Westwood Neighborhood Greenway
Proposition O Project

Final Concept Report
April 2012

Prepared by:
City of Los Angeles
Department Of Public Works
Bureau of Sanitation
Watershed Protection Division

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1. EXECUTIVE SUMMARY

The Westwood Neighborhood Greenway Project is located at the Exposition Light Rail Transit Station (Westwood Station) between Westwood Blvd and Overland Ave. Although the Greenway will be constructed as a separate project, the elements of the Greenway are designed to complement the objectives of the Expo Light Rail. The multi-benefit project will provide urban runoff treatment, green space, access to public transit, and educational and recreational opportunities. Project elements include:

- Simulated streams (vegetated swales) on north and south side of the station
- Educational and interpretive signs about local ecology and hydrology
- Native vegetation community (landscaping) and smart irrigation
- Stormwater lift stations (Overland drain)
- Return flow structure
- Class I bike path and pedestrian walkway on the north side of the station*

The project proposes to divert dry-weather flow from the Overland drain to capture runoff from a 2,400-acre drainage area. The diverted water will be lifted to the stream on the north side of the Station (North Stream) for physical and biological treatment by flowing through various plant communities, soil media, and through exposure to sunlight. The North Stream will be connected to the South Stream through a culvert that runs under the light rail tracks. During dry-weather, approximately 23 to 135 gallons per minute of dry weather flow is expected to be continuously captured and treated by the swales.

During the wet season, the alley on the north side of the Westwood station experiences flooding and water ponding. This project proposes catch basins and an underground culvert on the north side to capture stormwater runoff from 3 to 5 acres of residential and street areas. The captured storm flow will be designed to go through physical and biological treatment in the south swale. Excess treated water will flow back into the Overland drain through the return flow structure.

A 17-foot-wide Class I bike path (12 feet for bicyclists, 5 feet for pedestrians) will be constructed by the Los Angeles Department of Transportation (LADOT) on the north side of the station, extending from Overland Ave. to Westwood Blvd. Visitors will be able to enjoy the carefully selected native plants and interpretive signs along the path. The south side will also include a decomposed granite and grassy walkway that runs parallel to South Stream.

All of the components will provide year-round treatment of urban runoff, water conservation and beneficial use, educational opportunities for local K-12 schools, additional green recreational space, and will reduce the heat-island effect. The continuous flow in the streams will fulfill the site irrigation demand. This “rails with trails” concept will improve water quality, showcase the Exposition light rail line, encourage ridership, and provide a unique transit experience in the City of Los Angeles.

Project Costs

As shown in Table ES-1**,** this project has only Water Quality elements. The request for Proposition O funds totals $3.16 million, including all design, engineering, permitting, and contingency costs.

Table ES-1. Project Cost Estimate

	Budget Category	Non-Water Quality Elements	Water Quality Elements	Cost
(a)	Construction Cost (including estimating contingency, mobilization, allowances, construction contingency, and material cost escalation	$0	$2,360,416	$2,360,416
(b)	Land Purchase/ Right-of-Way Acquisition	N/A	N/A	$0
(c)	Pre-Design and Design (including environmental clearance, design project management, 22% of Construction Cost)	$0	$519,292	$519,292
(d)	Construction and Post-Construction management (12 % of Construction Cost	$0	$283,250	$283,250
(e)	Grand Total	$0	$3,162,958	$3,162,958

Schedule

Based on the best information available during the preparation of this Concept Report, the project design and construction phases could be completed within 36 months after Pre-Design activities are completed, as shown in Table ES-2. The project is located on City-owned land and the City's Bureau of Sanitation has started the legal procedure to transfer title to the Department of Recreation and Parks.

Table ES-2

Work Item	Mo.	Year 1												Year 2												Year 3												Year 4											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Land Agreement w/ MTA	6																																															
Pre-Design*	6																																															
CEQA	9																																															
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Bid & Award**	6																																															
Construction	18																																															
Post-Construction	6																																															
Total Schedule	48																																															

*Pre-Design needs to be done before the CEQA process can begin

**Cannot start Bid & Award before CEQA is complete

The Bureau of Sanitation - Watershed Protection Division, the office of the 5th Council District, and local residents have met with representatives from the Metropolitan Transit Authority – Exposition Light Rail Line and LADOT. Further discussions with local homeowner associations and neighborhood councils are scheduled to collect input and comments from the community.

2. INTRODUCTION

2.1 Ballona Creek and Watershed

Through a network of underground storm drains and several open channels, Ballona Creek receives runoff from 128 square miles of watershed area before discharging into Santa Monica Bay by Marina del Rey harbor. The watershed is shared by the City of Los Angeles, County of Los Angeles, California Department of Transportation, City of Culver City, City of Beverly Hills, City of West Hollywood, City of Inglewood, and City of Santa Monica (Figure 1). The watershed is bounded by the Santa Monica Mountains to the north and Baldwin Hills to the south and is highly developed, with the exception of the headwaters in the northern portions of the watershed in the Santa Monica Mountains.

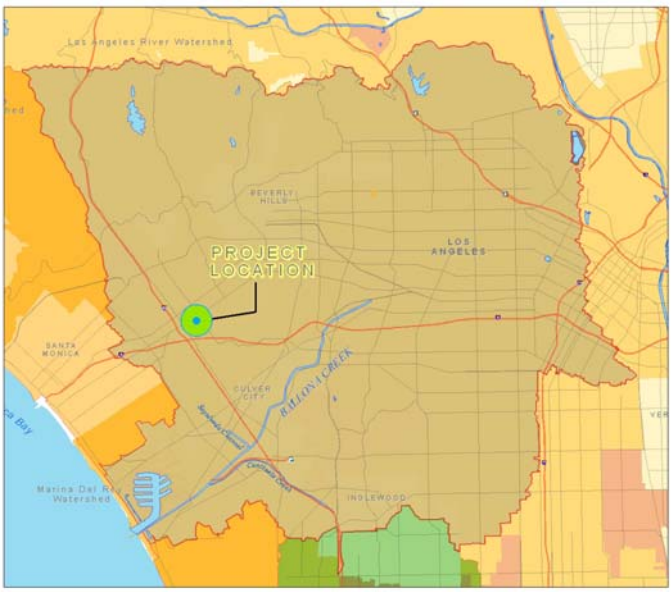

Figure 1 – Ballona Creek Watershed and Project Location

Ballona Creek flows as an open channel for about nine miles. Ballona Creek is concrete-lined except for the last three miles in the Ballona Estuary. The concrete is replaced by grouted riprap sides and an earthen bottom after the Centinela Ave. crossing. Major tributaries include Centinela Creek, Sepulveda Channel, and Benedict Canyon Channel.

2.2 Regulatory Background and Total Maximum Daily Loads

As required by the Clean Water Act (CWA), the Los Angeles Regional Water Quality Control Board sets water quality standards for the Los Angeles Region, which includes beneficial uses for surface and ground water, and numeric and narrative objectives, or Total Maximum Daily Loads (TMDLs), necessary to support beneficial uses to protect all waters in the region. A TMDL defines the maximum amount of a pollutant that a waterbody can receive and still meet the applicable water quality standards for that pollutant. A TMDL Implementation Plan defines strategies for meeting the TMDLs.

TMDLs were developed for coliform bacteria, heavy metals, estuary toxics, and trash in Ballona Creek. The City of Los Angeles submitted TMDL Implementation Plans strategizing how the City and other agencies intend to meet the water quality standards in Ballona Creek. The Plans propose structural projects and institutional measures, also known as Best Management Practices (BMPs), throughout the watershed. The City has identified eight large-scale (regional) structural project locations and 27 smaller (distributed) projects throughout the watershed. Proposed BMPs were identified in collaboration with the watershed stakeholders.

2.3 Exposition Light Rail Phase II

The Exposition Corridor Light Rail Project Phase I is currently under construction. The 8.6-mile route that begins in downtown Los Angeles and terminates in Culver City is expected to be completed in 2012. Environmental planning has begun on a future Phase II project that will extend the Exposition Light Rail line to the City of Santa Monica.

Figure 2 – Existing Condition between Overland Ave and Westwood Blvd.

The Exposition Light Rail line features an urban design concept for the alignment called the Exposition Transit Parkway. As proposed by the Los Angeles County Metropolitan Transportation Authority (LACMTA), the Exposition Transit Parkway includes the light rail transit alignment, bikeway facilities, pedestrian linkages, landscape design, public art, and related system facilities of the alignment as a multi-modal transit corridor. The Exposition Light Rail line is being constructed primarily at-grade within the existing Exposition right-of-way. The right-of-way spans 100-200 feet in some areas. Other portions may be less than 100 feet. The area between Overland Ave. and Westwood Blvd. is approximately 200 feet wide. For the purposes of this Proposition O project, the assumption has been made that the remaining right-of-way will be 35-feet wide or more on each side of the rail line, and that the rail line will be constructed at-grade within the project area.

Figure 3 – Water Ponding at Exposition Blvd. and Westwood Blvd. (North Side)

The goal of this concept is to integrate the light rail transit alignment, a bikeway, streets, and pedestrian linkages in a safe, balanced and cohesive parkway setting. In addition to passive and active recreation in the form of bikeways and pedestrian paths, additional parkway space will be available that could serve other purposes.

Utilizing the parkway for urban runoff treatment is ideal because major storm drains traverse the Exposition right-of-way. Integrating water treatment elements will not only establish a multi-modal transit corridor, but also a multi-benefit transit corridor. Including water treatment systems that mimic natural hydrologic processes will improve water quality, aesthetics, and enhance passive and active recreational opportunities.

3. SITE CHARACTERISTICS

The project site is an approximately 1,200-foot-reach of right-of-way located along Exposition Boulevard between Overland Ave. and Westwood Blvd. in West Los Angeles. Four major storm drains traverse the Exposition Parkway in the project area: 1) the Sawtelle-Westwood storm drain that runs along Overland Ave. and is under the jurisdiction of the City of Los Angeles; 2) a storm drain located between Midvale Ave. and Kelton Ave., also under the jurisdiction of the City of Los Angeles; 3) a storm drain running along Military Ave. that is under the jurisdiction of the County of Los Angeles; and 4) a storm drain along Rountree Road under the jurisdiction of the City of Los Angeles. Figure 5 shows the locations of the storm drains that traverse the right-of-way.

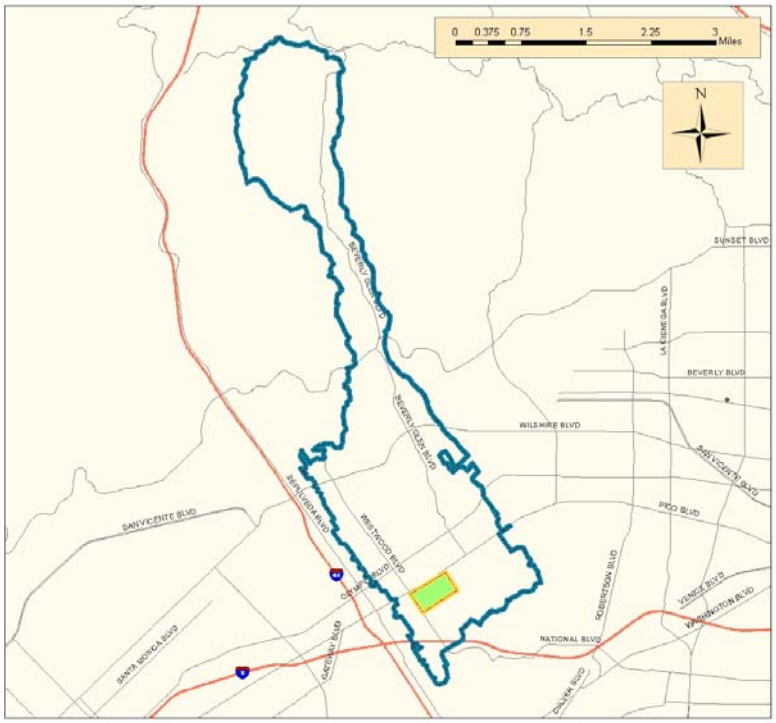

Figure 4 – Drainage Area (~2,400 Acres) of Overland Drain

Although the storm drains along Rountree Road and Kelton/Midvale Avenue are large in size, the drainage areas are relatively small at approximately 570 and 500 acres, respectively. The drains along Overland Avenue and Military Avenue have large drainage areas (2,490 acres and 7,145 acres, respectively) capable of conveying significant dry weather flow year-round. Preliminary analysis indicates that the Overland Avenue storm drain can be utilized to supply the parkway with a source of runoff year-round. Storm drain flow during dry weather can be diverted to the project site for treatment and beneficial use.

The storm drains are located approximately 10-15 feet underground and may require a pump system to bring water to the surface of the right-of-way. Diversion pumps will divert dry weather runoff from the Overland Avenue storm drain up to the ground surface of the parkway. The drainage area (Figure 4) is entirely within the City of Los Angeles. It may be possible to also divert a portion of wet weather runoff from residential parcels and streets along Westwood Blvd., from Pico Blvd. to Exposition Blvd.

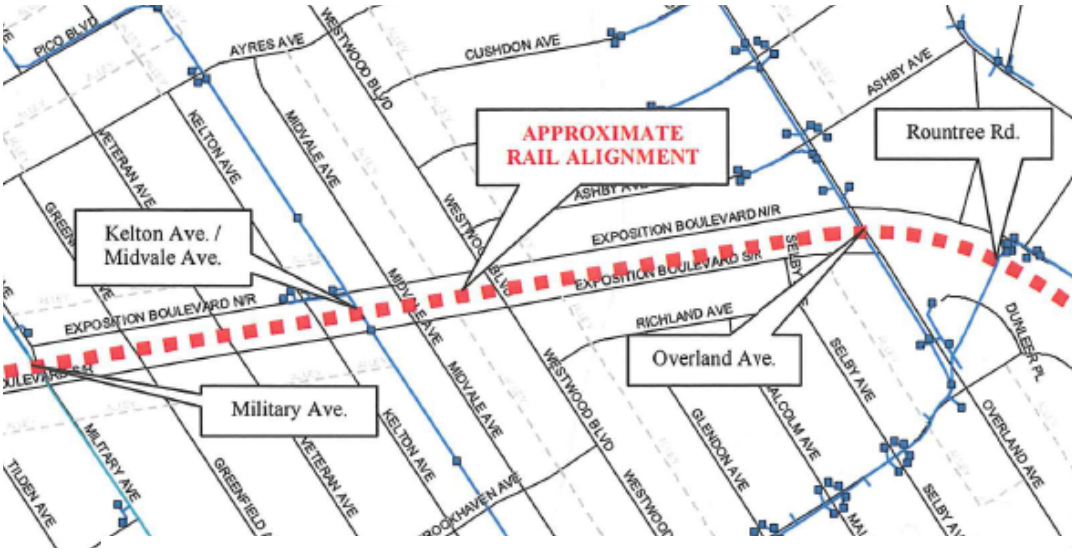

Figure 5 – Existing Drainage Systems

Minor grading may be required to provide continuous flow through the parkway. The pumps will be installed at strategic locations so that the storm drains will supply an independent flow of water to both the northern and southern portions of the parkway. Site elevations and the hydraulic profile are shown in Appendix D.

An underground petroleum line on the north side and a high-pressure gas line on the south side of the project area were also identified. Geotechnical reports conducted by the City of Los Angeles indicate that the soil is predominantly lean clay (Appendix C).

Figure 6 – Wet-Weather Drainage Area

After evaluating several alternatives, the concept of a simulated stream (bioswale) without infiltration is the most likely feasible option that could be designed with lower maintenance requirements, controllable flows, and an impermeable liner to prevent infiltration. LACMTA should be a partner in the planning and implementation of any proposed concepts.

4. PROJECT COMPONENTS

The multi-benefit project will be designed to provide urban runoff treatment, green space, access to public transit, and recreational opportunities. This "rails with trails" concept will improve water quality, showcase the Exposition Light Rail line, encourage ridership, and provide a unique transit experience in the City of Los Angeles.

Figure 7 – Simulated Stream with Appropriate Plants Found in Riparian Habitats

Several treatment systems will be integrated into the project area to treat urban runoff while mimicking natural hydrologic processes. A simulated stream and a tree-lined vegetated buffer will be integrated into the project area to facilitate biofiltration of urban runoff. Due to the project's close proximity to the rail line and low soil permeability, infiltration of the captured flow poses a challenge. As a result, until further geotechnical investigations are conducted, this Concept proposes a treatment system lined with an impermeable barrier (geomembrane).

Project elements include:

- Simulated stream (bioswale) on the north and south side of the railroad tracks
- Pedestrian walkways and foot bridges
- Class I bike path (by MTA) and
- Aesthetic and educational amenities

4.1 Simulated Stream (Bioswale)

This project proposes two simulated streams on the north and south sides of the railroad tracks. South Stream and a portion of North Stream are designed to capture wet-weather runoff from 3 to 5 acres of residential parcels and streets along Westwood between Pico and Exposition. Both North and South Streams are designed to capture and carry dry-weather runoff from the storm drain line that runs along Overland Avenue. The two streams combined will provide approximately 1,800 linear feet of treatment for dry-weather runoff from up to 2,400 acres.

Figure 8 – Streambed with Appropriate Plants Found in Riparian Habitats

Runoff will be diverted to a bioswale, a linear low-lying natural topographic drainage feature that will run parallel to the railroad tracks.

Figure 9 – Artist's Rendering of the North Stream, Bike Path, and Educational Display

Through biofiltration, this watercourse will trap particulate pollutants (suspended solids and trace metals) through deep-rooted plant communities, sand media, rocks, pebbles and boulders. The bioswale will be planted with native vegetation (native plants listed in Table 1 are preferred over turf grasses because the swale will offer higher resistance to flow and provide a better environment for filtering and trapping pollutants from urban runoff). The Plant Palette and landscaping scheme is described in Figures 7 - 9 and Table 1. Following treatment, the runoff will be returned to the storm drain system through underdrains. The bioswale will not be designed to infiltrate due to the presence of rail infrastructure. Native plant communities will be established along the stream bank. The deep-rooted vegetation will slow runoff velocities, reduce soil erosion, and provide passive treatment of urban runoff. Dry-weather runoff from Overland Drain is estimated to flow in the range of 20 to 130 gallons per minute (gpm) based on the drainage area and drain geometry. The flow diagram of the streams is shown in Figure 10.

The simulated stream also enhances aesthetics, creates habitat, and provides educational opportunities. Pedestrians and bicyclists will follow the path of the stream as they continue along the parkway. Pollutant load removals (effluent concentrations) and flow calculations are shown in Appendix B.

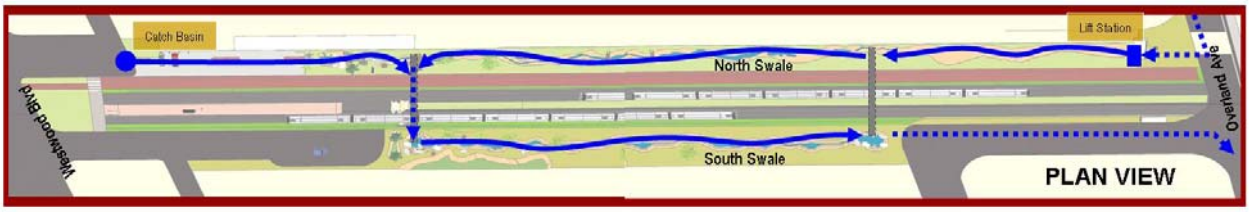

Figure 10 – Flow diagram of the streams. Dotted lines represent underground flow.

North Stream: Drain flow will be pumped to the northeast side of the project area and flow through 800 to 1,000 linear feet of soil media and plant communities. The excess stream flow will be diverted to the South Stream through a culvert and flow back into the Overland Drain at a downstream location. Pumps, additional flow diversion structures, and underground culverts are required for North Stream. Elements of North Stream include a pedestrian walkway, foot bridges, educational display boards of local hydrology, flora and fauna, water conservation, and urban runoff. Based on existing site topography, runoff will drain from east to west with an elevation difference of 4 to 5 feet. The site should be graded carefully to ensure the dry-weather runoff flows to the west.

South Stream: As shown in Figure 3, the low point of the area located at the alleyway at the northwest corner of Westwood Blvd. and Exposition Blvd. causes water ponding and occasional flooding. The South Stream will alleviate flooding and divert the storm runoff into the swale that flows from west to

east. Wet-weather runoff will be diverted into a catch basin and underdrain at the entrance of the parking lot. Diverted runoff will flow by gravity through a culvert than runs across the light rail tracks to the South Stream, and then through 450 to 800 linear feet of sand media and plant communities before it reaches the other end of the stream, where the treated runoff will be discharged into the Overland Drain.

Typical configurations of the streams are shown in Figure 11 and Appendix E. The top width of the streams range from 15 to 30 feet and the bottom width will range from 5 to 7 feet. The side slopes of the streams range from 1:1 to 1:3 and the average depth is approximately 4.5 to 5 ft. During typical dry-weather events, the bottom of the streams is expected to be covered with 1 to 2 inches of gently flowing water.

4.2 Pedestrian Walkway

Pedestrian walkways are proposed along both North and South Streams. The decomposed granite covered paths extend from the northwest parking lot from Westwood Blvd. to Overland on the north side and from the "Kiss-And-Ride" area to Overland on the south side. Visitors will walk along the creek through different plant communities and experience the native flora seen in Southern Californian riparian habitats. The walkways will be 5 to 15-feet wide. The walkways include footbridges that cross the creek and offer unique viewpoints to observe the stream and various plants on both sides.

4.3 Bike Path (by MTA and LADOT)

The "rails-with-trails" concept provides opportunities for the creation of trail systems that enhance local transportation systems and offer safe and attractive community connections. A Class I bike path is proposed on the north side of the railroad tracks. The bike path will parallel the North Stream extending from Westwood Blvd. to Overland Ave. Native shrubs and other vegetation will be placed between the swale and the bike path. Visitors will be able to access both the bike path and the walkway from Westwood Blvd. and Overland Ave.

4.4 Esthetic and Educational Amenities

A significant element of the project is educational signage about the local hydrology, native plant communities, urban runoff issues, and water conservation themes. Display boards will be placed at two entrances and half-way along the North Stream. At designated areas, visitors and students will be able to observe the hydrologic cycle, and learn about the functions of plant communities and ways to conserve water.

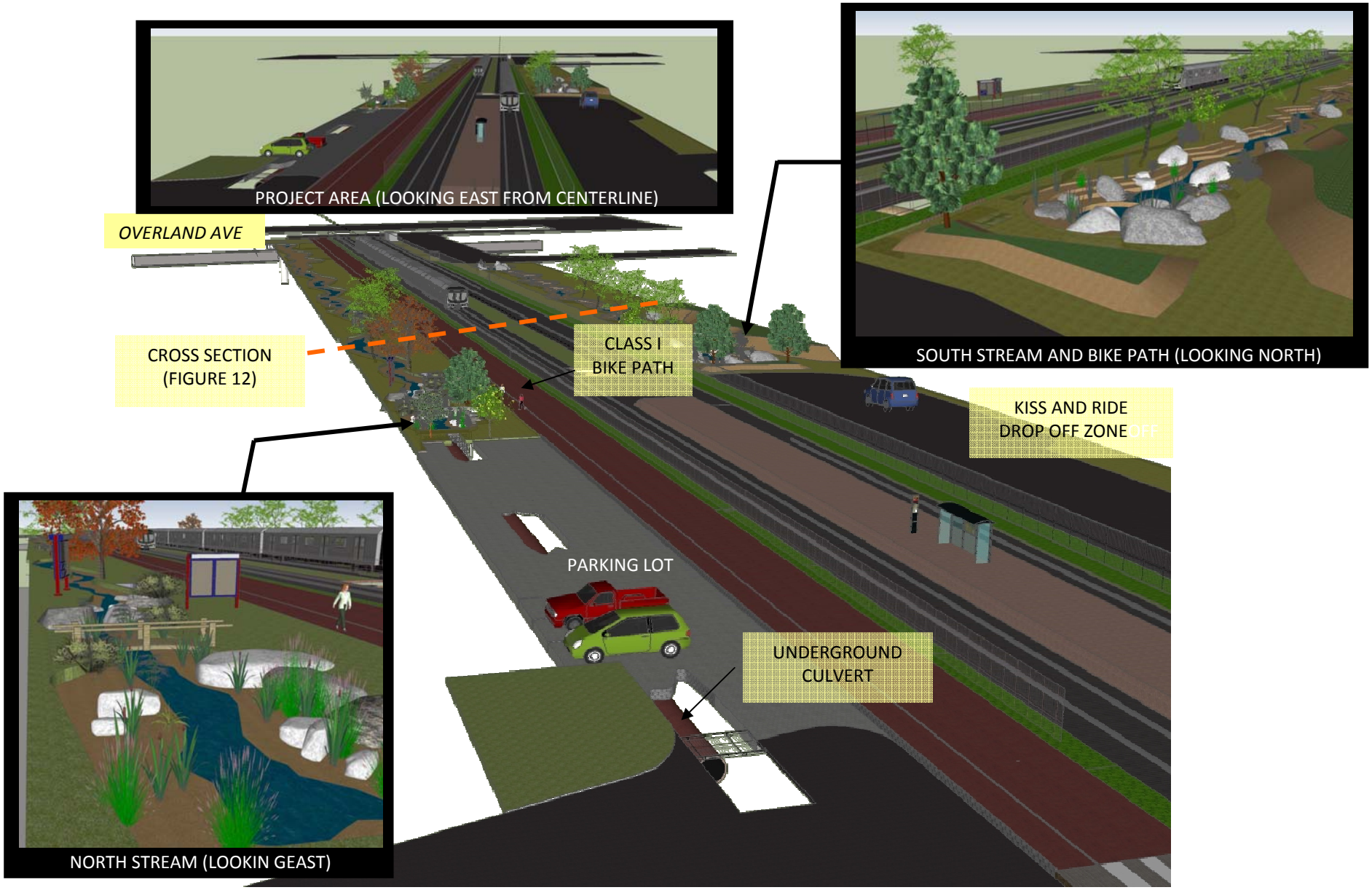

Figure 11 – Layout of Westwood Station with Simulated Streams, Vegetation, Walkway and Bike Path

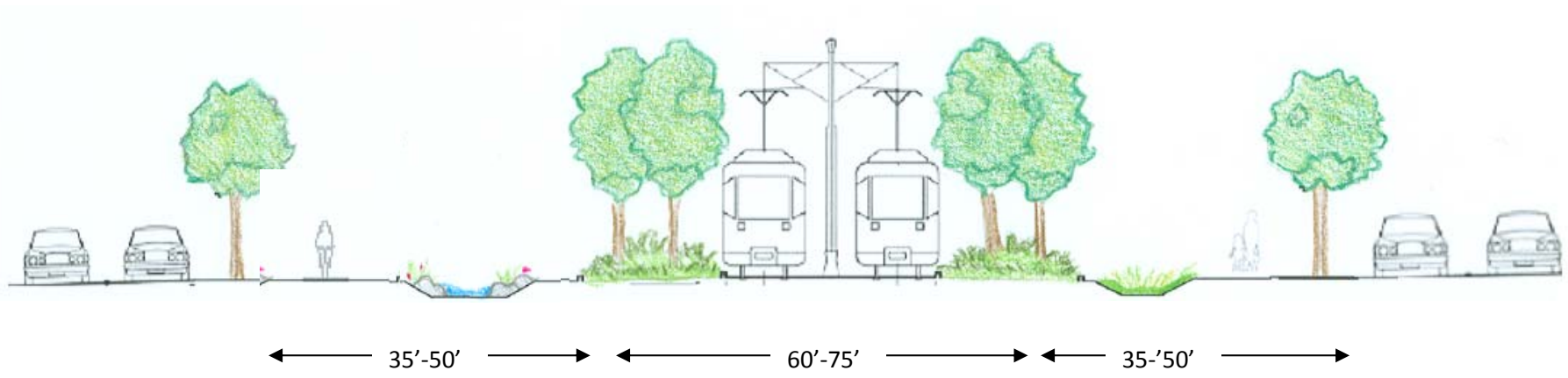

Figure 12. Cross-section of the proposed concept elements (not to scale)

Table 1. Native Plant Palette

Drought Tolerant (Sun-Loving)	
Carpenteria California	Bush anemone
Ceanothus Grisues Var	California Lilac
Encelia California	California Encelia
Feijoa Sellowiana	Strawberry Guava
Galvezia Speciosa	Island Bush Snapdragon
Keckiella Corofolia	Heart-Leaved Penstemon
Mimulus Aurantiacus	Sticky Monkey Flower
Platanus Racemosa	Western Sycamore
Ribes Speciosum	Fuchsia Flowering Gooseberry
Romneya Coulterii	Matilija Poppy
Rubus Ursinus	Blackberry
Salvia Clevelandi	California Blue Sage
Salvia Mellifera	Black Sage
Zauschneria Californica	California Fuchsia
Aquilegia Formosa	Western Columbine
Calycanthus Occidentalis	Sice Bush
Cercis Occidentalis	Western Redbud
Heuchera Hybrids	Coral Bells
Lilium Paradalinum	Leopard Lily
Mahonia Aquifolium	Oregon Grape
Mahonia Repens	Creeping Mahonia
Melica Imperfecta	Coast Range Melic
Muhlebergia Rigens	Deer Grass
Rhamnus Californica	Coffee Berry
Rhamnus Californica Seaview	Seaview Coffee Berry
Ribes Aurem	Golden Current
Ribes Viburnifolium	Evergreen Current
Rosa Californica	California Wild Rose
Salvia Soatchacea	Hummingbird Sage
Sambuscus Mexicana	Mexican Elderberry
Streamside	
Carex Barbarae	Sedge
Iris Douglasiana	Pacific Coast Iris
Juncus Patens	Rush
Leymus Triticoides	Creeping Wild rye
Mimulus Cardinalis	Scarlet Monkey Flower

5. BENEFITS

5.1 Water Quality Benefits

Stormwater runoff from the surrounding areas has the potential to contribute trash, oil and grease, suspended solids, metals, gasoline, and pathogens to the stormwater conveyance system. The goal of the project is to minimize, to the extent practicable, the introduction of pollutants of concern that may result in significant impacts to the stormwater conveyance system, which is tributary to Ballona Creek. Utilizing the Exposition Greenway Corridor to manage urban runoff will assist in complying with current and future TMDL regulations for Ballona Creek. Targeted pollutants include metals, bacteria, toxics, and bacteria.

The proposed tree-lined swales/streams with plants and sand media will reduce flow velocities, allowing sediment, nutrients, pesticides, and other pollutants to settle, and increasing the time for UV exposure and evapotranspiration to take effect. The plants will also intercept on-site runoff and increase the aerobic microbial environment in water-logged soils. The bioswale will be planted with native vegetation (native plants are preferred over turf grasses because the swale will offer higher resistance to flows and provide a better environment for filtering and trapping pollutants in urban runoff). Table 2 summarizes the pollutant loads that will be removed by the swales. The load removals are expected to increase as the plant communities become more fully established and result in a longer detention time. The optimal performance will be achieved two to three years after the project is completed. Detailed water quality calculations are shown in Appendix B.

Table 2. Pollutant Loads Removed from Overland Storm Drain During Dry-weather

	Nitrate (Kg/yr)	Tot Copper (Kg/yr)	Tot Lead (Kg/yr)	Tot Zinc (Kg/yr)	FC (MPN/yr)	TSS (kg/yr)
Pollutant Loads in Overland Drain	65	906.64	458	6706	3.70E+10	5018
Pollutant Loads Removed by the Project	17	362	161	1940	2.07E+10	1147
Percent Removal	27%	40%	35%	29%	56%	23%
Load removal efficiencies and effluent concentration are based on the values published on International BMP Database for a flow-through bioswale and media filter, except for fecal coliform, which is assumed to be 50% removal.Load removals account for loss of flow due to evaporation, site irrigation, and partial infiltration (approximately 6% of total flow).						

The water demand for site irrigation is calculated as 2% of the total flow, based on the number of irrigated areas and the density of trees. The dry-weather flow is more than adequate to fulfill onsite irrigation needs and could be used, if needed, to irrigate the landscaping along the Exposition Light Rail line.

5.2 Educational and Recreational Benefits

The project includes carefully placed display boards that describe the native flora and fauna, hydrologic cycle, water conservation, and water quality components. The plants placed along the streams will bear tags and interpretive signs that describe the role they play in the ecosystem and the water quality benefits they provide. The continuous flow in the Streams will provide opportunities for local students

to conduct scientific experiments in the study areas of Biology, Botany, Ecology, and Environmental Science. Trees lining the Streams will provide shade and comfort to joggers, cyclists and transit passengers.

6. COMMUNITY OUTREACH AND COORDINATION

To fully understand and address all of the concerns of various stakeholders, the Bureau of Sanitation - Watershed Protection Division (WPD) coordinated with the following offices, groups, and associations throughout the development of this report:

- Office of the 5th Council District
- City of Los Angeles Department of Transportation
- Metropolitan Transit Authority – Exposition Light Rail Line
- Westwood area residents (Westwood Gardens Civic Association)
- Expo Greenway (www.expogreenway.org)
- National Resources Defense Council (NRDC)

WPD met with staff of the 5th Council District, representatives from homeowner associations, and neighborhood councils to fully capture their concerns on this project. Draft renderings of the project have been shared with the stakeholders and their input on each project element has been carefully considered. WPD continues to work together with MTA-Expo authorities and residents to successfully implement the project.

Stakeholders expressed the following issues, which were addressed by WPD as follows. Additional discussion points at several community meetings are described in Attachment A.

Increased amount of trash - this project will include an adequate number of trash cans and recycling containers along the streams and by the interpretive signs.

Odor associated with stormwater - the streams are designed to have a consistent flow velocity to reduce ponding. Periodic maintenance activities, such as checking for blockages and flow-obstructing objects in the stream, will ensure that odor-causing problems will be prevented.

Vector associated with the swale - vectors such as mosquitoes are a common problem with stagnant water. Consistently flowing streams with a velocity of approximately 0.25 feet per second and total residence time (detention time) of approximately 3 hours will provide adequate hydraulic conditions to prevent mosquitoes, eggs, and larvae.

Overnight transients - the area along the streams and the walkway can be designed to slope down towards the stream (10 to 20% slopes) to discourage prolonged or overnight stays in the area. Additionally, installing entrance gates at both sides of the tracks and limiting the hours when the area is open to sunrise-to-sunset will prevent transients from staying overnight.

Vandalism - the display boards, foot bridges, trees and other structures could be the target for vandals at night. Installing entrance gates at both sides of the tracks and limiting the hours when the area is open to sunrise-to-sunset could prevent vandalism.

7. OPERATION AND MAINTENANCE (O&M)

Regular upkeep of the bioswales and pathway components will be necessary. Plant communities require several years to fully establish and thrive. Continuous flow from Overland Drain during dry-weather is considered to the meet irrigation demand of the streamside plants. Sun-loving and shade-tolerant plants that are placed farther from the stream bed may require irrigation lines, especially during the plant establishment phase.

The headwater area of the swale will require additional weed (invasive species) control, litter removal, clearing of debris, sediment, and blockages, and vegetation trimming.

Other maintenance activities may include inspection of the stream banks and bottoms for erosion and washouts. The pedestrian walkways and bike path will require periodic pick-ups from the trash receptacles. The tree-lined vegetated buffers will require standard landscaping maintenance as well. The irrigation system will need to be inspected periodically to assure it is functioning properly. The estimated annual O&M cost is summarized in Table 3.

Table 3. Operations and Maintenance Cost

Project Feature	Cost Type	Activity	Frequency	Annual Cost
Vegetation	Labor	Pruning, clearing debris, removing weed	Biweekly	$ 5000
	Plant Replacement	Remove and replace unhealthy plants	As needed	$ 2000
Filters	Labor	Inspect filter media for clogs, debris, and functionality	Annually	$ 5000
	Media Replacement	Clean or remove old media (or) replace with clean media	Annually	$ 8000
Pump Station	Labor	Clearing sump, electrical work	Annually	$ 3000
	Replacement Parts		As needed	$ 25,000
			Total Estimated Annual O&M	**$ 48,000**

8. SCHEDULE

The project is currently in the Planning Stage. After pre-design, design, and bid and award are concluded, it is expected that construction will be completed in 18 months. Details of the project's phases and schedule are described below in Table 4.

Table 4. Project Schedule

Work Item	Mo.	Year 1												Year 2												Year 3												Year 4											
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*Pre-Design needs to be done before the CEQA process can begin

**Cannot start Bid & Award before CEQA is complete

9. PRELIMINARY COST ESTIMATE

As shown in Table 5, this project has only Water Quality elements. The request for Proposition O funds totals $3.16 million, including all design, engineering, permitting, and contingency costs. Table 6 lists the itemized costs, which include landscaping, materials, construction, environmental permits, and allowances.

Table 5. Overall budget

	Budget Category	Non-Water Quality Elements	Water Quality Elements	Cost
(a)	Construction Cost (including estimating contingency, mobilization, allowances, construction contingency, and material cost escalation	$0	$2,360,416	$2,360,416
(b)	Land Purchase/ Right-of-Way Acquisition	N/A	N/A	$0
(c)	Pre-Design and Design (including environmental clearance, design project management, 22% of Construction Cost)	$0	$519,292	$519,292
(d)	Construction and Post-Construction management (12 % of Construction Cost	$0	$283,250	$283,250
(e)	Grand Total	$0	$3,162,958	$3,162,958

Table 6. Itemized Preliminary Cost Estimate

Description	Unit	Quantity	Unit Cost	Total
traffic control	LS	1	$10,000	$10,000
clearing and grubbing	LS	1	$60,000	$60,000
grading	CY	11,111	$18	$199,998
silty sand	CY	30	$50	$1,500
river pebbles	cy	20	$60	$1,200
mountain gray boulders (48"+ diameter)	TON	154	$760	$117,040
yosemite boulders (18" to 30")	TON	60	$480	$28,800
decomposed granite	cy	142	$75	$10,650
mulch	cy	23	$30	$690
cinder blocks (stream bottom cover)	SF	11,000	$2.50	$27,500
planting 1-gal shrubs	EACH	800	$15	$12,000
planting linder shrubs	EACH	800	$8	$6,400
assorted native trees (5' to 7')	EACH	200	$150	$30,000
geotextile	SF	48,400	$3	$145,200
install signage	EACH	6	$500	$3,000
storm flow diversion and catch basins	EACH	2	$40,000	$80,000
return flow connection structure	EACH	1	$12,000	$12,000
lift station	EACH	1	$250,000	$250,000
pump (south to north swale)	EACH	1	$20,000	$20,000
piping and valves	LF	300	$100	$30,000
instrumentation and control system	EACH	1	$50,000	$50,000
Irrigation system	EA	1	$170,000	$170,000
Subtotal (1)				**$1,265,978**
Mobilization – 5% of Subtotal (1)				$63,299
Permits – 3% of Subtotal (1)				$37,979
Allowances - 5% of Subtotal (1)				$63,299
Subtotal (2)				**$1,430,555**
Estimating Contingency - 25% of Subtotal (2)				$357,639
Subtotal (3)				**$1,788,194**
Escalation - 5% per year for 2 years of Subtotal (3)				$178,819
Subtotal (4)				**$1,967,013**
Construction Contingency - 20% of Subtotal (4)				$393,403
Total Estimated Project Construction Cost				**$2,360,416**

APPENDIX A – FAQs

What are the minimum widths required for the stream, walkway, and bikepath?
The stream will require 10 ft, the walkway will require 5 to 10 ft, and the Class I bike path will require 17 ft.

What will be the minimum width required for the Project on the north side of the tracks?
The north side requires a minimum of 30 ft for the stream, walkway, vegetated and tree buffer, and fencing. It will be up to 50 ft at the widest cross section.

What will be the minimum width required for the Project on the south side of the tracks?
The south side requires minimum of 37 ft (stream, bikepath, vegetated and tree buffer and fencing). It will be as wide as 50 ft at the largest cross section.

What is the detention time (residence time) of the stormwater from Overland Drain?
The two streams combined offer approximately 2,200 linear ft of flowthrough. Assuming a flow velocity of 0.25 fps, the detention time from the lift station to the return flow structure is approximately 4 hours.

What makes Westwood Station different from other areas along the Expo Light Rail?
Expo Right of Way (ROW), the stretch of land from Overland Blvd from the east to Westwood Blvd is sandwitched by similar size City owned ROW land on both side of the Expo ROW, offering wider stretch of land than other parts of the ROW.

Can this project concept be replicated elsewhere along the Expo Light Rail?
Yes, given there is enough land on either side of the ROW.

Are there any buried utility lines on City owned ROW? If so, will they interfere with the Project scope?
Yes, there is a petroleum line on the north side and SC Gas line on the south side. The streams on either side of the tracks are designed to be shallow (<5 ft deep) with waterproof geotextile that will prevent water infiltration. Utility lines are not expected to significantly interfere with the Project scope

How will the flow from Overland drain be captured?
It will be captured using a lift station. The invert elevation of the drain is approximately 20 ft below grade.

What is the flow rate in the Overland drain?
The dry-weather flow in the drain is calculated to be from 0.05 to 0.3 cfs based on calculations using landuse-based runoff rates and observation data from similar large drains. Wet weather flow is much larger.

How is the water treated and what happens to the excess water?
Water is treated through physical and biological process. The stream offers up to 2,200 linear feet of flow through plant root structures, sand medium. Plant root structures absorb and break down heavy metals, pesticides, and trap other particle-bond contaminants. Larger particles are filtered out at the headworks through screens and sieves. Surface flow is also exposed to heat and UV that are effective in disinfecting biomatters such as coliform bacteria. Water in the streams can also be used to irrigate

the adjacent plants by use of smart irrigation (drip irrigation). Excess treated water will rejoin the Overland drain through the Return Flow Structure.

Although a design issue with EXPO, The Kiss-and-Ride should be shortened adding more green space.
This could be resolved with Expo authorities. It is preferable for the Kiss-and-Ride area to be shortened. It will provide more green space.

Although a design issue with EXPO, Could and should the resident parking be eliminated adding more space available to the green space project?
If it is approved by the community, additional green space will bring more benefits.

Would adding more area increase funding possibilities?
Not necessarily from funding standpoint.

How wide is the bike path expected to be?
Class I bike path, together with the pedestrian walkway is expected to be 17 ft (12 ft for cyclists, and 5 ft for pedestrians). There can also be striping (dividing line between cyclist and pedestrian areas) to prevent accidents.

A walking path should be included in the green areas on both the north and south parts with access from both Westwood and Overland. The walkway should be gravel or some substance that won't attract skateboarders etc.
Agree. Trail (walkway) will be included in both sides. They will be either gravel or decomposed granite.

Where would the funding come from?
Currently City is looking for funding from several sources. One example is Prop 84-State Park and Recreation grant.

There was talk of exercise/stretching stations along the walk. Should this be included?
It can be included as they are fairly easy to incorporate into the project.

Who or what department is in charge of security? This could be an attractive option for homeless encampments or loitering especially given that there is a proposed station with late hours of operation.
Security issue is to be discussed. The project could be designed so that it will be difficult to stay overnight (ie, grading the area sloped down towards the creek, providing few level ground except the outdoor classroom area, filling up the area with knee to waist height plants, etc so that the area doesn't have blind spots)

Who or what department would be in charge of maintenance (planting, clearing of brush, trash removal)? Will this be maintained and preserved from a budgetary standpoint? The maintenance should be organic and presented as such in the educational areas.
Maintenance has three components; 1) landscaping 2) hardscape (pump stations and piping) and 3) effectiveness monitoring (water quality sampling). City is currently coordinating amongst different departments as well as with NGOs.

Trees should be California native and include California Pepper trees and others that are evergreen and or bloom. We should include botanists and University help and input.

All plants selected will be California native. Any assistance and input from Universities and community is warmly welcomed. City also has excellent landscape architects who are highly knowledgeable for this type of project.

Where has this type of project been done already?
City has experience with variety of stormwater projects. Examples are 1) Elmer Street Stormwater Project, 2) South LA Wetland Project and 3) Mar Vista Park Stormwater Project. City has also participated in projects such as Bimini Slough in Los Angeles Eco Village.

Secured Electrical sockets should be included at regular intervals along both north and south sections. There may be optional permitted small community events.
Agree. It could be included during the design phase

Handicap friendly/access
All amenities will be ADA approved.

What would be the result to the neighborhood resulting from a power failure to the pumps?
The result will be that the stream be dry until power to the pumps is restored.

Access to the daylighted water. Would this be a liability for the city?
Adding warning signs (ie. Non body-contact water, No wading, swimming in the stream, etc) are a few things we can do to reduce liability and discourage unwanted activities in the garden.

What departments, agencies or governmental bodies would need to approve the design and project?
Bureau of Sanitation and Bureau of Engineering, Dept of Transportation, Dept of Building and Safety, and Council District 5.

Is an Environmental Impact Report required?
The project is subject to CEQA Process.

What does "Class 1" signify in terms of a bike path?
Class 1 bikepaths are designated as bike-only, not sharing with other motorized vehicles.

A TPSS is shown on 2 different locations on the drawings looking west from Overland Ave. The TPSS will be an issue and needs more discussion.
Location for TPSS is negotiable by the MTA/EXPO Design.

Walls (high ones incl optional gates) between resident's backyards and the greenspace could be included in the discussion.
Comments noted.

Additional notes:
Trash cans and maintenance of them?
Curbside trash cans are serviced by LA Bureau of Street Services (BOSS) and Dept of Transportation (DOT) and those that are located in City Parks are serviced by Dept of Rec and

Parks(RAP) which include cleaning up of cans and transfer of waste to larger bins which are picked up by Bureau of Sanitation (BOS). BOS is responsible for residential, municipal solid waste that also includes bulky items and e-waste. Currently we are looking into which City department will be able to best service the trash cans located in the project site.

What is the quality of water that is being daylighted? Can we get a baseline measurement now (without spending money)? Does WPD have this recent data already?
Based on field samples collected through the years by public agencies, research institutes, and private entities, the concentrations of pollutants vary by landuse (residential, commercial, transportation, education, open space, etc). Overland stormdrain, which this project proposes to daylight, discharges into Sepulveda Channel which joins Ballona Creek in Mar Vista. The tributary area (drainage area) of Overland drain is ~ 2,400 acres and that of Sepulveda Channel is ~12,000 acres. Landuse characteristics of Overland Drain are very similar to those of Sepulveda Channel (similar water quality). City conducts weekly and monthly water quality sampling for ontaminants such as coliform bacteria and heavy metals. Samples are collected from various locations along Ballona Creek and its tributaries. From 2002 to 2007, the median concentration of E. coli bacteria (indicator bacteria that is associated with and share ninche with the types of bacteria that cause sickness) in Sepulveda Channel was 1,100 MPN/100 mL (most probably number or colony forming bacteria per 100 mL of water). The table contains typical concentrations of metals found in Sepulveda Channel (Cu (sol) means concentration of dissolved copper and Pb (tot) means total recoverable Lead).

What hours will it be open?
Sunrise to sunset.

Will there be lights?
The lighting in the garden may follow the plans of the Bike Path. If DOT and MTA plans to install lights along the bike path it will make it easier to include additional light poles in the garden.

Will there be food and drink and alcohol allowed?
Food and drinks should not be allowed around the stream and walkway to prevent vermin issue and trash falling into the stream. No alcohol is allowed in any of City's premises. No drugs either!

Where are people going to the park their cars?
There will be a designated parking area on the northwest side of the Project (or at least there will be parking made available by MTA but location may change).

How do people get in and out of the park?
The Garden could be accessible from south side (along the bike path), east side (from Overland) as well as from west side (Westwood).

Will the runoff water be monitored and tested?
Water coming in and out of the stream will be tested periodically. Performance and health of landscaped plants will also be monitored to ensure optimal performance in terms of pollutant removal.

How often would the stream bottom net will be replaced or flushed off in order to decrease waste accumulation and increase runoff water cleanup?
The frequency will depend on the concentrations of the effluent water at the exit point. If the influent concentration (entrance) and effluent concentration of the water is the same it means that the components of the pollutant removal mechanism (soil, plants, screens, etc) have reached its saturation point and one or more of the components will need to be serviced or replaced. Accumulated pollutants will be removed from site.

The runoff water source will include a very large area compared to the open water treatment space. How residents be protected from the VOC due to the runoff from gas stations, dry cleaners and other hazardous waste operating businesses, runoff water from the lawns of private houses, accidental chemical spill and other water contaminating sources such as herbicides/pesticides runoff from grassy areas?
The industrial landuse (ie, gas stations, auto repair shops, car washes, factories, etc) are required by local, state, and federal law to contain runoff within their own parcels up to 0.75 inch of rainfall. No runoff from such landuse should enter into the storm drains. In the event of chemical spills and other emergencies, government agencies (BOS, County Fire, Dept of Fish and Game, to name a few) are notified and the affected section of the storm drain is closed off, spill is removed, and stormdrain system is flushed out to the point that it is deemed acceptable by regulating and inspecting agencies. Only after that the affected stormdrain system will convey runoff. The project proposes to capture Overland flow only during the dry weather. Note that anything that goes into
the drain system will end up in federally protected waterways such as Ballona Creek.
There may be traces of household herbicides and pesticides that may come off from residential areas. Many researches show that the organics, herbicides and pesticides adhere almost entirely to suspended solids. The headworks (screening, soil medium, etc that mimic the headworks of a water reclamation plants) at the influent area (where water first comes into the project) will be designed to remove and contain such suspended solids in a small area (which will be periodically inspected). Low level of contaminants that escape the screens will be broken down and absorbed by plant root structure into a simpler chemical compounds.

Kids love to stick theirs fingers into the water. Is it dangerous? If so, what precautions will be taking to minimize the exposure to children, pets and wildlife?
The quality of water in the stream will be comparable to those in Reseda Lake, Echo Park Lake, and MacArthur Park Lake, which are exposed to public through the year. However they are not designated for body contact recreation. But people (even children) have been known to have had body contact with these waterbodies and there has been no cases of sickness due to slight body contact, such as dipping fingers in these waterbodies. In order to reinforce what public health officials say, always wash your hands after you touch foreign materials (even soil, pavement, and plants in one's backyard has household contaminants). City could follow procedures that are in place for facilities that contain non body-contact waters. Signs could be placed along the stream to discourage touching the water and wading in the stream. Dogs have to be on a 6 ft or shorter leash in public areas (required by law). Wildlife that thrives in Ballona Creek concrete channel may find the garden attractive. These species that can thrive in untreated water in Ballona Creek are expected to do well in the garden.

During the dry season will there be any water in the artificial stream?

It will have flow during both wet and dry weather. Dry weather flow will be from Overland drain and wet weather flow will be from street runoff along a section of Westwood Blvd and its alley. See Appendix A for more info about flow.

Who will be replacing and watering the beneficial plants and how often?
The detail is being worked out by the City. Potential responsible agencies are BOS, DOT, RAP, BOSS. Non profit organizations may step in and provide maintenance in terms of landscaping. Frequency will vary. In the beginning it may require more frequent care as the plant community establishes healthy and sustaining colonies. Maintenance may be less frequent one to two years after the project.

What could be a scenario in the case of an Earthquake?
The pumps will shut down and the stream will not be in operation until it is inspected and considered safe by officials.

How will the high pressure gas line currently located below ground be dealt with?
High pressure gas line will be relocated (based on conversations with MTA and DOT).

Could there be or should there be benches?
There will be benches along the stream, as well as educational display boards and interpretive signs.

Why is there a bridge over the stream?
To serve as an observation deck where visitors can look down directly into the stream.

Should there be a restrooms? Would this be a requirement? If so, where and how many?
The concept design doesn't include restrooms as they are not a requirement.

Graffiti should be addressed and the design should make it difficult for taggers to vandalize.
Comment noted.

Pathway design should be of a type that won't attract skateboarding, stunt bikes or graffiti.
Pathway will be paved by decomposed granite that looks like a natural ground cover that one will experience when he/she goes hiking in Santa Monica mountains. It will be very difficult for skateboarders or free riders to do any tricks and stunts in the area.

Will the north stream mixing with the runoff from the underground channel below Overland negate the previous filtration benefits before pumping up to the south stream?
The dry weather flow will be pumped to the North swale first then it will flow through culvert to the south swale which discharges the treated water back into the stormdrain at a downstream location therefore there is no cross contamination.

Other than having access to transit, "incorporating into phase 2" probably isn't accurate. Zev's rep mentioned that MTA has nothing to do with what is put on this parcel of city owned land.
Noted

Bike path is part of the funding?

Bike path is not a part of the funding.

What is a Heat-Island effect?
Head Island Effect: Daytime heat in the form of solar radiation and waste heat (human generated heat from combustion of fossil fuel) being trapped by impervious surfaces (such as roof, asphalt, concrete) released to the atmosphere. Note that it feels hotter to walk on concrete sidewalk than unpaved ground or grassy area. Plants absorb heat and light energy and use it to produce energy.

Gates at either end of the greenway closed from Sunset to Sunrise. would not stop transients, the
train would run later than sunset, and people walk/jog at all hours. I think design can preclude attractiveness to transients, and trash cans and vigilance will help with both issues. Open access would also allow LAPD access as necessary and preclude issues of keys, locks, etc.
Comment noted. Open Access is a preferred option.

Gates may actually cause the greenway to be a secluded attraction for transients and gangs.
Agree. Comment noted.

What does cfs mean when speaking about flow rate? Cubic feet per second?
Cfs = cubic ft per second.

APPENDIX B-CALCULATIONS

GIS Landuse	Grouped Landuse	Imperviousness	Size (acre)	Adjusted Flow (L/d)
High-Density Single Family Residential	HDSFR	0.42	820.64	62142
High-Density Single Family Residential	HDSFR	0.42	762.59	57746
Low-Density Single Family Residential	HDSFR	0.21	313.28	23723
Duplexes, Triplexes and 2-or 3-Unit Condominiums and Townhouses	HDMFR	0.55	8.90	674
Low-Rise Apartments, Condominiums, and Townhouses	HDMFR	0.82	246.21	18644
Medium-Rise Apartments and Condominiums	HDMFR	0.75	78.51	5945
High-Rise Apartments and Condominiums	HDMFR	0.90	52.70	3991
Mixed Residential	HDMFR	0.59	18.86	1428
Retail Centers (Non-Strip With Contiguous Interconnected Off-Stree	INDUS	0.97	3.31	251
Modern Strip Development	INDUS	0.97	50.06	3791
Motion Picture and Television Studio Lots	INDUS	0.82	37.73	2857
Mixed Urban	INDUS	0.89	6.26	474
Under Construction	INDUS	0.15	13.13	994
Older Strip Development	INDUS	0.97	63.72	4825
Low- and Medium-Rise Major Office Use	COMM	0.91	17.13	1297
High-Rise Major Office Use	COMM	0.91	20.68	1566
Skyscrapers	COMM	0.91	10.76	815
Commercial Recreation	COMM	0.91	2.37	180
Regional Shopping Center	COMM	0.95	40.66	3079
Hotels and Motels	COMM	0.91	21.14	1601
Fire Stations	COMM	0.91	2.26	171
Religious Facilities	COMM	0.82	21.12	1599
Non-Attended Public Parking Facilities	COMM	0.91	2.68	203
Elementary Schools	EDUC	0.82	38.82	2939
Junior or Intermediate High Schools	EDUC	0.82	9.50	720
Senior High Schools	EDUC	0.82	0.05	4
Colleges and Universities	EDUC	0.47	10.72	812
Freeways and Major Roads	TRANS	0.91	10	772
Golf Courses	OPEN	0.03	241.30	18272
Developed Local Parks and Recreation	OPEN	0.10	48.54	3675
Cemeteries	OPEN	0.74	1.69	128
Other Open Space and Recreation	OPEN	0.02	1.84	139
Vacant Undifferentiated	OPEN	0.01	406.69	30796
Water, Undifferentiated		1.00	0.14	0
Total/ Average		0.74	3384	256253

	Average Event Mean Pollutant Concentrations				
GIS Landuse	Tot Copper (ug/L)	Tot Lead (ug/L)	Tot Zinc (ug/L)	Fecal Coliform (MPN/100 mL)	TSS (mg/L)
HDSFR (high-density single family residential)	18.7	11.3	125.1	1180	39.9
HDMFR (high-density multi family residential)	12.1	4.5	125.1	3110	124.2
IND (retail, studios, warehouses, malls)	34.5	16.4	537.4	3760	219
COMM (office, hotels, fire stations, skyscrapers)	31.4	12.4	237.1	79900	67
EDUC (elementry, junior, high, colleges)	19.9	3.6	117.6	79900	99.6
Freeways and Major Roads	52	9	293	1680	78
OPEN (golf courses, parks, cementeries, vacant)	10.6	3	26.3	6310	216
Water, Undifferentiated			0.14		

Average Event Mean Pollutant Concentrations are log-transformed arithmetic mean values derived from Los Angeles County land use EMC data except for fecal coliform, which were derived from SCCWRP.

Pollutants Loads in Overland Stormdrain during dry-weather.

	Nitrate (Kg/yr)	Tot Copper (Kg/yr)	Tot Lead (Kg/yr)	Tot Zinc (Kg/yr)	FC (MPN/yr)	TSS (kg/yr)
HDSFR (high-density single family residential)	43.37	537	325	3593	3.39E+09	1146.015
HDMFR (high-density multi family residential)	4.79	74.25	27.61	767.65	1.91E+09	762.131
IND (retail, studios, warehouses, malls)	2.30	91.03	43.27	1417.88	9.92E+08	577.811
COMM (office, hotels, fire stations, skyscrapers)	1.16	66.01	26.07	498.46	1.68E+10	140.856
EDUC (elementry, junior, high, colleges)	0.546	17.808	3.222	105.238	7.15E+09	89.130
Freeways and Major Roads	0.114	8.056	1.420	45.201	2.59E+07	12.006
OPEN (golf courses, parks, cementeries, vacant)	12.404	112.382	31.806	278.835	6.69E+09	2290.05
TOTAL	**64.67**	**907**	**458**	**6706**	**3.70E+10**	**5018**

Thirty four GIS landuse layers are grouped into 8 corresponding layer to calculate landuse-specific pollutant loads.
Assuming flow from 200 dry-weather days per year is treated by the Project.
Overland drains capture runoff from approximately 2,400 acres of mixed landuses.
Loads are calculated based on dry-weather runoff of 100 gal/ac.day and adjusting it based on landuse composition.

Pollutant Loads Removed from Overland Stormdrain during dry-weather.

	Nitrate (Kg/yr)	Tot Copper (Kg/yr)	Tot Lead (Kg/yr)	Tot Zinc (Kg/yr)	FC (MPN/yr)	TSS (kg/yr)
HDSFR (high-density single family residential)	7.47	172	75	862	1.69E+09	474
HDMFR (high-density multi family residential)	1.60	37	16	184	9.54E+08	101
IND (retail, studios, warehouses, malls)	0.686	16	6.86	79	4.96E+08	44
COMM (office, hotels, fire stations, skyscrapers)	0.547	13	5.47	63	8.40E+09	35
EDUC (elementry, junior, high, colleges)	0.233	5.4	2.33	27	3.58E+09	15
Freeways and Major Roads	0.040	0.926	0.401	4.63	1.30E+07	2.5
OPEN (golf courses, parks, cementeries, vacant)	2.76	64	28	318	3.34E+09	175
TOTAL	**13.33**	**308**	**133**	**1538**	**1.85E+10**	**846**

Load removal efficiencies and effluent concentration are based on the values published on International BMP Database
for a flow-through bioswale and media filter, except for fecal coliform, which is assumed to be 50% removal.
This calculation does not account for infiltration. See Table XX for values with infiltration.

Dry-Weather Load Removal by the Project

	Nitrate (Kg/yr)	Tot Copper (Kg/yr)	Tot Lead (Kg/yr)	Tot Zinc (Kg/yr)	FC (MPN/yr)	TSS (kg/yr)
Pollutant Loads in Overland Drain	65	907	458	6706	3.70E+10	5018
Pollutant Loads Removed by the Project	13	308	133	1538	1.85E+10	846
Percent Removal	21%	34%	29%	23%	50%	17%

Calculation does not include load removal through volume reduction such as site irrigation demand, evaporation,
and partial infiltration

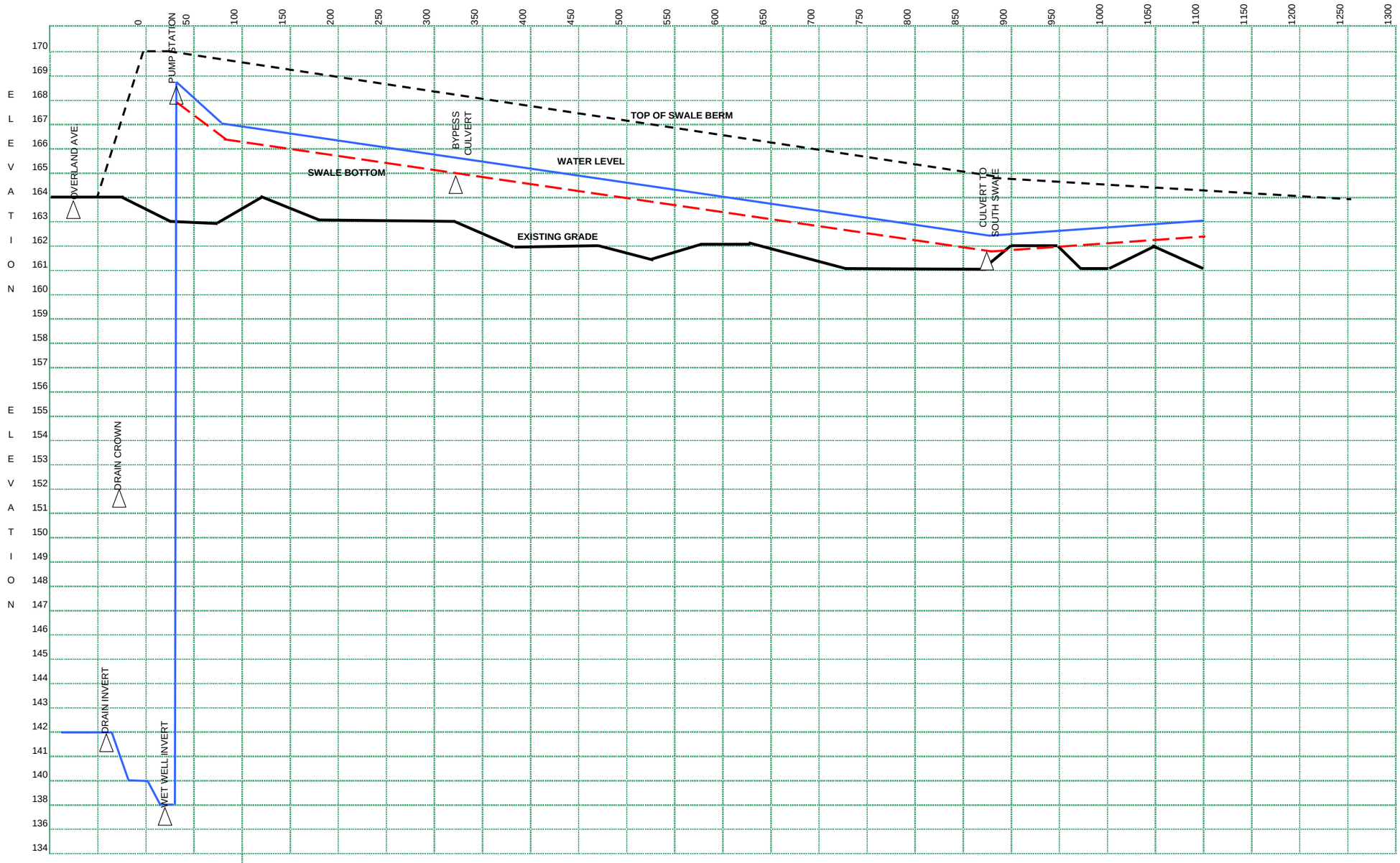
Pollutant Loads Removed from Overland Stormdrain during dry-weather.

	Nitrate (Kg/yr)	Tot Copper (Kg/yr)	Tot Lead (Kg/yr)	Tot Zinc (Kg/yr)	FC (MPN/yr)	TSS (kg/yr)
Pollutant Loads in Overland Drain	65	906.64	458	6706	3.70E+10	5018
Pollutant Loads Removed by the Project	17	362	161	1940	2.07E+10	1147
Percent Removal	27%	40%	35%	29%	56%	23%

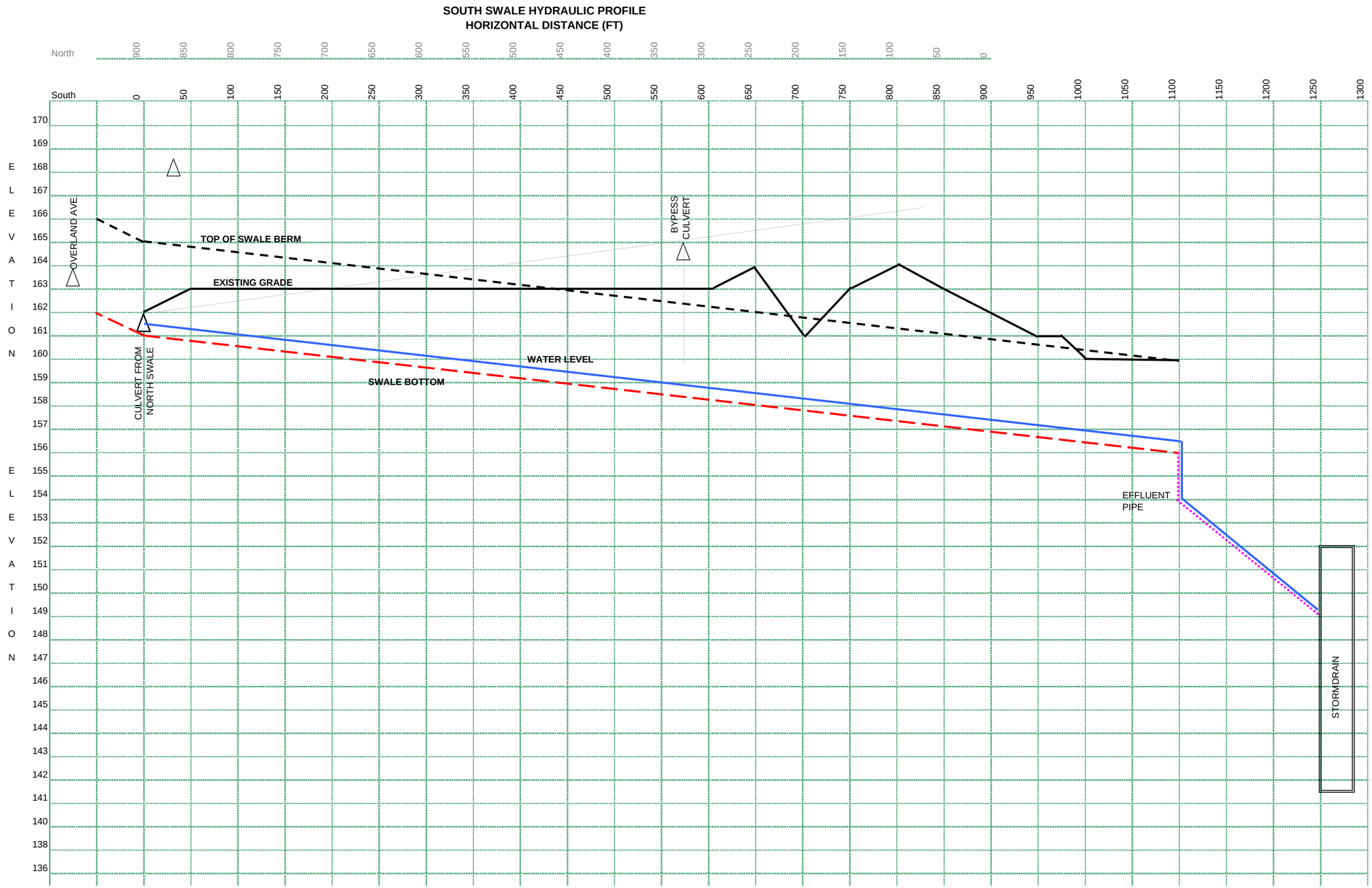
Load removals account for evaporation, site irrigation, and partial infiltration of approximately 6% of total influent.

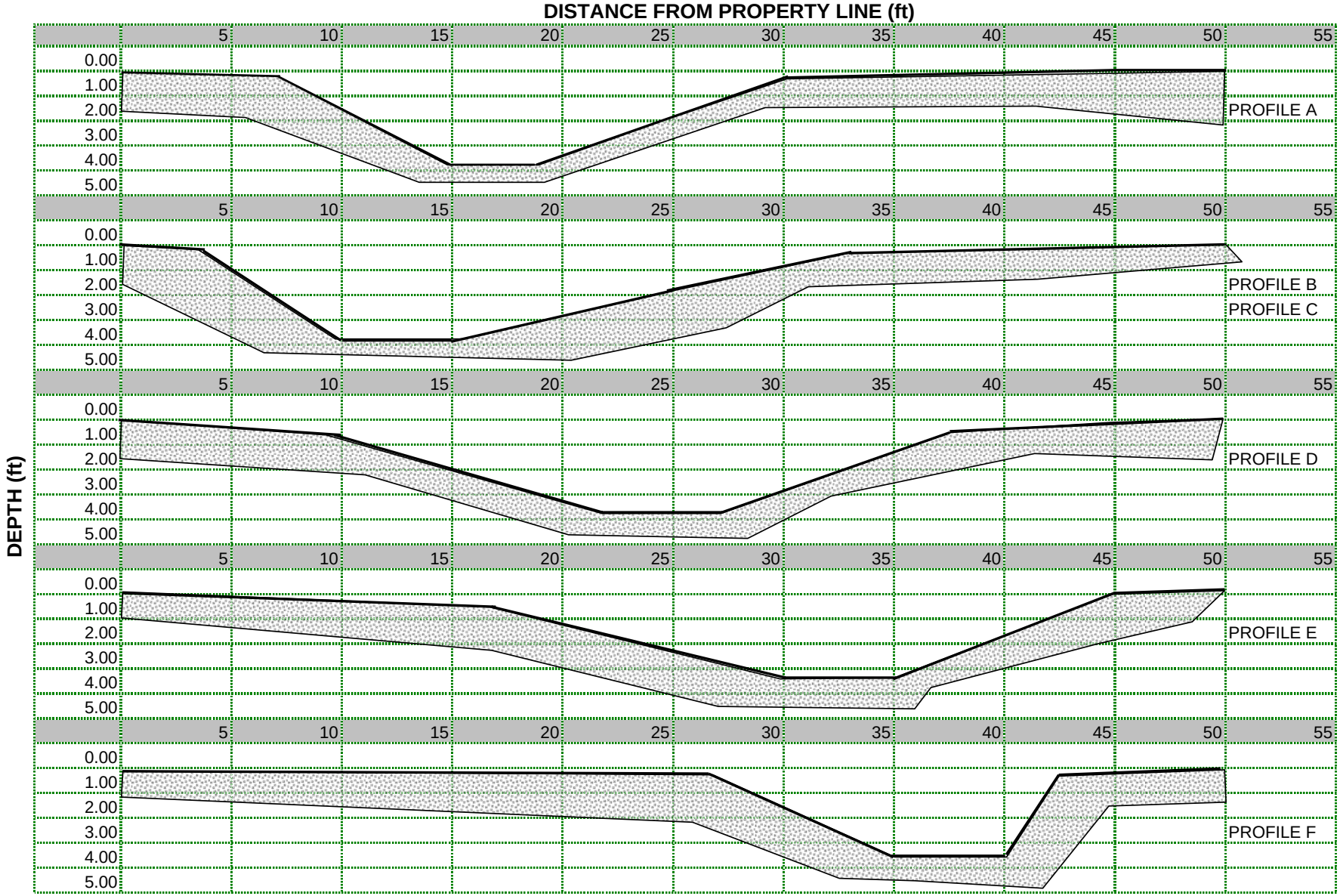
APPENDIX C-SITE ELEVATION, HYDRAULIC PLAN AND PROFILE

HORIZONTAL DISTANCE (FT)



SOUTH SWALE HYDRAULIC PROFILE
HORIZONTAL DISTANCE (FT)




DISTANCE FROM PROPERTY LINE (ft)
DEPTH (ft)
5 10 15 20 25 30 35 40 45 50 55
0.00
1.00
2.00
3.00
4.00
5.00
PROFILE A
PROFILE B
PROFILE C
PROFILE D
PROFILE E
PROFILE F

Normal Depth (dN) **0.0833** ft

		PROFILE A	PROFILE B	PROFILE C	PROFILE D	PROFILE E	PROFILE F	
1	Manning Coefficient (n)	0.1	0.1	0.1	0.1	0.1	0.1	
2	Slope (s)	0.005	0.005	0.005	0.005	0.005	0.005	ft/ft
3	Depth of Channel (D)	4.5	4.5	4.5	4.5	4.5	4.5	ft
4	Side slope (z)	**2.22**	**3.33**	**1.56**	**2.67**	**2.22**	**0.67**	ft/ft
5	Channel base (b)	5	5	5	5	5	5	ft
6	d/b	**0.0167**	**0.0167**	**0.0167**	**0.0167**	**0.0167**	**0.0167**	
7	A/d^2	52	53	51.5	52.5	52	20.6	
8	AR^(2/3)/b^(8/3)	0.0015	0.0015	0.0015	0.0015	0.0015	0.0067	
9	A	1.39	1.46	1.35	1.42	1.39	1.29	sq ft
10	b^8/3	73.10	73.10	73.10	73.10	73.10	73.10	ft
11	AR2/3	0.110	0.110	0.110	0.110	0.110	0.490	
12	Q	0.12	0.12	0.12	0.12	0.12	0.51	cuft/sec
13	Velocity (v)	0.083	0.079	0.086	0.081	0.083	0.398	ft/sec
14	Detention time(dT)	5.7	6.0	5.5	5.8	5.7	1.2	hours

1 Manning Coefficient (n) ranges from 0.03 to 0.10 depending on the height of vegatation (grass).
Values may be higher for channels with shrubbery or trees.
Table 8.7, ASCE Manual for Design and Construction of Urban Stormwater Management Systems
2 Slope ranges from 0.4 to 0.6 percent
4 Slopes of the sides of bioswale varies and calculated to be the ratio of horizontal over vertical distance (run/rise)
7,8 Values from Trapozoidal Section Factors, Appendix 5.8, F. Jangar. Basic Hydraulics for Civil Engineers
9 Cross section area of the wetted perimeter
12,13 Flow and velocity are derived using Manning Equation of Q = [s^0.5 x 1.266 AR^(2/3)]/n

Normal Depth (dN) **0.25** ft

	PROFILE A	PROFILE B	PROFILE C	PROFILE D	PROFILE E	PROFILE F	
Manning Coefficient (n)	0.1	0.1	0.1	0.1	0.1	0.1	
Slope (s)	0.005	0.005	0.005	0.005	0.005	0.005	ft/ft
Depth of Channel (D)	4.5	4.5	4.5	4.5	4.5	4.5	ft
Side slope (z)	**2.22**	**3.33**	**1.56**	**2.67**	**2.22**	**0.67**	ft/ft
Channel base (b)	5	5	5	5	5	5	ft
d/b	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	
A/d^2	22	24	21.5	22.5	22	20.6	
AR^(2/3)/b^(8/3)	0.007	0.0071	0.0069	0.007	0.007	0.0067	
A	1.39	1.46	1.35	1.42	1.39	1.29	sq ft
b^8/3	73.10	73.10	73.10	73.10	73.10	73.10	ft
AR2/3	0.512	0.519	0.504	0.512	0.512	0.490	
Q	0.54	0.55	0.53	0.54	0.54	0.51	cuft/sec
Velocity (v)	0.387	0.374	0.393	0.380	0.387	0.398	ft/sec
Detention time(dT)	1.2	1.3	1.2	1.2	1.2	1.2	hours

1 Manning Coefficient (n) ranges from 0.03 to 0.10 depending on the height of vegatation (grass).
Values may be higher for channels with shrubbery or trees.
Table 8.7, ASCE Manual for Design and Construction of Urban Stormwater Management Systems
2 Slope ranges from 0.4 to 0.6 percent
4 Slopes of the sides of bioswale varies and calculated to be the ratio of horizontal over vertical distance (run/rise)
7,8 Values from Trapozoidal Section Factors, Appendix 5.8, F. Jangar. Basic Hydraulics for Civil Engineers
9 Cross section area of the wetted perimeter
12,13 Flow and velocity are derived using Manning Equation of Q = [s^0.5 x 1.266 AR^(2/3)]/n

Normal Depth (dN) **0.333** ft

	PROFILE A	PROFILE B	PROFILE C	PROFILE D	PROFILE E	PROFILE F	
Manning Coefficient (n)	0.1	0.1	0.1	0.1	0.1	0.1	
Slope (s)	0.005	0.005	0.005	0.005	0.005	0.005	ft/ft
Depth of Channel (D)	4.5	4.5	4.5	4.5	4.5	4.5	ft
Side slope (z)	2.22	3.33	1.56	2.67	2.22	0.67	ft/ft
Channel base (b)	5	5	5	5	5	5	ft
d/b	0.0667	0.0667	0.0667	0.0667	0.0667	0.0667	
A/d^2	16.2857	17.2857	15.7875	16.7875	18.667	14.7857	
AR^(2/3)/b^(8/3)	0.0123	0.0128	0.0121	0.0126	0.0095	0.0114	
A	1.91	2.04	1.84	1.96	1.91	1.74	sq ft
b^8/3	73.10	73.10	73.10	73.10	73.10	73.10	ft
AR2/3	0.899	0.936	0.885	0.921	0.694	0.833	
Q	0.945	0.983	0.929	0.968	0.730	0.088	cuft/sec
Velocity (v)	0.494	0.483	0.505	0.493	0.381	0.050	ft/sec
Detention time(dT)	1.0	1.0	0.9	1.0	1.2	9.4	hours

1 Manning Coefficient (n) ranges from 0.03 to 0.10 depending on the height of vegatation (grass).
Values may be higher for channels with shrubbery or trees.
Table 8.7, ASCE Manual for Design and Construction of Urban Stormwater Management Systems
2 Slope ranges from 0.4 to 0.6 percent
4 Slopes of the sides of bioswale varies and calculated to be the ratio of horizontal over vertical distance (run/rise)
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9 Cross section area of the wetted perimeter
12,13 Flow and velocity are derived using Manning Equation of Q = [s^0.5 x 1.266 AR^(2/3)]/n

Normal Depth (dN) **0.667** ft

	PROFILE A	PROFILE B	PROFILE C	PROFILE D	PROFILE E	PROFILE F	
Manning Coefficient (n)	0.1	0.1	0.1	0.1	0.1	0.1	
Slope (s)	0.005	0.005	0.005	0.005	0.005	0.005	ft/ft
Depth of Channel (D)	4.5	4.5	4.5	4.5	4.5	4.5	ft
Side slope (z)	**2.22**	**3.33**	**1.56**	**2.67**	**2.22**	**0.67**	ft/ft
Channel base (b)	5	5	5	5	5	5	ft
d/b	**0.1333**	**0.1333**	**0.1333**	**0.1333**	**0.1333**	**0.1333**	
A/d^2	9.69	10.6923	9.1932	10.1923	9.69	8.44	
AR^(2/3)/b^(8/3)	0.0361	0.0387	0.0347	0.0374	0.0361	0.0323	
A	3.83	4.07	3.68	3.93	3.83	3.48	sq ft
b^8/3	73.10	73.10	73.10	73.10	73.10	73.10	ft
AR2/3	2.639	2.829	2.537	2.734	2.639	2.361	
Q	2.773	2.973	2.665	2.873	2.773	2.481	cuft/sec
Velocity (v)	0.725	0.730	0.724	0.732	0.725	0.713	ft/sec
Detention time(dT)	0.7	0.6	0.7	0.6	0.7	0.7	hours

1 Manning Coefficient (n) ranges from 0.03 to 0.10 depending on the height of vegatation (grass).
Values may be higher for channels with shrubbery or trees.
Table 8.7, ASCE Manual for Design and Construction of Urban Stormwater Management Systems
2 Slope ranges from 0.4 to 0.6 percent
4 Slopes of the sides of bioswale varies and calculated to be the ratio of horizontal over vertical distance (run/rise)
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9 Cross section area of the wetted perimeter
12,13 Flow and velocity are derived using Manning Equation of Q = [s^0.5 x 1.266 AR^(2/3)]/n

APPENDIX D-GEOTECHNICAL REPORTS

LOG OF BORING
B1

BORING / WELL CONSTRUCTION	DEPTH (FEET)	INTERVAL	BLOW COUNT	USCS SYMBOLS	USCS DESIGNATION	SOIL DESCRIPTION	SAMPLE ID	ANALYSES (mg/Kg) ppm FIELD PID / FID	LABORATORY 8020 BTEX	8056	8015m	418.1	LEAD
concrete cap; bentonite seal	0					905870001							
	1												
	2		6			CLAY, STIFF, DARK BROWN, SLIGHTLY MOIST, NO PRODUCT ODOR	B1-2	0				ND	
	3		10										
	4		20										
	5		6			CLAY, STIFF, DARK BROWN, SLIGHTLY MOIST, NO PRODUCT ODOR	B1-5	0					
	6		13										
	7		22										
	8												
	9												
	10		12			CLAY, STIFF, DARK BROWN, SLIGHTLY MOIST, NO PRODUCT ODOR	B1-10	0				ND	
	11		17		CL								
	12		20										
	13												
	14												
	15		8			CLAY, WITH 20 % GRAY SHALE PEBBLES, STIFF, DARK BROWN, SLIGHTLY MOIST, NO PRODUCT ODOR	B1-15	5					
	16		15										
	17		26										
	18												
	19												
	20		45			CLAY, WITH 20% GRAY SHALE PEBBLES, STIFF, DARK BROWN, SLIGHTLY MOIST, NO PRODUCT ODOR	B1-20	0	ND		ND	ND	
	21		55						ND				
			50						ND				
	22								ND				ND

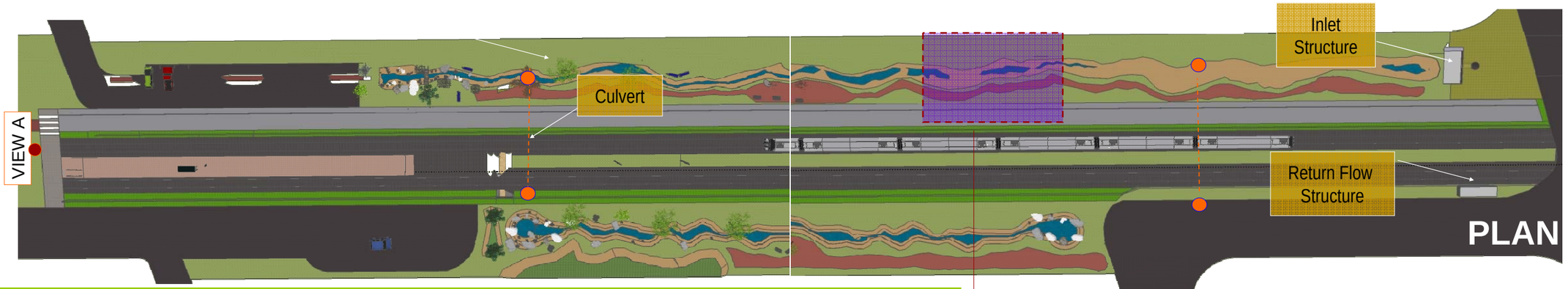
SURFACE ELEVATION: UNKNOWN
TOTAL DRILL DEPTH: 20 ft.
FINAL SAMPLE DEPTH: 1.5 ft.
TOTAL DEPTH: 21.5 ft.
TYPE OF SAMPLER: 3" O.D. MODIFIED PORTER SAMPLER

DATE DRILLED: 9-26-91
LOGGED BY: J FISHER
SUPERVISED BY: M JOHNSON
DIAMETER OF BORING: 6 in.
WATER ENCOUNTERED AT: NOT ENCOUNTERED

ACTIVE LEAK TESTING, INC.
1300 SOUTH BEACON STREET SUITE #120
SAN PEDRO, CA 90731

CLIENT: CITY OF LOS ANGELES
10901 PICO BLVD.
LOS ANGELES, CALIFORNIA

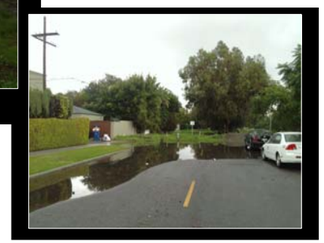
APPENDIX E-PICTURES AND RENDERINGS



PLAN VIEW

WESTWOOD NEIGHBORHOOD GREENWAY

EXISTING CONDITIONS

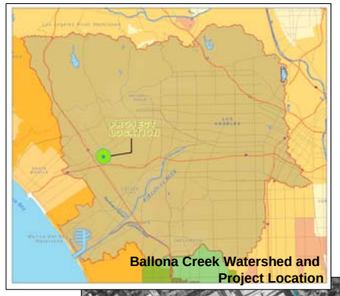


PROJECT COMPONENTS

- Dry-weather flow diversion structure from Overland Drain
- Two lateral culverts across the train tracks
- Trash screens and primary sediment removal devices
- Treated water outlet structure
- Westwood Blvd catch basin and local drain line
- North swale (900 to1,100 ft) with watertight liners
- South swale (400 to 700 ft) with watertight liners
- Swaleside landscaping with local plants
- Nature trail and recreational amenities
- Educational display boards and interpretive signage
- Community gathering area and outdoor classroom

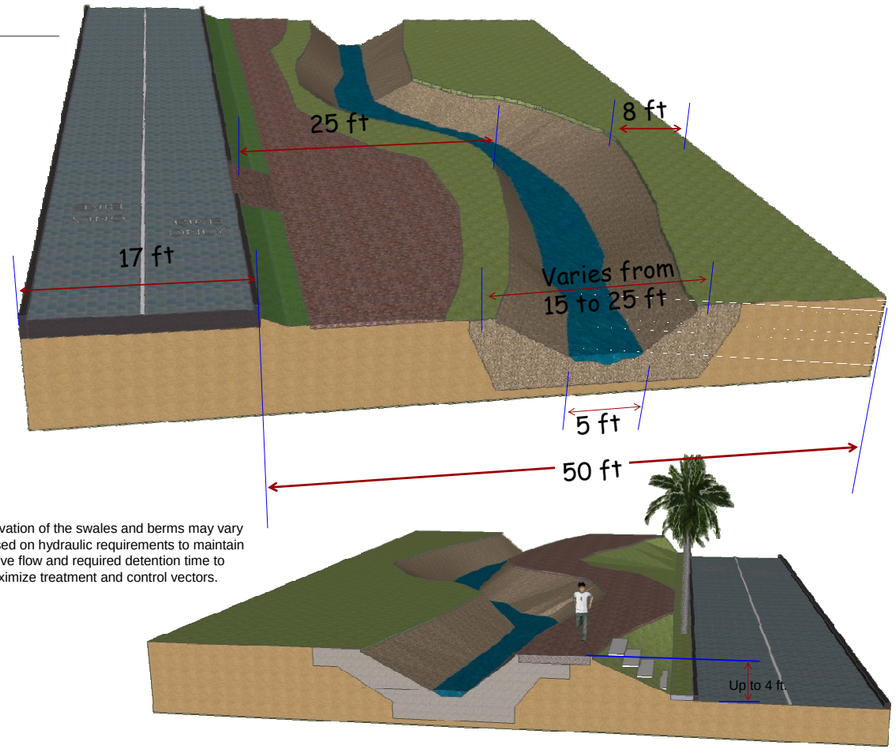
JURISDICTION AND REGULATORY INFORMATION

- Council District: 5 (P. Koretz)
- Senate District: 36th, (J. Hahn)
- Assembly District: 47th (H. Mitchell)
- Hydrologic Connection: Ballona Creek Watershed and Santa Monica Bay
- TMDLs: Bacteria, Metals, and Toxic Pollutant



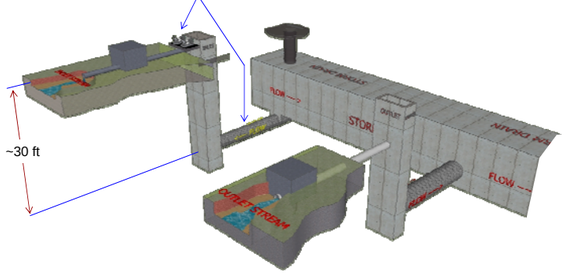
Ballona Creek Watershed and Project Location

Aerial photo of Project and adjacent flood prone area

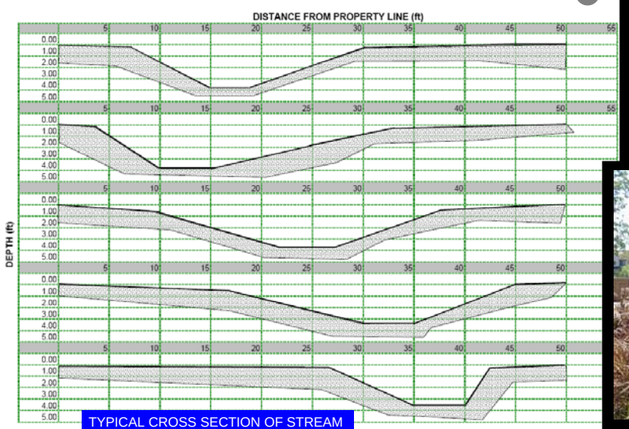


Elevation of the swales and berms may vary based on hydraulic requirements to maintain active flow and required detention time to maximize treatment and control vectors.

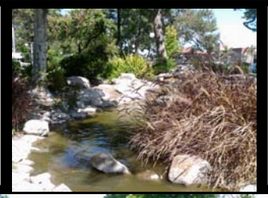
TYPICAL CROSS SECTIONS OF SWALE (WITHOUT LANDSCAPING)

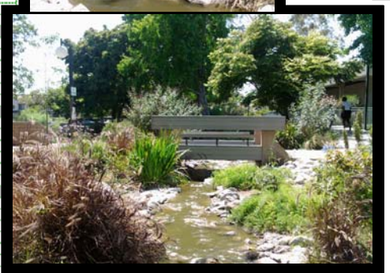


INLET DIVERSION, STORMDRAIN AND OUTLET STRUCTURES



TYPICAL CROSS SECTION OF STREAM





TYPICAL VEGETATED SWALES AND PLANTS

WATER QUALITY AND OTHER BENEFITS

- Treatment of dry-weather runoff from 2,400 acres
- Treatment of wet-weather runoff from Westwood
- Improve water quality in Ballona Creek and Santa Monica Bay
- Reduce local flooding potential
- Create open space and native habitat
- Create recreational space and community spirit
- Provide environmental outreach
- Create eco-educational opportunity
- Integrate eco-restoration, mass transit and sustainable transportation

VIEW A: Looking East from Westwood Blvd.