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# W37a

## CDP APPLICATION 3-16-0233

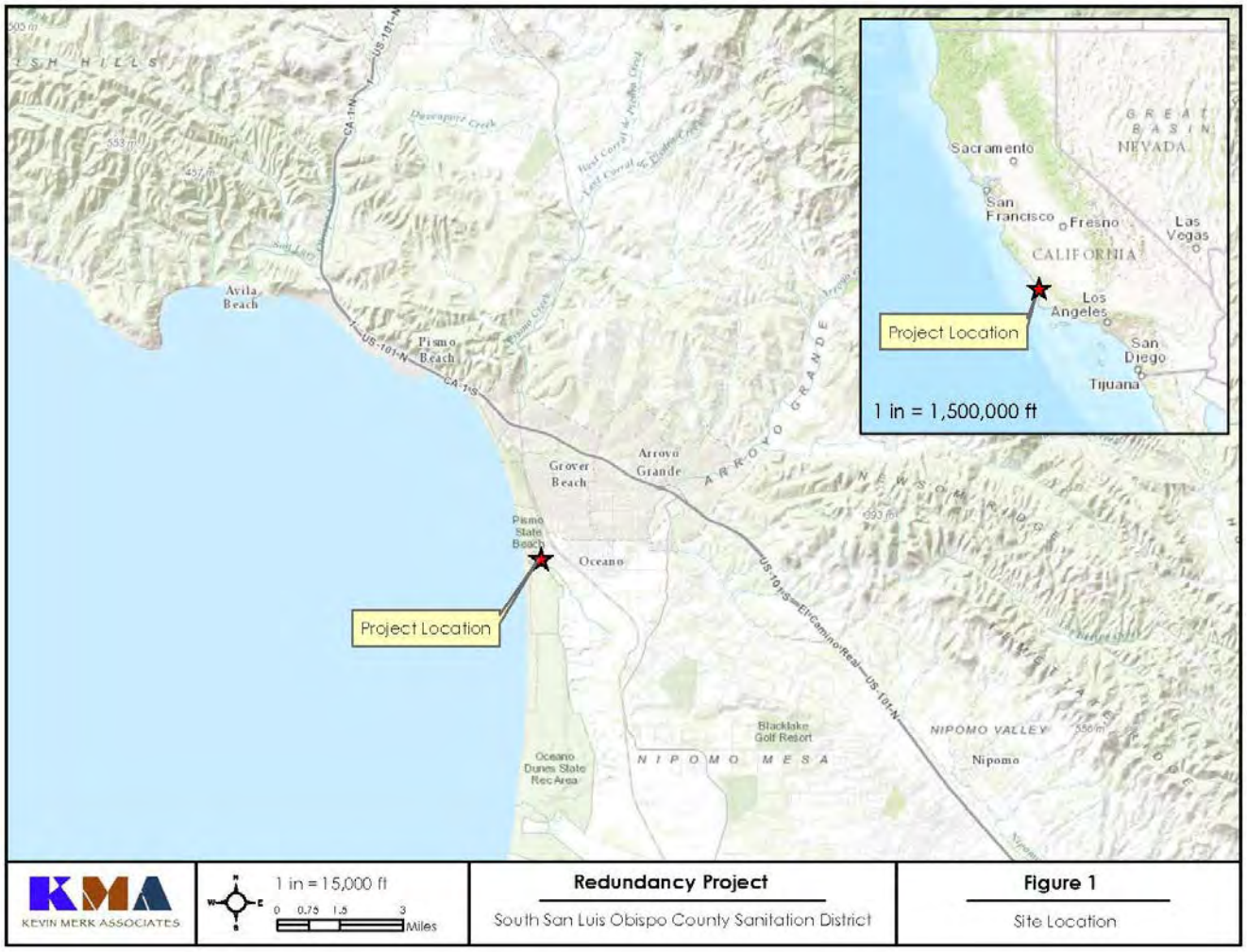
## SOUTH SAN LUIS OBISPO COUNTY SANITATION DISTRICT WASTEWATER TREATMENT PLANT REDUNDANCY PROJECT

## JUNE 7, 2017 REVISED FINDINGS HEARING

## EXHIBITS

**Table of Contents**

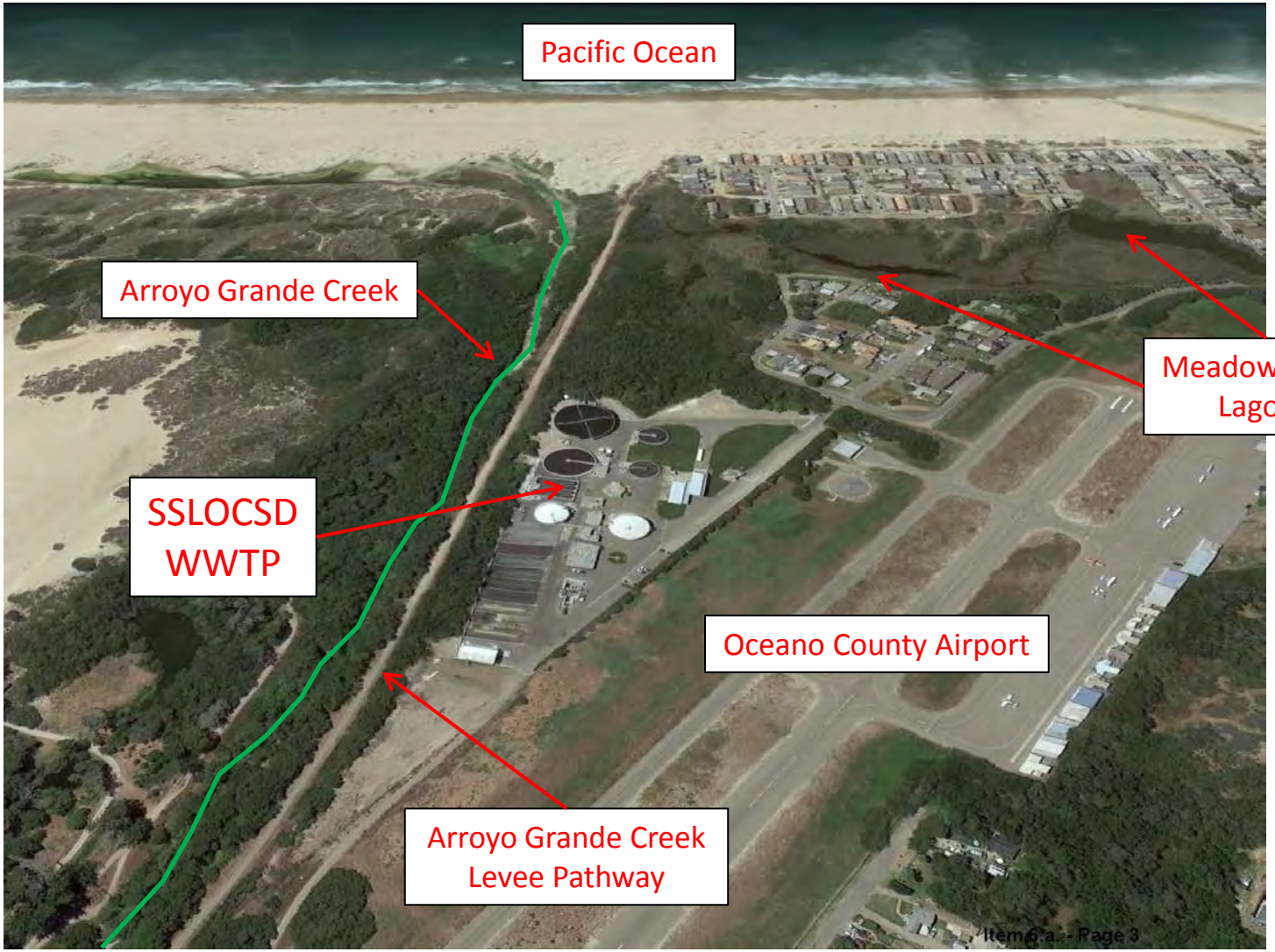
# South San Luis Obispo County Sanitation District Wastewater Treatment Plant (WWTP)

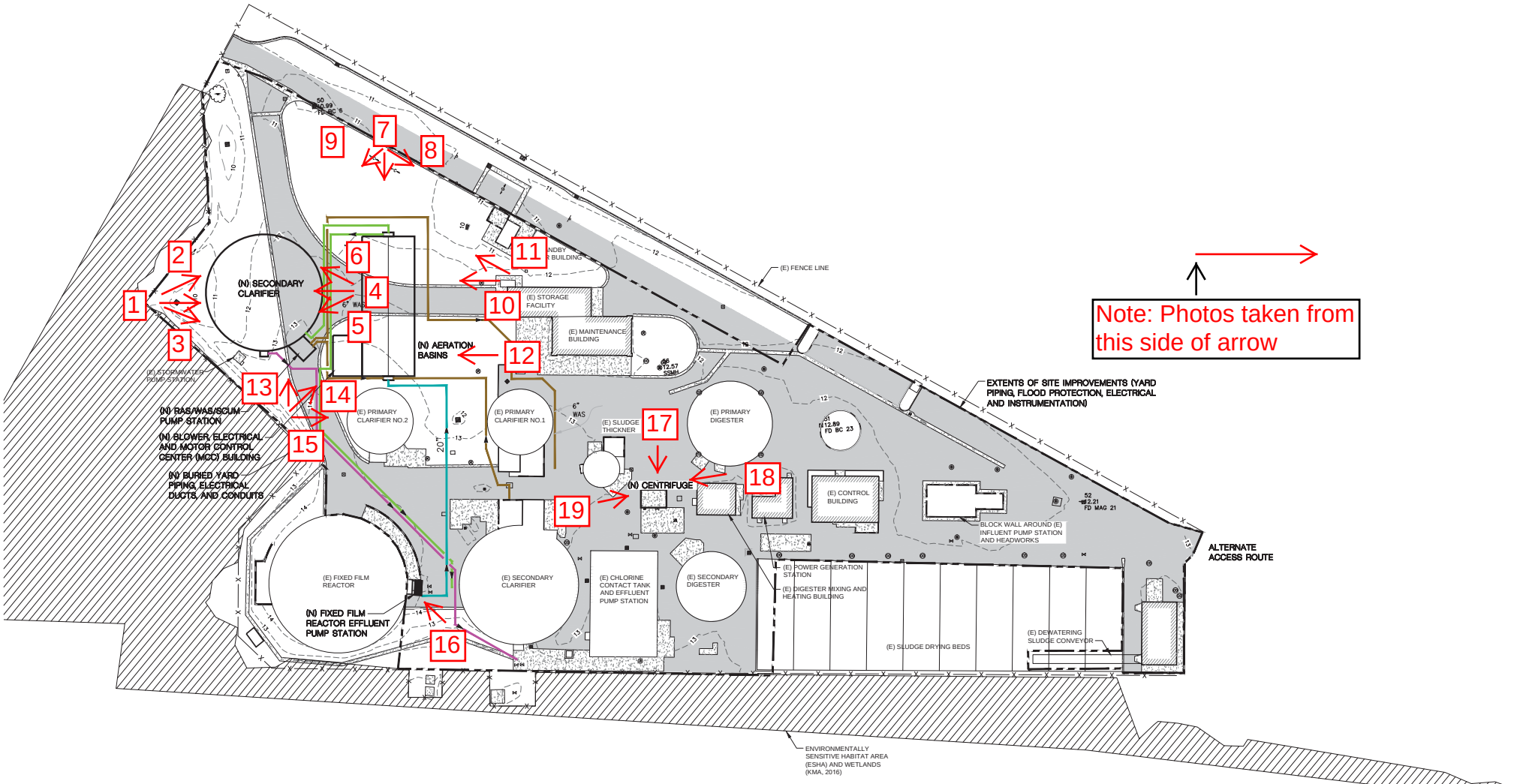



SOURCE:Aerial-NAIP 2012

SSLOCSD WWTF Redundancy Project Sea Level Rise Analysis. D150915.00

**Figure 2**
Site Map


Pacific Ocean
Arroyo Grande Creek
Meadow Creek Lagoon
SSLOCSD WWTP
Oceano County Airport
Arroyo Grande Creek Levee Pathway
Item 6.a. - Page 3




Note: Photos taken from this side of arrow

**LEGEND**

- GROUND SURFACE CONTOUR LINE
- FENCE LINE
- (E) EXISTING FACILITIES
- (N) NEW FACILITIES PROPOSED
- PAVED AREAS
- ENVIRONMENTALLY SENSITIVE HABITAT AREA AND WETLANDS (KMA, 2016)
- SOLIDS PIPING (RAS/WAS)
- SECONDARY EFFLUENT PIPING
- MIXED LIQUOR PIPING
- FFR EFFLUENT PIPING

PLAN VIEW
0 20 40 60
1"=40'

Kennedy/Jenks Consultants

SO. SAN LUIS OBISPO CO. SANITATION DISTRICT
SAN LUIS OBISPO COUNTY, CALIFORNIA

**SITE PLAN - PROPOSED IMPROVEMENTS**

K/J 1668009*00

3-16-0233
Exhibit 2
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*Photo 1 - East toward new Secondary Clarifier*

*Photo 2 - East (slight north) toward new Secondary Clarifier*

*Photo 3 - East (slight south) toward new Secondary Clarifier*

*Photo 4 - West toward new Secondary Clarifier*

*Photo 5 - West (slight south) toward new Secondary Clarifier*

*Photo 6 - West (slight north) toward new Secondary Clarifier*

*Photo 7 - South toward new Secondary Clarifier and new Aeration Basin*

*Photo 8 - South (slight east) toward existing utility (new Aeration Basin on far right of photo)*

*Photo 9 - South (slight west) (New Secondary Clarifier on left side of photo)*

*Photo 10 - West toward new Aeration Basin*

*Photo 11 - West (slight north) toward north side of new Aeration Basin*

*Photo 12 - West toward new Aeration Basin (south of road)*

*Photo 13 - North toward new Secondary Clarifier*

*Photo 14 - North (slight east) toward new Secondary Clarifier and new Aeration Basin*

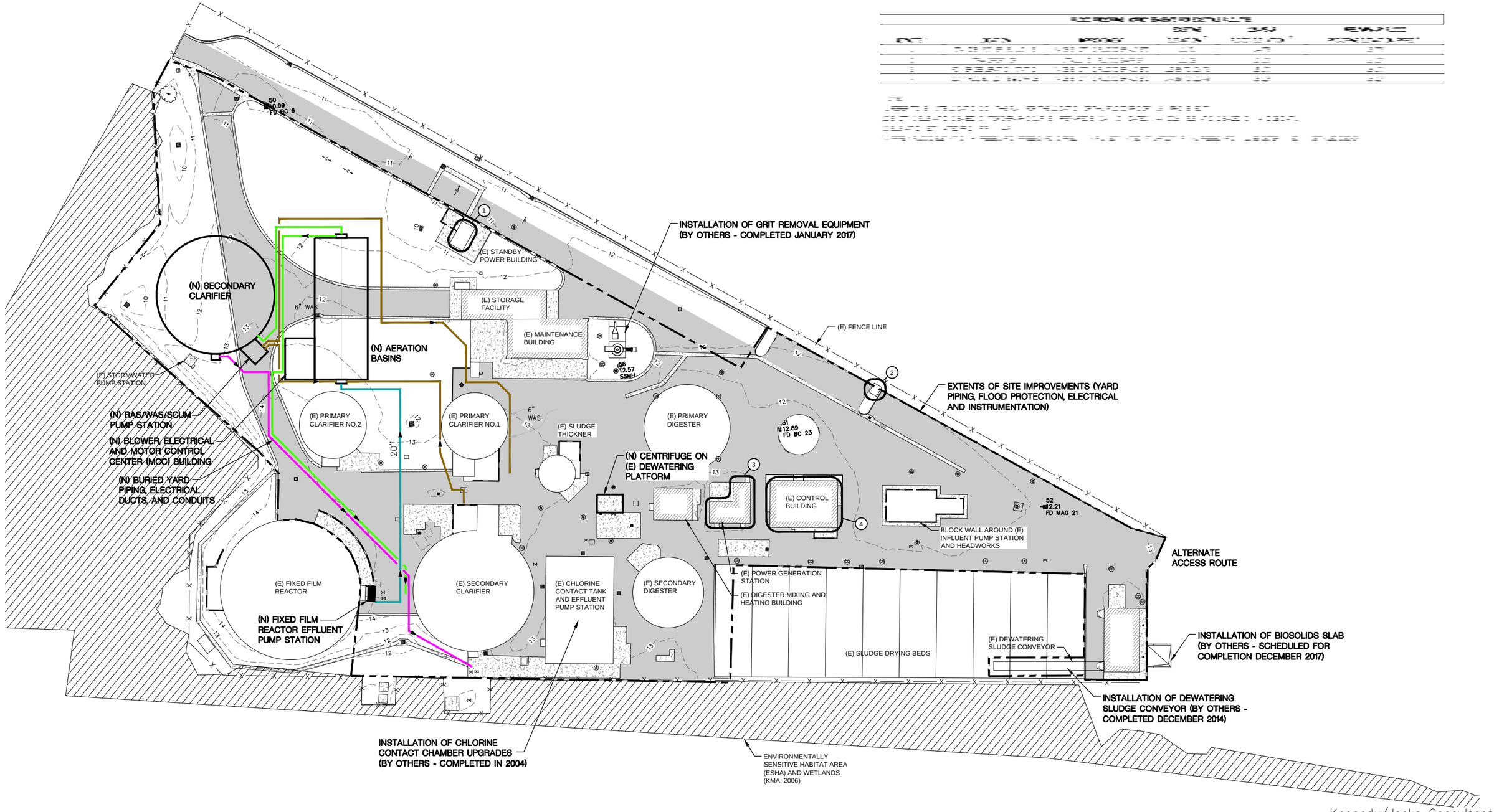
*Photo 15 - East (new Aeration Basin on left side of photo)*


*Photo 16 - North (west) toward new Fixed Film Reactor Effluent Pump Station*

*Photo 17 - South toward new Centrifuge*

*Photo 18 - West toward new Centrifuge*

*Photo 19 - East toward new Centrifuge*




## LEGEND

- GROUND SURFACE CONTOUR LINE
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- FFR EFFLUENT PIPING

**PLAN VIEW**
0 20 40 60
1"=40'

Kennedy/Jenks Consultants

3-16-0233
Exhibit 3
Page 1 of 1

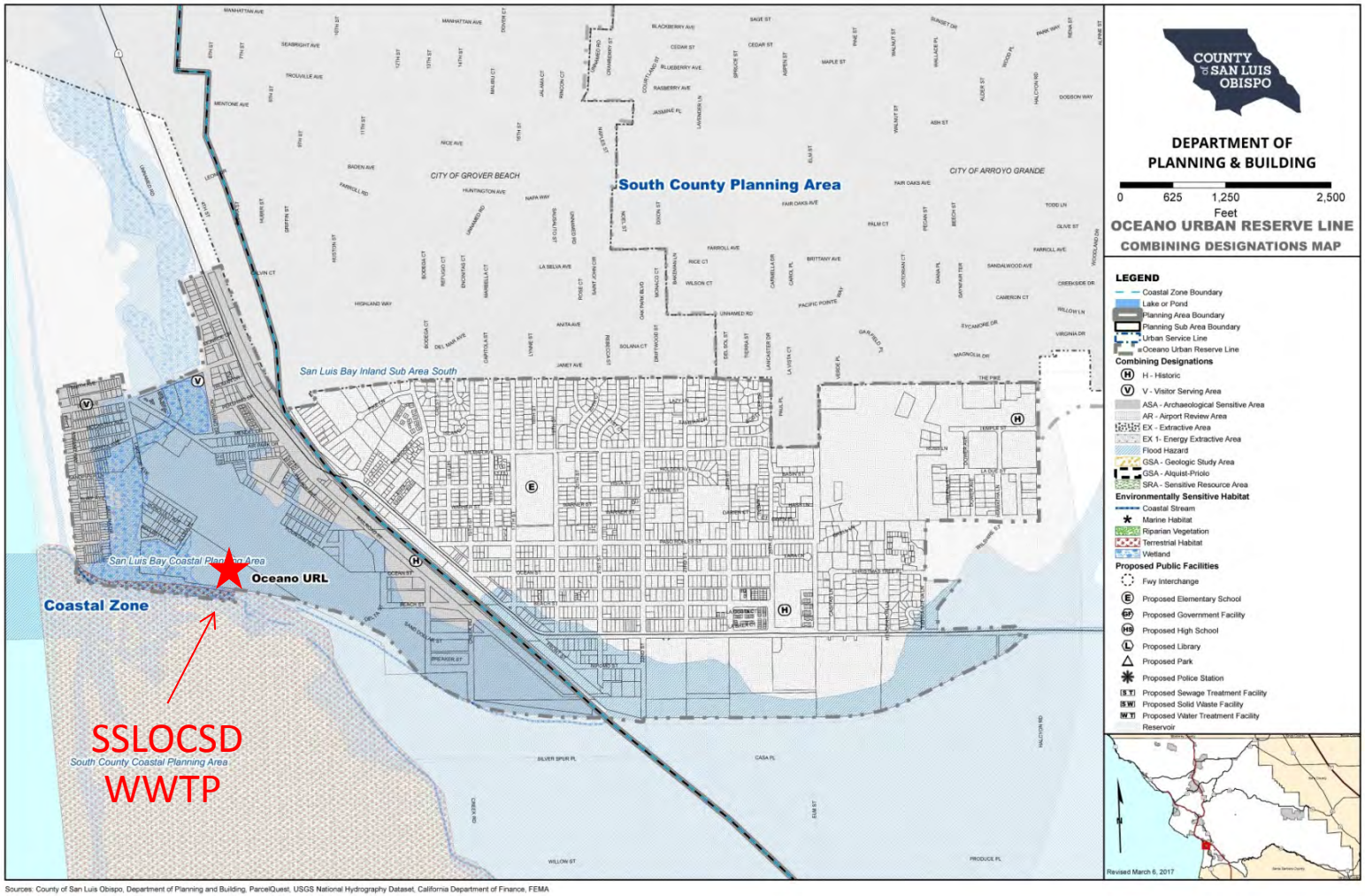
SO. SAN LUIS OBISPO CO. SANITATION DISTRICT
SAN LUIS OBISPO COUNTY, CALIFORNIA

**SITE PLAN - PROPOSED IMPROVEMENTS**

K/J 1668009*00
MARCH 2017

AD FILE: \\scl\O-DRIVE\16\1668009.00_SSLOCSD_RedundancyProject\Site-FIGURE.dwg LAST EDIT DATE: Mar 22, 2017 – 9:44am EDIT BY: LMM

# San Luis Obispo County Flood Hazard Map (Oceano Area)




Sources: County of San Luis Obispo, Department of Planning and Building, ParcelQuest, USGS National Hydrography Dataset, California Department of Finance, FEMA

# 2015 Preliminary FEMA FIRM Map
# (Oceano Area)


**Figure 10**
Existing conditions FEMA 100-year floodplain (in blue)

**Applicable SLO LCP Hazards Policies and Standards (3-16-0233)**

***LCP Hazards Policy 1.*** *New Development. All new development proposed within areas subject to natural hazards from geologic or flood conditions (including beach erosion) shall be located and designed to minimize risks to human life and property. Along the shoreline new development (with the exception of coastal-dependent uses or public recreation facilities) shall be designed so that shoreline protective devices (such as seawalls, cliff retaining walls, revetments, breakwaters, groins) that would substantially alter landforms or natural shoreline processes, will not be needed for the life of the structure. Construction of permanent structures on the beach shall be prohibited except for facilities necessary for public health and safety such as lifeguard towers. [THIS POLICY SHALL BE IMPLEMENTED AS A STANDARD.]*

***LCP Hazards Policy 2.*** *Erosion and Geologic Stability. New development shall ensure structural stability while not creating or contributing to erosion or geological instability. [THIS POLICY SHALL BE IMPLEMENTED AS A STANDARD AND PURSUANT TO SECTION 23.07.086 OF THE CZLUO.]*

***LCP Hazards Policy 3.*** *Development Review in Hazard Areas. The county shall require a detailed review of development proposed within the geologic study area and flood hazard combining designations as indicated on the Land Use Element maps for the coastal zone. The review shall be performed by a qualified registered and/or certified engineering geologist and shall be adequately detailed to provide recommendations and conclusions consistent with this plan. Residential, commercial and industrial development shall be prohibited within the l00 year floodplain (l% chance of inundation in any year) as delineated in the Flood Hazard combining designation except for those areas within an urban reserve line. [THIS POLICY SHALL BE IMPLEMENTED PURSUANT TO SECTIONS 23.07.082, 23.07.084, 23.07.062 AND 23.07.066 OF THE CZLUO.]*

***LCP Coastal Zone Land Use Ordinance (CZLUO) Section 23.07.062 (c).*** *Applicability of Flood Hazard Standards: All uses proposed within a Flood Hazard combining designation are subject to the standards of Sections 23.07.064 through 23.07.066, except:*

*c. Existing uses: The continuance, operation, repair, or maintenance of any lawful use of land existing on the effective date of this title is permitted. Any expansion or alteration of an existing structure or use, or grading of a site, shall be conducted in accordance with all applicable provisions of this title.*

***LCP CZLUO Section 23.07.064.*** *Flood Hazard Area Permit and Processing Requirements: Drainage Plan required.*

***LCP CZLUO Section 23.07.065.*** *General Hazard Avoidance:*

*a. **New Development in Flood Hazard Areas.** New structural development, including expansions, additions and improvements to existing development, shall be located outside of the flood hazard areas to the maximum extent feasible. All new structural development located in a flood hazard area, including expansions, additions, improvements, and repairs to existing development, shall be constructed consistent with the standards set forth in Section 23.07.066.*

*b. **Improvement/repair to existing structures in Flood Hazard Areas.** Where the value of improvements or repairs to existing structures located in flood hazard areas is greater than 50 percent of the market value of the existing structure before the start of construction of the new structure or any improvement, and prior to the damage requiring the repair, all structural*

*development (existing and proposed) shall be located outside of flood hazard areas to the maximum extent feasible. This can be determined by the assessment roll or by a current appraisal…. Any structural development (existing and proposed) that cannot be located outside of flood hazard areas shall be constructed and/or reconstructed consistent with the standards set forth in Section 23.07.066.*

***LCP CZLUO Section 23.07.066.*** *Construction Standards:*

*a. Construction, general:*

1. *No construction or grading is to limit the capacity of the floodway or increase flood heights on existing structures unless the adverse effect of the increase is rectified to the satisfaction of the Director of Public Works. In no case shall flood heights be increased above that allowed under the Federal Flood Insurance Program.*
2. *Structures shall be anchored to prevent collapse, lateral movement or flotation that could result in damage to other structures or restriction of bridge openings and narrow sections of the stream or river.*
3. *Service facilities such as electrical and heating equipment are to be floodproofed or constructed at minimum of one-foot above the 100-year storm flood profile level for the site*
4. *Water supply and sanitary sewage systems shall be designed to minimize infiltration of flood waters into the system and discharge from systems into flood waters.*
5. *On-site waste disposal systems shall be located to avoid their being impaired or contaminated during flooding.*
6. *All buildings or structures shall be located landward of the mean high tide.*
7. *Residential, commercial and industrial development shall be prohibited outside of urban and village reserve lines.*
8. *Whenever a watercourse is to be altered or relocated, the Department of Planning and Building shall notify adjacent communities and the California Department of Water Resources and evidence of such notification shall be sent to the Federal Insurance Administration*
9. *Fully enclosed areas below the lowest floor that are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: i) A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding; ii) The bottom of all openings shall be no higher than one foot above grade; iii) Openings may be equipped with screens, louvers, valves or other coverings or devices provided that they permit the automatic entry and exit of flood waters.*
10. *On the basis of structural plans and the depth analysis, the ground floor of all structures is to be constructed at a minimum of one-foot above the 100-year storm flood profile level. Within any AO zone on the Flood Insurance Rate maps, this elevation shall be determined by adding one foot to the depth number specified. If no depth is specified, structures shall be elevated a minimum of two feet above adjacent natural grade.*
11. *Non-residential construction shall either be elevated in conformance with Section 23.07.066a(10) above, or together with attendant utility and sanitary facilities, be elevated a minimum of two feet above the highest adjacent grade and be floodproofed to a minimum of one-foot above the 100- year storm flood profile level. Examples of floodproofing include, but are not limited to: (i) Installation of watertight doors, bulkheads, and shutters. (ii) Reinforcement of walls to resist water pressure. (iii) Use of paints, membranes, or mortars to reduce seepage through walls. (iv) Addition of mass or weight to structure to resist flotation. (v) Armor protection of all fill materials from scour and/or erosion.*

12. *All structures subject to inundation shall use flood resistant materials up to one foot above base flood elevation.*

b. ***Storage and processing:*** *The storage or processing of materials that in time of flooding are buoyant, flammable, or explosive; that could be injurious to human, animal, or plant life; or that may unduly affect the capacity of the floodway or unduly increase flood heights is not permitted. Storage of other material or equipment may be allowed if not subject to major damage by floods and if firmly anchored to prevent flotation, or if readily removable from the area within the time available after flood warning.*

c. ***Coastal High Hazard areas.*** *The following requirements shall apply to new structures or any improvement / repair to an existing structure as specified in Section 23.07.066 in areas identified as having special flood hazards extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity waters including coastal and tidal inundation or tsunamis as established on the maps identified in subsection 23.07.060 of this title:*

1. *All buildings or structures shall be elevated on adequately anchored pilings or columns and securely anchored to such pilings or columns so that the lowest horizontal portion of the structural members of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood elevation level. The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse, and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable state or local building standards.*
2. *All new construction and other development shall be located on the landward side of the reach of mean high tide.*
3. *All buildings or structures shall have the space below the lowest floor free of obstructions or constructed with breakaway walls. Such enclosed space shall not be used for human habitation and will be usable solely for parking of vehicles, building access or storage.*
4. *Fill shall not be used for structural support of buildings.*
5. *Man-made alteration of sand dunes that would increase potential flood damage is prohibited.*
6. *The Director of Planning and Building and/or the Public Works Director shall obtain and maintain the following records. (i) Certification by a registered engineer or architect that a proposed structure complies with Subsection D.3.a (ii) The elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings or columns) of all buildings and structures, and whether such structures contain a basement.*

d. ***Certification of Compliance.*** *The following certifications shall be filed with the Building Official prior to final building inspection:*

1. *Upon completion of any structure within a flood hazard combining designation, compliance with elevation requirements shall be certified by a registered civil engineer or licensed land surveyor. Such certification shall include as a minimum the elevation of the lowest floor. If the structure has been floodproofed in conformance with Section 23.07.066a(11) above, the certification shall include the elevation to which the structure has been floodproofed. Elevations shall be based on the National Geodetic Vertical Datum of 1929.*
2. *Where floodproofing is used, a registered civil engineer or architect shall certify that the floodproofing methods are adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the 100-year flood.*
3. *Compliance with the structural design requirements within Coastal High Hazard areas stated*

*in Section 23.07.066c shall be certified by a registered civil engineer or architect.*

e. ***Exceptions to Construction Standards.*** *The standards of this section may be waived or modified by the Board of Supervisors through the variance procedure set forth in Code of Federal Regulations, Title 44, Chapter 1, Section 60.6, instead of through the adjustment process described in Section 23.01.044 of this title. Requests for such waivers or modifications shall be filed with County Public Works for processing. Procedures for the granting of variances under Title 14 are available from the County Public Works Department.*

f. ***Waiver of Rights to Future Armoring.*** *Where applicant's geologic assessment/wave run-up studies determine that the new or improved development is sited such that it will not need a shoreline protective device for the life of the structure, the applicants shall waive their rights to a future shoreline protective device.*

g. ***Tsunami Inundation Zone.*** *Where feasible, development shall be sited outside of potential tsunami inundation zones, even if not currently designated FH. A Registered Civil Engineer with coastal experience shall make a determination, through examination of the most current tsunami inundation and run-up maps or a wave run-up analysis, whether the site is subject to inundation during a tsunami, pursuant to the criteria of Section 23.07.064b. If it is not feasible to site development outside of tsunami inundation zone, new development shall be in conformance with all provisions set forth in Section 23.07.066(c).*

**Kennedy/Jenks Consultants**

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COASTAL COMMISSION
CENTRAL COAST AREA

7 September 2016

# Technical Memorandum

To: Gerhardt Hubner, South San Luis Obispo County Sanitation District (District)

From: John M. Wyckoff

Subject: Redundancy Project – Flood Risk Mitigation Strategy
K/J 1669009*00

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Kennedy/Jenks Consultants scope of work for the subject project includes evaluation and recommendation of strategies to include in the project design to flood-proof certain new and existing facilities at the District's Wastewater Treatment Facility in Oceano, California. In general, the flood risk mitigation measures will likely include flood protection of critical existing and new structures and accommodation of access impacts at the site through 2050. Year 2050 coincides with the anticipated design life of other improvements implemented with the Redundancy Project. The design will address risks from a 100-year or lesser flood event on Arroyo Grande Creek, as well as address risks from nuisance flooding on Meadow Creek that may become more frequent due to sea level rise.

Flood protection will be considered for both new facilities that will be constructed as part of the Redundancy Project and existing facilities at the site. A majority of the existing facilities have flood proofing measures that were installed as part of the 1979 Improvements Project. Additional flood protection was implemented after a 2010 flood event by raising the flood protection wall height around the Headworks and Pumping Plant and installing heavy-duty floodgates. Exhibit A (South San Luis Obispo County Sanitation District Facility Flood Elevations), which is attached contains information on the elevations of the existing flood control measures at the plant. The protection provided by the existing flood protection measures range from elevation 13.81 feet at the Standby Power Building to elevation 17.75 feet at the Centrifuge Building.

It is District's intent that, as part of the Redundancy Project, all critical new and existing facilities will be installed or upgraded to be protected from the 100-year flood event on Arroyo Grande Creek as defined by Flood Insurance Rate Map (FIRM) maps. This would also protect these facilities from floods caused by sea level rise for the design life of the facilities. In the Environmental Science Associates (ESA) Sea Level Rise Analysis dated 20 July 2016, maximum flood elevations for existing and future conditions due to sea level rise are predicted to be as follows:

- Existing: 12.3 feet North American Vertical Datum of 1988 (NAVD)
- 2050: 12.7 to 13.2 feet NAVD (30+ years from present)
- 2100: 13.9 to 15.6 feet NAVD (80+ years from present).





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# Technical Memorandum



The ranges for the 2050 and 2100 conditions are levels resulting from medium to high scenarios for climate change per State of California planning guidance.

Flood protection for new critical facilities will be provided to protect the facilities from flood levels of up to 15.25 feet. This flood protection will be provided by installing mechanical equipment and electrical devices above this elevation or within areas enclosed by permanent barriers to flood waters (i.e., block/concrete walls).

The flood proofing of existing critical facilities will be modified and raised, as necessary, to accommodate for protection for these facilities from the flood elevations, as indicated on Exhibit A. The exact modifications to be utilized will be determined during the detailed design of the Redundancy Project and may include techniques such as raising the height of existing flood brackets and floodgates, installing walls around openings in structures, or combinations of these methods.

By protecting the new and existing critical facilities to the 100-year FIRM flood elevation, these facilities will also be protected from the estimated maximum level floods through the year 2050 time horizon indicted in the ESA Sea Level Rise Analysis. In the year 2050, when there is an additional 30 years of data on sea level rise, the District will re-evaluate the projected maximum flood levels due to sea level rise. Flood protection at the site will be increased if it is deemed to be prudent and necessary based upon any new information and data available at that time. This additional flood protection may entail the installation of a flood protection wall around the treatment plant site, if warranted and/or feasible.

Access to the treatment plant site through the current main plant entrance at 1600 Aloha Place during flooding events may be a future issue with sea level rise. As stated in the ESA Sea Level Rise Study, the threshold elevation at which site access is impacted is 10.4 feet NAVD. This threshold access elevation is below current maximum flood elevations, and the ESA Sea Level Rise Analysis indicates flooding at this elevation may become more common by year 2050.

Currently, the plant has a second entrance (back entrance) near the existing Centrifuge Building. This back entrance is at elevation 13.0 feet and, therefore, would provide a means of access to the plant during maximum flooding events associated with sea level rise through the year 2050.

Attachment: Exhibit A





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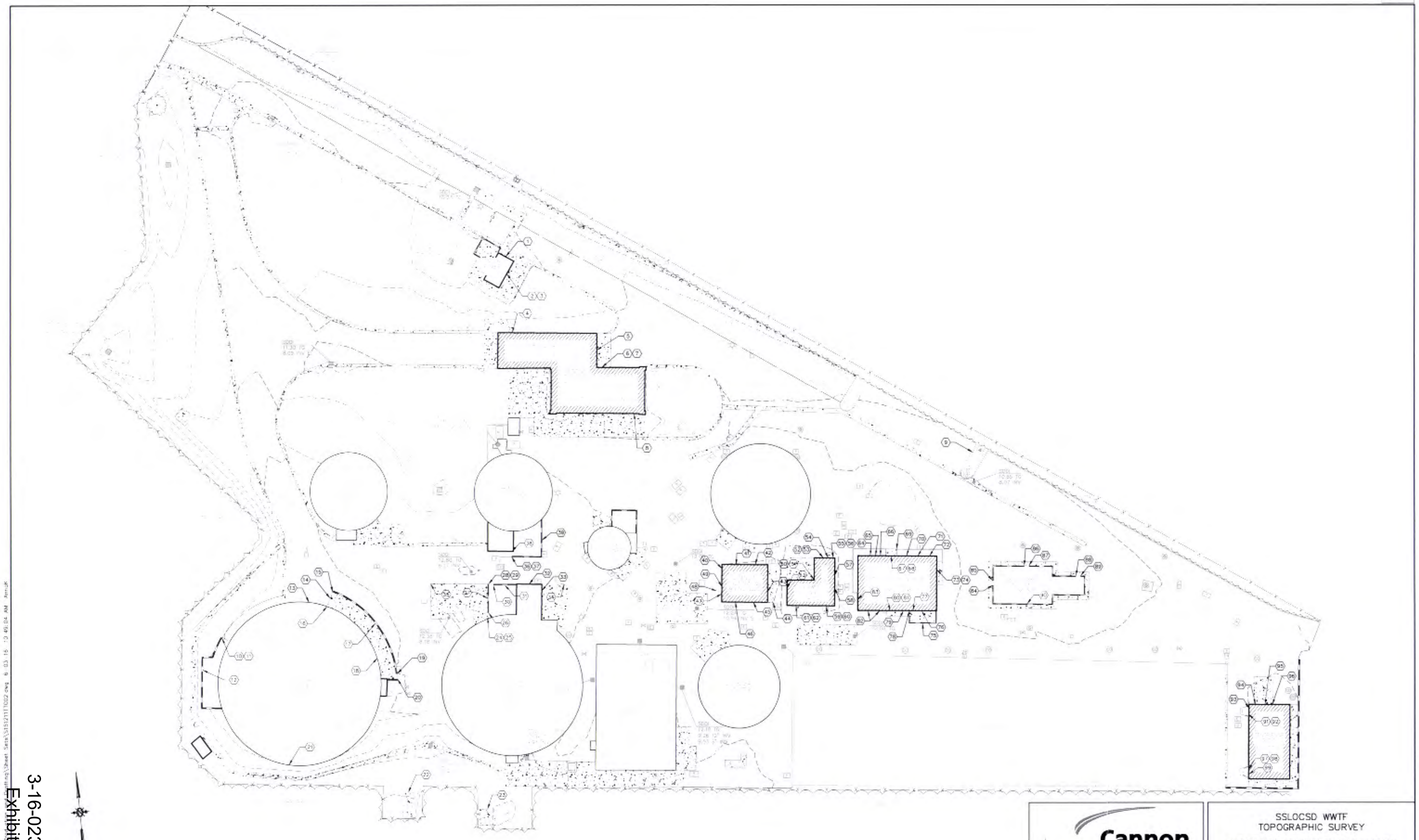
Exhibit A



1 INCH = 30 FEET

Cannon

1080 Southwood Drive
San Luis Obispo, CA 93401
P 805.544.7407 F 805.544.3863

THESE DRAWINGS ARE INSTRUMENTS OF SERVICE AND ARE THE PROPERTY OF CANNON. ALL DESIGNS AND INFORMATION ON THESE DRAWINGS ARE FOR USE OF THE SPECIFIED PROJECT AND SHALL NOT BE USED OTHERWISE OR REPRODUCED WITHOUT THE EXPRESSED WRITTEN PERMISSION OF CANNON.

SSLOCSD WWTF
TOPOGRAPHIC SURVEY

FACILITY FLOOD ELEVATIONS

OCEANO, CALIFORNIA

| DRAWN BY | DATE | CA JOB NO. |
|---|---|---|
| AK | 06-03-2016 | 151211 |
| CHECKED BY | SCALE | SHEET |
| | 1" = 30' | 1 OF 1 |

EXHIBIT A

3-16-0233 Exhibit 7 Page 4 of 6

**South San Luis Obispo County Sanitation District**
**Facility Flood Elevations**

Notes:
(1) Refer to Facility Flood Elevations exhibit for keynote locations
(2) Existing Elevations based on topographic survey, prepared by Cannon, dated May 2016. Elevations based on NAVD 88 datum
(3) Elevation estimated from FIRM map. Final Flood Elevation will be based on Flood Study.
(4) Preliminary flood proofing elevation (PFPE) = (flood elevation) + (freeboard). Freeboard is preliminarily estimated at 1'. Final freeboard will be determined during detailed design.

| Existing Facilities | | | | | | |
|---|---|---|---|---|---|---|
| Keynote per Plan [1] | Location | Description | Existing Elevation [2] | 100-year Flood Elevation [3] | Preliminary Flood Proofing Elevation (PFPE) [4] | Notes |
| 1 | Standby Power Building | Finish Floor | 10.85 | 14.75 | | Critical - can be floodproofed. Raise existing flood brackets by approximately 2 feet and/or install new flood barriers around openings to PFPE (15.75 ft). |
| 2 | Standby Power Building | Bottom of Window Sill | 11.56 | 14.75 | | |
| 3 | Standby Power Building | Top of Metal Flood Brackets | 13.81 | 14.75 | 15.75 | |
| 4 | Storage Facility | Finish Floor | 12.92 | 15.00 | | Not critical |
| 5 | Storage Facility | Finish Floor | 12.99 | 15.00 | | |
| 6 | Maintenance Building | Finish Floor | 13.02 | 15.00 | | |
| 7 | Maintenance Building | Bottom of Window Sill | 13.18 | 15.00 | | |
| 8 | Maintenance Building | Bottom of Window Sill | 19.42 | 15.00 | | |
| 9 | Transformer | Concrete Pad | 12.28 | 15.25 | 16.25 | Critical - can be floodproofed. Install new flood barrier around transformer to PFPE (16.25 ft - about a 4 foot high barrier) with sufficient access for PG&E. |
| 10 | Fixed Film Reactor | Top of Metal Flood Bracket | 15.60 | 14.75 | | Not critical after Redundancy Project is completed. |
| 11 | Fixed Film Reactor | Edge of Pavement | 14.02 | 14.75 | | |
| 12 | Fixed Film Reactor | Top of Wall | 15.51 | 14.75 | | |
| 13 | Fixed Film Reactor | Bottom of Fan | 15.24 | 14.75 | | |
| 14 | Fixed Film Reactor | Edge of Pavement | 14.23 | 14.75 | | |
| 15 | Fixed Film Reactor | Top of Metal Flood Bracket | 15.65 | 14.75 | | |
| 16 | Fixed Film Reactor | Top of Metal Flood Bracket | 15.57 | 14.75 | | |
| 17 | Fixed Film Reactor | Top of Wall | 15.56 | 14.75 | | |
| 18 | Fixed Film Reactor | Finish Floor | 8.65 | 14.75 | | |
| 19 | Fixed Film Reactor | Top of Metal Flood Bracket | 15.58 | 14.75 | | |
| 20 | Fixed Film Reactor | Top of Metal Flood Bracket | 15.59 | 14.75 | | |
| 21 | Fixed Film Reactor | Bottom of Fan | 15.36 | 14.75 | | |
| 22 | Pressure Regulary Station | Concrete Pad | 11.85 | 15.00 | | Can be flooded. |
| 23 | Outfall Manhole | Concrete Pad | 12.72 | 15.00 | | |
| 24 | Secondary Clarifier | Concrete | 13.70 | 15.00 | | Not critical after Redundancy Project is completed. |
| 25 | Secondary Clarifier | Top of Metal Flood Bracket | 14.40 | 15.00 | | |
| 26 | Secondary Clarifier | Top of Metal Flood Bracket | 14.41 | 15.00 | | |
| 27 | Secondary Clarifier | Top of Wall | 14.52 | 15.00 | | |
| 28 | Secondary Clarifier | Concrete | 13.70 | 15.00 | | |
| 29 | Secondary Clarifier | Top of Metal Flood Bracket | 14.42 | 15.00 | | |
| 30 | Secondary Clarifier | Top of Metal Flood Bracket | 14.04 | 15.00 | | |
| 31 | Secondary Clarifier | Top of Wall | 14.46 | 15.00 | | |
| 32 | Secondary Clarifier | Bottom of Window Sill | 15.08 | 15.00 | | |
| 33 | Secondary Clarifier | Bottom of Window Sill | 15.12 | 15.00 | | |
| 34 | Secondary Clarifier | Concrete Pad | 13.56 | 15.00 | | |
| 35 | Secondary Clarifier | Concrete Pad | 13.71 | 15.00 | | |

EXHIBIT A

3-16-0233 Exhibit 7 Page 5 of 6

| Existing Facilities | | | | | | |
|---|---|---|---|---|---|---|
| Keynote per Plan [1] | Location | Description | Existing Elevation [2] | 100-year Flood Elevation [3] | Preliminary Flood Proofing Elevation (PFPE) [4] | Notes |
| 36 | Primary Clarifier No. 1 | Edge of Pavement | 13.56 | 15.00 | | |
| 37 | Primary Clarifier No. 1 | Top of Metal Flood Bracket | 14.40 | 15.00 | | Sludge pumps can be down for up to 2 weeks |
| 38 | Primary Clarifier No. 1 | Top of Metal Flood Bracket | 14.41 | 15.00 | | |
| 39 | Primary Clarifier No. 1 | Top of Wall | 14.51 | 15.00 | | |
| 40 | Digester Heating & Mixing Bldg | Bottom of Window Sill | 16.22 | 15.00 | | |
| 41 | Digester Heating & Mixing Bldg | Bottom of Window Sill | 16.24 | 15.00 | | |
| 42 | Digester Heating & Mixing Bldg | Bottom of Window Sill | 16.31 | 15.00 | | |
| 43 | Digester Heating & Mixing Bldg | Finish Floor | 13.20 | 15.00 | | |
| 44 | Digester Heating & Mixing Bldg | Concrete Pad | 13.01 | 15.00 | | Not critical - can be down for up to 2 weeks. |
| 45 | Digester Heating & Mixing Bldg | Bottom of Window Sill | 16.25 | 15.00 | | |
| 46 | Digester Heating & Mixing Bldg | Bottom of Window Sill | 16.25 | 15.00 | | |
| 47 | Digester Heating & Mixing Bldg | Bottom of Window Sill | 16.39 | 15.00 | | |
| 48 | Digester Heating & Mixing Bldg | Concrete Pad | 13.15 | 15.00 | | |
| 49 | Digester Heating & Mixing Bldg | Finish Floor | 13.21 | 15.00 | | |
| 50 | Power Generation Station | Finish Floor | 14.26 | 15.00 | | |
| 51 | Power Generation Station | Top of Metal Flood Bracket | 15.61 | 15.00 | | |
| 52 | Power Generation Station | Bottom of Window Sill | 14.23 | 15.00 | | |
| 53 | Power Generation Station | Top of Metal Flood Brackets | 15.56 | 15.00 | 16.00 | |
| 54 | Power Generation Station | Top of Metal Flood Brackets | 15.66 | 15.00 | 16.00 | |
| 55 | Power Generation Station | Finish Floor | 14.28 | 15.00 | | Backside of Station Motor Control Center is critical. Can be floodproofed. Raise existing flood brackets by approximately 6 inches and/or install new flood barriers around openings to PFPE (16 ft). |
| 56 | Power Generation Station | Top of Metal Flood Brackets | 15.73 | 15.00 | 16.00 | |
| 57 | Power Generation Station | Bottom of Window Sill | 16.47 | 15.00 | | |
| 58 | Power Generation Station | Bottom of Window Sill | 16.33 | 15.00 | | |
| 59 | Power Generation Station | Finish Floor | 14.26 | 15.00 | | |
| 60 | Power Generation Station | Top of Metal Flood Brackets | 15.61 | 15.00 | 16.00 | |
| 61 | Power Generation Station | Finish Floor | 14.24 | 15.00 | | |
| 62 | Power Generation Station | Top of Metal Flood Brackets | 15.57 | 15.00 | 16.00 | |
| 63 | Power Generation Station | Bottom of Window Sill | 16.39 | 15.00 | | |

EXHIBIT A

| Existing Facilities | | | | | | |
|---|---|---|---|---|---|---|
| Keynote per Plan [1] | Location | Description | Existing Elevation [2] | 100-year Flood Elevation [3] | Preliminary Flood Proofing Elevation (PFPE) [4] | Notes |
| 64 | Control Building & Office | Top of Metal Flood Panels | 15.49 | 15.25 | 16.25 | Critical elements can be floodproofed. Raise existing brackets by 0.75 to 2 ft and/or install new flood barriers around openings to PFPE (16.25 ft). |
| 65 | Control Building & Office | Top of Metal Flood Panels | 15.49 | 15.25 | 16.25 | |
| 66 | Control Building & Office | Top of Metal Flood Panels | 15.47 | 15.25 | 16.25 | |
| 67 | Control Building & Office | Finish Floor | 12.95 | 15.25 | | |
| 68 | Control Building & Office | Top of Metal Flood Brackets | 14.40 | 15.25 | 16.25 | |
| 69 | Control Building & Office | Concrete Pad | 12.81 | 15.25 | | |
| 70 | Control Building & Office | Top of Metal Flood Panels | 15.43 | 15.25 | 16.25 | |
| 71 | Control Building & Office | Top of Metal Flood Panels | 15.42 | 15.25 | 16.25 | |
| 72 | Control Building & Office | Top of Metal Flood Panels | 15.42 | 15.25 | 16.25 | |
| 73 | Control Building & Office | Finish Floor | 12.97 | 15.25 | | |
| 74 | Control Building & Office | Top of Metal Flood Brackets | 14.42 | 15.25 | 16.25 | |
| 75 | Control Building & Office | Top of Wall | 18.00 | 15.25 | | |
| 76 | Control Building & Office | Finish Floor | 12.95 | 15.25 | | |
| 77 | Control Building & Office | Bottom of Window Sill | 13.13 | 15.25 | | |
| 78 | Control Building & Office | Top of Metal Flood Brackets | 14.43 | 15.25 | 16.25 | |
| 79 | Control Building & Office | Bottom of Window Sill | 15.92 | 15.25 | | |
| 80 | Control Building & Office | Finish Floor | 12.95 | 15.25 | | |
| 81 | Control Building & Office | Top of Metal Flood Brackets | 14.43 | 15.25 | 16.25 | |
| 82 | Control Building & Office | Bottom of Window Sill | 17.29 | 15.25 | | |
| 83 | Control Building & Office | Top of Metal Flood Panels | 14.39 | 15.25 | 16.25 | |
| 84 | Headworks/Influent Pumping | Top of Metal Flood Bracket | 16.38 | 15.25 | | Critical - already floodproofed. |
| 85 | Headworks/Influent Pumping | Top of Metal Flood Bracket | 16.38 | 15.25 | | |
| 86 | Headworks/Influent Pumping | Top of Metal Flood Bracket | 16.41 | 15.25 | | |
| 87 | Headworks/Influent Pumping | Top of Metal Flood Bracket | 16.39 | 15.25 | | |
| 88 | Headworks/Influent Pumping | Top of Metal Flood Bracket | 16.39 | 15.25 | | |
| 89 | Headworks/Influent Pumping | Top of Metal Flood Bracket | 16.40 | 15.25 | | |
| 90 | Headworks/Influent Pumping | Top of Wall | 16.40 | 15.25 | | |
| 91 | Centrifuge Bldg | Finish Floor | 13.51 | 15.25 | | Not critical - can recover/repair after flood subsides. |
| 92 | Centrifuge Bldg | Top of Metal Flood Bracket | 17.69 | 15.25 | | |
| 93 | Centrifuge Bldg | Top of Metal Flood Bracket | 17.72 | 15.25 | | |
| 94 | Centrifuge Bldg | Top of Metal Flood Bracket | 17.77 | 15.25 | | |
| 95 | Centrifuge Bldg | Finish Floor | 13.51 | 15.25 | | |
| 96 | Centrifuge Bldg | Top of Metal Flood Bracket | 17.75 | 15.25 | | |
| 97 | Centrifuge Bldg | Finish Floor | 13.54 | 15.25 | | |
| 98 | Centrifuge Bldg | Top of Metal Flood Bracket | 17.75 | 15.25 | | |
| 99 | Centrifuge Bldg | Top of Metal Flood Bracket | 17.75 | 15.25 | | |

3-16-0233
Exhibit 7
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# Technical Memorandum

**To:** Gerhardt Hubner, District Administrator
South San Luis Obispo County Sanitation District

**From:** Michael Nunley, PE
Eileen Shields, PE
Cris Swain, EIT

**Date:** September 9, 2016

**Re:** South San Luis Obispo County Sanitation District – WWTP Redundancy Project
Evaluation of Wastewater Treatment Plant Site Alternatives and Conceptual Costs for Coastal Development Permit Application

## INTRODUCTION AND BACKGROUND

South San Luis Obispo County Sanitation District (District) is currently moving forward with planning and design of the Redundancy Project, an upgrade to the existing wastewater treatment plant (WWTP) to address redundancy concerns and meet requirements from Regional Water Quality Control Board (RWQCB). The facility currently requires redundant secondary treatment processes to meet effluent requirements when the existing fixed film reactor (FFR) or secondary clarifier are taken offline for maintenance, repairs, or emergencies. On July 7, 2005, Kennedy/Jenks Consultants (KJ) submitted a comprehensive engineering study titled "Long-Range Plan for Wastewater Treatment Plant Improvements," evaluating potential improvements to the wastewater treatment plant. The 2005 KJ report was followed by a Peer Review Report by Carollo Engineers, which was submitted to the District on January 9, 2010. The purpose of the Carollo Review was to independently study and verify the KJ report and recommendations. Finally, on February 4, 2015, KJ submitted a report titled "Upgrading Existing Wastewater Treatment Plant Documentation Review and Update of Probable Cost" which summarized the 2005 report and the Peer Review, and updated pertinent information.

In 2015, the District developed a work plan, schedule, and budget for the project. They have since hired a design firm to move the preliminary design forward, submitted an application for an SRF Planning/Design Loan, and submitted the Coastal Development Permit application to the California Coastal Commission (CCC). A letter written by the CCC on April 15th, 2016 addressed to John F. Rickenbach in response to a Coastal Development Permit (CDP) application included a request for the District to investigate impacts from sea level rise to flood risk at the existing facility. On August 16th, 2016, the CCC verbally communicated the desire for information on costs to move the District WWTP to another location. The CCC also inquired about regional coordination efforts related to recycled water planning in the surrounding area.

This Technical Memorandum (TM) identifies conceptual costs for a relocated WWTP that meets current effluent requirements and provides a similar level of treatment to the existing facility. It is assumed the relocated facility will have the same treatment capacity and a similar level of redundancy in major unit processes to those at the existing plant with the addition of the WWTP Redundancy Project components. This effort will not address all of the land use, siting, and institutional constraints associated with a relocation of a regional treatment facility of this nature, but is intended to provide a range of likely project costs to inform future regional planning decisions. Relocation of the facility will require significant coordination with the District member agencies, the County of

San Luis Obispo, and many state and federal agencies as well as property owners and other project stakeholders. Those efforts are beyond the scope of this study, but the results of this study will inform those discussions and planning efforts and, more urgently, address the information request from CCC.

## EXISTING CONDITIONS

The WWTP is a conventional facility with mechanical screens, 2 primary clarifiers, a fixed film reactor (FFR), a secondary clarifier, and a chlorine disinfection system. Effluent is discharged out of an ocean outfall operated jointly with City of Pismo Beach WWTP. The District's plant operates under Waste Discharge Requirements (WDR) Order Number R3-2009-0046/ NPDES Number CA0048003. It is rated for a dry weather flow of 5.0 MGD. The 2015 KJ report evaluated changes in wastewater flow characteristics since 1965, and provided projections for buildout flows based on revisions to the future population assumptions. Table 1 below summarizes the recommended buildout flows from the 2015 report. Future flows for buildout of the service area are within the current plant rating of 5 MGD. No increase in capacity is proposed as part of the Redundancy Project

| Table 1: Projected Future (Buildout) Flows | |
|---|---|
| Average Annual Daily Flow (AADF) | 4.2 MGD |
| Peak Daily Flow, Dry Weather (PDF) | 4.9 MGD |
| Peak Daily Flow, Wet Weather (PDF) | 8.4 MGD |
| Peak Hour Wet Weather Flow (PHWWF) | 10.0 MGD |

The existing facility is located within FEMA Flood Zone AE which is defined as areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Attachment 3 provided to the CCC in the CDP application titled "Sea Level Rise Analysis" performed by Environmental Science Associates (ESA) identified three potential flood sources: coastal flooding due to proximity to the ocean, future changes to extreme fluvial flood flows on Arroyo Grande Creek, and the estuarine flood flow from the nearby Meadow Creek Lagoon. According to the ESA study, the existing maximum flood elevation is 12.3 feet as measured from the North American Vertical Datum of 1988 (NAVD). Maximum flood elevation ranges for the years 2050 and 2100 are 12.7 to 13.2 feet NAVD and 13.9 to 15.6 feet NAVD, respectively. Flood protection for new critical facilities at the existing WWTP will be provided to protect facilities from flood levels of up to 15.25 feet.

## REVIEW OF REGIONAL EFFORTS

The WWTP Redundancy Project will not result in production of recycled water, but will significantly improve plant effluent quality for future recycling. Multiple recycled water studies have been or are being conducted in south San Luis Obispo County due to the scarcity of water supplies. Protecting the beneficial uses of the ocean, improving flood and sea level rise resiliency, and improving the regional water supply portfolio are common goals shared by these efforts. Currently a Recycled Water Feasibility Planning Study (RWFPS) is being performed for the District and City of Arroyo Grande under a grant agreement from the State Water Resources Control board (SWRCB). The District RWFPS was originally scoped to evaluate potential opportunities for a Satellite Water Resource Recovery Facility (SWRRF) including an Investment Analysis of the SWRRF concept. The Investment Analysis determined that the SWRRF concept was not cost effective and consequently the District and the City of Arroyo Grande requested that the remaining budget for the study be utilized to evaluate alternate recycled water options, including potential sites for a regional advanced water purification facility.

The District RWFPS is currently being conducted with emphasis on the alternatives of upgrades to the existing WWTP to allow for recycled water production or expansion of a proposed City of Pismo Beach Offsite Advanced Treatment Facility to provide additional water for recharge of the Santa Maria River Valley groundwater basin. An initial planning study was completed by the City of Pismo Beach for their own facility in April of 2015 titled "Recycled Water Facilities Planning Study – Final for the City of Pismo Beach". The Pismo Beach RWFPS identified four desirable alternatives for water reuse. The alternatives are restricted irrigation using recycled water treated to Disinfected Secondary-23 standards, unrestricted landscape irrigation using recycled water treated to Disinfected Tertiary standards, and groundwater recharge via injection either as a seawater intrusion barrier or direct injection to the inland aquifer. Recycled water used for groundwater injection must undergo full advanced treatment including reverse osmosis treatment and an advanced oxidation process. The RWFPS recommended that groundwater injection into the inland aquifer be pursued as it could produce the highest volume of water that could be recovered for beneficial use while having an insignificant cost difference from injection for use as a seawater intrusion barrier.

Various groups in the region have coordinated efforts to address water resource issues at a regional scale. Some groups look into broad issues while others have a more specific focus. The District participates in many of these groups. Table 2 shows general descriptions and District staff involvement of each group. The long-term future of the District WWTP (past 2050) will require significant coordination among these regional partners but the framework is in place to move these discussions forward.

| Table 2: Regional Collaborative Efforts | | |
|---|---|---|
| **Regional Organization** | **Brief Description** | **Recent District Involvement** |
| Arroyo Grande Watershed Memorandum of Understanding Group | In 2006, the District and other parties entered into a Memorandum of Understanding to develop programs and policies for maintenance, protection, and enhancement of Arroyo Grande Watershed and creeks within the Watershed. | Staff attended latest meeting on 7/14/2016, next meeting scheduled for late September |
| Zone 1-1A Flood Control Advisory Committee District | Focused on goal of providing input and coordination on proposed improvement and maintenance of Zone 1/1A flood facilities, working with the Coastal San Luis Resource Conservation District | District staff participation approved 6/15/2016, staff attended meeting on 8/21/2016 |
| Integrated Water Resource Management (IRWM) | Collaborative effort with County of San Luis Obispo to manage grant and funding pursuits for water resource projects on a county-wide scale. | Board approved District participation on 7/6/2016 board meeting. Next IRWM meeting scheduled for 9/7/2016 |
| Water Reuse, Central Coast Chapter | Not-for-profit association of utilities, government agencies, and industry that advocates for laws, policies, and funding to promote water reuse. | Staff and elected officials to visit and tour Monterey Regional Water Pollution Control Agency's "Pure Water Demonstration Facility" on 9/14/2016 |
| North Cities Management Area Technical Group (NCMA TG) | Formed as a result of Santa Maria Groundwater Basin Adjudication, representatives from Arroyo Grande, Grover Beach, Pismo Beach, and the Oceano Community Services District are exploring various ways to protect and enhance future water supplies in the basin through groundwater monitoring and the collection and analyzing of data pertinent to water supply and demand. | Meeting attended 8/15/2016 Groundwater Modeling Subcommittee Met 9/6/2016 |
| Regional South SLO County Recycling Meeting (Stakeholder Outreach for RWFPS) | Recently staff have been invited to participate in meetings with the City of Pismo Beach to coordinate efforts regarding regional recycling projects. | Meeting attended 7/19/2016, District staff gave update on recent activities. Next Meeting is 9/23/2016 |
| Countywide Water Action Team | Water managers throughout San Luis Obispo County discuss and collaborate on water supply management solutions | Meeting attended 8/26/2016 |
| Outreach to member Agencies and Customers | District Administrator provided formal presentations on District and its initiatives (including Redundancy Project and RWFPS) to Arroyo Grande City Council, Oceano Community Services District, and Regional Water Quality Control Board | Presentations given between 7/26/2016 - 7/28/2016 |

## SITE ALTERNATIVES

Sites were determined by review of the the 100-year floodplain from the FEMA Flood Insurance Rate Maps (FIRM) and land use mapping from the County of San Luis Obispo, City of Arroyo Grande, and City of Grover Beach. The identified sites were located well outside of the floodplain and were confirmed for zoning as a suitable land use. For the purposes of this study, agriculture, industrial, open space, and public facilities were considered appropriate land uses for potential relocation sites. Individual parcels were not identified since the purpose of this study is to develop conceptual costs, not begin detailed planning for relocation of a regional facility. It should be noted that a designation of agricultural land use may introduce additional complications as individual parcels may be entered in a Land Conservation Contract protected by the California Land Conservation Act of 1965 (Williamson Act) and Government Code Section 51250 via AB 1492 (Laird Bill). Investigation of parcels that were protected by a Land Conservation Contract was outside of the scope for this study but should be performed before a land acquisition process. The District WWTP is located on land designated as public facilities land use category.

Three sites were identified within the District's service area. Each site had at least 12 acres of area. The existing WWTP site is about 10.6 acres, so sites with room to expand or add future treatment processes were considered desirable. The sites identified were labeled Site 1, Site 2, and Site 3 and are located in Grover Beach, Oceano, and Arroyo Grande respectively. Sites can be seen in Figure 1.

## PIPELINE ALIGNMENTS

It was assumed that a lift station would be constructed at the location of the existing WWTP to convey raw wastewater to the identified sites. Depending on the location of the new site, the lift station requirements would change significantly as site elevation and pipeline length will drive design of pumps and lift station size.

Preliminary pipeline alignments followed major roads and avoided highway or railroad crossings where possible. It should be noted that each site will require a pipeline that crosses Highway 1 and the railroad to the east of the existing facility. Assuming the pipeline can be directed through the Oceano County Airport adjacent to the existing WWTP, only Site 3 would have an additional creek crossing at the intersection of Halcyon Rd and Highway 1.

Since Site 2 and Site 3 are significantly further from the existing facility than Site 1, larger pumps are required. Each scenario would have 3 submersible pumps at the lift station so that two can be used during PHWWF times and one can always be used as a backup. Site 3 may require an interim lift station to provide adequate conveyance during PHWWF. Preliminary estimates for the pipeline alignment length and pumping are listed in Table 2.

**Table 3: Preliminary Estimates for Pipelines and Pumps**

| Site | Site Elevation (ft) | Pipeline Length (ft) | Approximate Pump TDH (ft) | Approximate Total Pump Horsepower Required (hp) |
|---|---|---|---|---|
| 1 | 45 | 4,200 | 125 | 330 |
| 2 | 90 | 11,000 | 260 | 650 |
| 3 | 180 | 21,000 | 475 | 1,200 |


South San Luis Obispo County Sanitation District

mkn WATER - WASTEWATER - REUSE

Figure 1:
SSLOCSD WWTP
Site Alternatives

1 inch = 2,500 feet

0 2,500 5,000

N

## PERMITTING AND LAND USE

In general, a new facility, if located in the Coastal Zone, would need to be consistent with Coastal Commission policies and the applicable Local Coastal Plan of the jurisdiction in which the site would be located. Even if the facility itself were located outside the Coastal Zone, any discharge from the facility into a creek that could affect coastal resources would likely make the facility subject to Coastal policies. For that reason, it is assumed that Coastal policies could apply to a new facility within the District's boundaries, regardless of location.

The new facility would also need to comply with local land use and zoning requirements, which would differ depending on whether the site would be located in the City of Grover Beach, the City of Arroyo Grande, or the unincorporated community of Oceano. In the case of Oceano, the facility would need to comply with the planning requirements of San Luis Obispo County.

These considerations will be important in the evaluation of potential sites for a new facility:

- **California Coastal Act compliance.** A new site would be potentially inconsistent with Coastal Act policies if it is:
    - located on prime agricultural land;
    - contains environmentally sensitive habitat area (ESHA) such that development outside of the habitat and buffer areas would not be feasible; and/or
    - located entirely within the 100-year flood hazard zone, and cannot be mitigated through design to the satisfaction of the Coastal Commission.

  Projects subject to Coastal Commission regulation must also comply with other key policies related to the following issues:
    - Local Coastal Program (LCP) consistency
    - Coastal Hazards
    - Public Access, Recreation, and Visitor-Serving Uses
    - Visual Resources
    - Sustainable Use of Public Resources
    - Coastal-Dependent Development
    - Cultural Resources

- **Local General Plan and Zoning Consistency.** A new facility must be consistent with land use designations and zoning requirements of the applicable jurisdiction. These provisions typically related to allowed uses, building heights, setbacks, noise, visual appearance, and other considerations that relate to land use compatibility and orderly development.

- **Environmental (CEQA) Considerations.** A new facility would need to be evaluated in accordance with the California Environmental Quality Act (CEQA), in order to determine and disclose potential environmental impacts, and to prescribe possible mitigation measures. Among the key issues to be considered include:

    - Aesthetics (Visual Resources)
    - Agricultural Resources
    - Air Quality
    - Biological Resources
    - Cultural Resources
    - Geology and Soils

- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning (including Land Use Compatibility)
- Mineral Resources
- Noise
- Population/Housing
- Public Services
- Recreation
- Traffic and Transportation
- Utilities

Other permits from state and national resource agencies may be required for pipeline construction across streams or other sensitive habitat areas.

## COMPARATIVE COST OPINIONS

Comparative conceptual cost opinions have been prepared for each identified site alternative. Due to the fact that the facility is currently undergoing upgrades to meet full redundancy via the construction of aeration basins and an additional secondary clarifier, it was assumed that if the facility were moved an FFR would not be constructed, as an FFR would not provide supplemental treatment or redundancy that would warrant the cost of its construction. The WWTP Redundancy Project will be designed to allow the facility to have full redundancy with both the FFR and an aeration basin out of service.

Costs such as property acquisition, easement acquisition, and other categories that cannot be estimated are not included in these opinions.

The construction costs are intended only to allow a comparison of potential costs to relocate the existing WWTP to various sites within the service area and vicinity of the WWTP. It should be noted that the entire WWTP Redundancy Project budget is approximately $20,000,000 and includes flood proofing through the year 2050.

To estimate construction costs at the midpoint of construction, the total present day (2016) construction cost was escalated by 2% annually for a total of 10 years. This 10-year period is intended to be a conceptual planning, permitting, and logistics period that would be taken by the District in the event that the WWTP was relocated. Construction costs include a 30% construction contingency allowance and a 30% design, administration and legal, and construction management allowance. Comparative construction costs are displayed in Table 4. A basis of cost evaluation is attached as Appendix A.

**Table 4: Preliminary Conceptual Cost Opinions**

| Site | Estimated Construction Costs (2016 $Million) | Estimated Construction Costs at Midpoint of Construction (2026 $Million) |
|---|---|---|
| 1 | 110 | 130 |
| 2 | 120 | 150 |
| 3 | 130 | 160 |

## ANTICIPATED TIMELINE

Given the number of regional partners, the need for extensive public outreach during siting of new wastewater treatment facilities, and the importance of developing goals that meet all the member agencies' needs (such as recycled water production), the timeline for planning, permitting, design, and construction is anticipated to

require seven to 11 years. Considering that floodproofing measures at the existing site will be designed to meet modeled sea rise levels through 2050 or 2070 at a minimum, there is adequate time for the member agencies to develop a long-term plan for future wastewater treatment and recycled water production at the existing site, at a new location, or participate in regional flooding or sea level mitigation planning efforts. Current coordination efforts related to regional planning were cited in Table 2. In order to determine the likely timeline for planning, design, and construction of a new regional treatment facility, MKN and JFR Consulting considered schedules for California Environmental Quality Act compliance, master planning, design, and construction.

It is expected that the CEQA process to prepare the necessary Environmental Impact Report (EIR) would likely take 24 to 36 months. The length of time would be a function of the multi-agency coordination that would need to occur, as well as the potential for public controversy, which often arises as a result of perceived neighborhood incompatibility concerns because of the nature of wastewater treatment facilities.

Detailed master planning and design of a new treatment plant facility, pipelines, and pumping stations is anticipated to require approximately 24 to 36 months based on experience with similar projects. This includes procurement of planning and engineering consultants, detailed design activities, field studies, and agency reviews and approvals.

Construction phase, including new pipelines, treatment plant processes, pumping facilities, recycled water delivery systems, decommissioning of the new facility, startup, and commissioning is anticipated to require an additional 36 to 60 months.

# Appendix A
# Basis of Cost Evaluation

The Technical Memorandum includes relative construction cost opinions for developing a new WWTP at three different sites. This Appendix discusses the approach for developing the conceptual cost opinions presented in the TM.

This evaluation does not identify the total costs for each alternative, but attempts to establish a comparative framework for analysis of each site under consideration. The construction costs described herein are meant to support a relative construction cost comparison of the potential project sites under consideration. They represent planning level estimates and do not reflect actual project costs. The following table summarizes the project components and estimated unit cost ranges developed for the evaluation. Descriptions of the criteria used to develop these costs are included in the paragraphs below.

| Project Component | Unit | Estimated Unit Cost Range[1] | |
|---|---|---|---|
| | | Low | High |
| Sewer force main (18") | mile | $1,360,000 | $2,420,000 |
| Raw Wastewater Lift Station[2] | each | $1.920.000 | $3,230,000 |
| Headworks and Grit Removal | each | $2,000,000 | $2,800,000 |
| Primary Clarifiers | each | $2,140,000 | $2,990,000 |
| Aeration Basins | each | $2,010,000 | $2,220,000 |
| Secondary Clarifiers | each | $2,850,000 | $3,170,000 |
| Dewatering | each | $5,750,000 | $6,270,000 |
| Digesters | each | $5,600,000 | $7,600,000 |
| Disinfection system | each | $1,570,000 | $1,880,000 |
| Treated effluent disposal pump station | each | $1,600,000 | $2,100,000 |
| Treated effluent disposal pipeline (18") | mile | $1,360,000 | $2,420,000 |
| General Site Work (ops buildings, storage, etc) | %[3] | 20 | 30 |
| Earthwork Allowance | %[3] | 5 | 10 |
| Site Improvements and Piping | %[3] | 20 | 25 |
| Electrical and Instrumentation | % | 20 | 20 |
| Construction Contingency | % | 30 | 30 |
| Administration, Design, and Management | % | 30 | 30 |

Notes:

1. Estimated unit cost range includes capital construction costs as defined in the paragraphs below.
2. Lift station costs varied between alternatives due to differing pump design criteria. The complete range is shown.
3. Unit cost range for percentages calculated as percentage of construction cost subtotals.
4. Costs for property acquisition, easements, permitting, and advanced treatment are not included.

Cost Index – The Engineering New Record (ENR) Construction Cost Index (CCI) is the industry standard measure of changes in the construction sector. It is commonly used to bring historical costs (bids and estimates) to current estimates. The ENR CCI 20-city average for August 2016 of 10385.65 was used for this report.

Unit cost ranges – Construction costs are estimated based on the order-of-magnitude unit cost ranges established herein. Unit cost estimates include materials, labor, equipment, contractor overhead and profit, and mobilization costs, and represent the median price expected from a responsible bid. These costs represent conceptual level estimates for probable construction costs with ranges reflecting the anticipated accuracy of the estimate based on limited information such as basic design criteria, limited process flow diagram, and list of major project components.

Sewer force main – The sewer force main must be sized to transport the pumped flow, assumed to be the peak hour flow of ten million gallons per day (MGD). Based on a design velocity of five to eight fps, it is estimated that the sewer force main will be 18-inches in diameter. For the purposes of this report, it is assumed the pipeline will be AWWA C900 polyvinyl chloride (PVC) pressure pipe, installed at depths ranging from 3 to 5 feet of cover. A per mile unit cost estimate was established and estimated lengths were rounded to the nearest mile. The unit cost estimate assumes trenching in paved roadways, traffic control, and asphalt paving.

Lift stations – Lift stations must be designed to meet the peak hour flow rate of 10 MGD (approximately 6,950 gpm). The pump size will be chosen based on the pumping head requirements for each site. Pumping head requirements were estimated by projecting a pipeline route for the raw wastewater force main between the existing wastewater treatment plant and the new sites, and summing the resultant elevation head loss, friction head loss and minor losses. Required elevation head was estimated using the maximum elevation along the potential force main route. Friction head loss and minor losses assume an 18-inch diameter force main. The approximate lift station pump horse power was estimated using the peak hour flow rate, estimated pumping head (total dynamic head) and a pump efficiency of 70%. For this report 'ilt is assumed at least three pumps will be required to effectively meet the range of flows and provide redundancy. Some sites may require additional booster pumps to achieve desired head during peak flow events. Construction cost estimates were derived from cost curve data presented in Figure 29-3 of Pumping Station Design by Robert Sanks. Considered to be industry standard, these cost curves were derived from historical construction costs. Cost estimates for this study were adjusted using the ENR CCI. The estimated cost within this range was chosen for each site based on the pumping head requirement.

Treatment Facilities– The construction costs for the primary clarifiers, aeration basins, and secondary clarifiers are based on estimates from the Kennedy Jenks report prepared for the District titled "Upgrading Existing Wastewater Treatment Plant Documentation Review and Update of Probable Cost" (February, 2015). The KJ report did not specify costs for primary clarifiers. Since primary clarifiers are smaller than secondary clarifiers it was assumed that the cost for the primary clarifiers would be roughly 75% of the cost of secondary clarifiers. These costs were adjusted to August 2016 using the ENR CCI.

Dewatering – The construction costs for dewatering equipment included both gravity sludge thickening and centrifuges. A cost range was developed after reviewing comparable project cost estimations for the City of Oxnard and the City of Morro Bay, as documented in the reports "Oxnard Unit Process

## References

Capacity Evaluation of the California Men's Colony Wastewater Treatment Plant – Carollo, December 3, 2014

Coastal Development Permit (CDP) Application Number 3-16-0233 (SSLOCSD Wastewater Treatment Facility Redundancy Project) – California Coastal Commission, April 15, 2016

Comparative Site Analysis: Regional CMC Facility vs. Rancho Colina, John F. Rickenbach Consulting, December 9, 2014

Morro Bay WRF Site Report, Appendix A – Basis of Cost Evaluation – MKN and Associates May 6, 2016

Oxnard Unit Process Evaluation and Equipment Optimization – Penfield and Smith and MKN and Associates, June 11, 2014

SSLOCSD Wastewater Treatment Facility Redundancy Project: Sea Level Rise Analysis – ESA, August 3, 2016

State Revolving Fund Planning or Design Financial Assistance Application, WWTP Redundancy Project, South San Luis Obispo County Sanitation District – SSLOCSD and MKN and Associates, June 20, 2016

Upgrading Existing Wastewater Treatment Plant Documentation Review and Update on Probable Cost – Kennedy/Jenks Consultants, February 4, 2015

Wastewater Treatment Plant Expansion, Phase II Bid No. 2008/01 Award of Bid – Director of Public Works/City Engineer for Santa Maria, California, May 20, 2008

# Appendix B

# Comparative Cost Opinions for Sites 1-3

SSLOCSD WWTP Site Alternatives Comparative Construction Cost Opinion - Site 1

| Project Component | Unit | Estimated Unit Cost Range | | Quantity | Estimated Cost Range | | |
|---|---|---|---|---|---|---|---|
| | | Low | High | | Low | High | Midpoint |
| Sewer force main (18 inch) | mile | $1,360,000 | $2,420,000 | 1 | $1,360,000 | $2,420,000 | $1,890,000 |
| Lift Station (6950 gpm, 125 ft TDH) | each | $1,920,000 | $2,270,000 | 1 | $1,920,000 | $2,270,000 | $2,095,000 |
| Headworks | LS | $1,500,000 | $2,000,000 | 1 | $1,500,000 | $2,000,000 | $1,750,000 |
| Grit removal process | each | $500,000 | $800,000 | 1 | $500,000 | $800,000 | $650,000 |
| Primary Clarifiers | Each | $2,140,000 | $2,990,000 | 2 | $4,280,000 | $5,980,000 | $5,130,000 |
| Aeration Basins | each | $2,010,000 | $2,220,000 | 4 | $8,040,000 | $8,880,000 | $8,460,000 |
| Secondary Clarifier | Each | $2,850,000 | $3,170,000 | 2 | $5,700,000 | $6,340,000 | $6,020,000 |
| Dewatering | Each | $5,750,000 | $6,270,000 | 1 | $5,750,000 | $6,270,000 | $6,010,000 |
| Digesters (2) | LS | $5,600,000 | $7,600,000 | 1 | $5,600,000 | $7,600,000 | $6,600,000 |
| Disinfection | LS | $1,570,000 | $1,880,000 | 1 | $1,570,000 | $1,880,000 | $1,725,000 |
| Treated effluent disposal pump station (6950 gpm) | each | $1,600,000 | $2,100,000 | 1 | $1,600,000 | $2,100,000 | $1,850,000 |
| Treated effluent disposal pipeline (18 inch) | mile | $1,360,000 | $2,420,000 | 1 | $1,360,000 | $2,420,000 | $1,890,000 |

| | | | | |
|---|---|---|---|---|
| Estimated Construction Cost Subtotal 1 | | $39,180,000 | $48,960,000 | $44,070,000 |
| General Site work (ops building, storage, etc) | 20 - 30% | $7,836,000 | $14,688,000 | $11,017,500 |
| Earthwork Allowance | 5 - 10% | $1,959,000 | $4,896,000 | $3,305,250 |
| Estimated Construction Cost Subtotal 2 | | $48,975,000 | $68,544,000 | $58,392,750 |
| Site Improvements and Piping | 20 - 25% | $9,795,000 | $17,136,000 | $11,678,550 |
| Construction Contingency | 30% | $14,692,500 | $20,563,200 | $17,517,825 |
| Admin, Design, Management | 30% | $14,692,500 | $20,563,200 | $17,517,825 |
| **Estimated Construction Cost Total** | | **$90,000,000** | **$130,000,000** | **$110,000,000** |

SSLOCSD WWTP Site Alternatives Comparative Construction Cost Opinion - Site 2

| Project Component | Unit | Estimated Unit Cost Range | | Quantity | Estimated Cost Range | | |
|---|---|---|---|---|---|---|---|
| | | Low | High | | Low | High | Midpoint |
| Sewer force main (18 inch) | mile | $1,360,000 | $2,420,000 | 2.1 | $2,856,000 | $5,082,000 | $3,969,000 |
| Lift Station (6950 gpm, 260 ft TDH) | each | $2,120,000 | $2,630,000 | 1 | $2,120,000 | $2,630,000 | $2,375,000 |
| Headworks | LS | $1,500,000 | $2,000,000 | 1 | $1,500,000 | $2,000,000 | $1,750,000 |
| Grit removal process | each | $500,000 | $800,000 | 1 | $500,000 | $800,000 | $650,000 |
| Primary Clarifiers | Each | $2,140,000 | $2,990,000 | 2 | $4,280,000 | $5,980,000 | $5,130,000 |
| Aeration Basins | each | $2,010,000 | $2,220,000 | 4 | $8,040,000 | $8,880,000 | $8,460,000 |
| Secondary Clarifier | Each | $2,850,000 | $3,170,000 | 2 | $5,700,000 | $6,340,000 | $6,020,000 |
| Dewatering | Each | $5,750,000 | $6,270,000 | 1 | $5,750,000 | $6,270,000 | $6,010,000 |
| Digesters (2) | LS | $5,600,000 | $7,600,000 | 1 | $5,600,000 | $7,600,000 | $6,600,000 |
| Disinfection | LS | $1,570,000 | $1,880,000 | 1 | $1,570,000 | $1,880,000 | $1,725,000 |
| Treated effluent disposal pump station (6950 gpm) | each | $1,600,000 | $2,100,000 | 1 | $1,600,000 | $2,100,000 | $1,850,000 |
| Treated effluent disposal pipeline (18 inch) | mile | $1,360,000 | $2,420,000 | 2.1 | $2,856,000 | $5,082,000 | $3,969,000 |

| | | | | |
|---|---|---|---|---|
| Estimated Construction Cost Subtotal 1 | | $42,372,000 | $54,644,000 | $48,508,000 |
| General Site work (ops building, storage, etc) | 20 - 30% | $8,474,400 | $16,393,200 | $12,127,000 |
| Earthwork Allowance | 5 - 10% | $2,118,600 | $5,464,400 | $3,638,100 |
| Estimated Construction Cost Subtotal 2 | | $52,965,000 | $76,501,600 | $64,273,100 |
| Site Improvements and Piping | 20 - 25% | $10,593,000 | $19,125,400 | $12,854,620 |
| Construction Contingency | 30% | $15,889,500 | $22,950,480 | $19,281,930 |
| Admin, Design, Management | 30% | $15,889,500 | $22,950,480 | $19,281,930 |
| **Estimated Construction Cost Total** | | **$100,000,000** | **$140,000,000** | **$120,000,000** |

SSLOCSD WWTP Site Alternatives Comparative Construction Cost Opinion - Site 3

| Project Component | Unit | Estimated Unit Cost Range | | Quantity | Estimated Cost Range | | |
|---|---|---|---|---|---|---|---|
| | | Low | High | | Low | High | Midpoint |
| Sewer force main (18 inch) | mile | $1,360,000 | $2,420,000 | 4 | $5,440,000 | $9,680,000 | $7,560,000 |
| Lift Station (6950 gpm, 480 ft TDH) | each | $2,630,000 | $3,230,000 | 1 | $2,630,000 | $3,230,000 | $2,930,000 |
| Headworks | LS | $1,500,000 | $2,000,000 | 1 | $1,500,000 | $2,000,000 | $1,750,000 |
| Grit removal process | each | $500,000 | $800,000 | 1 | $500,000 | $800,000 | $650,000 |
| Primary Clarifiers | Each | $2,140,000 | $2,990,000 | 2 | $4,280,000 | $5,980,000 | $5,130,000 |
| Aeration Basins | each | $2,010,000 | $2,220,000 | 4 | $8,040,000 | $8,880,000 | $8,460,000 |
| Secondary Clarifier | Each | $2,850,000 | $3,170,000 | 2 | $5,700,000 | $6,340,000 | $6,020,000 |
| Dewatering | Each | $5,750,000 | $6,270,000 | 1 | $5,750,000 | $6,270,000 | $6,010,000 |
| Digesters (2) | LS | $5,600,000 | $7,600,000 | 1 | $5,600,000 | $7,600,000 | $6,600,000 |
| Disinfection | LS | $1,570,000 | $1,880,000 | 1 | $1,570,000 | $1,880,000 | $1,725,000 |
| Treated effluent disposal pump station (6950 gpm) | each | $1,600,000 | $2,100,000 | 1 | $1,600,000 | $2,100,000 | $1,850,000 |
| Treated effluent disposal pipeline (18 inch) | mile | $1,360,000 | $2,420,000 | 4 | $5,440,000 | $9,680,000 | $7,560,000 |

| | | | | |
|---|---|---|---|---|
| Estimated Construction Cost Subtotal 1 | | $48,050,000 | $64,440,000 | $56,245,000 |
| General Site work (ops building, storage, etc) | 20 - 30% | $9,610,000 | $19,332,000 | $14,061,250 |
| Earthwork Allowance | 5 - 10% | $2,402,500 | $6,444,000 | $4,218,375 |
| Estimated Construction Cost Subtotal 2 | | $60,062,500 | $90,216,000 | $74,524,625 |
| Site Improvements and Piping | 20 - 25% | $12,012,500 | $22,554,000 | $14,904,925 |
| Construction Contingency | 30% | $18,018,750 | $27,064,800 | $22,357,388 |
| Admin, Design, Management | 30% | $18,018,750 | $27,064,800 | $22,357,388 |
| **Estimated Construction Cost Total** | | **$110,000,000** | **$170,000,000** | **$130,000,000** |

# View of WWTP from Highway 1 (southbound)