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Application for Certification
(15-AFC-01)

Puente Power Project (P3)
Oxnard, CA

Responses to City of Oxnard Data Requests Set 6

October 2016

Submitted to:
The California Energy Commission

Prepared by:

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RESPONSES TO CITY OF OXNARD DATA REQUESTS SET 6

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LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

AFC	Application for Certification
AFY	acre-feet per year
cfs	cubic feet per second
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
gpm	gallons per minute
MGS	Mandalay Generating Station
P3	Puente Power Project
VCWPD	Ventura County Watershed Protection District

Technical Area: Soil and Water Resources

DATA REQUEST

104. ***The Edison canal receives stormwater discharge from two County of Ventura Watershed Protection District (VCWPD) drainage channels, the West Fifth Street Drain, and the Doris Drain (see attached FEMA map 903F), as well as discharges from surrounding agricultural operations and adjacent properties. What is the canal's drainage design capacity and how much of that capacity do the existing drainages fill? What impact would NRG's proposed discharge have on the canal's ability to accommodate all discharge sources during an 100-year storm event.***

RESPONSE

The Edison Canal was constructed for the primary purpose of conveying cooling water from the ocean to Mandalay Generating Station (MGS), but it also receives stormwater discharge from drainage channels, agricultural operations, and other sources. The incremental discharge to the Edison Canal from the proposed Puente Power Project (P3), namely wastewater from P3 operations and stormwater runoff from the MGS property following closure of the MGS outfall, will be very small compared to the current discharge sources. As explained below, the proposed wastewater discharge from P3 and stormwater from the remainder of the MGS site are estimated to be approximately 1.3 percent of the peak flow to the canal from current discharge sources during a 100-year storm event. Excluded from this analysis is MGS Unit 3 single-pass bearing cooling water discharge, because this bearing cooling water is sourced from the canal and would be discharged directly back into the canal.

Geometry and FEMA Maps

The Edison Canal has greater capacity than the combined capacities of the Doris Drain and the West Fifth Street Drain. The Edison Canal ranges from approximately 80 to 100 feet wide, while the Doris Drain is approximately 40 to 50 feet wide, and the West Fifth Street Drain is approximately 30 to 40 feet wide. The Edison Canal is more than 10 feet deep, which is as deep as, or deeper than, the Doris Drain and the West Fifth Street Drain. Because the capacity of the Edison Canal is greater than the combined capacity of the Doris and West Fifth Street Drains, it should be able to convey the stormwater discharged from the combination of the two canals. As described below, both the Doris Drain and the West Fifth Street Drain can convey 100-year storm events without flooding. Though not mentioned in the response to Data Request 104, there is a third drain, the Wooley Road Drain, that discharges into the Edison Canal downstream of the Fifth Street Drain near Channel Island Harbor and Mandalay Bay. Because it is so close to the harbor and bay, it should have minimal impact on flows and canal capacity upstream.

Floodplains associated with the Doris and West Fifth Street Drains (which are tributaries to the Edison Canal) and the Edison Canal are included on Federal Emergency Management Agency (FEMA) floodplain maps. The preliminary Flood Insurance Rate Map (FIRM) (Map Number 06111C0903F, dated September 30, 2016) notes that the 1 percent annual chance flood (i.e., 100-year event) is contained in the channel for both the Doris Drain and the Edison Canal upstream of the West Fifth Street Drain. This indicates that there is no flooding during the 100-year event along these canals. In addition, the FEMA map shows no significant flooding along the West Fifth Street Drain due to 100-year flood.

The FEMA map shows the 100-year water surface elevation in the Edison Canal is 8 feet downstream of the West Fifth Street Drain (FEMA FIRM Number 06111C0903F). The ground

surface elevation adjacent to the Edison Canal, based on the Coastal Conservancy Coastal LiDAR, is 14 to 15 feet, resulting in 6 to 7 feet of freeboard in the Edison Canal during a 100-year event. The ground surface elevation along the Edison Canal upstream of the Fifth Street Drain varies from 15 to 17 feet on average, also indicating significant freeboard during a 100-year event. Figure 104-1 shows that the freeboard in the Edison Canal at high tide is approximately 6 to 7 feet at MGS. Based on geometry and the FEMA FIRMs, the Edison Canal would be able to convey the 100-year storm without any flooding, while maintaining 6 to 7 feet of freeboard.

Drainage Area

The current drainage area to the Edison Canal is approximately 3,300 acres (5.2 square miles) and is roughly bounded by Harbor Boulevard to the west, Gonzales Road to the north, Ventura Road to the east, and Fifth Street and Wooley Road to the south. Stormwater enters the canal through major drainage ditches, numerous culvert pipes, and one concrete paved flume. There are three major storm drains that discharge to the canal: the Doris Drain, the West Fifth Street Drain, and the Wooley Road Drain. Figure 104-2 shows the major watersheds that drain to the canal, and Table 104-1 summarizes their areas and percent developed and undeveloped (Parma, 2003). Since the time that Figure 104-2 was created, Area 7 (Hemlock Street Drain) has been incorporated into Channel Island Harbor. Because Area 7 no longer drains to the Edison Canal, it is not included in Table 104-1. The MGS property, including the P3 site, is approximately 36 acres, which corresponds to about 4 percent of the developed area currently draining to the canal, or approximately 1 percent of the total area currently draining to the canal.

As discussed above, the Edison Canal has significant remaining freeboard (6 to 7 feet) during a 100-year event; therefore, a 1 percent increase in total drainage area to the Edison Canal would not significantly increase the risk of flooding of the Edison Canal or its tributaries.

Discharge Rate – Stormwater

The current drainage area to the Edison Canal is approximately 29 percent developed and 71 percent undeveloped. The Doris Drain at Patterson Road has a drainage area of 0.40 square mile and a 100-year peak flow of 250 cubic feet per second (cfs), according to the FEMA Flood Insurance Study (FIS) (FEMA, 2015). The 0.40-square-mile drainage area is primarily residential. The West Fifth Street Drain was not studied in detail by FEMA, so a 100-year flow rate is not available. For the purposes of this study, it was assumed that the 100-year discharge for all developed areas in the Edison Canal watershed would have the same unit discharge as reported in the FEMA FIS for Doris Drain at Patterson Road, or 625 cfs per square mile (250 cfs/0.40 square mile = 625 cfs per square mile = approximately 1 cfs/acre). Because the drainage area is 29 percent (i.e., 0.29) developed (see Table 104-1), the total runoff from the developed area would be:

3,284 acres *0.29 * 1 cfs/acre = 952 cfs

Undeveloped areas are primarily agricultural lands, which tend to produce smaller discharges than developed areas (that are mostly paved). The Ventura County Watershed Protection District Design Hydrology Manual (Hydrology Manual) (VCWPD, 2010) classifies the soils in the Edison Canal watershed as predominantly Type 3 soils (moderately permeable soils). Edison Canal is in Zone K, according to the Hydrology Manual, with a 100-year rainfall of 10.6 inches and a maximum rainfall intensity of 2 inches/hour for a peak 30-minute period (see Exhibit 2 in the Hydrology Manual). According to Figure 104-3 (which is from the Hydrology Manual), agricultural areas will produce about 75 percent of the runoff compared to developed areas for a

100-year event (compare P = 0 percent to P = 90 percent for 2 inches per hour). The runoff from the agricultural areas would then be:

3,284 acres * 0.71 * 0.75 * 1 cfs/acre = 1,749 cfs.

The total runoff into the Edison Canal from the surrounding drainage is estimated to be approximately 2,700 cfs (i.e., 952 cfs from developed areas, plus 1,749 cfs from undeveloped areas).

The 36 acres of the MGS property is assumed to be all developed, so its runoff is predicted to be based on an unit runoff rate for developed areas, as described above, and assumes no reuse of stormwater:

36 acres * 1 cfs/acre = 36 cfs

Therefore, runoff from the 36-acre MGS property is approximately 1.3 percent (36 cfs/2,700 cfs) of the estimated total peak runoff into the Edison Canal during a 100-year storm event. Keep in mind that stormwater runoff from the P3 site will be conveyed to the Service Water Storage Tank, as long as there is available storage capacity in the tank, and used for onsite industrial or irrigation purposes. Stormwater from P3 that is not recycled, and stormwater from the remainder of the MGS property, will be stored in the North and South basins before being conveyed to the Edison Canal.

Wastewater Discharge

Additional flows of wastewater from P3 or bearing cooling water from MGS Unit 3, even if one were to assume that P3 discharge and MGS Unit 3 discharge were occurring simultaneously and occurring at peak capacity at the time of the peak stormwater flow, would represent only a marginal increase to the estimated peak flow into the canal described above.

Wastewater discharge from P3 at a peak daily rate of 25 gallons per minute (gpm) and at an estimated total annual discharge of 6.5 acre-feet per year (AFY) represents a small contribution to the canal. Approximately 9 gpm of the 25-gpm wastewater discharge is from evaporative cooling water, which would typically occur on hot days in the summer and not during an extreme rain event (see Application for Certification [AFC] Section 2.0, Table 2.7-5). Conservatively assuming that P3 discharge is 25 gpm, the potential maximum flow of this nonstormwater discharge to the canal would be approximately 0.036 cfs.

Once the proposed wastewater system is in place and the outfall is removed, MGS Unit 3 bearing cooling water will also be discharged to the Edison Canal. MGS Unit 3 is limited to 200 hours of annual operation, which corresponds to an estimated maximum of 400 hours of bearing cooling water pump operation, or up to 240 AFY. When the pump operates, it is typically operated for short durations (several hours at a time); therefore, discharge to the canal will be infrequent and intermittent (Project Refinement – Outfall Removal and Beach Restoration, Section 3.15.2.2). Furthermore, MGS Unit 3 bearing cooling water is currently sourced from the canal; therefore, any discharge of this single-pass bearing cooling water to the canal is fully offset by equivalent withdrawals and would result in no net effect on the flow to, or free board in, the canal.

Consequently, nonstormwater discharge would add a potential maximum flow of 0.036 cfs to the 36 cfs estimated stormwater flow from the MGS property.

Conclusion

The additional discharge to the Edison Canal as a result of the P3 refinements will be negligible, based on:

- the geometry of the canals;
- the preliminary FEMA FIRMs;
- the small increase in drainage area attributable to the MGS property compared to the entire drainage area;
- the predicted discharges of stormwater and wastewater to the canal; and
- the estimated canal freeboard of 6 to 7 feet.

Table 104-1
Edison Canal Drainage Sub-Areas

Area #	Description	Size (acres)	% Developed	% Agricultural
1	Sod Farm north	250	0	100
2	Doris Drain	1,190	37	63
3	West Fifth Street Drain	975	34	66
4	Sod Farm West	140	0	100
5	Strawberry Fields	250	0	100
6	Wooley Road Drain	240	72	28
8	Oxnard Shores	24	100	0
	Undeveloped Sand Dunes	215	0	100
Total/Average		**3,284**	**29**	**71**

Source: Parma, 2003

References

FEMA (Federal Emergency Management Agency), 2015. FEMA Flood Insurance Study, Ventura County. September 30.

Parma James, G., 2003. Mandalay Generating Station Intake Canal Shoaling Study. Prepared by Reliant Energy Wholesale Service Company, Engineering Services. November 18. PF#MAN 300008.

VCWPD (Ventura County Watershed Protection District), 2010. Design Hydrology Manual.

DATA REQUEST

105. ***FEMA FIRM maps that were just released assume that there is no discharge from NRG properties into the canal. What impact would discharge into the canal have on the flooding potential associated with the canal?***

RESPONSE

To assess the potential for MGS discharges (including stormwater, P3 wastewater, and MGS Unit 3 discharges) to increase the flood potential of the canal, the Applicant first considered the current flood potential based on the recently released FEMA FIRM maps (see the response to Data Request 104). As discussed in the response to Data Request 104, the FEMA FIRM indicates that the 100-year flood, which does not include discharges from MGS, is contained in the canal with several feet of freeboard to spare.

As a result of the P3 refinements in which the ocean outfall will be closed and stormwater, P3 wastewater and MGS Unit 3 wastewater will be discharged to the canal, impacts on the flooding potential along the canal will be negligible. As discussed in the response to Data Request 104, the MGS property is predicted to contribute 1.3 percent of the 100-year stormwater flow into the canal. Theoretically, a maximum of 25 gpm of wastewater discharge from P3 could be discharged to the canal, although 9 gpm of that maximum rate is attributable to evaporative cooling on hot operating days not during a severe rain event (see AFC Section 2.0, Table 2.7-5). The discharge to the canal from MGS Unit 3 single-pass bearing cooling water would be the same as its withdrawal from the canal (i.e., net zero contribution to the canal). Therefore, nonstormwater discharge would add a potential maximum flow of 0.036 cfs to the 36 cfs estimated stormwater flow.

The addition of 36 cfs (or 36.036 cfs if P3 wastewater is included) to the Edison Canal would be negligible relative to the 6 to 7 feet of available freeboard associated with current baseline conditions resulting from a 100-year storm event.

DATA REQUEST

106. ***What is the likelihood that during the co-occurrence of high tide and a 100-year storm event that NRG's proposed discharge will "back up" behind the discharge of the VCWPD at full volume flows, and increase flooding risk near Harbor Boulevard or within the NRG facility?***

RESPONSE

The level of the tide would not significantly alter the impact of the discharges from NRG's facility, as described above, because the canal has adequate freeboard (about 6 to 7 feet). High tides at their peak are limited in duration (1 to 2 hours), as is peak stormwater runoff. The water level would rise above the level of the 100-year event under current baseline conditions, but only by enough to convey an additional 36 cfs, as discussed in the responses to Data Requests 104 and 105.

DATA REQUEST

107. ***Would 2 feet of sea level rise alter the answers to questions 105 and 106?***

RESPONSE

For this analysis, adding 2 feet of sea-level rise is assumed to increase the water level in the Edison Canal by 2 feet at any given time. With 2 feet of sea-level rise, the freeboard during a 100-year storm event would be reduced from 6 to 7 feet to 4 to 5 feet. The impact of adding an additional approximately 36 cfs to the canal would be the same as discussed in the responses to Data Requests 104, 105, and 106, and there would continue to be adequate freeboard in the canal to manage cumulative impacts due to high tide and the 100-year storm event.

DATA REQUEST

108. ***NRG's plans indicate that the dune adjacent to the outfall will be restored following outfall removal. The Puente project relies on the dune that fronts the project site as protection from sea level rise, flooding, and other coastal hazards. Please discuss how NRG will maintain the integrity the dune system once it is restored.***

RESPONSE

To avoid impacts to the protective dunes, the portions of the outfall that are below the dunes will remain in place and be plugged and filled with slurry. After the wing walls and riprap are removed, the scalloped-shaped depressions that have been created north and south of the outfall by the MGS discharge to the ocean would be re-contoured and restored to a more natural state. Riprap may be reused to cover and protect the plugged outfall. Sand that is currently adjacent to the riprap would also be used to cover the plugged outfall. Activities near the toe of the dunes will be limited to filling the below-grade outfall conduit and mixing vault with slurry and backfilling the outfall channel, currently located between riprap, with sand. Sand from the dunes will not be disturbed, nor used to fill or re-contour areas currently occupied by the outfall. Furthermore, although no erosion of the dunes is expected based on the extensive analysis conducted by Applicant in its assessment of coastal hazards, the project will implement a Beach and Dune Monitoring Program to be carried out over the life of the project. The purpose of this monitoring would be to determine if, and at what rate, the beach and/or dunes are eroding. The Program would include triggers for further action based on the degree of beach narrowing and/or dune loss, and measures would be identified that could halt or slow the observed erosion without construction of shoreline protective devices.

DATA REQUEST

109. ***Any environmental analysis must consider alternatives and mitigation. To assist in determining whether discharge to the Edison Canal is the only feasible measure to reduce impacts associated with use of the existing outfall across the beach, please provide an analysis of the feasibility of discharging into the City of Oxnard's sanitary sewer system, which currently has a 12" main trunk line at Harbor Boulevard and Beachcomber Way.***

RESPONSE

Applicant evaluated the feasibility of discharging to the City of Oxnard's sanitary sewer system. The closest point of connection would be at the 12-inch main truck line at Harbor Boulevard and Beachcomber Way, which is more than 1 mile away from the project site. Due to the relatively flat topography between the project site and this point of connection, a lift station would be required. Furthermore, the sewer pipe would need to cross the bridge along Harbor Boulevard over the Edison Canal. Installation of the new offsite linear would require trenching along Harbor Boulevard and the associated environmental impacts to biology, cultural, and traffic/ transportation resource areas. For these reasons, and considering the very small amount of process wastewater generated by the project, this alternative was deemed to be both economically infeasible and environmentally inferior to the proposed discharge to Edison Canal.

DATA REQUEST

110. ***The current outfall crosses public tidelands before discharging into the Pacific Ocean. Please provide all communications with the State Lands Commission regarding ownership of the property over which the outfall and drainage passes or regarding the outfall and discharge itself.***

RESPONSE

Particularly now that Applicant has proposed to cease operation of the existing outfall, questions related to historical or current operation of the outfall (other than the effects associated with its removal) are outside the scope of these proceedings, because the outfall will not continue to be used to serve P3. Furthermore, the outfall structure is above the mean-high tide line and is therefore outside State Lands Commission jurisdiction; MGS' discharge is allowed under the facility's National Pollutant Discharge Elimination System permit.

DATA REQUEST

111. ***How would the MGS stormwater collection system discharge to the ocean during periods of high runoff if the outfall is removed?***

RESPONSE

Because the outfall structure will be plugged, MGS stormwater will no longer be discharged to the ocean. The proposed stormwater system, which consists of collection and conveyance pipelines, pumps, North and South basins, Service Water Storage Tank, and discharge to the canal, will be designed to handle stormwater without discharge to the ocean. With the closure of the outfall to the ocean, stormwater will not be discharged to the ocean. Stormwater from the P3 site will be conveyed to the Service Water Storage Tank, as long as there is available storage capacity in the tank, and used for onsite industrial or irrigation purposes. Stormwater from P3 that is not recycled, and stormwater from the remainder of the MGS property, will be stored in the North and South basins or directed to the new discharge pump vault to be pumped to the Edison Canal. The system has been designed to handle stormwater during periods of high runoff, and as discussed in the responses to Data Requests 104, 105, and 106, the canal has the capacity to accept stormwater during such periods.

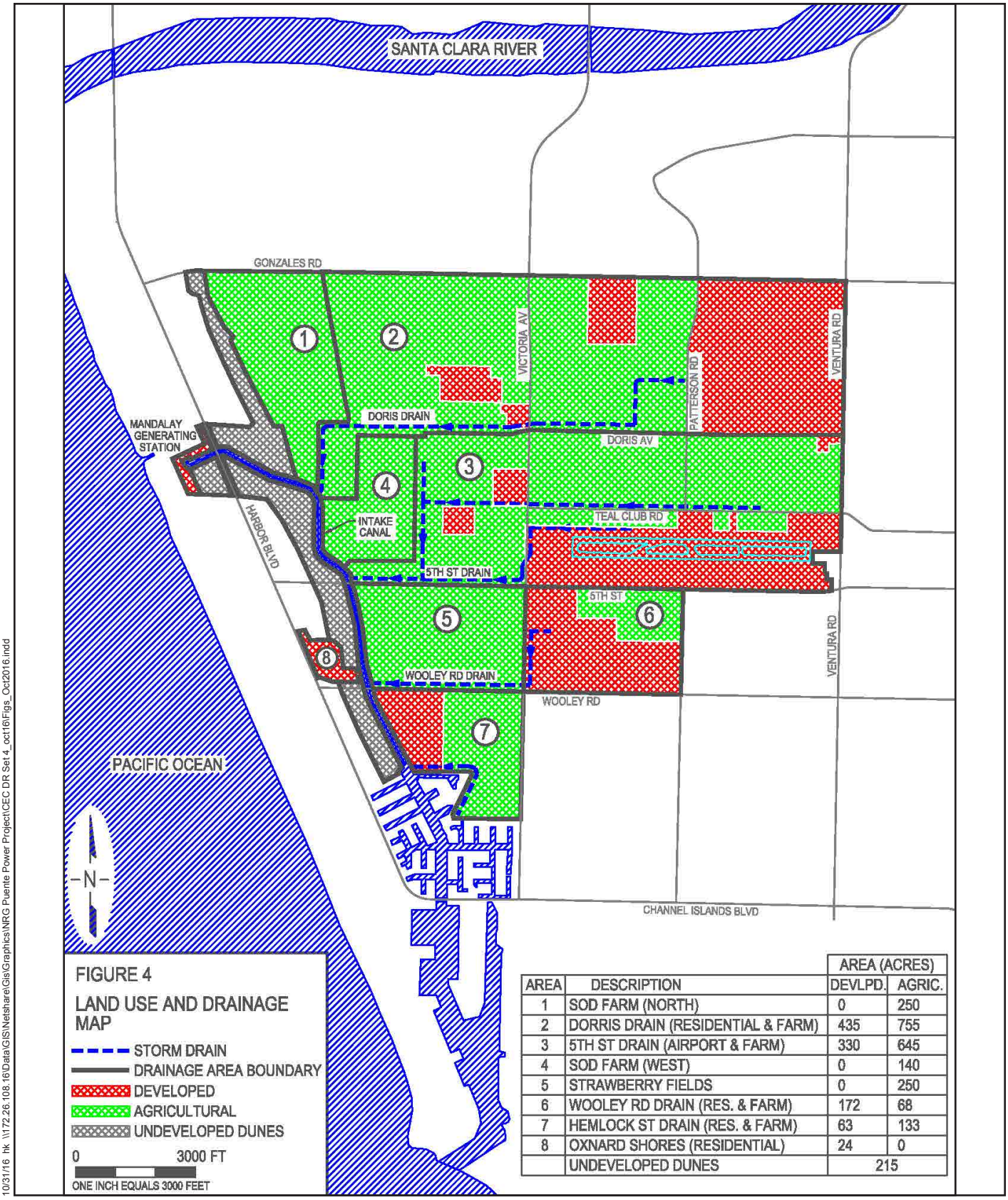
FIGURES

Source: NRG, 2015

FREEBOARD IN THE EDISON CANAL AT THE MGS

NRG
Puente Power Project
October 2016 Oxnard, California

FIGURE 104-1



AREA	DESCRIPTION	AREA (ACRES) DEVLPD.	AGRIC.
1	SOD FARM (NORTH)	0	250
2	DORRIS DRAIN (RESIDENTIAL & FARM)	435	755
3	5TH ST DRAIN (AIRPORT & FARM)	330	645
4	SOD FARM (WEST)	0	140
5	STRAWBERRY FIELDS	0	250
6	WOOLEY RD DRAIN (RES. & FARM)	172	68
7	HEMLOCK ST DRAIN (RES. & FARM)	63	133
8	OXNARD SHORES (RESIDENTIAL)	24	0
	UNDEVELOPED DUNES	215	

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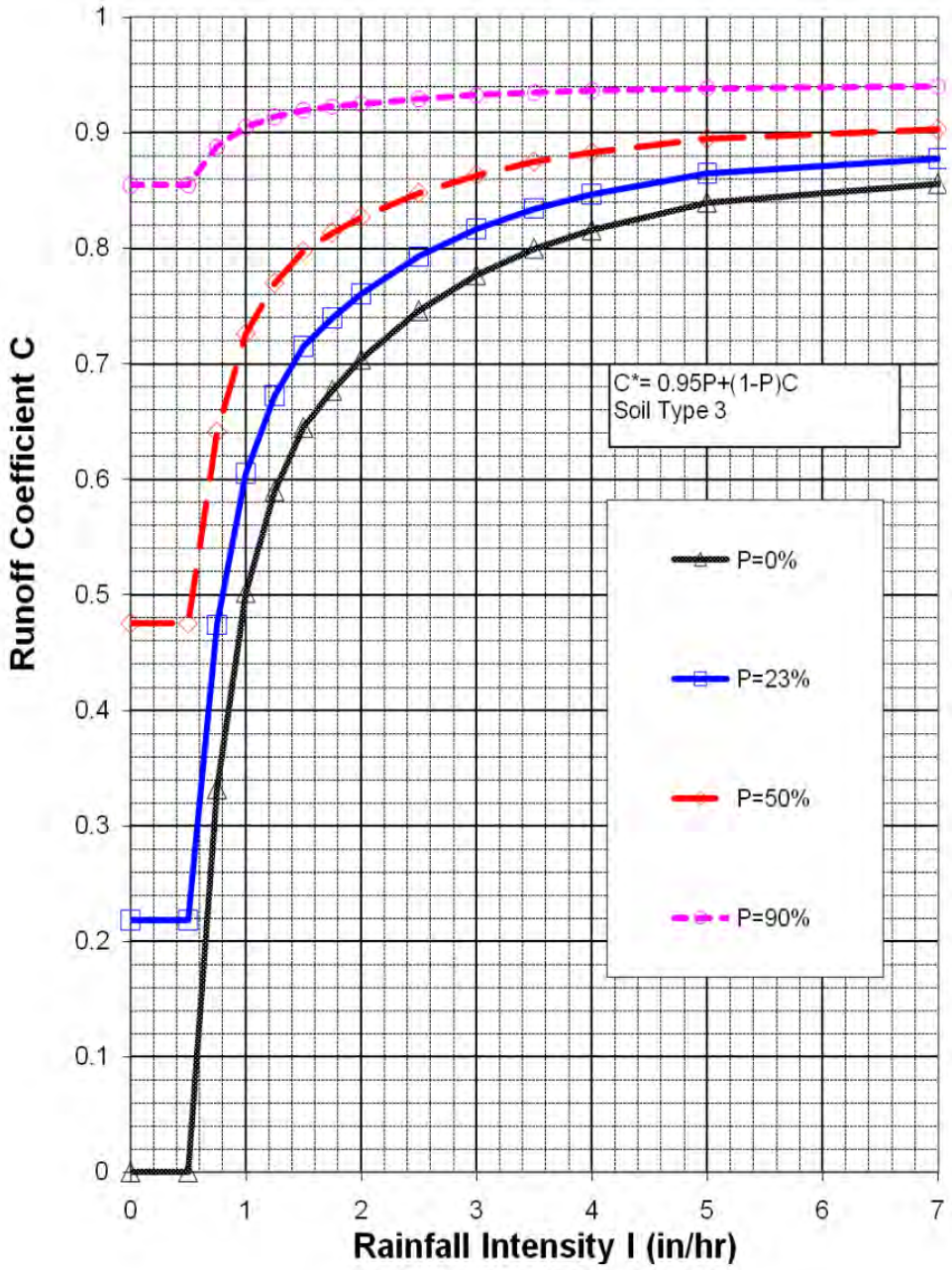
LAND USE AND DRAINAGE SUB-AREAS THAT DRAIN TO THE EDISON CANAL

NRG
Puente Power Project
October 2016 Oxnard, California

FIGURE 104-2



Source: VCWPD Design Hydrology Manual, 2010.

RUNOFF COEFFICIENTS FOR SOILS IN THE EDISON CANAL WATERSHED

NRG
Puente Power Project
October 2016 Oxnard, California

FIGURE 104-3