oak Shores Drive and Captains Walk is approximately 4' deep. There have been ongoing maintenance concerns (i.e. stoppages, slow moving flow) with approximately 300 linear feet of sewer line northeast of this manhole to the next manhole on Shoreline Drive and approximately 206 linear feet of sewer line north

to the next manhole on Captains Walk. The as-built drawings show the lines as being constructed at a grade of 0.5%, and recent video surveys have shown numerous sags in the lines. The slight grade and sags in the line have prevented self-cleaning flow velocities to be established, leading to clogs and maintenance concerns. Reconstruction of these facilities is included in this report as part of Westside Improvement No. 13.

C. Shoreline Road at Cove Court. There have been flow problems for a portion of the sewer line on Shoreline Road, running between the manhole at Cove Court and the manhole between Lots 92 and 93 of Tract 381. In addition, there have been maintenance concerns with a portion of the sewer line running from this manhole to the Eastside Interceptor between Lots 92 and 93. It should be noted that the line on Shoreline Drive would be reconstructed and the line between Lots 92 & 93 would be abandoned after construction of the Cove Court Lift Station (Eastside Improvement No. 9).

4.2 Lift Stations and Forcemains

According to discussions with County maintenance staff, the existing lift stations are operating well. The lift stations appear to have sufficient capacity to accommodate build-out of the current CSA 7A boundary. Locations of the existing and concept plan lift stations are illustrated in Exhibits 5 and 6. Physical and operating data (assuming build-out flows) for the existing and proposed lift stations are presented in Tables 3 and 4. Detailed descriptions of the proposed lift stations are included in Appendicies A and B.

4.3 Cost Estimates

Concept plan improvements to the CSA-7A collection system were developed after evaluating various alternatives for modifying the existing collection system and estimating impacts of build-out flows to the existing collection system. Estimated construction and project costs for the conceptual improvements to the Eastside and West side collection systems are included in Appendices C and D, respectively. Due to the limited nature of topographic and as-built data available at the time this report was prepared, higher contingency and other adjustment factors were included in the cost estimates. The following assumptions were made in developing the cost estimates for this study:

Miscellaneous Unit Costs Historic ranges of unit prices for constructing new gravity sewer and forcemain piping, manholes and tying into existing manholes were discussed with Dean Benedix in the Design Division of the County Public Works Department. In most cases, unit prices at the high end of the range were used for this study to account for the conceptual nature of the proposed improvements.

Lift Stations It was assumed that the new lift stations will have similar construction as the existing lift stations on Rough, Ready and Boat Hook Roads, which had major retrofitting in 1995. The construction will include: duplex submersible pumps with slide rail assemblies in a 48" diameter precast concrete wetwell; external precast concrete

valve vault with plug valves, check valves and tee with camlock coupling for connecting pumping equipment in the event of a power failure; pad-mounted pump control panel. The 1995 retrofit included all of these improvements, but excluded the pumps and the bottom 4' of the wetwell, which were existing and incorporated into the retrofit design. The construction contract was approximately $100,000 for three lift stations, or about $35,000 per lift station. For this study, the lump sum amount was increased to $60,000 per proposed lift station, to account for the pumps, construction of the wetwell and extension of electrical service to the site. This amount was increased to $100,000 for three larger lift stations (Eastside Improvements No. 1 and 9, Westside Improvement No. 9) and was increased to $150,000 for the lift station (Westside Improvement No. 16) intended to replace Lift Station No. 3.

Directional Boring According to an estimator at Tidwell Excavating, a budget cost for construction of a gravity sewer line using directional boring methods would be roughly $92 per foot, excluding the pipe. For this study, the unit price was increased to $200 per foot to allow for mobilization, pipe cost, excavation of sending and receiving pits, and to account for their work being performed as a subcontractor.

Pipe Bridge It was assumed that the concept plan pipe bridges would have construction similar to a pipe bridge built over the Chorro Creek in 1995 as part of a reclaimed water pumping system to serve the County's Dairy Creek Golf Course. According to the contractor for the job, the actual construction cost for the 110' long structure was approximately $50,000, or about $500 per foot including construction of concrete pile foundations, fabrication of the structure, delivery to the site and installation. The contractor recommended that the estimate be increased for budget purposes. For this study, a unit price of $1000 per foot was assumed, including concrete pile foundations, offsite fabrication of the structure, delivery to the site and installation.

Sewer Eiector Pumps Product literature was reviewed for individual packaged sewer ejector pump systems. It was assumed that 230volt pump systems would be required to accommodate the vertical lift. According to a service representative at PG&E, the existing residences at Oak Shores have 120/240 volt service and it should be relatively easy for an electrician to add a 20-amp, 240volt breaker to an existing panel to accommodate the pump unit. According to a local supplier, the list price for a typical packaged system would be approximately $3800, including simplex pump, control panel, basin and discharge piping. A lump sum cost of $6,000 for each unit was assumed for this study, to account for installation of the packaged system at the site, wiring and extension of discharge piping to the new gravity sewer main in the adjacent street.

Extended Cost Estimation of contingency and mark-ups for other direct project costs were based upon guidelines presented in the "Project Management Manual", published by the County Public Works Department in June 2003. A contingency of 50% was applied to the estimated construction cost to account for the conceptual nature of the proposed improvements. In accordance with the Project Management Manual, project cost mark-ups totaling 82% were applied to the estimated construction costs after the 50% contingency factor was applied. In order to simplify the calculations, flagging costs were included in the mark-ups as a 2% multiplier. It was assumed that certain construction items (e.g. lift stations outside of the roadway) would not require flagging,

and that other items (e.g. sewer lines and manholes in streets) could share flagging. In consideration of this and given the remote location and low traffic volumes at the site, it was assumed that 2% would be reasonable to account for flagging/traffic control for the overall project. Consideration of project financing was beyond the scope of this study, so financing costs were not included for this report.

San Luis Obispo County Public Works Department
Oak Shores Interceptor Bypass Study

Table 1
Limiting Reaches of Eastside Collection System at Buildout[1]

Location	Pipe	Slope	Length L.F.	Capacity MGD[1]	D.u.2	Demand D.U.3	Comments
Lakeview Drive							
between Rough & Ready Roads	6"ACP	0.5%	300	0.128	256	45	Adequate
between Ready & Shoreline Roads	6" ACP	0.5%	70	0.128	256	3	Adequate
Rough Road	6" ACP	0.5%	180	0.128	256	16	Adequate
Ready Road	6" ACP	4.0%	180	0.363	726	45	Adequate
Boat Hook Road	6"ACP	5.5%	90	0.425	850	9	Adequate
Shoreline Road							
between Lakeview & Boat Hook Roads	6"ACP	7.8%	320	0.287	574	63	Adequate
between Boat Hook & Woody Point Roads	6"ACP	2.0%	650	0.256	512	114	Adequate
between Woody Point and Cove Lane	6" ACP	6.0%	50	0.444	888	6	Adequate
between Cove Lane and Bass Point Road	6" ACP	10.8%	300	0.596	1192	164	Adequate
between Bass Point and Smith Point Roads	6" ACP	0.5%	160	0.128	256	134	Adequate, but may limit future phases of Tract 2162
between Smith Point and East Point Circle	6" ACP	0.5%	190	0.128	256	2	Adequate
Woody Point Lane	6" ACP	9.8%	360	0.573	1146	9	Adequate
Cove Lane							
Between Shoreline and Pine Branch Roads	6" ACP	2.8%	240	0.287	574	19	Adequate
Bass Point Road	6"ACP	0.5%	260	0.128	256	21	Adequate
Smith Point Road	6"ACP	8.8%	220	0.529	1058	25	Adequate
East Beach Circle	6" ACP	0.5%	100	0.128	256	80	Adequate, but may limit future phases of Tract 2162
Pine Ridge Road							
between Ridge and Boat Hook Roads	6"ACP	2.0%	240	0.256	512	19	Adequate
North of Pine Branch Road	6" ACP	2.0%	110	0.256	512	40	Adequate
between Pine Branch & Shoreline Roads	6" ACP	14.0%	170	0.678	1356	13	Adequate
Pine Branch Road	6" ACP	14.0%	170	0.669	1338	13	Adequate

Notes:
1. Assuming pipe slope rounded to nearest 0.5% with d/D of 0.5, per SLO Co Std Improvement Spec. 11-351.1611
2. Assuming 250 gpd per dwelling unit and a peaking factor of 2.0, per SLO Co Std Improvement Spec. 11-351.1611
3. Assuming buildout of the Central Village and Phase 1 of Tract 2162 only.

San Luis Obispo County Public Works Department
Oak Shores Interceptor Bypass Study

Table 2
Limiting Reaches of Westside Collection System at Buildout[1]

Location	Pipe	Slope	Length L.F.	Capacity MGD[1]	D.U.2	Demand D.U.3	Comments
Oak Shores Drive							
between Captains Walk and Anchor	6"ACP	4.42%	440	0.363	726	22	Adequate
between Anchor and Captains Walk	6"PVC	0.50%	447	0.139	278	135	Adequate
between Captains Walk and Fan Court	6"ACP	0.96%	300	0.181	362	296	Adequate
between Tree Trap Road and Lookout Loop	6"PVC	2.85%	290	0.311	622	7	Adequate
at Landlubber Lane	6"PVC	5.00%	240	0.439	878	32	Adequate
Ridge Rider Road							
South to Lakeview Drive	6"PVC	12.50%	190	0.694	1,388	26	Adequate
between Lakeview Drive and Anchor Way	6"PVC	0.30%	440	0.108	216	89	Adequate
Anchor Way	6"PVC	0.50%	210	0.139	278	103	Adequate
Stern Deck Road	6"PVC	8.20%	140	0.556	1,112	14	Adequate
Captains Walk							
South to Stern Deck	6"PVC	0.74%	140	0.139	278	58	Adequate
Stern Deck Road to Stub End Circle	8"PVC	0.50%	370	0.299	598	503	Adequate, but may limit future outside of Central Village
Stub End Circle to Lot 140	8" PVC	13.32%	300	1.525	3,050	534	Adequate
Lot 140 to back of Lot 143	8"PVC	21.00%	210	1.939	3,878	538	Adequate
Stub End Circle	6"PVC	11.00%	260	0.651	1,302	18	Adequate
Crows Nest Loop							
Between Turkey Cove Road and Oak Shores Drive	6"ACP	3.00%	290	0.314	628	207	Adequate
Crows Nest to Stub End Circle	6"PVC	3.56%	160	0.367	734	18	Adequate
Fan Court to Lift Station No. 2	6"ACP	0.50%	75	0.128	256	12	Adequate
Tree Trap Road	6"PVC	0.35%	380	0.116	232	66	Adequate
Landlubber Lane	6"PVC	0.65%	300	0.139	278	32	
Turkey Cove Road							
South to Capstan Circle	8"PVC	10.70%	320	1.371	2,742	20	Adequate
Capstan Circle to Activity Center	8"PVC	2.00%	60	0.598	1,196	26	Adequate
Capstan Circle	6"ACP	2.00%	180	0.256	512	6	Adequate
Deer Trail Court							
through Water Plant to Saddle Way	6"ACP	0.50%	320	0.128	256	12	Adequate
Spike Court to Saddle Way	6"ACP	1.45%	650	0.222	444	22	Adequate
Saddle Way to Pronghorn Court	6"ACP	14.68%	50	0.690	1,380	32	Adequate
Pronghorn Court	6"ACP	1.54%	50	0.222	444	32	Adequate
Circle Oak Drive							
North Circle Oak West to Saddle Way	6"ACP	6.98%	180	0.480	960	12	Adequate
North Circle Oak South to Bluff Court	6"ACP	5.70%	130	0.425	850	15	Adequate
Bluff Court	6"ACP	8.42%	120	0.513	1,026	19	Adequate
Saddle Way							
Deer Trail to Circle Oak Way	6"ACP	2.00%	180	0.256	512	55	Adequate
Circle Oak Way to New Lift Station at Water Plant	6"ACP	6.00%	260	0.444	888	10	Adequate

Notes:
1. Assuming pipe slope rounded to nearest 0.5% with d/D of 0.5, per SLO Co Std Improvement Spec. 11-351.1611
2. Assuming 250 gpd per dwelling unit and a peaking factor of 2.0, per SLO Co Std Improvement Spec. 11-351.1611
3. Assuming buildout of the Central Village and Phase 1 of Tract 2162 only.

San Luis Obispo County Public Works Department
Oak Shores Interceptor Bypass Study

Table 3

Existing Lift Station Data

Name	Location	Flow Data				Elevation Head			Forcemain		Losses		TOH	Comments
		Buildout Demand[1]		Proposed Caoacity[3]		Pump Off	Discharge[6]	Delta H	Diameter	Length	Friction[7]	Minor[8]		
		(D.U.)[2]	(gpd)	(gpm)	gpd[4]	EL (ft)	EL(ft)	EL(ft)	(in)	(ft)	(ft)	(ft)	(ft)	
L.S.#1	Westside, west of Tree Trap Road	45	22,500	100	72,000	908	950	42	4	135	1.2	12	55	
LS. #2	Westside, west of Fan Court	80	40,000	100	72,000	920	983	63	4	510	4.5	12	79	
L.S. #3	Approximately 800' south of WWTP headworks	907	453,500	350	252,000	792	877	85	12 4	600 225	0.3 20.0	12	117	
L.S.#4	End of Rough Road cul-de-sac	16	8,000	100	72,000	1,002	1,038	36	4	520	4.6	12	53	
LS. #5	End of Ready Road cul-de-sac	45	22,500	100	72,000	1,008	1,018	10	4	330	2.9	12	25	
L.S. #6	End of Boat Hook Road cul-de-sac	9	4,500	100	72,000	990	1,005	15	4	175	1.5	12	29	

Notes:
1. Assuming Phase 1 of Tract 2162 and buildout of Central Neighborhood only
2. Equivalent "Dwelling Unit" flow assumed to 250 gpd
3. Minimum pump flowrate selected to provide 2.0 fps flow in forcemain; assume duplex pump station with only one pump running
4. Assuming a peaking factor of 2.0
5. Assumed to be the bottom of the lift station wetwell unless noted otherwise
6. Assumed to be the invert elevation of the forcemain at the discharge point into the manhole
7. Hazen -Williams head loss. assuming C = 120
8. Assume minor losses are approximately 12' (approx 5 psi)
9. According to as-built drawings, the existing forcemain at Lift Station #3 is 12" and transitions to 4" near the gated entrance to the wastewater treatment plant.

San Luis Obispo County Public Works Department
Oak Shores Interceptor Bypass Study

Table 4

Concept Plan Lift Station Data

Name	Location	Flow Data				Elevation Head			Forcemain		Losses		TDH	Horseoower			Comments
		Buildout Demand[1]		Prooosed Caoacitv3		Pump off[4]	Discharge[6]	Delta H	Diameter	Length	Friction[7]	Minor[8]		Hydraulic[9]	Etectrical[10]	Selected[11]	
		(D.U.)[2]	(gpd)	laam)	gpd'	EL(ft)	EL(ft)	EL(ft)	(in)	(ft)	(ft)	(ft)	(ft)	(Hp)	(Hp)	!Hal	
L.S. #1	Westside, west of Tree Trap Road	45	11,250	100	72,000	908	950	42	4	135	1.2	12	55	1.4	2.9	5.0	
L.S. #2	Westside, west of Fan Court	80	20,000	100	72,000	920	976	56	4	440	3.9	12	72	1.8	3.8	5.0	
L.S. #3	Approximately 800' south of WWTP headworks			N/A													Assuming LS #3 is abandoned after construction of Westside Improvement 16
L.S. #4	End of Rough Road cul-de-sac	16	4,000	100	72,000	1,002	1,038	36	4	520	4.6	12	53	1.3	2.8	5.0	
L.S. #5	End of Ready Road cul-de-sac	45	11,250	100	72,000	1,008	1,018	10	4	330	2.9	12	25	0,6	1.3	5.0	
L.S. #6	End of Boat Hook Road cul-de-sac	9	2,250	100	72,000	990	1,005	15	4	175	1.5	12	29	0.7	1.5	5.0	
	East Beach Circle	96	24,000	200	144,000	798	955	157	4	1,200	37.9	12	207	10.5	21.8	15.0	Proposed Eastside Improvement 1
	Smith Point Road	25	6,250	100	72,000	867	955	88	4	750	6.6	12	107	2.7	5.6	10.0	Proposed Eastside Improvement 5
	Bass Point Road	21	5,250	100	72,000	840	932	92	4	600	5.3	12	109	2.8	5.8	10.0	Proposed Eastside Improvement 7
	Cove Lane	222	55,500	200	144,000	852	905	53	4	330	10.4	12	75	3.8	7.9	10.0	Proposed Eastside Improvement 9
	Saddle Way	22	5,500	100	72,000	896	955	59	4	650	5.7	12	77	1.9	4.0	5.0	Proposed Westside Improvement 1
	Bluff Court	19	4,750	100	72,000	877	924	47	4	360	3.2	12	62	1.6	3.3	5.0	Proposed Westside Improvement 4
	Near Activity Center	202	50,500	200	144,000	792	1,000	208	6	1,640	7.2	12	227	11.5	23.9	30.0	Proposed Westside Improvement 9
	At L.S. #3[12]	907	226,750	400	288,000	792	877	85	12 4	600 225	0.3 25.6	12	123	12.4	25.9	30.0	Proposed Westside Improvement 16 (Replaces L.S. #3)

Notes:
1. Assuming Phase 1 of Tract 2162 and buildout of Central Neighbortiood only
2. Equivalent "Dwelling Unit" flow assumed to 250 gpd
3. Minimum pump flowrate selected to provide 2.0 fps flow in forcemain; assume duplex pump station with only one pump running
4. Assuming a peaking factor of 2.0
5. Assumed to be the bottom of the lift station wetwell unless noted otherwise
6. Assumed to be the invert elevation of the forcemain at the discharge point into the manhole
7. Hazen -Williams head loss, assuming C = 120
8. Assume minor losses are approximately 12' (approx 5 psi)
9. Assuming hydraulic horsepower (hp)= TDH(feet) • Q(gpm) 13956.
10. Assuming electrical horsepower (hp) to the motor= hydraulic horsepower(hp) / pump efficiency(approx. 60%) I motor efficiency(approx 80%)
11. Assuming motor selected with additional capacity to allow for pump wear or impeller replacement to accommodate future growth.
12. According to as-built drawings, the existing forcemain at Lift Station #3 is 12" and transitions to 4" near the gated entrance to the wastewater treatment plant.
    It is assumed that this new lift station will handle peak flows with two pumps running. Simplex operation will be about 400 gpm & duplex operation will be about 600 gpm.

LEGEND

- Existing Interceptor Sewer
- Existing Gravity Sewermoin
- Existing Forcemoin
- Concept Pion Gravity Sewermain
- Concept Pion Sewer Forcemain
- Existing Sewer Manhole
- Existing Sewer Cleonout
- Concept Pion Sewer Manhole
- Concept Pion Sewer Cleonout
- Existing Sewer Lift Station
- Concept Pion Sewer Lift Station
- Concept Plan Improvement No.
- Concept Pion Grinder Pump Unit

N

SCALE

0 250 500

REVISIONS

Date mo/day/yr	By name	Comments

EXHIBIT 5

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY

CONCEPT PLAN SEWER COLLECTION
SYSTEM: EASTS/OE

(Rev 7/13/04) Oak_Shores_Interceptor_Bypass_Study.dwg

LEGEND

- Existing Interceptor Sewer
- Existing Gravity Sewermoin
- Existing Forcemoin
- Concept Plan Gravity Sewermain
- Concept Plan Sewer Forcemoin
- Existing Sewer Manhole
- Existing Sewer Cleonout
- Concept Pion Sewer Manhole
- Concept Plan Sewer Cleonout
- Existing Sewer Lift Station
- Concept Pion Sewer Lift Station
- Concept Pion Improvement No.
- Concept Plan Grinder Pump Unit

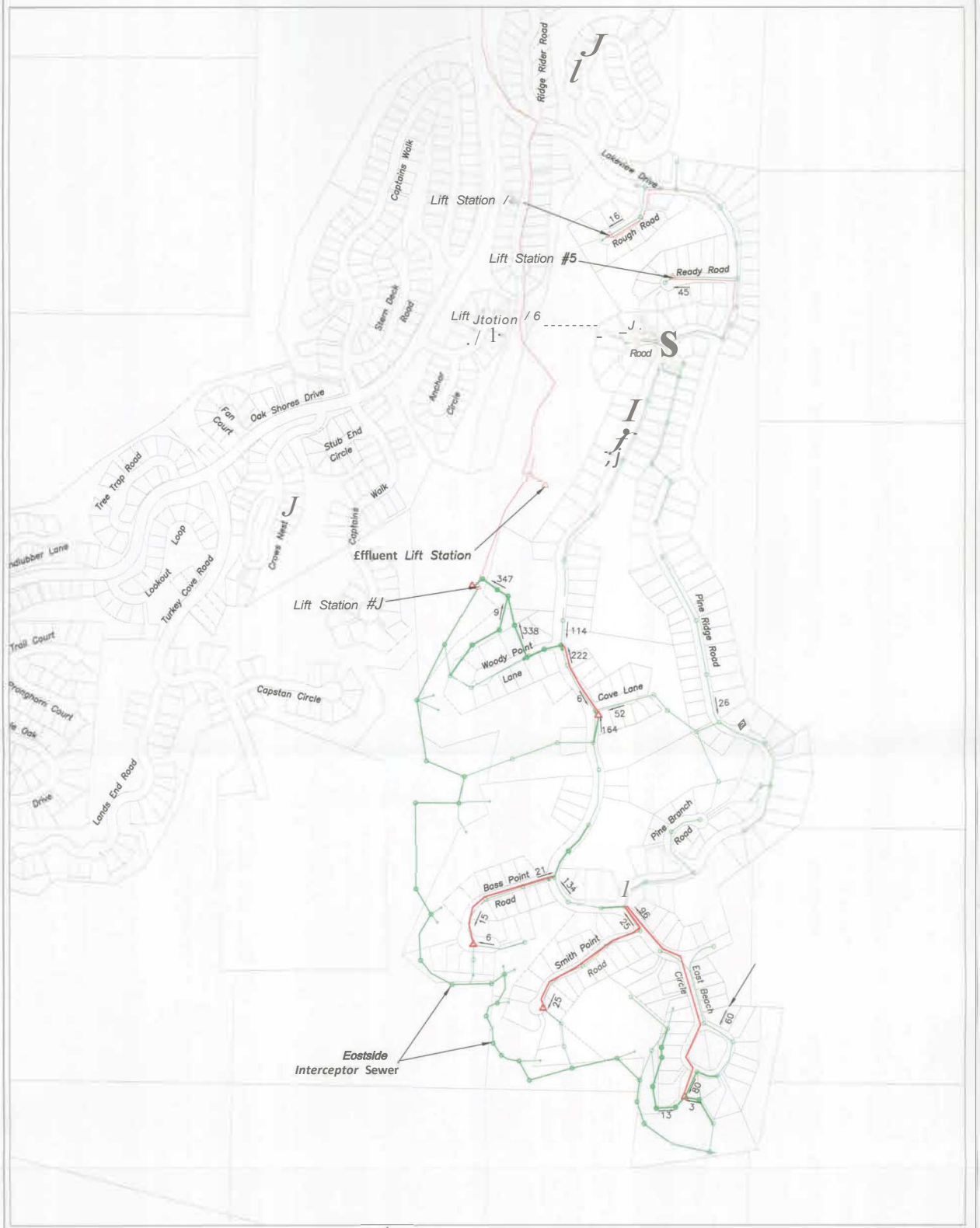
SCALE
250 o

EXHIBIT 6

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY

CONCEPT PLAN SEWER COLLECTION
SYSTEM: WESTSIDE



LEGEND

- Existing Interceptor Sewer
- Existing Gravity Sewermoin
- Existing Forcemoin
- Concept Plan Gravity Sewermain
- Concept Plan Sewer Forcemoin
- Existing Sewer Manhole
- Existing Sewer Cleonout
- Concept Plan Sewer Manhole
- Concept Pion Sewer Cleonout
- Existing Sewer Uft Station
- Concept Pion Sewer Lift Station
- Concept Pion Grinder Pump Unit
- 13 Buildout Flows (D.U.)

N

SCALE

0 250 500

• **Note:** **Buildout wastewater flows are expressed in equivalent dwelling units (D.U.)** and assume buildout of the Central Village and Phase 1 of Tract 2162 only.

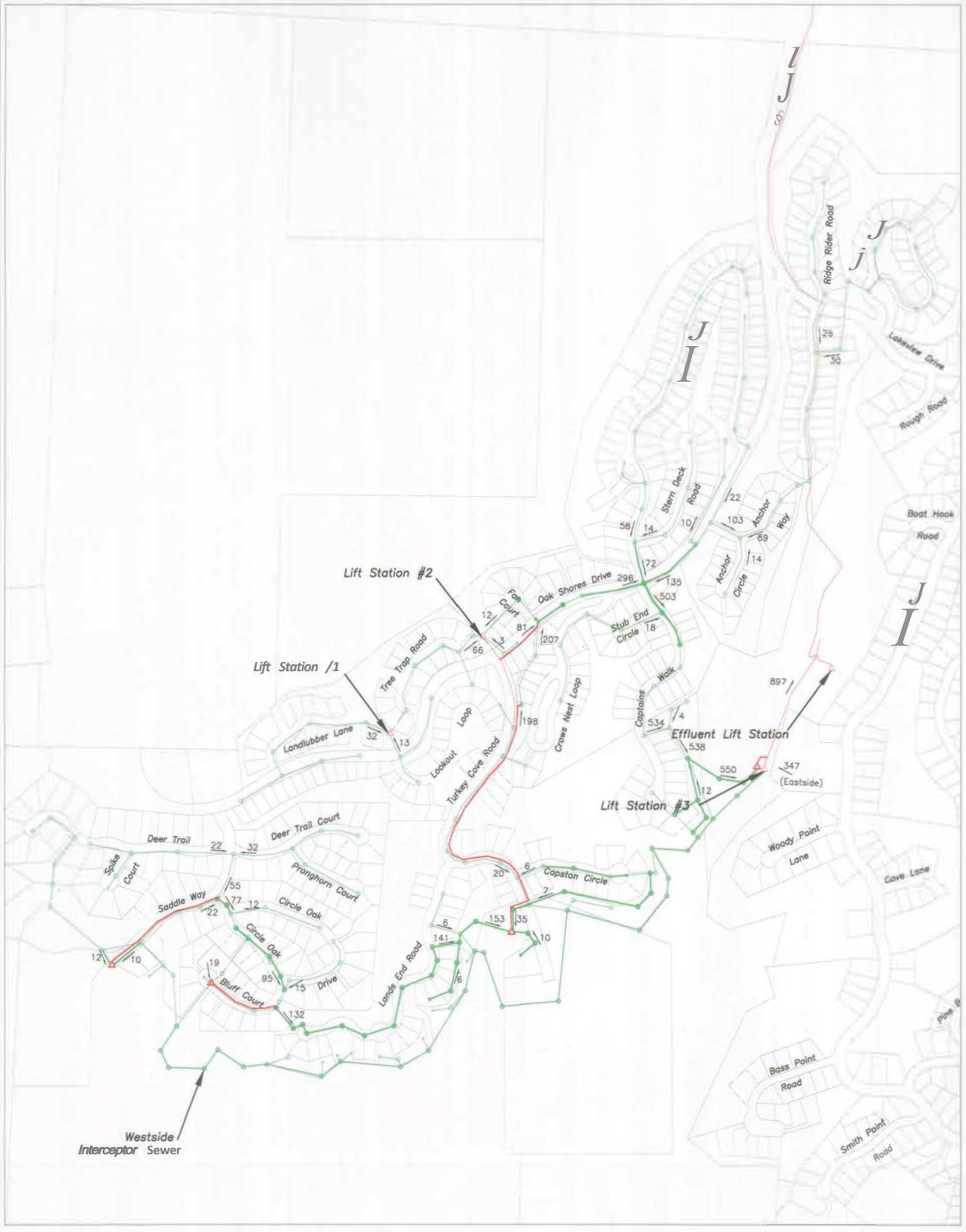
EXHIBIT 7

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY

BUILDOUT WASTEWATER FLOWS*
EASTS/DE

(Rev 7/12/04)



LEGEND

- Existing Interceptor Sewer
- Existing Gravity Sewermoin
- Existing Forcemain
- Concept Pion Gravity Sewermoin
- Concept Plan Sewer Forcemoin
- Existing Sewer Manhole
- Existing Sewer Cleonout
- Concept Pion Sewer Manhole
- Concept Plan Sewer Cleonout
- Existing Sewer Lift Station
- Concept Pion Sewer Lift Station
- Concept Pion Grinder Pump Unit
- Buildout Flows {O.U.)

• Note: Buildout wastewater flows are expressed in equivalent dwelling units (D.U.) ond ossume buildout of the Centrol Village end Phase 1 of Troe! 2162 only.

N

SCALE

0 250 500

EXHIBIT 8

SAN LUIS OBISPO COUNTY
PUBLIC WORKS DEPARTMENT

CSA 7A OAK SHORES
INTERCEPTOR BYPASS STUDY

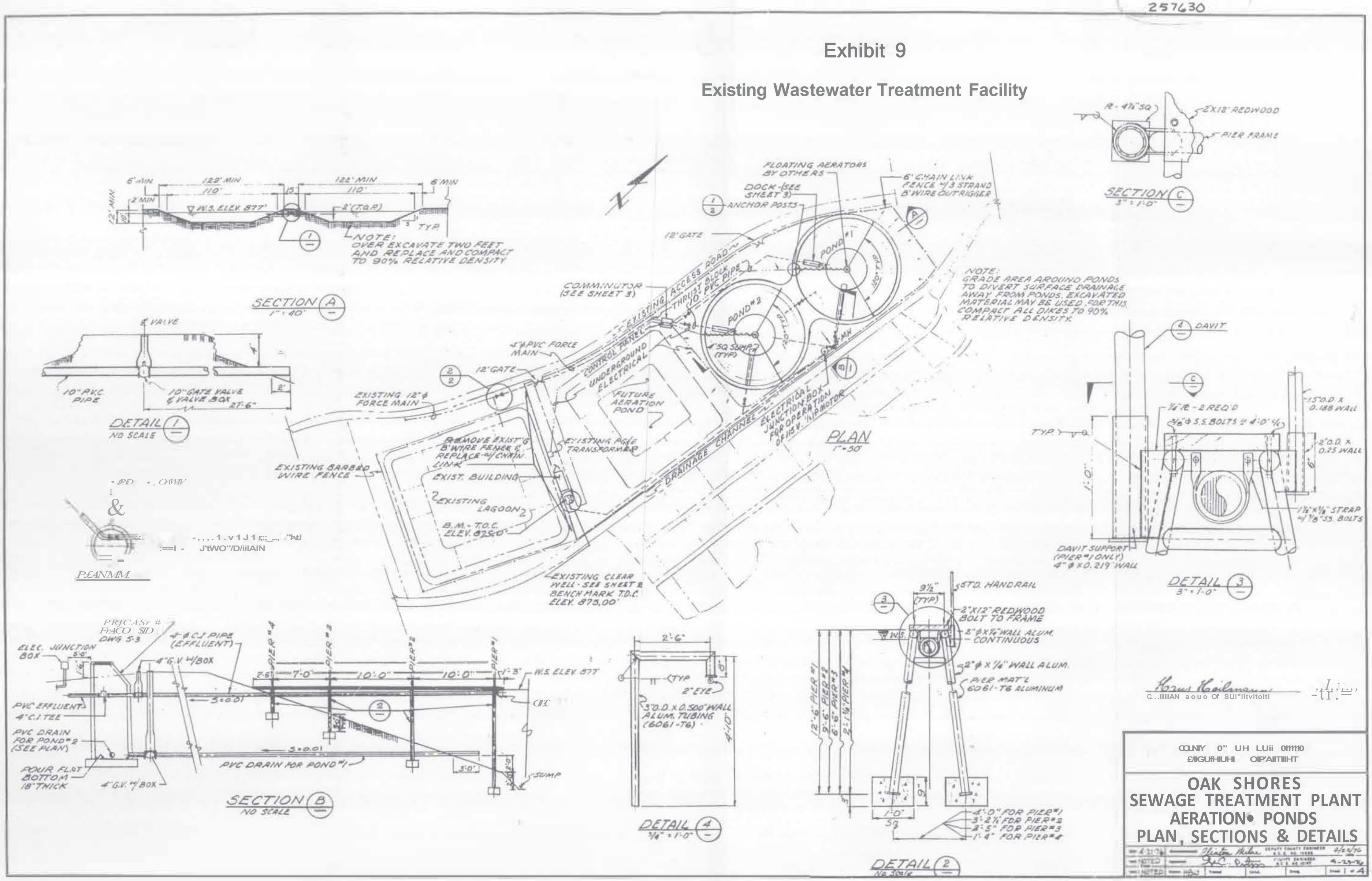
BUILDOUT WASTEWATER FLOWS*
WESTSIDE

(Rev 7/12/04)

257630

Exhibit 9

Existing Wastewater Treatment Facility



5.0 Conclusions and Recommendations

5.1 Conclusions

As described in this report, abandonment of the Interceptor sewer system will require construction of eight new lift stations and approximately 22 sewer ejector pump systems to be maintained by individual homeowners. The proposed improvements reduce the potential for leakage of raw sewage directly to the lake from the Interceptor, eliminate the risk of shutdown of the pumping and treatment facilities due to inflow to a submerged collection system, allow maintenance staff to have year-round access to the entire collection system, and allow Lift Station No. 3 to be replaced with a new lift station that is both more accessible and easier to safely maintain. Conversely, the risk of spills or overflow of raw sewage reaching the lake is not eliminated and could potentially increase due to the increased number of lift stations that would be added by the project. Furthermore most, if not all, project costs will need to be borne by the existing property owners within the current CSA 7A boundary, a total of approximately 913 equivalent dwelling units. Assuming a total project cost of approximately $6.0 million, this amounts to about $6,600 per property owner, exclusive of project financing costs.

In balancing all of the factors discussed above with the amount of capital investment required to construct the proposed improvements, implementation of the overall capital project would not appear to be justified at this time. However, this report has been structured in such a way as to identify a number of individual improvements which could be constructed individually or grouped together to allow a phased abandonment of the Interceptor, or to facilitate rerouting of flows to avoid problem areas in the existing collection system. Such projects could be incorporated into the ongoing capital improvement program for future upgrades to the collection system, as budgets allow.

It should also be noted that expansion of the CSA 7A boundary to include service to the remaining undeveloped parcels of the East and West Neighborhoods will more than double the demand, and will exceed the capacity of the existing treatment and disposal facilities. It is not known whether there is sufficient property at the existing treatment plant to allow expansion to meet the demand at build-out. Therefore, additional or replacement treatment facilities may need to be constructed at a different location as build-out occurs, which may require further modifications to the existing collection system that can not be identified at the present time.

5.2 Recommendations

Based upon the analysis and findings described in this study and discussions with maintenance staff, the following recommendations are made:

1. It is recommended that the Interceptor sewer and Lift Station #3 be maintained at the present time, and that the County proceed with plans to retrofit the lift station with retractable pumps on slide rail assemblies.
2. Future annexations to CSA 7A should be required to construct facilities to convey project wastewater flows directly to the treatment plant, bypassing the Interceptor altogether. As an alternative, properties to be annexed should be

conditioned to build improvements proposed in this report, or to pay a prorated share of the cost for those improvements, based on the number of dwelling units to be added.

3. Exhibits in this report showing the existing collection system were created in Autocad and were based on record drawings which have been noted as having inconsistencies. It is recommended that larger scale atlas maps be created from these exhibits for use in maintenance activities and service area planning. Plots of these maps should be compared with actual conditions in the field by County maintenance personnel and any corrections noted should be incorporated into the Autocad drawings.
4. A contingency plan should be developed identifying emergency procedures to be followed in the event of a spill or overflow of raw sewage from the collection system, including the Interceptor. The plan should address notification of authorities and posting of warning signs, as appropriate, if lake waters will be impacted, and should include procedures to deal with inflow of lake water if a leak is developed in the Interceptor while it is submerged.
5. Maintenance and inspection of the Interceptor is limited to those times when lake levels are low enough to expose the facilities and when the exposed shoreline is dry enough to allow access. County maintenance staff has indicated that, in addition to our regular maintenance program, there should be established a more rigorous program of inspection and repair of Interceptor manholes, and cleaning of the Interceptor sewer lines through vacuuming or jetting. Staff has indicated that this work would need to be performed by contractors and that a gravel road would need to be constructed along the Interceptor to allow access for the maintenance equipment. It is therefore recommended that development of the access road be included in the capital improvement program for CSA 7A, and that "boiler plate" specifications and bid documents be prepared for Interceptor maintenance and repair work, to facilitate bidding and award of such work on relatively short notice, in anticipation of suitable lake conditions to allow access.

Appendix A
Eastside Sewer Collection System
Summary of Concept Plan Improvements

1. New Lift Station at East Beach Circle (Tract 381)

Most of the sewage flows from East Beach Circle are conveyed to the Eastside Interceptor from a sewermain on East Beach Circle, through a manhole at Lot 157 and a sewermain running through the open space adjacent to Lots 157 and 158. The gravity system will eventually receive additional sewage flows from the first phase of Tract 2162 through a proposed gravity sewer between Lots 166 and 167. It is intended to intercept these flows at the manhole at Lot 157 and convey them to a new lift station in the open space parcel adjacent to Lot 156 and then via forcemain to a manhole at the intersection of Shoreline Road and Pine Ridge Road. The proposed improvements include:

a. Construct a new 5' diameter duplex lift station, approximately 24' deep. The bottom elevation will be approximately 796.0', and lid elevation approximately 820.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 798.0'.
b. Construct approximately 1,200 linear feet of 4" PVC forcemain along East Branch Circle and Shoreline Road from the lift station to an existing manhole at the intersection of Shoreline Road and Pine Ridge Road. The discharge elevation of the forcemain will be approximately 955.0'.
c. Construct approximately 150' access driveway from East Branch Circle to the lift station.
d. Construct approximately 150 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole at Lot 156 to the proposed lift station.
e. Connect the gravity sewer to the manhole at Lot 156 through coring or sawcutting and grouting. Plug the existing manhole outlet using grout or other measures.
f. Connect the new forcemain to the existing manhole through coring or sawcutting and grouting.

2. New Gravity Sewer from Lots 157 and 158 (Tract 381)

As described above, sewage flows from East Beach Circle are conveyed to the Eastside Interceptor from a sewermain running beside Lots 157 and 158. These flows will be diverted upstream of this sewerline to the proposed lift station adjacent to Lot 156. It is proposed to divert the flows from Lots 157-159 to the lift station from the existing manhole at the back of Lot 158. The proposed improvements include:

a. Construct a new manhole in the existing gravity sewerline running adjacent to Lots 157 and 158 approximately 105' upstream of the existing manhole at the back of Lot 158. The existing line on the upstream side of the manhole will be plugged and abandoned in place. The new manhole will have a rim elevation of approximately 816' and invert elevation of approximately 803'

b. Construct approximately 100 linear feet of 8" SOR-35 gravity sewer pipe between the new manhole and the new lift station (proposed to be constructed as Improvement 1).
c. Remove approximately 105 linear feet of 6" gravity sewer between the new manhole and the existing manhole at the back of Lot 158. According to the as-built drawings, the existing sewer slopes southeast towards the interceptor at a grade of approximately 0.5%.
d. Construct approximately 105 linear feet of 8" SOR 35 gravity sewer pipe between the new manhole and the existing manhole at the back of Lot 157. The new sewer line will slope to the northwest at a grade of approximately 1.0%. [It should be noted that the owner of Lot 158 appears to have constructed landscape and hardscape improvements beyond the property line for Lot 158 and over the existing sewerline]
e. Reconnect 3 sewer laterals to serve Lots 157-159.

3. Upsize the Gravity Sewer on East Beach Circle (Tract 381)

According to the as-built improvement plans for Tract 381, the slope of the existing gravity sewerline just upstream of the manhole proposed for diversion of flows to the new lift station (proposed to be constructed as Improvement 1) has a grade of 0.5%. Once the flows from Tract 2162 are added to the system, the existing stretch of pipe will not meet the County standard d/O ratio of 0.5 with a peaking factor of 2.0. This improvement intends to upsize the gravity sewer to increase the capacity of the line. The proposed improvements include:

a. Remove approximately 100 linear feet of existing 6" sewer pipe between the existing manholes on East Beach Circle in front of Lots 157.
b. Construct approximately 100 linear feet of 8" SOR 35 gravity sewer pipe between the two existing manholes.
c. Connect the gravity sewer to the two existing manholes through coring or sawcutting and grouting.

4. New Gravity Sewer behind Lots 151-156 near East Beach Circle (Tract 381)

Sewage flows from Lots 143 and 145-156 are conveyed to the Eastside Interceptor via a series of gravity sewers behind the lots. Improvement 4 proposes to construct a new gravity sewer behind Lots 151-156 to convey the flows to the new lift station on the east side of Lot 156 (proposed to be constructed as Improvement 1). The proposed improvements include:

a. Remove approximately 130 linear feet of existing gravity sewer behind Lots 154 and 155.
b. Remove the existing sewer cleanout behind Lot 155.

c. Construct approximately 660 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole at the back of Lot 151, south behind Lots 151-155, around the back of Lot 156 to the new lift station.
d. Connect the new gravity sewer to the existing manhole at the back of Lot 151 through coring or sawcutting and grouting. Plug the outlet to the existing line leading to the Interceptor using grout or other measures.
e. Construct approximately 5 new manholes along the new sewerline.
f. Reconnect 6 sewer laterals to serve Lots 151-156.

5. New Lift Station on Smith Point Road (Tract 381)

Most of the sewage flows from Smith Point Road are conveyed to the Eastside Interceptor from a sewermain on Smith Point Road, through a manhole near the center of the cul-de-sac bulb and a sewermain running between Lots 131 and 132. It is intended to intercept these flows by constructing a new lift station at the location of the existing manhole at the center of the cul-de-sac bulb and then convey them via forcemain to a manhole at the intersection of Shoreline Road and Pine Ridge Road. It is assumed that the existing residences on Lots 128, 129, 131 and 132 will need to construct individual ejector pumps to convey sewage to the existing gravity sewerline fronting their property on Smith Point Road. The proposed improvements include:

a. Remove the existing sewer manhole near the center of the cul-de-sac on Smith Point Road.
b. Construct a new 4' diameter duplex lift station, approximately 10' deep at the site of the existing manhole. Based on as-built improvement plans, the invert of the gravity sewer entering the wet well will be approximately 870.0', the bottom elevation will be approximately 865.0', and lid elevation approximately 875.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 867.0'.
c. Construct approximately 750 linear feet of 4" PVC forcemain along Smith Point Road from the lift station to an existing manhole at the intersection of Shoreline Road and Pine Ridge Road. The discharge elevation of the forcemain will be approximately 955.0'.
d. Connect the new forcemain to the existing manhole through coring or sawcutting and grouting.
e. Construct 4 individual private sewer ejector pumps for Lots 128, 129, 131 and 132.

6. New Gravity Sewer on Shoreline Road at Pine Ridge Road (Tract 381)

Sewage from Pine Branch Road and a large portion of the homes on Pine Ridge Road flow to the Eastside Interceptor through a gravity sewerline on Smith Point Road. Improvement 6 will divert these flows and the flows from

the new lift stations on East Branch Circle and Smith Point Road to the existing gravity sewer on Shoreline Road north of Smith Point Road. The proposed improvements include:

a. Construct approximately 100 linear feet of 8" SOR 35 gravity sewer pipe along Shoreline Road from the existing manhole at Pine Ridge Road (Sta 18+39) to the existing manhole in front of Lot 248 at Sta 19+71.
b. Connect the new gravity sewer to the existing manhole at Sta 19+71 at Shoreline Road through coring or sawcutting and grouting. According to the as-built plans for Tract 381, the invert elevation of the existing manhole is 945.93', and the rim elevation is about 952.8'.
c. Connect the new gravity sewer to the existing manhole at Sta 18+39 at Pine Ridge Road through coring or sawcutting and grouting. Plug the outlet to the existing line heading south on Shoreline Road using grout or other measures. According to the as-built plans for Tract 381, the invert elevation of the existing manhole is 955.44', and the rim elevation is about 960.8'.
d. Construct a new sewer cleanout at approximate Sta 18+35 on Shoreline Road, south of the existing manhole.

7. New Lift Station on Bass Point Road (Tract 381)

Sewage from most of the homes on Bass point Road are conveyed to the Eastside Interceptor from a sewermain on Bass Point Road, through a manhole in front of Lot 106 and a sewermain running between Lots 106 and 107. It is intended to intercept these flows by constructing a new lift station at the location of the existing manhole in front of Lot 106 and then convey them via forcemain to a manhole at the intersection of Shoreline Road and Bass Point Road. It is assumed that the existing residences on Lots 106 and 107 will need to construct individual ejector pumps to convey sewage to the existing gravity sewerline fronting their property on Bass Point Road. The proposed improvements include:

a. Remove the existing sewer manhole in front of Lot 106 on Bass Point Road.
b. Construct a new 4' diameter duplex lift station, approximately 12' deep at the site of the existing manhole. Based on as-built improvement plans, the invert of the gravity sewerlines entering the wet well will be approximately 843.0', the bottom elevation will be approximately 838.0', and lid elevation approximately 850.5'. For planning purposes, it is assumed the pump shut off elevation will be approximately 840.0'.
c. Construct approximately 600 linear feet of 4" PVC forcemain along Bass Point Road from the lift station to an existing manhole at the intersection of Shoreline Road and Bass Point Road. The discharge elevation of the forcemain will be approximately 931 .5'.
d. Connect the new forcemain to the existing manhole through coring or sawcutting and grouting.

e. Construct 2 individual private sewer ejector pumps for Lots 106 and 107.

8. New Gravity Sewer on Shoreline Road at Bass Point Road (Tract 381)

Sewage from a Bass Point Road and a few homes on Shoreline Road flow to the Eastside Interceptor through a gravity sewerline on Bass Point Road. Improvement 8 will divert the flows from the few homes on Shoreline Drive and the flows from the new lift stations on Bass Point Road, Smith Point Road, and East Branch Circle to the existing gravity sewer on Shoreline Road north of Bas Point Road. The proposed improvements include:

a. Construct approximately 320 linear feet of 8" SOR 35 gravity sewer pipe along Shoreline Road from the existing manhole at Bass Point Road (Sta 16+48) to the existing manhole in front of Lot 97 at Sta 4+94.
b. Connect the new gravity sewer to the existing manhole at Sta 4+94 at Shoreline Road through coring or sawcutting and grouting. According to the as-built plans for Tract 381, the invert elevation of the existing manhole is 908.69', and the rim elevation is about 913.91 '.
c. Connect the new gravity sewer to the existing manhole at Sta 16+48 at Bass Point Road through coring or sawcutting and grouting. Plug the outlet to the existing line heading west on Bass Point Road using grout or other measures. According to the as-built plans for Tract 381, the invert elevation of the existing manhole is 931.23', and the rim elevation is about 938.0'.
d. Construct a new sewer cleanout at approximate Sta 16+25 on Bass Point Road, west of the existing manhole.
e. Construct approximately 1 new manhole along the new sewerline.

9. New Lift Station at Cove Lane (Tract 381)

Sewage from most of the homes on Shoreline Road and Pine Ridge Road are conveyed to the Eastside Interceptor from a sewermain on Shoreline Road, through a manhole in front of Lots 92 and 93 and a sewermain running between Lots 92 and 93. It is intended to intercept these flows by constructing a new lift station at the southeast return of the intersection with Cove Lane, approximately 180' north of the manhole in front of Lots 92 and 93, and then convey them via forcemain to a new manhole at the intersection of Shoreline Road and Woody Point Lane. It is assumed that the residences on Lots 92 and 93 will need to construct an individual ejector pump to convey sewage to the existing gravity sewerline fronting the property on Shoreline Road. The proposed improvements include:

a. Construct a new 5' diameter duplex lift station, approximately 16' deep at the southeast return of the Shoreline Road and Cove Lane intersection. Based on as-built improvement plans, the invert of the gravity sewerlines entering the wet well will be approximately 855.0', the bottom elevation will

be approximately 850.0', and lid elevation approximately 866.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 852.0'.

b. Construct approximately 330 linear feet of 4" PVC forcemain along Shoreline Road from the lift station to the new manhole (proposed to be constructed as Improvement 10) at the intersection of Shoreline Road and Woody Lane. The discharge elevation of the forcemain will be approximately 904.5'.
c. Remove approximately 150 linear feet of 6" gravity sewer between the existing manhole in front of Lots 92 and 93 and the existing manhole at the intersection with Cove Lane. According to the as-built drawings, the existing sewer slopes south towards Lots 92 and 93 at a grade of approximately 1.0%.
d. Construct approximately 150 linear feet of 8" SDR 35 gravity sewer pipe between the existing manhole in front of Lots 92 and 93 and the new lift station. The new sewer line will slope north to the lift station at a grade of approximately 1.0%.
e. Construct approximately 20 linear feet of 8" SDR 35 gravity sewer pipe between the existing manhole at the Cove Lane intersection and the new lift station. The new sewer line will slope south to the lift station at a grade of approximately 1.0%.
f. Connect the gravity sewer to the two existing manholes through coring or sawcutting and grouting.
g. Construct 2 individual private sewer ejector pumps for Lots 92 and 93.

10. New Gravity Sewer at Woody Point Lane (Tract 381)

Sewage from most of the homes north of Woody Point Lane flow to the Eastside Interceptor through a gravity sewerline on Shoreline Drive through a manhole in front of Lots 92 and 93 and a sewermain running between Lots 92 and 93. Improvement 10 will divert the flows from Shoreline Road north of Woody Point Lane and the flows from the new lift stations on Cove Lane, Bass Point Road, Smith Point Road, and East Branch Circle to the existing gravity sewer on Woody Lane. The proposed improvements include:

a. Construct a new manhole in the existing sewerline on Shoreline Road at the intersection with Woody Point Lane at approximate Sta 15+00. According to the as-built plans for Tract 381, the invert elevation of the new manhole will be approximately 904.5', and the rim elevation will be approximately 911.0'.
b. Construct a new sewer cleanout at approximate Sta 14+95 on Shoreline Road, south of the existing manhole.
c. Remove the existing sewer manhole on Woody Point Lane at approximate Sta 12+53.
d. Construct a new manhole on Woody Point Lane in front of Lot 80 at approximate Sta 12+40. According to the as-built plans for Tract 381, the

invert elevation of the new manhole will be approximately 900.0', and the rim elevation will be approximately 913.5'.

e. Construct a new sewer cleanout at approximate Sta 12+35 on Woody Point Lane, west of the new manhole.
f. Construct approximately 200 linear feet of 8" SOR 35 gravity sewer pipe along Woody Lane from the new manhole at the intersection with Shoreline Road (Sta 15+00) to the new manhole in front of Lot 80 at approximate Sta 12+40.
g. Construct approximately 1 new manhole along the new sewerline.

11. New Gravity Sewer and Pipe Bridges North of Woody Point Lane

All of the Eastside sewage flows will be conveyed through the new manhole constructed in front of Lot 80 on Woody Point Lane as part of Improvement 10. Improvement 11 proposes to convey these flows to a new lift station (proposed to be constructed as Westside Improvement 16) adjacent to Lift Station No. 3 via a new gravity sewerline on the east side of Lot 80 to a 10" steel gravity sewerline on two pipe bridges. Proposed improvements include:

a. Construct a steel pipe bridge with a span of approximately 80' across the small lake inlet just east of the location of the existing Lift Station No. 3. The bridge will probably have a triangular cross section, fabricated offsite with welded structural tubesteel, delivered to the site in sections and bolted together. The abutments will most likely be concrete pile and the exposed pipe will be steel.
b. Construct a steel pipe bridge with a span of approximately 50' across the small lake inlet just east of the proposed 80' pipe bridge. The 50' pipe bridge will be of similar construction as the 80' pipe bridge.
c. A total length of approximately 200 linear feet of 10" steel pipe will be required across and between the two pipe bridges.
d. Construct approximately 300 linear feet of 10" SOR 35 gravity sewer pipe between the new manhole on Woody Point Lane at the front of Lot 80 (Improvement 10) to the new lift station (Westside Improvement 16), excluding the length of steel pipe on and between the new pipe bridges. Construction of the new sewerline will require a sewer easement along the east property line of Lot 80 and may require removal of a few existing pine and/or oak trees.
e. Construct approximately 4 new manholes along the new sewerline.

12. New Gravity Sewer behind Lots 80-83 near Woody Point Lane (Tract 381)

Sewage flows from Lots 79-89 are conveyed to the Eastside Interceptor via a gravity sewerline on Woody Point Lane through a manhole at the back of Lots 83 and 84. Improvement 12 proposes to intercept the flows at this manhole

and to construct a new gravity sewer behind Lots 80-83 to convey the flows to the new gravity sewerline north of Lot 80 (proposed to be constructed as Improvement 11). The proposed improvements include:

a. Construct approximately 520 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole at the back of Lot 83, east and north behind Lots 80-83, to a new manhole just south of the new pipe bridges (proposed to be constructed as Improvement 11). Construction of the new sewerline will require a sewer easement across the back of Lot 83 and may require removal of a few existing pine and/or oak trees.
b. Connect the new gravity sewer to the existing manhole at the back of Lot 83 through coring or sawcutting and grouting. Plug the outlet to the existing line leading to the Interceptor using grout or other measures.
c. Construct approximately 2 new manholes along the new sewerline.

Appendix B
Westside Sewer Collection System
Summary of Concept Plan Improvements

1. New Lift Station on Saddle Way (Tract 378)

Sewage flows from Deer Trail Road, Spike Court, Deer Trail Court and Pronghorn Court are conveyed to the Westside Interceptor from a sewermain on Saddle Way, through a manhole at Lot 43 and a sewermain running between Lots 42 and 43. It is intended to intercept these flows and convey them to the existing gravity sewermain in Circle Oak Drive. It is assumed that the existing residences on Lots 41, 42 and 43 will need to construct individual ejector pumps to convey sewage to the new sewerline fronting their property on Saddle Way. The proposed improvements include:

a. Construct a new 4' diameter duplex lift station, approximately 16' deep. The bottom elevation will be approximately 894.0', lid elevation approximately 910.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 896.0'.
b. Construct approximately 650 linear feet of 4" PVC forcemain along Saddle Way from the lift station to a proposed manhole at the intersection of Circle Oak Drive and Saddle Way. The discharge elevation of the forcemain will be approximately 955.0'.
c. Construct approximately 100 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole at the entrance to the Nacimiento Water Company treatment plant to the proposed lift station.
d. Connect the gravity sewer to the manhole at the treatment plant through coring or sawcutting and grouting. Plug the existing manhole outlet using grout or other measures.
e. Construct approximately 190 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole at Lots 42 / 43 on Saddle Way to the proposed lift station.
f. Connect the gravity sewer to the manhole at Lots 42 / 43 the treatment plant through coring or sawcutting and grouting. The outlet to the line running between lots 42 and 43 and the inlet from the line running to the manhole at the water treatment plant will be plugged through grouting. [Note: It is unclear from the as-built drawings whether the manhole has a "drop" connection for the existing main entering on the northeast side of the manhole. If it is a "drop" connection, the bottom of the manhole will be filled with concrete up to the invert elevation of the line entering from the northeast to minimize the depth required for the new gravity sewer pipe to the lift station.]
g. Construct 3 individual private sewer ejector pumps for Lots 41, 42 and 43.

2. New Manhole and Gravity Sewer at the Saddle Way Circle Oak Intersection (Tract 378)

As described above, sewage flows from Deer Trail Road, Spike Court, Deer Trail Court and Pronghorn Court are conveyed to the Westside Interceptor

from a sewermain on Saddle Way, through a manhole at Lot 43 and a sewermain running between Lots 42 and 43. It is intended to divert the majority of these flows upstream of the proposed lift station to minimize the demand on the lift station. The proposed improvements include:

a. Construct a new manhole in the existing gravity sewerline in Saddle Way at the intersection with Circle Oak Drive. Based on Tract 378 as-built drawings, it is assumed that the invert elevation for the manhole will be approximately 954.6', and the lid elevation approximately 963.0'
b. Construct approximately 110 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at Saddle Way, along Circle Oak Drive to an existing manhole at the intersection of Circle Oak Drive and Circle Oak Court.
c. Construct a new manhole in the in the proposed gravity sewerline on Circle Oak Drive midway between Saddle Way and Circle Oak Court.
d. Construct a new manhole in the in the proposed gravity sewerline on Circle Oak Drive midway between Saddle Way and Circle Oak Court.

3. New Manholes and Gravity Sewer on Circle Oak Drive to Bluff Court (Tract 378)

The majority of the sewage flows from Circle Oak Drive are conveyed to the Westside Interceptor from the Bluff Court cul-de-sac via a gravity sewer between Lots 49 & 50 and Lots 57 & 58. Improvement 4 proposes to construct a lift station at the Bluff Court cul-de-sac. Improvement 3 proposes to reconstruct the gravity sewerline on Circle Oak Drive to bypass the line between Lots 49 & 50 and Lots 57 & 58 and convey the flows southeast, to the existing gravity main at the intersection of Bluff Court and Circle Oak Drive. The proposed improvements include:

a. Construct a new manhole in the existing gravity sewerline in Circle Oak Drive at approximate Sta 2+00. Based on Tract 378 as-built drawings, it is assumed that the invert elevation for the manhole will be approximately 941.6', and the lid elevation approximately 950.0'
b. Construct a new manhole in the existing gravity sewerline in Bluff Court at approximate Sta 0+70. Based on Tract 378 as-built drawings, it is assumed that the invert elevation for the manhole will be approximately 937.0', and the lid elevation approximately 946.0'
c. Construct approximately 420 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at Sta 2+00, along Circle Oak Drive to the new manhole on Bluff Court at Sta 0+70.
d. Construct a new manhole on Circle Oak Drive at approximate Sta 4+20. Based on Tract 378 as-built drawings, it is assumed that the invert elevation for the manhole will be approximately 939.25', and the lid elevation approximately 949.0'
e. Construct a new manhole on Circle Oak Drive at approximate Sta 5+40. Based on Tract 378 as-built drawings, it is assumed that the invert

elevation for the manhole will be approximately 938.1 O', and the lid elevation approximately 952.0'.

f. Construct a sewer cleanout at Sta 2+81 for Line "C".
g. Remove two existing sewer manholes.
h. Remove approximately 270 linear feet of 6" ACP sewerline.
i. Reconnect 7 sewer laterals to serve Lots 48, 51, 52, 90, 102, 101 and 100.

4. New Lift Station on Bluff Court {Tract 378)

As described above, the majority of the sewage flows from Circle Oak Drive are conveyed to the Westside Interceptor from the Bluff Court cul-de-sac via a gravity sewer between Lots 49 & 50 and Lots 57 & 58. Improvement 4 proposes to construct a lift station at the Bluff Court cul-de-sac to convey these flows to a new gravity sewerline (proposed to be constructed as Improvement 8) along Land's End Road. The proposed improvements include:

a. Construct a new 4' diameter duplex lift station, approximately 12' deep. The bottom elevation will be approximately 876.0' and the lid elevation approximately 888.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 877.5'.
b. Construct a new manhole in the existing gravity sewerline in Bluff Court at approximate Sta 1+55. Based on Tract 378 as-built drawings, it is assumed that the invert elevation for the manhole will be approximately 923.3', and the lid elevation approximately 932.0'
c. Construct a new clean out in the existing sewerline just downstream from the new manhole, at approximate Sta 1+60.
d. Construct approximately 360 linear feet of 4" PVC forcemain along Bluff Court from the lift station to a proposed manhole at approximate Sta 1+55. The discharge elevation of the forcemain will be approximately 924'.

5. New Manholes and Gravity Sewer between Bluff Court and Lands End Road (Tract 378)

It is proposed to construct a gravity sewerline from the new manhole at Sta 1+55 on Bluff Court to the new gravity sewerline (proposed to be constructed as Improvement 8) along Land's End Road. A sewer easement will be required from the owner of Lot 70. The proposed improvements include:

a. Construct approximately 140 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at Sta 1+55 on Bluff Court, southeast between Lots 70 and 71. Due to the presence of landscaping, hardscape and a retaining wall on Lot 70, trench construction may prove difficult. It is therefore assumed that the sewerline will be constructed with directional boring methods.

b. Construct a manhole on the existing slope behind Lot 70 at the end of the gravity sewerline installed by directional boring.
c. Construct a new manhole on the slope just north of the Lands End cul-de-sac.
d. Construct a new manhole in the Bluff Court cul-de-sac at approximate Sta 25+30.
e. Construct approximately 100 linear feet of 8" SOR 35 gravity sewer pipe down the slope to the Lands End cul-de-sac through the new manholes described above.

6. New Gravity Sewer on Lands End Road (Tract 379)

Sewage from the homes on Lots 199 through 207 flows directly into the Westside Interceptor through laterals and/or a trunkline below the lake high water line. It is proposed to construct a gravity sewerline from the new manhole at Sta 25+30 on Lands End (proposed to be constructed as Improvement 5), along Lands End to the existing manhole at the back of Lot 192. The new sewerline will be used to collect the flows from Lots 199 through 207 and to convey the flows from Tract 378. It is assumed that the existing residences on Lots 199 through 207 will need to construct individual ejector pumps to convey sewage to the new sewerline fronting their property on Lands End. The proposed improvements include:

a. Construct approximately 1120 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at Sta 25+30 to the existing manhole at the back of Lot 192.
b. Construct approximately 10 manholes along the new sewerline on Lands End Road and through the open space parcel to the existing manhole at the back of Lot 192.
c. Connect the new gravity sewer to the existing manhole at the back of Lot 192, through coring or sawcutting and grouting.
d. Construct 9 individual private sewer ejector pumps for Lots 199-207.

7. New Gravity Sewer behind Lots 193-198 South of Lands End Road (Tract 379)

Sewage from the homes on Lots 193 through 198 flow directly into the Westside Interceptor through laterals and/or a trunkline below the lake high water line. It is proposed to construct a new sewermain to serve these lots behind the existing residences outside of the lake high water limits. Sewer easements will be required across each lot. Due to existing trees, hardscape improvements and retaining walls, construction of new sewerline may be difficult. If this improvement is not feasible, the existing residences will need to construct individual ejector pumps to convey sewage to the new sewerline on Lands End Road. The proposed improvements include:

a. Construct a new clean out on the common property line between Lots 197 and 198.
b. Construct approximately 420 linear feet of 8" SOR 35 gravity sewer pipe from the new cleanout behind Lot 198 to the new manhole (constructed as Improvement 6) in the open space parcel near Lot 192.
c. Construct approximately 2 new manholes along the new sewerline.
d. Reconnect 6 sewer laterals to serve Lots 193-198.

8. New Gravity Sewer behind Lots 191 and 192 South of Lands End Road to New Lift Station Near Activity Center (Tract 379)

Sewage from the homes on Lots 187 through 192 and Lots 208 through 210 flow directly into the Westside Interceptor through a trunkline running from Lands End Road, between Lots 191 and 192. It is proposed to intercept these flows at an existing manhole at the back of Lots 191 and 192 and convey them to a new lift station (proposed to be constructed as Improvement 9) adjacent to the Oak Shores Activity Center. The new sewerline would also convey flows from the remaining lots on Lands End as well as the flows from Tract 378. The proposed improvements include:

a. Construct approximately 300 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole to the new lift station.
b. Connect the new gravity sewer to the existing manhole behind Lots 191 and 192 through coring or sawcutting and grouting. Plug the outlet to the existing line leading to the Interceptor using grout or other measures. According to the improvement plans for Tract 379 (sheet 12 of the as-builts was not available), the invert elevation of the existing manhole is 805.0', and the rim elevation is about 810'.
c. Construct approximately 1 new manhole along the new sewerline.

9. New Lift Station adjacent to the Oak Shores Activity Center (Tract 378)

As described above, all of the flows from Tract 378 and a large portion of flows from Tract 379 will be diverted to the location of this proposed lift station. The lift station will serve approximately 188 parcels and the Oak Shores Activity Center. Estimated flows to the lift station are approximately 61,000 gpd, assuming 305 gpd per dwelling unit and assuming the Activity Center demand to be equivalent to 12 dwelling units. The site is located in an unpaved parking area approximately 150' north of the existing Oak Shores Activity Center building, near the toe of fill slope of Turkey Cove Road. Based upon observations in the field, the site appears to be about 5' above the lake high water level. Flows from this lift station will be conveyed to an existing manhole at the back of Lot 105 of Tract 379, near Crows Nest Loop. The proposed improvements include:

a. Construct a new 6' diameter duplex lift station, approximately 15' deep. The bottom elevation will be approximately 790.0' and the lid elevation approximately 805.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 792'.
b. Construct approximately 1640 linear feet of 6" PVC forcemain along Turkey Cove Road from the lift station to the existing manhole at the back of Lot 105 of Tract 379, near Crows Nest Loop. Based on Tract 379 as-built drawings, it is assumed that the invert elevation for the manhole is 1000'.
c. Connect the new forcemain to the existing manhole through coring or sawcutting and grouting.

10. New Gravity Sewer at Turkey Cove Road near Capstan Circle to New Lift Station Near Activity Center (Tract 379)

Sewage from several homes along Turkey Cove Road, Crows Nest Loop, Lookout Loop, Landlubber Lane, Tree Trap Road and Fan Court flow through the sewerline on Turkey Cove Road to an existing manhole just south of Capstan Circle, and directly into the Westside Interceptor at manhole M-100. It is proposed to intercept these flows at the existing manhole on Turkey Cove Road at Sta 17+13 and convey them to a new lift station (proposed to be constructed as Improvement 9) adjacent to the Oak Shores Activity Center. The proposed improvements include:

a. Construct approximately 200 linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole to the new lift station.
b. Connect the new gravity sewer to the existing manhole at Sta 17+13 on Turkey Cove Road through coring or sawcutting and grouting. Plug the outlet to the existing line leading to the Interceptor using grout or other measures. According to the as-built plans for Tract 379, the invert elevation of the existing manhole is 816.74', and the rim elevation is about 822.5'.
c. Construct approximately 1 new manhole along the new sewerline near the west toe of slope of Turkey Cove Road.

11. New Gravity Sewer at Capstan Circle {Tract 379)

Sewage flows from Lots 169, 170, 180 and 181 near the intersection of Capstan Circle and Turkey Cove Road are conveyed to a gravity sewer in Turkey Cove Road via a gravity sewer on Capstan Circle. Lots 171-175, situated at the end of the street, served by a gravity sewer line running from the cul-de-sac, between lots 173 and 174 to a manhole at the back of Lot 174 to manhole M-103 of the Westside Interceptor. Lots 176-179 are served by a gravity sewer running from the back of Lot 176 to a manhole at the back of lot 179 and to manhole M-100 of the Westside Interceptor. The gravity sewer is

below the high water level of the lake. Two alternatives (#11A & 11B) are proposed for serving Lots 171 through 179.

Alternative 11A includes construction of a new manhole approximately 40' west (uphill) of the existing manhole at the back of lot 174. The existing flows from Lots 171-175 will be diverted from this manhole through a new 6" gravity sewer constructed at approximately 0.5% grade, running south and west in back of lots 174-179 above the high water line, crossing Turkey Cove Road to the new manhole (proposed to be constructed as Improvement 10) north of the Activity Center. If feasible, this alternative would require construction of manholes and sewerline on 2: 1 slopes, and approximately 24' deep trench at Turkey Cove Road. Directional boring across Turkey Cove Road may be a cost effective alternative to trenching. The proposed improvements include:

a. Construct a new manhole in the existing gravity sewerline "B-B" running between Lots 173 and 174 at approximate Sta 1+75. Plug the outlet to the existing line leading to the Interceptor using grout or other measures. Based on the improvement plans for Tract 379 (sheet 11 of the as-builts was not available), it is assumed that the invert elevation for the manhole will be approximately 805.0', and the lid elevation approximately 81 O'.
b. Construct approximately 870 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at the back of Lot 174 to the new manhole in the day use parking area north of the Oak Shores Activity Center. Due to the depth of the proposed sewer crossing Turkey Cove Road, directional boring techniques may be required.
c. Construct approximately 4 new manholes along the new sewerline.
d. Reconnect 7 sewer laterals to serve Lots 173-179.

Alternative 11 B includes construction of a new gravity sewer in Capstan Circle between the existing manhole at Lots 176 and 177 and the existing manhole at Lot 180. A new gravity sewer and cleanout would be extended to the end of the cul-de-sac between Lots 173 and 174. Based on existing lateral elevations, it may be possible for lots 171, 172 and 175 to flow to the new sewer by gravity. Lots 173, 174 and 176-179 will probably need to install and maintain private sewer ejector pumps. The proposed improvements include:

a. Construct approximately 460 linear feet of 8" SOR 35 gravity sewer pipe in Capstan Circle from the exiting manhole at Lot 180 to the new cleanout manhole fronting Lot 174.
b. Connect the new gravity sewer to the existing manhole at Lot 180 on Capstan Circle through coring or sawcutting and grouting.
c. Connect the new gravity sewer to the existing manhole at Lots 176 & 177 on Capstan Circle through coring or sawcutting and grouting.
d. Remove approximately 100 linear feet of existing 6" AC sewer pipe between the existing manhole and proposed clean out at the end of Capstan Circle.

e. Construct a new manhole fronting Lot 179 on Capstan Circle.
f. Construct a new sewer cleanout at the end of Capstan Circle.
g. Construct 7 individual private sewer ejector pumps for Lots 173-179.

12. Reroute Forcemain from Lift Station No. 2 (Tract 379)

The discharge from Lift Station No. 2, adjacent to the intersection of Oak Shores Drive and Turkey Cove Road is currently conveyed to a manhole on Turkey Cove Road adjacent to Lot 80 via a 4" PVC forcemain. From this manhole, the discharge flows by gravity south on Turkey Cove Road to the Westside Interceptor. Improvements 9 and 10 would divert the flows from Turkey Cove Road to a proposed lift station adjacent to the Oak Shores Activity Center. Improvement 12 reroutes the forcemain to discharge into the existing manhole at the intersection of Fan Court and Oak Shores Drive. This would eliminate the need to pump the sewage again from the new lift station at the Activity Center. Proposed improvements include:

a. Cut into the existing forcemain at the intersection of Oak Shores Drive and Turkey Cove Road and construct a 90 deg elbow with thrust block. Abandon the unused portion of the existing forcemeain in place.
b. Construct approximately 280 linear feet of 4" PVC forcemain to the existing manhole at Fan Court.
c. Connect the forcemain to the manhole through coring or sawcutting and grouting.

13. New Gravity Sewer on Oak Shores Drive at Fan Court (Tract 379)

Sewage from Lots 97 through 105 on Crows Nest Loop currently flow to Lift Station No. 2 through a gravity sewer along Fan Court. Improvement 13 will divert these flows and the flows from the realigned Lift Station No. 2 forcemain to the existing gravity sewer on Oak Shores Drive east of Fan Court. In addition, County Maintenance staff have identified flow problems with portions of the existing gravity mains east and north of the intersection of Oak Shores Drive and Captains Walk. It is therefore proposed to reconstruct existing manholes and gravity lines adjacent to the intersection. Proposed improvements include:

a. Construct approximately 180 linear feet of 8" SOR 35 gravity sewer pipe along Oak Shores Drive from the existing manhole at Fan Court (Sta 294+30) to the new manhole at Sta 292+50.
b. Connect the new gravity sewer to the existing manhole at Sta 294+30 at Fan Court through coring or sawcutting and grouting. Plug the outlet to the existing line heading north on Fan Court using grout or other measures. According to the as-built plans for Tract 379, the invert elevation of the existing manhole is 975.0', and the rim elevation is about 982.5'.

c. Construct a new sewer cleanout at approximate Sta 10+05 on Fan Court.
d. Remove the existing cleanout at Sta 292+50 on Oak Shores Drive.
e. Construct a new manhole at Sta 292+50 on Oak Shores Drive. According to the as-built plans for Tract 379, the invert elevation of the new manhole will be approximately 972.0' and the and the rim elevation will be about 982.0'.
f. Remove the existing manhole at the intersection of Oak Shores Drive and Captains Walk.
g. Construct a new manhole at the intersection of Oak Shores Drive and Captains Walk. Based on Tract 379 as-built drawings, it is assumed that the invert elevation for the manhole will be approximately 965.5', and the lid elevation approximately 971.0'
h. On Oak Shores Drive, remove approximately 292 linear feet of 6" gravity sewer pipe from the existing manhole at Sta 292+50 on Oak Shores Drive to the new manhole at the Intersection of Oak Shores Drive and Captains Walk.
i. On Oak Shores Drive, construct approximately 292 Linear feet of 8" SOR 35 gravity sewer pipe from the existing manhole at Sta 292+50 on Oak Shores Drive to the new manhole at the Intersection of Oak Shores Drive and Captains Walk.
j. Connect the new gravity sewer to the existing manhole at Sta 292+50 on Oak Shores Drive through coring or sawcutting and grouting.
k. Reconnect 4 sewer laterals On Oak Shores Drive serving lots 1, 2, 3 and 4 of Tract 379.
l. On Captains Walk, remove approximately 206 linear feet of 6" gravity sewer pipe, from the existing manhole at the Stern Deck / Captains Walk intersection to the new manhole at the Intersection of Oak Shores Drive and Captains Walk.
m. On Captains Walk, construct approximately 206 linear feet of 8" SOR 35 gravity sewer pipe, from the existing manhole at the Stern Deck/ Captains Walk intersection to the new manhole at the Intersection of Oak Shores Drive and Captains Walk.
n. Connect the new gravity sewer to the existing manhole at the Stern Deck/ Captains Walk intersection through coring or sawcutting and grouting.
o. Reconnect 2 sewer laterals on Captains Walk serving lots 1 and 2 of Tract 380.
p. On Oak Shores Drive, remove approximately 300 linear feet of 6" gravity sewer pipe, from the existing manhole at "Q" Line Sta 1+50 to the new manhole at the Intersection of Oak Shores Drive and Captains Walk.
q. On Oak Shores Drive, construct approximately 300 linear feet of 8" SOR 35 gravity sewer pipe, from the existing manhole at "Q" Line Sta 1+50 to the new manhole at the Intersection of Oak Shores Drive and Captains Walk.
r. Connect the new gravity sewer to the existing manhole at "Q" Line Sta 1+50 through coring or sawcutting and grouting.
s. On Captains Walk, remove two manholes (Sta 12+00 and 13+64).

t. On Captains Walk, remove approximately 400 linear feet of 6" gravity sewer pipe, from the new manhole at the Intersection of Oak Shores Drive and Captains Walk to a new manhole at approximate Station 13+90 on Captains Walk.
u. On Captains Walk, construct approximately 400 linear feet of 8" SOR 35 gravity sewer pipe, from the new manhole at the Intersection of Oak Shores Drive and Captains Walk to a new manhole at approximate Station 13+90 on Captains Walk.
v. On Captains Walk, construct a new manhole at Sta 12+00 (approximate lid elevation of 979.0' and invert elevation of 963.4') and at Station 13+90 (approximate lid elevation of 973.0' and invert elevation of 961.2').
w. Reconnect 7 sewer laterals on Captains Walk serving lots 128, 129, 130, 131,132,133, and 134 of Tract 379.

14. New Gravity Sewer at Captains Walk (Tract 379)

Sewage flows from Lots 146-154 at the end of the Captains Walk cul-de-sac are conveyed to the Westside Interceptor at manhole M-104A via a 6" PVC gravity sewer running between Lots 147 and 148. Lots 143-145 are served via an 8" PVC pipe running across the back of the lots to manhole M-104A. Sewage flows will be diverted just upstream of the lateral for Lot 143 and conveyed directly to the lift station at the treatment plant via a new gravity sewer and pipe bridge (proposed to be constructed as Improvement 15). Two alternatives (#14A & 14B) are proposed for serving Lots 143-154.

Alternative 14A includes construction of a new manhole approximately 240' southeast (downhill) from the existing manhole in front of Lot 153 at the end of the Captains Walk cul-de-sac. The existing flows from Lots 146-154 will be diverted from this manhole through a new 6" gravity sewer constructed at approximately 0.5% grade, running northeast at the back of Lots 147 to a new manhole at the southeast corner of Lot 147, then northwest to a new manhole at the back of Lots 146 and 147, then north to a new manhole constructed in the existing 8" PVC sewerline at the back of Lots 142 and 143. The new sewerline will require a sewer easement across the back of Lot 147. Due to existing trees and residences, construction of the new sewerline may be difficult or infeasible. The proposed improvements include:

a. Construct a new manhole in the existing gravity sewerline "F" running between Lots 147 and 148 at approximate Sta 2+40. Plug the outlet to the existing line leading to the Interceptor using grout or other measures. Based on the as-built improvement plans for Tract 379, it is assumed that the invert elevation for the manhole will be approximately 809.5', and the lid elevation approximately 814'.
b. Construct a new manhole in the existing gravity sewerline "E" running in back of Lots 144-143 at approximate Sta 3+10. Plug the outlet to the existing line leading to the Interceptor using grout or other measures.

Based on the as-built improvement plans for Tract 379, it is assumed that the invert elevation for the manhole will be approximately 807.0' and the lid elevation approximately 817'.

c. Construct approximately 405 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at the back of Lot 147 to the new manhole at the back of Lot 142.
d. Construct approximately 2 new manholes along the new sewerline.
e. Reconnect 5 sewer laterals to serve Lots 143, 144, 145, 147 and 148.

Alternative 148 includes construction of a new manhole approximately 165' southeast (downhill) from the existing manhole in front of Lot 153 at the end of the Captains Walk cul-de-sac. The existing flows from Lots 146 and 149-154 will be diverted from this manhole through a new 6" gravity sewer constructed at approximately 27% grade, running northeast between Lots 146 and 147 to a new manhole at the southeast corner of Lot 146, then north to a new manhole constructed in the existing 8" PVC sewerline at the back of Lots 142 and 143. The new sewerline will require a sewer easement across Lot 147. The existing residences on Lots 147 and 148 will probably need to install and maintain private sewer ejector pumps. Due to existing trees and residences, construction of the new sewerline may be difficult. The proposed improvements include:

a. Construct a new manhole in the existing gravity sewerline "F" running between Lots 147 and 148 at approximate Sta 1+65. Plug the outlet to the existing line leading to the Interceptor using grout or other measures. Based on the as-built improvement plans for Tract 379, it is assumed that the invert elevation for the manhole will be approximately 835.5', and the lid elevation approximately 841 '.
b. Construct a new manhole in the existing gravity sewerline "E" running in back of Lots 140-143 at approximate Sta 3+10. Plug the outlet to the existing line leading to the Interceptor using grout or other measures. Based on the as-built improvement plans for Tract 379, it is assumed that the invert elevation for the manhole will be approximately 807.0' and the lid elevation approximately 817'.
c. Construct approximately 335 linear feet of 8" SOR 35 gravity sewer pipe from the new manhole at Sta 1+65 to the new manhole at the back of Lot 142.
d. Construct one new manhole along the new sewerline.
e. Reconnect 4 sewer laterals to serve Lots 143-146.
f. Construct 2 individual private sewer ejector pumps for Lots 147 and 148.

15. New Gravity Sewer and Pipe Bridge East of Captains Walk

All of the Westside sewage flows will be conveyed through the new manhole constructed in the existing gravity sewerline "E" as part of Improvement

alternative 14A or B. Improvement 15 proposes to convey these flows to a new lift station (proposed to be constructed as Improvement 16) adjacent to Lift Station No. 3 via a 12" steel gravity sewerline on a pipe bridge. Proposed improvements include:

a. Construct a steel pipe bridge with a span of approximately 150'. The bridge will probably have a triangular cross section, fabricated offsite with welded structural tubesteel, delivered to the site in sections and bolted together. The abutments will most likely be concrete pile and the exposed pipe will be steel.
b. A total length of approximately 170 linear feet of 12" steel pipe will be required across the pipe bridge.
c. An approximately 150' long, 10' wide based access road will need to be constructed to the east abutment from the Lift Station No. 3 site.
d. Construct approximately 230 linear feet of 12" SOR 35 gravity sewer pipe between the new manhole at the back of Lot 142 (Improvement 14A or 14B) to the new lift station (Improvement 16), excluding the length of steel pipe on the new pipe bridge. Construction of the new sewerline and access road may require removal of a few existing pine and/or oak trees.
e. Construct approximately 2 new manholes along the new sewerline.

16. New Lift Station Adjacent to Lift Station No. 3

As described above, all of the Westside sewage will flow through the new gravity sewer and pipe bridge proposed to be constructed as Improvement 15. According to as-built drawings, the existing ground elevation at Lift Station No. 3 is approximately 805', the bottom of the wetwell at approximate elevation 745', and the invert of the Westside Interceptor line enters the wetwell at approximately 756.35'. As-builts show the water surface elevation of the treatment ponds at the plant as being approximately 877', for a total lift of about 120' from the existing Interceptor. The new Westside gravity sewer will enter the Lift Station No. 3 site at an invert elevation of approximately 803'. The lift station will serve approximately 550 parcels from the Westside (assuming the Activity Center demand to be equivalent to 12 dwelling units) and approximately 300 parcels from the Eastside). Estimated flow to the lift station will be approximately 259,250 gpd, assuming 305 gpd per dwelling unit. Flows from this lift station will be conveyed to the existing treatment plant using the existing forcemain from Lift Station No. 3. The proposed improvements include:

a. Construct a new 10' diameter triplex lift station, approximately 15' deep. The pumps will operate in duplex with a third pump for backup and maintenance. Piping and valves will be in a separate vault. The bottom elevation of the wetwell will be approximately 790.0' and the lid elevation approximately 805.0'. For planning purposes, it is assumed the pump shut off elevation will be approximately 792'.

b. Construct approximately 50 linear feet of 12" PVC forcemain to the existing 12" forcemain from Lift Station No. 3.
c. Connect the new forcemain to the existing 12" forcemain from Lift Station No. 3.

Appendix C
Eastside Sewer Collection System
Concept Plan Improvements Cost Estimates

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Concept Plan Improvements Cost Estimates
Oak Shores Eastside Collection System Upgrade

Date: 12, 2004
Revised: - -
By: Jeff Werst
Checked: Frank Honey cutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 1					**Lift Station at East Beach Circle**
a	Lift Station	1	EA	$100,000	$100,000	
b	4" C900 PVC Forcemain	1,200	LF	$50	$60,000	
c	10' Wide Based D/W	150	LF	$50	$7,500	
d	6" SOR 35 Sewer Pipe	150	LF	$50	$7,500	
e	Modify Sewer Manhole	1	EA	$1,500	$1,500	
f	Modify Sewer Manhole	1	EA	$1,500	$1,500	
	Improvement 1 Construction Subtotal				**$178,000**	
	With Contingency Adjustment Factor*				**$267,000**	
	Total Project Cost*				**$485,940**	

	Improvement 2					Gravity Sewer from Lots 157 & 158
a	New Sewer Manhole	1	EA	$5,000	$5,000	
b	6" SOR 35 Sewer Pipe	100	LF	$50	$5,000	
c	Remove Exist Sewerline	105	LF	$10	$1,050	
d	6" SOR 35 Sewer Pipe	105	LF	$50	$5,250	
e	Reconnect Sewer Lateral	3	EA	$500	$1,500	
	Improvement 2 Construction Subtotal				**$17,800**	
	With Contingency Adjustment Factor*				**$26,700**	
	Total Project Cost*				**$48,594**	

	Improvement 3					Upsize Gravity Sewer on East Beach Circle
a	Remove Exist Sewerline	100	LF	$10	$1,000	
b	6" SOR 35 Sewer Pipe	100	LF	$50	$5,000	
c	Modify Sewer Manhole	2	EA	$1,500	$3,000	
	Improvement 3 Construction Subtotal				**$9,000**	
	With Contingency Adjustment Factor*				**$13,500**	
	Total Project Cost*				**$24,570**	

Concept Plan Improvements Cost Estimates
Oak Shores Eastside Collection System Upgrade

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Date: 12, 2004
Revised: --
By: Jeff Werst
Checked: Frank Honercutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 4					**Gravity Sewer behind Lots 151-156**
a	Remove Exist Sewerline	130	LF	$10	$1,300	
b	Remove Exist Cleanout	1	EA	$500	$500	
c	8" SOR 35 Sewer Pipe	660	LF	$50	$33,000	
d	Modify Sewer Manhole	1	EA	$1,500	$1,500	
e	New Sewer Manhole	5	EA	$5,000	$25,000	
f	Reconnect Sewer Lateral	6	EA	$500	$3,000	
				Improvement 4 Construction Subtotal	**$64,300**	
				With Contingency Adjustment Factor*	**$96,450**	
				Total Project Cost*	**$175,539**	

	Improvement 5					**Lift Station on Smith Point Road**
a	Remove Exist Manhole	1	EA	$1,000	$1,000	
b	Lift Station	1	EA	$60,000	$60,000	
c	4" C900 PVC Forcemain	750	LF	$50	$37,500	
d	Modify Sewer Manhole	1	EA	$1,500	$1,500	
e	Sewer Ejector Pump	4	EA	$6,000	$24,000	
				Improvement 5 Construction Subtotal	**$124,000**	
				With Contingency Adjustment Factor*	**$186,000**	
				Total Project Cost*	**$338,520**	

	Improvement 6					**Gravity Sewer on Shoreline at Pine Ridge**
a	8" SOR 35 Sewer Pipe	100	LF	$50	$5,000	
b	Modify Sewer Manhole	1	EA	$1,500	$1,500	
c	Modify Sewer Manhole	1	EA	$1,500	$1,500	
d	New Sewer Cleanout	1	EA	$2,500	$2,500	
				Improvement 6 Construction Subtotal	**$10,500**	
				With Contingency Adjustment Factor*	**$15,750**	
				Total Project Cost*	**$28,665**	

	Improvement 7					**Lift Station on Bass Point Road**
a	Remove Exist Manhole	1	EA	$1,000	$1,000	
b	Lift Station	1	EA	$60,000	$60,000	
c	4" C900 PVC Forcemain	600	LF	$50	$30,000	
d	Modify Sewer Manhole	1	EA	$1,500	$1,500	
e	Sewer Ejector Pump	2	EA	$6,000	$12,000	
				Improvement 7 Construction Subtotal	**$104,500**	
				With Contingency Adjustment Factor*	**$156,750**	
				Total Project Cost*	**$285,285**	

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Concept Plan Improvements Cost Estimates
Oak Shores Eastside Collection System Upgrade

Date: 12, 2004
Revised:
By: Jeff Werst
Checked: Frank Honey_cutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 8					**Gravity Sewer on Shoreline at Bass Point**
a	8" SOR 35 Sewer Pipe	**320**	LF	$50	$16,000	
b	Modify Sewer Manhole	1	EA	$1,500	$1,500	
c	Modify Sewer Manhole	1	EA	$1,500	$1,500	
d	New Sewer Cleanout	1	EA	$2,500	$2,500	
c	New Sewer Manhole	1	EA	$5,000	$5,000	
	Improvement 8 Construction Subtotal				**$26,500**	
	With Contingency Adjustment Factor*				**$39,750**	
	Total Project Cost*				**$72,345**	

	Improvement 9					**Lift Station at Cove Lane**
a	Lift Station	1	EA	$100,000	$100,000	
b	4" C900 PVC Forcemain	330	LF	$50	$16,500	
c	Remove Exist Sewerline	150	LF	$10	$1,500	
d	8" SDR 35 Sewer Pipe	150	LF	$50	$7,500	
e	8" SOR 35 Sewer Pipe	20	LF	$50	$1,000	
f	Modify Sewer Manhole	2	EA	$1,500	$3,000	
g	Sewer Ejector Pump	2	EA	$6,000	$12,000	
	Improvement 9 Construction Subtotal				**$141,500**	
	With Contingency Adjustment Factor*				**$212,250**	
	Total Project Cost*				**$386,295**	

	Improvement 10					**Gravity Sewer West at Woody Point Lane**
a	New Sewer Manhole	1	EA	$5,000	$5,000	
b	New Sewer Cleanout	1	EA	$2,500	$2,500	
c	Remove Exist Manhole	1	EA	$1,000	$1,000	
d	New Sewer Manhole	1	EA	$5,000	$5,000	
e	New Sewer Cleanout	1	EA	$2,500	$2,500	
f	8" SDR 35 Sewer Pipe	200	LF	$50	$10,000	
g	New Sewer Manhole	1	EA	$5,000	$5,000	
	Improvement 10 Construction Subtotal				**$31,000**	
	With Contingency Adjustment Factor*				**$46,500**	
	Total Project Cost*				**$84,630**	

	Improvement 11					**Gravity Sewer & Pipe Bridges East of L.S. 3**
a	Steel Pipe Bridge	80	LF	$500	$40,000	
a	Steel Pipe Bridge	50	LF	$500	$25,000	
b	10' Steel Sewer Pipe	200	LF	$60	$12,000	
c	10" SOR 35 Sewer Pipe	300	LF	$60	$18,000	
d	New Sewer Manhole	4	EA	$5,000	$20,000	
	Improvement 11 Construction Subtotal				**$115,000**	
	With Contingency Adjustment Factor*				**$172,500**	
	Total Project Cost*				**$313,950**	

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Concept Plan Improvements Cost Estimates
Oak Shores Eastside Collection System Upgrade

Date: July 12, 2004
Revised:
By: Jeff Werst
Checked: Frank Honeycutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 12					**Gravity Sewer behind Lots 80-83**
a	8" SDR 35 Sewer Pipe	520	LF	$50	$26,000	
b	Modify Sewer Manhole	1	EA	$1,500	$1,500	
c	New Sewer Manhole	2	EA	$5,000	$10,000	
	Improvement 12 Construction Subtotal				**$37,500**	
	With Contingency Adjustment Factor*				**$56,250**	
	Total Project Cost*				**$102,375**	

Total Construction Cost	**$859,600**	ENR Index=	6957
With Contingency Adjustment Factor*	**$1,289,400**		(1st Quarter 2004)
Total Project Cost*	**$2,346,708**		

* Includes the following adjustment factors recommended by the San Luis Obispo County Public Works Dept "Project Management Manual" (June 2003):

Contingency Factor **50%**

Project Cost Mark-Ups:

Preliminary Engineering	1%
Project Management	5%
Environmental	10%
Design	20%
Right of Way	2%
Flagging Cost	2%
Storm Water Prevention Plan	5%
Contract Administration	20%
Overhead	17%
Total Mark-Up	**82%**

Appendix D
Westside Sewer Collection System
Concept Plan Improvements Cost Estimates

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Concept Plan Improvements Cost Estimates
Oak Shores Westside Collection System Upgrade

Date: July 12, 2004
Revised:
By: Jeff Werst
Checked: Frank Honeycutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 1					**Lift Station on Saddle Way**
a	Lift Station	1	**EA**	$60,000	**$60,000**	
b	4" C900 PVC Forcemain	**650**	LF	$50	**$32,500**	
c	**8" SDR 35 Sewer Pipe**	**100**	LF	$50	$5,000	
d	Modify Sewer Manhole	1	**EA**	$1,500	$1,500	
e	8" SDR 35 Sewer Pipe	**190**	LF	$50	$9,500	
f	Modify Sewer Manhole	1	**EA**	$1,500	**$1,500**	
g	Sewer Ejector Pump	3	**EA**	$6,000	**$18,000**	
				Improvement 1 Construction Subtotal	**$128,000**	
				With Contingency Adjustment Factor*	**$192,000**	
				Total Project Cost*	**$349,440**	

	Improvement 2					**Gravity Sewer at Circle Oak Intx.**
a	New Sewer Manhole	1	EA	$5,000	$5,000	
b	8" SDR 35 Sewer Pipe	110	LF	$50	$5,500	
c	New Sewer Manhole	1	EA	$5,000	$5,000	
d	New Sewer Manhole	1	EA	$5,000	$5,000	
				Improvement 2 Construction Subtotal	**$20,500**	
				With Contingency Adjustment Factor*	**$30,750**	
				Total Project Cost*	**$55,965**	

	Improvement 3					**Gravity Sewer on Circle Oak Drive**
a	New Sewer Manhole	1	EA	$5,000	$5,000	
b	New Sewer Manhole	1	EA	$5,000	$5,000	
c	8" SDR 35 Sewer Pipe	420	LF	$50	$21,000	
d	New Sewer Manhole	1	EA	$5,000	$5,000	
e	New Sewer Manhole	1	EA	$5,000	$5,000	
f	New Sewer Cleanout	1	EA	$2,500	$2,500	
g	Remove Exist Manhole	2	EA	$100	$200	
h	Remove Exist Sewerline	270	LF	$10	$2,700	
i	Reconnect Sewer Lateral	7	EA	$500	$3,500	
				Improvement 3 Construction Subtotal	**$49,900**	
				With Contingency Adjustment Factor*	**$74,850**	
				Total Project Cost*	**$136,227**	

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Date: Jul'. 12, 2004
Revised:
By: Jeff Werst
Checked: Frank Hone1'. cutt

Concept Plan Improvements Cost Estimates
Oak Shores Westside Collection System Upgrade

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 4					**Lift Station on Bluff Court**
a	Lift Station	1	EA	$60,000	$60,000	
b	New Sewer Manhole	1	EA	$5,000	$5,000	
c	New Sewer Cleanout	1	EA	$2,500	$2,500	
d	4" C900 PVC Forcemain	360	LF	$50	$18,000	
	Improvement 4 Construction Subtotal				**$85,500**	
	With Contingency Adjustment Factor*				**$128,250**	
	Total Project Cost*				**$233,415**	

	Improvement 5					Gravity Sewer - Bluff Ct. to Lands End
a	8" SOR 35 Sewer Pipe	140	LF	$200	$28,000	Directional Bore under sideyard
b	New Sewer Manhole	1	EA	$5,000	$5,000	
c	New Sewer Manhole	1	EA	$5,000	$5,000	
d	New Sewer Manhole	1	EA	$5,000	$5,000	
e	8" SOR 35 Sewer Pipe	100	LF	$50	$5,000	
	Improvement 5 Construction Subtotal				**$48,000**	
	With Contingency Adjustment Factor*				**$72,000**	
	Total Project Cost*				**$131,040**	

	Improvement 6					**Gravity Sewer on Lands End Road**
a	8" SOR 35 Sewer Pipe	1,120	LF	$50	$56,000	
b	New Sewer Manhole	10	EA	$5,000	$50,000	
c	Modify Sewer Manhole	1	EA	$1,500	$1,500	
d	Sewer Ejector Pump	9	EA	$6,000	$54,000	
	Improvement 6 Construction Subtotal				**$161,500**	
	With Contingency Adjustment Factor*				**$242,250**	
	Total Project Cost*				**$440,895**	

	Improvement 7					Gravity Sewer South of Lands End Road
a	New Sewer Cleanout	1	EA	$2,500	$2,500	
b	8" SDR 35 Sewer Pipe	420	LF	$50	$21,000	
c	New Sewer Manhole	2	EA	$5,000	$10,000	
d	Reconnect Sewer Lateral	6	EA	$500	$3,000	
	Improvement 7 Construction Subtotal				**$36,500**	
	With Contingency Adjustment Factor*				**$54,750**	
	Total Project Cost*				**$99,645**	

Concept Plan Improvements Cost Estimates
Oak Shores Westside Collection System Upgrade

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Date: July 12, 2004
Revised:
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Checked: Frank Honeycutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 8					**Gravity Sewer East to Activity Center**
a	8" SOR 35 Sewer Pipe	300	LF	$50	$15,000	
b	Modify Sewer Manhole	1	EA	$1,500	$3,005	
c	New Sewer Manhole	1	EA	$5,000	$7,100	
	Improvement 8 Construction Subtotal				**$25,105**	
	With Contingency Adjustment Factor*				**$37,658**	
	Total Project Cost*				**$68,537**	
	Improvement 9					**Lift Station Near Activity Center**
a	Lift Station	1	EA	$100,000	$100,000	
b	6" C900 PVC Forcemain	1,640	LF	$50	$82,000	
c	Modify Sewer Manhole	1	EA	$1,500	$1,500	
	Improvement 9 Construction Subtotal				**$183,500**	
	With Contingency Adjustment Factor*				**$275,250**	
	Total Project Cost*				**$500,955**	
	Improvement 10					**Gravity Sewer West to Activity Center**
a	8" SOR 35 Sewer Pipe	200	LF	$50	$10,000	
b	Modify Sewer Manhole	1	EA	$1,500	$1,500	
c	New Sewer Manhole	1	EA	$5,000	$5,000	
	Improvement 10 Construction Subtotal				**$16,500**	
	With Contingency Adjustment Factor*				**$24,750**	
	Total Project Cost*				**$45,045**	
	Improvement 11A					**Gravity Sewer South of Capstan Circle**
a	New Sewer Manhole	1	EA	$5,000	$5,000	
b	8" SOR 35 Sewer Pipe	870	LF	$50	$52,145	
c	New Sewer Manhole	4	EA	$5,000	$24,650	
d	Reconnect Sewer Lateral	7	EA	$500	$5,345	
	Improvement 11A Construction Subtotal				**$87,140**	
	With Contingency Adjustment Factor*				**$130,710**	
	Total Project Cost*				**$237,892**	
	Improvement 12					**Reroute Forcemain at LS. 2**
a	Modify Forcemain	1	EA	$1,000	$1,000	
b	4" C900 PVC Forcemain	280	LF	$50	$14,000	
c	Modify Sewer Manhole	1	EA	$1,500	$1,500	
	Improvement 12 Construction Subtotal				**$16,500**	
	With Contingency Adjustment Factor*				**$24,750**	
	Total Project Cost*				**$45,045**	

County of San Luis Obispo
Public Works Department
Utilites Division
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Concept Plan Improvements Cost Estimates
Oak Shores Westside Collection System Upgrade

Date: July 12, 2004
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	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 13					**Gravity Sewer on Oak Shores at Fan Ct**
a	8" SDR 35 Sewer Pipe	180	LF	$50	$9,000	**and Captains Walk**
b	Modify Sewer Manhole	1	EA	$1,500	$1,500	
c	New Sewer Cleanout	1	EA	$2,500	$2,500	
d	Remove Exist Cleanout	1	EA	$500	$500	
e	New Sewer Manhole	1	EA	$5,000	$5,000	
f	Remove Exist Manhole	1	EA	$100	$100	
g	New Sewer Manhole	1	EA	$5,000	$5,000	
h	Remove Exist Sewerline	292	LF	$10	$2,920	
i	8" SOR 35 Sewer Pipe	**292**	LF	$50	$14,600	
j	Modify Sewer Manhole	1	EA	$1,500	$1,500	
k	Reconnect Sewer Lateral	4	EA	$500	$2,000	
l	Remove Exist Sewerline	206	LF	$10	$2,060	
m	8" SOR 35 Sewer Pipe	206	LF	$50	$10,300	
n	Modify Sewer Manhole	1	EA	$1,500	$1,500	
o	Reconnect Sewer Lateral	2	EA	$500	$1,000	
p	Remove Exist Sewerline	300	LF	$10	$3,000	
q	8" SOR 35 Sewer Pipe	300	LF	$50	$15,000	
r	Modify Sewer Manhole	1	EA	$1,500	$1,500	
s	Remove Exist Manhole	2	EA	$100	$200	
t	Remove Exist Sewerline	400	LF	$10	$4,000	
u	8" SOR 35 Sewer Pipe	400	LF	$50	$20,000	
v	New Sewer Manhole	2	EA	$5,000	$10,000	
w	Reconnect Sewer Lateral	7	EA	$500	$3,500	
				Improvement 13 Construction Subtotal	**$116,680**	
				With Contingency Adjustment Factor*	**$175,020**	
				Total Project Cost*	**$318,536**	

	Improvement 14b					Gravity Sewer at Captains Walk
a	New Sewer Manhole	1	EA	$5,000	$5,000	
b	New Sewer Manhole	1	EA	$5,000	$5,000	
c	8" SOR 35 Sewer Pipe	335	LF	$50	$16,750	
d	New Sewer Manhole	1	EA	$5,000	$5,000	
e	Reconnect Sewer Lateral	4	EA	$500	$2,000	
f	Sewer Ejector Pump	2	EA	$6,000	$12,000	
				Improvement 14B Construction Subtotal	**$45,750**	
				With Contingency Adjustment Factor*	**$68,625**	
				Total Project Cost*	**$124,898**	

County of San Luis Obispo
Public Works Department
Utilites Division
Hydraulic Planning Unit

Concept Plan Improvements Cost Estimates
Oak Shores Westside Collection System Upgrade

Date: July 12, 2004
Revised:
By: Jeff Werst
Checked: Frank Honercutt

	Item	Quantity	Unit	Unit Cost	Cost	Remarks
	Improvement 15					**Gravity Sewer & Pipe Bridge at L.S. 3**
a	Steel Pipe Bridge	150	LF	$500	$75,000	
b	12" Steel Sewer Pipe	170	LF	$80	$13,600	
c	10 Wide Based D/W	150	LF	$50	$7,500	
d	12" SOR 35 Sewer Pipe	230	LF	$100	$23,000	
e	New Sewer Manhole	2	EA	$5,000	$10,000	
				Improvement 15 Construction Subtotal	**$129,100**	
				With Contingency Adjustment Factor*	**$193,650**	
				Total Project Cost*	**$352,443**	

	Improvement 16					Lift Station Adjacent to L.S. 3
a	Lift Station	1	EA	$150,000	$176,750	
b	12" C900 PVC Forcemain	50	LF	$100	$7,100	
c	Connect to Exist Forcemain	1	EA	$1,500	$3,005	
				Improvement 16 Construction Subtotal	**$186,855**	
				With Contingency Adjustment Factor*	**$280,283**	
				Total Project Cost*	**$510,114**	

		ENR Index=	6957
Total Construction Cost	**$1,337,030**		(1st Quarter 2004)
With Contingency Adjustment Factor*	**$2,005,545**		
Total Project Cost*	**$3,650,092**		

* Includes the following adjustment factors recommended by the San Luis Obispo County Public Works Dept "Project Management Manual" (June 2003):

Contingency Factor **50%**

Project Cost Mark-Ups:

Preliminary Engineering	1%
Project Management	5%
Environmental	10%
Design	20%
Right of Way	2%
Flagging Cost	2%
Storm Water Prevention Plan	5%
Contract Administration	20%
Overhead	17%
Total Mark-Up	**82%**

Appendix E
California Regional Water Quality Control Board
Waste Discharge Requirements Order No. 01-130

California Rei ional Water Quality Control Board

Central Coast Region

'"''lston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.cagov/rwqcb3
81 Higuera Street, Suite 200, San Luis Obispo, California 93401-5421
Phone (805) .549-3147 • FAX (805) 543-0397

Gray Davis
Governor

December 11, 2001

County of San Luis Obispo
Attn: Mr. Perry Garcia
Water Quality Manager
County Government Center, Room 207
San Luis Obispo, CA 93408

REVISED WASTE DISCHARGE REQUIREMENTS ORDER NO. 01-130 FOR OAK SHORES DEVELOPMENT, SAN LUIS OBISPO COUNTY, CALIFORNIA

Dear Mr. Garcia:

Enclosed is the final Waste Dischcrge Requirements Order No. 01-130 for Oak Shores Development adopted by this Board at it December 7, 2001 meeting.

If you have any questions, please call **Tom Kukol at (805) 549-3689** or Eric Gobler at (805) 549-3467.

Sincerely,

tJ

Executive Offilcer

Enclosw-es:

1. Order No. 01-130
2. MRP No. 01-130
3. Standard Provisions
4. Customer Service Survey

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SAN LUIS OBISPO COUNIY
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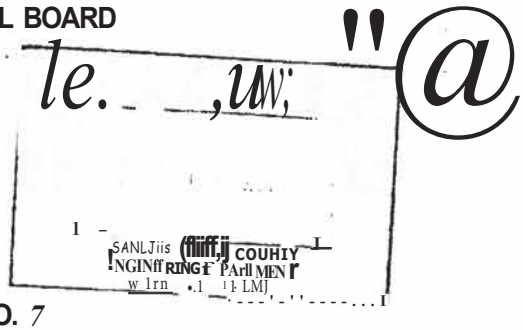
DATE:

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
81 Higuera Street, Suite 200
San Luis Obispo, California 93401



ORDER NO. 01-130

W STE DISCHARGE REQUIREMENTS
FOR
SAN LUIS OBISPO COUNTY SERVICE AREA NO. 7
OAK SHORES DEVELOPMENT
SAN LUIS OBISPO COUNTY

Waste IJischarger Identification No. 3 400113003
Second Draft November 8, 2001
Proposed tor Consideration at the December 7, 2001 Meeting

The California Regional Water *Quality* Control Board, Central Coast Region (Board), finds:

SITE OWNER AND LOCATIOU

I. San Luis Obispo County Servi e Area No. 7 (hereafter "Discharger") owns a1d operates the Oak Shores Wastewater Tn:atment Plant (hereafter "Facility"), which :s a domestic wastewater treatment facility that serves the Oak Shores residential community.

2. The Facility is located within tile Nacimiento Lake watershed in San Luis Obispo County (Adelaide Section, R9E, T25S, \.11JB&M) on property owned by the Discharg,:r and located at 2167 Ridge Rider Road, as shown on Attachment "A" and "B" of thi:; Order. The wastewater facilities are regula:ed by Order No. 94-023 adopted by the Boad on March *1!*, I999. The Board has r•!gulated this discharge since 1971. Treatment consists of screening, oxidation in aerated lagoons, and standby chlorination.

PURPOSE OF ORDER

3. On January 25, 2001 the Discharrer submitted a complete Report of Waste Discharge for authorization to continue a discharge to land from a wastewater collection. treatment, disposal plant serving a residential subdivision.

4. This Order revises waste discharge requirements that are intended to:
   a. allow the discharge described in the Discharger's Report of Waste Discharge, and
   b. uphold State water quality standards.

SITE/FACILITY DESCRIPTION

Dischnrgc Type

5. The Oak Shores Residential Community produces domestic sanitary wastewater from 513 homes. At build-out, 853 homes will produce wastewater.

6. Occupancy, and corresponding wastewater generation, varies throughout the year with highest occupancy, and flows, occurring during the summer months.

7. Wastewater receives secondary treatment via two aeration ponds and two settling lagoons. Disposal is to an evaporation/percolation pond and spray disposal area. The disposal area comprises eight acres. Twenty additional acres are also available for disposal. Both the eight-acre and the twenty-acre parcels are as shown on Attachment B.

Design and Current Capacity

8. Approximately 46,000 gallons per day (gpd) of treated wastewater from the development is discharged. The treatmen'. and disposal capacity is 100,000 gpd.

9. Flow data for the last five years indicates the maximum monthly daily flow was 77,110 gpd with a monthly minimum average daily flow of 27,877 gpd.

10. Part of the wastewater col'.ection system, including the interceptor sev•er, is located below the spillway elevat on of Lake Nacimiento. Existing treatment facilities are located on an earthen fill near Ulke Nacimiento. Pumps lift treated effluent to the disposal area. Disposal urea runoff is cortained behind earthen dikes.

Geology

11. The discharge area is located on hilly topography. Soils are non-water bearing sedimentary formations, prirnaiily sandstone plus some conglomerate and shale that are low permeable. Sedimentary bedrock is generally encountered at 20 feet. At the di:;posal site, the thickness of the unsaturated zone varies between about 30 and 50 feet. :;-he sediments are generally granular witi favorable characteristics (e.g., minor arnol!nts of clay). Sandstone bedrock or cemented silty sand/sandy silt underlies the surfidal sediments at a depth of about 50 feet bgs.

Surface and Groundwater

12. The nearest surface water body i; Kavanaugh Creek, which is within Lake Nacimiento watershed. It is located apprm.imately 250 feet east of the discharge location.

13. The Basin Plan lists the fdlowing as beneficial uses of Lake Nacimiento:
    a) Municipal & Domestic Water Supply
    b) Agricultural Water Supply
    c) Industrial Service Supply
    d) Groundwater Recharge
    e) Water Contact Recreation
    f) Non Contact Water Recreation
    g) Wann Fresh Water Habitat
    h) Cold Fresh Water Habitat
    i) Wildlife Habitat
    j) Fish spawning, and,
    k) Rare, Threatened, or Endangered Species

14. Depth to groundwater near of the discharge is 33 teet. Regional groundwater is presumed to move in a westerly direction. No water supply wells are known to exist within 0.5 mile of the disposal area.

15. Onsite groundwater monitoring suggest the following ambient groundwater quality:

INORGANIC CHEMISTRY AND PHYSICAL PROPERTIES		
Constituent/Parameter	Value	
Alkalinity	550	*mgn*
Calcium	120	mg/I
Chloride	100	mg/I
Hardness	820	mg/!
Magnesium	120	mg/I
Nitrate	300	ug/1
Sodium	140	mg/I
Sulfate	550	mg/I.
Total Dissolved Solids	1500	mg/I
pecific Conductance	2000	µmhos/cm

16. Present and anticipated beneficial uses of groundwater near the discharge include:
    a) Municipal & Domestic Water Supply,
    b) Agricultural Water Supply
    c) Industrial Process Supply, and
    d) Industrial Service Supply.

Water Supply

17. Water supply at Oak Shores is obtained from a Lake Naciemiento well. The quality of water supply at the development is quite variable with total dissolved solids ranging from 350-900 mg/l.

MONITORING PROGRAM

18. Monitoring and Reporting Program (MRP) No. 0I-130 is a part of the proposed Order. . The MRP requires routine water supply, groundwater, influent, disposal area, and

effluent monitoring to verify compliance and protection of groundwater quaity.

BASIN PLAN

19. The Water Quality Control Pla:1, Central Coast Basin (Basin Plan) was adopted by the Regional Board on November 19, 1989, md approved by the State Board on August 16, 1990. The Regional Board approved amendments to the Basin Plan on February 11, 1994, and September 8, 1994. The Basin Plan incorporates statewide plans and policies by reference and contains a strateg;' for protecting beneficial uses of State waters.

ENVIRONMENTAL ASSESSMENT

20. These waste discharge requirements are for an existing facility and are exempt from the provisions of the California : nvironmental Quality Act (Public Resources •:ode, Section 21000, et. seq.) in accordance with Section 15301, Article 19, Chapter 3, Dt,,ision 6, Title I4 of the California Code of Regulations.

EXISTING ORDERS/GENERAL FINDINGS

21. The discharge has been regulatt:d by Waste Discharge Requirements Order NJ. Order No. 94-23, adopted by the Board on March 11, 1994. The Board has regulated his discharge since 1971.

22. Discharge of Waste is a privilege, not a right, and authorization to discharge is conditional upon the discharge complying with provisions of Division 7 of the California Waler Code and any more s1ringent effluent limitations necessary to implement water qu:1lity control plans, to protect beneficial uses, and to prevent nuisance. Compliance with this Order should assume this and mitigate any poteritial adverse changes in water quality due to discharge.

23. On September 24, 2001, the Board notified the Discharger and interested agencies and person of its intent to issue waste discharge requirements for the discharge and has provided them with a copy of the proposed Order and an opportunity to submit written views and comments.

24. After considering all comments pertaining to this discharge during a public hearing on December 7, 200 l, this Order was found consistent with the above findings.

IT **IS HEREBY ORDERED,** pursuant to authority in Section 13263 of the California Water Code, San Luis Obispo County Service Area No. 7, its agents, successors, and assigns may discharge wastes from the Oak Shores Development Wastewater Treatment Plant, providing compliance is maintained with the following:

Notes:

- Other prohibitions and conditions, definitions, and the method of detennining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated January 1984.

- Throughout these requirements footnotes are listed to indicate the source of requirements specified. Requirement footnotes may be one of the following:

  BP Basin Plan
  ROWD Report of Waste Discharge
  ewe California Water Code
  BPJ Best Professional Judgement
  Design Discharger's original design

All technical and monitoring reports submitted pursuant to this Order are required pursuant to Section 13267 of the California Water Code. Failure to submit reports in accordance with schedules established by this Order, attachments to this Order, or failure to suhmit a report of sufficient technical quality to be acceptable to the Executive Officer, may subject the Discharger to enforcement action pursuant to Section 13268 of the California Water Code. The Regional Board will base all enforcement actions on the date of Order adoption.

PROHIBITIONS

1. Discharge of treated wa:-itewatcr to areas other titan the designz.ted ponds and disposal area, as shown on Attachment "B", is prohibited. ROWD

2. Discharge of effluent to tl.e spray disposal area is prohibited BPJ
   a when rainfall is forecast within 24 hours,
   b. during rainfall,
   c. within 24 hours after a ,:ainfall, and
   d. when soils are saturatec.

3. Discharge of any w tes; including overflow, bypass, seepage, and overspray; from transport, treatment, storage, or disposal systems to adjacent drai ways or adjacent properties is prorlbited. c

4. Bypass of the treatment facility and discharge of untreat.ed or partially treated wastes directly to the designated disposal area is prohibited. ROWD

5. Discharges not specificall1 regulated by this Order are prohibited. 8 1
6. Discharge of uncontaminated storm waters, except stonn waters falling d;rectl into the treatment facilities, is prohibited. B1

7. Creation of a condition of pollution, contamination, or nuisance, I> defined by Section 13050 of the California Water Code (CWC), is prohibited.ewe

8. The dischar e of radioactive substances is prohibited. B

B. DISCHARGE SPECIFICATIO,\JS

General

1. Extraneous surface drainag! shall be excluded from all wastewat1:r treatment and disposal facilities. BPJ

•2. Effluent shall not be discha:·ied within lO0 feet of water supply wells. PJ

3. The Discharger shall maintain all devices or designed features, installed in accordance with this Order such that they continue to oJjerate as intended without interruption. 8 1

4. Pond Freeboard shall exceed two feet in each pond at all times. BPJ

5. "Removal efficiencies" for Total Suspended Solids and Biochemical Oxygen Demand ODS) shall not be less than 85 percent. 8 1

6. Daily flow averaged over each month shall not exceed I00,000 gallons.

Effble_n_t

7. Effluent shall not have dissolved oxygen concentrations less than 2.0 mg/I.

8. Effluent concentrations shall not exceed the following limits: BPJ

Table 1 - Effluent Limits

Constituent/ Parameter	Units	30-Day Average	.Daily Maximum
BODS	mg/L	50	100
Total Suspended Solids	mg/L	50	100
Settleable Solids	mLJL	-	0.5

C. GROUNDWATER LIMITATIONS

1. The discharges shall not cause a significant increase of mineral constituent concentrations in underlying groundwaters. BP

2. The discharge shall not cause concentrations of chemicals and radionuclides in groundwater to exceed limits set forth in Title 22, Chapter 15, A1ticles 4, 4.5, 5, and 5.5 of the California Code of Regulations. BP

3. Compliance with grouncwater limitations shall be detennined by comparing upgradient and downfiadient groundwater monitoring well data 8 1

D. PROVISIONS

1. The requirements prescrilnd by this Order (No. 01-130) supersed•! requirements prescribed by Order No. 9t-023, on March 11, 1994. Order No. 94-023, Waste Discharge Requirements ior Oak Shores Development, San Luis Obispo County is hereby rescinded.

2. Discharger shall comply with Monitoring and Reporting Program No. 01-130, as specified by the Executive Officer.

3. The wastewater treatment facilities shall be operated by qualified (:3tate certified) personnel according to tht: requirements specified in Section t::627 of the California Water Code.The wastewater treatment and disposal areas ,hall be posted to warn the public of the presence of wastewater and managed t> exclude the public.

4. Discharger shall comply wiih all relevant sections of the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requireraents" dated January I984.

5. Pursuant to Title 23, Division 3, Subchapter 9, of the California Code· of Regulations, the Discharger must submit a written report to the Executive Officer not later than June 22, 2011 addressing: APM

   a Whether there will be changes in the continuity, character, location, ur volume of the discharge; and,
   b. Whether, in their opinion, there is any portion of the Order that is incorrect, obsolete, or otherwise in need of revision.

6. The Discharger shall maintain a comprehensive operations and maintenance manual for the wastewater treatment, storage and disposal facilities. This manual must include a contingency plan for high pH levels and excessive storm flows.

7. Wastewater treatment and storage facilities shall be managed to exclude the public.

I, Roger W. Briggs, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Coast Region, on December 7, 2001.

Roger W. Briggs, Executive Officer

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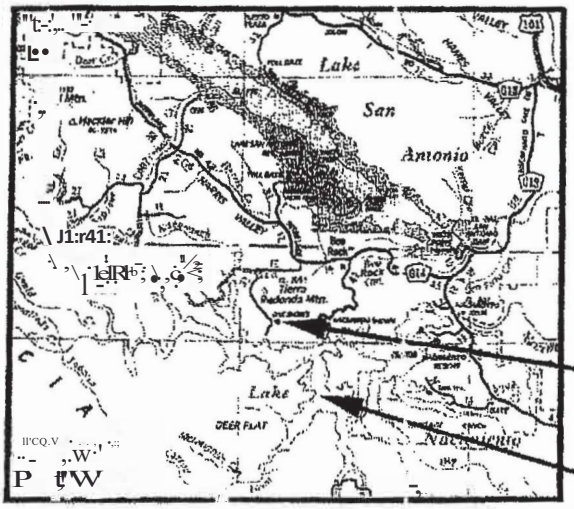
ATTACHMENT A
OAK SHORES DEVELOPMENT



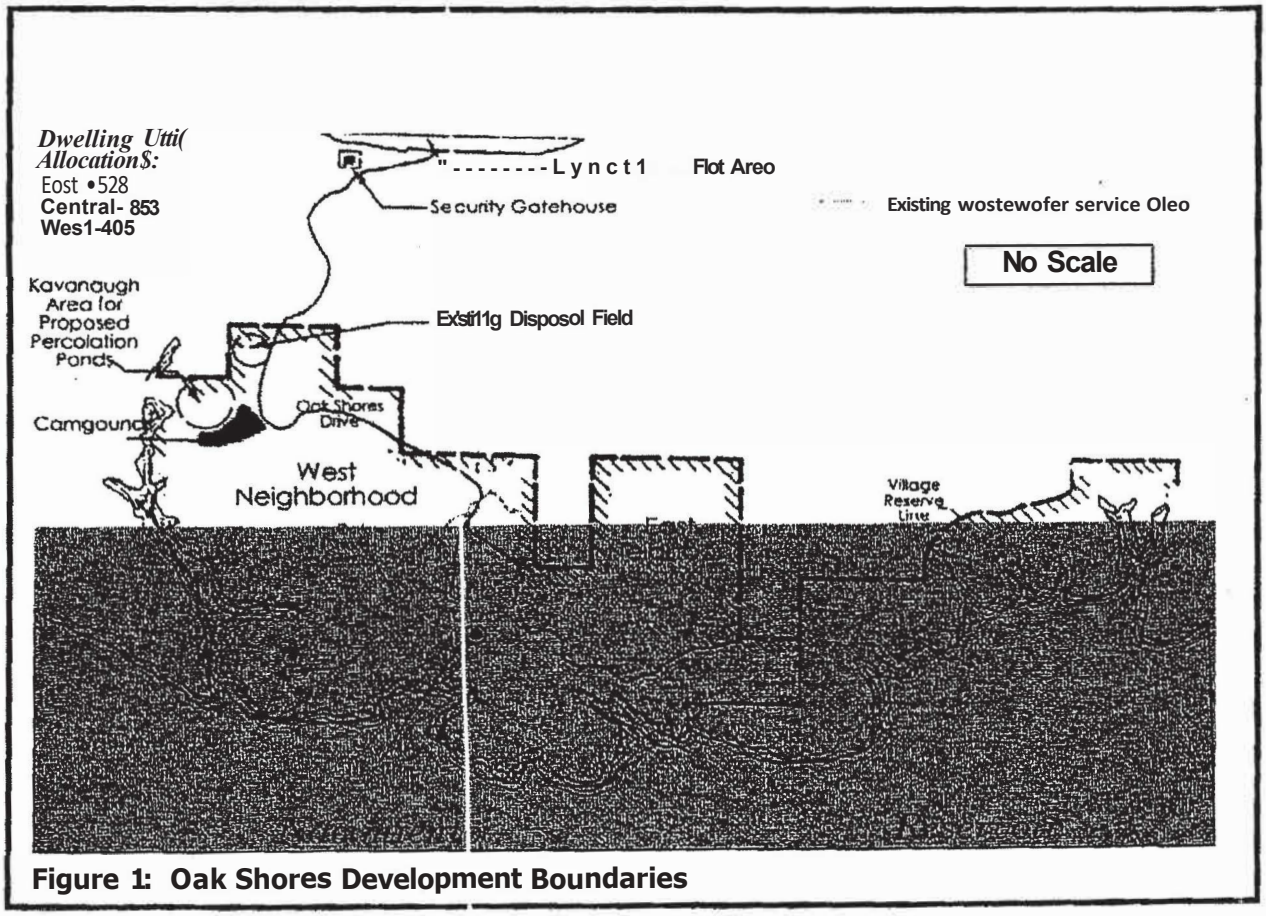
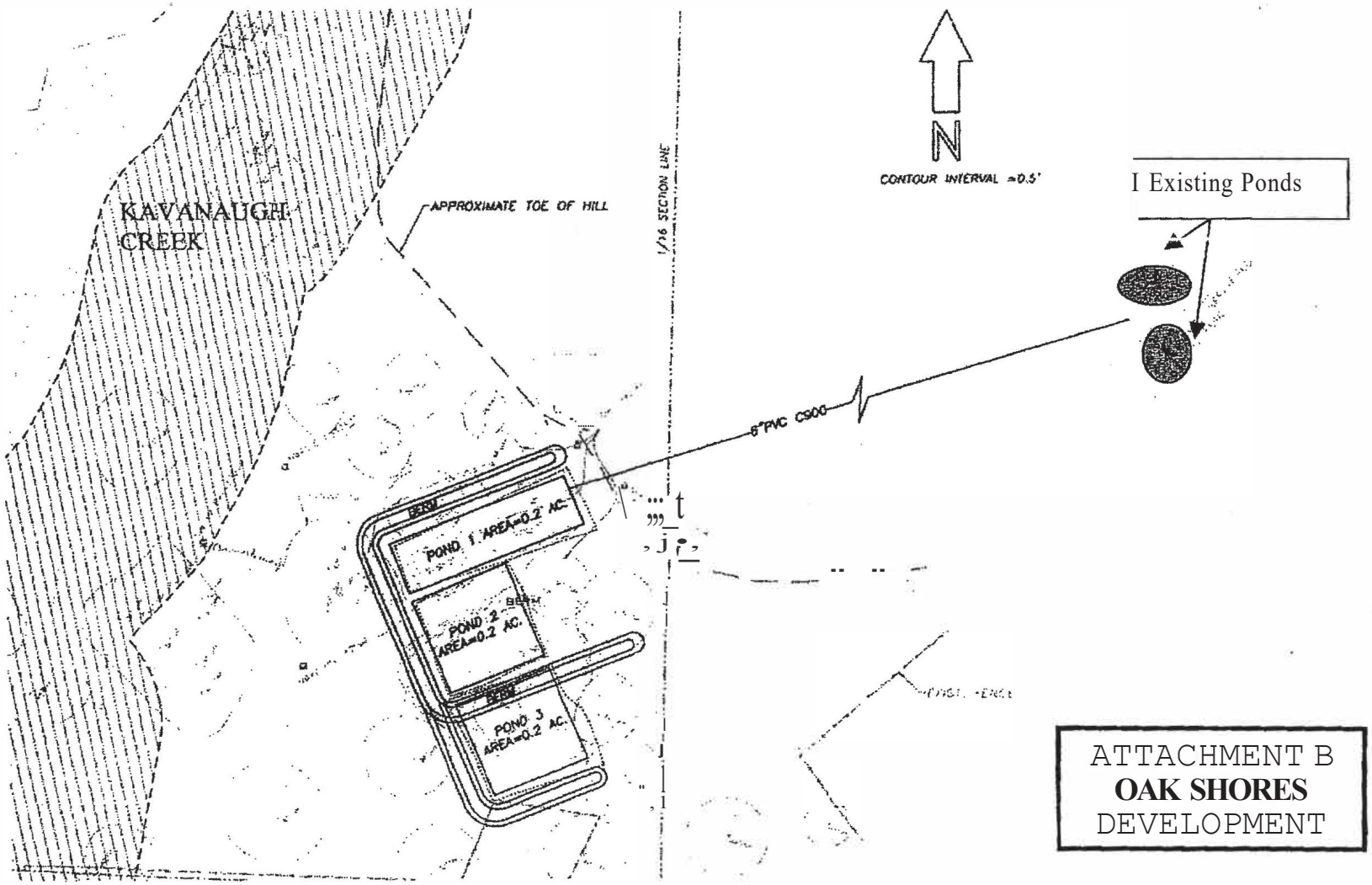


Figure 1: Oak Shores Development Boundaries



ATTACHMENT B
OAK SHORES
DEVELOPMENT

ece·:-.,c 4.,.__ 7-.:,,..

CALIFORNIA REGIONAL WATER QUAUTY CONTROL BOARD
CENTRAL COAST REGION
81 Higuera Street, Suite 200
ian Luis Obispo, California 93401

MONITORING ANO REPORTING PROGRAM ORDER NO. 01-130
Waste Ctscharger Identification No. 3 400113003
For
SAN LUIS OBISPO COUNTY SERVICE AREA NO. 7
OAK SHORES DEVELOPMENT
San Luis Obispo County

Reporting responsibilities are specified in Sections 13225(a), 13267(b), 13383, and 133S7(b) of the California Water Code. This Monitoring and .Reporting Program is issued in accordance with Provision D.2. of Regional Board Order No. 01-130.

Water Supply Monitoring

Representative sampla, of the commuuity water supply shall be collected and analyzed for the constituents and at the frequency specified below:

Param[illegible]	[illegible]	[illegible]	[illegible]
General Minerals*	mg/l	Grab	Annually (December)

* General Mineral analyses shall indrui.e the following constituents: Calcium, Magnesium, Sodium, Sulfirte, Carbonate, Bi-Carbooate, Chloride, Total Hardness, Total Alkalinity, Total Dissolved Solids, pH, Electric.al Conductivity, Boroo. Iron. and Nitrate (as N). Sampling IC3Ub h r the Department of Healtb. Services may be submitted to satisfy this requirement

Influent Monitoring

Wastewater eotering wastewater ponds shall be collected and analyzed for the following:

Parameter/Con[illegible]	[illegible]	Sample Type	Sampling Fr[illegible]
Flow Volume	MG	Metered	Daily
Maximum DailI Flow	MOD	Metered	Monthly
Mean Daily Flow	MGD	Calculated	Monthly
BOD,	mg/l	Grab	Quarterly (Mar/Jun/Sept/Dec)
Total Suspended Solids	mg/l	Grab	Quarterly (Mar/Jun/Sept/Dec)
pH	Units	Grab	Quarterly (Mar/Jun/Sept/Dec)

Pond Monitoring

Representative samples shall be collect and analyzed for the following:

1. Freeboard measurements relative to the lowest crest elevation of each pond shall be taken and recorded for each pond the first working day of 1 ch month.

2. Representative samples of wastewater from the final treatment pond shall be collected and analyzed as follows:

pH	units	Type	Weekly
Settleable Solids	ml/l	Grab	arterly{Mar!Jtm!Sept/Dec)
BOD,	3L!	Grab	Quarterly (Mar/Jun/Sept/Dec}
Total Nitrogen	mg/l	Grab	Quarterly (Mar/Jun/Sept/Dec)
Suspended Solids		Grab	Annually (December)
Total Dissolved Solids	mg/L	Grab	Annua (December)
Sodium		Grab	Annually (December)
Oiloride	mg/L	Grab	Annwilly(December)
Nitrate (asN)		Grab	Once every 5 years (June)
Aluminum	mg/l	Grab	Once every 5 years (June)
Antimony	mwl	Grab	Once every 5 years (June)
Arsenic	mg/I	Grab	Once every 5 years(June)
Barium	mg/I	Grab	Once every s years (Jllle)
Berylium	mwl	Grab	Once every 5 years (June)
Cadmium	mg/I	Grab	Once every 5 years (Junel
Chromium	mg/I	Grab	Onco every 5 years (June)
Coooer	mg/I	Grab	Once every 5 years (June)
Cyanide	mg/l	Grab	Once every 5 years (June}
Flouride	mwl	Grab	Once every 5 years (June)
Lead	mg/1	Grab	Once every 5 years (June)
Mercury	mgll	Grab	Once every 5 years (June)
Nickel	mg/I	Grab	Once every 5 years (June)
Selenium	lllVl	Grab	Once every 5 years (June)
Thalium	lllVl	Grab	Once every 5 years (June)
Zinc	mwl	Grab	Once every 5 years (June)
PCBs	mg/1	Grab	Once every 5 years (June)
Pesticides	mg/I	Grab	Once every 5 years (June)

A summary of observations and other information shall be submitted with Semi-Annual monitoring reports.

The Discharger shall conduct weekly inspections of spray fields in use. A log shall be maintained with at least the following information:

- Dates of discharge;
- Amount of discharge;
- Acres under irrigatim;
- Irrigation area rotatio.1 dates;
- Irrigation system insp on dates; and
- Irrigation repairs and :naintenance
- Note any spray or ove:rspray beyond fence area
- Note the condition of JlOsting around fence area

Biosolidl Monitoring

A sumnuuy of estimated volumes of biosolid waste nmoved and disposal areas shall be made and submitted with the annual reports.

The Discharge.r sball submit a sumtnary of activities regarding solids hmJdling with each quarterly monitoring report. Prior to biosolid removal or change in disposal practices (location, process, frequency), the Discharger shall submit all disposal informati.cn to the Executive Officer for approval. Representative samples of too biosolids to be disposed off shall be collected and analyzed for the constituents and at the frequencies specified below:

l>?.- : if:rt	;t:-:.-t:.\1"intsi(:_:-?/		r.i:- P:.-:.-!r.:-Lt
Quantity	Tcins oryds[3]	Measured during removal	Each load
Moisture Content	%	Grab	Prior to transoort/diBnosal
Nitrate (as N)	m2lk2	Grab	Prior to transnnrt/dis-al
Total Phosohoros	m2l'k2	Grab	Prior to tmnmnrt/di!ffln!llal
iH	1lH units	Grab	Prior to transport.llisnnsal
Grease & Oil	D1Sllk2	Grab	Prior to transnort/disnosal
Arsenic	mru'lm	Grab	Prior to u -;11disD011al
Antimonv	rrurlkll	Grab	Prior to transpo:11WSDOSal
Barium	nw'kll	Grab	Prior to transpo:uwsoosal
Bervllium	tn2lkR	Grab	Prior to tr-----t/cusposal
Boron	·m2:/k2-	Grab	Prior In transport/disl)OSa]
Cadmimn	:lll!/lm	Grab	Prior to transoortdisoosal
Cobalt	:rut/kiz	Grab	Prior to tr:ansportdisf)()Sai
Copper	me;/kfz	Grab	Prior to transport/disposal
Chromium, VI & Total	ine:.lkdt	Grab	Prior to tr,inmnrt/disoosal
Lead	1ng/kg	Grab	Prior to tranStx>rtldisoosal.
MercuJY	mw'k,;	Grab	Prior to transport/disoosal
Molvoaenum	1rut/kg	Grab	Prior to trammort/disoosal
Nickel	1na/kg;	Grab	Prior to transport/cusposal
Selenium	1	Grab	Prior to transoort/dimnsal
Silver	cll2'b	Grab	Prior to transport/cusposal
ThalliUD1	r w ' b	Grab	Prior to transportdisoosal
Tin	I lf/lcl1	Grab	Prior to tr:ansportdisoosal
VanadiUD1	IIII?/1dl	Grab	Prior to transport/cusposal
Zinc	n12/b	Grab	Prior to trans=-...::..ral
Pesticides	n!J!lb:	Grab	Prior to transport/cusposat•••
Organic Lead	nuz/b	Grab	Prior to transport/cusposat•••
PCBs	n	Grab	Prior to transnnrtAusposa••••

- • Clwacteri7.ation required by dispol al facility may be submitted in place of this list
- •• If no need for sludgdbiosolids nmoval occurs during a given year, the Discharger will ha e no obligation for biosolids monitoring. Reporting in this case shall explain the absence of this monitoring.
- ••• At least once every 5 yems prior to lnmSport or disposal.

Disposal Area Monitoring

The-disposal area shall be inspected three times per week and daily during heavy rains. Evidence of any improper operation shall be reported to the Executive Officer within 24 hoW'S of knowing of such conditions, and promptly investigated and remedied. A record shall be kept of dates and nature of observations and remedies and of when use of each spray disposal area is alternated or suspended. A summary of any problems found at the spray disposal fields and corrective nctions taken shall be included in each monitoring report

Collection System Testine

The collection system shall be dye 1:ested at least annually, in July, to determine if leaks exist below the lake level. Discharger shall notify Regioul Board staff at least two weeks prior to petforming the testing procedure. Results from dye--testing shall be included in the next quarterly monitoring report following test procedures. Any leaks found shall be reported within :4 hours.

Reportin2

Reports shall be submitted quarterly by the 30th of the month (Jan/Apr/Jul/Oct) following quarrerly sampling and shall contain all data collected or calculated over the previous quarter. Reports shall ajso contain a narrative summary of any exceptions pursuant to Disposal Area Monitoring described above.

ORDERED BY_____
Executive Officer

_____
Date

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Appendix F
Rating Tables for Gravity Sewer Pipes

CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	J.013
Depth	3.0 in
Diameter	6 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/ft)	Discharge (mgd)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
:l.005000	0.128	2.02	0.1	0.79	0.50
:l.010000	0.181	2.86	0.1	0.79	0.50
:l.015000	0.222	3.50	0.1	0.79	0.50
:l.020000	0.256	4.04	0.1	0.79	0.50
:l.025000	0.287	4.52	0.1	0.79	0.50
:l.030000	0.314	4.95	0.1	0.79	0.50
:l.035000	0.339	5.35	0.1	0.79	0.50
:l.040000	0.363	5.72	0.1	0.79	0.50
:l.045000	0.385	6.06	0.1	0.79	0.50
:l.050000	0.405	6.39	0.1	0.79	0.50
:l.055000	0.425	6.70	0.1	0.79	0.50
:l.060000	0.444	7.00	0.1	0.79	0.50
:l.065000	0.462	7.29	0.1	0.79	0.50
:l.070000	0.480	7.56	0.1	0.79	0.50
:l.075000	0.497	7.83	0.1	0.79	0.50
:l.080000	0.513	8.08	0.1	0.79	0.50
:l.085000	0.529	8.33	0.1	0.79	0.50
:l.090000	0.544	8.57	0.1	0.79	0.50
:l.095000	0.559	8.81	0.1	0.79	0.50
:l.100000	0.573	9.04	0.1	0.79	0.50
:l.105000	0.588	9.26	0.1	0.79	0.50
:l.110000	0.601	9.48	0.1	0.79	0.50
:l.115000	0.615	9.69	0.1	0.79	0.50
:l.120000	0.628	9.90	0.1	0.79	0.50
:l.125000	0.641	10.10	0.1	0.79	0.50
:l.130000	0.654	10.30	0.1	0.79	0.50
:l.135000	0.666	10.50	0.1	0.79	0.50
:l.140000	0.678	10.69	0.1	0.79	0.50
:l.145000	0.690	10.88	0.1	0.79	0.50
:l.150000	0.702	11.07	0.1	0.79	0.50

Notes: Capacity of 6" ACP gravity sewer pipe in MGD, assuming d/D of 0.5.

County of San Luis Obispo
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666
Project Engineer: Public Works Department

CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.012
Depth	3.0 in
Diameter	6 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/ft)	bischarge (mgd)	Velocity (ft/s)	Flow Area (ft2)	Wetted Perimeter (fl)	Top Width (ft)
:>.005000	0.139	2.19	0.1	0.79	0.50
:>.010000	0.196	3.10	0.1	0.79	0.50
:l.015000	0.241	3.79	0.1	0.79	0.50
:>.020000	0.278	4.38	0.1	0.79	0.50
:>.025000	0.311	4.89	0.1	0.79	0.50
:>.030000	0.340	5.36	0.1	0.79	0.50
:>.035000	0.367	5.79	0.1	0.79	0.50
:>.040000	0.393	6.19	0.1	0.79	0.50
:>.045000	0.417	6.57	0.1	0.79	0.50
:>.050000	0.439	6.92	0.1	0.79	0.50
:>.055000	0.461	7.26	0.1	0.79	0.50
:>.060000	0.481	7.58	0.1	0.79	0.50
:>.065000	0.501	7.89	0.1	0.79	0.50
J.070000	0.520	8.19	0.1	0.79	0.50
J.075000	0.538	8.48	0.1	0.79	0.50
:>.080000	0.556	8.76	0.1	0.79	0.50
:>.085000	0.573	9.03	0.1	0.79	0.50
:>.090000	0.589	9.29	0.1	0.79	0.50
:>.095000	0.605	9.54	0.1	0.79	0.50
:>.100000	0.621	9.79	0.1	0.79	0.50
3.105000	0.636	10.03	0.1	0.79	0.50
:>.110000	0.651	10.27	0.1	0.79	0.50
:>.115000	0.666	10.50	0.1	0.79	0.50
:>.120000	0.680	10.72	0.1	0.79	0.50
:>.125000	0.694	10.94	0.1	0.79	0.50
:l.130000	0.708	11.16	0.1	0.79	0.50
J.135000	0.722	11.37	0.1	0.79	0.50
J.140000	0.735	11.58	0.1	0.79	0.50
:>.145000	0.748	11.79	0.1	0.79	0.50
J.150000	0.761	11.99	0.1	0.79	0.50

Notes: Capacity of 6" SDR-35 gravity sewer pipe in MGD, assuming d/O of 0.5.

CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.013
Depth	4.0 in
Diameter	8 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/fl)	bischarge (mgd)	Velocity (ft/s)	Flow Area (ft2)	Wetted Perimeter (fl)	Top Width (ft)
:l.005000	0.276	2.45	0.2	1.05	0.67
:l.010000	0.390	3.46	0.2	1.05	0.67
:l.015000	0.478	4.24	0.2	1.05	0.67
:l.020000	0.552	4.90	0.2	1.05	0.67
:l.025000	0.617	5.47	0.2	1.05	0.67
:l.030000	0.676	6.00	0.2	1.05	0.67
:l.035000	0.731	6.48	0.2	1.05	0.67
:l.040000	0.781	6.92	0.2	1.05	0.67
:l.045000	0.828	7.34	0.2	1.05	0.67
:l.050000	0.873	7.74	0.2	1.05	0.67
:l.055000	0.916	8.12	0.2	1.05	0.67
:l.060000	0.956	8.48	0.2	1.05	0.67
:l.065000	0.996	8.83	0.2	1.05	0.67
:l.070000	1.033	9.16	0.2	1.05	0.67
:l.075000	1.069	9.48	0.2	1.05	0.67
:l.080000	1.104	9.79	0.2	1.05	0.67
:l.085000	1.138	10.09	0.2	1.05	0.67
:l.090000	1.171	10.38	0.2	1.05	0.67
:l.095000	1.204	10.67	0.2	1.05	0.67
:l.100000	1.235	10.95	0.2	1.05	0.67
:l.105000	1.265	11.22	0.2	1.05	0.67
:l.110000	1.295	11.48	0.2	1.05	0.67
3.115000	1.324	11.74	0.2	1.05	0.67
3.120000	1.353	11.99	0.2	1.05	0.67
3.125000	1.381	12.24	0.2	1.05	0.67
3.130000	1.408	12.48	0.2	1.05	0.67
:l.135000	1.435	12.72	0.2	1.05	0.67
:l.140000	1.461	12.95	0.2	1.05	0.67
:l.145000	1.487	13.18	0.2	1.05	0.67
:l.150000	1.512	13.41	0.2	1.05	0.67

Notes: Capacity of 8" ACP gravity sewer pipe in MGD, assuming d/D of 0.5.

County of San Luis Obispo
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Project Engineer: Public Works Department
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CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.012
Depth	4.0 in
Diameter	8 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/ft)	Discharge (mgd)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
:I.005000	0.299	2.65	0.2	1.05	0.67
:I.010000	0.423	3.75	0.2	1.05	0.67
:I.015000	0.518	4.59	0.2	1.05	0.67
:I.020000	0.598	5.30	0.2	1.05	0.67
:I.025000	0.669	5.93	0.2	1.05	0.67
:J.030000	0.733	6.50	0.2	1.05	0.67
:J.035000	0.791	7.02	0.2	1.05	0.67
:J.040000	0.846	7.50	0.2	1.05	0.67
:J.045000	0.897	7.96	0.2	1.05	0.67
:I.050000	0.946	8.39	0.2	1.05	0.67
:I.055000	0.992	8.79	0.2	1.05	0.67
:I.060000	1.036	9.19	0.2	1.05	0.67
:I.065000	1.079	9.56	0.2	1.05	0.67
:J.070000	1.119	9.92	0.2	1.05	0.67
:I.075000	1.159	10.27	0.2	1.05	0.67
:J.080000	1.197	10.61	0.2	1.05	0.67
:J.085000	1.233	10.93	0.2	1.05	0.67
:I.090000	1.269	11.25	0.2	1.05	0.67
:J.095000	1.304	11.56	0.2	1.05	0.67
:J.100000	1.338	11.86	0.2	1.05	0.67
:J.105000	1.371	12.15	0.2	1.05	0.67
:I.110000	1.403	12.44	0.2	1.05	0.67
:I.115000	1.435	12.72	0.2	1.05	0.67
:I.120000	1.465	12.99	0.2	1.05	0.67
:I.125000	1.496	13.26	0.2	1.05	0.67
:I.130000	1.525	13.52	0.2	1.05	0.67
:J.135000	1.554	13.78	0.2	1.05	0.67
:I.140000	1.583	14.03	0.2	1.05	0.67
:I.145000	1.611	14.28	0.2	1.05	0.67
:I.150000	1.638	14.52	0.2	1.05	0.67

Notes: Capacity of 8" SDR-35 gravity sewer pipe in MGD, assuming d/D of 0.5.

County of San Luis Obispo
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Project Engineer: Public Works Department
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CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.012
Depth	5.0 in
Diameter	10 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/ft)	Discharge (mgd)	Velocity (ft/s)	Flow Area (ft')	Wetted Perimeter (ft)	Top Width (ft)
J.005000	0.542	3.08	0.3	1.31	0.83
J.010000	0.767	4.35	0.3	1.31	0.83
J.015000	0.939	5.33	0.3	1.31	0.83
J.020000	1.085	6.15	0.3	1.31	0.83
J.025000	1.213	6.88	0.3	1.31	0.83
J.030000	1.328	7.54	0.3	1.31	0.83
J.035000	1.435	8.14	0.3	1.31	0.83
J.040000	1.534	8.70	0.3	1.31	0.83
J.045000	1.627	9.23	0.3	1.31	0.83
J.050000	1.715	9.73	0.3	1.31	0.83
J.055000	1.799	10.21	0.3	1.31	0.83
J.060000	1.879	10.66	0.3	1.31	0.83
J.065000	1.955	11.09	0.3	1.31	0.83
J.070000	2.029	11.51	0.3	1.31	0.83
J.075000	2.101	11.92	0.3	1.31	0.83
J.080000	2.169	12.31	0.3	1.31	0.83
J.085000	2.236	12.69	0.3	1.31	0.83
J.090000	2.301	13.05	0.3	1.31	0.83
J.095000	2.364	13.41	0.3	1.31	0.83
J.100000	2.425	13.76	0.3	1.31	0.83
J.105000	2.485	14.10	0.3	1.31	0.83
J.110000	2.544	14.43	0.3	1.31	0.83
J.115000	2.601	14.76	0.3	1.31	0.83
J.120000	2.657	15.07	0.3	1.31	0.83
J.125000	2.712	15.39	0.3	1.31	0.83
J.130000	2.765	15.69	0.3	1.31	0.83
J.135000	2.818	15.99	0.3	1.31	0.83
J.140000	2.870	16.28	0.3	1.31	0.83
J.145000	2.921	16.57	0.3	1.31	0.83
J.150000	2.971	16.85	0.3	1.31	0.83

Notes: Capacity of 10" SDR-35 gravity sewer pipe in MGD, assuming d/D of 0.5.

CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.012
Depth	6.0 in
Diameter	12 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/ft)	:}ischarge (mgd)	Velocity (ft/s)	Flow Area (ft2)	Wetted Perimeter (ft)	Top Width (ft)
J.005000	0.882	3.47	0.4	1.57	1.00
J.010000	1.247	4.91	0.4	1.57	1.00
J.015000	1.528	6.02	0.4	1.57	1.00
J.020000	1.764	6.95	0.4	1.57	1.00
J.025000	1.972	7.77	0.4	1.57	1.00
J.030000	2.160	8.51	0.4	1.57	1.00
J.035000	2.333	9.19	0.4	1.57	1.00
J.040000	2.494	9.83	0.4	1.57	1.00
J.045000	2.646	10.42	0.4	1.57	1.00
J.050000	2.789	10.99	0.4	1.57	1.00
J.055000	2.925	11.52	0.4	1.57	1.00
J.060000	3.055	12.04	0.4	1.57	1.00
J.065000	3.180	12.53	0.4	1.57	1.00
J.070000	3.300	13.00	0.4	1.57	1.00
J.075000	3.416	13.46	0.4	1.57	1.00
J.080000	3.528	13.90	0.4	1.57	1.00
J.085000	3.636	14.33	0.4	1.57	1.00
J.090000	3.742	14.74	0.4	1.57	1.00
J.095000	3.844	15.15	0.4	1.57	1.00
J.100000	3.944	15.54	0.4	1.57	1.00
J.105000	4.041	15.92	0.4	1.57	1.00
J.110000	4.137	16.30	0.4	1.57	1.00
J.115000	4.230	16.66	0.4	1.57	1.00
J.120000	4.321	17.02	0.4	1.57	1.00
J.125000	4.410	17.37	0.4	1.57	1.00
J.130000	4.497	17.72	0.4	1.57	1.00
J.135000	4.583	18.06	0.4	1.57	1.00
J.140000	4.667	18.39	0.4	1.57	1.00
:J.145000	4.749	18.71	0.4	1.57	1.00
:J.150000	4.830	19.03	0.4	1.57	1.00

Notes: Capacity of 12" SDR-35 gravity sewer pipe in MGD, assuming d/D of 0.5.

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Project Engineer: Public Works Department
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CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.015
Depth	5.0 in
Diameter	10 in

Attribute	Minimum	Maximum	Increment
Slope (ft/ft)	0.005000	0.150000	0.005000

Slope (ft/fl)	bischarge (mgd)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (fl)	Top Width (ft)
::>.005000	0.434	2.46	0.3	1.31	0.83
::>.010000	0.614	3.48	0.3	1.31	0.83
::>.015000	0.752	4.26	0.3	1.31	0.83
::>.020000	0.868	4.92	0.3	1.31	0.83
::>.025000	0.970	5.50	0.3	1.31	0.83
::>.030000	1.063	6.03	0.3	1.31	0.83
::>.035000	1.148	6.51	0.3	1.31	0.83
::>.040000	1.227	6.96	0.3	1.31	0.83
::>.045000	1.302	7.38	0.3	1.31	0.83
::>.050000	1.372	7.78	0.3	1.31	0.83
::>.055000	1.439	8.16	0.3	1.31	0.83
::>.060000	1.503	8.53	0.3	1.31	0.83
::>.065000	1.564	8.88	0.3	1.31	0.83
::>.070000	1.623	9.21	0.3	1.31	0.83
::>.075000	1.680	9.53	0.3	1.31	0.83
::>.080000	1.736	9.85	0.3	1.31	0.83
::>.085000	1.789	10.15	0.3	1.31	0.83
::>.090000	1.841	10.44	0.3	1.31	0.83
::>.095000	1.891	10.73	0.3	1.31	0.83
::>.100000	1.940	11.01	0.3	1.31	0.83
::>.105000	1.988	11.28	0.3	1.31	0.83
::>.110000	2.035	11.55	0.3	1.31	0.83
::>.115000	2.081	11.81	0.3	1.31	0.83
::>.120000	2.126	12.06	0.3	1.31	0.83
::>.125000	2.169	12.31	0.3	1.31	0.83
::>.130000	2.212	12.55	0.3	1.31	0.83
::>.135000	2.255	12.79	0.3	1.31	0.83
::>.140000	2.296	13.03	0.3	1.31	0.83
::>.145000	2.337	13.26	0.3	1.31	0.83
::>.150000	2.376	13.48	0.3	1.31	0.83

Notes: Capacity of 1O' Steel gravity sewer pipe in MGD, assuming d/D of 0.5.

CSA 7A Oak Shores Interceptor Bypass Study
Rating Table for Circular Channel

Project Description	
Worksheet	Oak Shores Interceptor I
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data	
Mannings Coeffic	.015
Depth	6.0 in
Diameter	12 in

Attribute	Minimum	Maximum	Increment
Slope (fVft)	0.005000	0.150000	0.005000

Slope (ft/fl)	Discharge (mgd)	Velocity (ft/s)	Flow Area (12)	Wetted Perimeter (ft)	Top Width (fl)
J.005000	0.706	2.78	0.4	1.57	1.00
J.010000	0.998	3.93	0.4	1.57	1.00
J.015000	1.222	4.81	0.4	1.57	1.00
J.020000	1.411	5.56	0.4	1.57	1.00
J.025000	1.578	6.22	0.4	1.57	1.00
J.030000	1.728	6.81	0.4	1.57	1.00
J.035000	1.867	7.35	0.4	1.57	1.00
J.040000	1.996	7.86	0.4	1.57	1.00
J.045000	2.117	8.34	0.4	1.57	1.00
J.050000	2.231	8.79	0.4	1.57	1.00
J.055000	2.340	9.22	0.4	1.57	1.00
J.060000	2.444	9.63	0.4	1.57	1.00
J.065000	2.544	10.02	0.4	1.57	1.00
:J.070000	2.640	10.40	0.4	1.57	1.00
:J.075000	2.733	10.77	0.4	1.57	1.00
J.080000	2.822	11.12	0.4	1.57	1.00
:J.085000	2.909	11.46	0.4	1.57	1.00
:J.090000	2.993	11.79	0.4	1.57	1.00
:J.095000	3.075	12.12	0.4	1.57	1.00
:J.100000	3.155	12.43	0.4	1.57	1.00
J.105000	3.233	12.74	0.4	1.57	1.00
:J.110000	3.309	13.04	0.4	1.57	1.00
:J.115000	3.384	13.33	0.4	1.57	1.00
:J.120000	3.456	13.62	0.4	1.57	1.00
:J.125000	3.528	13.90	0.4	1.57	1.00
:J.130000	3.598	14.17	0.4	1.57	1.00
:J.135000	3.666	14.44	0.4	1.57	1.00
:J.140000	3.733	14.71	0.4	1.57	1.00
:J.145000	3.799	14.97	0.4	1.57	1.00
J.150000	3.864	15.23	0.4	1.57	1.00

Notes: Capacity of 12" Steel gravity sewer pipe in MGD, assuming d/D of 0.5.

Appendix G
References

References

1 "Oak Shores Disposal Area Expansion Project" by San Luis Obispo County Public Works Department Water Quality Laboratory, January 2001.

2 San Luis Obispo County Planning Department. *Nacimiento Area Plan.* November 7, 1996.

3 San Luis Obispo County Engineering Department. *Standard Improvement Specifications and Drawings*..

4 San Luis Obispo County Planning Department. *Nacimiento Area Plan.* November 7, 1996.