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# Project 4: Shift Wastewater Treatment of Canyon Flows to U.S. (via Expanded ITP or SBWRP) to Reduce Flows to SAB Creek

## Addendum to the Feasibility Analysis

### USMCA Mitigation of Contaminated Transboundary Flows Project

Prepared for:



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## 1. INTRODUCTION

Under the modified EPA Contract No. 68HERH19D0033, Task Order No. 53, PG Environmental has prepared this addendum to the feasibility analysis for Project 4 to review the design of sub-project 1 to ensure the proposed network of pipes is able to convey the expected ranges of flows from the El Matadero, Los Laureles 1, and Los Laureles 2 pump stations while allowing the pumps to be decommissioned. PG also updated the impacts that the Project 4 conveyance line would have on discharges to San Antonio de los Buenos (SAB) Creek to reflect new information on untreated wastewater flows in the Tijuana River and sources of influent to the South Bay International Wastewater Treatment Plant (ITP).

## 2. DESIGN FEATURES

The design PG outlined in the Project 4 feasibility analysis consists of five sections of pipe, described in Section 2.1.1 of the feasibility analysis. As part of the alternatives analysis process, PG altered the route of Section 5 of the pipe to flow around the north side of the ITP to allow for easier and cheaper construction. The updated network of pipes is shown in Figure 2-1 on the next page.

PG updated the starting and ending elevations of Section 5 to reflect the elevation of the headworks for the ITP. PG made this update because treating the canyon flows at the South Bay Water Reclamation Plant (SBWRP) is no longer feasible, and because the International Boundary and Water Commission (IBWC) has provided new elevation information. PG determined the surface elevation of the ITP and the starting and ending points of each section of pipe using LiDAR data.

The updated characteristics for each section of the conveyance network are shown in Table 2-1 below.

**Table 2-1. Updated Conveyance Line Features for Sub-Project 1**

Pipe Reach	Pipe Size/Type	Pipe Length (Feet)	Starting Pipe Invert Elevation (Feet)	Final Pipe Invert Elevation (Feet)	Estimated Range of Flow Rates (MGD)
1	15-inch, HDPE	2,000	256	226	0.6–2.7
2	15-inch, HDPE	1,700	226	175	0.6–2.7
3	18-inch, HDPE	3,500	175	115	3.6–10.7
4	15-inch, HDPE	4,000	135	115	0.6–2.0
5	24-inch, PVC	14,900	115	55	4.2–12.7

PG determined that Section 5 of the new conveyance line would operate under force main conditions due the pipe flowing uphill from Smuggler’s Gulch to the headworks of the ITP. The pressure gradient in Section 5 would be generated from the change in the pipe invert elevation from the beginning of Section 5 to Monument Road in Smuggler’s Gulch. PG used the Bernoulli equation to determine whether this pressure would be sufficient to overcome the frictional losses in the pipe during peak flow conditions. PG used the combined capacity of the three pump stations (12.7 MGD) as the anticipated peak flow rate. PG estimated the frictional losses from the pipe using the Darcy-Weisbach equation. The frictional losses were multiplied by 1.1 to account for additional losses from pipe fittings. PG determined that the 60 feet of head generated from the elevation change would be sufficient to overcome the 57 feet of head loss due to friction. Since enough head is generated in Section 5 to convey the flows to the ITP, Sections 3 and 4 would now operate as gravity lines.

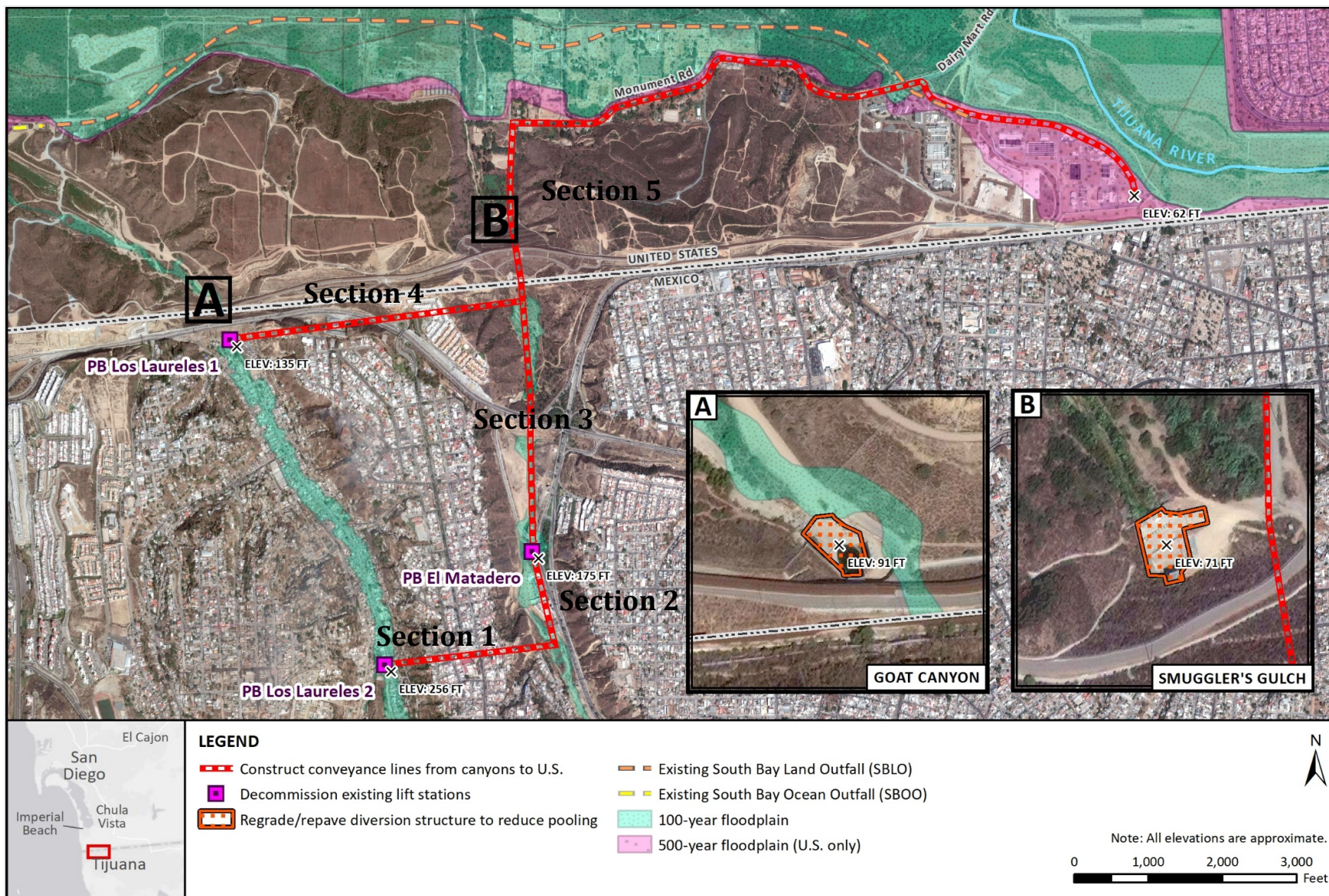


Figure 2-1. Updated Overview of the Project 4 Conveyance System

PG adjusted the characteristics of Section 3 to reflect that it would flow by gravity rather than force by changing the pipe used from 21-inch PVC to 18-inch HDPE. PG verified that the pipe in Sections 1–4 would be able to convey flows by gravity using Manning’s equation. PG evaluated the flow characteristics for each section at both ends of the expected range of flow rates shown in Table 2-2. PG assumed that plastic pipe has a Manning’s roughness coefficient of 0.11.

**Table 2-2: Manning's Equation Values for Gravity Pipe Sections**

Pipe Reach	Pipe Diameter (Inches)	Slope (Rise/Run)	Percent Full at Low Flow (%)	Low Flow Linear Fluid Velocity (Feet/Second)	Percent Full at Peak Flow (%)	Peak Flow Linear Fluid Velocity (Feet/Second)
1	15	0.015	16	4.9	46	7.4
2	15	0.030	12	6.2	36	9.6
3	18	0.021	26	8.9	80	11.7
4	15	0.005	23	3.3	55	4.5

### 3. UPDATED IMPACTS

PG updated the impacts of Project 4 to reflect new information on untreated wastewater in the diverted river water, as well as conversations with representatives from Veolia about other sources of flow that is currently being treated at the ITP. The updated water quality information that PG used to evaluate the impacts of Project 4 is described in the *Background Conditions Document*. Appendix B in the alternatives analysis describes the flow and mass balances that PG used to estimate the impacts of Project 4. The updated impacts are shown in Table 3-1.

**Table 3-1. Updated Impacts of Project 4 on Discharges to the Pacific Ocean via SAB Creek**

Parameter	Current Conditions	Canyon Flows Are Redirected to the U.S. for Treatment
Total annual flow (million gallons)	13,100	10,700
<i>Percent change</i>	N/A	-18%
Annual BOD <sub>5</sub> load (tons)	17,200	13,300
<i>Percent change</i>	N/A	-23%
TSS load (tons)	17,900	14,000
<i>Percent change</i>	N/A	-22%

As shown in Table 3-1, implementing Project 4 reduces the total flow discharges to the Pacific Ocean via SAB Creek by 18% and the total annual BOD<sub>5</sub> load by about 23%. PG estimates that the project would reduce the untreated wastewater discharges to SAB Creek from an average flow rate of 28 MGD to an average flow rate of 22 MGD. Scripps Institute of Oceanography estimated that reducing untreated wastewater discharges from SAB Creek to an average of 10 MGD and eliminating transboundary flows below 35 MGD would reduce the frequency of beach impacts predicted to result in beach closures at Imperial Beach from an average of 14% of the time to 7% time. The Scripps report also estimated that reducing the untreated wastewater discharges from SAB Creek to an average of 10 MGD would reduce regional impacts predicted to result in beach closures during the dry tourist season (May 22 through September 8) from an average of 24% of the time to an average of 9% of the time (Feddersen et al. 2020). Although Project 4 alone does not reduce untreated wastewater discharges at SAB Creek to less than 10 MGD, the results from the Scripps report indicate that the reduction in untreated wastewater discharges to SAB Creek caused by the implementation of Project 4 is likely to have a positive impact on the water quality at the

beaches and Naval facilities in San Diego County, including the Navy SEALs training facility in Coronado, California. Additionally, Project 4 combined with other improvements could bring the average untreated wastewater discharges below 10 MGD.

#### **4. CONCLUSION**

PG verified the calculations of both the gravity mains and the force mains in the conveyance system to ensure that the system would be able to operate under current and peak conditions. PG made minor refinements to the Project 4 design to optimize the conveyance system to convey flows to the wet well of the ITP, whereas the design proposed in the original memo conveys flows to the ITP or SBWRP. The design refinements are not anticipated to significantly impact the feasibility or cost of constructing and operating the new conveyance network. The impacts were updated to reflect new information on the flow rate of wastewater that is entering the river, as well as new information on other sources of flows that are entering the ITP.