

# Tijuana River Diversion Study



# Objective and Scope Work

Identify operational improvements and/or infrastructure investments, in Mexico and/or the U.S., to reduce transboundary flows in the Tijuana River



1. Transboundary Flow Analysis
2. Infrastructure and Operations Diagnostic
3. Alternatives Analysis

# 1. Transboundary flow analysis

- Historical analysis of flows (2009-2016) to understand trends and assess impact of evaluated alternatives on transboundary river flows

<b>System Diversion Capacity</b>	<b>Average Number of Transboundary Flow Days/Year</b>
< 1000 lps (23 mgd)*	138
≤ 1,300 lps (29 mgd)	65
≤ 1,500 lps (34 mgd)	56
≤ 2,000 lps (45 mgd)	39
≤ 3,000 lps (68 mgd)	24

\* Operations based on existing protocol



- Existing diversion operational capacity of 1,000 lps is expected to result in 138 days per year of transboundary flows
- Increasing diversion capacity could significantly reduce expected days of flow
- However, it is impractical to completely eliminate flows during large rain events

# 1. Transboundary flow analysis

## Key findings

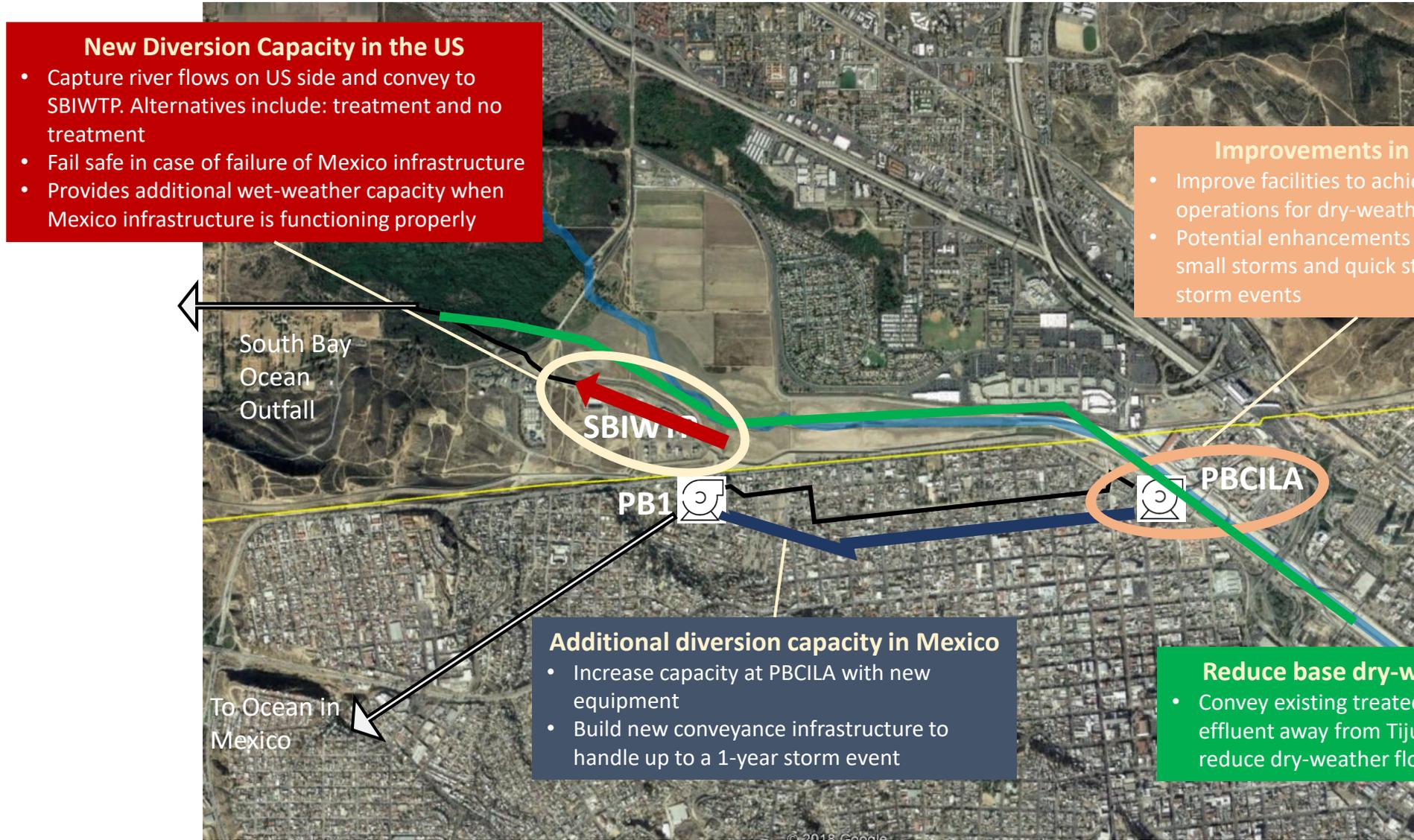
- Study identifies options to prevent and/or better manage the small, short-term flows that result at the tail end of storms; when the diversion system is preparing to restart; or when there is a breakdown in equipment.
- Beach closures are not simply a function of the number of days of transboundary flow, but of the size of the flows
  - Flows < 3mgd (100 lps) approximately **34 days** per year (some may not reach ocean)
  - No feasible options identified that could prevent all large stormwater flows from crossing the border
- Average of **20 days** per year of transboundary flows are the result of diversion system failures
  - Temporary soil berms built by IBWC to contain flows in Mexico have been effective in reducing small, short-term dry-weather flows caused by interruptions to diversion system
- Dry-weather flows in the river approaching the capacity of the diversion system
  - Portion of dry-weather flows consists of treated wastewater effluent from 3 WWTPs
  - This issues could worsen as Tijuana grows
- Upstream recycling of treated wastewater would effectively increase capacity of the diversion system by reducing base dry-weather flows in the river

## 2. Infrastructure and Operations Diagnostic

### Key findings

- The assessment consisted of the on-site evaluation of four main facilities, including pumps stations and wastewater treatment plants, and eight secondary components of the diversion system
  - Structural, mechanical and electrical components
- Operation of the diversion infrastructure in Mexico has had frequent interruptions due to blockages, power outages, mechanical failures, and high trash and sediment volumes, particularly
- Underlying these issues is:
  - Limited operations and maintenance personnel
  - Limited budget
  - Aging infrastructure
- Mexico is taking steps to improve its wastewater infrastructure
  - Improving vulnerable infrastructure: Colector Poniente, International Interceptor, Colector Oriente
  - Conducting urgent improvements to PBCILA
  - Development activities to improve Punta Bandera

# 3. Evaluation of alternatives



**New Diversion Capacity in the US**

- Capture river flows on US side and convey to SBIWTP. Alternatives include: treatment and no treatment
- Fail safe in case of failure of Mexico infrastructure
- Provides additional wet-weather capacity when Mexico infrastructure is functioning properly

**Improvements in Mexico**

- Improve facilities to achieve reliable operations for dry-weather flows
- Potential enhancements to handle some small storms and quick start-up after storm events

**Additional diversion capacity in Mexico**

- Increase capacity at PBCILA with new equipment
- Build new conveyance infrastructure to handle up to a 1-year storm event

**Reduce base dry-weather flows**

- Convey existing treated wastewater effluent away from Tijuana River to reduce dry-weather flows

# 3. Evaluation of alternatives

## Highest-ranking alternatives in Mexico

	Alternative	Targeted diversion flow capacity	Capital cost	O&M cost	Average trans-boundary flow days/yr
No action	Continued operation of Mexican facilities without major improvements	1,000 lps (23 mgd)	\$0	\$2.7M/yr	138
1	<b>Optimize Existing Facilities:</b> Diversion of all Tijuana River flows up to 1,000 lps, no diversion when flow exceeds 1,000 lps	1,000 lps (23 mgd)	\$16 M	\$4.35 M/yr	90
2	<b>Optimize Existing Facilities with Improvements:</b> Allow diversions up to 1,300 lps and improve reliability	1,300 lps (29 mgd)	\$23.5 M	\$4.95 M/yr	69
3	<b>Diversion Capacity Expansion:</b> Diversion system expansion in Mexico	2,600 lps (60 mgd)	\$108 M	\$6.59 M/yr	30

# 3. Evaluation of alternatives

## Highest ranking alternatives in U.S.

	Alternative	Targeted diversion flow capacity	Capital cost	O&M cost	Average trans-boundary flow days/yr
No action	Continued operation of Mexican facilities without major improvements	1,000 lps (23 mgd)	\$0	\$2.7M/yr	138
1	New lift station in US to discharge directly to SBOO without treatment.	1,500 lps (35 mgd)	\$27.5 M	\$5.0 M/yr	58
2	New lift station in US to discharge at SBIWTP for primary treatment only OPTION: Discharge at South Bay Reclamation Plant	1,500 lps (35 mgd)	\$48 M	\$7.0 M/yr	
3	Single inflatable dam or permanent weir on US-side of Tijuana River OPTION: To be located in Mexico	< 100 lps (2.3 mgd) (estimated - not modeled)	\$8 M	\$3.5 M/yr	122

# Other critical investments

## Critical investments outside river diversion system

	Name	Estimated Cost
Prioritized PDAP/BEIF Applications	Rehabilitation of International Collector	\$16.25 M
	Rehabilitation of Poniente 1A Collector	\$6.2 M
	Rehabilitation of Wastewater Oriente Collector	\$1.4 M
Other Potential Investments	Stewart's Drain In-take, Capture, and Conveyance to SBIWTP Infrastructure	\$1.4 M
	San Antonio de los Buenos WWTP	\$40 M
	Reclaimed Water to Valle de Guadalupe	Private

# 3. Evaluation of alternatives

## Conclusions

- Improving O&M on the existing system would reduce transboundary flows by approximately 30% (from ~138 to 95 days/year)
  - Developing and implementing best management practices, hiring sufficient personnel and adequate budgeting would improve reliability
- Mexican-side alternatives are typically more cost-effective
- Mexican-side alternatives would likely be easier to implement from a regulatory point of view
- U.S. options would allow U.S. agencies control over operations and maintenance
- Continued investment in infrastructure outside the diversion system is necessary
  - Replace aging infrastructure
  - Investigate and address fugitive flows to the river or other low elevation areas.
  - Promote adequate operation and maintenance budget and practices.
- ◆ Storm water and waste management are integral components for addressing transboundary flows. Neither of these items is the responsibility of CESPT nor will they be improved by the infrastructure investment options identified in this study

# Backup slides

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# Tijuana River Diversion Infrastructure Study

## Conclusions – Top Investment Options

2a

Optimize existing facilities: Modifications for Dry-Weather flow diversion

- **PBCILA Intake:** resize and reconfigure intake system and sedimentation channel, replace racks. Add flow meters
- **PBCILA:** add 4 new pumps/motors, replace piping and valves for each system, replace electrical conduits replacement, replace panel and controls.
- **PB1A & PB1B:** demolish/rebuilt concrete channels, demolish/rebuild buildings, add 2 new pumps/motors trains in each, replace piping and valves for PB1A, replace electrical conduits, panel and controls in each. Add flow meters
- Add SCADA, flow meters, and replace Hoists systems

**Diversion Target:**  
**1,000 lps**

**Avg. days TB flows:**  
**90 days/yr**

**Capital Cost:**  
**\$16M USD**

**O&M Cost:**  
**\$4.3M USD**



### Comments

- Improves capacity for full system operations
- Built-up sludge and sediment will be removed from wet wells and influent channels, restoring needed capacity.

- Improved operational flexibility.
- Increases reliable operations for diversion of all dry-weather transboundary wastewater flows.
- No U.S. control over operations

# Tijuana River Diversion Infrastructure Study

## Conclusions – Top Investment Options

2b

Optimize existing facilities: Modification of intake and operational protocols for Continuous Operations - Improved Reliability

- All improvements from Alternative 2a
- PBCILA Intake: additional sedimentation traps with influent channel re-design
- PBCILA LS: additional bar screens for coarse and fine sediments, emergency generator for a 3 day run period
- PB1A & PB1B: additional bar screens for coarse and fine sediments, automatic trash, debris conveyor belt system, new emergency generator for each PS for a 3 day run period

Diversion Target:  
**1,300 lps**

Avg. days TB flows:  
**69 days/yr**

Capital Cost:  
**\$23.5M USD**

O&M Cost:  
**\$4.95M USD**



### Comments

- Increase the reliability of the diversion system.
- Similar benefits/costs as 2a with NEW capability to continue operations during small storm events and quick start-up of equipment post-storm

- In-take improvements for sediment and debris removal protect upstream equipment and reduce manual labor .
- New generators mitigate interruptions in electricity service.
- Requires Mexico to agree to accept more flows.

# Tijuana River Diversion Infrastructure Study

## Conclusions – Top Investment Options

3a

Capacity increase: New diversion and conveyance infrastructure in Mexico

- All improvements from Alternative 2b
- PBCILA Intake: expansion to 60 MGD (2,600 lps)
- PBCILA lift station: expansion with additional 30 MGD
- PBCILA to PB1A: force main expansion
- PB1A and PB1B PS: add 15 MGD (660 lps) capacity and larger emergency generator –requires additional CFE capacity for additional pumps
- Pipeline addition to Parallel Line system to tie into SAB WWTP

**Diversion Target:**  
**2,600 lps**

**Avg. days TB flows:**  
**30 days/yr**

**Capital Cost:**  
**\$108M USD**

**O&M Cost:**  
**\$6.59M USD**



### Comments

- Same benefits/costs as 2b with added capacity to divert flows during storm events, up to 2,600 lps.
- Financial feasibility concern with high capital & O&M costs.

- Provides additional flexibility in operation.
- Additional capacity is only required during storm events (approximately 50-100 days average per year), resulting in excess capacity and challenges O&M.

# Tijuana River Diversion Infrastructure Study

## Conclusions – Top Investment Options

**4a**

New Lift Station to discharge to SBOO without Treatment

- Concrete river intake box
- 35 MGD (1,500 lps) Lift station
- 5,100 linear feet (1,555 meters) new ductile iron pipelines, (36 and 42 inch diameter)
- Tie in to SBOO

Diversion Target:  
**1,500 lps**

Avg. days TB flows:  
**58 days/yr**

Capital Cost:  
**\$27.5M USD**

O&M Cost:  
**\$5M USD**



### Comments

- Establishes a redundant diversion capacity.
- Critical when operations fail in Mexico and/or for small storm events, upto 1,500 lps.
- Typical lift station design with familiar operation requirements. Designed for improved water quality.

- Includes physical and chemical removal of sediment.
- **Undefined terms: Owner/operator? Income source to support operations? Regulatory compliance (CWA) / allowance for quality exception?**

# Tijuana River Diversion Infrastructure Study

## Conclusions – Top Investment Options

**4b**

New Lift Station to discharge at SBIWTP for primary treatment only

- Alternative 4a lift station components
- 3,500 linear foot (1,080 meters) new ductile iron pipeline (36 and 42 inch diameter)
- SBI WTP improvements to have additional 35 MGD treated through primary treatment

**Diversion Target:**  
**1,500 lps**

**Avg. days TB flows:**  
**58 days/yr**

**Capital Cost:**  
**\$48M USD**

**O&M Cost:**  
**\$7M USD**



### Comments

- Same benefits and concerns as 4a.
- Flows receive chemically enhanced primary treatment at SBIWTP, most likely avoiding water quality concerns for discharge; requires upgrades at SBIWTP.

- **Technical Feasibility: Will mix of water low in food sources affect the biological process?**
- Regulatory approval may be more favorable due to primary treatment.

# Tijuana River Diversion Infrastructure Study

## Conclusions – Top Investment Options



**4f**

Single inflatable dam or permanent weir US-side of Tijuana River Channel

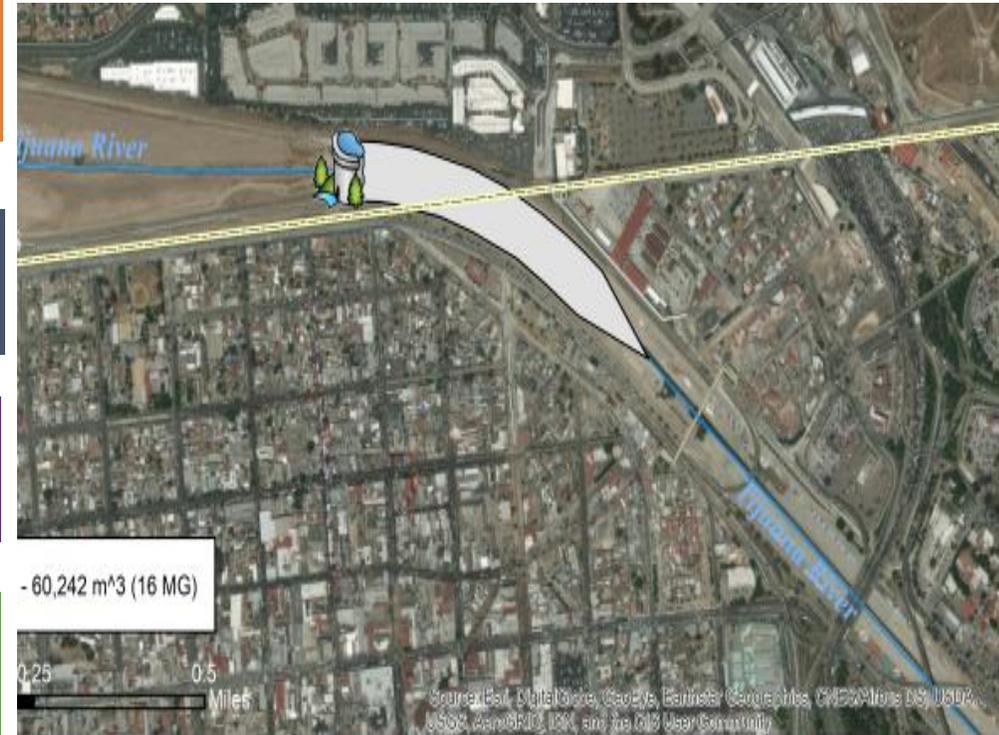
- Storage capacity of 60,000 cubic meters or 16 MG
- Bypass to maintain some small flows to Tijuana Statuary

Diversion Target:  
< 100 lps

Avg. days TB flows:  
122 days/yr

Capital Cost:  
\$8M USD

O&M Cost:  
\$3M USD



### Comments

- To control dry-weather TB flows due to failure at diversion infrastructure
- Formalizes a similar temporary practice implemented with effective results

- Is relocation to Mexico an option? Overtopping of new structure could be an unpermitted discharge in U.S
- **Undefined terms: Owner/operator? Final destination of flows?**