Appendix G

Stormwater Management Investigation

STORM WATER MANAGEMENT INVESTIGATION

LUSK BUSINESS PARK REDEVELOPMENT SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

SAN DIEGO SORRENTO TECH HOLDINGS, LLC
SAN DIEGO, CALIFORNIA

JULY 14, 2022
PROJECT NO. G2896-52-01

Project No. G2896-52-01
July 14, 2022

San Diego Sorrento Tech Holdings, LLC
11772 Sorrento Valley Road, Suite 250
San Diego, California 92121

Attention: Mr. Eric Hotovy

Subject: STORM WATER MANAGEMENT INVESTIGATION
LUSK BUSINESS PARK REDEVELOPMENT
SAN DIEGO, CALIFORNIA

Reference: *Preliminary Geotechnical Investigation, Lusk Business Park Redevelopment, San Diego, California*, prepared by Geocon Incorporated, dated July 15, 2022 (Project No. G2896-52-01).

Dear Mr. Hotovy:

We prepared this letter to describe the existing geotechnical conditions for the purposes of storm water management for the subject property. We performed the referenced geotechnical investigation to evaluate the current geologic conditions on the property in accordance with the *City of San Diego Storm Water Standards* (SWS), dated May, 2021.

SITE AND PROJECT DESCRIPTION

The subject property is situated on the south side of Lusk Boulevard in the Sorrento Valley area of San Diego, California. The site comprises the properties addressed as 6640, 6650, 6540, 6440, 6450 and 6370 Lusk Boulevard. The property is occupied by six, two-story commercial structures with driveways, surface parking and accommodating utilities and landscaping. We expect the existing structures are supported on conventional shallow foundations with a concrete slab-on-grade. The property is split into two separate relatively flat pads, with elevations ranging from about 320 to 330 feet above Mean Sea Level (MSL) on the western half and about 340 to 350 feet above Mean Sea Level (MSL) on the eastern half. A fill slope descends along the southern edge of the properties that ranges from about 40 to 70 feet in height. Slope buttresses were constructed at three separate locations along the descending slope due to slope stability concerns of the cut-slope areas during the original site grading in the 1980s. The Existing Site Map shows the current site configuration.

Existing Site Map

We understand the project will consist of demolishing the existing structure and improvements at the site and constructing several bio-medical office and laboratory buildings, parking structures, and other related improvements. We understand that the office buildings are currently planned to consist of 10- to 15- levels above grade over 1- to 2-levels subterranean and that the parking structure will be 7-levels above grade with 2-levels subterranean. The site development will also include utilities, sidewalks and other associated improvements.

The locations, site descriptions, and proposed development are based on our site reconnaissance, review of published geologic literature, field investigations, and discussions with project personnel. If development plans differ from those described herein, Geocon Incorporated should be contacted for review of the plans and possible revisions to this report.

We prepared the referenced geotechnical investigation report for the site and proposed development. Our field investigation consisted of advancing 13 exploratory borings, 6 cone penetrometer tests (CPTs), and performing 5 infiltration tests. During our investigation, we encountered one surficial soil unit (consisting of previously placed fill) and one formational unit (consisting of Scripps Formation). The occurrence, distribution, and description of each unit encountered are shown on the on the boring logs in Appendix A of the referenced report.

STORM WATER MANAGEMENT INVESTIGATION

We understand storm water management devices are being proposed in accordance with the 2021 *City of San Diego Storm Water Standards* (SWS). If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. We have not performed a hydrogeological study at the site. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Hydrologic Soil Group

The United States Department of Agriculture (USDA), Natural Resources Conservation Services, possesses general information regarding the existing soil conditions for areas within the United States. The USDA website also provides the Hydrologic Soil Group. Table 1 presents the descriptions of the hydrologic soil groups. If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. In addition, the USDA website also provides an estimated saturated hydraulic conductivity for the existing soil.

TABLE 1
HYDROLOGIC SOIL GROUP DEFINITIONS

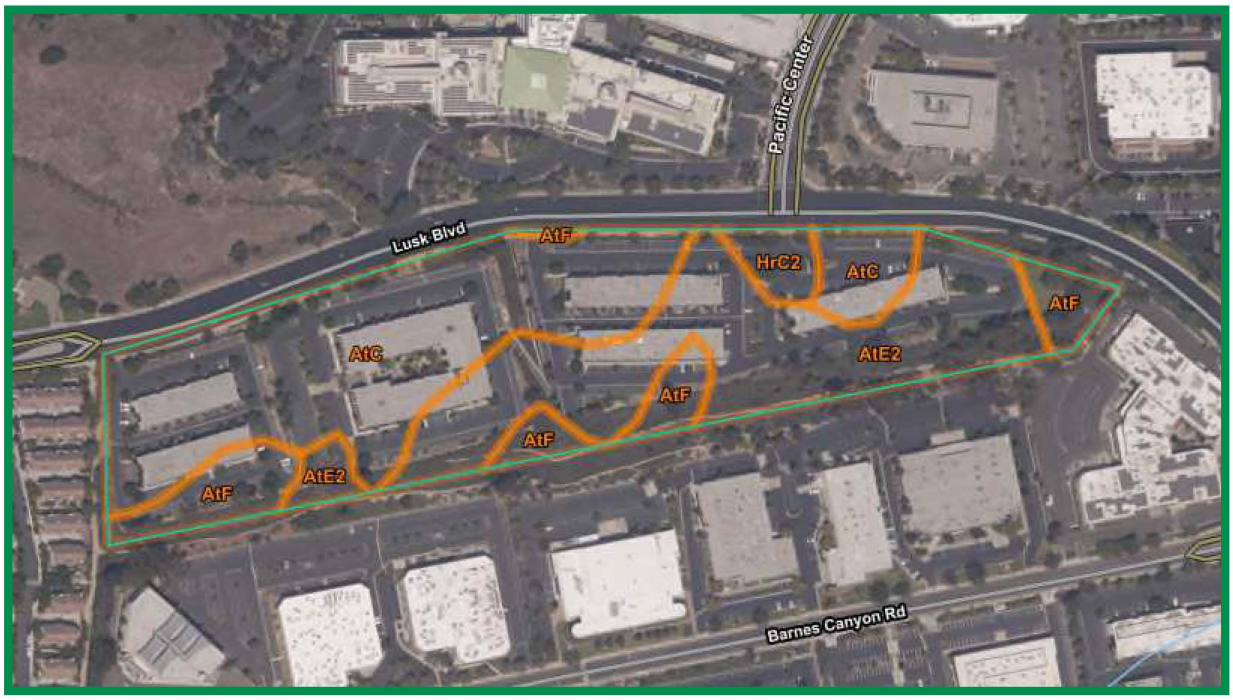
Soil Group	Soil Group Definition
A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high-water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The site is underlain by previously placed fill and Scripps Formation and should be classified as Soil Group D. Table C-2 presents the information from the USDA website for the subject property. The

Hydrologic Soil Group Map presents output from the USDA website showing the limits of the soil units.

TABLE C-2
USDA WEB SOIL SURVEY – HYDROLOGIC SOIL GROUP

Map Unit Name	Map Unit Symbol	Approximate Percentage of Property	Hydrologic Soil Group	k_{SAT} of Most Limiting Layer (Inches/ Hour)
Altamont clay, 5 to 9 percent slopes	AtC	47	D	0.00-0.06
Altamont clay, 15 to 30 percent slopes	AtE2	37	D	0.00-0.06
Altamont clay, 30 to 50 percent slopes, warm MAAT, MLRA 20	AtF	13	C	0.06-0.57
Huerhuero loam, 5 to 9 percent slopes, eroded	HrC2	3	D	0.00-0.06



Hydrologic Soil Group Map

In-Situ Testing

We performed 5 infiltration tests using the Aardvark permeameter within the general area of potential storm water management basins. The results of the tests provide design parameters regarding the saturated hydraulic conductivity and infiltration characteristics of on-site soil and geologic units. Table 3 presents the results of the estimated field saturated hydraulic conductivity and estimated infiltration rates obtained from the infiltration tests. The field sheets are also attached herein. Based on the SWS, the infiltration rate should be considered equal to the saturated hydraulic conductivity rate. We applied a feasibility factor of safety of 2.0 to our estimated infiltration rates to provide input on Worksheet C.4-1. Soil infiltration rates from in-situ tests can vary significantly from one location to another due to the heterogeneous characteristics inherent to most soil. The Geologic Map, Figure 1 presents the locations of the infiltration tests and the areas determined infeasible for infiltration due to site or geologic conditions discussed herein.

TABLE 3
FIELD PERMEAMETER INFILTRATION TEST RESULTS

Test No.	Geologic Unit	Test Depth (feet)	Field-Saturated Infiltration Rate, k_{sat} (inch/hour)	C.4-1 Worksheet Infiltration Rate[1], k_{sat} (inch/hour)
P-1	Tsc	4	0.008	0.004
P-2	Tsc	5	0.004	0.002
P-3	Tsc	5.5	0.009	0.004
P-4	Tsc	5	0.034	0.017
P-5	Tsc	5	0.044	0.022
		Average:	**0.020**	**0.010**

[1] Using a factor of safety of 2.

Infiltration categories include full infiltration, partial infiltration and no infiltration. Table 4 presents the commonly accepted definitions of the potential infiltration categories based on the infiltration rates.

TABLE 4
INFILTRATION CATEGORIES

Infiltration Category	Field Infiltration Rate, I (inches/hour)	Factored Infiltration Rate*, I (inches/hour)
Full Infiltration	$I > 1.0$	$I > 0.5$
Partial Infiltration	$0.10 < I \leq 1.0$	$0.05 < I \leq 0.5$
No Infiltration (Infeasible)	$I < 0.10$	$I < 0.05$

*Using a Factor of Safety of 2.

GEOLOGIC HAZARDS AND CONSIDERATIONS

Groundwater Elevations

We did not encounter static groundwater during our field investigation to the maximum depth explored of 41 feet on the property. We expect static groundwater exits at depths greater than 100 feet below existing grades.

Soil or Groundwater Contamination

We are unaware of contaminated soil or groundwater contamination on the property. Therefore, infiltration associated with this risk is considered feasible

New or Existing Utilities

Existing utilities are located in the streets and parking lot areas adjacent to the site and utilities will be constructed within the site boundaries. Full or partial infiltration should not be allowed in the areas of the utilities to help prevent potential damage/distress to improvements. Mitigation measures to prevent water from infiltrating the utilities consist of setbacks, installing cutoff walls around the utilities and installing subdrains and/or installing liners. The horizontal and vertical setbacks for infiltration devices should be a minimum of 10 feet and a 1:1 plane of 1 foot below the closest edge of the deepest adjacent utility, respectively.

Existing and Planned Structures

Existing and proposed commercial structures are present on and adjacent to the site. Water should not be allowed to infiltrate in areas where it could affect the neighboring properties and existing adjacent structures, improvements and roadway. Mitigation for existing structures consists of not allowing water infiltration within a lateral distance of at least 10 feet from the new or existing foundations and properly lines.

Existing Fill Materials

We encountered previously placed fill in our borings with a thickness ranging from 3 to 45 feet, with the majority of fill exceeding 5 to 10 feet in thickness. Infiltration should not be allowed in areas with greater than 5 feet of existing or proposed fill materials. Due to the potential for lateral water migration within the existing soils, full or partial infiltration should be considered infeasible within the previously placed or proposed compacted fill.

Slopes and Other Geologic Hazards

As previously described, a descending slope about 40 to 70 feet in height exists along the entirety of the southern property line. The infiltration location should possess a minimum setback of 50 feet or

1.5 times the slope height from sensitive slopes. Full or partial infiltration should be considered infeasible within this slope setback zone.

CONCLUSIONS AND RECOMMENDATIONS

Storm Water Evaluation Narrative

The area where infiltration could potentially be feasible is limited based on the locations of existing or proposed underground utilities, buildings, fill material and the descending slope. Therefore, we performed infiltration tests within the Scripps Formation where infiltration could be potentially feasible within the northern and eastern portion of the site.

Storm Water Infiltration Conclusion

Infiltration would not be possible in the areas of existing underground utilities, buildings, previously placed fill and descending slopes, as discussed herein and shown on the Geologic Map, Figure 1. The infiltration test results from the area where infiltration could be possible within the Scripps Formation indicate permeability rates less than 0.05 inches per hour (with a FOS of 2). Therefore, full or partial infiltration within Scripps Formation is considered infeasible at the site. The rates recorded can be applied to the geologic units across the property.

Storm Water Infiltration Recommendations

Liners and subdrains should be incorporated into the design and construction of the planned storm water devices. The liners should be impermeable (e.g. High-density polyethylene, HDPE, with a thickness of about 30 mil or equivalent Polyvinyl Chloride, PVC) to prevent water migration. The subdrains should be perforated within the liner area, installed at the base and above the liner, be at least 3 inches in diameter and consist of Schedule 40 PVC pipe. The subdrains outside of the liner should consist of solid pipe. The penetration of the liners at the subdrains should be properly waterproofed. The subdrains should be connected to a proper outlet. The devices should also be installed in accordance with the manufacturer's recommendations.

Storm Water Standard Worksheets

The SWS requests the geotechnical engineer complete the *Categorization of Infiltration Feasibility Condition* (Worksheet C.4-1 or Form I-8) worksheet information to help evaluate the potential for infiltration on the property. The attached Worksheet C.4-1 presents the completed information for the submittal process.

The regional storm water standards also have a worksheet (Worksheet D.5-1 or Form I-9) that helps the project civil engineer estimate the factor of safety based on several factors. Table 5 describes the

suitability assessment input parameters related to the geotechnical engineering aspects for the factor of safety determination.

TABLE 5
SUITABILITY ASSESSMENT RELATED CONSIDERATIONS FOR INFILTRATION FACILITY SAFETY FACTORS

Consideration	High Concern – 3 Points	Medium Concern – 2 Points	Low Concern – 1 Point
Assessment Methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates. Use of well permeameter or borehole methods without accompanying continuous boring log. Relatively sparse testing with direct infiltration methods	Use of well permeameter or borehole methods with accompanying continuous boring log. Direct measurement of infiltration area with localized infiltration measurement methods (e.g., Infiltrometer). Moderate spatial resolution	Direct measurement with localized (i.e. small-scale) infiltration testing methods at relatively high resolution or use of extensive test pit infiltration measurement methods.
Predominant Soil Texture	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site Soil Variability	Highly variable soils indicated from site assessment or unknown variability	Soil boring/test pits indicate moderately homogenous soils	Soil boring/test pits indicate relatively homogenous soils
Depth to Groundwater/ Impervious Layer	<5 feet below facility bottom	5-15 feet below facility bottom	>15 feet below facility bottom

Based on our geotechnical investigation and the previous table, Table 6 presents the estimated factor values for the evaluation of the factor of safety. This table only presents the suitability assessment safety factor (Part A) of the worksheet. The project civil engineer should evaluate the safety factor for design (Part B) and use the combined safety factor for the design infiltration rate.

TABLE 6
FACTOR OF SAFETY WORKSHEET DESIGN VALUES – PART A[1]

Suitability Assessment Factor Category	Assigned Weight (w)	Factor Value (v)	Product (p = w x v)
Assessment Methods	0.25	2	0.50
Predominant Soil Texture	0.25	2	0.50
Site Soil Variability	0.25	2	0.50
Depth to Groundwater/ Impervious Layer	0.25	1	0.25
Suitability Assessment Safety Factor, $S_A = \square p$			1.75

[1.] The project civil engineer should complete Worksheet D.5-1 or Form I-9 using the data on this table. Additional information is required to evaluate the design factor of safety.

If you have any questions regarding this correspondence, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

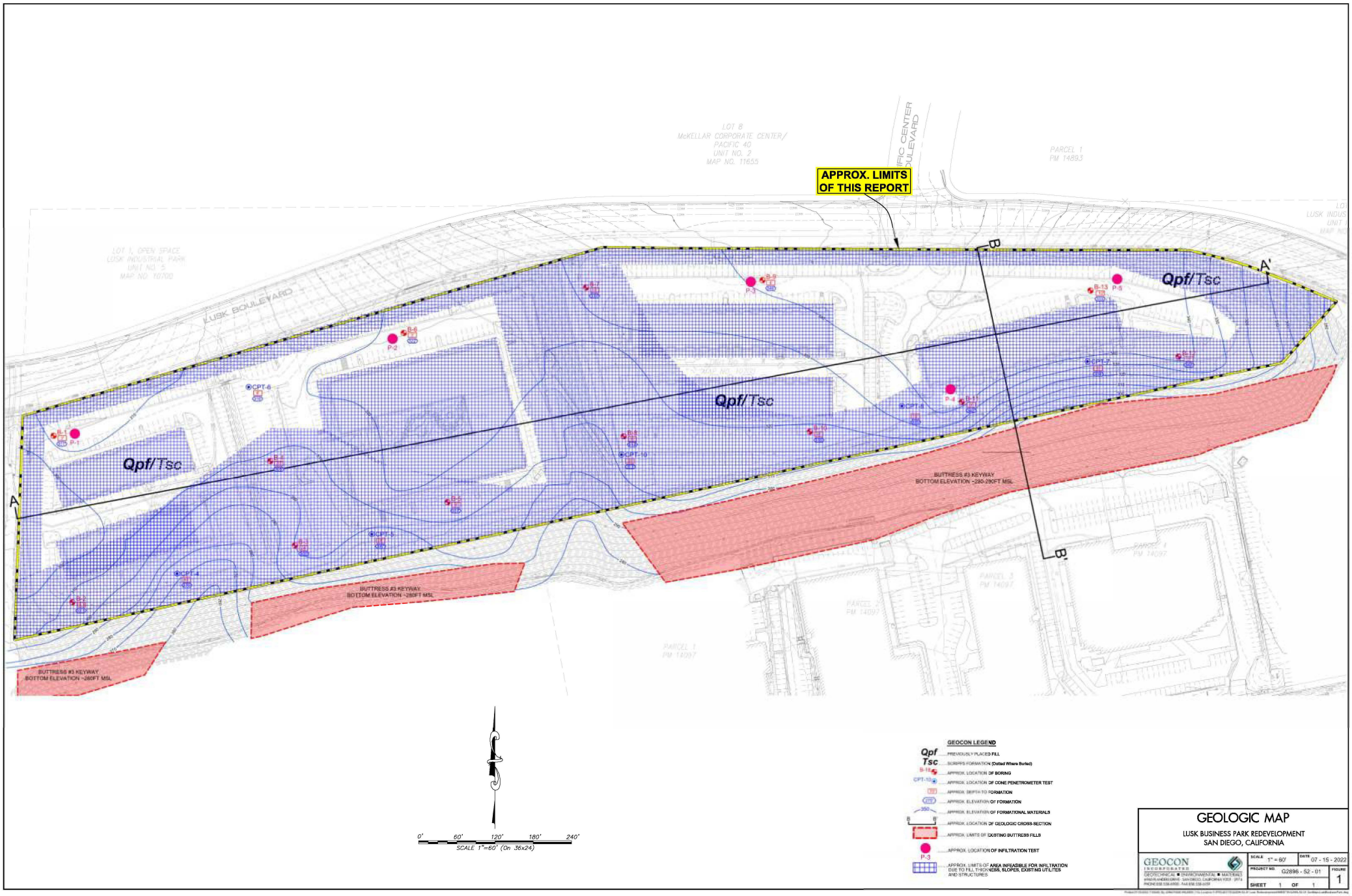
Matt R. Love
RCE 84154

Shawn Foy Weedon
GE 2714

MRL:SFW:arm

Attachments: Figure 1, Geologic Map
Test Results

(e-mail) Addressee



GEOLOGIC MAP

LUSK BUSINESS PARK REDEVELOPMENT
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

SCALE	1" = 60'	DATE	07 - 15 - 2022
PROJECT NO.	G2896 - 52 - 01	FIGURE	1
SHEET	1 OF 1		

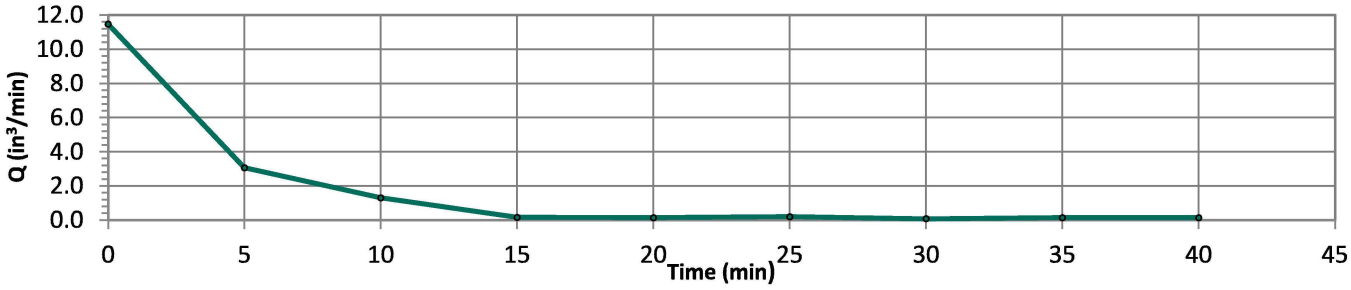
TEST NO.: **P-1**

GEOLOGIC UNIT: **Tsc**

EXCAVATION ELEVATION (MSL, FT): **314**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	8
BOREHOLE DEPTH (FT):	4.0
TEST/BOTTOM ELEVATION (MSL, FT):	310
MEASURED HEAD HEIGHT (IN):	6.5
CALCULATED HEAD HEIGHT (IN):	6.1
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.120**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.008**
FACTORED INFILTRATION RATE (IN/HR):	**0.004**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	2.070	57.32	11.465
3	5.00	0.555	15.37	3.074
4	5.00	0.235	6.51	1.302
5	5.00	0.030	0.83	0.166
6	5.00	0.025	0.69	0.138
7	5.00	0.035	0.97	0.194
8	5.00	0.015	0.42	0.083
9	5.00	0.025	0.69	0.138
10	5.00	0.025	0.69	0.138

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AARDVARK PERMEAMETER TEST RESULTS

LUSK BUSINESS PARK REDEVELOPMENT

PROJECT NO.: G2896-52-01

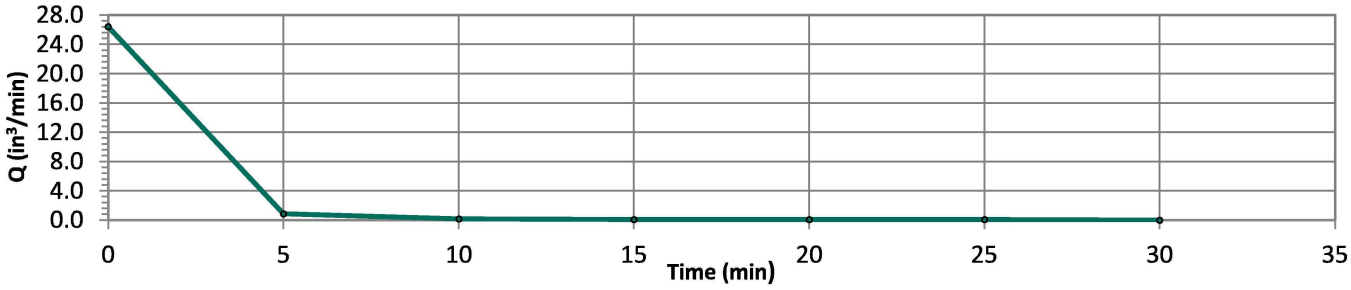
TEST NO.: **P-2**

GEOLOGIC UNIT: **Tsc**

EXCAVATION ELEVATION (MSL, FT): **325**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	8
BOREHOLE DEPTH (FT):	5.0
TEST/BOTTOM ELEVATION (MSL, FT):	320
MEASURED HEAD HEIGHT (IN):	6.8
CALCULATED HEAD HEIGHT (IN):	6.3
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.055**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.004**
FACTORED INFILTRATION RATE (IN/HR):	**0.002**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	4.770	132.09	26.418
3	5.00	0.155	4.29	0.858
4	5.00	0.030	0.83	0.166
5	5.00	0.010	0.28	0.055
6	5.00	0.010	0.28	0.055
7	5.00	0.010	0.28	0.055

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AARDVARK PERMEAMETER TEST RESULTS

LUSK BUSINESS PARK REDEVELOPMENT

PROJECT NO.: G2896-52-01

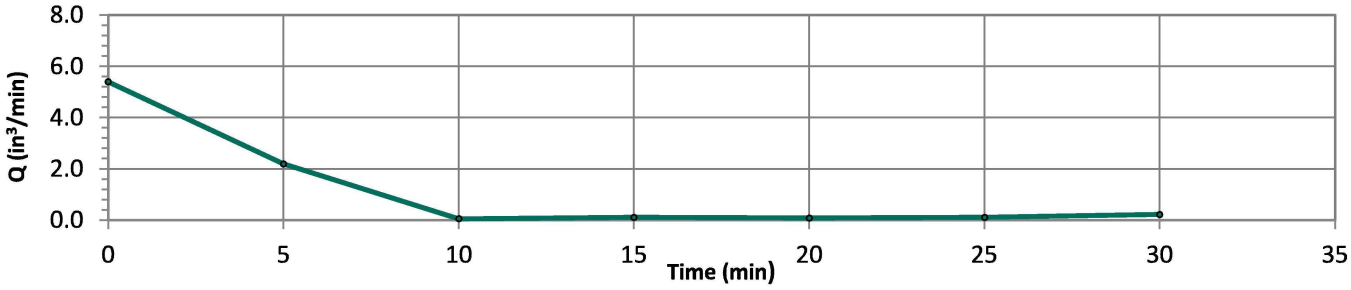
TEST NO.: **P-3**

GEOLOGIC UNIT: **Tsc**

EXCAVATION ELEVATION (MSL, FT): **350**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	8
BOREHOLE DEPTH (FT):	5.5
TEST/BOTTOM ELEVATION (MSL, FT):	345
MEASURED HEAD HEIGHT (IN):	7.0
CALCULATED HEAD HEIGHT (IN):	6.4
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.132**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.009**
FACTORED INFILTRATION RATE (IN/HR):	**0.004**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	0.975	27.00	5.400
3	5.00	0.395	10.94	2.188
4	5.00	0.010	0.28	0.055
5	5.00	0.020	0.55	0.111
6	5.00	0.015	0.42	0.083
7	5.00	0.020	0.55	0.111
8	5.00	0.040	1.11	0.222

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AARDVARK PERMEAMETER TEST RESULTS

LUSK BUSINESS PARK REDEVELOPMENT

PROJECT NO.: G2896-52-01

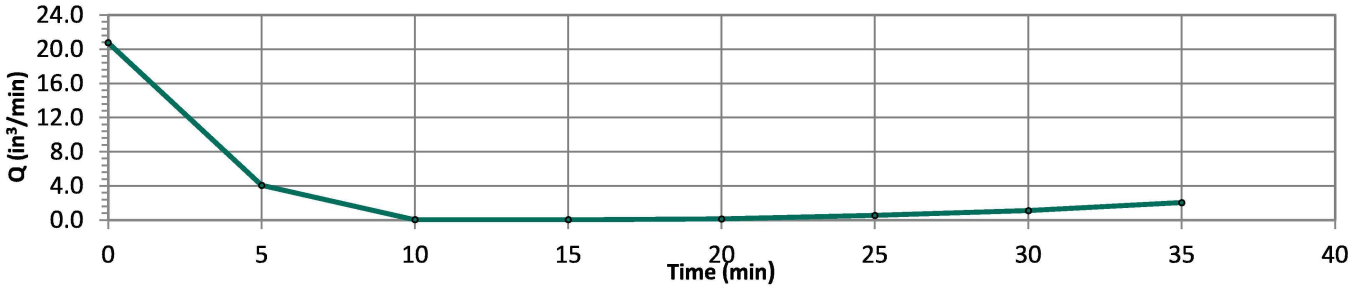
TEST NO.: **P-4**

GEOLOGIC UNIT: **Tsc**

EXCAVATION ELEVATION (MSL, FT): **345**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	8
BOREHOLE DEPTH (FT):	5.0
TEST/BOTTOM ELEVATION (MSL, FT):	340
MEASURED HEAD HEIGHT (IN):	6.0
CALCULATED HEAD HEIGHT (IN):	6.4
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.464**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.034**
FACTORED INFILTRATION RATE (IN/HR):	**0.017**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	3.750	103.85	20.769
3	5.00	0.735	20.35	4.071
4	5.00	0.010	0.28	0.055
5	5.00	0.010	0.28	0.055
6	5.00	0.025	0.69	0.138
7	5.00	0.100	2.77	0.554
8	5.00	0.200	5.54	1.108
9	5.00	0.370	10.25	2.049

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AARDVARK PERMEAMETER TEST RESULTS

LUSK BUSINESS PARK REDEVELOPMENT

PROJECT NO.: G2896-52-01

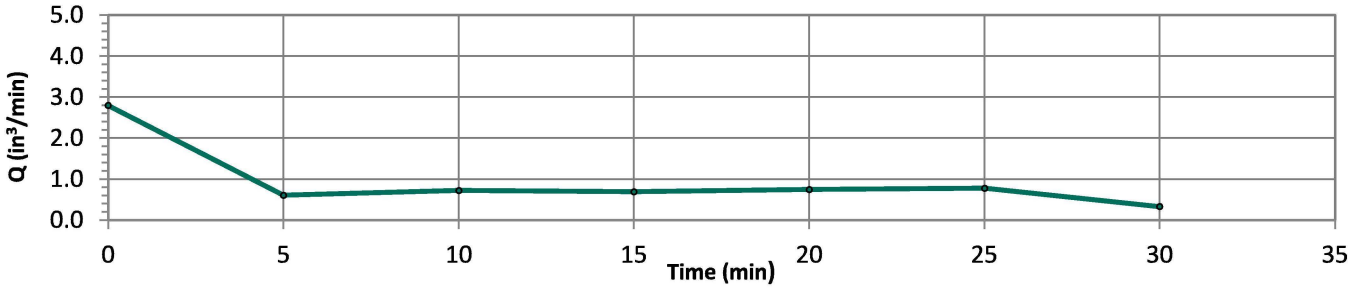
TEST NO.: **P-5**

GEOLOGIC UNIT: **Tsc**

EXCAVATION ELEVATION (MSL, FT): **345**

TEST INFORMATION	
BOREHOLE DIAMETER (IN):	8
BOREHOLE DEPTH (FT):	5.0
TEST/BOTTOM ELEVATION (MSL, FT):	340
MEASURED HEAD HEIGHT (IN):	7.3
CALCULATED HEAD HEIGHT (IN):	6.4
FACTOR OF SAFETY:	2.0

TEST RESULTS	
STEADY FLOW RATE (IN^3/MIN):	**0.674**
FIELD-SATURATED INFILTRATION RATE (IN/HR):	**0.044**
FACTORED INFILTRATION RATE (IN/HR):	**0.022**



TEST DATA				
Reading	Time Elapsed (min)	Water Weight Consumed (lbs)	Water Volume Consumed (in^3)	Q (in^3/min)
1	0.00	0.000	0.00	0.00
2	5.00	0.505	13.98	2.797
3	5.00	0.110	3.05	0.609
4	5.00	0.130	3.60	0.720
5	5.00	0.125	3.46	0.692
6	5.00	0.135	3.74	0.748
7	5.00	0.140	3.88	0.775
8	5.00	0.060	1.66	0.332

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AARDVARK PERMEAMETER TEST RESULTS

LUSK BUSINESS PARK REDEVELOPMENT

PROJECT NO.: G2896-52-01

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I- 8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	**Project Phase:**
Lusk Business Park Redevelopment	Design
Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☐ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☒ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☒ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☒ No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.

Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data include site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I- 8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐ Yes; answer "Yes" to Criteria 1 Result. ☐ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒ No; full infiltration is not required. Skip to Part 1 Result.

Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.

We performed 5 infiltration tests using the Aardvark permeameter at the site within existing Scripps Formation. The following presents the results of our field infiltration tests with a FS of 2.0 applied.

P-1 at 4 feet = 0.004 inches/hour
P-2 at 5 feet = 0.002 inches/hour
P-3 at 5.5 feet = 0.004 inches/hour
P-4 at 5 feet = 0.017 inches/hour
P-5 at 5 feet = 0.022 inches /hour

The test results indicate the approximate infiltration rate is 0.010 inches per hour (with FS of 2 applied).

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A–1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐ Yes	☐ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B–1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐ Yes	☐ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☐ No
Summarize findings and basis; provide references to related reports or exhibits.			
Part 1 Result – Full Infiltration Geotechnical Screening [12]		**Result**	
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.		☐ Full infiltration Condition ☒ Complete Part 2	

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]

Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria

DMA(s) Being Analyzed:	Project Phase:
Lusk Business Park Redevelopment	Design

Criteria 3: Infiltration Rate Screening

3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☒ No; infiltration testing is conducted (refer to Table D.3–1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☒ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☒ No: Skip to Part 2 Result.

Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).

We performed 5 infiltration tests using the Aardvark permeameter at the site within existing Scripps Formation. The following presents the results of our field infiltration tests with a FS of 2.0 applied.

P-1 at 4 feet = 0.004 inches/hour
P-2 at 5 feet = 0.002 inches/hour
P-3 at 5.5 feet = 0.004 inches/hour
P-4 at 5 feet = 0.017 inches/hour
P-5 at 5 feet = 0.022 inches/hour

The test results indicate the approximate infiltration rate is 0.010 inches per hour (with FS of 2 applied).

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 4B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A–1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☐ Yes	☐ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B–1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I- 8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☐ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☒ No Infiltration Condition

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.