SUPPLEMENTAL INFILTRATION FEASIBILITY TESTING FOR THE PUBLIC LIBRARY EXPANSION PROJECT
TOWN SQUARE PARK
PARCELS 7 AND 8 OF PARCEL MAP NO. 29924
CITY OF MURRIETA, RIVERSIDE COUNTY
CALIFORNIA (APNS 906-080-039 AND -040)

FOR

CITY OF MURRIETA
COMMUNITY SERVICES DEPARTMENT
1 TOWN SQUARE
MURRIETA, CALIFORNIA 92562

GeoSoils, Inc.

W.O. 8582-A1-SC MARCH 4, 2024

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March 4, 2024

W.O. 8582-A1-SC

City of Murrieta
Community Services Department
1 Town Square
Murrieta, California 92562

Attention: Mr. Brian Crawford

Subject: Supplemental Infiltration Feasibility Testing for the Public Library Expansion Project, Town Square Park, Parcels 7 and 8 of Parcel Map No. 29924, City of Murrieta, Riverside County, California (APNs 906-080-039 and -040)

Dear Mr. Crawford:

In accordance with your request and authorization, GeoSoils, Inc. (GSI) is providing the results of our supplemental infiltration feasibility testing for the Town Square Park public library expansion project in the City of Murrieta, Riverside County, California. The scope of our services has included a review of the referenced reports and documents (see the Appendix), the advancement of two (2) exploratory borings onsite, which were excavated to depths of approximately 5 and 10 feet below the existing surface (bgs), geologic logging, supplemental field infiltration testing, analysis of field test data obtained, and preparation of this summary infiltration feasibility testing report.

SITE LOCATION AND CURRENT SITE CONDITIONS

The subject property (Parcels 7 and 8) is located at 8 Town Square, in the City of Murrieta, Riverside County, California). Based on our review, the site is currently developed with the Murrieta Public Library building with associated concrete flatwork and landscape improvements. Topographically, the property consists of flat-lying terrain that varies in elevation from approximately 1,115 feet MSL (Mean Sea Level) near the southern corner of the site to approximately 1,118 feet MSL near the northern corner of the property. Therefore, overall relief is on the order of 3 feet. Based on our review, the project site is mantled by compacted artificial fill placed during original and following site grading activities (GSI, 2000a and 2000b, and GI, 2005), that is in-turn underlain at shallow depths by Quaternary-age younger alluvium and sedimentary bedrock of the Pauba Formation.

PROPOSED DEVELOPMENT AND BACKGROUND

It is our understanding that continued development within the Murrieta Town Square Park would consist of the expansion of the existing public library, along with the installation of underground utilities, stormwater BMP systems, associated concrete flatwork improvements, and potentially perimeter block wall improvements. The public library expansion is proposed to be constructed in the existing garden area of the library complex. We further understand that the library expansion is proposed as a one- to two-story structure, with slab-on-grade and continuous footings, using typical wood-, block-, or steel-frame and stucco type construction. Building loads are assumed to be typical for this type of relatively light structure.

SITE GEOLOGY

Based on our previous subsurface investigation (GSI, 2023) and published geologic mapping by Kennedy and Morton (2003), the project site is mantled by compacted artificial fill placed during original site grading (GSI, 2000a and GI, 2005), which is in-turn underlain at shallow depths by Quaternary-age young alluvial valley deposits and sedimentary bedrock of the Pauba Formation. Compacted artificial fill was encountered in approximately the upper five (5) feet. The compacted artificial fill ranged in composition but was generally dark brown to brown, silty to clayey sands. Sedimentary bedrock was encountered at depth during our field investigation for this study, and is assigned to the Quaternary Pauba Formation (Qpfs). The sandstone deposits underlying the compacted fill generally consisted of pale brown to reddish brown clayey sands to sandy clays, that were generally wet and hard to very stiff with depth.

GROUNDWATER

Seeps, springs, or other indications of a high groundwater level were not noted on the subject property during the time of our field investigation, as groundwater was not encountered within any of the subsurface borings advanced during our previous field work (GSI, 2000c). Based on our review of the California Department of Water Resources, (CDWR) Water Data Library (2023), the historic depth to groundwater in a well east of the property was measured at approximately 27 feet below the ground surface (Well No. 339586N1175535W001) in 1994. The current depth to groundwater in a well just southwest of the property was measured as approximately 61.5 feet below the ground surface (Well No. 339566N1175810W001) in March of 2023. In general, and based upon the available data to date, the regional groundwater gradient is to the southwest, and is not expected to be a factor in the development if the site. However, these observations reflect site conditions at the time of our field work and do not prevent future changes in local groundwater conditions from excessive irrigation, precipitation, or that were not evident at the time of our investigation, including perched water conditions.

SUPPLEMENTAL INFILTRATION TESTING

In general accordance with guidelines of the Riverside County Flood Control (RCFC, 2011) Design Handbook for Low Impact Development Best Management Practices, two (2) infiltration tests were conducted within the proposed stormwater BMP system locations onsite. As requested by the design engineer, the infiltration testing was conducted at depths of 5 feet and 10 feet, in the designated area provided. The approximate locations of the infiltration tests for this study are provided on Figure 1 (Boring Location Map). The supplemental infiltration testing was performed to further evaluate site conditions with respect to the proposed BMP systems that would retain and filter onsite storm water. The infiltration testing was performed in general conformance with the RCFC (2011 and 2016) and CASQA (2003) design handbooks for such testing. The infiltration testing was performed by a staff geologist from our firm. Logs of the borings advanced for this study are presented in Appendix B, and the Field Infiltration Data Sheets are presented in Appendix C. Procedures for testing are outlined briefly below:

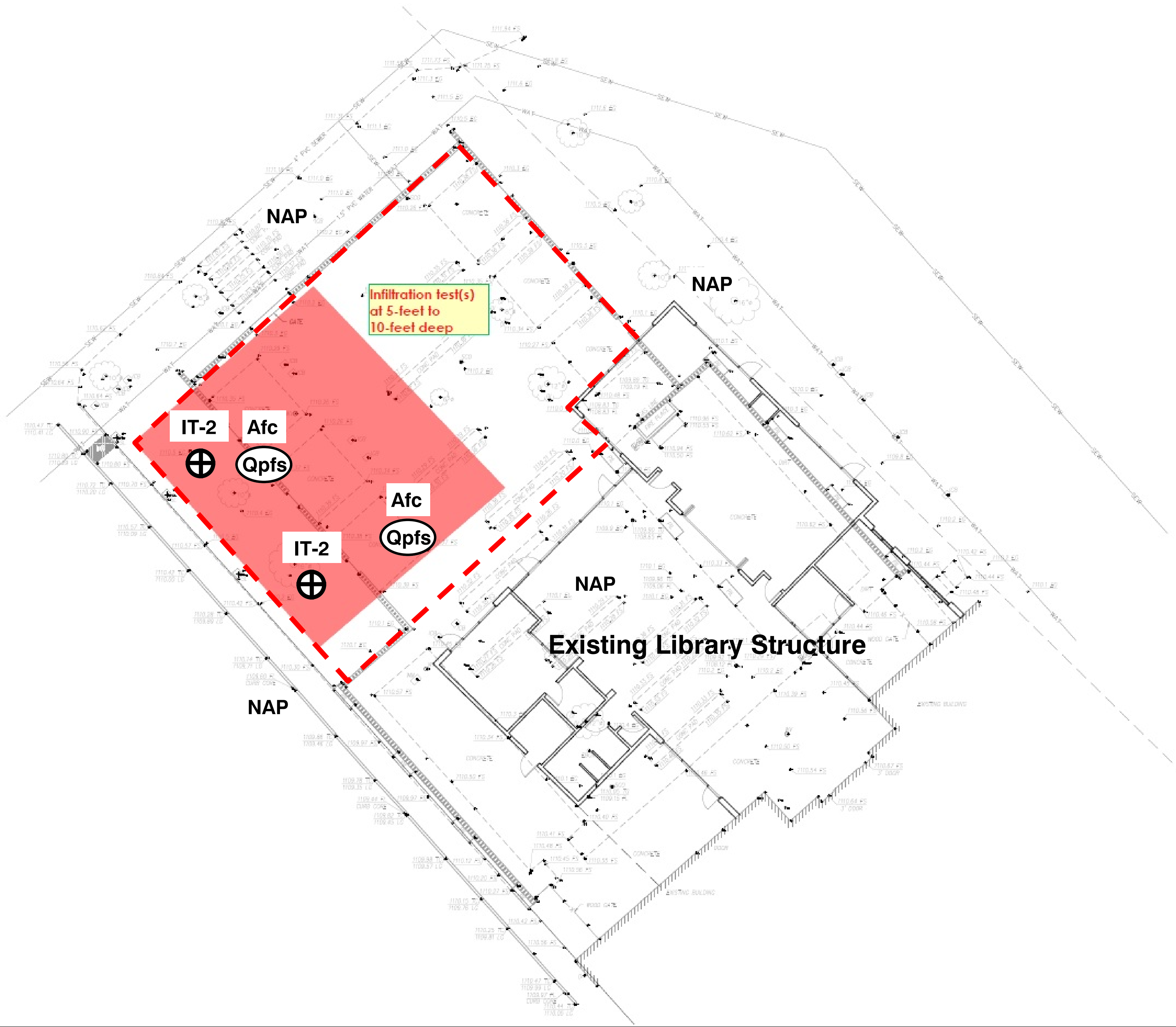
Percolation Test Procedures

Test Borings:

1. Drill rig excavated to depths of approximately 5 feet and 10 feet.
2. Diameter - 8 inches.
3. After the removal of loose materials, 2 inches of gravel were placed on the bottom of each test boring.
4. A perforated pipe with silt-sock was then installed within each test boring to facilitate accurate field measurements and prevent caving during the pre-soak period and infiltration testing.

Pre-Soaking: After the installation of the perforated pipes, the 5-foot boring was filled with clear water several times. The 10-foot boring was filled with a column of clear water to four (4) feet below existing grades (i.e., at least five (5) times the borings radius [RCFC, 2011]). The pre-soak continued overnight for a period of at least 24 hours, as the water did not seep away while the tester was present.

Sandy Soil Test: Following the pre-soak period, sandy soil criteria testing was conducted. Two (2) consecutive measurements were made at each test location at intervals of approximately 25 minutes. Less than 6 inches of water seeped away during each of the two (2) test measurements within the percolation test locations, therefore a 30 minute test period was selected for standard (percolation) testing (RCFC, 2011).



GSI LEGEND

Afc Artificial Fill, Compacted.

Qpfs Quaternary Pauba Formation, Sandstone Member, Circled where Buried.

⊕ IT-2 Approximate Location of Infiltration Test Boring.

— — — Approximate Boundary of Area Under the Purview of this Report.

NAP Not A Part of this Study.

ALL LOCATIONS ARE APPROXIMATE

This document or e-file is not part of the Construction Documents and should not be relied upon as being an accurate depiction of design.

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Figure 1

BORING LOCATION MAP

W.O. 8582-A1-SC	DATE: 03/24	SCALE: NTS

Testing: After required pre-soak period and sandy soil test periods, infiltration testing started at all locations. A column of clear water was re-established within each of the test locations to a depth of at least five (5) times the boring radius for the shallow testing, and of four (4) feet below the existing grade for the deep testing. The drop in water level was measured from a fixed reference point, refilling after each test measurement. Within all percolation test locations, a series of test measurements were taken for a minimum period of six (6) hours, at time intervals of 30 minutes.

Accuracy: All test measurements were read to the nearest ¼-inch.

Test Results: Calculations from our field testing indicate percolation rates of 120 minutes/inch in both locations. Per the RCFC (2011) guidelines, the percolation rates obtained were then converted to infiltration rates using the "Porchet Method," to be used by the design engineer for appropriate sizing of the BMP systems (RCFC, 2011). The converted infiltration rates obtained varied between 0.03 inches/hour at a depth of 5 feet, and 0.02 inches/hour, at a depth of 10 feet. Typically, the lowest infiltration rate obtained is applied to the design; therefore, an unfactored (i.e., no factor of safety) infiltration rate (UIR) of 0.02 inches/hour was obtained. The converted infiltration rates, along with the formulas used are presented in Figure 2 (Percolation Rate to Infiltration Rate Conversion).

USDA Site Soil Group, Soil Units, and Ksat Values

Our review of the United States Department of Agriculture (USDA, 2024) Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm), indicates that only one (1) major soil unit underlies the portion of the site where the proposed library expansion is proposed. The Ramona very fine sandy loam (ReC2) is shown underlying the proposed BMP system locations with a generalized Hydrologic Soil Group of "C," and a capacity of the most limiting soil layer to transmit water (Ksat) of "Moderately High" (i.e., 0.20 to 0.57 in/hr), which is significantly higher than tested average.

Infiltration Siting Requirements

Our review of the general infiltration siting requirements and limitations (CASQA, 2003), indicates sites characterized as belonging to Hydrologic Soil Group "A," "B," and "C" may be suitable for infiltration, requiring a minimum soil infiltration rate of 0.5 inches/hour (CASQA, 2003). Based on our review of historic regional groundwater levels and previous onsite subsurface investigation, a minimum 10-foot vertical separation from the bottom of the BMP system to the top of historic high groundwater levels will be maintained.

Percolation Rate to Infiltration Rate Conversion

$$* \text{Infiltration Rate } (I_t) = \frac{\Delta H \, \pi r^2 \, 60}{\Delta t(\pi r^2 + 2\pi r H_{avg})} = \frac{\Delta H \, 60 \, r}{\Delta t(r + 2H_{avg})}$$

Where:
I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

		Δt	Init Level	Fnl Level	ΔH	H_{avg}	I_t	
Infiltration Test Numbers	IT-1 @ 5 ft.	30	34	33 3/4	1/4	33 7/8	0.03	
	IT-2 @ 10 ft.	30	48	47 3/4	1/4	47 7/8	0.02	
								Low = 0.02
								Average = 0.25
								**UIR= 0.02

* Conversion per the "Porchet Method" (RCFC, 2011)

** UIR = Unfactored Infiltration Rate

The design engineer will need to review basin siting requirements by CASQA (2003) and the converted infiltration rates obtained during this study with respect to the proposed water quality BMP systems. An appropriate factor of safety (FOS), per the RCFC (2011) BMP design handbook, should be applied by the design engineer, as warranted. Due to the lower infiltration rates obtained (below 0.50 in/hr), filtration/detention systems, bio-retention facilities, extended detention basins, sand filter/media treatment areas, vegetated swales, etc., may need to be incorporated onsite, and should be considered for supplemental planning purposes. The design infiltration rates, general BMP design parameters, and recommendations proved herein are based on our experience with earth materials within the City of Murrieta, RCFC (2011) and State criteria (CASQA, 2003), and our experience on adjacent sites with similar geologic conditions.

CONCLUSIONS AND RECOMMENDATIONS

Based on the onsite infiltration testing conducted, it is our opinion that the proposed continued site development is feasible from a geologic and geotechnical viewpoint, provided the recommendations presented herein, and within the previous report by GSI (2023) are properly implemented during project planning, design, and construction, as warranted. General recommendations for storm water quality BMP systems are presented below.

Onsite Storm Water Quality Best Management Practice (BMP) Systems

Should onsite infiltration-runoff retention systems (OIRRS) be planned for Best Management Practices (BMP's) or Low Impact Development (LID) principles for the project, some guidelines should/must be followed in the planning, design, and construction of such systems. Such facilities, if improperly designed or implemented without consideration of the geotechnical aspects of site conditions, can contribute to flooding, saturation of bearing materials beneath site improvements, slope instability, and possible concentration and contribution of pollutants into the groundwater or storm drain and/or utility trench systems.

A key factor in these systems is the infiltration rate (often referred to as the percolation rate) which can be ascribed to, or determined for, the earth materials within which these systems are installed. Additionally, the infiltration rate of the designed system (which may include gravel, sand, mulch/topsoil, or other amendments, etc.) will need to be considered. The project infiltration testing is very site specific, any changes to the location of the proposed OIRRS and/or estimated size of the OIRRS, may require additional infiltration testing. Locally, relatively impermeable formations include: terrace deposits, claystone, siltstone, cemented sandstone, igneous and metamorphic bedrock, as well as expansive fill soils.

Some of the methods which are used for onsite infiltration include percolation basins, dry wells, bio-swale/bio-retention, permeable pavers/pavement, infiltration trenches, filter boxes and subsurface infiltration galleries/chambers. Some of these systems are constructed using native and import soils, perforated piping, and filter fabrics while others employ structural components such as stormwater infiltration chambers and filters/separators. Every site will have characteristics which should lend themselves to one or more of these methods; but, not every site is suitable for OIRRS. In practice, OIRRS are usually initially designed by the project design civil engineer. Selection of methods should include (but should not be limited to) review by licensed professionals including the geotechnical engineer, hydrogeologist, engineering geologist, project civil engineer, landscape architect, environmental professional, and industrial hygienist. Applicable governing agency requirements should be reviewed and included in design considerations.

The following geotechnical guidelines should be considered when designing onsite infiltration-runoff retention systems:

- It is not good engineering practice to allow water to saturate soils, especially near slopes or improvements; however, the controlling agency/authority is now requiring this for OIRRS purposes on many projects.

- Where possible, infiltration system design should be based on actual infiltration testing results/data to determine the infiltration rate of the earth materials being contemplated for infiltration.

- Impermeable liners used in conjunction with basins should consist of a 30-mil polyvinyl chloride (PVC) membrane that is covered by a minimum of 12-inches of clean soil, free from rocks and debris, at a maximum inclination of 4:1 (h:v), and meets the following minimum specifications:

  Specific Gravity (ASTM D792): 1.2 (g/cc [min.]); Tensile (ASTM D882): 73 (lb/in-width [min.]); Elongation at Break (ASTM D882): 380 (% [min.]); Modulus (ASTM D882): 30 (lb/in-width [min.]); and Tear Strength (ASTM D1004): 8 (lbs [min.]); Seam Shear Strength (ASTM D882) 58.4 (lb/in [min.]); Seam Peel Strength (ASTM D882) 15 (lb/in [min]).

- Wherever possible, infiltrations systems should not be placed within a distance of H/2 from the toes of slopes (where H equals the height of slope).

- The landscape architect should be notified of the location of the proposed OIRRS. If landscaping is proposed within the OIRRS, consideration should be given to the type of vegetation chosen and their potential effect upon subsurface improvements (i.e., some trees/shrubs will have an effect on subsurface improvements with their extensive root systems). Over-watering landscape areas above, or adjacent to, the proposed OIRRS could adversely affect performance of the system.

- Areas adjacent to, or within, the OIRRS that are subject to inundation should be properly protected against scouring, undermining, and erosion, in accordance with the recommendations of the design engineer.

- If subsurface infiltration galleries/chambers are proposed, the appropriate size, depth interval, and ultimate placement of the detention/infiltration system should be evaluated by the design engineer, and be of sufficient width/depth to achieve optimum performance, based on the infiltration rates provided. In addition, proper debris filter systems will need to be used for the infiltration galleries/chambers. Debris filter systems will need to be self cleaning and periodically and regularly maintained on a regular basis. Provisions for the regular and periodic maintenance of any debris filter system are recommended and this condition should be disclosed to all interested/affected parties.

- Infiltrations systems should not be installed within 8 feet of building foundations utility trenches, and walls, or a 1:1 (horizontal to vertical [h:v]) slope (down and away) from the bottom elements of these improvements. Alternatively, deepened foundations and/or pile/pier supported improvements may be used.

- Infiltration systems should not be installed adjacent to pavement or hardscape improvements. Alternatively, deepened/thickened edges and curbs and/or impermeable liners may be used in areas adjoining the OIRRS.

- As with any OIRRS, localized ponding and groundwater seepage should be anticipated. The potential for seepage and/or perched groundwater to occur after site development should be disclosed to all interested/affected parties.

- Installation of infiltrations systems should avoid expansive soils (Expansion Index [E.I.] $\geq$51) or soils with a relatively high plasticity index (P.I. > 20).

- Infiltration systems should not be installed where the vertical separation of the groundwater level is less than 10 feet from the base of the system.

- Infiltration systems should be designed using a suitable factor of safety (FOS) to account for uncertainties in the known infiltration rates (as generally required by the controlling authorities), and reduction in performance over time.

- As with any OIRRS, proper care will need to provided. Best management practices should be followed at all times, especially during inclement weather. Provisions for the management of any siltation, debris within the OIRRS, or overgrown vegetation (including root systems) should be considered. An appropriate inspection schedule will need to adopted and provided to all interested/affected parties.

- Any designed system will require regular and periodic maintenance, which may include rehabilitation and/or complete replacement of the filter media (e.g., sand, gravel, filter fabrics, topsoils, mulch, etc.) or other components used in construction, so that the design life exceeds 15 years. Due to the potential for piping and adverse seepage conditions, a burrowing rodent control program should also be implemented onsite.

- Newly established vegetation/landscaping (including phreatophytes) may have root systems that will influence the performance of the OIRRS or nearby LID systems.

- The potential for surface flooding, in the case of system blockage, should be evaluated by the design engineer.

- Any proposed utility backfill materials (i.e., inlet/outlet piping and/or other subsurface utilities) located within or near the proposed area of the OIRRS may become saturated. This is due to the potential for piping, water migration, and/or seepage along the utility trench line backfill. If utility trenches cross and/or are proposed near the OIRRS, cut-off walls or other water barriers will need to be installed to mitigate the potential for piping and excess water entering the utility backfill materials. Planned or existing utilities may also be subject to piping of fines into open-graded gravel backfill layers unless separated from overlying or adjoining OIRRS by geotextiles and/or slurry backfill.

- The use of OIRRS above existing utilities that might degrade/corrode with the introduction of water/seepage should be avoided.

LIMITATIONS

The materials encountered on the project site and used for our analysis are believed representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during mass grading. Site conditions may vary due to seasonal changes or other factors.

Inasmuch as our study is based upon our review and engineering analyses and field test data, the conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty, either express or implied, is given. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented. Use of this report constitutes an agreement and consent by the user to all the limitations outlined above, notwithstanding any other agreements that may be in place. In addition, this report may be subject to review by the controlling authorities. Thus, this report brings to completion our scope of services for this portion of the project.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GeoSoils, Inc.

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Enclosures: Appendix A - References
Appendix B - Boring Logs
Appendix C - Field Infiltration Data Sheets

Distribution: (1) Addressee (PDF via email)

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX B

BORING LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions			Group Symbols	Typical Names
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravel with	GM	Silty gravels gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands more than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, mucic, and other highly organic soils

CONSISTENCY OR RELATIVE DENSITY

CRITERIA

Standard Penetration Test

Penetration Resistance N (blows/ft)	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium
30 - 50	Dense
> 50	Very dense

Standard Penetration Test

Penetration Resistance N (blows/ft)	Consistency	Unconfined Compressive Strength (tons/ft^2)
<2	Very Soft	<0.25
2 - 4	Soft	0.25 - .050
4 - 8	Medium	0.50 - 1.00
8 - 15	Stiff	1.00 - 2.00
15 - 30	Very Stiff	2.00 - 4.00
>30	Hard	>4.00

3" 3/4" #4 #10 #40 #200 U.S. Standard Sieve

Unified Soil Classification	Cobbles	Gravel		Sand			Silt or Clay
		coarse	fine	coarse	medium	fine	

MOISTURE CONDITIONS

Dry	Absence of moisture: dusty, dry to the touch
Slightly Moist	Below optimum moisture content for compaction
Moist	Near optimum moisture content
Very Moist	Above optimum moisture content
Wet	Visible free water; below water table

MATERIAL QUANTITY

trace	0 - 5 %
few	5 - 10 %
little	10 - 25 %
some	25 - 45 %

OTHER SYMBOLS

C	Core Sample
S	SPT Sample
B	Bulk Sample
–	Groundwater
Qp	Pocket Penetrometer

BASIC LOG FORMAT:
Group name, Group symbol, (grain size), color, moisture, consistency or relative density. Additional comments: odor, presence of roots, mica, gypsum, coarse grained particles, etc.

EXAMPLE:
Sand (SP), fine to medium grained, brown, moist, loose, trace silt, little fine gravel, few cobbles up to 4" in size, some hair roots and rootlets.

GeoSoils, Inc.

BORING LOG

PROJECT: CITY OF MURRIETA LIBRARY EXPANSION

W.O. 8582-A1-SC *BORING* I-1 *SHEET* 1 *OF* 1

DATE EXCAVATED 2-13-24 *LOGGED BY:* MAM *APPROX. ELEV.:* 1,118 MSL

SAMPLE METHOD: 8" Hollow Stem Auger (no sampling)

Depth (ft.)	Sample: Bulk	Sample: Undisturbed	Sample: Blows/Ft.	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Material Description
0				SM				**ARTIFICIAL FILL, COMPACTED (Afc):** @ 0', SILTY SAND, dark brown, wet, loose; abundant organics and root materials at surface, planter soil.
				SC				@ 0.5', CLAYEY SAND, gray, wet, medium stiff.
				SC				@ 4', As per 0.5', brown.
5								Total Depth = 5'. No groundwater or caving encountered. Presoaked at 8:25 am. Backfilled 2-14-24.
10								
15								
20								
25								
30								

Standard Penetration Test
Undisturbed, Ring Sample
Groundwater
Seepage

GeoSoils, Inc. BORING LOG

PROJECT: CITY OF MURRIETA LIBRARY EXPANSION

W.O. 8582-A1-SC *BORING* I-2 *SHEET* 1 *OF* 1

DATE EXCAVATED 2-13-24 *LOGGED BY:* MAM *APPROX. ELEV.:* 1,117 MSL

SAMPLE METHOD: 8" HSA, 140lb @ 30" Drop, Cal Sampler Only

Depth (ft.)	Sample: Bulk	Sample: Undisturbed	Blows/Ft.	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Material Description
0								**ARTIFICIAL FILL, COMPACTED (Afc):**
								@ 0', SILTY CLAYEY SAND, brown, wet, loose; organics at surface, planter soil at surface.
		Ring	14	SC/ SM				@ 1', As per 0, medium dense.
	Bulk	Ring	18	SC				@ 3', CLAYEY SAND, brown, wet, medium dense; trace organics.
5		Ring	43	SC/CL				@ 5', As per 3'; no organics.
								QUATERNARY PAUBA FORMATION (Qpfs):
		Ring	54	CL				@ 5.5', SANDY CLAY, pale brown to medium brown, wet, hard; trace roots.
10		Ring	33	CL				@ 10', CLAYEY SAND, medium brown to reddish brown, wet, very stiff.
								Total Depth = 11.5'.
								No groundwater or caving encountered.
								Presoaked at 9:43.
								Backfilled 2-14-23.
15								
20								
25								
30								

Standard Penetration Test
Undisturbed, Ring Sample
Groundwater
Seepage

APPENDIX C

FIELD INFILTRATION DATA SHEETS

Leach Line Percolation Data Sheet

Project: 8582-A1-SC City of Murrieta	W.O. Number: Murrieta Library Expansion
Test Hole No.: I-1	Date Excavated: 2/13/2024
Depth of Test Hole: 5'	Soil Classification: SC
Check for Sandy Soil Criteria Tested by: MAM	Date: 2/13/2024 | Presoak: @8:25A
Actual Percolation Tested by: MAM	Date: 2/14/2024

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (Min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)
1	9:35 10:00	25	30	28	2.0
2	10:03 10:28	25	31	29.5	1.5

Use: Normal Sandy (Circle One) Soil Criteria

	Time	Time Interval (min)	Total Elapsed Time (Min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Percolation Rate (min/inch)
First Hour	10:30 11:00	30	30	30.5	29	1.5	
	11:01 11:31	30	60	30	29.875	0.125	240
Second Hour	11:32 12:02	30	90	33	32.5	0.5	60
	12:04 12:34	30	120	33	32.75	0.25	120
Third Hour	12:35 1:05	30	150	33	32.75	0.25	120
	1:05 1:35	30	180	33	32.75	0.25	120
Fourth Hour	1:37 2:07	30	210	33.25	33	0.25	120
	2:09 2:39	30	240	33.5	33.25	0.25	120
Fifth Hour	2:41 3:11	30	270	33.5	33.25	0.25	120
	3:12 3:42	30	300	33.75	33.5	0.25	120
Sixth Hour	3:43 4:13	30	330	34	33.75	0.25	120
	4:13 4:43	30	360	34	33.75	0.25	120

Leach Line Percolation Data Sheet

Project: 8582-A1-SC	W.O. Number: Murrieta Library Expansion
Test Hole No.: I-8	Date Excavated: 2/13/2024
Depth of Test Hole: 11	Soil Classification: SC
Check for Sandy Soil Criteria Tested by: MAM	Date: 2/13/2024 Presoak: @ 9:43
Actual Percolation Tested by: MAM	Date: 2/14/2024

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (Min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)
1	9:45 / 10:10	25	48	45.25	2.75
2	10:12 / 10:37	25	48	47	1.0

Use: Normal Sandy (Circle One) Soil Criteria

	Time	Time Interval (min)	Total Elapsed Time (Min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Percolation Rate (min/inch)
First Hour	10:39 / 11:09	30	30	48	47.5	0.5	60
First Hour	11:13 / 11:43	30	60	48	47.5	0.5	60
Second Hour	11:44 / 12:14	30	90	48	47.5	0.5	60
Second Hour	12:16 / 12:46	30	120	48	47.5	0.5	60
Third Hour	12:48 / 1:28	30	150	48	47.5	0.5	60
Third Hour	1:29 / 1:59	30	180	48	47.5	0.5	60
Fourth Hour	2:00 / 2:30	30	210	48	47.75	0.25	120
Fourth Hour	2:32 / 3:02	30	240	48	47.5	0.5	60
Fifth Hour	3:04 / 3:34	30	270	48	47.5	0.5	60
Fifth Hour	3:35 / 4:05	30	300	48	47.75	0.25	120
Sixth Hour	4:05 / 4:35	30	330	48	47.75	0.25	120
Sixth Hour	4:36 / 5:06	30	360	48	47.75	0.25	120