Appendix I2 Preliminary LID Report

Appendices

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PRELIMINARY LID REPORT

Irwindale Gateway Development

Irwindale, CA

Prepared for:
Kearny Real Estate Company
11150 Santa Monica Blvd, Suite 300
Los Angeles, CA 90025

Prepared under the Supervision of:

Oscar Rivera, P.E.

March 20, 2023

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1.Project Description

The Irwindale Gateway project is a Logistics and Distribution center that will construct three warehouse buildings and associated parking and loading docks. The project is located in the City of Irwindale in the County of Los Angeles, bound by Interstate 605 on the project's westerly boundary, Live Oak Ln on the north and east and Live Oak Avenue on the south. The existing site is a vacant lot that was previously a 60-acre rock and cement quarry and is set to begin rough grading in the near future. The existing site drains towards an existing Pit/detention basin that is located on the westerly property line. The report hereon represents the LID analysis for the Option 1 site plan of the Irwindale Gateway Specific Plan. Option 2 represents the site plan for the construction of BESS (Battery Energy Storage System) site. The proposed Option 1 study hereon effectively addresses the LID design for Option 2, since Option 1 contains a larger impervious area. The BESS site is anticipated to have a similar drainage pattern with minimal to no pavement.

The purpose of this report is to provide engineering LID calculations in support of the Irwindale Gateway Development project, which will:

- Perform hydrology calculations for the 85th percentile storm eventProvide engineering calculations of the proposed LID BMPs for the site

2.Existing Hydrologic Characteristics

The existing onsite condition consists of graded land that sheet flows south towards an existing detention basin/pit. Previous site work done on the site was the rough grade of the project area, where dirt piles and truck loading areas were present and removed. The overall drainage flows west towards the I-605 freeway with an average slope of 3%. The onsite soil classification is split between class 008 and 015. Soil Class 008 is described as Hanford Silt Loam Soils and Class 015 is described as Tujunga Fine Sandy Loam Soils. The onsite area is mostly pervious in the existing condition. However, a visit to the project site revealed the presents of an impervious asphalt layer in several locations of the site. For that reason, the impervious ratio for the existing onsite area is 25%.

Prior to the use of the project site as a quarry and now graded land, stormwater flowed across the site from the north and east to the southwest and would leave the site at its southwest corner and discharge to culverts located beneath Live Oak Avenue. These existing storms drain facilities are no longer used and will not be used as a part of this project.

3.Developed Hydrologic Characteristics

The project site will be developed into an industrial logistics center that will construct three warehouses with associated parking stalls and loading docks. Similar to the existing condition, the soil group for the project is defined by soil type 008 and 015, but for the purpose of simplicity and modeling, a soil type of 008 was used, which is the more conservative value. A rainfall depth of 1.07 inches was used to analyze the site hydrology for the 85th percentile storm.

Overall, the developed condition hydrology will follow the existing condition surface flow pattern, where drainage continues to flow south towards the proposed detention basin pit, now referred to as Basin A1. The existing pit has been altered in coordination with Sothern California Edison and is now configured into two basins, which is modeled as one basin in this report by hydraulically connecting them through storm drainpipe.

Onsite drainage areas are described through areas A1-A3 and will be pumped from the proposed detention basin, for storm events exceeding the 85th percentile storm. The draining will be directed to Line E on Live Oak Avenue, which outfalls to the San Gabriel River, located to the east of the project. The onsite drainage can be described in 5 sub-drainage areas:

Area A1 refers to the northerly drainage area that includes offsite drainage from the existing commercial site, proposed building 1 and 2 and pavement from parking stalls and drive isles. The drainage here sheet flows to nearby catch basins, into the underground storm drain system and outlets to proposed detention basin A1. Drainage for the 85th percentile will first drain to two drywells located on the northwest boundary, adjacent to the basin and I-605 freeway for onsite retention, for the purpose of water quality.

Area A2.1 refers to the onsite drainage located in the middle of that site. The drainage area includes drainage from building 2, building 3 and pavement from the parking isles and stalls. Storm water will first drain to nearby catch basins, into the underground storm drain and into proposed detention basin A1.

Area A2.2 refers to the onsite drainage located in the westerly side of the site. The drainage area includes drainage from building 3 and pavement from the parking isles and stalls. Storm water enters the underground storm drain system and drains to proposed detention basin A1, where storm water is treated and mitigated.

Area A3 refers to the onsite drainage that makes up the proposed detention basin. The basin is considered self-retaining and does not affect the onsite storm drain system. It does however contribute to sizing the detention basin itself and the design of the outlet storm drain/pump discharge line. The basin also manages storm water volumes for the proposed drywells for the 85th percentile storm.

Area A4 refers to the offsite project area located in the southeast side of that site. The drainage area includes runoff from the existing businesses on Live Oak Lane and the existing street width, which includes the improved sections that is part of the project. Storm water follows the existing flow path, draining south towards Live Oak Avenue, along the street gutters on Live Oak Lane. Storm water for this drainage area will first flow into a Modular Wetlands System and then into a catch basin. Water will drain into a proposed storm drain line that will connect to Line E on Live Oak Lane and drain towards the San Gabriel River.

Please refer to Appendix B LID Exhibit for an overview of the described hydrology.

4.Low Impact Development (LID) Criteria and Design

The Low Impact Development (LID) plan is intended to mitigate the hydrological and environmental stresses imposed on the site due to its proposed development. As the site's development typically increases impervious level, so does the stormwater runoff volume and the amount of environmental pollutant it produces. The goal of the LID plan is to mitigate these factors by both reducing the volume of stormwater and potential pollutants in stormwater runoff to the most reasonable extent possible. This strategy may be accomplished by implementing a variety of Best Management Practices (BMPs) stormwater quality control measures designed to handle the frequent, smaller storm event, or the initial volume of stormwater run-off from a larger storm event (referred as first flush). This study will focus on and follow the procedures for selecting and implementing stormwater quality measures, as recommended in the Los Angeles County Department of Public Works (LACDPW) Low Impact Development Standards Manual.

Los Angeles County Design Guidelines

The focus of the design criteria for stormwater control measures is the construction and implementation of stormwater quality control measures that meet stormwater runoff requirements in terms of on-site retention and pollutant removal. The project must design and implement stormwater quality control measures that can handle the SWQDv. Any surplus storm run-off must be diverted around the stormwater quality control measures to prevent overloading. The Los Angeles County Department of Public Works Low Impact Development Standards Manual categorized stormwater control quality measures into the following types listed in level of priority:

1. Retention based BMPs (bioretention, infiltration basin, drywells, capture and reuse cisterns, green roof)
2. Biofiltration BMPs (biofiltration)
3. Vegetation-based BMPs (stormwater planters, vegetated swales, tree-well filter, etc.)
4. Treatment-based BMPs (Extended detention basin, constructed wetlands, wet pond, sand filters, proprietary devices)

Systems in a lower priority level may only be used if higher priority measures are deemed to be technically infeasible as set forth in the county's standards manual. For this project, the natural infiltration capacity will be used for a portion of the site, while treatment-based strategies will be used where space is limited, and infiltration is infeasible due to fill.

Proposed Low Impact Development (LID) System

For the onsite areas (Area A1 and A3), the proposed Low Impact Development (LID) system will take advantage of the native soils percolation rates to infiltrate the SWQDv from the 85th percentile, 24-hour storm. This will be accomplished through detention basin A1 currently proposed as part of the site hydrology study and flood control measures. This basin will be designed to accommodate the required portion of the 50-yr design storm that needs to be mitigated on site, while providing temporary storage for the

2 proposed drywells. The drywells will take advantage of native soil located west of Detention Basin A1, between the basin and Interstate 605. The soil infiltration capacity is based on geotechnical study done for The Park at Live Oak Development, located east of this project. Based on this report and historical records of the site, it is expected that the infiltration capacity will be similar and therefore was used in this study. Future onsite testing will be conducted and will verify this assumption.

The drywells will be designed and constructed by Old Caslte or an equivalent manufacturer. Sizing and capacity analysis of the proposed drywell systems was calculated following the design guidelines defined within the Los Angeles County Department of Public Works Low Impact Development Standards Manual for dry wells, which allows for a maximum drawdown time of 96 hours. The proposed drywells result in a maximum drawdown time of 58 hours. Additionally, the onsite drainage will be pre-treated before entering the basin using Nutrient Separating Baffle Box to extend the life of the drywells. The NSBB is designed based on the treatment flow at max bypass flow, which is based on the 50-year storm event.

For study area A4, treatment will occur through 4 flow-by Modular Wetlands Systems (MWS). These areas are limited in space in the public right of way and for that reason, compact biofiltration BMPs are the best option to treat storm water from this area. The design will be based on the available standard model flow capacity and were compared with the tributary flow of each respective drainage area. The below summary table demonstrates the drainage facilities ability to treat storm water and bypass excess flow.

Table 1: Treatment Device Hydrology Parameters					Pre-treatment Device		
Drainage Area ID	Acreage	SWQDV (cf)	Q_{85th} Treatment Flow (cfs)	Q_{50} Bypass (cfs)	Devic Name	Treatment Capacity	Bypass Capacity
A1	29.0	96,010.0	5.7	70.1	Nurtient Separating Baffle Box (NSBB)	9.96	102.7
A2.1-A2.2	31.3	103,849.0	5.9	70.9	Nurtient Separating Baffle Box (NSBB)	9.96	102.7
A3	6.6	3,554.0	1.2	24.1	None	n/a	n/a
Total Onsite:	66.9	203,413.0	12.8	165.1			
A4	13.6	45,088.0	2.3	28.0	Internal to MWS	Refer to Table 3	

Table 2: Maxwell Drywell Summary Table							
Treatment Area ID	Acreage	Drywell Disposal Rate (cfs)	Factor of Safety	Design Disposal Rate per drywell (cfs)	Disposal Rate for 2 Drywells (cfs)	SWQDV (cf)	Drawdown Time (hrs)
A1-A3	66.9	1.2	2.5	0.5	1.0	203,413.0	57.9

Table 3: Modular Wetlands Summary Table			
Treatment Area ID	Acreage	Q_{85th} Treatment Flow (cfs)	MWS Model
A4.1	1.9	0.3	1-MWS-L-8-12 (0.346 Capacity)
A4.2	11.7	2.0	3-MWS-L-10-20 or MWS-L-8-24 (0.693 Capacity)

Hydromodification

As outlined in Section 8.2 of the Los Angeles County Department of Public Works Low Impact Development Standards Manual, projects may be exempt from implementation of hydromodification control measures where assessments of downstream channel conditions and proposed discharge hydrology indicate that adverse hydromodification effects to beneficial uses of natural drainage systems are unlikely. Since the project proposed to connect directly to the San Gabriel River, which is a county engineered and maintained facility, hydromodification impacts to natural streams will not occur.

Site Design

Current water quality requirements are based on treating a specific volume of stormwater run-off from the project site (SWQDv). The design storm from which the SWQDv is calculated is defined as the greater of:

- The 0.75-inch, 24-hour rain event, or
- The 85th percentile, 24-hour rain event as determine by the Los Angeles County 85th percentile precipitation isohyetal map, which is 1.07-inch

The volume and peak flow of stormwater run-off that must be retained at a project site is calculated using MODRAT. LACDPW developed a hydrologic calculator (HydroCalc) that completes the full MODRAT calculation process and produce the SWQDv volumes and flow rates for single subareas. This report will utilize the results from HydroCalc as a means of determining the stormwater quality design volumes (SWQDv) and flow. The proposed site was divided into five (5) drainage sub-areas, based on the proposed site grading and proposed drainage patterns. Refer to the LID exhibit in Appendix B, for the definition of the drainage sub areas.

Structural Source Control BMPs

Source Control Measures are designed to prevent pollutants from contacting stormwater run-off or prevent discharge of contaminated stormwater run-off to stormdrain system and/or receiving water. The project will implement the following source control measures:

- Storm drain message and signage
- Outdoor trash storage/waste area
- Outdoor loading/unloading dock area
- Landscape irrigation practices

Refer to Appendix E – BMP Maintenance and Documents for source control details and design specifications.

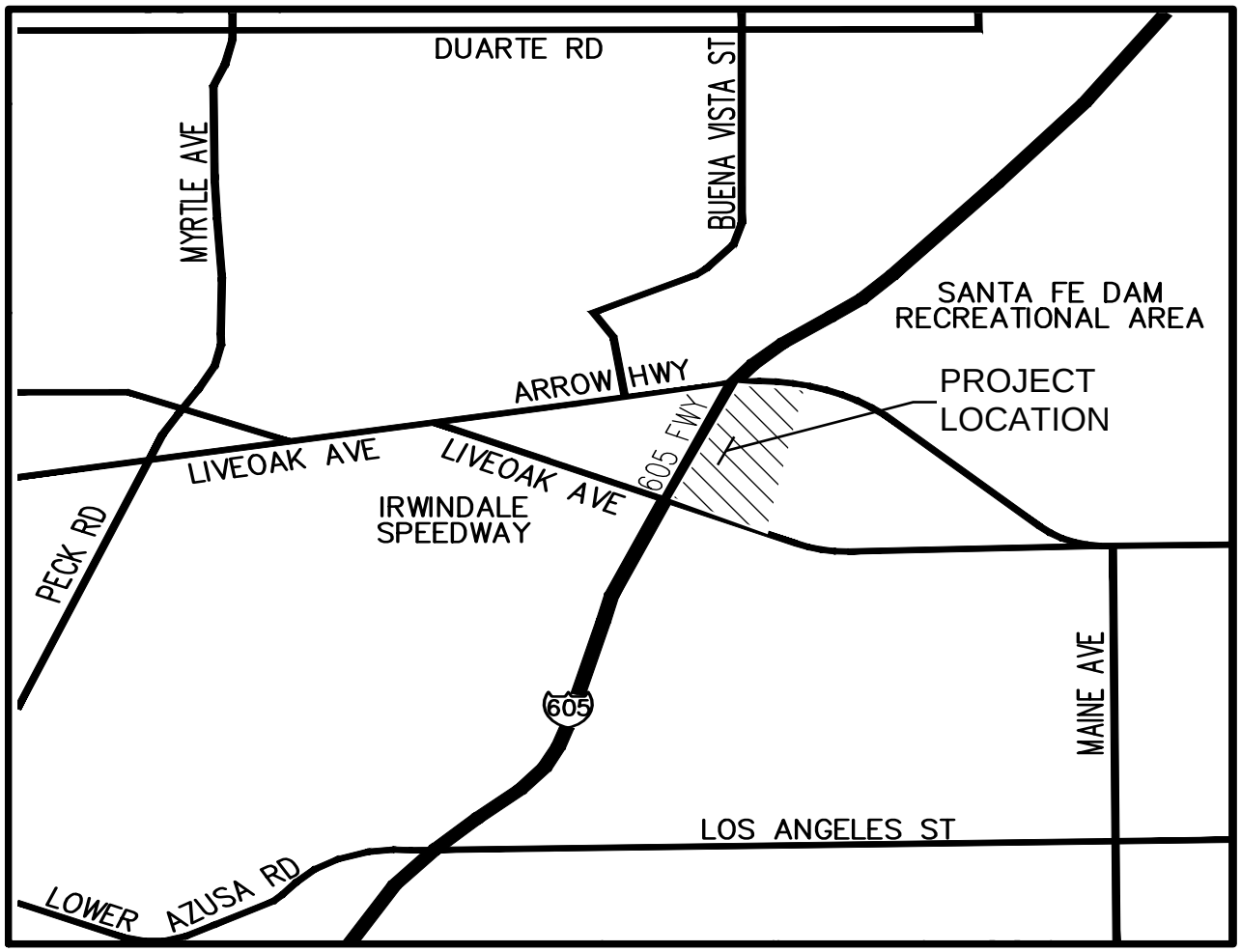
5.Summary and Conclusion

To summarize, the proposed low impact development (LID) system stormwater quality control measures and structural source measures are adequately designed and sized to accomplish the following:

- Capture and treat the SQWDv volume from the 85th percentile, 24-hour storm
- On-site retention of captured volume by infiltrating through two drywells for onsite drainage Areas A1-A3
- Prevent pollutants from contacting stormwater run-off and/or prevent discharge of contaminated stormwater run-off to storm drain system

Based on the calculations and conclusions presented in this report, the proposed LID stormwater quality control measures will retain storm water for the 85^{th} percentile storm on-site through infiltration, where feasible. For areas not feasible for Infiltration/ retention, treatment devices will be provided and discharge offsite as required by the Los Angeles County Department of Public Works Low Impact Development Standards Manual.

Appendix A: Vicinity Map



VICINITY MAP

NOT TO SCALE

N

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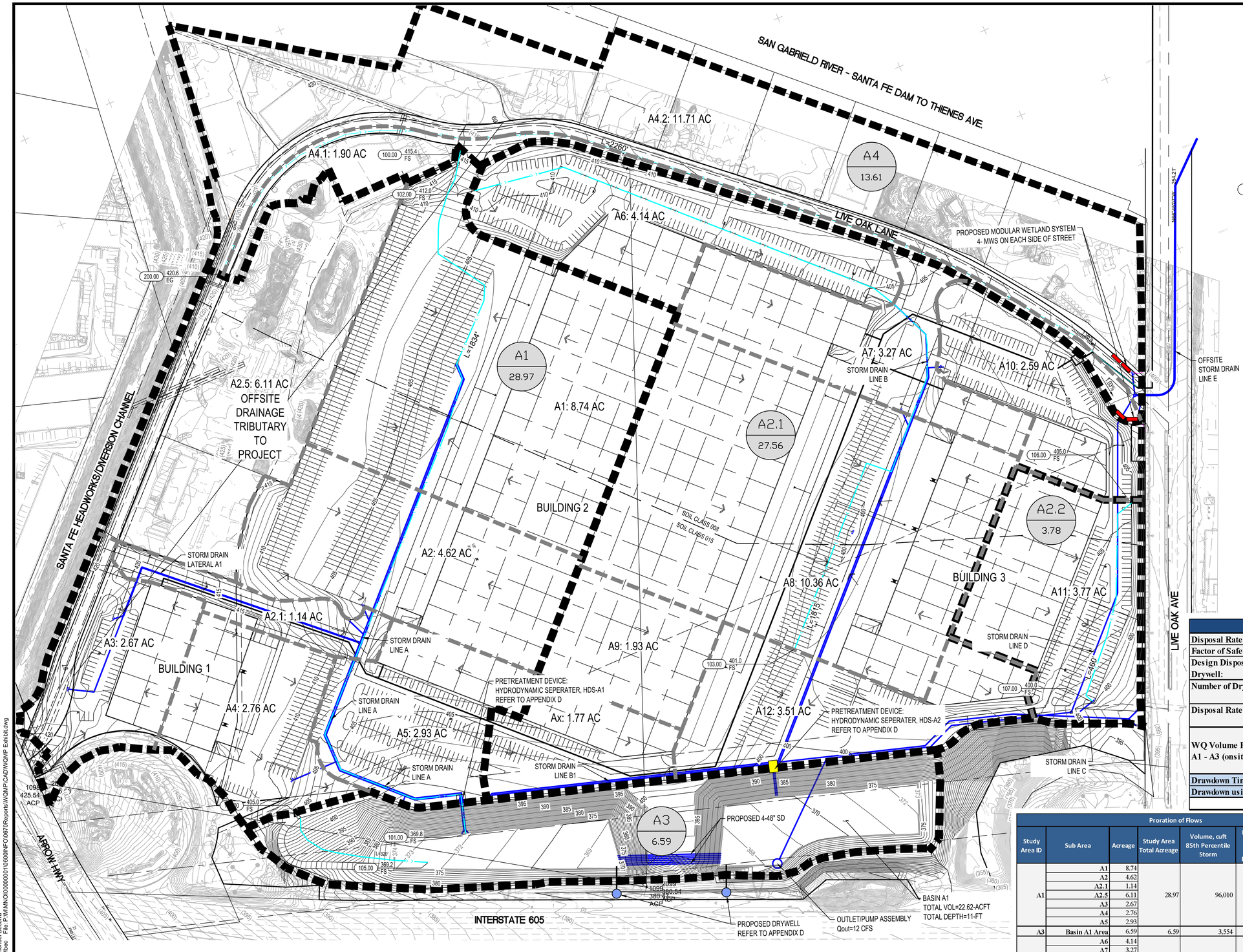
VICINITY MAP

IRWINDALE GATEWAY
PROJECT

Appendix B: LID Exhibits

- LID Exhibit and Details
- Receiving Waters Exhibit



LEGEND

- PRETREATMENT (HYDRODYNAMIC SEPARATOR) REFER TO APPENDIX D
- DRAINGE AREA BOUNDARY(A1,A2.1,A2.2,A3,A4)
- PRORATED DRAINAGE AREA
- PROPOSED STORM DRAIN
- FLOW PATH
- DIRECTION OF FLOW
- SOIL CLASSIFICATION
- 100.00 249.97 FS — NODE DESIGNATION
- A11: 3.77 AC — PRORATED SUB-AREA
- D 0.18 AC — DMA ID, HYDROLOGY STUDY AREA (ACREAGE)

Drywell Analysis

Disposal Rate for Drywell:	1.22	cfs	Refer To Appendix D for Geotechnical Report for Disposal Rate used hereon
Factor of Safety:	2.5		
Design Disposal Rate Per Drywell:	0.49	cfs	
Number of Drywells	2		
Disposal Rate using 2 Drywells	0.98	cfs	
WQ Volume For Study Area A1 - A3 (onsite):	4.67	acft	
	203,412	cuft	
Drawdown Time Per drywell:	115.79	hours	
Drawdown using 2 drywells	57.89	hours	

Use 2 Drywells

Proration of Flows

Study Area ID	Sub Area	Acreage	Study Area Total Acreage	Volume, cuft 85th Percentile Storm	Flow Rate CFS 85th Percentile	V_{85th} Sub Area	Q_{85th} Sub Area	Proposed BMP
A1	A1	8.74	28.97	96,010	5.69	28,965	1.72	2-Drywell for Study Area A1. See calculation Below
	A2	4.62				15,311	0.91	
	A2.1	1.14				3,778	0.22	
	A2.5	6.11				20,249	1.20	
	A3	2.67				8,849	0.52	
	A4	2.76				9,147	0.54	
	A5	2.93				9,710	0.58	
A3	Basin A1 Area	6.59	6.59	3,554	1.24	3,554	1.24	
A2.1	A6	4.14	27.57	91,305	4.82	**13,711**	0.72	
	A7	3.27				**10,829**	0.57	
	A8	10.36				**34,310**	1.81	
	A9	1.93				6,392	0.34	
	A10	2.59				**8,577**	0.45	
	A11	1.77				5,862	0.31	
	A12	3.51				11,624	0.61	
A2.2	A2.2 (ALL)	3.78	3.78	12,544	1.08	12,544	1.08	
	Onsite Total:	66.91	66.91	203,412	13	203,412	12.83	
A4	A4.1	6.91	13.61	45,088	2.31	22,892	1.17	2-MWS-L-10-20 or MWS-L-8-24 (0.693 Capacity)
	A4.2	6.7				22,196	1.14	2-MWS-L-10-20 or MWS-L-8-24 (0.693 Capacity)
	Total Project:	80.52	80.52	248500.59	15.14	248,501	15.14	

SCALE
100 0 50 100 200
(FEET)
1 INCH = 100 FT.

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IRWANDALE GATEWAY DEVELOPMENT
LID EXHIBITS

LID EXHIBIT

CITY OF IRWINDALE CALIFORNIA

NO.	DATE	REVISION	BY	CK
		REVIEWED BY: REVIEW BY	DATE: DATE	

SUBMITTAL TYPE

SUBMITTAL STATUS

CHECKED BY: MBEC
DESIGNED BY: MBEC
DRAWN BY: MBEC

DATE PREPARED: 10/4/2022

PROJECT NO.
MNOI00000001

SHEET NO.
1 OF 1

Plot Date: 3/20/2023 5:21 PM By: Michael Becerra
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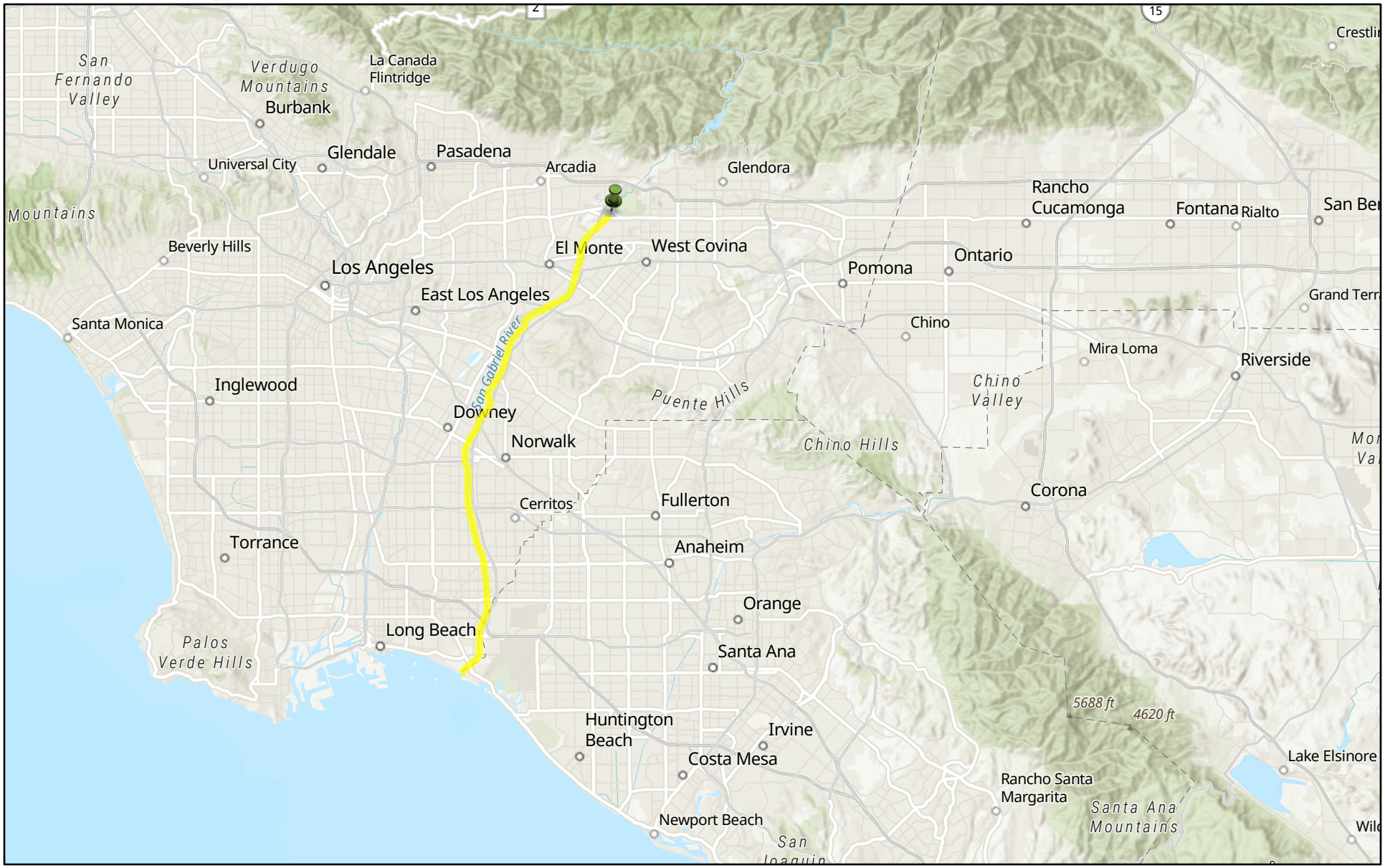
Receiving Waters Exhibit



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Result: Link Path

Result: Streams Selected

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0 4 8 16 mi

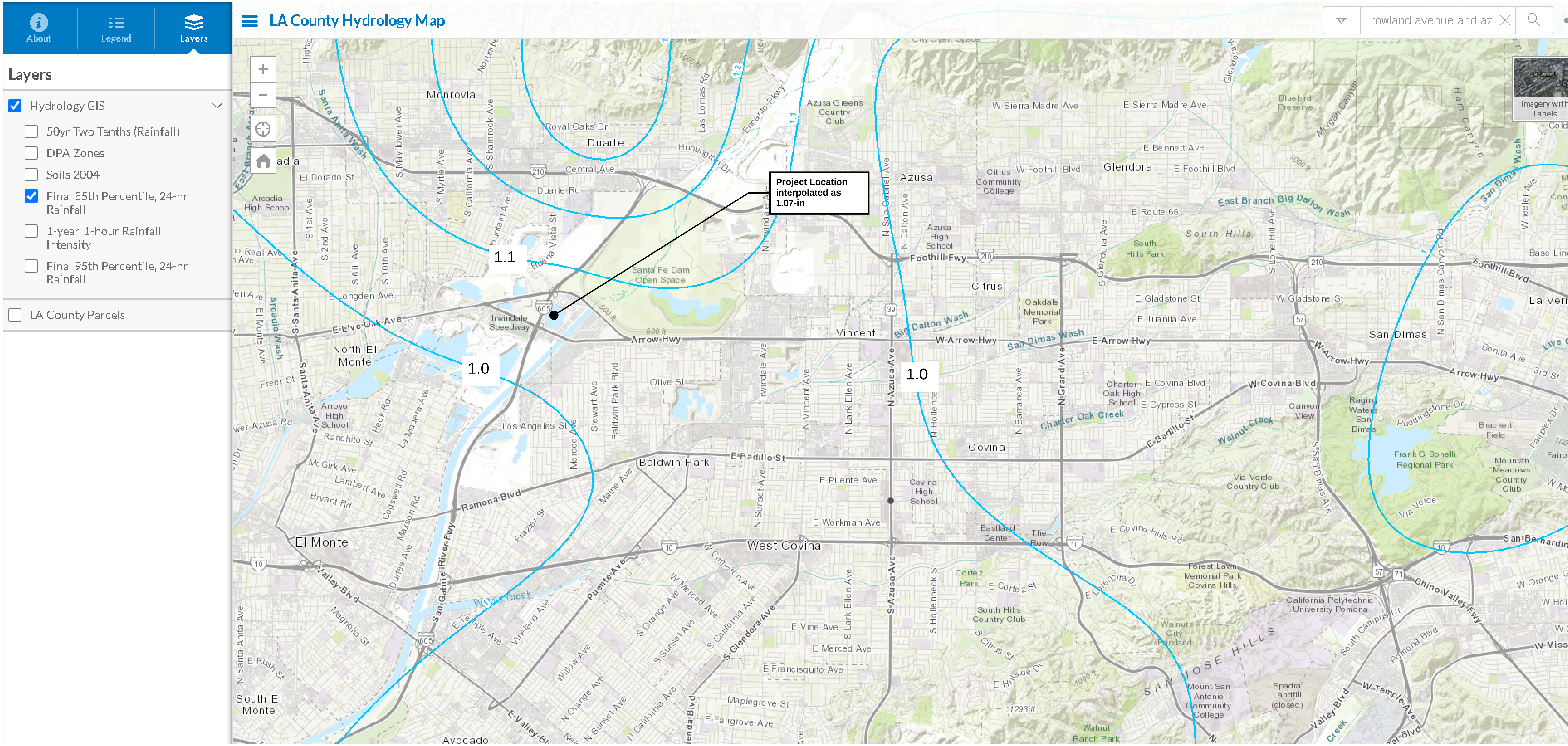
0 5 10 20 km

Esri, CGIAR, USGS, County of Los Angeles, California State Parks, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land

US Environment Protection Agency

Appendix C: Hydrology Analysis

- 85th Percentile 24-Hour Rainfall
- Soil Classification from GIS
- 85th Percentile 24-Hour Year – Developed Condition Area A1
- 85th Percentile 24-Hour Year – Developed Condition Area A2.1
- 85th Percentile 24-Hour Year – Developed Condition Area A2.2
- 85th Percentile 24-Hour Year – Developed Condition Area A3
- 85th Percentile 24-Hour Year – Developed Condition Area A4



About
Legend
Layers
LA County Hydrology Map
rowland avenue and azu
Layers
Hydrology GIS
50yr Two Tenths (Rainfall)
DPA Zones
Soils 2004
Final 85th Percentile, 24-hr Rainfall
1-year, 1-hour Rainfall Intensity
Final 95th Percentile, 24-hr Rainfall
LA County Parcels
Imagery with Labels
Project Location interpolated as 1.07-in
1.1
1.0
1.0
Monrovia
Duarte
Azusa
Glendora
Citrus
Vincent
North El Monte
Irwindale Speedway
Santa Fe Dam Open Space
Baldwin Park
Covina
San Dimas
La Verne
El Monte
West Covina
South El Monte
Avocado
Frank G Bonelli Regional Park
California Polytechnic University Pomona

COUNTY OF LOS ANGELES
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LA County Soil Types

Based on LA County Soil Types

This layer was created to represent soil types in Los Angeles County. Polygons were derived from scanned soil maps. Attributes include ▸

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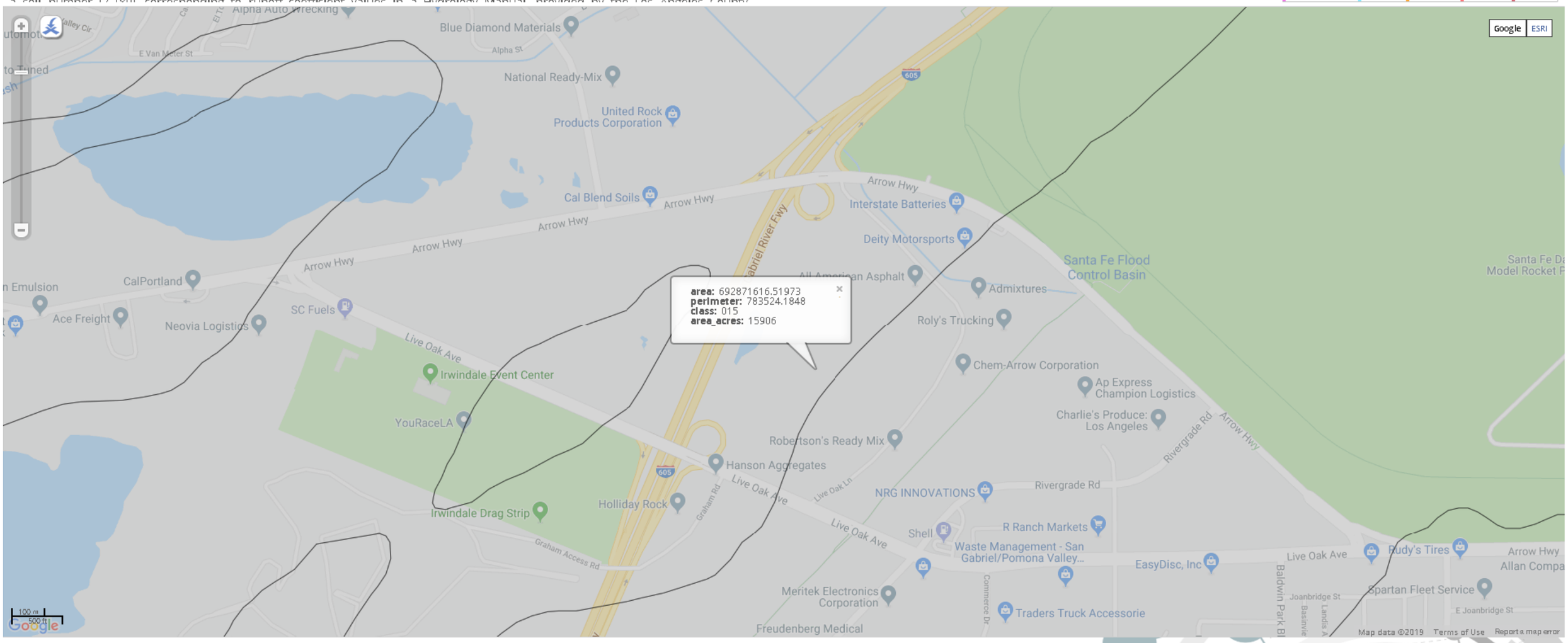

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LA County Soil Types

Based on LA County Soil Types

This layer was created to represent soil types in Los Angeles County. Polygons were derived from scanned soil maps. Attributes include a soil number (2,180), corresponding to runoff coefficient values in a Hydrology Manual provided by the Los Angeles County

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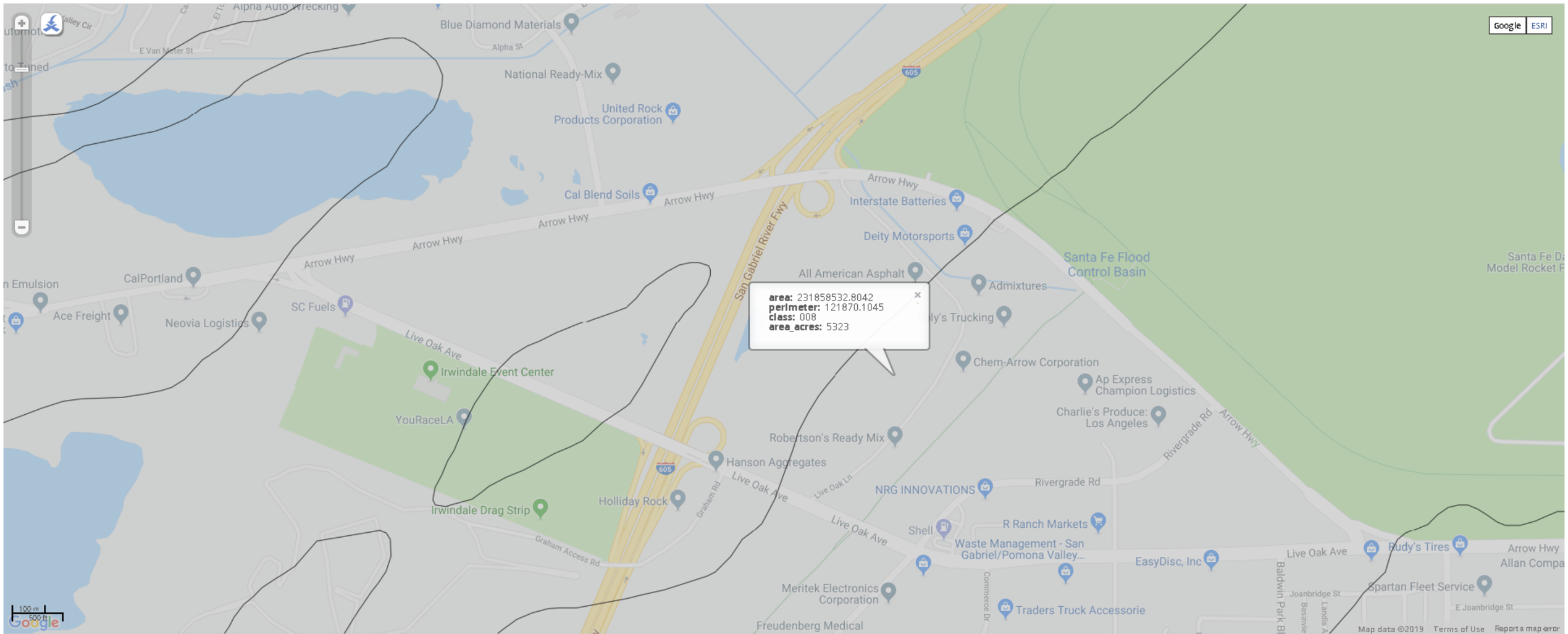

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Peak Flow Hydrologic Analysis

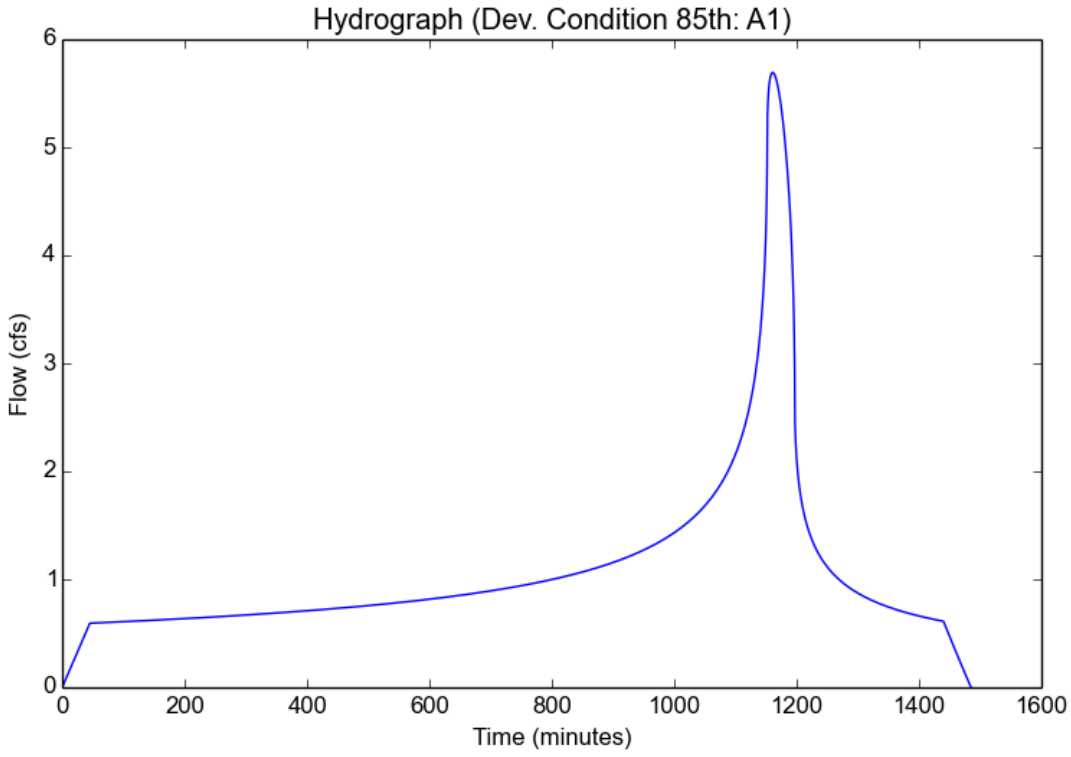
File location: P:/M/MNOI00000001/0600INFO/0670Reports/WQMP/Appendix C Hydrology Analysis/Dev. Condition 85th Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Dev. Condition 85th
Subarea ID	A1
Area (ac)	28.97
Flow Path Length (ft)	1834.0
Flow Path Slope (vft/hft)	0.024863686
85th Percentile Rainfall Depth (in)	1.07
Percent Impervious	0.95
Soil Type	8
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.07
Peak Intensity (in/hr)	0.2273
Undeveloped Runoff Coefficient (Cu)	0.1917
Developed Runoff Coefficient (Cd)	0.8646
Time of Concentration (min)	45.0
Clear Peak Flow Rate (cfs)	5.6931
Burned Peak Flow Rate (cfs)	5.6931
24-Hr Clear Runoff Volume (ac-ft)	2.2041
24-Hr Clear Runoff Volume (cu-ft)	96010.0619



Peak Flow Hydrologic Analysis

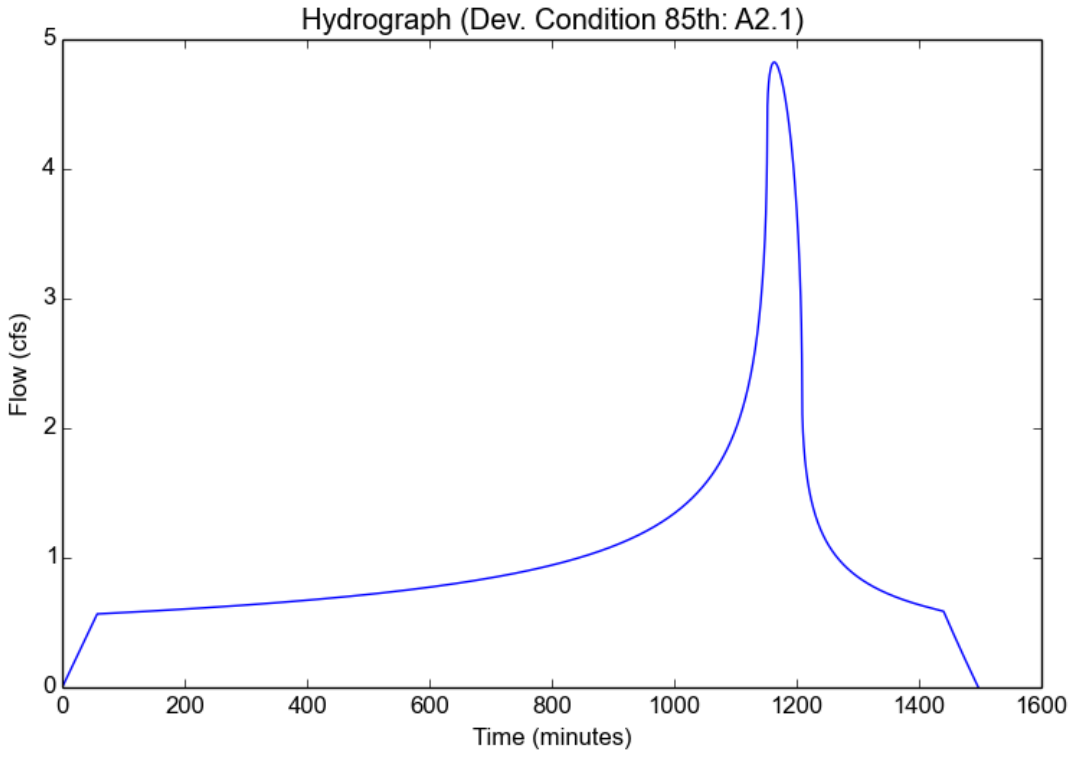
File location: P:/M/MNOI00000001/0600INFO/0670Reports/WQMP/Appendix C Hydrology Analysis/Dev. Condition 85th Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Dev. Condition 85th
Subarea ID	A2.1
Area (ac)	27.56
Flow Path Length (ft)	1815.0
Flow Path Slope (vft/hft)	0.006060606
85th Percentile Rainfall Depth (in)	1.07
Percent Impervious	0.95
Soil Type	8
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.07
Peak Intensity (in/hr)	0.2034
Undeveloped Runoff Coefficient (Cu)	0.1114
Developed Runoff Coefficient (Cd)	0.8606
Time of Concentration (min)	57.0
Clear Peak Flow Rate (cfs)	4.824
Burned Peak Flow Rate (cfs)	4.824
24-Hr Clear Runoff Volume (ac-ft)	2.0961
24-Hr Clear Runoff Volume (cu-ft)	91304.5165



Peak Flow Hydrologic Analysis

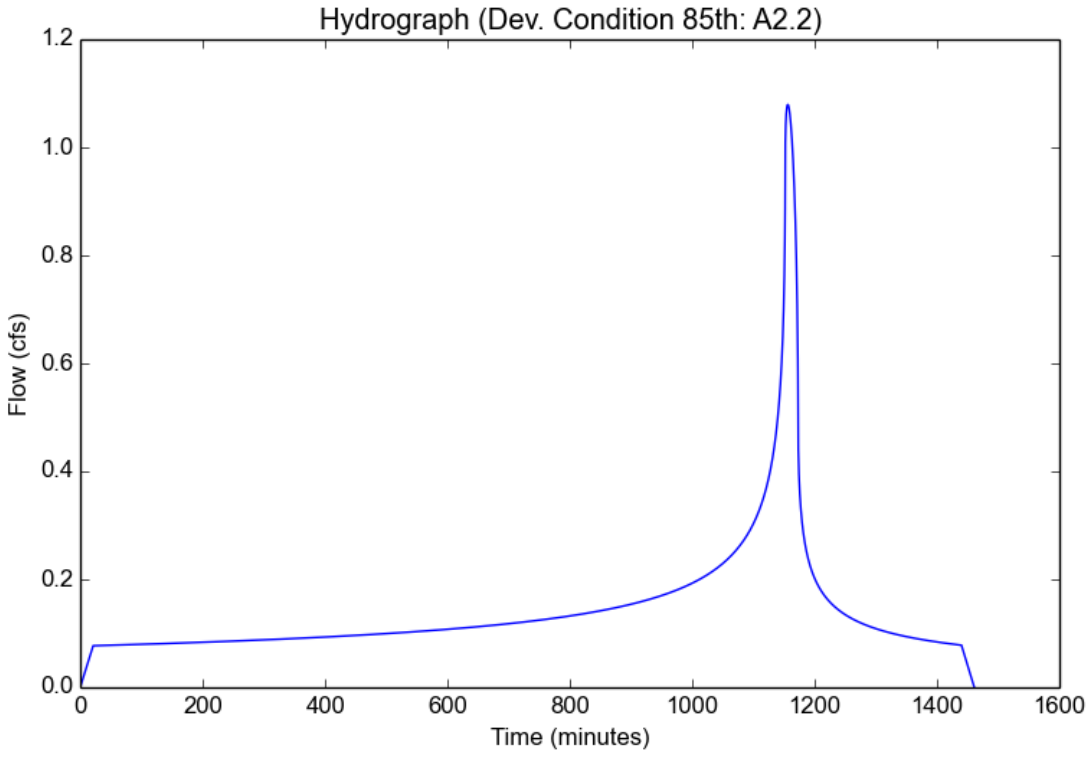
File location: P:/M/MNOI00000001/0600INFO/0670Reports/WQMP/Appendix C Hydrology Analysis/Dev. Condition 85th Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Dev. Condition 85th
Subarea ID	A2.2
Area (ac)	3.78
Flow Path Length (ft)	460.0
Flow Path Slope (vft/hft)	0.0108695
85th Percentile Rainfall Depth (in)	1.07
Percent Impervious	0.95
Soil Type	8
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.07
Peak Intensity (in/hr)	0.3252
Undeveloped Runoff Coefficient (Cu)	0.4609
Developed Runoff Coefficient (Cd)	0.878
Time of Concentration (min)	21.0
Clear Peak Flow Rate (cfs)	1.0794
Burned Peak Flow Rate (cfs)	1.0794
24-Hr Clear Runoff Volume (ac-ft)	0.288
24-Hr Clear Runoff Volume (cu-ft)	12543.8555



Peak Flow Hydrologic Analysis

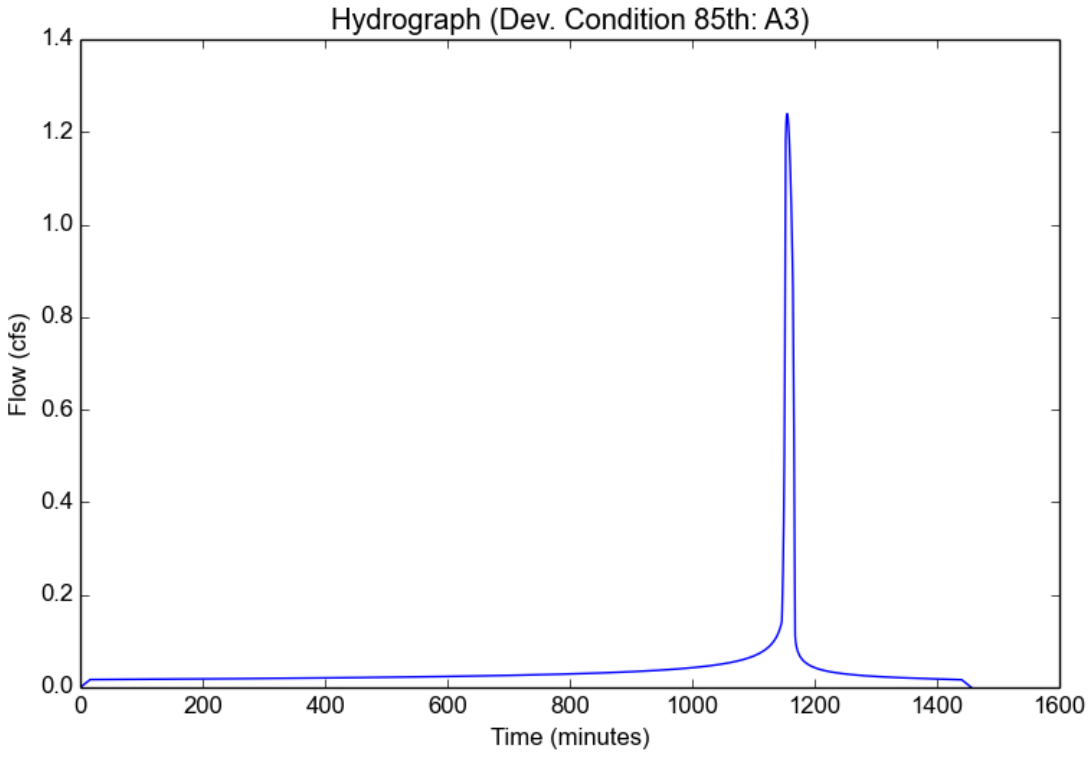
File location: P:/M/MNOI00000001/0600INFO/0670Reports/WQMP/Appendix C Hydrology Analysis/Dev. Condition 85th Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Dev. Condition 85th
Subarea ID	A3
Area (ac)	6.59
Flow Path Length (ft)	320.0
Flow Path Slope (vft/hft)	0.111875
85th Percentile Rainfall Depth (in)	1.07
Percent Impervious	0.01
Soil Type	8
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.07
Peak Intensity (in/hr)	0.3695
Undeveloped Runoff Coefficient (Cu)	0.505
Developed Runoff Coefficient (Cd)	0.5089
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	1.2394
Burned Peak Flow Rate (cfs)	1.2394
24-Hr Clear Runoff Volume (ac-ft)	0.0816
24-Hr Clear Runoff Volume (cu-ft)	3553.8525



Peak Flow Hydrologic Analysis

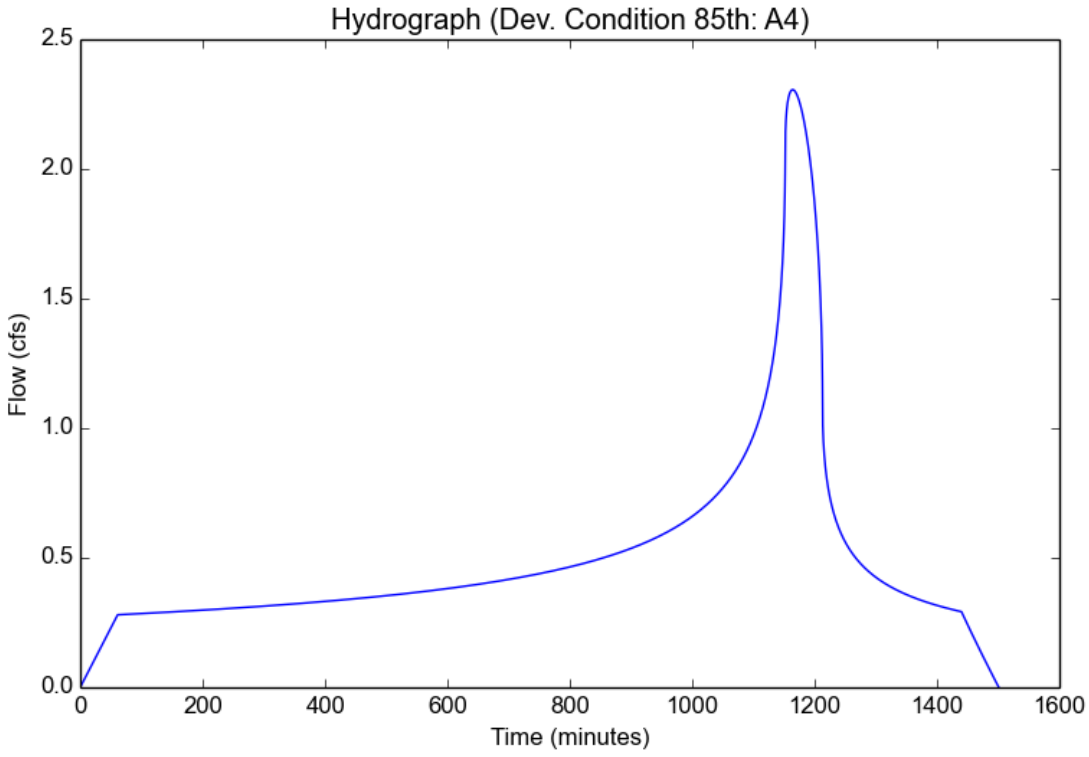
File location: P:/M/MNOI00000001/0600INFO/0670Reports/WQMP/Appendix C Hydrology Analysis/Dev. Condition 85th Report.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Dev. Condition 85th
Subarea ID	A4
Area (ac)	13.61
Flow Path Length (ft)	2260.0
Flow Path Slope (vft/hft)	0.009513274
85th Percentile Rainfall Depth (in)	1.07
Percent Impervious	0.95
Soil Type	8
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	1.07
Peak Intensity (in/hr)	0.197
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.86
Time of Concentration (min)	61.0
Clear Peak Flow Rate (cfs)	2.306
Burned Peak Flow Rate (cfs)	2.306
24-Hr Clear Runoff Volume (ac-ft)	1.0351
24-Hr Clear Runoff Volume (cu-ft)	45088.3036



Appendix D: LID BMP Design

- LID BMP Analysis - Drywell and Modular Wetlands System Design
- Geotechnical Study
- Drywell Design
- Hydrodynamic Separator Design

LID BMP Analysis

Proration of Flows								Proposed BMP
Study Area ID	Sub Area	Acreage	Study Area Total Acreage	Volume, cuft 85th Percentile Storm	Flow Rate CFS 85th Percentile	$V_{85th\text{-}SubArea}$	$Q_{85th\text{-}SubArea}$	
A1	A1	8.74	28.97	96,010	5.69	28965.41	1.717	2-Drywell for Study Area A1. See calculation Below.
	A2	4.62				15311.24	0.907	
	A2.1	1.14				3778.10	0.224	
	A2.5	6.11				20249.27	1.200	
	A3	2.67				8848.70	0.524	
	A4	2.76				9146.97	0.542	
	A5	2.93				9710.37	0.575	
A3	Basin Area	6.59	6.59	3,554	1.24	3553.85	1.240	
A2.1	A6	4.14	27.57	91,305	4.82	**13710.58**	0.724	
	A7	3.27				**10829.37**	0.572	
	A8	10.36				**34309.57**	1.811	
	A9	1.93				6391.65	0.337	
	A10	2.59				**8577.39**	0.453	
	A11	1.77				5861.77	0.309	
	A12	3.51				11624.19	0.614	
A2.2	A2.2 (ALL)	3.78	3.78	12,544	1.08	12543.86	1.080	
	Onsite Total:	66.91	66.91	203,412	13	203,412	12.830	
A4	A4.1	6.91	13.61	45,088	2.31	22892.00	1.17	2-MWS-L-10-20 or MWS-L-8-24 (0.693 Capacity)
	A4.2	6.7				22196.30	1.14	2-MWS-L-10-20 or MWS-L-8-24 (0.693 Capacity)
	Total Project:	80.52	80.52	248500.59	15.14	248,500.59	15.14	

Drywell Analysis			
Disposal Rate for Drywell:	1.22	cfs	Refer To Appendix D for Geotechnical Report for Disposal Rate used hereon
Factor of Safety:	2.5		
Design Disposal Rate Per Drywell:	0.49	cfs	
Number of Drywells	2		
Disposal Rate using 2 Drywells	0.98	cfs	
WQ Volume For Study Area A1 - A3 (onsite):	4.67	acft	
	203,412	cuft	
Drawdown Time Per drywell:	115.79	hours	
Drawdown using 2 drywells	57.89	hours	
Use 2 Drywells			

December 8, 2021
J.N.: 3022.00

Philip Bruttig
Irwindale Partners, LP
c/o Yellow Iron Investments, LLC
373 E Foothill Blvd #100
San Dimas, CA 91773

Subject: **Supplemental Geotechnical Investigation for Proposed Water Quality Improvements, The Park At Live Oak, Arrow Highway and Live Oak Ave., Irwindale, California**

Dear Mr. Bruttig,

Albus & Associates, Inc. has completed a supplemental geotechnical investigation of the site for evaluation of the percolation characteristics of the site soils. The scope of this investigation consisted of the following:

- Exploratory drilling, soil sampling and test well installation
- Field percolation testing
- Laboratory testing of selected soil samples
- Engineering analysis of the data
- Preparation of this report

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

Site Location and Description

The site is bordered by Arrow Hwy, Live Oak Ave, and the San Gabriel Fwy. The location of the site and its relationship to the surrounding areas is shown on Figure 1, Site Location Map.

The site consists of a triangularly-shaped property containing approximately 77 acres of land. At the time of this investigation, the site was an active grading site. Elevations across the site varied considerably with the site having no consistent direction of drainage.

Review of historical imagery shows that the site was previously used as a quarry and quarry operations began between 1952 and 1960. The site topography was altered drastically as quarry operations expanded until around the 1990s. Exact quarry depths are unclear from the aerial imagery, but we understand that depths exceeded 100 feet in some areas. During the 2000s to present, the quarry was backfilled to its present state.

1011 N. Armando Street, Anaheim, CA 92806-2606 (714) 630-1626

N

FIGURE 1-SITE LOCATION MAP

The Park At Live Oak,
Arrow Highway and Live Oak Ave
Irwindale, California

NOT TO SCALE

Proposed Development

We understand the site will be redeveloped for industrial use. Site development will include open basins and dry wells for storm water quality management.

SUMMARY OF FIELD AND LABORATORY WORK

Previous Investigation

Subsurface exploration by HD Geosolutions, Inc. was conducted on April 28, September 16 and 17, 2020 and consisted of the drilling of twenty-three (23) soil borings to depths ranging from approximately 30 to 80 feet below the existing ground surface (bgs). The borings were drilled using a truck-mounted, continuous flight, hollow-stem-auger drill rig.

Subsurface Investigation

Subsurface exploration for this investigation was conducted on October 5, 2021, and consisted of drilling five (5) soil borings to depths ranging from approximately 15 to 40 feet below the existing ground surface (bgs). The borings were drilled using a truck-mounted, continuous flight, hollow-stem-auger drill rig. A representative of Albus & Associates, Inc. logged the exploratory borings. Visual and tactile identifications were made of the materials encountered, and their descriptions are presented in the Exploration Logs in Appendix A. The approximate locations of the exploratory excavations completed by this firm are shown on the enclosed Geotechnical Map, Plate 1.

Small bag samples were obtained at selected depths within the exploratory borings for subsequent laboratory testing. Samples were placed in plastic bags and transported to our laboratory for analyses.

Upon completion of drilling, well materials were installed within B-1 to B-4 for subsequent percolation testing. Well materials were installed to the bottom of each boring. The bottom 5 feet for each well utilized perforated 3-inch-diameter pipe with the remaining well utilizing solid 3-inch-diameter pipe to ground surface. The joints between pipes were reinforced with duct tape and the sections of perforated pipe were covered with filter sock. Caving occurred at each location to near surface and we were unable to extract the well materials. Therefore, well materials were left in space and covered with soil cuttings.

Percolation Testing

Percolation testing was performed on October 5 and 6, 2021, in general conformance with the constant-head test procedures outlined in the referenced Well Permeameter Method (USBR 7300-89). A water hose attached to a water source on site was connected to an inline flowmeter to measure the water flow. The flowmeter is capable of measuring flow rates up to 10 gallons per minute and as low as 0.06 gallons per minute. A valve was connected in line with the flowmeter to control the flow rate. A filling hose was used to connect the flowmeter and the test wells. Water was introduced by the filling hose near the bottom of the test wells. A water level meter with 1/100-foot divisions was used to measure the depths to water surface from the top of well casings.

Flow to the wells was terminated upon either completion of testing of all the pre-determined water levels or the flow rate exceeded the maximum capacity of the flowmeter. Measurements obtained during the percolation testing are provided in Appendix C on Plates C-1 through C-4. Boring 5 was not tested due to the presence of artificial fill soils.

Laboratory Testing

Selected soil samples of representative earth materials were tested to assist in the formulation of conclusions and recommendations presented in this report. Tests consisted of sieve analyses. Results of laboratory testing relevant to percolation characteristics are presented in Appendix B.

ANALYSIS OF DATA

Subsurface Conditions

Descriptions of the earth materials encountered during our investigation are summarized below and are presented in detail on the Exploration Logs presented in Appendix A.

Review of the Dibblee Map for the El Monte and Baldwin Park Quadrangles shows Quaternary gravel and sand of major streams and alluvial fan detritus from the San Gabriel Mountains (Qg) underlies the general area. Our exploration was focused on the southern boundary, just outside of the previous mining pit which is filled with artificial fill based on exploration by HD Geosolutions. Our borings B-1 through B-4 encountered Qg to the maximum depth explored of 25 feet. The materials exposed were primarily comprised of dry to moist, gray sands and gravels with some cobble up to 8 inches in greatest dimension. Boring B-5 encountered artificial fill to the maximum depth of 15 feet. This material was generally comprised of silty sand with gravel as well as construction debris. We noted in aerial photographs that the previous mining pit encroached very close to Live Oak Avenue in this general area due to what appeared to be a localized slope failure. As such, this area was deemed unfeasible for infiltration and was not tested.

A more detailed description of the interpreted soil profile at each of the boring locations, based upon the soil cuttings and soil samples, are presented in Appendix B. The stratigraphic descriptions in the logs represent the predominant materials encountered during investigation. Relatively thin, often discontinuous layers of different material may occur within the major divisions.

Groundwater

Groundwater was not encountered during this firm's subsurface exploration to the maximum depth of 25 feet. The CDMG Special Report 022 suggests that historic high groundwater for the subject site may be as deep as 100 feet. Review of the Department of Water Resources groundwater level data for the nearby well 340931N1179615W001 indicates that groundwater for the area is currently below 170 feet. Wells readings have been recorded from 2011 to 2020, and during this period, groundwater has remained more than 150 feet below ground surface. The last recorded reading at the time of this report was January 1, 2020. Given the continued increase in urbanization and drought conditions in California, we anticipate ground water will remain below a depth of 100 feet during the next 50 years.

Percolation Data

Analyses were performed to evaluate permeability of the site soils using the flow rate obtained from the constant-head field percolation testing. These analyses were performed in accordance with the procedures provided in the referenced USBR 7300-89. The procedure essentially uses a closed-form solution to percolation out of a small-diameter well to obtain the permeability of the surrounding soil.

Using the USBR method, we calculated a composite permeability value for the head conditions maintained in the wells. The results are summarized in Table 1 below and the supporting analyses are included in Appendix C, Plates C-5 through C-8.

TABLE 1
Summary of Back-Calculated Permeability Coefficient

Test Well	Total Depth of Well (ft)	Depth to Water in Well (ft)	Height of Water in Well (ft)	Static Flow Rate (gal./min.)	Estimated Permeability, k_s (in/hr.)
B-1	14.7	12.45	2.3	1.58	8.1
B-2	29.5	27.5	2	1.96	12.0
B-3	30.6	28	2.6	3.96	19.4
B-4	40	39.35	0.65	4	114

Correlations of permeability to grain-size were evaluated using the results of laboratory testing of our samples. Based on these correlations, the estimated permeabilities are greater than 50 in/hr. Due to the relatively large size of the particles, our samples were generally too small to provide an accurate testing of grain-size distribution. However, the results do suggest the site materials could have permeabilities well above those obtained by the field percolation testing. The USBR test method is intended for soils with permeabilities less than 15 in/hr. Therefore, the results of field testing likely underestimate the true permeability of site soils.

Design of Dry Well

The ***infiltration rate*** in a dry well is dependent upon several factors including the soil permeabilities of the various soil layers throughout the soil mass, hydraulic gradient of water pressure head in the soil mass, and depth to groundwater. The infiltration rate is related to the permeability by Darcy's equation:

$V = ki$

Where:

V= water velocity (infiltration rate)
k= permeability
i=hydraulic gradient

The presence of differing soil layers with differing permeabilities, the variable head condition in the well shaft, and presence of ground water are factors that make determining the effective infiltration rate of a dry well somewhat complicated. We have performed the Well Permeameter tests in accordance with the test method. This test provides a means to estimate the ***Permeability Rate*** of the soils influencing the dry well, not the infiltration rate. Therefore, the effective infiltration rate must be determined using the relationship between permeability and infiltration rate as expressed by Darcy's equation. Solution of the Darcy equation essentially requires solving a differential mass balance equation. Due to these complications, the infiltration characteristics of the proposed dry well were modeled using a computer program.

Infiltration in a dry well was modeled using the software Seep/W, version 2007, by Geo-Slope International. The program allows for modeling of both partially-saturated and saturated porous medium using a finite element approach to solve Darcy's Law. The program can evaluate both steady-state and transient flow in planar and axisymmetric cases. Boundaries of the model can be identified with various conditions including fix total head, fix pressure head, fix flow rate, and head as a function of flow. Soil permeability properties for partially-saturated soils can be modeled with either Fredlund et al (1994), Green and Corey (1971), Van Genuchten (1980), or Saxton et al. (1986). Only saturated permeabilities were used in our analyses.

A Seep/W model was setup with the bottom of the dry well at a depth of 50 feet below ground surface. The dry well was assumed to consist of a shaft that is 6 feet in diameter and contains a settling chamber having an inside diameter of 4 feet, outside diameter of 4.5 feet, and length of 18 feet. The annular space around the chamber between the depths of 0 and 10 feet was assumed to consist of a cement slurry. A more detailed model of the dry well design can be found on Plate 2.

The model consisted of a single zone of material to represent the general soil profile. The saturated permeability of material 1 was selected based on the coefficient of permeability estimated from percolation tests and is considered conservative. The permeability value is summarized in Table 2.

TABLE 2
Summary of Permeability Values

Depth (ft)	Material No.	Material Type	Sat. Perm., Ks (in/hr)
0-70	1	GP	8

The model was setup with the ground surface being the bottom of the basin. Therefore, water in the well was assumed to be at a depth of 0 feet below the top of the well so a fix-head boundary was set with a total head elevation of 100 feet around the edge of the well (ground surface was set to an elevation of 100 feet).

A steady state analysis was performed to estimate the maximum inflow that the well can accommodate. Using a well as described above, we obtain a static total flow of 1.22 $ft^3/sec.$ A plot depicting the resulting pressure head contours and flow vectors for the model is provided on Plate C-9. The average infiltration rate can be determined by taking the flow rate divided by the wetted surface area. The surface area is equal to 490.1 square feet which includes the side and bottom area. Based on the above flow rate and surface area, the average "measured" infiltration rate across the wetted surface area is 91 in/hr.

To evaluate the time required to empty the well once no more water is introduced, the model was reanalyzed with a variable head condition that was dependent upon the volume of water leaving the well. As water infiltrates into the surrounding soil, the volume of water remaining in the well is reduced as well as the resulting water head. A graph of the well head versus exit volume is provided

in Figure 2. The function assumes a void ratio of 0.4 within the zones occupied by gravel. If some other well configuration is used, then the analyses will require updating.

The analysis was performed as a transient case over a total time of 0.25 hours. The conditions in the model were evaluated in 10 increments of time over the total duration. From our analyses, the water is evacuated from the chamber in less than 6 minutes and the well is fully empty in less than 15 minutes. Plots depicting the resulting pressure head contours and flow vectors at selected times are provided in Appendix C on Plates C-6 through C-9. A plot of time versus water height in the well is shown on Figure 3.

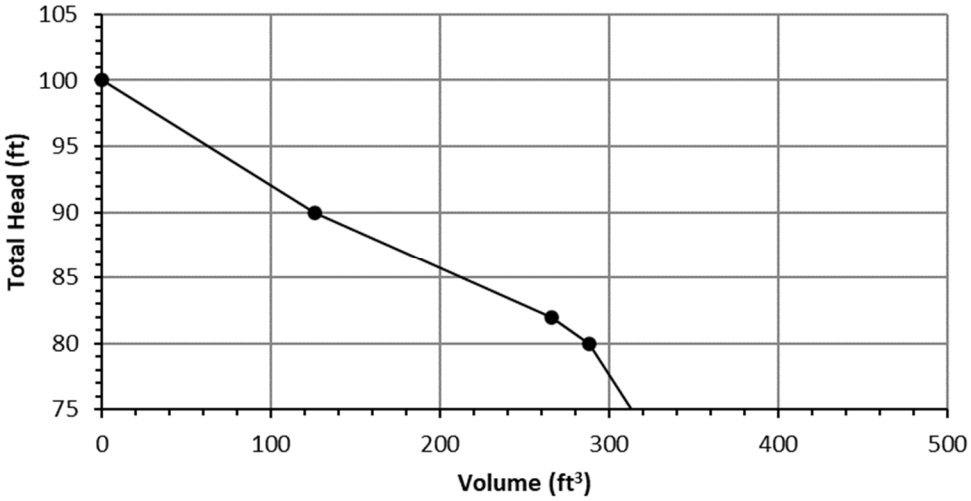


FIGURE 2- Well Head versus Exit Volume

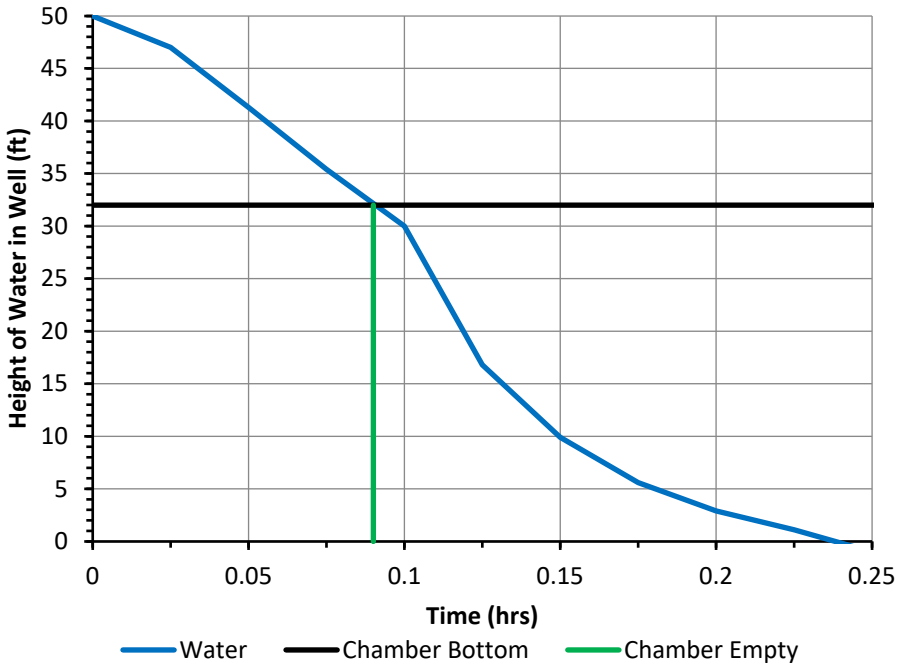


FIGURE 3- Water Head Versus Time

CONCLUSIONS AND RECOMMENDATIONS

Results of our work indicate a storm water disposal system consisting of dry wells is feasible at the site. The use of dry wells is not anticipated to result in worsening any adverse conditions or hazards that may be present for the proposed site development or adjacent properties including subsidence, landsliding, or liquefaction. As discussed above, the historic groundwater level in this area is greater than 100 feet will remain at least 100 feet below ground surface for the life of the project. Therefore, a dry well having a total depth of 55 feet below the adjacent ground surface (50' well + 5' basin) will maintain a clearance above groundwater greater than the minimum required clearance of 10 feet.

Based on the results of percolation testing and analyses, the well configuration as depicted on Plate 2 may utilize a "measured" peak flow rate of 1.22 ft^3/sec. This flow rate corresponds to an average "measured" infiltration rate of 91 in./hr. This flow rate and infiltration rate only apply to the well configuration evaluated and will differ for other configurations. These values are "measured" values and as such, an appropriate factor of safety should be applied to determine the "design" rates.

The design infiltration rate requires the application of a Reduction Factor in accordance with the County of Los Angeles GS200.1 (6/30/21) guidelines. Based on the county requirements, the reduction factor (safety factor) is determined by multiplying the partial reduction factors as indicated in Table 3 below.

The RFt value is prescribed by the test method used and takes into consideration the conservative permeability assigned to the site soils . The RFv value is based on the fact that soil conditions are relatively uniform within the infiltration zone, that two tests were performed in close proximity to the proposed dry well locations, and correlations with laboratory testing of site materials confirm the selected permeability rate obtained by the field test. The RFs value is based on the dry well being located within a basin that will trap sediments and the well providing a chamber that traps sediments and removes oils via an absorptive pillow for the removal of most sediment and oils before entering the dry well.

TABLE 3
Reduction Factor

Factor	Value
RFt	2.0
RFv	1.0
RFs	1.0
Total Reduction Factor (RF)	**2.0**

Note:
Total Reduction Factor, RF= RFt x RFv x RFs

Based on the above reduction factor, design of the system should be based on a peak "design" flow of 1.22 cfs/2.0 = **0.61 cfs.** This flow rate results in an average peak design infiltration rate of 45.5 in/hr. when applied to the wetted surface area. Once water flow to the well has ceased, we estimate the time to empty the chamber will be approximately 0.1 hours.

Assuming an allowable total drawdown time of 96 hours, the maximum total design capture volume (DCV) one dry well can dispose would be approximately (96-0.1) hrs x 0.60 cfs x 3600 s/hr = 207,144 cubic feet. The dry well presented on Plate 2 is calculated to hold 439 cuft of water storage. The remaining DCV will need to be stored in basins or other devices upstream of the dry well.

Where multiple dry wells are used, they should be spaced at least 30 feet center to center to avoid cross influence that would reduce the infiltration flow rate. The dry wells may be located along the southerly boundary of the site between the locations of B-1 and B-4. We have assumed the dry wells will be located in the bottoms of Detention Basins #1 and #2 so the water head will be at the top of the dry well and the basins will provide desilting of water before it enters the dry wells. The well should be located at least 10 feet horizontally from any habitable structure.

Once the final WQMP plans and calculations are complete, they should be reviewed by this office to confirm our recommendations have been properly applied to the project design.

The actual flow capacity of the dry well could be less or more than the estimated value. As such, provisions should be made to accommodate excess flow quantities in the event the dry well does not infiltrate the anticipated amount. The design also assumes that sediments will be removed from the inflowing water through an upper chamber or other device. Sediments that are allowed to enter the dry well will tend to degrade the flow capacity by plugging up the infiltration surfaces.

In general, the dry well shafts are anticipated to require casing in order to maintain stability of the shafts during drilling. The casing should not be removed ahead of the placement of gravel and chamber. Installation will require the introduction of gravel along with incremental extraction of the casing so that gravel backfill will always flow out to stabilize the uncased shaft as the casing is withdrawn.

Workers should not enter the shaft unless the excavation is cased in accordance with OSHA requirements. The placement and compaction of backfill materials, including the gravel and slurry, should be observed by the project geotechnical consultant.

LIMITATIONS

This report is based on the geotechnical data as described herein. The materials encountered in our boring excavations and utilized in our laboratory testing for this investigation are believed representative of the project area, and the conclusions and recommendations contained in this report are presented on that basis. However, soil and bedrock materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions and recommendations contained herein. As such, observations by a geotechnical consultant during the construction phase of the storm water infiltration systems are essential to confirming the basis of this report.

This report has been prepared consistent with that level of care being provided by other professionals providing similar services at the same locale and time period. The contents of this report are professional opinions and as such, are not to be considered a guaranty or warranty.

This report should be reviewed and updated after a period of one year or if the site ownership or project concept changes from that described herein.

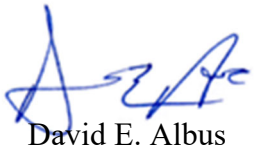
This report has been prepared for the exclusive use of **Irwindale Partners, LP** to assist the project consultants in the design of the proposed development. This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

This report is subject to review by the controlling governmental agency.

We appreciate this opportunity to be of service to you. If you should have any questions regarding the contents of this report, please do not hesitate to call.

Sincerely,

ALBUS & ASSOCIATES, INC.



David E. Albus
Principal Engineer
GE 2455

Enclosures: Plate 1- Geotechnical Map
Plate 2- Dry Well Diagram
Appendix A - Exploratory Logs
Appendix B – Laboratory Testing
Appendix C - Percolation Testing and Analyses

REFERENCES

Publications and Reports

Dibblee, T.W., Jr., 1999, Geologic map of the El Monte and Baldwin Park quadrangles, Los Angeles County, California: Dibblee Geological Foundation, Map DF-69, scale 1:24,000.

California Department of Conservation, Division of Mines and Geology, Seismic Hazard Report 022, "Seismic Hazard Zone Report for the Baldwin Park 7.5-Minute Quadrangle, Los Angeles County, California", 1998.

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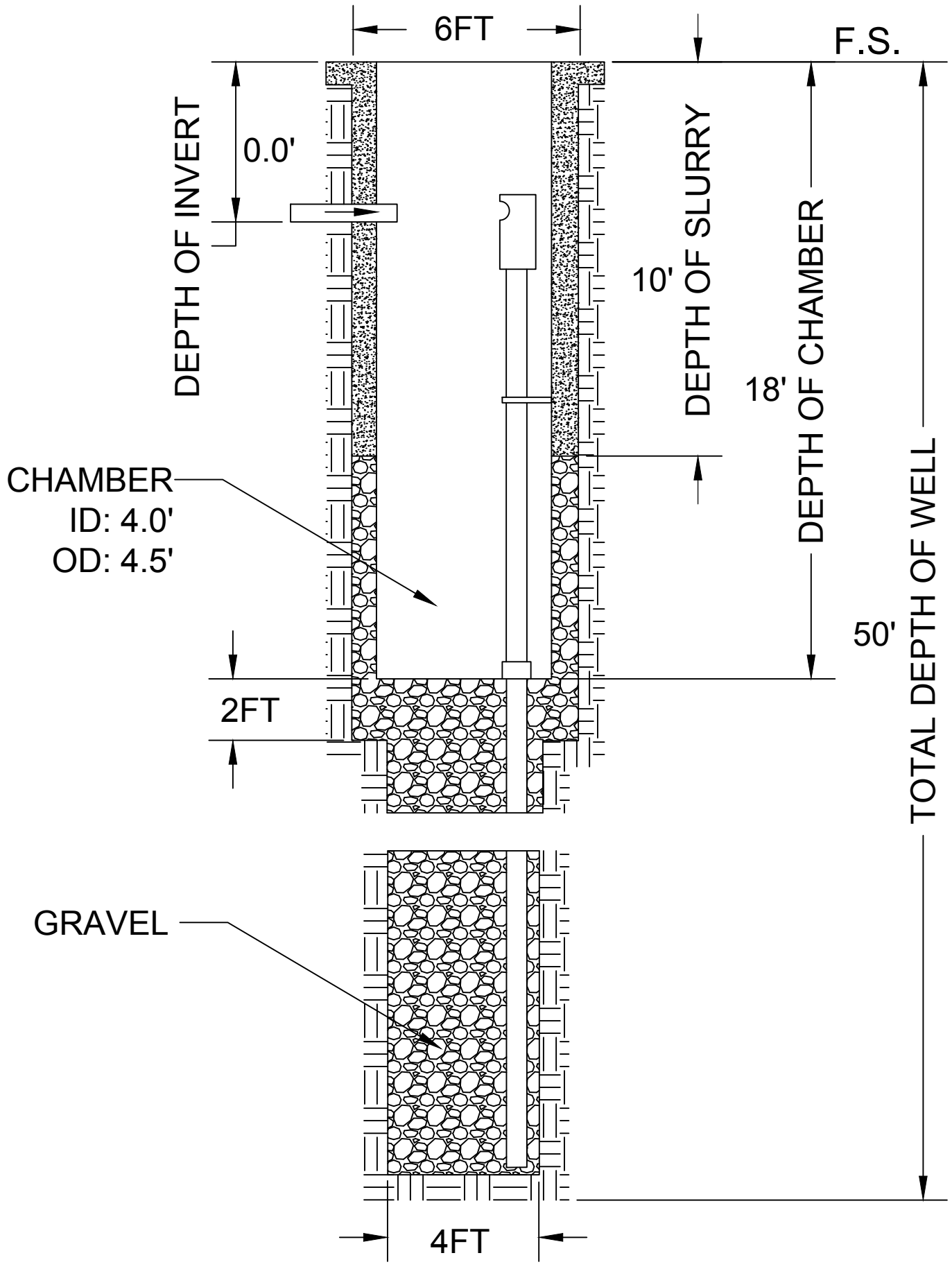
Procedure for Performing Field Permeability Testing by the Well Permeameter Method, by United States Department of The Interior, Bureau of Reclamation (USBR 7300-89).

Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, by County of Los Angeles, Department of Public Works, Geotechnical and Materials Engineering Division (GS200.2), dated 6/30/21.

TYPICAL DRY WELL CONSTRUCTION



APPENDIX A

EXPLORATORY LOGS

Field Identification Sheet

Light gray

Gray

Dark gray

Gray Brown

Light brown

Brown

Dark Brown

Olive brown

Olive

Yellow

Yellowish brown

Yellowish red

Red

Reddish Brown

Tan

Description Order:

Description, Color, Moisture, Density, Grain Size, Additional Description

Description	%	Example
	0-5	Sand
trace	5-15	Sand trace Silt
with	15-30	Sand with Silt
	30+	Silty Sand

More Examples

Sand with Silt trace Clay

Sand trace Silt and Clay

Sand with Silt and Clay

Gravelly Sand with Silt trace Clay

Silty Clay with Sand trace Gravel

Moisture

Dry	absence of water
Damp	below optimum
Moist	near optimum
Very Moist	above optimum
Wet	free water visible

Density (Navfac)

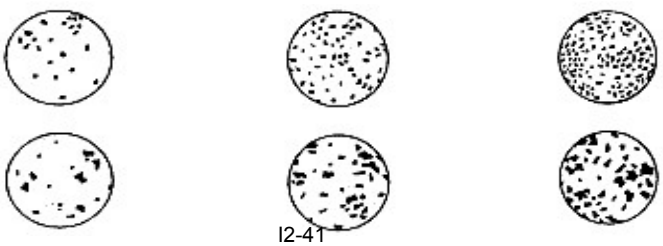
Coarse grained soils	SPT	CA
Very Loose	0-3	0-5
Loose	3-8	5-13
Medium Dense	8-14	13-22
Dense	14-25	22-40
Very Dense	25>	40>
Fine grained soils		
Very Soft	2<	0-3
Soft	2-4	3-6
Medium Stiff	4-8	6-13
Stiff	8-15	13-24
Very Stiff	15-30	24-48
Hard	30>	48>

Grain Size

Description		Sieve Size	Approx. Size
Boulders		>12"	Larger than basketball
Cobbles		3-12"	Fist to basketball
Gravel	coarse	3/4-3"	Thumb to Fist
	fine	#4-3/4"	Pea to Thumb
Sand	coarse	#10-4	Rock Salt to Pea
	medium	#40-10	Sugar to Rock Salt
	fine	#200-40	Flour to Sugar
Fines		Pass #200	Smaller than Flour

Additional Description (ie. roots, pinhole pores, debris, etc.)

Trace 5% Moderate 15% Abundant 30%



EXPLORATION LOG

Project:		Location:
Address:		Elevation:
Job Number:	Client:	Date:
Drill Method:	Driving Weight:	Logged By:

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		EXPLANATION							
		Solid lines separate geologic units and/or material types.							
		Dashed lines indicate unknown depth of geologic unit change or material type change.							
5		**Solid black rectangle** in Core column represents California Split Spoon sampler (2.5in ID, 3in OD).							
		Double triangle in core column represents SPT sampler.							
10		**Vertical Lines** in core column represents Shelby sampler.							
		Solid black rectangle in Bulk column respresents large bag sample.							
		Other Laboratory Tests:							
15		Max = Maximum Dry Density/Optimum Moisture Content							
		EI = Expansion Index							
		SO4 = Soluble Sulfate Content							
		DSR = Direct Shear, Remolded							
		DS = Direct Shear, Undisturbed							
		SA = Sieve Analysis (1" through #200 sieve)							
		Hydro = Particle Size Analysis (SA with Hydrometer)							
20		200 = Percent Passing #200 Sieve							
		Consol = Consolidation							
		SE = Sand Equivalent							
		Rval = R-Value							
		ATT = Atterberg Limits							

Albus & Associates, Inc.

Plate A-1

EXPLORATION LOG

Project:		Location: B-1
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 385.2
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		QUATERNARY GRAVEL AND SAND (Qg) Silty Sand with Gravel (SM): Light brown, moist, fine to coarse grained sand							
		Sandy Gravel with Cobbles (GP): Gray, dry to damp, fine to coarse grained sand, cobbles up to 5in dia, trace cobbles up to 8in dia							
5									
10						■			SA
15		Total Depth 15 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

Plate A-2

EXPLORATION LOG

Project:		Location: B-2
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 385.1
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		QUATERNARY GRAVEL AND SAND (Qg) Silty Sand with Gravel (SM): Light brown, moist, fine to coarse grained sand Sandy Gravel with Cobbles (GP): Gray, dry to damp, fine to coarse grained sand, cobbles up to 5in dia, trace cobbles up to 8in dia							
5									
10									
15									
20									

Albus & Associates, Inc.

Plate A-3

EXPLORATION LOG

Project:		Location: B-2
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 385.1
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
									SA
30		Total Depth 30 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

Plate A-4

EXPLORATION LOG

Project:		Location: B-3
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 369.7
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		QUATERNARY GRAVEL AND SAND (Qg)							
		Silty Sand with Gravel (SM): Light brown, moist, fine to coarse grained sand							
		Sandy Gravel with Cobbles (GP): Gray, dry to damp, fine to coarse grained sand, cobbles up to 5in dia, trace cobbles up to 8in dia							
5		@ 5 ft, more sand							
10		@ 10 ft, less sand							
15		@ 17 ft, more sand				■			SA
20									

Albus & Associates, Inc.

Plate A-5

EXPLORATION LOG

Project:		Location: B-3
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 369.7
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
30		Total Depth 30 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

Plate A-6

EXPLORATION LOG

Project:		Location: B-4
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 373.3
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		QUATERNARY GRAVEL AND SAND (Qg) Silty Sand with Gravel (SM): Light brown, moist, fine to coarse grained sand							
		Sandy Gravel with Cobbles (GP): Gray, dry to damp, fine to coarse grained sand, cobbles up to 5in dia, trace cobbles up to 8in dia							
5		@ 5 ft, more sand							
10		@ 10 ft, less sand							
15		@ 17 ft, more sand							
20									

Albus & Associates, Inc.

Plate A-7

EXPLORATION LOG

Project:		Location: B-4
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 373.3
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
30									
35									
40		Total Depth 40 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

Plate A-8

EXPLORATION LOG

Project:		Location: B-5
Address: 1270 Arrow Hwy, Irwindale, CA		Elevation: 357.9
Job Number: 3022.00	Client: Irwindale Partners, LP	Date: 10/5/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
5		**ARTIFICIAL FILL (Af)** Silty Sand with Gravel (SM): Dark brown, moist, fine to coarse grained sand, brick and other construction debris present							
10									
15		Total Depth 15 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

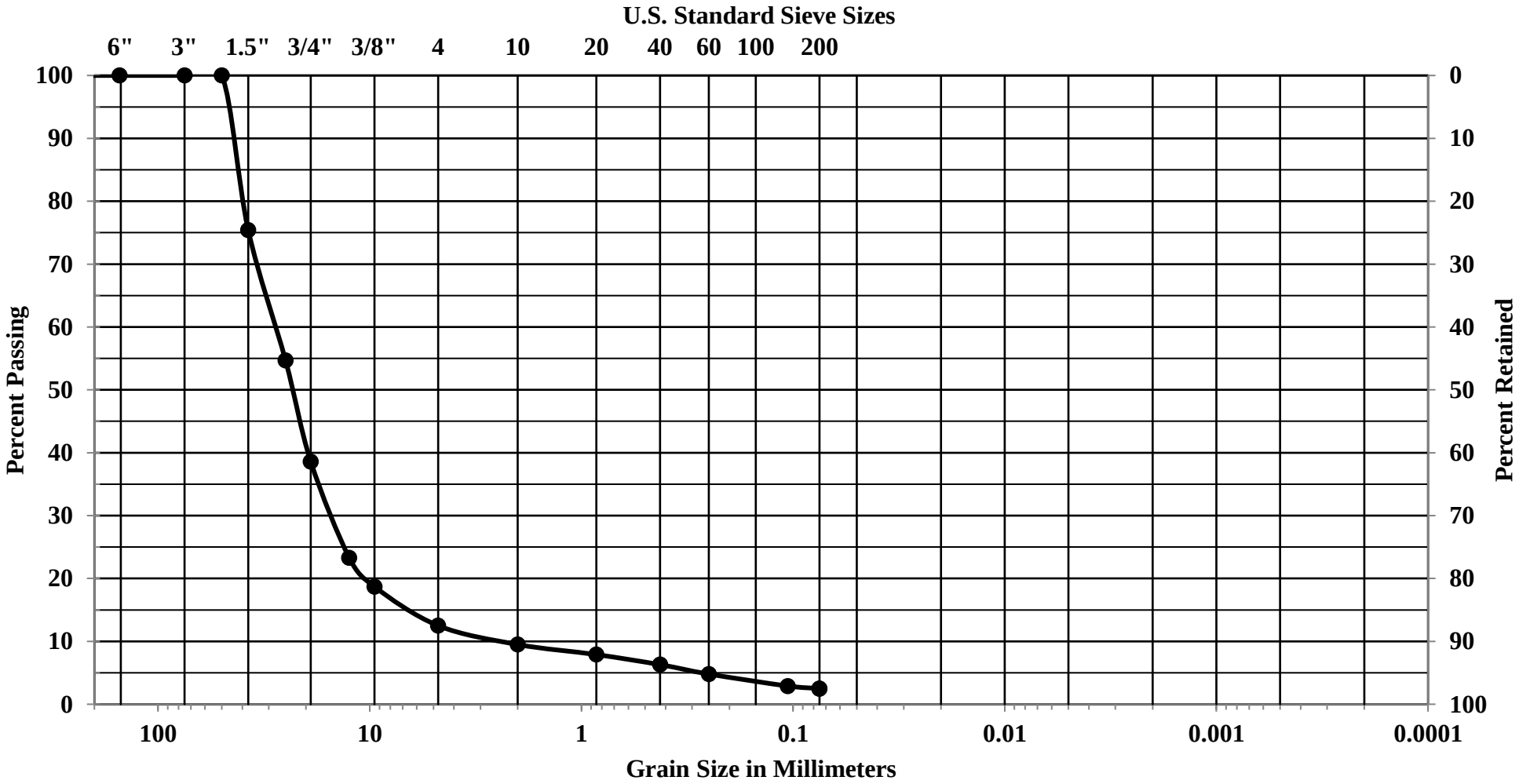
Plate A-9

APPENDIX B

LABORATORY TEST PROGRAM

GRAIN SIZE DISTRIBUTION

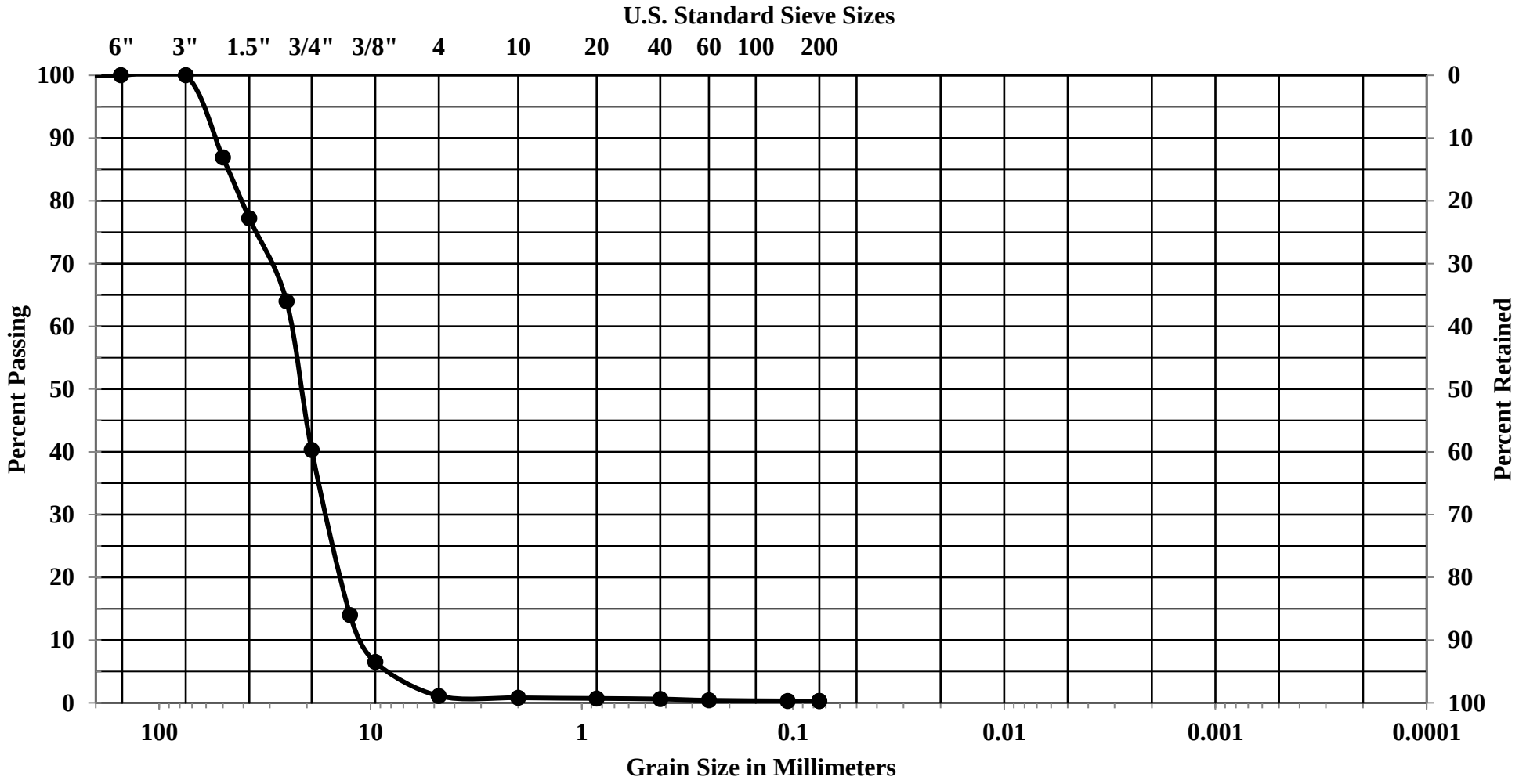
COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Job Number	Location	Depth	Description
3022.00	B-1	10-15	Gravel trace Sand

GRAIN SIZE DISTRIBUTION

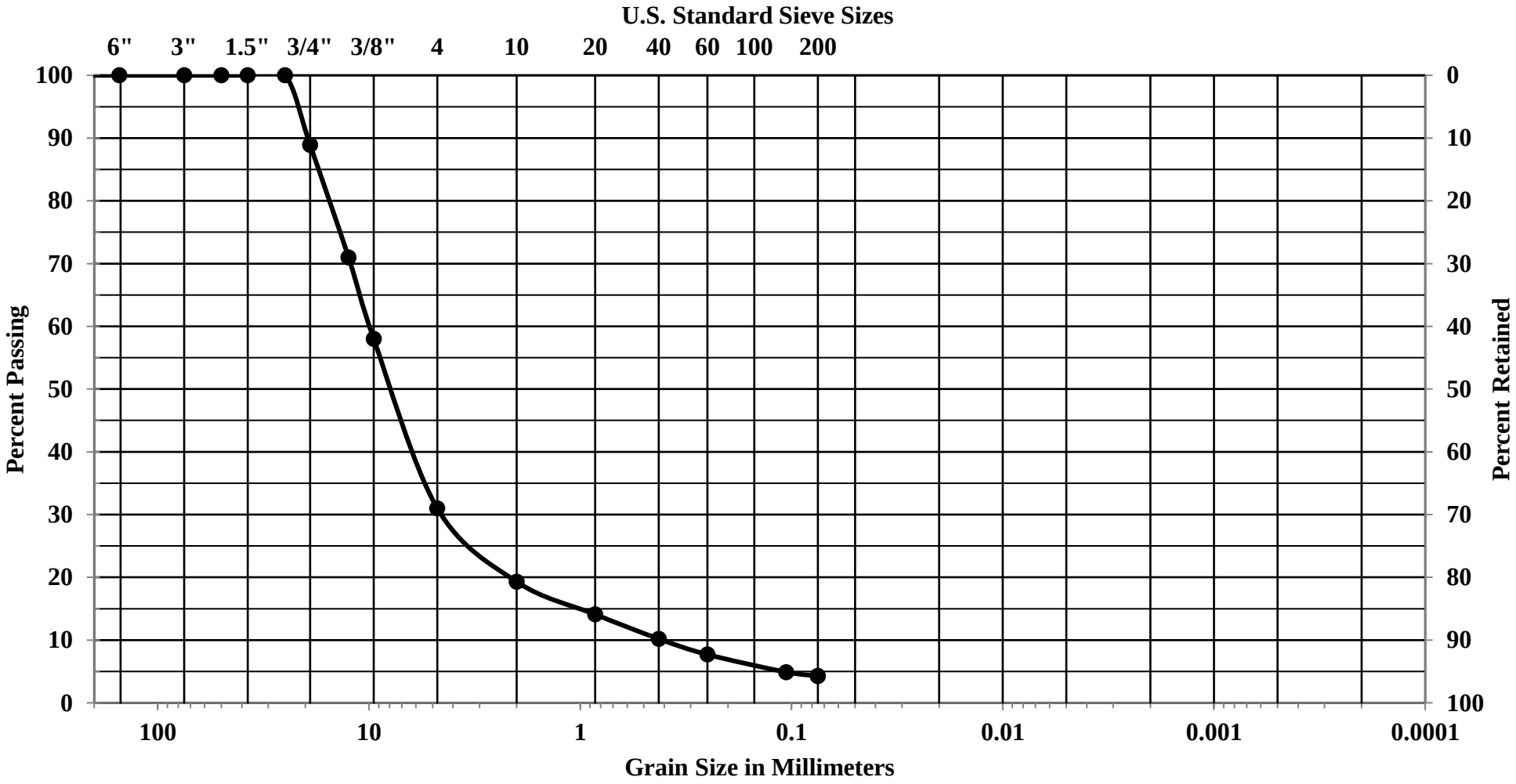
COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Job Number	Location	Depth	Description
3022.00	B-2	25-30	Gravel

GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Job Number	Location	Depth	Description
3022.00	B-3	17-18	Gravel with Sand

APPENDIX C

PERCOLATION TESTING AND ANALYSES

Field Percolation Testing - Constant Head

Client: Irwindale Partners, LP

Job. No.: 3022.00

Date Tested: 10/6/2021

Test by: ddalbus

Location: B-1

Top of Casing to Bottom of Well (ft): 14.7

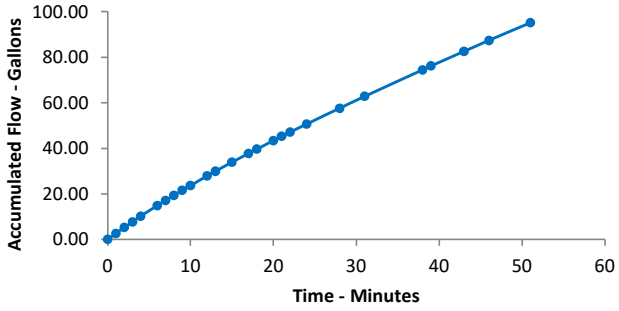
Elev. of Ground Surface (ft): 8

Diam. of Test Hole (in): 3

Diam. of Casing (in): 3

Ht. to Top of Casing (ft): 0

Water Tempurature (C°): 21



Constant Head

Elapsed Time (minutes)	Time	Depth to H2O (ft)	Flow Rate (gal./min.)	Total H_2O used (gal)
0	9:42	12.55	2.70	0.00
1	9:43	12.55	2.56	2.63
2	9:44	12.55	2.46	5.26
3	9:45	12.55	2.40	7.77
4	9:46	12.55	2.30	10.20
6	9:48	12.55	2.24	14.90
7	9:49	12.55	2.20	17.17
8	9:50	0.54	2.14	19.39
9	9:51	12.55	2.10	21.56
10	9:52	12.55	2.08	23.68
12	9:54	12.55	2.00	27.86
13	9:55	12.55	1.96	29.90
15	9:57	12.55	1.94	33.86
17	9:59	12.55	1.90	37.76
18	10:00	12.55	1.86	39.68
20	10:02	12.55	1.82	43.44
21	10:03	12.55	1.80	45.28
22	10:04	12.55	1.76	47.09
24	10:06	12.55	1.74	50.65
28	10:10	12.55	1.70	57.65
31	10:13	12.55	1.64	62.81
38	10:20	12.50	1.64	74.50
39	10:21	12.45	1.60	76.14
43	10:25	12.45	1.56	82.62
46	10:28	12.45	1.58	87.36
51	10:33	12.45	1.58	95.21

Field Percolation Testing - Constant Head

Client: Irwindale Partners, LP

Job. No.: 3022.00

Date Tested: 10/6/2021

Test by: ddalbus

Location: B-2

Top of Casing to Bottom of Well (ft): 29.5

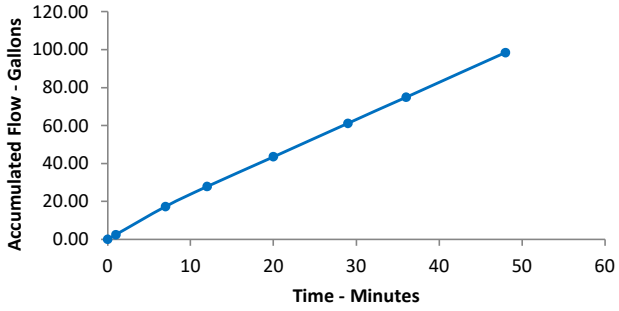
Elev. of Ground Surface (ft):

Diam. of Test Hole (in): 8

Diam. of Casing (in): 3

Ht. to Top of Casing (ft): 0

Water Tempurature (C°): 21



Constant Head

Elapsed Time (minutes)	Time	Depth to H2O (ft)	Flow Rate (gal./min.)	Total H_2O used (gal)
0	10:53	27.1	2.76	0.00
1	10:54	27.1	2.20	2.48
7	11:00	27.1	1.98	17.36
12	11:05	27.1	1.96	27.81
20	11:13	27.4	1.96	43.57
29	11:22	27.4	1.96	61.21
36	11:29	27.45	1.96	74.93
48	11:41	27.50	1.96	98.45

Field Percolation Testing - Constant Head

Client: Irwindale Partners, LP

Job. No.: 3022.00

Date Tested: 10/5/2021

Test by: ddalbus

Location: B-3

Top of Casing to Bottom of Well (ft): 30.6

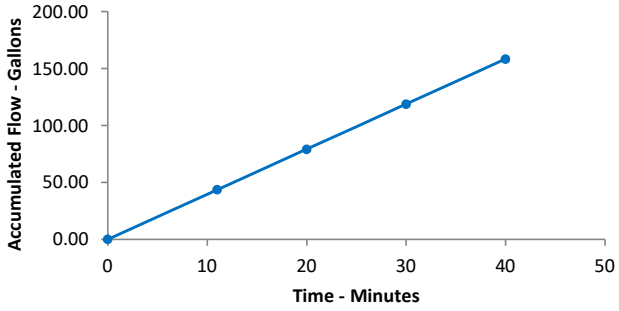
Elev. of Ground Surface (ft):

Diam. of Test Hole (in): 8

Diam. of Casing (in): 3

Ht. to Top of Casing (ft): 0

Water Tempurature (C°): 21



Constant Head

Elapsed Time (minutes)	Time	Depth to H2O (ft)	Flow Rate (gal./min.)	Total H_2O used (gal)
0	11:40	28	3.96	0.00
11	11:51	28	3.96	43.56
20	12:00	28	3.96	79.20
30	12:10	28	3.96	118.80
40	12:20	28	3.96	158.40

Field Percolation Testing - Constant Head

Client: Irwindale Partners, LP

Job. No.: 3022.00

Date Tested: 10/6/2021

Test by: ddalbus

Location: B-4

Top of Casing to Bottom of Well (ft): 40

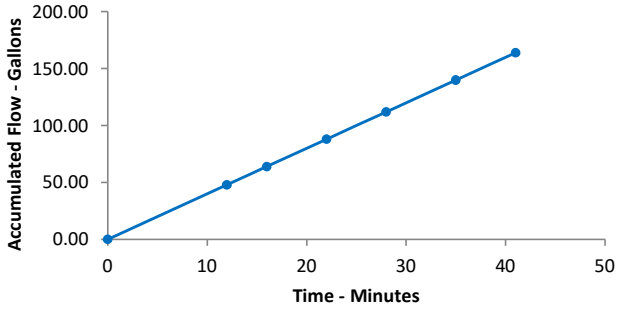
Elev. of Ground Surface (ft):

Diam. of Test Hole (in): 8

Diam. of Casing (in): 3

Ht. to Top of Casing (ft): 0.35

Water Tempurature (C°): 21



Constant Head

Elapsed Time (minutes)	Time	Depth to H2O (ft)	Flow Rate (gal./min.)	Total H_2O used (gal)
0	8:20	39.2	4.00	0.00
12	8:32	39.2	4.00	48.00
16	8:36	39.3	4.00	64.00
22	8:42	39.3	4.00	88.00
28	8:48	39.35	4.00	112.00
35	8:55	39.35	4.00	140.00
41	9:01	39.35	4.00	164.00

INFILTRATION WELL DESIGN

Constant Head
USBR 7300-89 Method
J.N.: 3022.00
Client: Irwindale Partners, LP
Well No.: B-1

Low Water Table	Condition 1	
High Water Table & Water Below Bottom of Well	Condition 2	
High water Table with Water Above the Well Bottom	Condition 3	
		Units:
Enter Condition (1, 2 or 3):	1	
Ground Surface to Bottom of Well (**h_1**):	14.7	feet
Depth to Water (**h_2**):	12.45	feet
Height of Water in the Well (h_1-h_2=**h**):	2.25	feet
Radius of Well (**r**):	4.0	Inches
Minimum Volume Required:	245.1	Gal.
Discharge Rate of Water Into Well for Steady-State Condition (**q**):	1.58	Gal/min.
Temperature (**T**):	21	Celsius
(Viscosity of Water @ Temp. T) / (Viscosity of water @ 20° C) (**V**):	0.9647	ft^3/min.
Unsaturated Distance Between the Water Surface in the Well and the Water table (**T_u**):		Ignore T_u
Factor of Safety:	1	
Coefficient of Permeability @ 20° C (**k_{20}**):	1.13E-02	ft/min.
Design k_{20}:	8.14	in./hr.

The presence or absence of a water table or impervious soil layer within a distance of less than three times that of the water depth in the well (measured from the water surface) will enable the water table to be classified as **Condition I**, **Condition II**, **Condtion III**.

Low Water Table-When the distance from the water surface in the test well to the ground water table, or to an impervious soil layer which is considered for test puposes to be equivalent to a water table, is greater than three times the depth of water in the well, classify as **Condition I**.

High Water Table-When the distance from the water surface in the test well to the ground water table or to an impervious layer is less than three times the depth of water in the well, a high water table condition exists. Use **Condition II** when the water table or impervious layer is below the well bottom. Use **Condition III** when the water table or impervious layer is above the well bottom.

INFILTRATION WELL DESIGN

Constant Head
USBR 7300-89 Method
J.N.: 3022.00
Client: Irwindale Partners, LP
Well No.: B-2

Low Water Table	Condition 1	
High Water Table & Water Below Bottom of Well	Condition 2	
High water Table with Water Above the Well Bottom	Condition 3	
		Units:
Enter Condition (1, 2 or 3):	1	
Ground Surface to Bottom of Well (**h_1**):	29.5	feet
Depth to Water (**h_2**):	27.5	feet
Height of Water in the Well (h_1-h_2=**h**):	2	feet
Radius of Well (**r**):	4.0	Inches
Minimum Volume Required:	192.7	Gal.
Discharge Rate of Water Into Well for Steady-State Condition (**q**):	1.96	Gal/min.
Temperature (**T**):	21	Celsius
(Viscosity of Water @ Temp. T) / (Viscosity of water @ 20° C) (**V**):	0.9647	ft^3/min.
Unsaturated Distance Between the Water Surface in the Well and the Water table (**T_u**):		Ignore T_u
Factor of Safety:	1	
Coefficient of Permeability @ 20° C (**k_{20}**):	1.67E-02	ft/min.
Design k_{20}:	12.04	in./hr.

The presence or absence of a water table or impervious soil layer within a distance of less than three times that of the water depth in the well (measured from the water surface) will enable the water table to be classified as **Condition I**, **Condition II**, **Condtion III**.

Low Water Table-When the distance from the water surface in the test well to the ground water table, or to an impervious soil layer which is considered for test puposes to be equivalent to a water table, is greater than three times the depth of water in the well, classify as **Condition I**.

High Water Table-When the distance from the water surface in the test well to the ground water table or to an impervious layer is less than three times the depth of water in the well, a high water table condition exists. Use **Condition II** when the water table or impervious layer is below the well bottom. Use **Condition III** when the water table or impervious layer is above the well bottom.

INFILTRATION WELL DESIGN

Constant Head
USBR 7300-89 Method
J.N.: 3022.00
Client: Irwindale Partners, LP
Well No.: B-3

Low Water Table	Condition 1	
High Water Table & Water Below Bottom of Well	Condition 2	
High water Table with Water Above the Well Bottom	Condition 3	
		Units:
Enter Condition (1, 2 or 3):	1	
Ground Surface to Bottom of Well (**h_1**):	30.6	feet
Depth to Water (**h_2**):	28	feet
Height of Water in the Well (h_1-h_2=**h**):	2.6	feet
Radius of Well (**r**):	4.0	Inches
Minimum Volume Required:	332.8	Gal.
Discharge Rate of Water Into Well for Steady-State Condition (**q**):	3.96	Gal/min.
Temperature (**T**):	21	Celsius
(Viscosity of Water @ Temp. T) / (Viscosity of water @ 20° C) (**V**):	0.9647	ft^3/min.
Unsaturated Distance Between the Water Surface in the Well and the Water table (**T_u**):		Ignore T_u
Factor of Safety:	1	
Coefficient of Permeability @ 20° C (**k_{20}**):	2.27E-02	ft/min.
Design k_{20}:	16.37	in./hr.

The presence or absence of a water table or impervious soil layer within a distance of less than three times that of the water depth in the well (measured from the water surface) will enable the water table to be classified as **Condition I**, **Condition II**, **Condtion III**.

Low Water Table-When the distance from the water surface in the test well to the ground water table, or to an impervious soil layer which is considered for test puposes to be equivalent to a water table, is greater than three times the depth of water in the well, classify as **Condition I**.

High Water Table-When the distance from the water surface in the test well to the ground water table or to an impervious layer is less than three times the depth of water in the well, a high water table condition exists. Use **Condition II** when the water table or impervious layer is below the well bottom. Use **Condition III** when the water table or impervious layer is above the well bottom.

INFILTRATION WELL DESIGN

Constant Head
USBR 7300-89 Method
J.N.: 3022.00
Client: Irwindale Partners, LP
Well No.: B-4

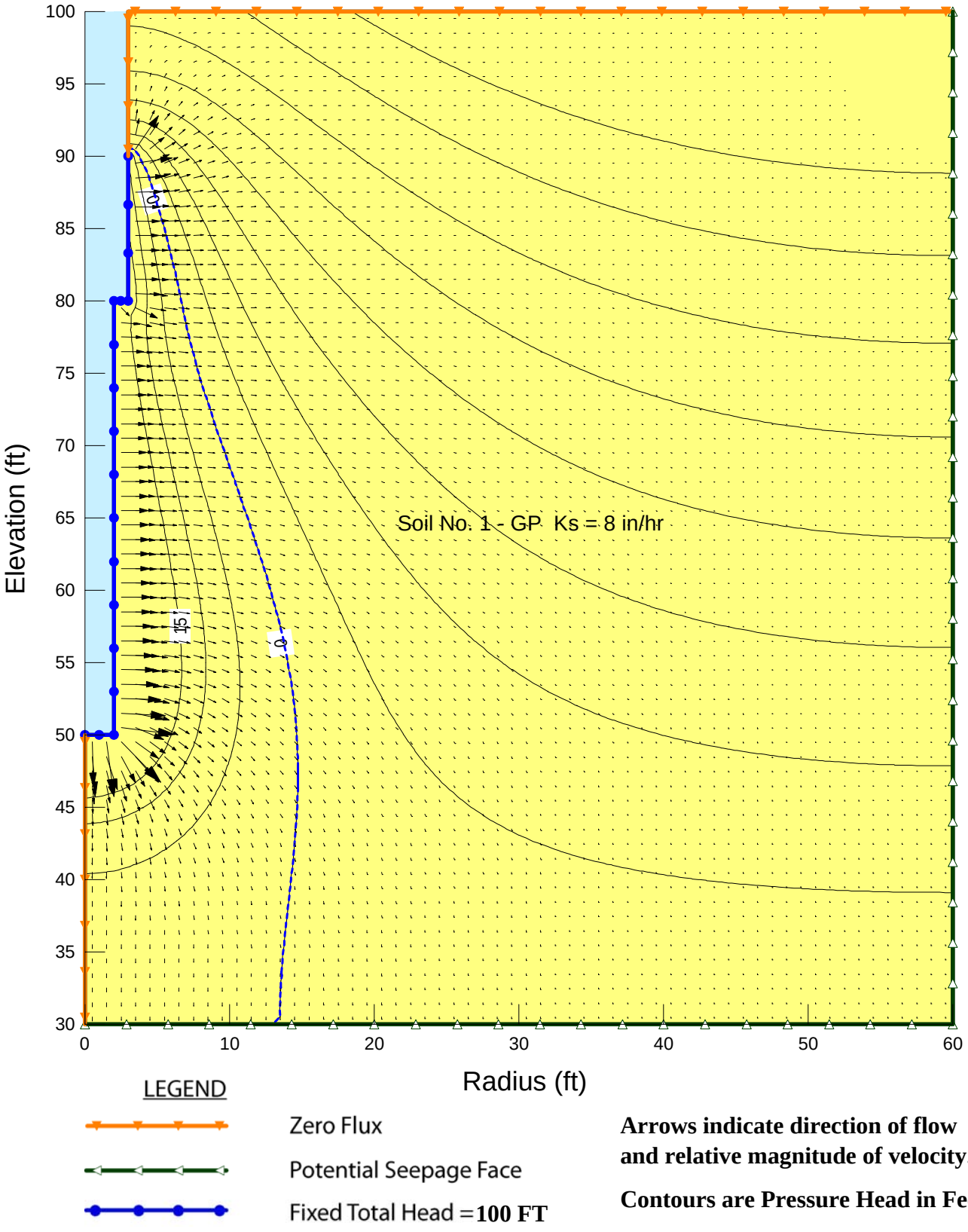
Low Water Table	Condition 1	
High Water Table & Water Below Bottom of Well	Condition 2	
High water Table with Water Above the Well Bottom	Condition 3	
		Units:
Enter Condition (1, 2 or 3):	1	
Ground Surface to Bottom of Well (**h_1**):	40	feet
Depth to Water (**h_2**):	39.35	feet
Height of Water in the Well (h_1-h_2=**h**):	0.65	feet
Radius of Well (**r**):	4.0	Inches
Minimum Volume Required:	44.1	Gal.
Discharge Rate of Water Into Well for Steady-State Condition (**q**):	4	Gal/min.
Temperature (**T**):	21	Celsius
(Viscosity of Water @ Temp. T) / (Viscosity of water @ 20° C) (**V**):	0.9647	ft^3/min.
Unsaturated Distance Between the Water Surface in the Well and the Water table (**T_u**):		Ignore T_u
Factor of Safety:	1	
Coefficient of Permeability @ 20° C (**k_{20}**):	1.59E-01	ft/min.
Design k_{20}:	114.54	in./hr.

The presence or absence of a water table or impervious soil layer within a distance of less than three times that of the water depth in the well (measured from the water surface) will enable the water table to be classified as **Condition I**, **Condition II**, **Condtion III**.

Low Water Table-When the distance from the water surface in the test well to the ground water table, or to an impervious soil layer which is considered for test puposes to be equivalent to a water table, is greater than three times the depth of water in the well, classify as **Condition I**.

High Water Table-When the distance from the water surface in the test well to the ground water table or to an impervious layer is less than three times the depth of water in the well, a high water table condition exists. Use **Condition II** when the water table or impervious layer is below the well bottom. Use **Condition III** when the water table or impervious layer is above the well bottom.

STEADY STATE



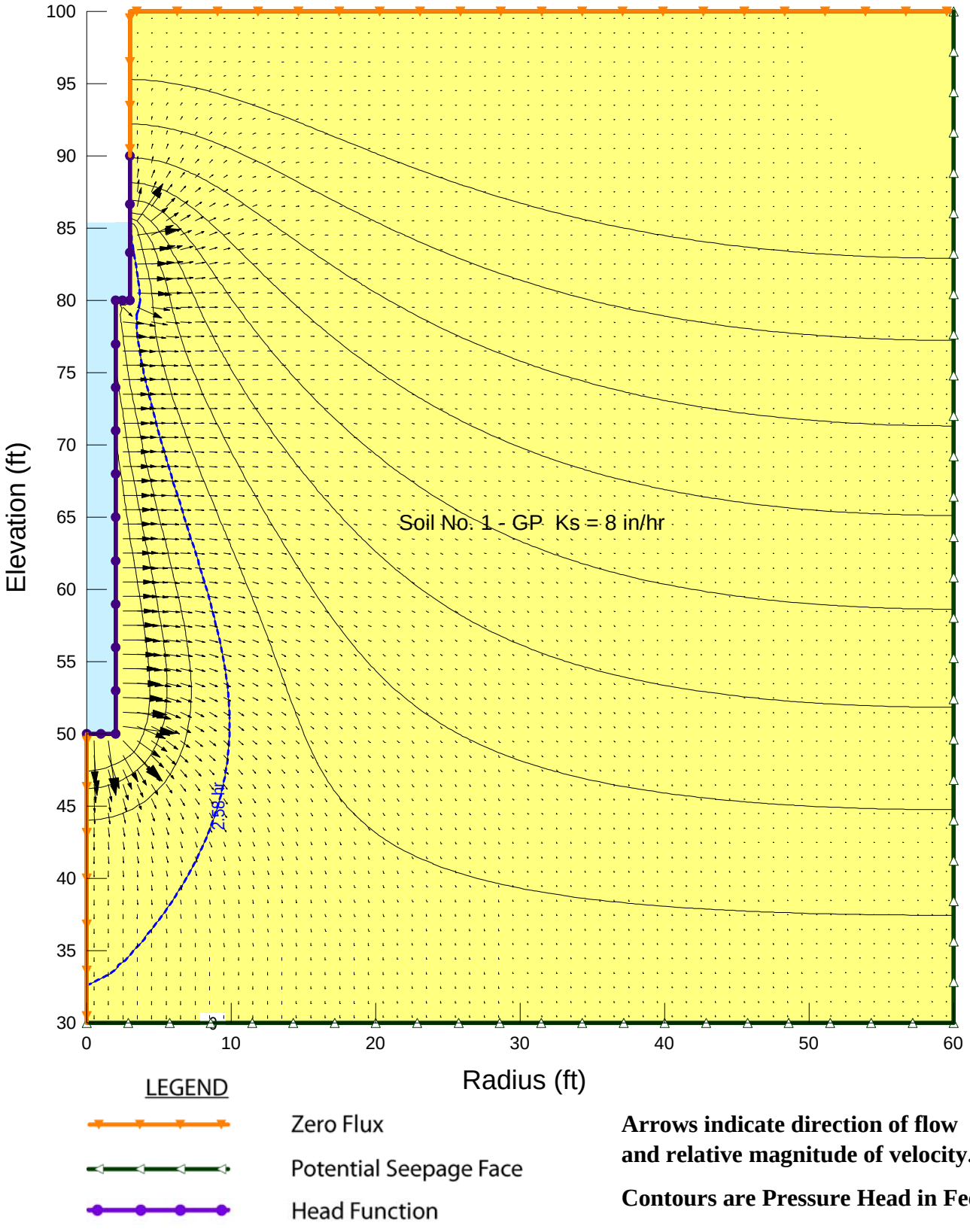
Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

ALBUS & ASSOCIATES, INC.

PLATE C-9

TRANSIENT @ 0.075 hrs

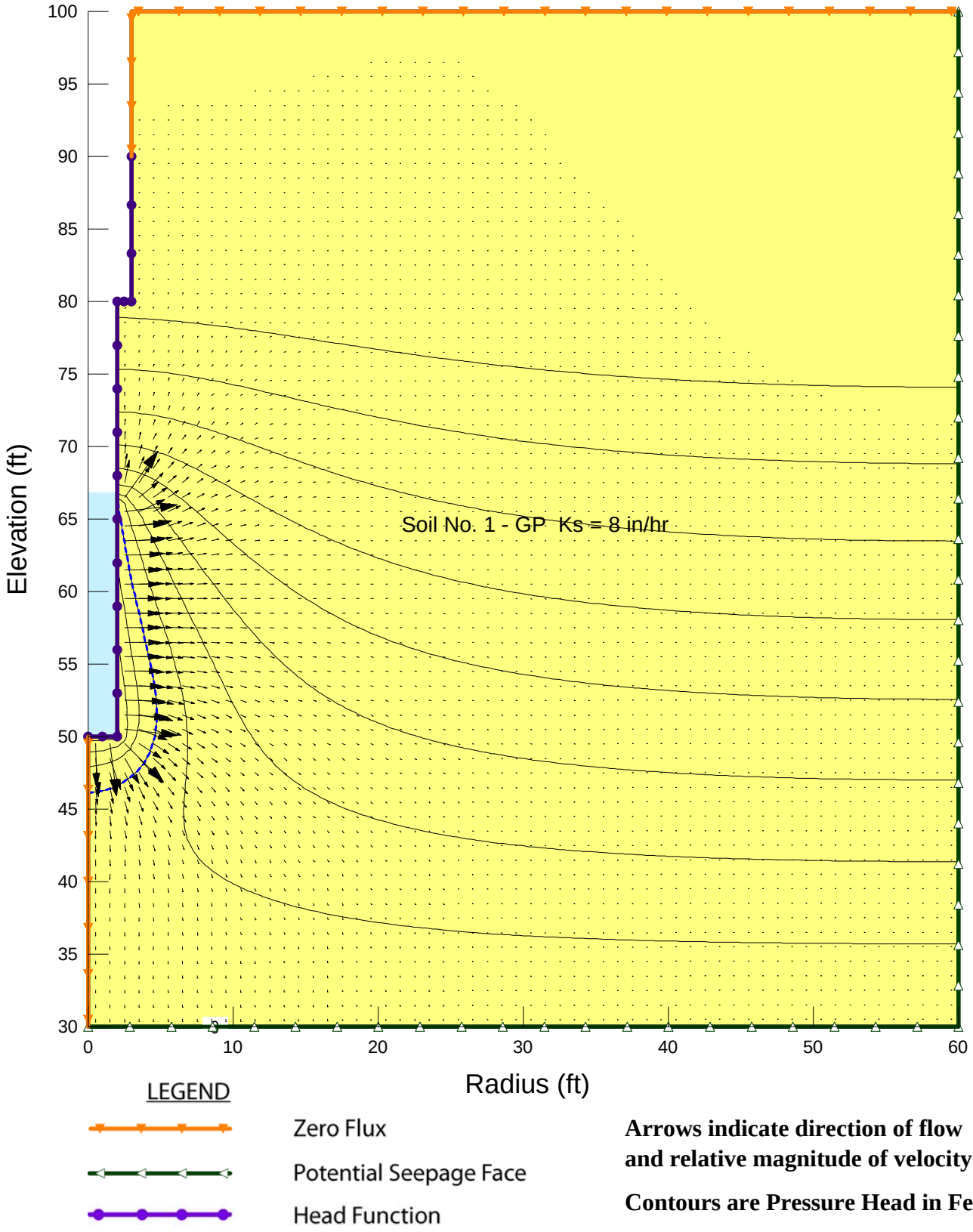


Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

ALBUS & ASSOCIATES, INC. **PLATE C-10**

TRANSIENT @ 0.125 hrs



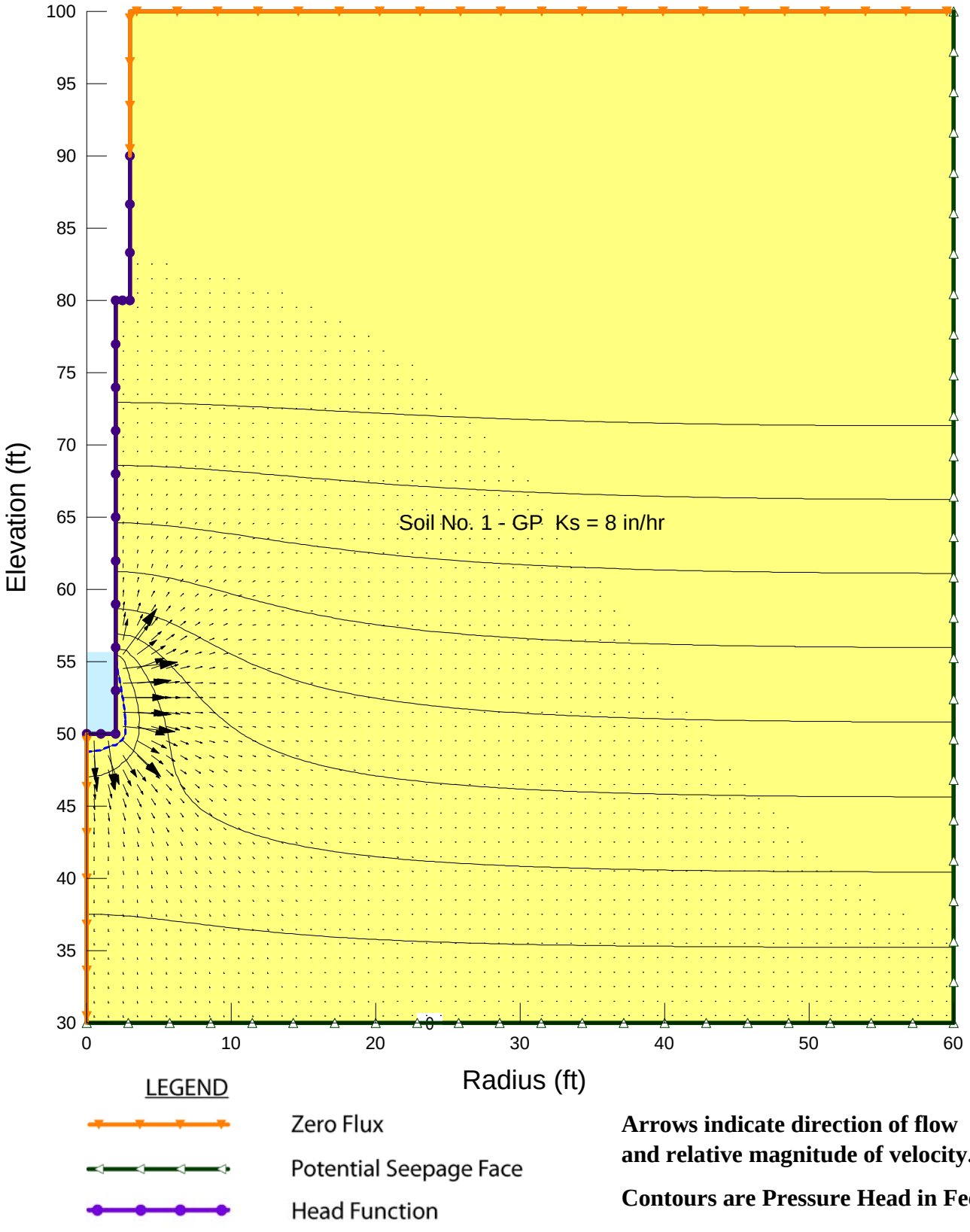
Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

ALBUS & ASSOCIATES, INC.

PLATE C-11

TRANSIENT @ 0.175 hrs



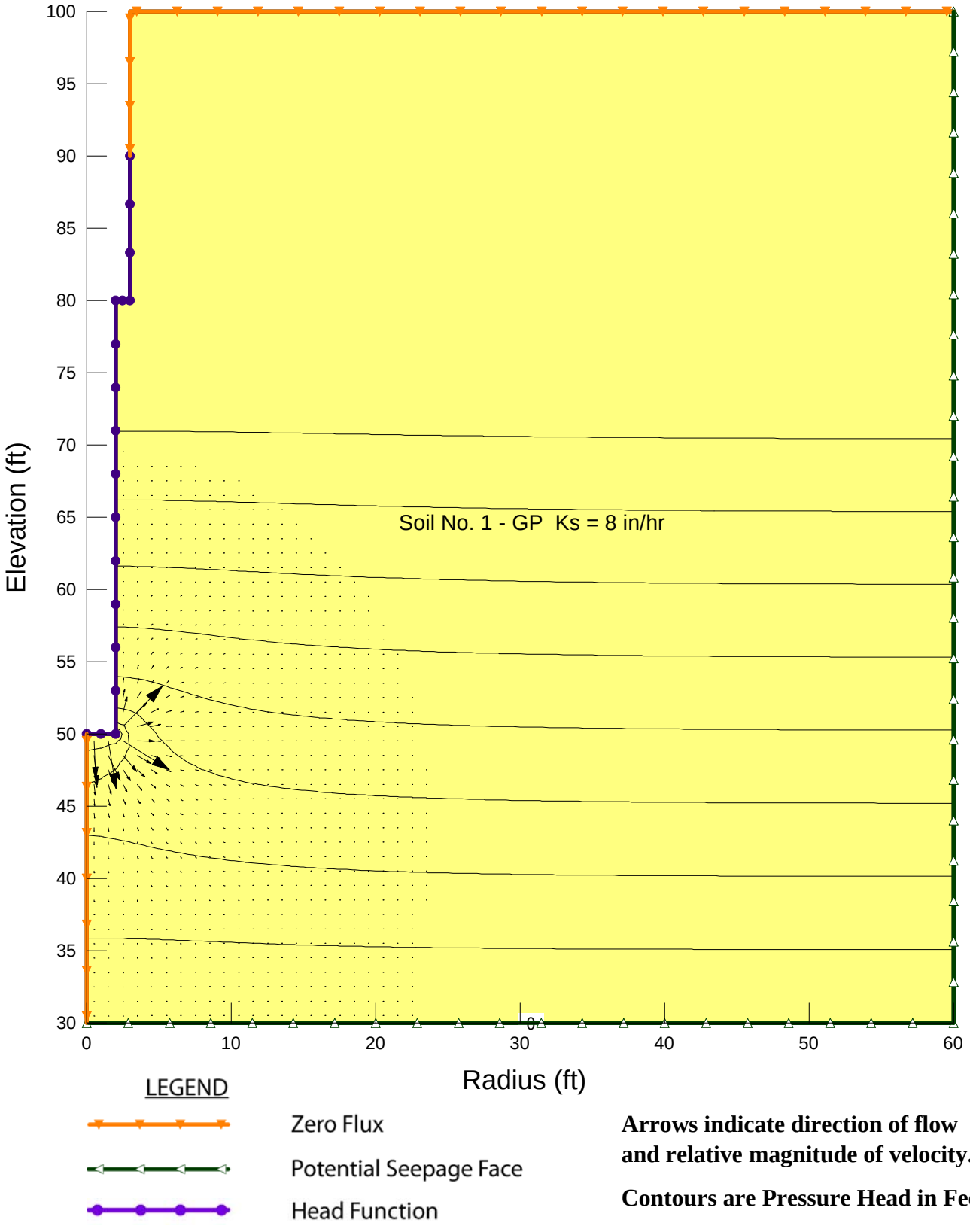
Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

ALBUS & ASSOCIATES, INC.

PLATE C-12

TRANSIENT @ 0.25 hrs



Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

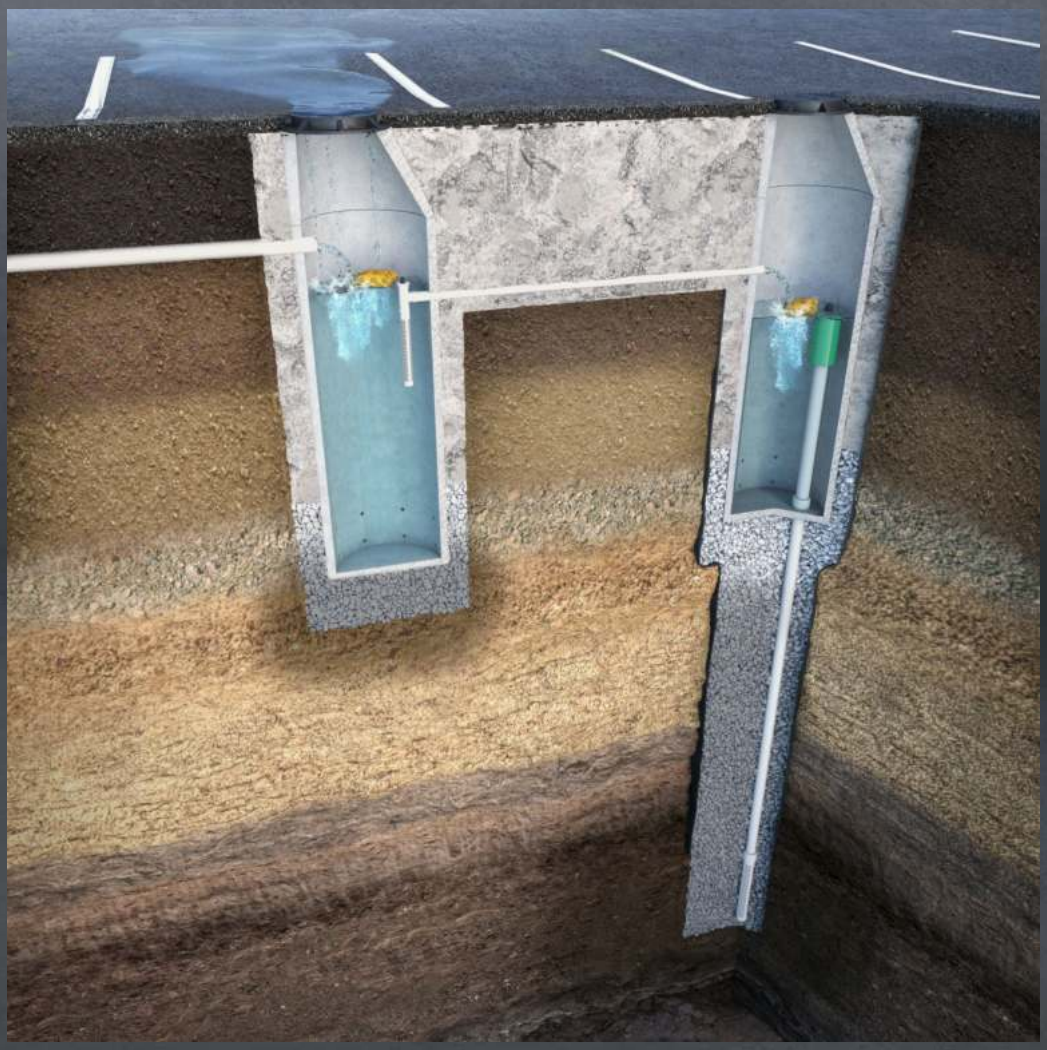
ALBUS & ASSOCIATES, INC. **PLATE C-13**

Oldcastle Infrastructure
A CRH COMPANY

MaxWell®

Deep Infiltration System

Design Summary



PROJECT INFORMATION

PROJECT NAME: Irwindale Gateway

PROJECT CITY: Baldwin Park

PROJECT STATE: California

COMPANY: DEA

SITE TYPE: Industrial

SYSTEM DESIGN

Inputs

System Type	Name of Drainage Area	Measured Infiltration Rate	Factor of Safety	Water Quality Volume (or Flow Rate)	Required Drawdown Time	Min Depth to Infiltration	Depth to Groundwater	Depth to Deepest Inlet Below Rim	Cover Type
		(in/hr)		(cf) or (cfs)	(hrs)	(ft)	(ft)	(ft)	
Maxwell Plus	A1-A3	381.50	1.00	203,412.00	96.0	0.0	170.00	21.00	Solid Cover

System Design

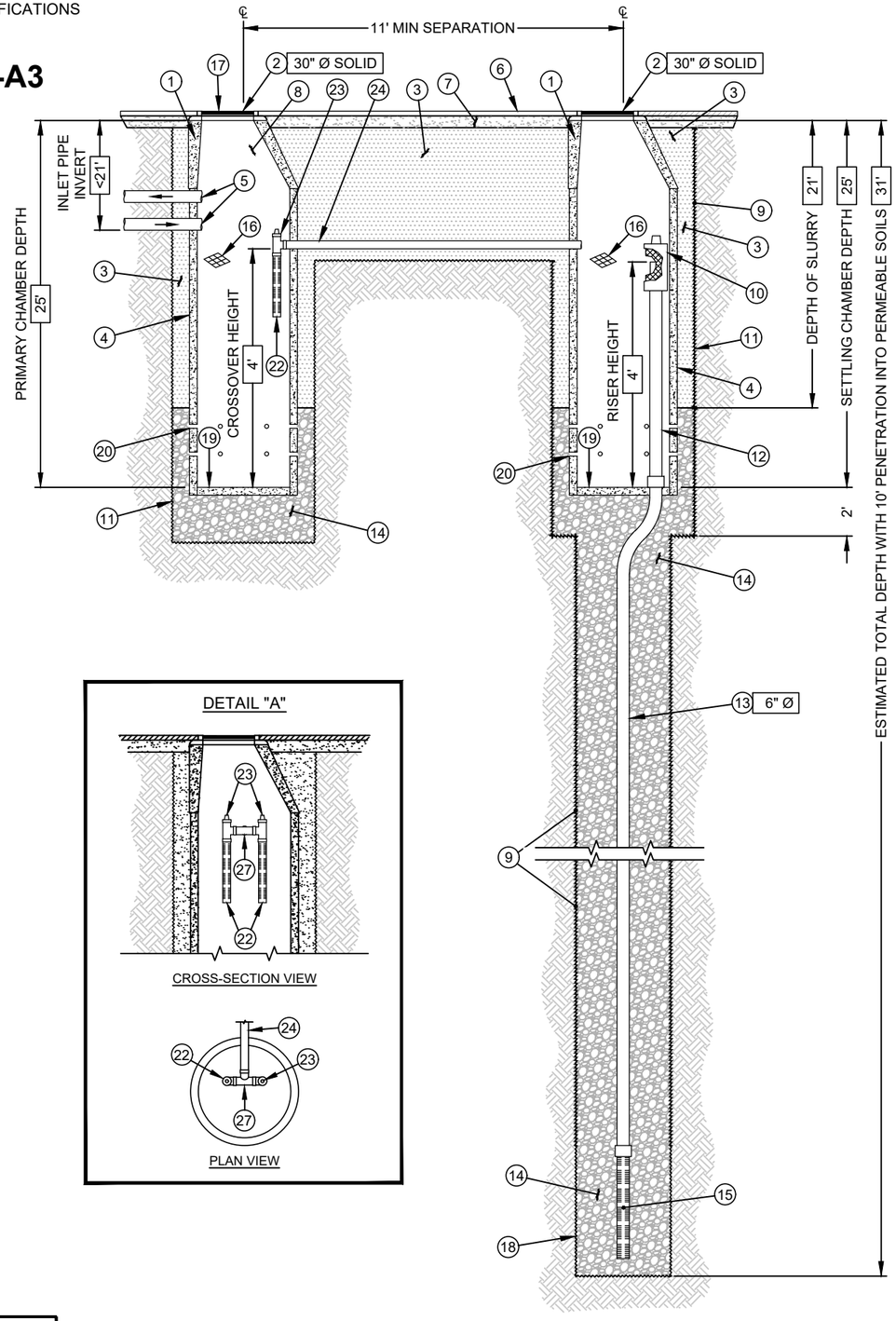
Name of Drainage Area	# of Drywells Needed	Total Drywell Depth	Chamber Depth	Infiltration Flow Rate per Drywell	Volume Provided Per Drywell	Total Flow Rate	Total Volume Provided	Total Volume Infiltrated within Drawdown Time
		(ft)	(ft)	(cfs)	(cf)	(cfs)	(cf)	(cf)
A1-A3	1	31	25	1.22009	344.1	1.22009	658.1	421,663

The MaxWell® Plus

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS

Irwindale Gateway:
Drainage Area 1 - A1-A3

Baldwin Park, California



ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE/COVER** - DIAMETER & TYPE AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
3. **STABILIZED BACKFILL** - TWO-SACK SLURRY MIX.
4. **PRE-CAST LINER -** 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE.**
5. **INLET PIPE/OUTLET PIPE (BY OTHERS). SEE SEPARATE PLAN FOR INVERT ELEVATIONS.**
6. **GRADED BASIN OR PAVING** (BY OTHERS).
7. **COMPACTED BASE MATERIAL**, IF REQUIRED (BY OTHERS).
8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE PRIMARY AND SECONDARY CHAMBER DEPTHS AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. **NON-WOVEN GEOTEXTILE SLEEVE** - MIRAFI 140 NL. MIN. 6 FT Ø. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
10. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED**.
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE** - ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, 2 PER CHAMBER.
17. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **MIN. 4' Ø DRILLED SHAFT.**
19. **BASE SEAL** - CONCRETE SLURRY
20. **6 PERFORATIONS MINIMUM PER FOOT, 2 ROWS MINIMUM.**
21. NOT USED.
22. **DUAL INTAKE SCREEN** - 4" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/ FT. 48" OVERALL LENGTH WITH TRI-B COUPLER PER DETAIL. REFER TO "DETAIL A" HEREON.
23. **VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.**
24. **CONNECTOR PIPE** - 4" Ø SCH. 40 PVC.
27. **4" Ø SCH. 40 PVC TEE.**

DETAIL : PL-4-SS-CA	REVISED BY: OI	
DRAWN ON: 05-23-19	REVISED DATE: 12-06-22	SCALE: N.T.S

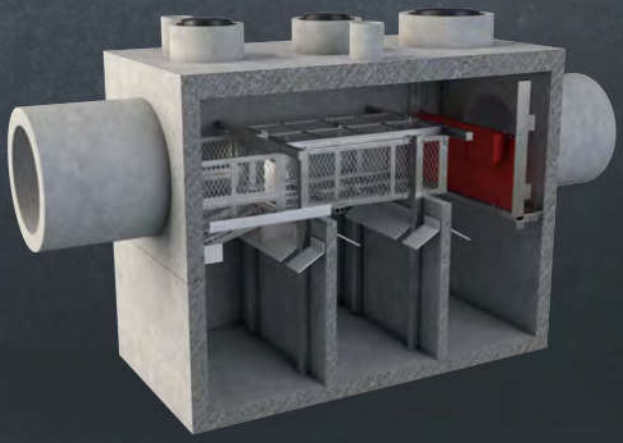
Manufactured and Installed by
TORRENT RESOURCES
An evolution of McGuckin Drilling
www.torrentresources.com
CALIFORNIA 909-829-0740
ARIZONA 602-268-0785

Oldcastle Infrastructure™
A CRH COMPANY

Hydrodynamic Separation

Design Summary

Dual-Vortex Separator (DVS)



Nutrient Separating Baffle Box® (NSBB™)

PROJECT INFORMATION

PROJECT NAME: Irwindale Gateway

PROJECT CITY: Baldwin Park

PROJECT STATE: California

COMPANY: DEA

SITE TYPE: Industrial

SYSTEM DESIGN

Site Designation	Model	Sizing Criteria	Treatment Flow Rate (cfs)	Peak Flow Rate (cfs)	Rim Elevation (ft)	Outlet Pipe Invert (ft)	Outlet Pipe Diameter (in)	Grated Inlet	High Groundwater	Bedrock
A1	NSBB-816	Level III - 50% Removal of 75 microns	5.69	70.10	401.00	393.00	48			
A2	NSBB-816	Level III - 50% Removal of 75 microns	5.90	70.92	401.00	393.00	48			

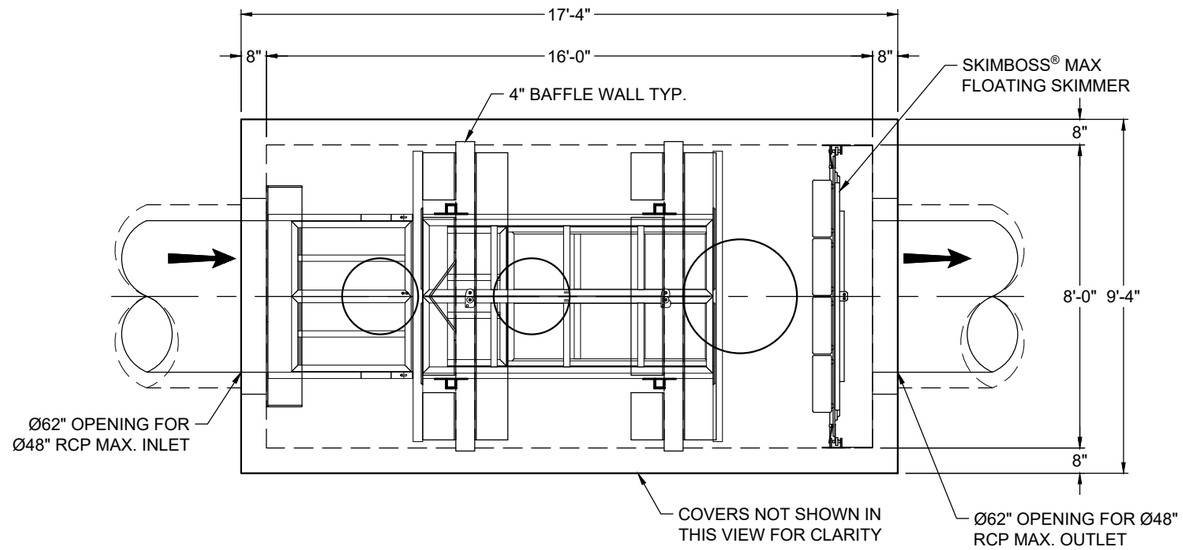
SITE SPECIFIC DATA	
Structure ID	A1
Water Quality Flow Rate (cfs)	5.69
Peak Flow Rate (cfs)	70.1
Rim Elevation	401
Top of Vault Elevation	-

Pipe Data	Pipe Size	Pipe Type	Invert Elevation
Inlet	48	HDPE	395
Outlet	48	HDPE	393

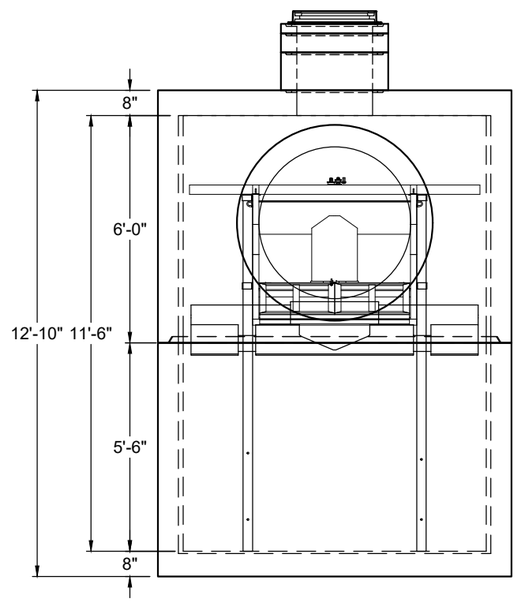
Notes:

PERFORMANCE SPECIFICATIONS	
Screen System Storage Volume	126.49 cf
Total Sump Volume	750.00 cf
NJDEP Sediment Storage Volume	122.60 cf
Peak Flow Capacity*	102.70 cfs
Treatment Flow Capacities:*	
NJDEP 50% Removal, 75 micron	9.96 cfs
80% Removal, 150 micron	26.00 cfs

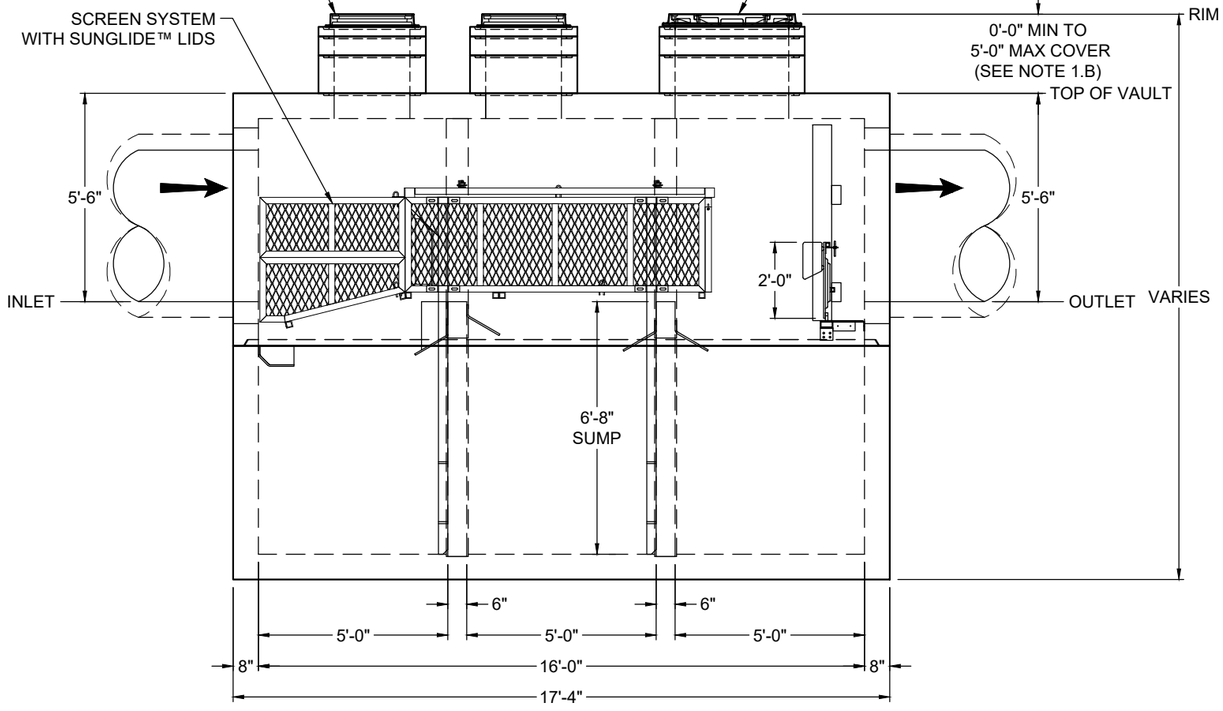
*Contact Oldcastle for additional treatment and peak flow capacities.



PLAN VIEW



LEFT END VIEW



ELEVATION VIEW

NOTES:

1. DESIGN LOADINGS:
   A. AASHTO HS-20-44 (WITH IMPACT)
   B. DESIGN SOIL COVER: 5'-0" MAXIMUM
   C. ASSUMED WATER TABLE: BELOW BASE OF PRECAST (ENGINEER-OF-RECORD TO CONFIRM SITE WATER TABLE ELEVATION)
   D. LATERAL EARTH PRESSURE: 45 PCF (DRAINED)
   E. LATERAL LIVE LOAD SURCHARGE: 80 PSF (APPLIED TO 8'-0" BELOW GRADE)
   F. NO LATERAL SURCHARGE FROM ADJACENT BUILDINGS, WALLS, PIERS, OR FOUNDATIONS.
2. CONCRETE 28-DAY MINIMUM COMPRESSIVE STRENGTH: 5,000 PSI MINIMUM.
3. REINFORCING: REBAR, ASTM A615/A706, GRADE 60
4. CEMENT: ASTM C150
5. REQ'D ALLOWABLE SOIL BEARING CAPACITY: 2,500 PSF
6. REFERENCE STANDARD:
   A. ASTM C890
   B. ASTM C913
   C. ACI 318-14
7. THIS STRUCTURE IS DESIGNED TO THE PARAMETERS NOTED HEREIN. ENGINEER-OF-RECORD SHALL VERIFY FY THAT NOTED PARAMETERS MEET OR EXCEED PROJECT REQUIREMENTS. IF DESIGN PARAMETERS ARE INCORRECT, REVIEWING ENGINEER/AUTHORITY SHALL NOTIFY OLDCASTLE INFRASTRUCTURE UPON REVIEW OF THIS SUBMITTAL.
8. OVERSIZED HOLES TO ACCOMMODATE SPECIFIC PIPE TYPE MUST BE CONCENTRIC TO PIPE ID. AFTER PIPES ARE INSTALLED, ALL ANNULAR SPACES SHALL BE FILLED WITH A MINIMUM OF 3,000 PSI CONCRETE FOR FULL THICKNESS OF PRECAST WALLS. PIPES ARE TO BE FLUSH WITH THE INSIDE SURFACE OF THE CONCRETE STRUCTURE.
9. CONTRACTOR RESPONSIBLE TO VERIFY ALL SIZES, LOCATIONS, AND ELEVATIONS OF OPENINGS.
10. CONTRACTOR RESPONSIBLE TO ENSURE ADEQUATE BEARING SURFACE IS PROVIDED (I.E. COMPACTED AND LEVEL PER PROJECT SPECIFICATIONS).
11. SECTION HEIGHTS, SLAB/WALL THICKNESSES, AND KEYWAYS ARE SUBJECT TO CHANGE AS REQUIRED FOR SITE REQUIREMENTS AND/OR DUE TO PRODUCT AVAILABILITY AND PRODUCTION FACILITY CONSTRAINTS.
12. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT OLDCASTLE INFRASTRUCTURE.
13. MAXIMUM PICK WEIGHT: 54,000 LBS. (* COMBINED WEIGHT INCLUDES BAFFLE WALLS AND PRODUCT INTERNALS.)
14. INTERNALS SHALL CONSIST OF A FLOATING SKIMMER, FLOW DEFLECTORS, ELEVATED CENTRAL SCREEN SYSTEM AND SLIDING LIDS. THESE COMPONENTS EFFECTIVELY REDUCE HEAD LOSS, INCREASE POLLUTANT REMOVAL AND SIMPLIFY MAINTENANCE.

Oldcastle Infrastructure™
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Ph: 800.579.8819 | www.oldcastleinfrastructure.com/stormwater

Nutrient Separating Baffle Box® (STANDARD)

CUSTOMER: DEA

PROJECT NAME: Irwindale Gateway

SHEET NAME	REVISION	SHEET
Specifier Drawing NSBB-816	-	1 OF 1
	REV DATE: -	

SITE SPECIFIC DATA	
Structure ID	A2
Water Quality Flow Rate (cfs)	5.9
Peak Flow Rate (cfs)	70.92
Rim Elevation	401
Top of Vault Elevation	-

Pipe Data	Pipe Size	Pipe Type	Invert Elevation
Inlet	48	HDPE	395
Outlet	48	HDPE	393

Notes:

PERFORMANCE SPECIFICATIONS	
Screen System Storage Volume	126.49 cf
Total Sump Volume	750.00 cf
NJDEP Sediment Storage Volume	122.60 cf
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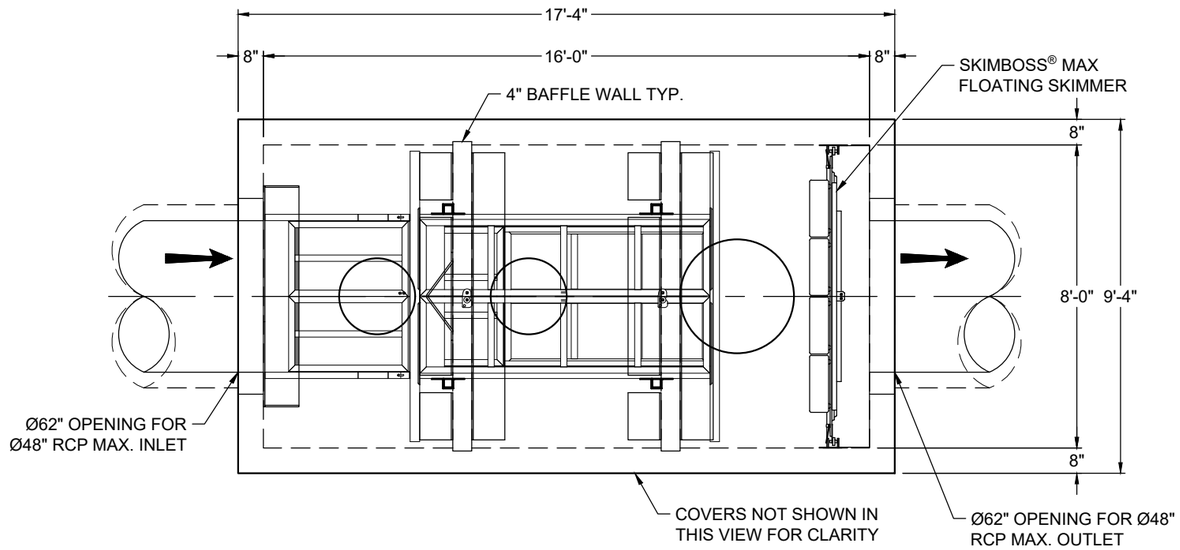
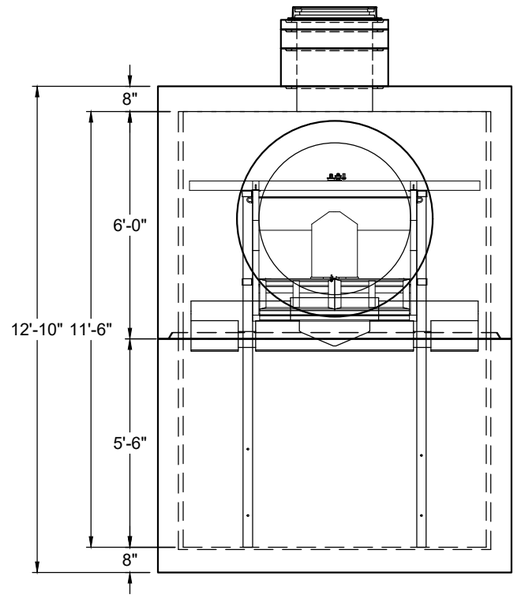
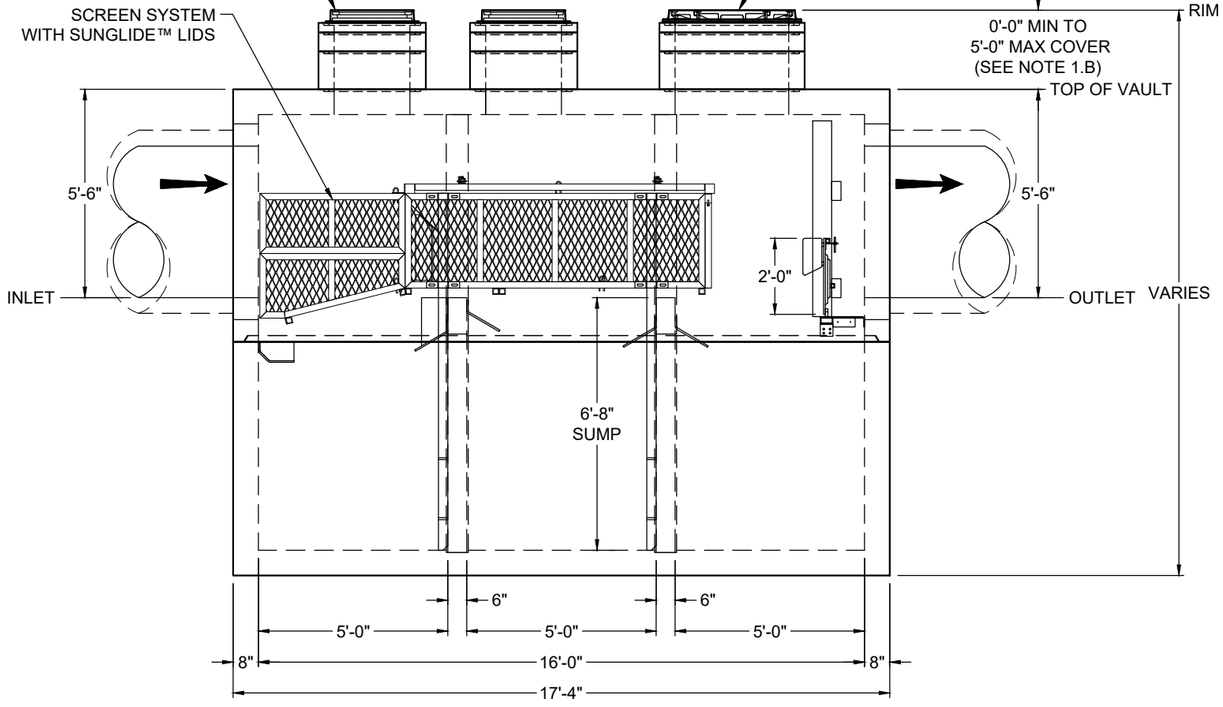


PLAN VIEW



LEFT END VIEW



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NOTES:

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Nutrient Separating Baffle Box® (STANDARD)

CUSTOMER: DEA

PROJECT NAME: Irwindale Gateway

SHEET NAME	REVISION	SHEET
Specifier Drawing NSBB-816	-	1 OF 1
	REV DATE -	

Oldcastle Infrastructure™
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MWS STANDARD SIZING TABLE

Model #	Dimensions	WetlandMEDIA Surface Area	Treatment Flow Rate (cfs)	Detention Time Adjustment to Tc (min)
MWS-L-4-4	4′ x 4′	23 sq. ft.	0.052	6
MWS-L-4-6	4′ x 6′	32 sq. ft.	0.073	4
MWS-L-4-8	4′ x 8′	50 sq. ft.	0.115	4
MWS-L-4-13	4′ x 13′	63 sq. ft.	0.144	6
MWS-L-4-15	4′ x 15′	76 sq. ft.	0.175	5
MWS-L-4-17	4′ x 17′	90 sq. ft.	0.206	4
MWS-L-4-19	4′ x 19′	103 sq. ft.	0.237	3
MWS-L-4-21	4′ x 21′	117 sq. ft.	0.268	3
MWS-L-8-8	8′ x 8′	100 sq. ft.	0.23	5
MWS-L-8-12	8′ x 12′	151 sq. ft.	0.346	5
MWS-L-8-16	8′ x 16′	201 sq. ft.	0.462	6
MWS-L-8-20	8′ x 20′	252 sq. ft.	0.577	4
MWS-L-8-24	8′ x 24′	302 sq. ft.	0.693	4

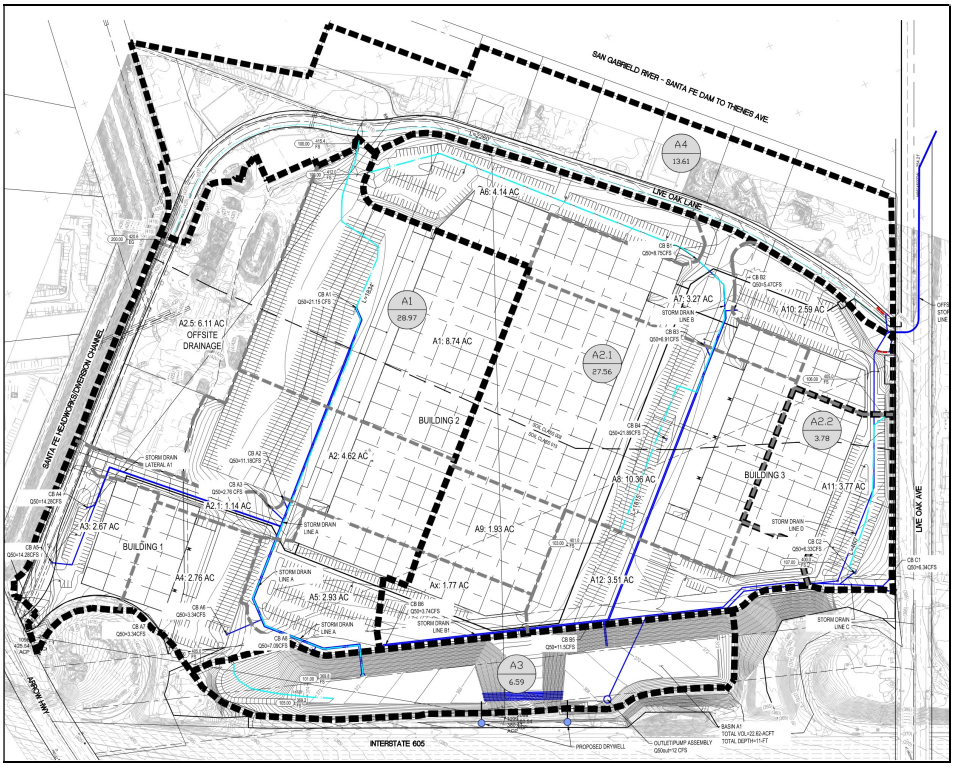
Appendix E: BMP Maintenance Manual

- Maintenance Manual

Irwindale Gateway

13620 Live Oak Lane
Irwindale, CA

OPERATION AND MAINTENANCE MANUAL



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3. Inspection and Maintenance Log 3
4. Maintenance Agreement 6
5. Reference Material 7
6. BMP Fact Sheets 8
7. WQMP Exhibit 9

1. Discussion

The long-term operation and maintenance of storm water management systems on the Irwindale Gateway property is critical to BMP performance as its design and construction. Proper operation and maintenance practices are outlined in this plan and will ensure that the BMPs will continue to remove and reduce sources of pollutants effectively over the long-term, and therefore, improve water quality. Without proper maintenance, BMPs are likely to fail and no longer provide the necessary Storm water treatment. Common maintenance issues that are encountered include:

- Maintenance that occurs too infrequently
- Owners not understanding the long-term financial burden for the maintenance of a storm water system
- Lack of the knowledge on the maintenance needs of the system and
- Conflicts between municipalities and landowners on who is responsible for maintenance of a storm water system.

To address these issues the following sections have been developed for the project owner

Maintenance Frequency
Maintenance frequency is outlined in Form 5-1. This form clearly identifies required inspection activities, the maintenance schedule, and directs provider to use a log sheet to document inspections and maintenance activities. There is the potential that a City or Regional Board inspector could visit this site and request owner to provide Maintenance records.

BMP Fact Sheets
BMP Fact sheets are provided to supplement BMP maintenance background and provide general knowledge on BMPs.

Maintenance Agreement
The maintenance agreement clearly identifies the project owner as the entity responsible for BMP maintenance and associated costs.

Reference Material
Reference material covers proprietary information for BMPs and recommended maintenance activities.

Inspection and Maintenance Log
The inspection and maintenance log provide a form to document inspections and maintenance. This form is a sample form and other forms can be used as long as they provide the minimum information outlined in this sample log.

WQMP Exhibit
The WQMP exhibit illustrates the spatial distribution of BMPS throughout the site and can be cross-referenced with Form 5-1 to identify where maintenance activities are expected to occur onsite.

2.Inspection and Maintenance Responsibility Form 5-1

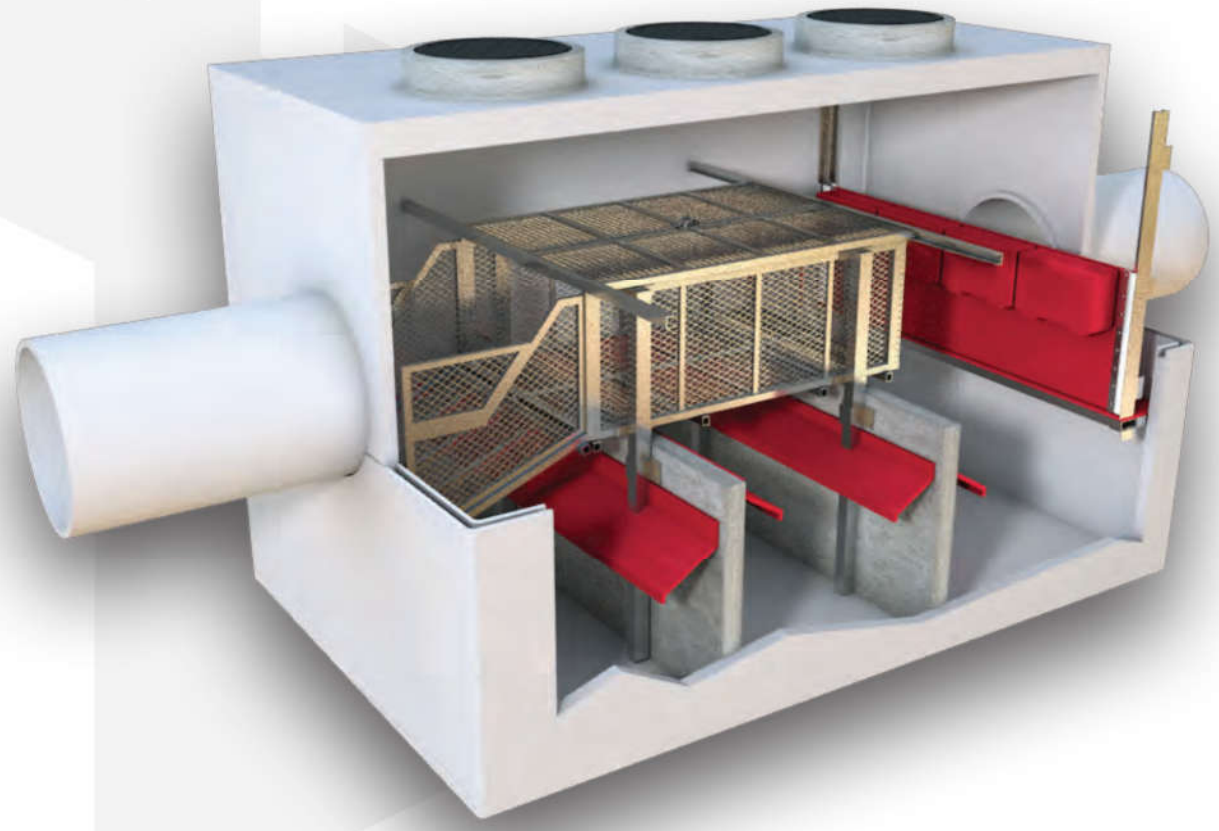
Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Detention Basin	**Owner**	Regular inspections of system to observe sediment build up and infiltration capacity. Cleaning of accumulated trash, debris and seediment as determined by inspections. Cleaning is recommended during dry weather. See manufacturer recommendations for additional maintenance activities	Monthly and within 48 hours follwing a significant storm event to verify there is no standing water
Drywell	**Owner**	Inspect catchment area for an excessive sediment, trash, and/or debris accumulation on surface. Clean up excessive sediment, trash, and/or debris accumulation. Litter, leaves and debris should be removed from Drywell to reduce risk of well clogging. Pump stored runoff from an impaired or failed dry well can also be accomplished through the test well.	4 times Annually, and after heavy rain
Landscape Maintenance	**Owner**	Maintain landscape area vegetation, slope protection and grades, adjacent to hardscape and prevent discharges of landscape maintenance waste into storm drains	Weekly
Roadways & Parking Area	**Owner**	Clean and remove accumulated sand and debris in parking lots and along roadway. Sweep pavement in lieu of using house or water spray. Ensure stormwater runoff is not impeded by deposit of debris and accumulated sediment by ground maintenance staff.	Inspect after wind storm or minimum monthly
Litter Control	**Owner**	Site to be inspected and all litter be collected and disposed of in trash containers. Inspection and maintenance to be performed by HOA	Weekly
Modular Wetlands System	**Owner**	1)Remove Trash from Screening Device, 2)Sediment from Separation Chamber. 3) Replace Cartridge Filter Media and 4) Drain Down Filter Media, 5)Trim Vegetation.	1) 6-12 Months 2)12-24 Months 3) 12-24 Months 4) 12-24 Months, 5)6-12 Months
Hydrodynamic Separators	**Owner**	1) Remove all manhole covers (or open hatches or grates) to gain access to the screening basket. 2) Remove all trash, litter, debris ,organics and sediments captured by the screened basket either manually or with the use of a vacuum truck. The vacuum hose will not damage the screen. 3) Remove vacuum hose and replace manhole covers or hatch doors 4) Transport all debris, trash, litter, organics and sediments to an approved disposal facility in accordance with local and State requirements.	Inspect every 6 months and clean every 12 months
Signage and Stencil	**Owner**	Clean the stencil/signage surface to remove any excess dirt. Re-paint if necessary.	Annually

3.Maintenance Logs and BMP Maintenance Manuals

NSBB®

Nutrient Separating Baffle Box®

Operation and Maintenance Manual



Oldcastle Infrastructure™
A CRH COMPANY

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WARNING

Read the Following Information, Instructions and Warnings Before Inspecting, Cleaning or Performing Maintenance on this Stormwater Treatment Device.

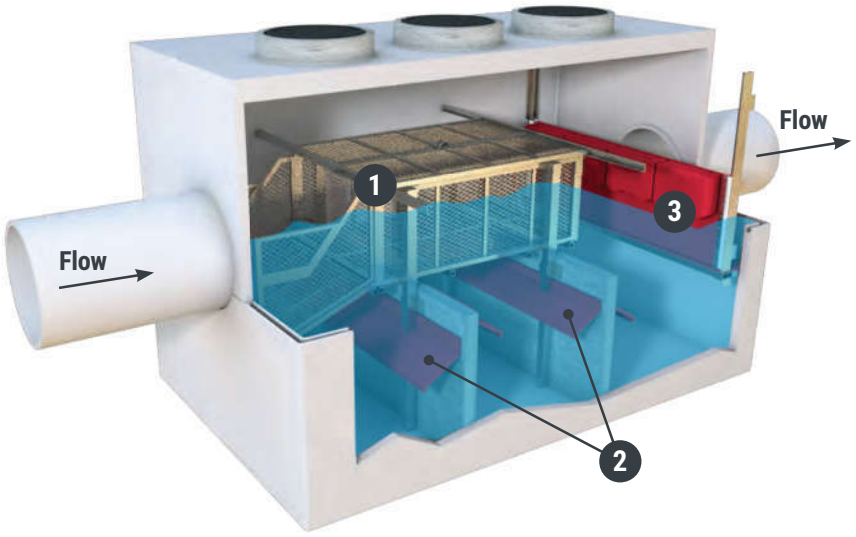
This manual is intended to explain the specifics of the Oldcastle Infrastructure Nutrient Separating Baffle Box and to review the aspects of existing regulations and safety procedures. It is the responsibility of all personnel to familiarize themselves with, understand and comply with all applicable local, state and federal laws before attempting to inspect or service this unit. All precautions and procedures in this manual are current at the time of printing but are subject to change based on the development of new processes and procedures. Oldcastle Infrastructure assumes no responsibility and is not accountable for any injuries, fines, penalties or losses that occur involving any procedure in this manual or other unaddressable actions taken. The Nutrient Separating Baffle Box performance is based on the procedures being followed in this manual. Non-Compliance with the outlined measures will be the responsibility of the owner.

GENERAL INFORMATION

The Nutrient Separating Baffle Box (NSBB) is a key component of your stormwater management program. To maintain proper operation, maintenance of these units is essential. The NSBB designed and manufactured by Oldcastle Infrastructure contains patented technologies to treat and manage stormwater. The NSBB is highly effective in capturing Nitrogen, Phosphorus, Total Suspended Solids, organics, trash, oils and grease. Independent testing has shown the NSBB is capable of capturing up to 95% of trash, 90% of Total Suspended Solids, 20% of nitrogen and 19% of phosphorus. Oldcastle Infrastructure recommends inspections be conducted semi-annually for the first year and annually thereafter for optimal removal efficiency.

During Storm Event

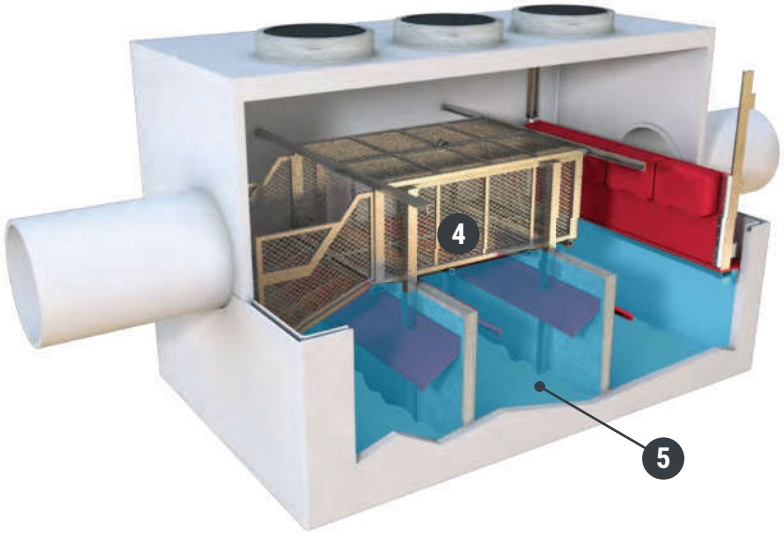
Nutrient rich organics and litter are captured in the screen system.



1. Runoff filters through the screen and skimmer leaving pollutants behind. Left over runoff evaporates over time.
2. Turbulence defectors prevent captured sediment from becoming resuspended.
3. Hydrocarbons and other floating debris are trapped upstream of the floating skimmer.

After Storm Event

Debris dry out between storm events while pollutants are stored above the static water. As a result, the system does not turn septic.



4. Nutrient pollutant load is not lost to static water and will not be flushed out during the next storm event.
5. Separating organic matter from the static water prevents bacterial buildup.

INSPECTION INFORMATION

Oldcastle Infrastructure recommends the following guidelines for inspection: After installation and the site has stabilized, post construction inspections should be conducted after every runoff event. To ensure the Nutrient Separating Baffle Box obtains optimal pollutant removal efficiencies, subsequent sediment accumulation inspections should be conducted a minimum of every six (6) months. In the event the sediment accumulation equals or exceeds 80% of the minimum sediment storage volume (Fig 1), then all accumulated sediment must be removed.

Fig 1: NSBB® HVT Maximum Flow Rates 80% Removal

MODEL	STRUCTURE SIZE (FT X FT)	MAX PIPE SIZE (IN)	MIN RIM TO INVERT DEPTH[a] (FT)	SUMP DEPTH[b] (FT)	SEDIMENT STORAGE[c] (CF)	TREATMENT FLOW RATES			MAX PEAK FLOW[f] (CFS)
						50% REMOVAL, 75 MICRON NJCAT[e] (CFS)	80% REMOVAL, 150 MICRON[d] (CFS)	5MM TRASH CAPTURE (CFS)	
NSBB-48	4 x 8	24	4.5	3.0	15.0	2.49	4.60	23.50	23
NSBB-510	5 x 10	30	5.0	4.1	23.8	3.89	8.03	-	38
NSBB-612	6 x 12	36	5.5	4.8	34.3	5.60	12.70	48.80	66
NSBB-816	8 x 16	48	7.25	6.2	61.3	9.96	26.00	75.50	114
NSBB-1020	10 x 20	60	8.0	7.6	95.0	15.56	45.40	-	199
NSBB-1224	12 x 24	72	Varies	9.0	138.0	22.40	71.70	-	291

(a) Minimum Rim to Invert Depth based on Max Pipe Size listed. For depths less than minimum contact Soln Engr for design assistance.

(b) Sump depth for all Trash Capture approved model sizes is 3.0' typical.

(c) 50% Maximum Sediment Storage Volume per NJCAT verification.

(d) Based on NJCAT verification for 50% removal of D50 = 75 micron.

(e) Based on AET Tech, LLC Technical Memo (Smith, 7/20/18). Contact Soln Engr for alternative particle size treatment flows.

(f) Based on empty 5mm Screen Basket.

(g) Based on a Hydraulic Grade Line at 6" above maximum pipe size. For smaller pipe sizes confirm capacity with Soln Engr.

INSPECTION PROCEDURE

- Inspect the unit from surface.
- Open access points (Manhole / Hatch) and secure properly.
- Visually inspect screen system to determine overall debris accumulation.
- Inspect sediment chambers under screen system.
- Inspect condition of joints and inflow / outflow pipe grout areas.

INSPECTION CHECKLIST

Inspection Checklist and Maintenance Guidance: Nutrient Separating Baffle Box.
To be completed at Time of Inspection or Maintenance.

OWNER NAME

LOCATION

ADDRESS

PHONE

DATE & TIME

SITE CONDITIONS

INSPECTION ITEMS	RECOMMENDED INTERVAL	COMMENTS
Access Openings	Semi-annually	
Screen System	Semi-annually	
Skimmer	Semi-annually	
Sediment Chambers	Semi-annually	
Vault Condition	Semi-annually	

1. Inspection items are to determine accessibility into Nutrient Separating Baffle Box.

2. Inspect screen system for debris volume and broken parts.

3. Inspect sediment chambers for estimated quantity.

4. Inspect general condition of vault for any clogged areas.

MAINTENANCE ITEMS	VOLUME COLLECTED	DATE	COMMENTS
Screen System			
Sediment Chambers			

1. Inspection items are to determine accessibility into Nutrient Separating Baffle Box.

2. After cleaning screen system, open bottom doors and vacuum out sediment chambers. (Estimate Volume Collected)

NSBB® COMPONENTS

Component Descriptions

The Nutrient Separating Baffle Box is a multi stage, self contained treatment system. Each subsequent component in the system protects prior stages from clogging. These stages include screening, separation and hydrocarbon absorption.

- Screening is provided by a rectangular basket system which is suspended above the static water level of the sedimentation chambers. The screening filter has a storage capacity of several cubic yards depending on the model. The primary function of the basket is to capture gross solids like trash and nutrient rich debris. The screening system contains debris and provides a dry storage state to prevent nutrient leaching and contamination of static water, causing a septic state.
- Sediment Separation is facilitated by three settling chambers each with a capacity of several cubic yards depending on the model. These chambers work to target smaller sediments and particulate metals.

View of Nutrient Separating Baffle Box and SkimBoss Upflow Filter

REQUIREMENTS & PARTS

Minimum Equipment Requirements

The use of a vacuum truck is required for servicing of the Nutrient Separating Baffle Box. Service crews are recommended to check all local, state and federal guidelines for servicing and disposal of any collected debris and sediments.

Structural Components

The structural components of the NSBB are designed to have a life span of several decades. Structural inspections are not required unless stipulated in guidelines set by the local municipality, state or federal agencies.

Replacement Parts

All interior components are designed and sized to be assembled and removed from the NSBB for servicing or for parts replacement. This can easily be accomplished via the access ports atop the structure. For any replacement parts or further instructions please contact:

Oldcastle Infrastructure
7000 Central Parkway
Suite 800
Atlanta, GA 30328

Phone: (888) 965-3227

SERVICING SUMMARY

Service Information

Maintenance activities include the removal of captured sediments and debris. Maintenance can be performed from outside the NSBB through access points such as manhole covers or hatches installed in the vault surface above the sediment chambers. During maintenance, the screen system may have either SunGlide™ Sliding Doors or Hinged Doors.

These top doors open to gain access to the debris captured by the screen system. This system also has bottom doors that open to give access to the sediment collected in the settling chambers. A vacuum truck is required for debris and sediment removal. Although not every circumstance can be covered in this manual, a situation may arise where the structure needs to be entered. Servicing does not require specialized tools.

Caution!
Any Service Work done in traffic areas must meet all DOT Roadway Work guidelines and necessary safety procedures.

Warning!
All OSHA confined space requirements must be met while cleaning any of the Nutrient Separating Baffle Box structures.

Service Procedure

1. Open the access openings (Manhole, Hatch or Grate) on the top of the Baffle Box.

2. Vacuum the debris captured by the screen system to expose the sediment collection chambers.

3. Open the bottom doors to the basket system to expose the sediment collection chambers. These doors have eyebolts to attach the service tool in order to open the bottom doors which hinge off to the side.

4. Vacuum each sediment chamber until they are empty.

5. After cleaning the sediment chambers close the bottom screen doors of the screen system. Lower or Slide the top doors and assure they lock correctly (if equipped with SunGlide Lids).

6. When all maintenance work is completed, be sure to close the access covers or hatches.

Note

All vacuum servicing of NSBB components can be done with the use of any vacuum truck designed for catch basin cleaning.

When possible, maintenance should be performed from the surface level.

SCREEN MAINTENANCE

Screen Maintenance Procedure

The Nutrient Separating Baffle Box Screen Basket is recommended to be inspected every 6 months and cleaned every 12 months.

1. Remove all manhole covers (or open hatches or grates) to gain access to the screening basket.

2. Remove all trash, litter, debris, organics and sediments captured by the screened basket either manually or with the use of a vacuum truck. The vacuum hose will not damage the screen.

3. Remove vacuum hose and replace manhole covers or hatch doors.

4. Transport all debris, trash, litter, organics and sediments to an approved disposal facility in accordance with local and state requirements.

Note

The screen basket must be cleaned before vacuuming each sediment separation chamber.

The bottom of the screen basket is designed with three hinged panels that are lifted vertically to access each separation chamber.

Nutrient Separating Baffle Box with trash / debris collected inside the screening system basket.

CHAMBER MAINTENANCE

Separation Chamber Maintenance Procedure
The Nutrient Separating Baffle Box Hydrodynamic Separation Chambers are recommended to be inspected every six (6) months and cleaned every twelve (12) months.

1. Remove all manhole covers (or open hatches or grates) to gain access to the separation chambers.
2. Lower vacuum truck hose into the first separation chamber through the screening basket closest to the inflow pipe. Pressure washing may be needed to remove compacted sediments.
3. Repeat this process in each separation chamber.
4. Remove vacuum hose and lower hinged panels of screening basket back to a horizontal position.

Open lower screen panels to remove sediments via vacuum truck.

POST SERVICING PROTOCOL

After completing inspection or maintenance, the service operator should prepare a record of service. The record should include maintenance activities performed, amount and description of debris collected and system condition.

- The owner will retain the service / inspection record for a minimum of five (5) years from the date of maintenance, or in accordance to specified EPA / DEP requirements.
- All records should be made available to the governing municipalities for inspection upon request at any time.
- Transport all debris, trash, litter, organics and sediments to an approved facility for disposal in accordance with local and state requirements.

Nutrient Separating Baffle Box with collected trash, organics and debris inside the screened basket system ready for disposal.

WARRANTY

Warranty Information

Oldcastle Infrastructure products are engineered and manufactured with the intent of being a permanent part of the infrastructure. Oldcastle Infrastructure warranties its products to be free from manufacturing defects for a period of 5 years from the purchase date. In the event a warranty claim is made and determined to be valid, Oldcastle Infrastructure will replace or repair the product at their own discretion. Warranty claims must be submitted, evaluated and approved by Oldcastle Infrastructure for the claim to be determined valid. All warranty work must be authorized by Oldcastle Infrastructure prior to work beginning not covered by this warranty. There are no warranties expressed or implied other than what is specified herein. Abusive treatment, neglect or improper use of the Nutrient Separating Baffle Box will not be covered by this warranty.

CONTACT INFORMATION

General Inquires

For additional information concerning installation, general usage, maintenance products, warranties or replacement parts please contact:

Oldcastle Infrastructure
7000 Central Parkway
Suite 800
Atlanta, GA 30328

Phone: (888) 965-3227

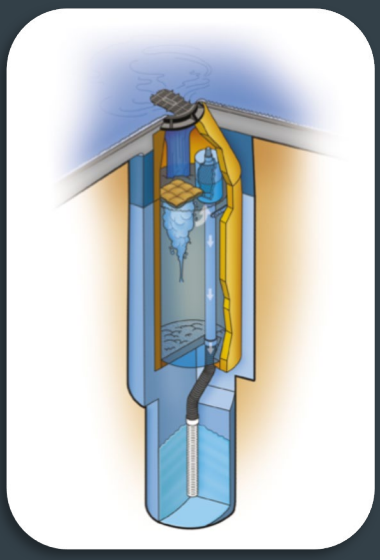
Oldcastle Infrastructure™
A CRH COMPANY

CALIFORNIA

OPERATION AND MAINTENANCE MANUAL

for

MaxWell® Drywell Systems



MaxWell® IV

MaxWell® Plus

TORRENT RESOURCES
AN OLDCASTLE INFRASTRUCTURE COMPANY

January 2021

Company Overview

Torrent Resources (www.TorrentResources.com) is a full-service drainage solutions partner with a team of experts ready to address ever-growing stormwater management needs in California, Arizona, and throughout the western United States. Since 1972, Torrent Resources has set the standard in design and construction of stormwater drywell systems for the mitigation of excess surface runoff. In 1974, the company revolutionized the industry with its exclusive ***MaxWell***® system – unmatched in efficiency and reliability by any other type of stormwater drywell system. To date, more than 70,000 MaxWell drywells have been installed and are successfully operating for both our municipal and private development customers.

Torrent Resources is a wholly-owned subsidiary of Oldcastle Infrastructure (www.oldcastleinfrastructure.com)

MaxWell Drywell System Description

The MaxWell is an enhanced stormwater treatment drywell which utilizes deep infiltration to capture and treat surface runoff and recharge groundwater. Maxwell drywells are used either as a stand-alone Best Management Practice (BMP) or in combination with other storage/treatment BMPs. The MaxWell system is not intended to provide significant storage volume, but instead is designed to dispose of accumulated stormwater to ensure maximum pretreatment efficiency.

A key feature of the MaxWell system is its pretreatment settling chamber(s) designed to remove sediment, debris, floating hydrocarbons, and other organic compounds prior to recharging the treated stormwater back into the sub-grade. The water is then further treated by the soil as it passes through the vadose zone to eventually replenish the groundwater resources.

There are two main types of MaxWell drywells systems, 1) the MaxWell IV, and 2) the MaxWell Plus. The ***MaxWell IV*** (the fourth iteration of enhanced drywell since 1974) provides pretreatment with a single 4-ft diameter settling chamber. The chamber is typically 15 - 25 feet deep with up to a 10-ft riser pipe (sump) fitted with a debris shield and screen to ensure stormwater is treated before entering the drywell rock shaft (4 - 6 feet diameter, up to 120 feet deep). The debris shield forces water to be drawn into the system from several inches beneath the surface, effectively isolating and containing floating trash, paper, debris and pavement oils within the chambers. The ***MaxWell Plus*** provides an additional chamber to increase pretreatment. The primary settling chamber includes a vented and screened outlet to capture trash, debris, and pollutants before treated water can enter the second chamber.

Each MaxWell chamber is equipped with two hydrophobic floating absorbent pillows, which will remove a wide range of hydrocarbons and organic liquids. The sponges are 100% water repellant, and wick floating petrochemical compounds from the surface of the water. Each pillow has a removal capacity of up to 1.35 gallons to accommodate effective, long-term treatment.

Typically, each chamber is equipped with a bolted 30” diameter cast-iron grate or solid manhole lid, at the surface. These metal grates and covers are embossed with the Torrent Resources company name, the MaxWell trade name, and the words “Storm Water Only” as a general reminder to the public as to the intended usage of the structure. In some cases, alternative covers may be required by a local jurisdiction and/or to address project constraints.

Note: The operation, inspection, and maintenance procedures described herein, can be performed without entering the drywell chambers. Should chamber entry be required for repairs or other unforeseen reasons, proper confined space protocols, equipment, and training shall be used.

Operation

All water is routed through the drywell system via gravity flow. There are no mechanical moving parts or electrical equipment. Any flow monitoring equipment is considered separate from the MaxWell system and not covered within this document. Likewise, all pipes and any apparatus used to bring water to and from the drywell are considered separate from the MaxWell system.

Inspection

Protocol

Inspection of MaxWell systems can be performed from the surface without entering the drywell. Inspections will typically require the following equipment:

- 3/4” socket wrench to remove/replace grate/lid bolts
- A manhole lid puller/lifter or similar means to safely remove the manhole lid
- Flashlight and/or mirror to reflect light into chamber
- 25-ft + measuring tape
- *Maintenance Data and Warranty Information* sheet provided by Torrent Resources after installation.
- Where necessary, appropriate traffic control and pedestrian safety measures may be needed to safely inspect the drywell.

The inspection should include, at a minimum, the following observations for each drywell/settling chamber:

1. Ensure that water in the chambers has drawdown within the required time (varies by jurisdiction, typically 48-96 hours). It is normal for a few inches of water to remain at the bottom of slurry-bottom chambers.
2. Ensure that there are no obstructions, trash, or debris that prevent water from entering or leaving the drywell chambers.
3. Measure the amount of sediment and trash accumulation by using a tape measure to determine the depth of material and subtracting that amount from the total chamber depth (reference *Maintenance Data and Warranty Information* sheet). If 2 feet or more of material has accumulated, then maintenance should be performed. For the MaxWell Plus system, it is common to see significantly more accumulation in the primary settling chamber.
4. Observe the presence and condition of all hydrocarbon pillows. Each chamber should have two hydrocarbon pillows. Pillows should be intact and free to float.
5. Ensure that all screens, shields, and pipes are intact and not damaged.
6. Most chambers have a concrete bottom. However, in some cases the bottom is made of geotextile fabric. If applicable, ensure the geotextile fabric is completely covering the bottom surface area and not damaged.

If drywell grates/lids were removed during inspection, replace (clean lip, if necessary, to ensure a flush fit) and re-secure with bolts.

Frequency

It is recommended that systems are inspected at least once each year and after major storms.

Maintenance

Protocol

Maintenance of MaxWell systems can be performed from the surface without entering the drywell. Maintenance operations will typically require the following equipment:

- 3/4” socket wrench to remove/replace grate/lid bolts
- A manhole lid puller/lifter or similar means to safely remove the manhole lid
- A long/extendable hook to remove riser pipe screen
- Flashlight and/or mirror to reflect light into chamber
- Vacuum truck with extension hose and jet rod
- Replacement absorptive pillows
- *Maintenance Data and Warranty Information* sheet provided by Torrent Resources after installation.
- Where necessary, appropriate traffic control and pedestrian safety measures may be needed to safely inspect the drywell.

Typical maintenance shall include removing all surface grates/lids to clean and service the drywell chambers. Removal of accumulated trash, debris, and sediment shall be done using a hydro-vacuum truck (see photo below). The hydro-vacuum truck utilizes streams of air and high-pressure water to dislodge built-up material, which is then removed via a vacuum hose and stored within the truck’s tank until proper disposal. Obstructions or accumulated debris on inlets, screens, and/or connecting pipes is removed by jet-rodding (typically included on the hydro-vacuum truck) and then vacuumed. If the riser screen requires cleaning, the riser shield is fitted with a metal loop and can removed/replaced from the surface with a long hook. Certain MaxWells utilize a geotextile fabric bottom within the chambers; care should be taken to note the depth of the chamber and ensure that the fabric is not damaged or removed during the vacuuming process.

Absorbent pillows are typically removed during hydro-vacuum operations and disposed of with removed debris and sediment. If pillow replacement is required prior to hydro-vacuum operation, new pillows can be dropped in the chambers.

Following hydro-vacuum operations, drywell grates/lids should be replaced (clean lip, if necessary, to ensure a flush fit) and re-secured with bolts.

All removed material, including absorptive pillows, shall be disposed of in accordance with local regulations.

A written log shall be kept of all inspections and maintenance actions performed on the drywell systems Hydro-vacuum maintenance typically requires 2-4 hours per drywell system.

Refer to **Appendix A** for detailed maintenance steps and blank inspection and maintenance log.

Typical hydro-vacuum truck used for drywell maintenance

Frequency

The need for maintenance is assessed and determined by annual/post-storm inspections, as described above, and can vary from year to year. Additionally, the frequency of recurrent maintenance is heavily dependent on many factors including, but not limited to drywell drainage area size and condition, as well as the size and condition of any upstream BMPs. The following should therefore be considered only as general estimates for maintenance intervals:

Hydro-vacuum and jet-rod cleaning:

1-2 years for:

- urban right-of-ways and parcels with high trash, debris, and/or sediment loads

or

- drainage areas larger than 10 acres

3-5 years for:

- drainage areas with upstream BMPs and/or pretreatment (i.e. trash capture devices)

or

- drainage areas smaller than 5 acres

Pillow replacement:

1-5 years

Hydrocarbon pillows are typically replaced during hydro-vacuum cleaning; however, it is possible the pillows may need to be replaced sooner than a hydro-vacuum cleaning is required. This may be the case for drainage areas that have heavy vehicular use, but low sediment/trash loads (i.e. parking lots).

Repairs

Protocol

Should repairs be needed, all materials shall be replaced in accordance with the design specifications for the drywell. Confined space entry to the drywell may be required and shall only be done by trained staff with proper safety equipment.

Frequency

As needed.

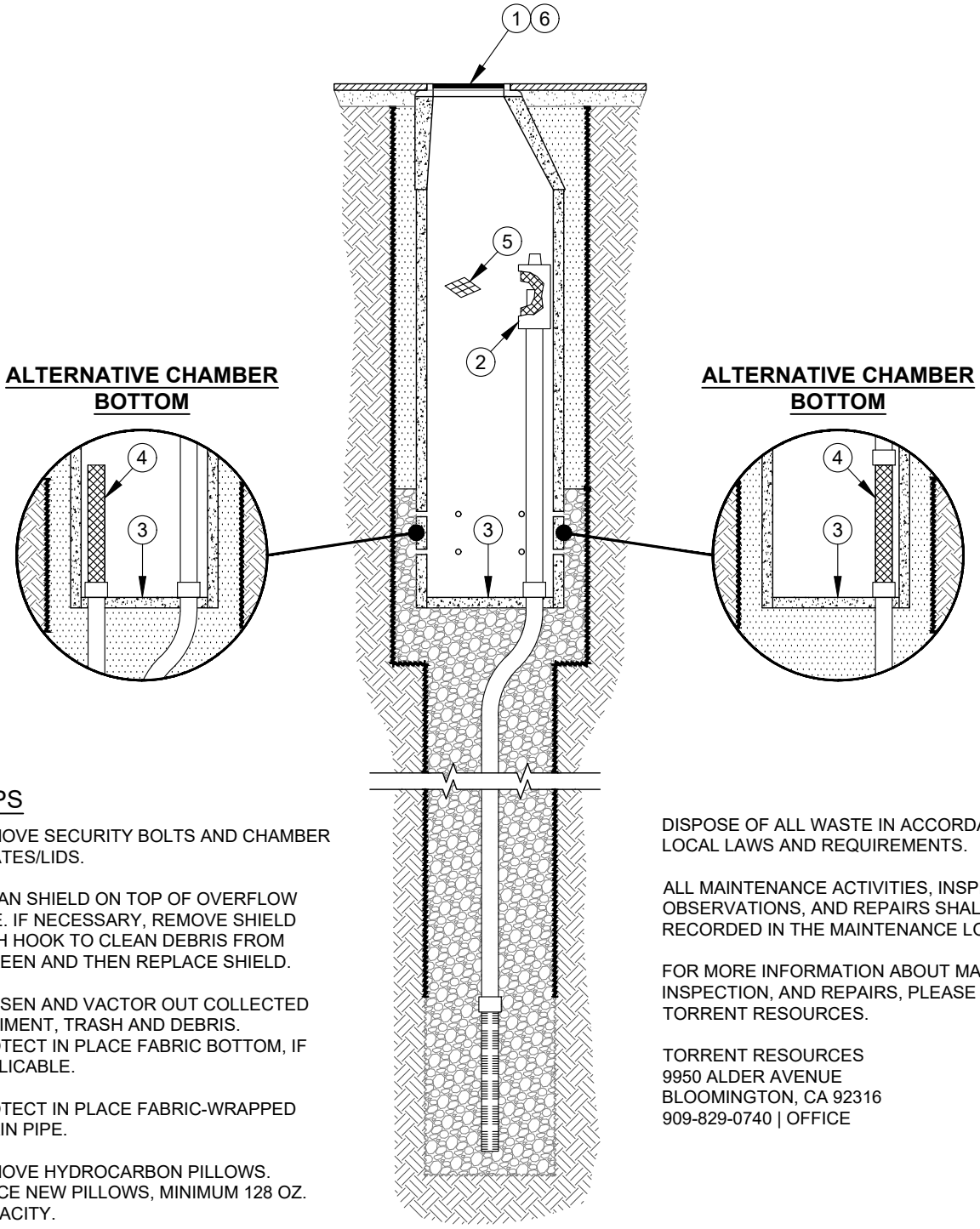
Torrent Resources can be contracted to assist with any MaxWell maintenance and/or repairs.

Lifespan

Torrent Resources has been installing MaxWell systems since 1974. Most of these drywells are still successfully operating today. With proper maintenance, a MaxWell drywell system will provide an efficient stormwater management solution for many decades. All MaxWell systems include a 5-year limited warranty – refer to the *Maintenance Data and Warranty Information* sheet provided by Torrent Resources after installation for warranty details.

APPENDIX A

The MaxWell® IV
MAINTENANCE PROCEDURES



STEPS

1. REMOVE SECURITY BOLTS AND CHAMBER GRATES/LIDS.
2. CLEAN SHIELD ON TOP OF OVERFLOW PIPE. IF NECESSARY, REMOVE SHIELD WITH HOOK TO CLEAN DEBRIS FROM SCREEN AND THEN REPLACE SHIELD.
3. LOOSEN AND VACTOR OUT COLLECTED SEDIMENT, TRASH AND DEBRIS. PROTECT IN PLACE FABRIC BOTTOM, IF APPLICABLE.
4. PROTECT IN PLACE FABRIC-WRAPPED DRAIN PIPE.
5. REMOVE HYDROCARBON PILLOWS. PLACE NEW PILLOWS, MINIMUM 128 OZ. CAPACITY.
6. REPLACE CHAMBER GRATES/LIDS AND SECURE WITH SECURITY BOLTS.

TYPICAL DETAIL
MAY VERY FROM DESIGN PLANS

DISPOSE OF ALL WASTE IN ACCORDANCE WITH LOCAL LAWS AND REQUIREMENTS.

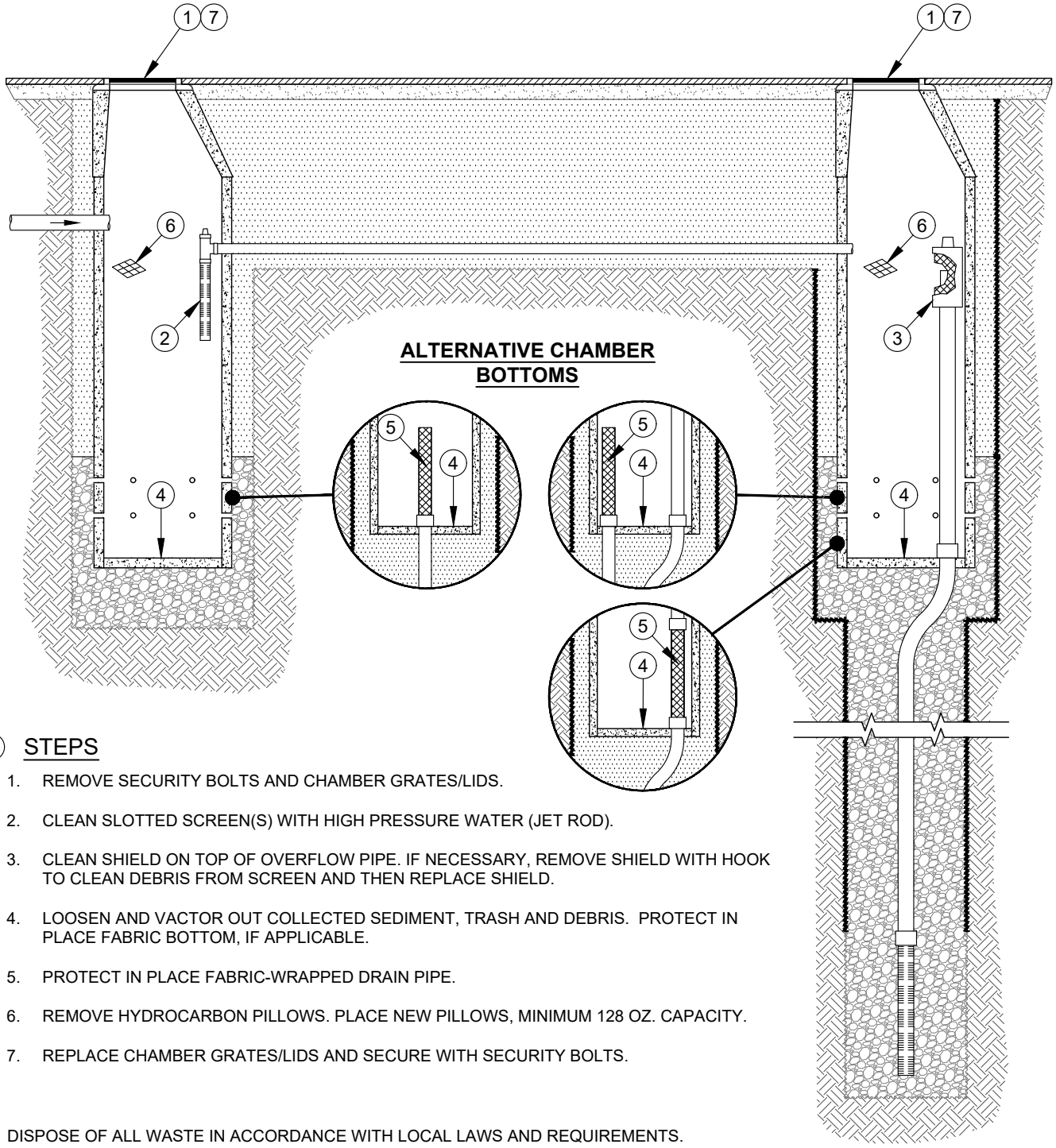
ALL MAINTENANCE ACTIVITIES, INSPECTION OBSERVATIONS, AND REPAIRS SHALL BE RECORDED IN THE MAINTENANCE LOG BOOK.

FOR MORE INFORMATION ABOUT MAINTENANCE, INSPECTION, AND REPAIRS, PLEASE CONTACT TORRENT RESOURCES.

TORRENT RESOURCES
9950 ALDER AVENUE
BLOOMINGTON, CA 92316
909-829-0740 | OFFICE

TORRENT® RESOURCES

The MaxWell® Plus
MAINTENANCE PROCEDURES



STEPS

1. REMOVE SECURITY BOLTS AND CHAMBER GRATES/LIDS.
2. CLEAN SLOTTED SCREEN(S) WITH HIGH PRESSURE WATER (JET ROD).
3. CLEAN SHIELD ON TOP OF OVERFLOW PIPE. IF NECESSARY, REMOVE SHIELD WITH HOOK TO CLEAN DEBRIS FROM SCREEN AND THEN REPLACE SHIELD.
4. LOOSEN AND VACTOR OUT COLLECTED SEDIMENT, TRASH AND DEBRIS. PROTECT IN PLACE FABRIC BOTTOM, IF APPLICABLE.
5. PROTECT IN PLACE FABRIC-WRAPPED DRAIN PIPE.
6. REMOVE HYDROCARBON PILLOWS. PLACE NEW PILLOWS, MINIMUM 128 OZ. CAPACITY.
7. REPLACE CHAMBER GRATES/LIDS AND SECURE WITH SECURITY BOLTS.

DISPOSE OF ALL WASTE IN ACCORDANCE WITH LOCAL LAWS AND REQUIREMENTS.

ALL MAINTENANCE ACTIVITIES, INSPECTION OBSERVATIONS, AND REPAIRS SHALL BE RECORDED IN THE MAINTENANCE LOG BOOK.

FOR MORE INFORMATION ABOUT MAINTENANCE, INSPECTION, AND REPAIRS, PLEASE CONTACT TORRENT RESOURCES.

TYPICAL DETAIL
MAY VERY FROM DESIGN PLANS

TORRENT RESOURCES
9950 ALDER AVENUE
BLOOMINGTON, CA 92316
909-829-0740 | OFFICE

TORRENT® RESOURCES

Inspection & Maintenance Log

Location: _____

Date	Description of Actions Performed/Comments	Performed By

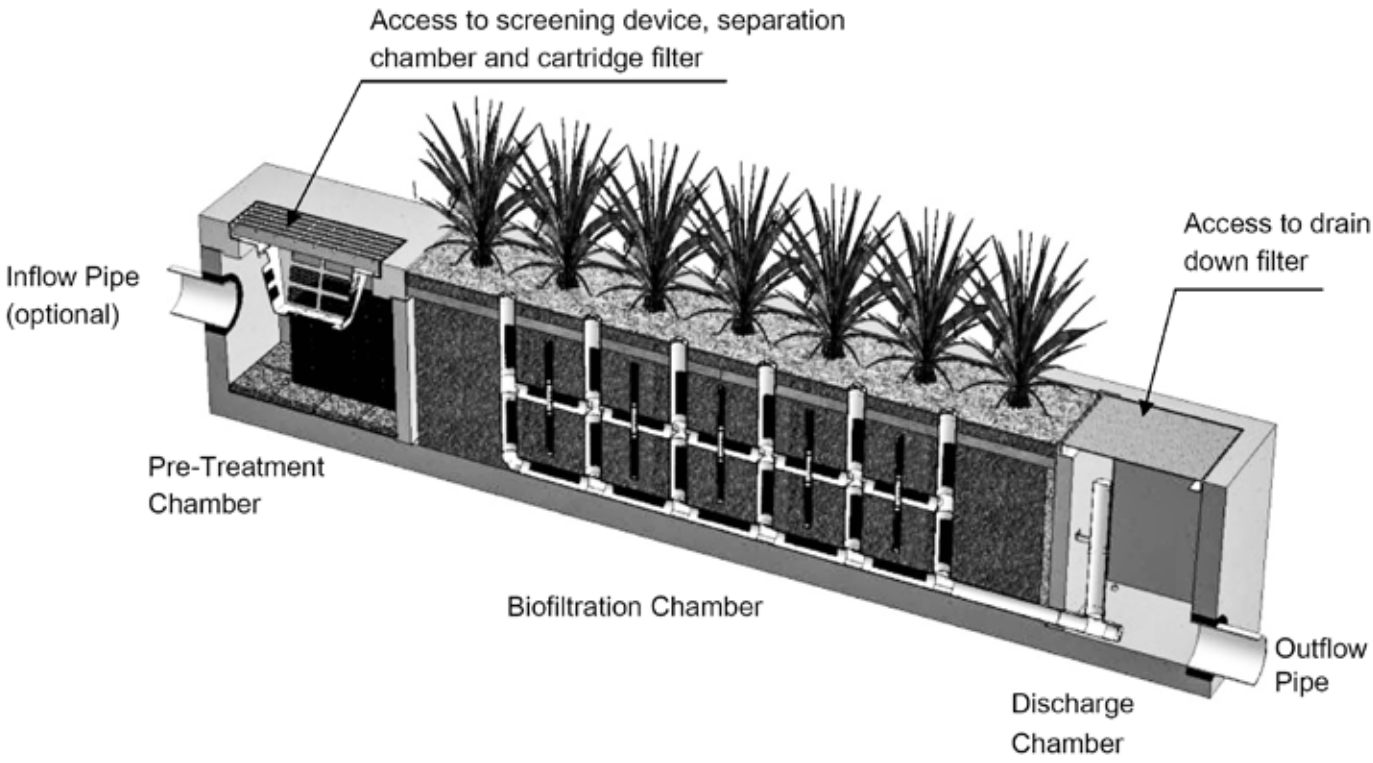
CONTECH®
ENGINEERED SOLUTIONS

Modular Wetlands® Linear
Operation & Maintenance Manual

MODULAR WETLANDS®

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
  - *(5 minute average service time).*
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
  - *(10 minute average service time).*
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
  - *(10-15 minute per cartridge average service time).*
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
  - *(5 minute average service time).*
- Trim Vegetation – average maintenance interval is 6 to 12 months.
  - *(Service time varies).*



System Diagram

Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre- Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer, spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber. Entry into chambers may require confined space training based on state and local regulations.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/ inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

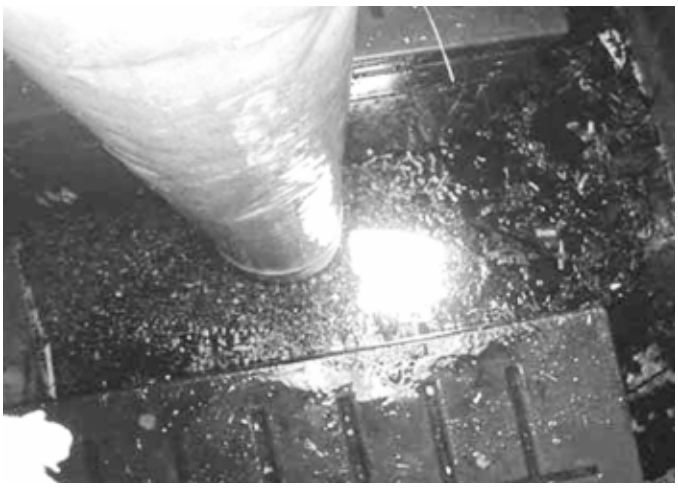
Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.

Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.

Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.

Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.

CONTECH® ENGINEERED SOLUTIONS

Inspection Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	**Yes**	**No**	**Comments**
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	**Yes**	**No**
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

CONTECH®
ENGINEERED SOLUTIONS

Cleaning and Maintenance Report
Modular Wetlands Linear

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone ( ) –

Inspector Name _____ Date ____/____/____ Time _____ AM / PM

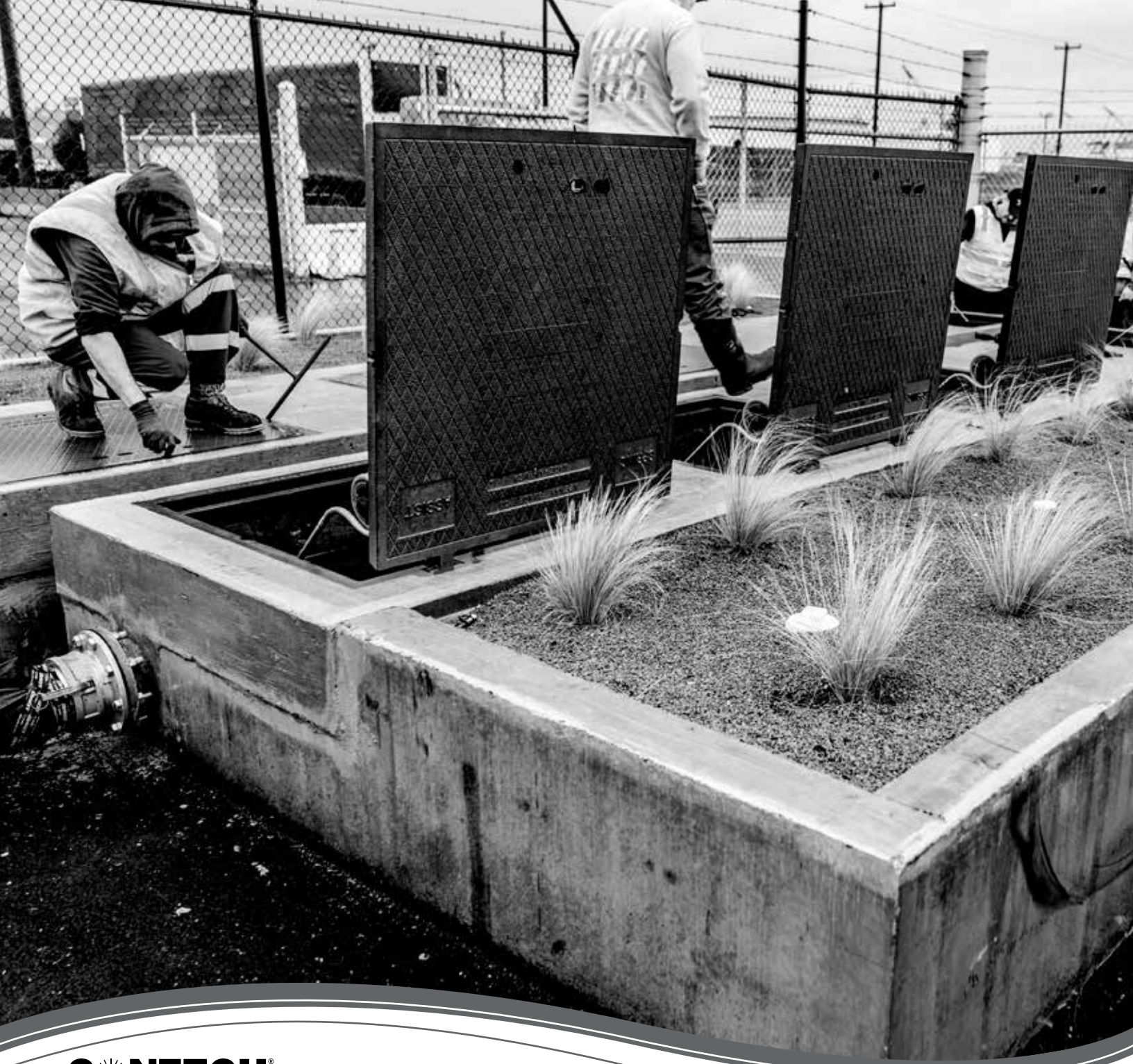
For Office Use Only
(Reviewed By)
(Date)
Office personnel to complete section to the left.

Type of Inspection ☐ Routine ☐ Follow Up ☐ Complaint ☐ Storm Storm Event in Last 72-hours? ☐ No ☐ Yes

Weather Condition _____ Additional Notes _____

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:



CONTECH®
ENGINEERED SOLUTIONS

800-338-1122

WWW.CONTECHES.COM

CONTECH ENGINEERED SOLUTIONS LLC PROVIDES SITE SOLUTIONS FOR THE CIVIL ENGINEERING INDUSTRY. CONTECH'S PORTFOLIO INCLUDES BRIDGES, DRAINAGE, SANITARY SEWER, STORMWATER AND EARTH STABILIZATION PRODUCTS. FOR INFORMATION ON OTHER CONTECH DIVISION OFFERINGS, VISIT CONTECHES.COM OR CALL 800-338-1122.

SUPPORT

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT WWW.CONTECHES.COM

4. Maintenance Agreement

RECORDING REQUESTED BY
AND MAIL TO:

Space above this line is for Recorder's use

COVENANT AND AGREEMENT
REGARDING THE MAINTENANCE OF LOW IMPACT DEVELOPMENT (LID) & NATIONAL POLLUTANTS DISCHARGE ELIMINATION SYSTEM (NPDES) BMPs

The undersigned, _____ ("Owner"), hereby certifies that it owns the real property described as follows ("Subject Property"), located in the County of Los Angeles, State of California:

LEGAL DESCRIPTION

ASSESSOR'S ID #_____TRACT NO._____LOT NO._____

ADDRESS: _____

Owner is aware of the requirements of County of Los Angeles' Green Building Standards Code, Title 31 Section 4.106.5 (LID), and Title 12, Chapter 12.84 – Low Impact Development Standards. The following post-construction BMP features have been installed on the Subject Property:

- □ Porous pavement
- □ Cistern/rain barrel
- □ Infiltration trench/pit
- □ Bioretention or biofiltration
- □ Rain garden/planter box
- □ Disconnect impervious surfaces
- □ Dry Well
- □ Storage containers
- □ Landscape and landscape irrigation
- □ Green roof
- □ Other _____
  _____

The location, including GPS x-y coordinates, and type of each post-construction BMP feature installed on the Subject Property is identified on the site diagram attached hereto as Exhibit 1.

Owner hereby covenants and agrees to maintain the above-described post-construction BMP features in a good and operable condition at all times, and in accordance with the LID/NPDES Maintenance Guidelines, attached hereto as Exhibit 2.

Owner further covenants and agrees that the above-described post-construction BMP features shall not be removed from the Subject Property unless and until they have been replaced with other post-construction BMP features in accordance with County of Los Angeles' Title 12, Chapter 12.84 – Low Impact Development Standards.

Owner further covenants and agrees to maintain all drainage devices located within his/her property in good condition and operable condition at all times.

Owner further covenants and agrees that if Owner hereafter sells the Subject Property, Owner shall provide printed educational materials to the buyer regarding the post-construction BMP features that are located on the Subject Property, including the type(s) and location(s) of all such features, and instructions for properly maintaining all such features.

Owner makes this Covenant and Agreement on behalf of itself and its successors and assigns. This Covenant and Agreement shall run with the Subject Property and shall inure to the benefit of the County of Los Angeles and be binding upon Owner, future owners, and their heirs, successors and assignees, and shall continue in effect until the release of this Covenant and Agreement by the County of Los Angeles, in its sole discretion.

Owner(s):

By:_____ Date:_____

By:_____ Date:_____

A notary public or other officer completing the attached certificate verifies only the identity of the individual who signed the document to which the certificate is attached, and not the truthfulness, accuracy, or validity of that document.

(PLEASE ATTACH NOTARY)

FOR DEPARTMENT USE ONLY:

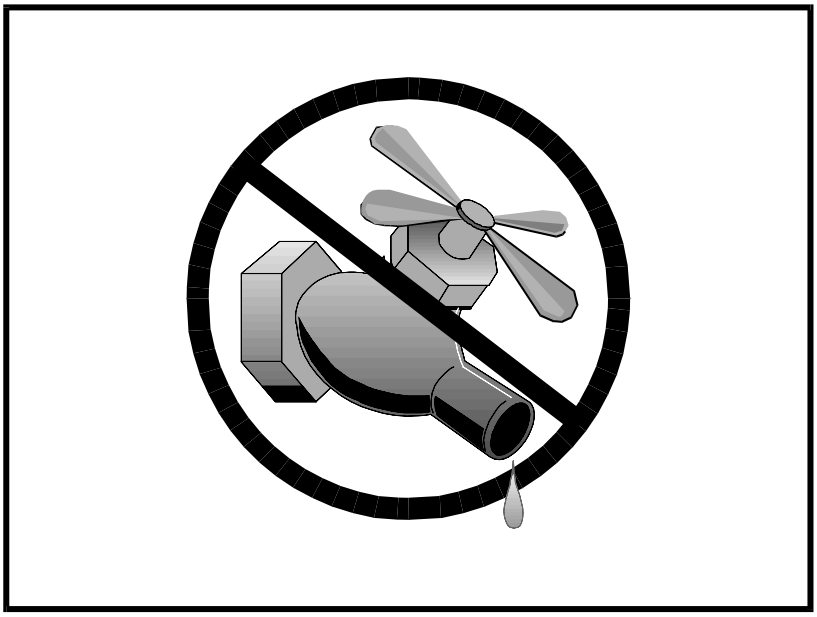
MUST BE APPROVED BY COUNTY OF LOS ANGELES BUILDING AND SAFETY DIVISION PRIOR TO RECORDING.

APPROVED BY:_____ _____ Date _____ Permit No._____
(Print Name) (Signature)

5. Reference Material

6. BMP Fact Sheets

Water Conservation Practices NS-1



Categories		
EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Direct construction water runoff to areas where it can soak

into the ground or be collected and reused.

- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

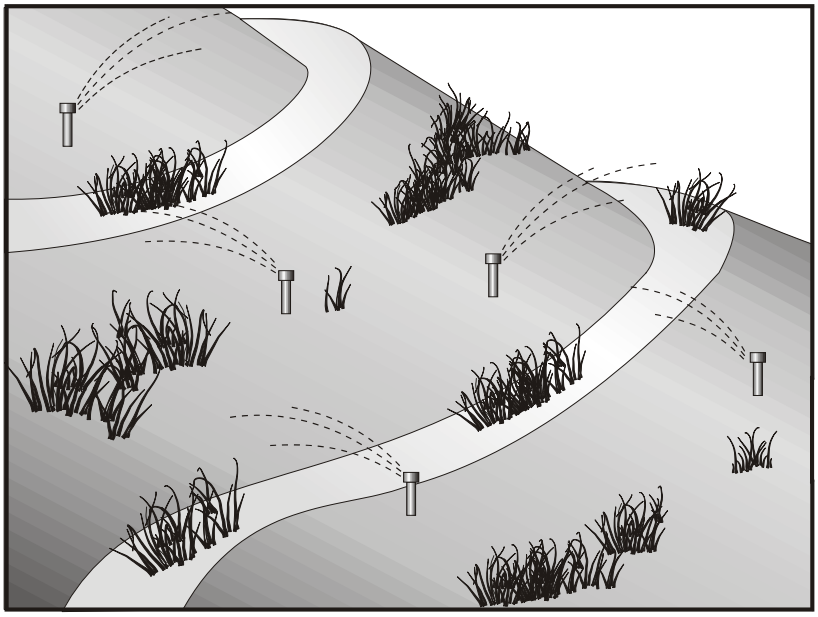
Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Potable Water/Irrigation NS-7



Description and Purpose

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Suitable Applications

Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

Limitations

None identified.

Implementation

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.
- Inspect irrigated areas within the construction limits for

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	☑

Potential Alternatives

None

excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events..
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Repair broken water lines as soon as possible.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

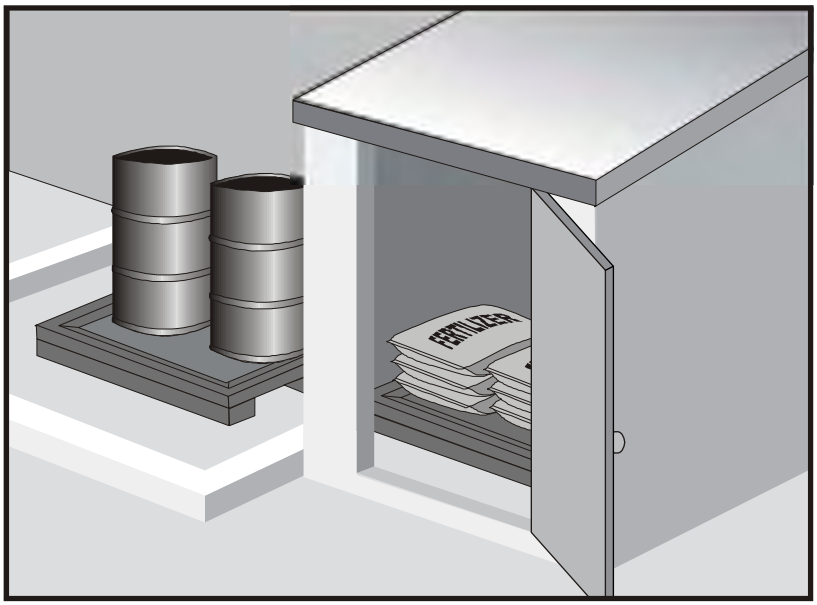
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Material Delivery and Storage WM-1



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
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NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
    - Avoid transport near drainage paths or waterways.
    - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
    - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

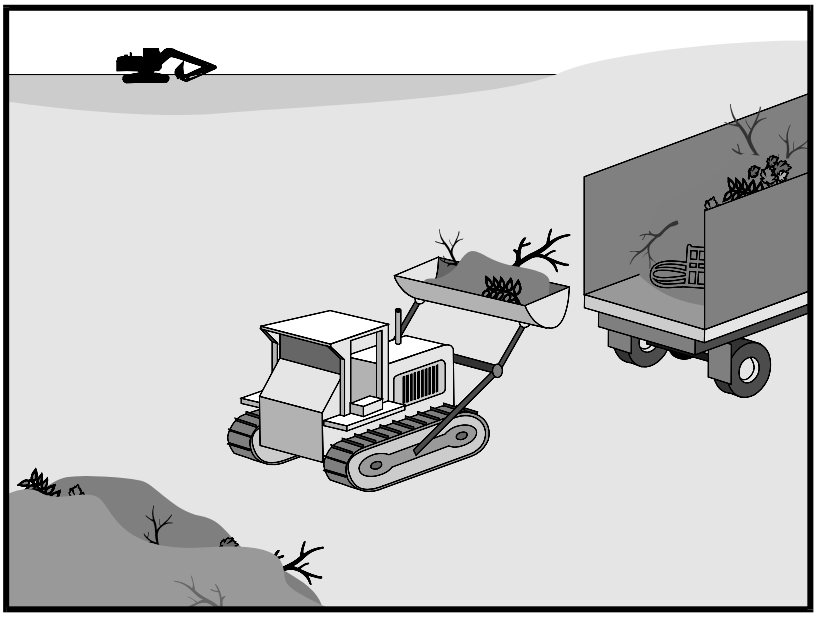
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials
- Highway planting wastes, including vegetative material,

plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur

- Inspect construction waste area regularly.

- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

7. WQMP Exhibit

To be Provided during Final Engineering