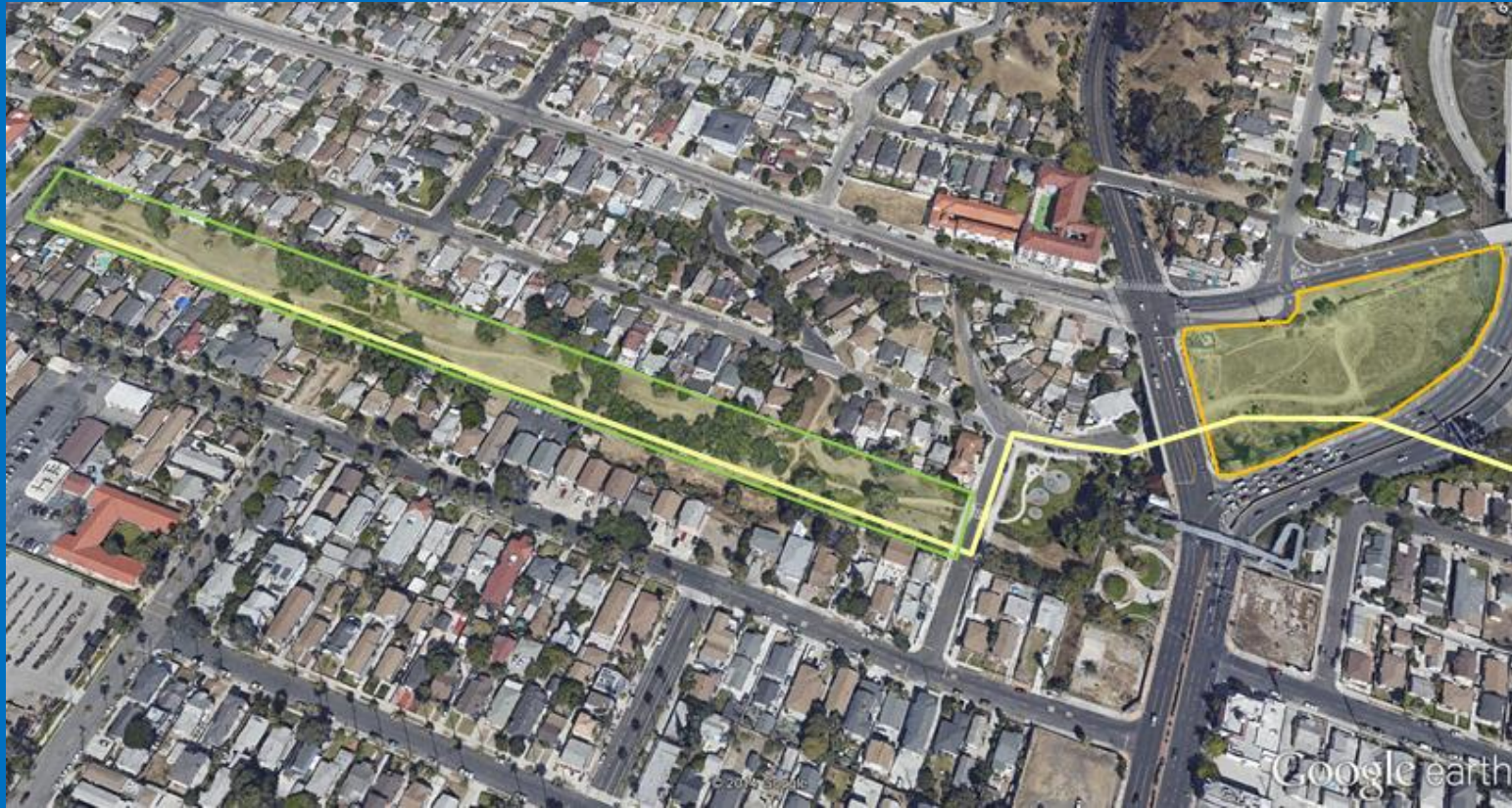


Bandini Park

Stormwater Quality Project



Deborah Deets, QSP/QSD
Shahriar Eftekharzadeh, PhD, PE



SEITec

Agenda

1. Background and Objective
2. Stormwater Runoff
3. Quality Enhancement Scheme
4. Next Steps



Project Setting

- 5.5-acre park
- Adjacent 3.1-acre site
- 48" storm drain through the park and the site



Objective

Enhance stormwater runoff quality using BMPs in Bandini Park and 3.1-Acre site



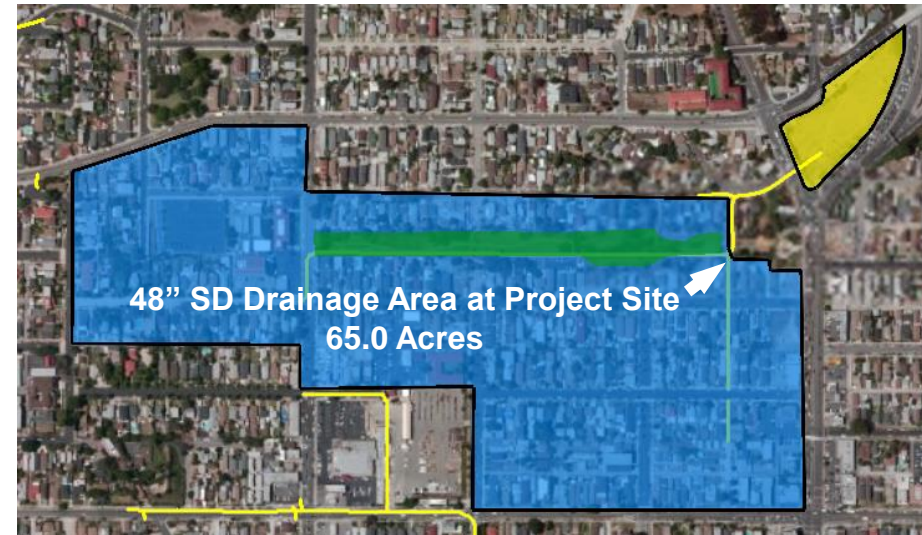
Stormwater Runoff



Average Annual Stormwater Runoff

Ann. Rainfall – in	13.5
Drainage Area – Acres	65
Run off Coefficient*	0.41
Ann. Runoff – MG	9.8

* LA County Hydrology Manual



SEITec

85th Percentile (3/4") Rain Runoff

85 th Percentile rain (in)	0.75
DA (acres)	65
Peak runoff (cfs)	2.9
Runoff Volume (ac-ft)	1.66
Runoff (MG)	0.54

Need **500,000 gal** of stormwater storage to capture the entire 85th percentile rain runoff at project site

Peak Flow Hydrologic Analysis

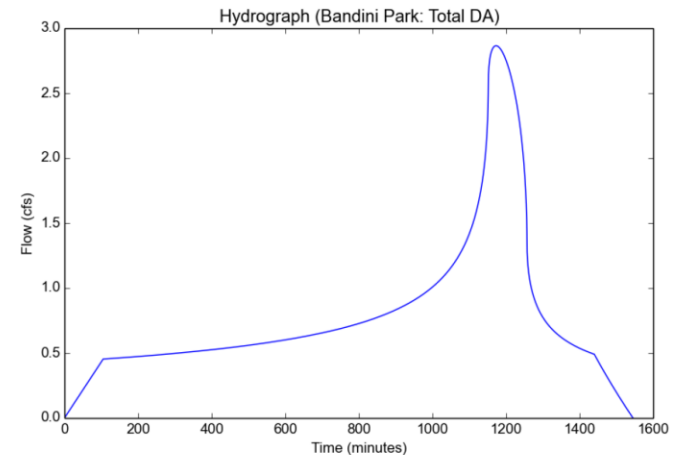
File location: C:/Users/SE/Documents/Projects/1110-Gaffer/Runoff Rate Calcs/Bandini Park - 85th Percentile Storm Hyd. Calc.pdf
Version: HydroCalc 0.3.1-beta

Input Parameters

Project Name	Bandini Park
Subarea ID	Total DA
Area (ac)	65.0
Flow Path Length (ft)	2700.0
Flow Path Slope (vft/hft)	0.056
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.39
Soil Type	3
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

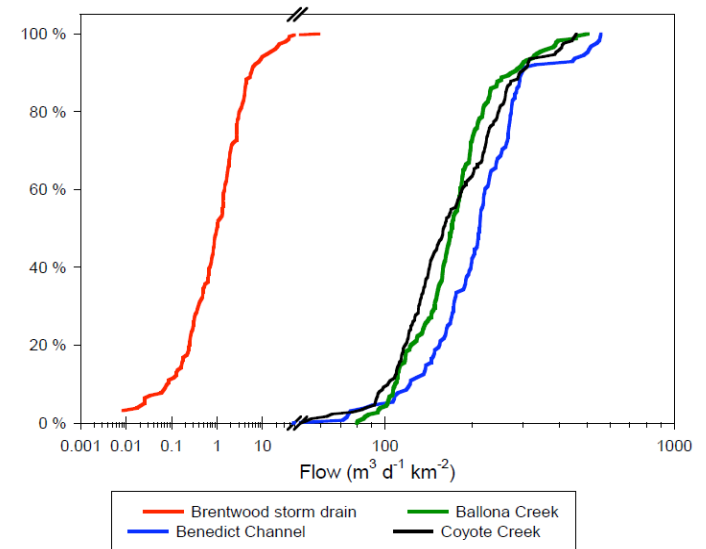
Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.107
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.412
Time of Concentration (min)	105.0
Clear Peak Flow Rate (cfs)	2.865
Burned Peak Flow Rate (cfs)	2.865
24-Hr Clear Runoff Volume (ac-ft)	1.6602
24-Hr Clear Runoff Volume (cu-ft)	72316.6922



Estimated Storm Drain Dry-Weather Flow

DA (acres)	65
DA (km ²)	0.26
Dry Weather flow (m ³ /d/km ²)*	1.0
Dry Weather flow (m ³ /d)	0.26
Dry Weather flow (gpd)	69

* Ackerman and Stein, 2005



	Drainage Area (km ²)	Developed Land Use
Brentwood Storm Drain	1	98%
Benedict Channel	30	62%
Ballona Creek	250	85%
Coyote Creek	487	68%

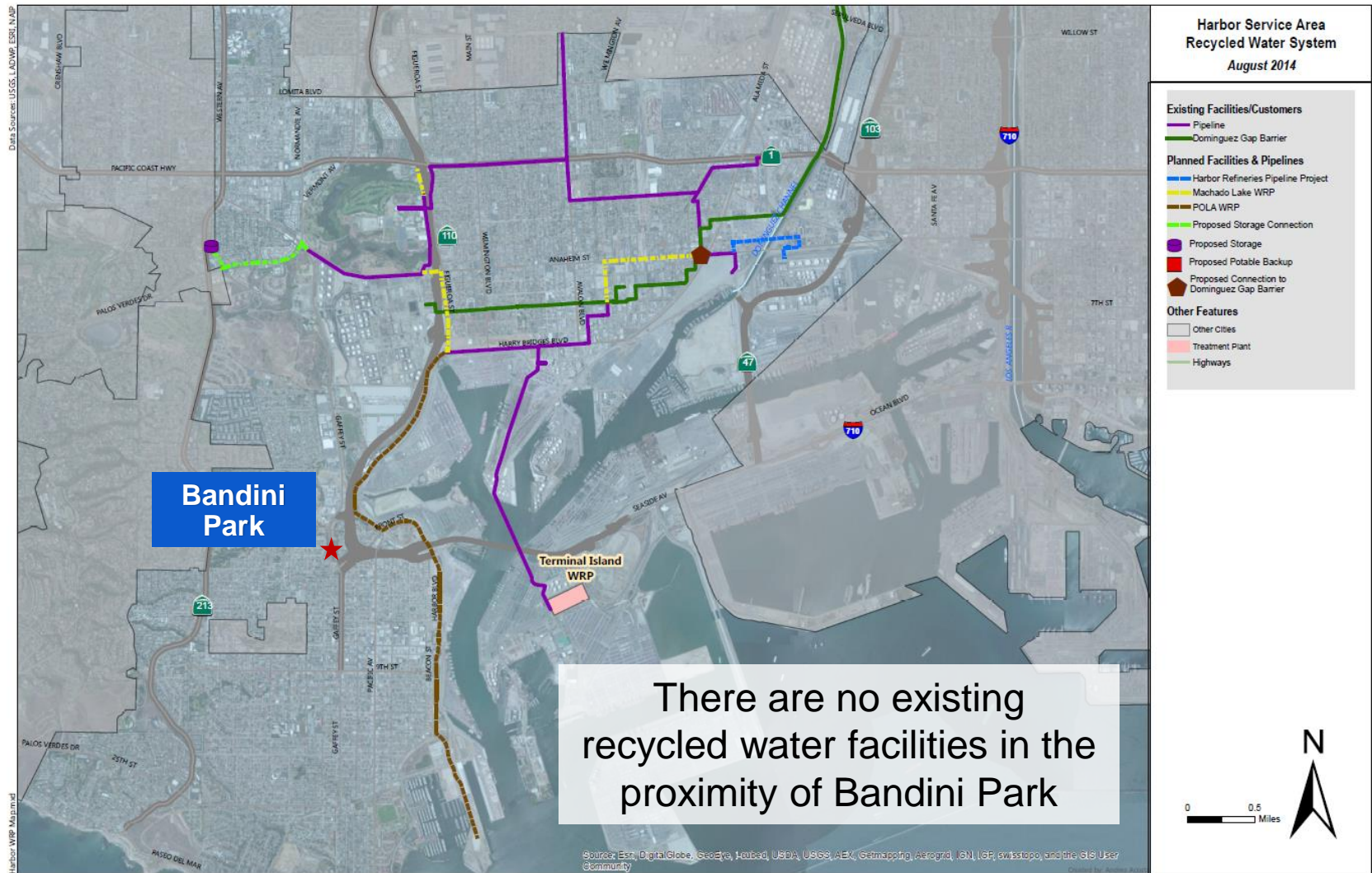


SEITec

Potential for Recycled Water Use



RW Availability (for potential irrigation)



SEITec

Stormwater Quality Enhancement Scheme

A. Storage at the 3.1-Acre Site in Project



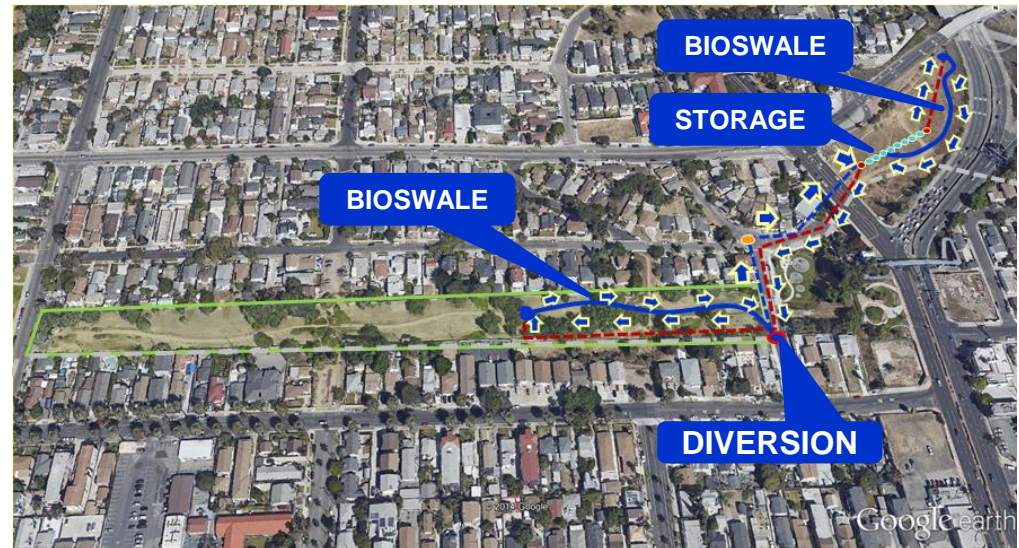
Existing System



SEITec

Stormwater Quality Enhancement Scheme

1. Construct stormwater storage facility (WaterSilos) at the 3.1-acre site
2. Divert and store the 85th percentile rain runoff
3. Pump and recirculate (treat) stored water to two separate bioswales
4. Return remaining treated water back to storm drain before rain



Proposed System



SEITec

1. Construct WaterSilos Storage at 3.1-Acre Site



2. Divert and Store Stormwater in WaterSilos



3. Pump Stored Water to High Ground



4. Enhance Water Quality by Recirculating thru Bioswales



5. Return Treated Water to Harbor via SD Before Rain



SEITec

Stormwater Quality Enhancement Scheme

B. Storage at Bandini Park



Stormwater Quality Enhancement Scheme

1. Construct stormwater storage facility (WaterSilos) in Bandini Park
2. Divert and store the 85th percentile rain runoff
3. Pump and recirculate stored water to two separate bioswales
4. Return remaining treated water back to storm drain before rain



Proposed System



1. Construct WaterSilos Storage in Bandini Park



2. Divert and Store Stormwater



3. Pump Stored Water to High Ground



4. Enhance Water Quality by Recirculating thru Bioswales



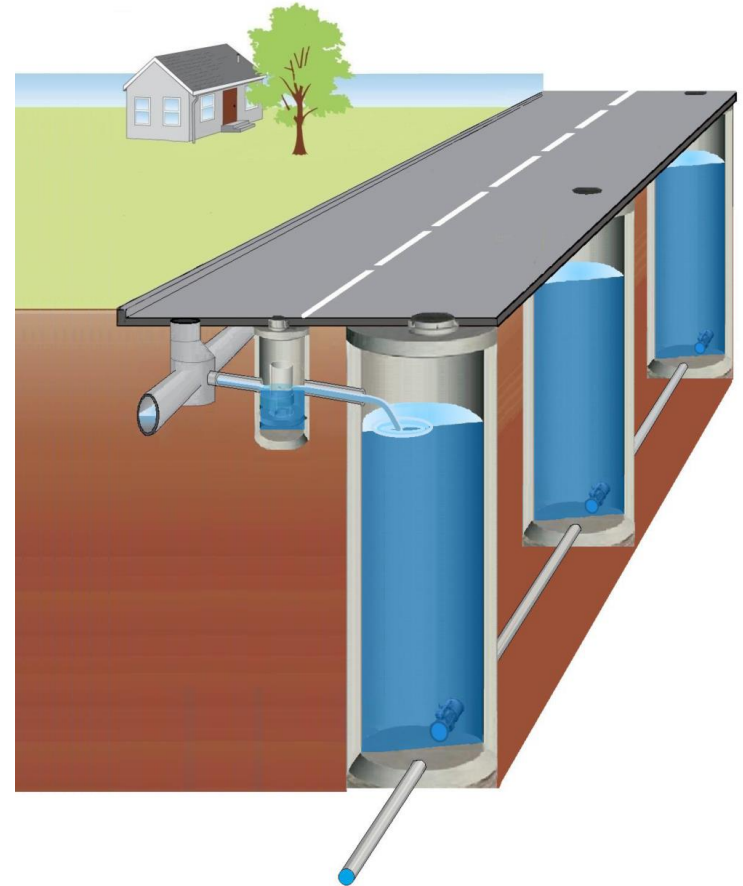
SEITec

5. Return Treated Water to Harbor via SD Before Rain



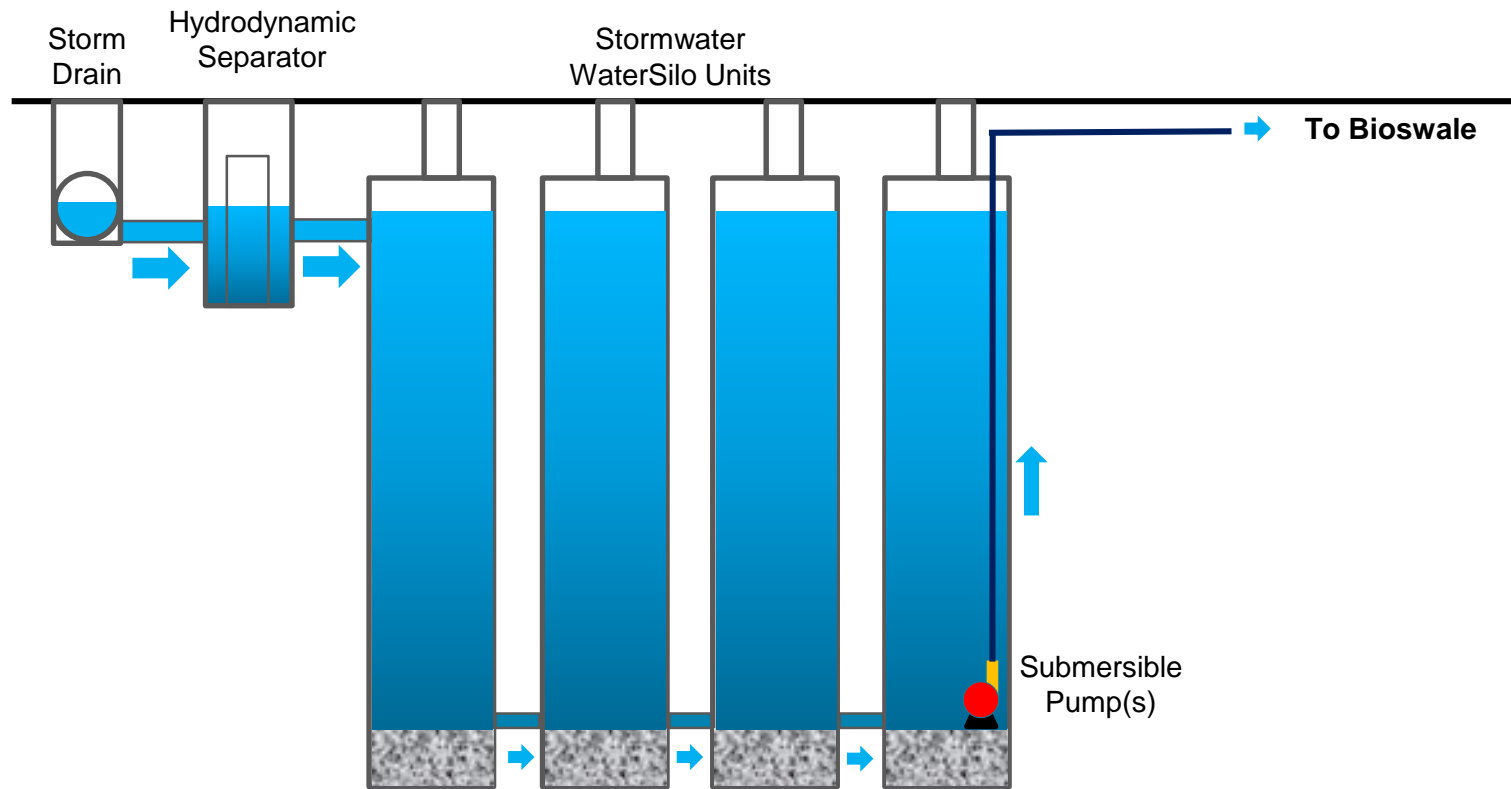
WaterSilos Stormwater Storage System

www.WaterSilos.info



SEITec

Stormwater Storage and Pumping Process



SEITec

WaterSilo Units

Ground (El. 95 - 100)

El. 85.3

(D-22931, Sheet
13, Sta. 36+08)

48" SD

El. 83.0

60 Ft

(50,000 gal)

El. 23

8 ft

5 ft

50 - 200 ft

14 ft

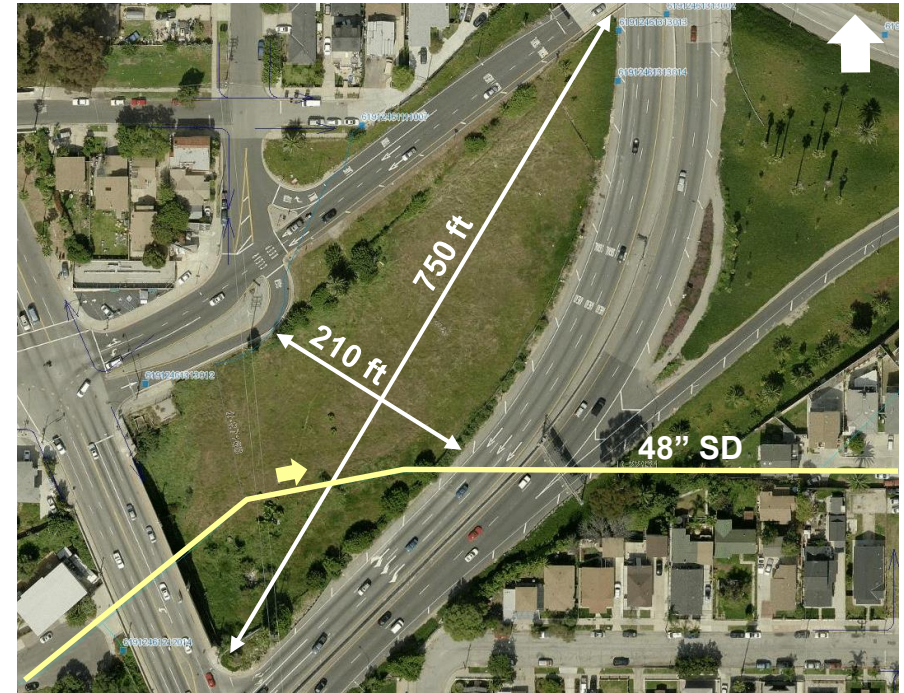
50,000 -
200,000 Gallons



SEITec

WaterSilos Location at the 3.1-acre Site

- Large plot
- Excellent access
- Must still divert at Bandini Park (SD too deep)
- Longer pressure line to Bandini Park



WaterSilos Layout at 3.1-acre Site (shown above ground)



WaterSilos Layout at 3.1-acre Site (shown above ground)



SEITec

Proposed Layout



SEITec

The 3.1-Acre Site Looking South



SEITec

WaterSilos Location at Bandini Park

- Good access
- Sufficient width
- Close to point of diversion



WaterSilos at Bandini Park (shown above ground)

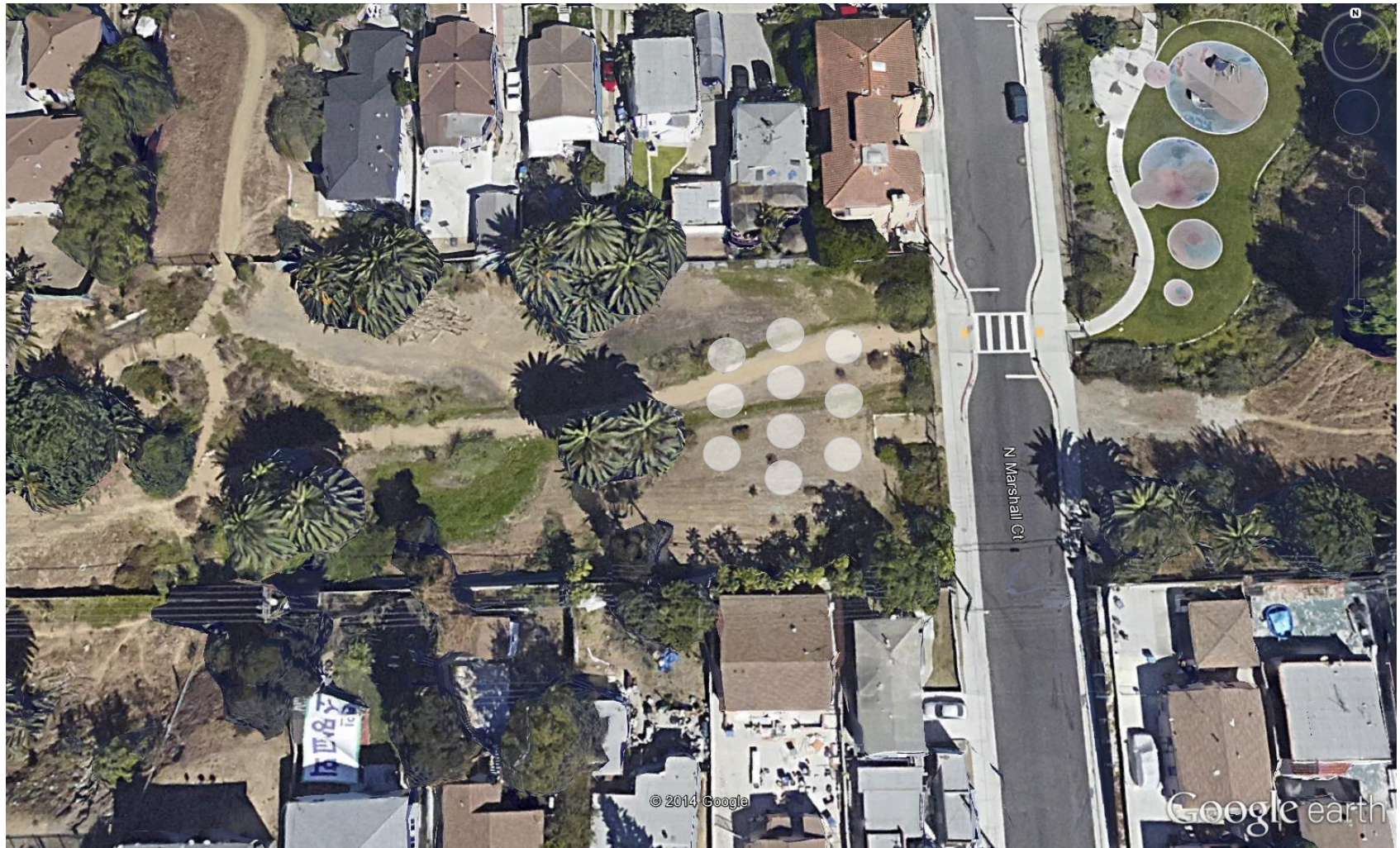


WaterSilos at Bandini Park (shown above ground)



SEITec

Finished WaterSilos at Bandini Park (below ground)



SEITec

Proposed Site for WaterSilos at Bandini Park



SEITec

WaterSilo Analysis



Analysis Approach

- **Water balance** using 10 years of 24-hr rainfall data

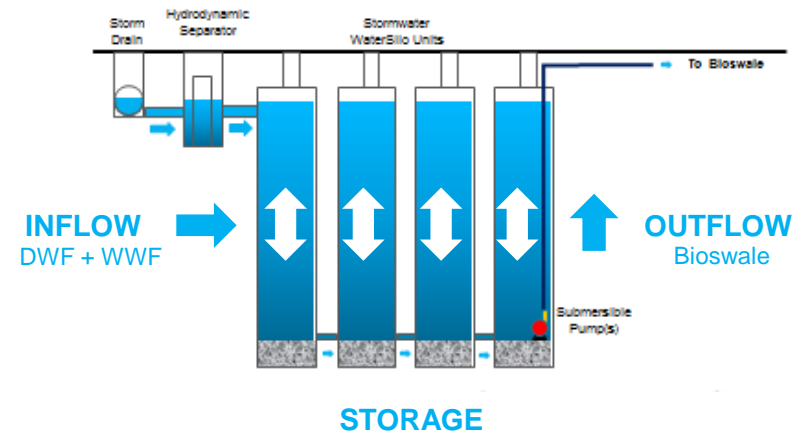
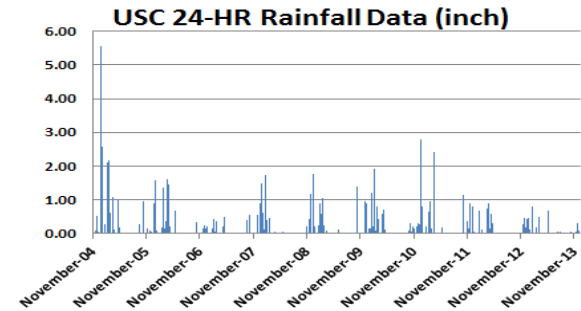
$$\text{INFLOW} - \text{OUTFLOW} = \Delta \text{STORAGE}$$

INFLOW: DWF + WWF

OUTFLOW: Pumping to bioswale

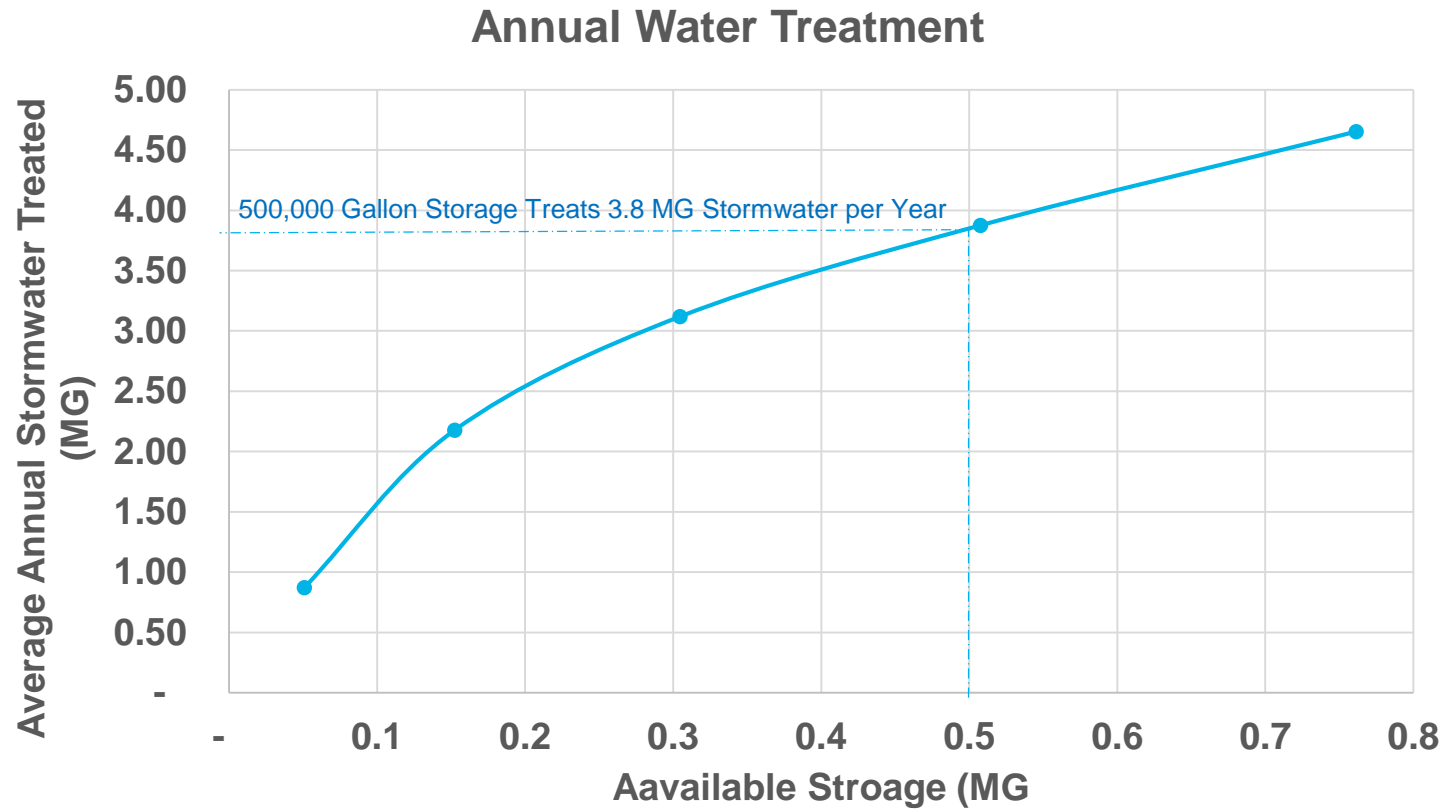
- **Determine Water Treated*** for different levels of available storage

* Average annual volume storm drain water diverted, stored, and supplied to bioswales



SEITec

Water Harvested



SEITec

Preliminary System Cost

Alternative A – WaterSilos at 3.1-Acre Site

Description	Quantity	Unit	Unit Cost	Total Cost
Stormwater Diversion Structure	1	ALLW	\$30,000	\$30,000
Hydrodynamic Separator	1	ALLW	\$40,000	\$40,000
WaterSilo Mobilization	1	LS	\$70,000	\$70,000
WaterSilo Units	10	EA	\$100,000	\$1,000,000
Hauling, and disposal of drilled spoils	5,818	CY	\$25	\$145,444
Interconnection pipe @ 5-ft	60	LF	\$500	\$30,000
Submersible Solids handling pump - 100 gpm, 174 TDH, 4.4 HP	1	EA	\$7,500	\$7,500
Submersible Solids handling pumps - 100 gpm, 112 TDH, 2.8 HP	1	EA	\$5,000	\$5,000
Off-grid 8 kW solar power system with batteries for pumps	1	EA	\$40,000	\$40,000
Storm Drain Diversion Pipeline	800	LF	\$180	\$144,000
3-inch pressure pipeline	2100	LF	\$25	\$52,500
Bioswale	950	LF	\$100	\$95,000
Step Drops in Bioswales	35	EA	\$1,500	\$52,500
Subtotal				\$1,711,944
Contingencies			15%	\$256,792
Total Estimated Construction Cost				\$1,968,736



Preliminary System Cost

Alternative B – WaterSilos at Bandini Park

Description	Quantity	Unit	Unit Cost	Total Cost
Stormwater Diversion Structure	1	ALLW	\$30,000	\$30,000
Hydrodynamic Separator	1	ALLW	\$40,000	\$40,000
WaterSilo Mobilization	1	LS	\$70,000	\$70,000
WaterSilo Units	10	EA	\$100,000	\$1,000,000
Hauling, and disposal of drilled spoils	5,818	CY	\$25	\$145,444
Interconnection pipe	60	LF	\$500	\$30,000
Submersible Solids handling pump - 100 gpm, 140 ft TDH, 3.5 HP	1	EA	\$5,000	\$5,000
Submersible Solids handling pump - 100 gpm, 130 ft TDH, 3.3 HP	1	EA	\$5,000	\$5,000
Submersible Solids handling pump - 100 gpm, 25 ft TDH, 0.7 HP	1	EA	\$15,000	\$15,000
Off-grid K 8 kW solar power system with batteries for pumps	1	EA	\$40,000	\$40,000
Storm Drain Diversion Pipeline	50	LF	\$180	\$9,000
3-inch pressure pipeline	2800	LF	\$25	\$70,000
Bioswale	950	LF	\$100	\$95,000
Step Drops in Bioswales	35	EA	\$1,500	\$52,500
Subtotal				\$1,606,944
Contingencies			15%	\$241,042
Total Estimated Construction Cost				\$1,847,986



SEITec

Next Steps

1. There is an opportunity to implement a stormwater quality enhancement project at Bandini Park
2. Project would capture and treat the 85th percentile runoff
3. Preliminary estimated cost is about \$2.0 Million



Summary

1. Present to LASAN management for approval
2. Secure funding
3. Proceed with preliminary design



Q&A

