SUMMARY OF DRAFT SCOPE OF WORK FOR
TIJUANA RIVER DIVERSIONS-
DIAGNOSTIC AND ALTERNATIVES DEVELOPMENT
December 10, 2017

The Tijuana River flows from Mexico into the United States and discharges to the Pacific Ocean through the Tijuana River Estuary. The flow of the river, at any given time, may be composed of storm water, effluent from wastewater treatment plants located in Mexico, "fugitive" untreated wastewater flows, and other unidentified sources. Some of these flow components may impair the water quality of the river. River flows reaching the Pacific Ocean in the U.S. may lead to beach closures in San Diego County. In addition to water contaminants, the river may carry trash and debris, which in addition to creating an environmental problem, may impact the operation of critical infrastructure.

There is an agreement between the United States and Mexico to divert water from the Tijuana River in Mexico prior to crossing the border to the United States. Intercepted flows are conveyed to the Pacific Ocean in Mexico, approximately 5 miles south of the border. Flows above 1,000 l/s cross into the United States and, depending on their magnitude, may or may not reach the ocean.

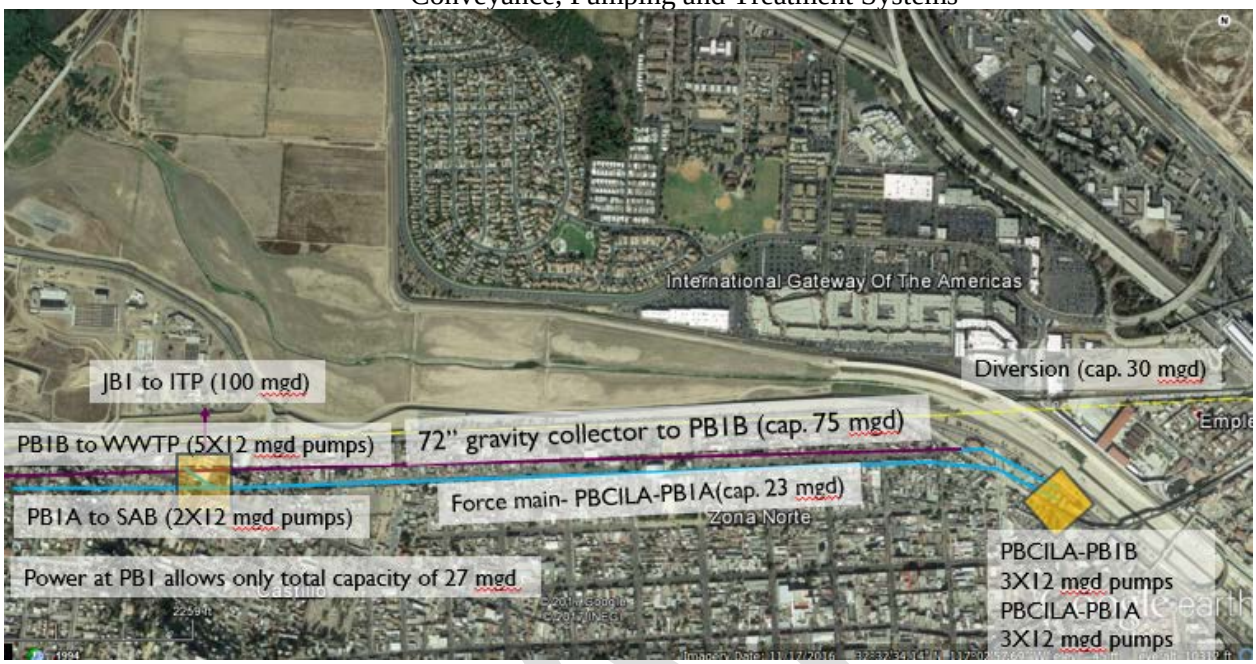
Dry-weather flows are intercepted in Mexico as intended most of the time. However, during certain conditions, such as failures in Tijuana's collection system or the river diversion infrastructure, river flows may reach the U.S. During wet conditions, on the other hand, river water reaches the U.S. frequently.

Previously, all dry-weather river flows were pumped via the CILA Pump Station (PBCILA), located near the border, to the International Collector (gravity line)[1] and conveyed to either the South Bay International Wastewater Treatment Plant (SBIWTP), located in the US, which discharges effluent through an ocean outfall; and/or sent to a second pump station located in Mexico ("PB1") and then on to the wastewater treatment plant at San Antonio de Los Buenos (SAB WWTP), also located in Mexico approximately 5 miles south of the border. Flows from PB1 to SAB WWTP were conveyed via one of two 10-mile pipelines ("parallel lines") over a 100-meter grade. River flows reaching the SAB WWTP would either enter the treatment plant, along with collected wastewater, or bypass the treatment plant and be discharged directly to the ocean.

More recently, to better manage flows to SBIWTP and SAB WWTP, a force main was constructed to also carry the diverted river flows from PBCILA to a new pump station (the PB1A), adjacent to the existing PB1 (which was renamed to PB1B), from where flows are sent directly to the ocean in Mexico, via the rehabilitated "parallel line", bypassing the SAB WWTP. Figure 1 shows the general location of conveyance, pumping and treatment infrastructure as described above.

[1] The International Collector (gravity line) receives untreated wastewater flows for treatment at either the SBIWTP or SAB WWTP from three main wastewater collectors in Tijuana - Sanchez Taboada, Techite and Poniente collectors.

Figure 1. Border Region Infrastructure – Wastewater and Tijuana River flows
Conveyance, Pumping and Treatment Systems



As mentioned above, flows are intended to be maintained south of the border during "dry-weather," but typically cross into the U.S. during "wet-weather." The following describes flows under these two scenarios.

1. Dry-weather: Flows averaging around 14 million gallons per day (mgd) (613 l/s), 80-90% of which are treated wastewater discharges from upstream wastewater treatment facilities with the remaining flows assumed to be uncontrolled raw sewage flows and/or "urban drool," are diverted in Tijuana before crossing the border. Flow rates south of the border have been increasing due to urban growth.
2. Wet-weather: Rainfall normally occurs in Tijuana between October and April, but rain events between April and October have been more common in recent years. After almost any size rain event, the flows in the river exceed 23 mgd (1000 l/s) and the Comision Estatal de Servicios Publicos de Tijuana (CESPT) shuts down PBCILA in order to protect the equipment from operational damage due to grit and other factors. Under these circumstances, the flows from the Tijuana River channel cross into the U.S. through the Tijuana River Estuary and empty to the ocean just south of Imperial Beach. These flows can measure well over a billion gallons per day (43 m^3/s). Depending on the size and frequency of rainfall, the time required for the flows in the river to decrease to below 23 mgd (1,000 l/s), when PBCILA can be restarted and flows are once again diverted in Mexico, can range from a few days to months.

Figure 2 shows the number of days of transboundary flows in the Tijuana River during both wet- and dry-weather. According to the operational protocol of PBCILA, days of flows under 1000 l/s (23 mgd), the yellow portion of the bar, reaching the U.S. should be almost non-existent.

Figure 2. Number of Days of Transboundary River Flows and Days of Dry-Weather Flows

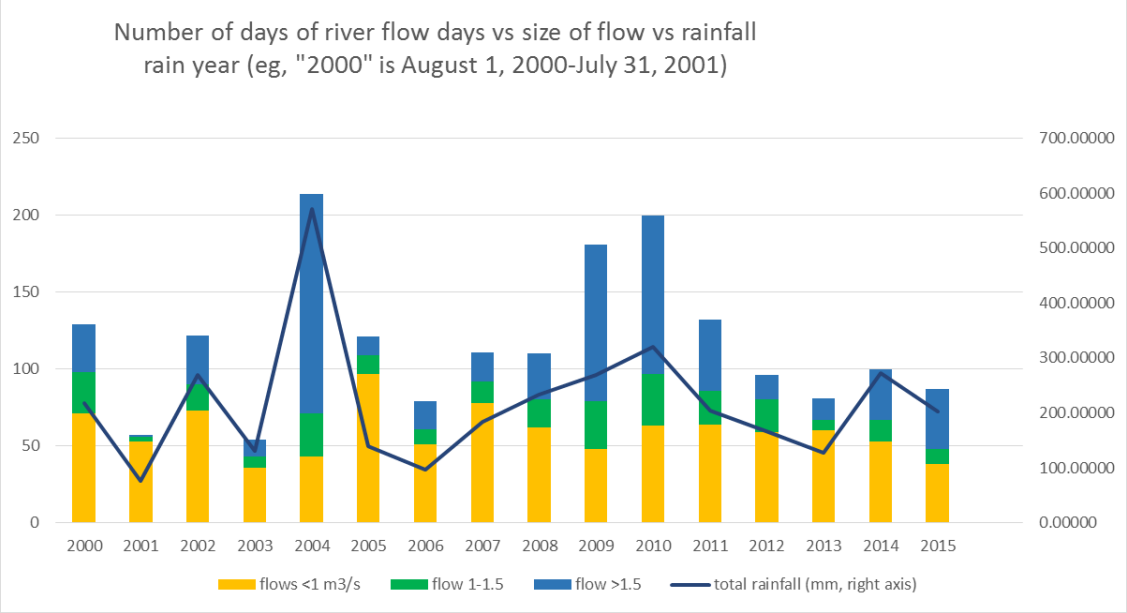
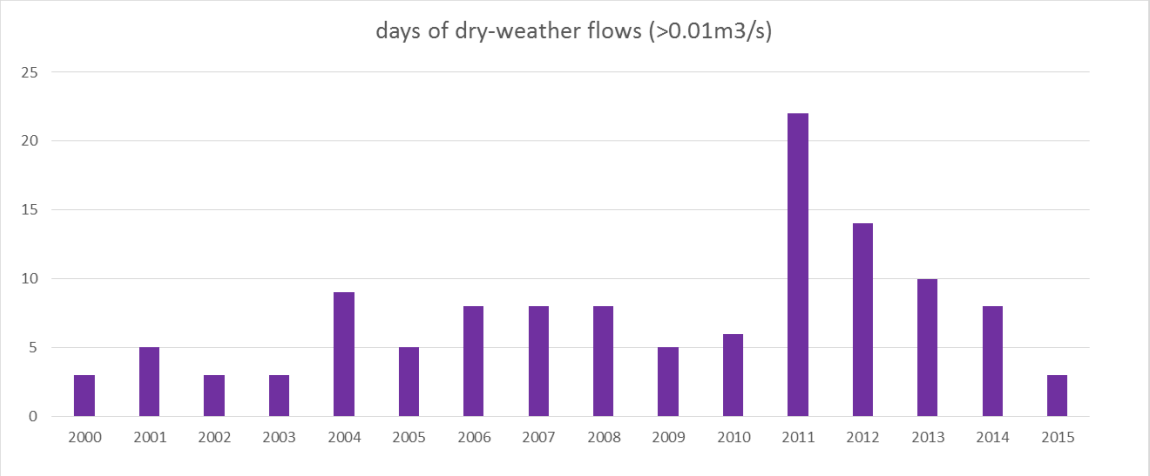


Figure 3 shows the number of days of dry-weather transboundary flows, which are typically the result of power outages at the pump stations, trash blocking the intake, or other operational problems.

Figure 3. Number of days of dry-weather flows in the Tijuana River reaching the U.S.

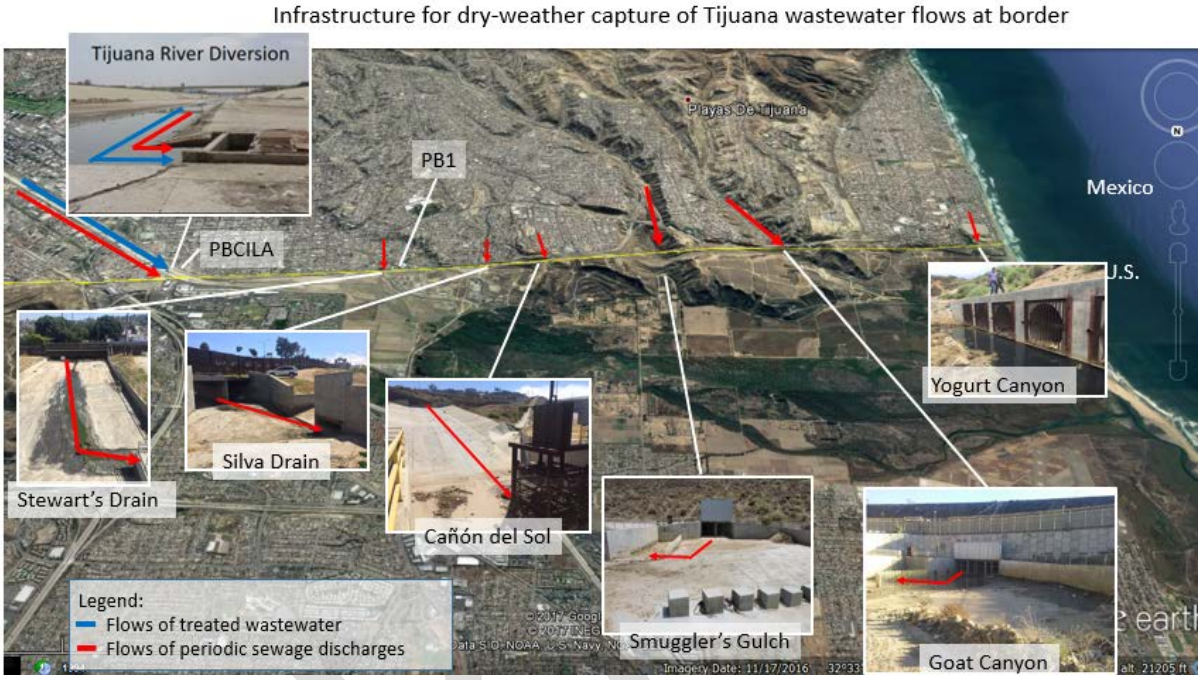


In addition to flows in the river, transboundary flows from other canyons in the western portion of the watershed drain directly into the U.S. While most of the wastewater south of the border is collected and treated during dry-weather, some uncollected sewage as well as urban runoff does occasionally make it across the border. In such a case, these flows are typically diverted via the canyon collectors in the US (except for Yogurt Canyon, which does not have a canyon collector) for treatment at the SBIWTP. Even though these dry-weather flows are typically collected and treated at the SBIWTP, U.S. Customs and

Border Protection personnel have expressed concerns to U.S. Environment Protection Agency (EPA) that the flows present a health risk to their personnel. Except for "Stewart's Drain," ("Dren Puerta Blanca" in Mexico), which is directly south and across the border from Pump Station 1," this diagnostic is not currently intended to address flows through the collectors.

Figure 4. shows the general location of the canyon collectors.

Figure 4. US-side Canyon Collectors



Scope of Work:

Task 1. Review of Existing Documents and Transboundary Flow Analysis

During the last several years, several studies have been conducted to address sanitations issues in Tijuana. One objective of this task is to compile existing studies to understand problems and potential solutions identified in the past. These studies or available data shall include but not be limited to: Tijuana River flow data (source: USIBWC), spill reports (IBWC), river inspections (IBWC), pumping data (CESPT), facility designs (CESPT, US-MX IBWC), hydrology study Phase 1 (City of San Diego/US Army Corps of Engineers), 2016 transboundary flow analysis (EPA), flood mapping (UC Irvine: bit.ly/floodrise_TRV), Potable Water and Wastewater Master Plan, 2002, CDM (BECC), Wastewater Reclamation Feasibility Study for Urban Area of Tijuana, 2007 (BECC), Summary of Tijuana River Recovery Project: Hydrologic Study Development, 2010, URS (EPA), Identificacion de Alternativas de Tratamiento y Disposicion Final de Las Aguas Residuales de Tijuana, Caloca, 2015 (BECC), and the Plan Integral de Saneamiento y Reúso del Agua en Tijuana y Playas de Rosarito, B. C. (August 2017). Additional sources may be identified through interviews with key stakeholders, participation in regional technical groups, and/or through the consultant's own knowledge or research.

In addition, the consultant shall gather existing data on river flows, flows captured at the border and along different points of the transmission system, water quality data, beach closure reports, rainfall events, etc. Based on the review of available data, a Transboundary Flow Analysis shall be presented to describe findings and trends, answering the following questions:

1. In the last 5 years, how often (days/year) have peak flows in the river at the Border (Tijuana River International Boundary flow gauge) measured < 1,000 l/s or exceeded 1,000 l/s, 1300 l/s, 1,500 l/s, 2,000 l/s, and 3,000 l/s? What is the frequency distribution of different flow magnitudes? Include any correlation identified between volume and registered storm events for the same period.
2. How often (days/year) have flow events under 1,000 l/s resulted in transboundary flow due to failure or non-operation of the diversion infrastructure?
3. How many days of transboundary Tijuana river flows would have hypothetically occurred if:
    a. The existing infrastructure had no failures
    b. If the existing infrastructure were operated at the full capacity of 1,300 l/s
    c. If the existing infrastructure were expanded to 1,500 l/s
    d. If the existing infrastructure were expanded to 2,000 l/s
    e. If the existing infrastructure were expanded to 3,000 l/s
4. What is the frequency and source of dry-weather flows in Stewart's Drain?

Task 2. Infrastructure and Operations Diagnostic

The purpose of this task is to determine the "nominal" or theoretical capacity of the different components of the diversion system; as well as the physical condition of such components and their ability to operate at their nominal levels. The consultant shall conduct a diagnostic of both operational practices as well as the condition of conveyance, pump station and wastewater treatment infrastructure, such as the age, basic components, capacity, physical conditions, operational challenges, and estimated annual operations and maintenance costs. The consultant shall also identify the types of infrastructure failures or causes for such failures that result in transboundary flows from the Tijuana River and though Stewart's Drain. Additionally, the consultant shall provide a description of remaining unserved areas along with the

potential impacts to existing infrastructure that may result from extending service.

The infrastructure to be considered includes but is not limited to: SBIWTP, South Bay Ocean Outfall, Primary Effluent Return Connection (PERC),[2] PBCILA, PBCILA intake, PB1A, PB1B, International Collector (gravity line), PBCILA force main, SAB WWTP, and parallel ocean outfall system in Mexico.

Task 3. Alternatives Analysis

Based on the data analysis and infrastructure diagnostic, the consultant will propose technically-feasible alternatives to address: 1) dry-weather transboundary river flows per existing agreements between Mexico and the US; 2) the expansion of existing infrastructure and/or construction of complementary infrastructure in either Mexico or the US to increase river diversion capacity, and; 3) options to optimize operations of existing facilities during and after a rain event to reduce duration of transboundary river flows from a storm event.

All alternatives should include capital costs, O&M costs, and indicate the number of days per year and the total volume of uncontrolled transboundary river flows (or flows downstream of capture devices in the U.S.) and through Stewart's Drain that such alternative would have prevented over the last 5 years. A qualitative discussion should also be included as to how the number of days and water quality may change over time as Tijuana's population continues to grow, with resulting higher effluent discharges upstream and increase impervious surface.

Some of the options, particularly those concerning capturing flows in the US for discharge in the US, would require engagement with regulators and the owner of the corresponding facilities. The study should describe applicable regulations, identify regulatory requirements (e.g., types of permits and environmental reviews) and any other legal considerations for each alternative.

An indicative list of alternatives is presented below. Based on initial results, the consultant may propose modifications to this list. Furthermore, the consultant shall propose a decision-making matrix with the primary objective of determining the alternative, which will achieve effective system operations in consideration of a positive cost-benefit result for the proposed investment. The alternatives shall include:

1. No Action

The consultant shall perform an analysis considering that the existing infrastructure continues operating as-is, with no significant physical improvements or modifications to the operations protocols. The consultant shall estimate how many days of transboundary flows in the Tijuana River could be expected to occur in a 20-year planning period, particularly in view of increasing flows in the river as a result of an expanding population in Tijuana and an anticipated increase in wastewater effluent discharges upstream. Include a discussion on impacts to the no action alternative based on an increasing frequency, duration or strength of storm events.

2. Optimization of existing facilities

Under this alternative, the consultant shall evaluate options to optimize operation and/or make minor physical improvements to existing facilities to increase the effectiveness to capture dry-weather flows and post-storm flows in the Tijuana River and in Stewart's Drain. The following shall be considered:

a. For dry-weather river flows: Relatively minor physical improvements and/or operational

[2] PERC is not currently in operating condition.

modifications to improve efficiency, optimize O&M cost, and reduce the number of dry-weather flow events for 1,000 l/s up to 1,300 l/s. Note: The actual flow limit of the intake structure at PBCILA is 1,300 l/s (30 mgd)

b. Post-Storm Operations: Operational changes or modifications to improve efficiency and optimize O&M in order to rapidly bring PBCILA back on line after storm impacted flow levels are at or below capacity of PBCILA (1000 l/s), as agreed by CESPT/CILA. This would include silt removal, wet well cleaning, etc., necessary to protect equipment.

c. During Storm Event: Operational changes or modifications to allow for the use of PBCILA at 1,000 l/s when river flows reach up to 2,000 l/s without capacity increase and considering impacts of higher levels of sediment, sand and grit. Note: This option does not eliminate all flows from crossing into the US but is expected to reduce those flows.

3. **Increase in capacity to capture Tijuana River flows in Mexico**

The consultant shall evaluate options to increase capture capacity on the Mexican side to handle dry-weather flows and some level of wet-weather flows in the Tijuana river and in Stewart's Drain, as determined by the Transboundary Flow Analysis performed in Task 1. Options may include operational modifications as well as new construction.

a. Modifications to existing facilities and construction of new diversion and conveyance infrastructure in Mexico to increase capacity to manage two possible flow volumes, as determined from the 30% progress review meeting with stakeholders. Concepts to be considered include:
    i. Expansion or modifications to the intake structure at the river and/or expansion of pump capacity at PBCILA.
    ii. Expansion of the force main from PBCILA to PB1 and/or construction of an additional force main.
    iii. Expansion of the PB1A/PB1B, including emergency power supply.
    iv. Evaluar los posibles impactos que estos flujos adicionales tendrían en el sistema de colección, bombeo, alejamiento y tratamiento de la ciudad de Tijuana, incluyendo la PTAR-SAB o en la infraestructura proyectada a futuro por el Organismo Operador CESPT (Gobierno del Estado de Baja California) y la CONAGUA (Gobierno federal).

b. Additional diversion or reduction of upstream river flows
    i. Installation of a new diversion point at another location upstream of the border and construction of related conveyance and/or pumping infrastructure.
    ii. Alternatives that reduce the volume of flows reaching the river, such as reusing and/or infiltrating effluent from the wastewater treatment plants located upstream. Provide a summary of existing studies, including costs and potential volumes of flows diverted from the Tijuana River. Note: This option shall be based on existing studies for reuse and infiltration and potential flow estimates utilized to discuss the potential reduction of downstream flows. The consultant may also consider the prognostic of flows without application of these types of strategies.

4. **New capacity to capture transboundary flows in the US**

The consultant shall evaluate options to increase capture capacity on the US side to handle dry-weather flows and some level of wet-weather flows, as determined optimal by the Transboundary Flow Analysis performed in Task 1. Options may include operational modifications as well as new construction. These options would take advantage of existing infrastructure in the US that may have additional capacity, subject to regulatory approval.

a. Construction of new infrastructure to convey transboundary flows for disposal at the South Bay Ocean Outfall (SBOO). Note: Although not currently included in the permit, a high flow by-pass provision at the SBIWTP may be available for temporary conditions related to managing these flows. The consultant shall describe the anticipated duration of discharges, any structural impacts to the SBOO and the expected effluent quality of discharges occurring from the by-passed flows. The capacity of the SBOO and should also be taken into consideration. Anticipated compliance with regulatory requirements should be identified, but should not be used to eliminate alternatives from analysis. For this alternative, consultant shall evaluate the alternatives of 1) no treatment, 2) treatment to primary levels, and 3) treatment to secondary levels.
b. Construction of new infrastructure to convey transboundary flows to the Point Loma Treatment Plant through the existing Emergency Connection for disposal in accordance with discharge permit requirements. Any potential capacity modifications at Point Loma shall be estimated. Anticipated impacts on the discharge from Point Loma should be estimated and potential compliance problems identified.
c. Construction of new or use of existing infrastructure (PERC) in the U.S. to capture flows and convey them back to Tijuana for discharge at coast (Punta Bandera) without additional treatment. Note: The consultant shall consider improvements required to conveyance infrastructure, such as PB1A, which are necessary to address these additional flows.

The consultant shall consider sediment and trash structures that may be necessary to meet regulatory requirements and avoid damage to equipment. The consultant shall identify any factors that should be considered in the alternative analysis as related to the compatibility of proposed structures with any new border security infrastructure being considered by the U.S. Department of Homeland Security as well as the impact that any new U.S.-side infrastructure could have on Customs and Border Protection activities.

5. **Combination of any of the above Alternatives**

The consultant shall evaluate options to combine any of the previously evaluated alternatives to determine the optimal results from operational optimization and capital investment. For example, use of the SBOO along with infrastructure improvements in Mexico could sufficiently address transboundary flows.

Project Management and Stakeholder Coordination

The consultant shall expect to:

- Participate in a “kick-off” meeting.
- Interview key stakeholders of both countries, including but not limited to EPA, IBWC U.S. and Mexican Section, CESPT, CalEPA, California Regional Water Quality Control Board, City of Tijuana, City of Imperial Beach, City and County of San Diego, US Customs and Border Patrol, and U.S. Department of Homeland Security (to ensure that any U.S.-side infrastructure does not interfere with planned border security infrastructure).

- Conduct site visits, as necessary.
- Coordinate a binational stakeholder meeting to present the results of Task 1 and Task 2 along with initial findings based on data collection, identified alternatives, and proposed decision-making criteria and methodology to filter available alternatives for further analysis, at or around 30% progress of the scope of work, to receive feedback from the stakeholders and incorporate that input into completing the required tasks.
- Coordinate a binational stakeholder meeting to present initial results of applying the decision-making criteria including an explanation related to any alternatives that will be eliminated for further analysis, at or around 50-60% progress of the scope of work. Based on feedback from the stakeholders, select a number of alternatives with the most apparent feasibility to be included in the more in-depth evaluation.
- Prepare a draft report which will include a brief description of each alternative eliminated and reason for elimination. For selected alternatives with a full analysis, the report shall include conceptual designs, cost estimates for construction and O&M, and the consultant's evaluation of feasibility and effectiveness based on the Transboundary Flow Analysis. The consultant shall coordinate a stakeholder meeting to present the document and receive comments.
- Prepare a final report in both English and Spanish and PowerPoint presentation file. Provide a final presentation.

Project milestone meetings, as described above, will be held in San Diego, California or in Tijuana, Baja California, shall be accessible for off-site participation, and should include simultaneous translation services.