

Preliminary Stormwater Soakage Testing

Ladies Mile Masterplan Area, Queenstown



Report prepared for:

Queenstown Lakes District Council

Report prepared by:

GeoSolve Limited

Distribution:

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Candor3

GeoSolve Limited (File)

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GEOTECHNICAL







PAVEMENTS

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WATER Resources





1 Introduction

1.1 General

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This report summarises the results of preliminary stormwater soakage testing carried out by GeoSolve Ltd for the Ladies Mile masterplan area. Investigations were undertaken within each of the proposed stormwater management areas to assess the potential for below ground stormwater disposal and to aid preliminary soakage design.



Photograph 1a - Site photo taken on the hills east of the site, looking south across the masterplan area.

The investigation was carried out for Queenstown Lakes District Council in accordance with GeoSolve Ltd.'s proposal dated 24 March 2021, which outlines the scope of work and conditions of engagement.

1.2 Proposed Development

We understand five stormwater management areas are proposed within the Ladies Mile masterplan area. A location plan has been provided by Candor3.



2 Site Description

2.1 General

The Ladies Mile masterplan area is approximately 160 Ha in size, and is located between Shotover River and Lake Hayes, as shown in Figure 1 below. State Highway 6 (Frankton-Ladies Mile Highway) runs in an east-west direction through the site.



Figure 1 – Site location plan. The Ladies Mile Masterplan Area of Focus is marked in red *(map sourced from maps.qldc.govt.nz/qldcviewer).*

The site area is largely undeveloped and comprises farmland, associated farming infrastructure, council infrastructure, roading networks, scattered residential dwellings and associated outbuildings. There is sporadic vegetation across the area.

The site is bounded by Shotover River to the west, Slope Hill to the north, Lake Hayes to the east and the existing Lake Hayes Estate, Queenstown County Club and Shotover Country residential areas to the south.

2.2 Topography and Surface Drainage

The five proposed stormwater management areas are situated on a sub-horizontal terrace.

Surface drainage is expected to drain to more permeable layers beneath the site. It is expected that groundwater flows track towards Lake Hayes and the Kawarau River at the eastern end of the site and the Shotover River at the western end of the site.

Local culverts and drainage ditches/paths are present around the property boundaries in association with the adjacent road network.



3 Site Investigations

An engineering geological site assessment has been undertaken with confirmatory subsurface investigations. The following site investigations were carried out between the 12th and 15th of April 2021:

- 14 test pits (TP1-14) which were advanced to a maximum depth of 4 m below ground level (bgl) to produce geological logs of the subsoils, and;
- 5 soakage tests completed within test pit excavations to assess the relative permeability and soakage potential of the subsoils. The permeability tests were undertaken between 1.2 and 2.0 m depth, where safely practical.

Test pit and soakage pit locations were positioned to obtain a representative spread across the proposed stormwater management areas.

TP 13 and 14 was excavated approximately 50 m to the east compared to the location originally provided to GeoSolve as the original location was fenced off with horses grazing, and the landowner did not allow access to this area.

Test pit and soakage pit locations and logs are presented in Appendix A and B. Results from the soakage testing are presented in Appendix C.

4 Subsurface Conditions

4.1 Geological Setting

The site is located in the Wakatipu basin, a feature formed largely by glacial advances. The last advance occurred about 15,000 years ago, scouring the schist bedrock in the Lake Hayes area and depositing glacial till. On ice retreat, Lake Wakatipu initially formed at a high level (Frankton Flats - Queenstown Airport level). In the site area, sediments from the Shotover River built a large delta into the lake and silty sediments accumulated in the lakebed.

Headward erosion by the Kawarau River eventually intersected the lake and gradually lowered it to the current level. Lake Hayes, behind the delta barrier, was lowered by Hayes Creek, which cut a deep gully through the deltaic sediments in the site area. Downcutting slowed when the creek intersected a buried schist ridge, now evident in the Hayes Creek bed.

Active fault traces were not observed at the site or in the immediate vicinity, and the closest major active fault is the Nevis-Cardrona Fault system. However, significant seismic risk exists in this region from potentially strong ground shaking, associated with the rupture of the Alpine Fault, located 80 km northwest of Queenstown along the west coast of the South Island. There is a high probability that an earthquake with an expected magnitude of over M8 will occur along the Alpine Fault in the next 50 years.



4.2 Stratigraphy

The subsurface stratigraphy observed during test pitting (TPs 1-14) around the proposed stormwater management areas comprises:

- 0.1-0.25 m of **topsoil**, overlying;
- 0.3-1.5 m of **loess**, overlying;
- 3.4 m+ of interbedded **deltaic sand and gravel**.

Topsoil was observed at the surface of all test pits to a maximum depth of 0.25 m bgl and comprises dark brown, organic SILT with a trace rootlets and light brown SILT with some organics.

Loess was observed to underlie the topsoil in all test pits and extends to depths of between 0.5 and 1.7 m. Loess comprises stiff to very stiff, SILT and loose to medium dense, silty SAND.

Interbedded **deltaic sand and gravel** was observed beneath the loess from depths of between 0.5 and 1.7 m to the full depth of the test pits (maximum depth 4.0 m bgl). The deltaic sand comprises loose to medium dense, silty SAND to gravelly SAND. The deltaic gravel comprises loose to medium dense, sandy GRAVEL with occasional silt to sandy GRAVEL and GRAVEL with some to minor sand and cobbles. ORC well data (F41/0134 and F41/0239) indicate the sands and gravels are present to at least 67 m depth beneath the site.

Full details of the observed subsurface stratigraphy can be found within the test pit logs contained in Appendix B.

4.3 Groundwater

The regional groundwater level is expected to lie at depth beneath the site. Otago Regional Council (ORC) well data indicates the regional groundwater table is at depths of approximately 39-51 m below the site.

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5 Stormwater Disposal

5.1 Suitability of Soil Types

From discussions with QLDC and Candor3 it is understood that below ground soakage is proposed for the five stormwater management areas within the Ladies Mile Masterplan area. Sub-surface investigations have identified the area below the site is predominantly underlain by moderate permeability deltaic sand and gravel, which is expected to extend at least 50 m depth beneath the site.

5.2 Field Soakage Testing

Soakage testing was undertaken within loess, deltaic sand and gravel at five locations (refer to Appendix A, B and C for test locations, logs and results respectively).

Prior to undertaking soakage testing, deep test pits were excavated within each of the five stormwater management areas to log the subsoil conditions and determine a suitable layer for soakage testing. A smaller test pit/soak pit was then excavated within each stormwater management area. The dimensions of the soakage pits were recorded to calculate volumes and areas of soakage during testing.

Before soakage testing was undertaken, all soakage pits were pre-soaked for between 2 and 24 hours depending on the observed soil type at the infiltration depth. This was undertaken by introducing water from a 10,000 L water cart. The deltaic sand and gravel soils were subject to a 2-4 hour pre-soak (TPs 3, 6, 9 and 12). The loess was subject to a 24 hour pre-soak (TP14).

Soakage testing was undertaken at depths of between 1.2 and 2.0 m depth.

Soakage testing was performed by introducing water from the 10,000 L watercart until the water level of the pit reached the designated testing level. The inflow was then ceased and the time it took for the water level to drop was recorded. Tests were completed within each soakage pit until a representative amount of testing had been achieved for each test location.

The regional groundwater table was not encountered during test pit investigations and is expected to lie approximately 39-51 m beneath the site. Therefore, the regional groundwater table is not expected to influence soakage rates on this site.

Results from the field soakage testing have been analysed to determine indicative infiltration rates which are provided below in Table 1.

5.3 Permeability Analysis

The results from field soakage testing are presented below in Table 1 and Appendix C.



Table 1	- Cal	culated	Infiltration	Rates.

Location	Test Depth (m bgl)	Soil Description at Base of Soak Test	Infiltration Rate (m/s)*				
TP 3	1.4	SAND, underlain by sandy GRAVEL at 1.5 m bgl	2.3x10 ⁻⁵				
TP 6	1.2	Sandy GRAVEL, underlain by SAND with some silt at 1.6 m bgl	3.4x10 ⁻⁵				
TP 9	2.0	Sandy GRAVEL with a trace of silt, underlain by silty SAND at 2.5 m bgl	3.6x10 ⁻⁵				
TP 12	1.5	Sandy GRAVEL with a trace of silt, underlain by SAND with some silt at 2.6 m bgl	2.7x10 ⁻⁴				
TP 14	1.5	Silty SAND underlain by SAND with some silt at 1.7 m bgl	5.5x10 ⁻⁷				
* Values presented above do not include any reduction factor to account for loss of soakage performance overtime. It is recommended that a 0.5 reduction factor is adopted for design.							

The loess silty SAND observed a significantly lower soakage rate compared to the underlying deltaic sand and gravel. It is recommended the deltaic sand and gravel is targeted for stormwater disposal across the site.

5.4 Preliminary Soakage Design Recommendations and Considerations

- Stormwater soakage to ground within topsoil and loess overlying deltaic sand and gravel is not recommended. It is recommended that stormwater is discharged directly to the deltaic sand and gravel in all cases. Lower permeability layers within the deltaic sand and gravel (silty SAND) as observed in the test pits limit the soakage/infiltration rates in these soil types;
- Infiltration rates are provided above in Table 1. Test results within TP 3, 6 and 9 were observed to be relatively consistent. A greater infiltration rate was observed within TP 12, likely due to the 1.1 m thickness of sandy GRAVEL present beneath the base of the soakage pit. A lower infiltration rate was observed in TP 14, which was undertaken within silty SAND (loess);
- To allow for any loss of soakage performance over time we recommend a reduction factor of at least 0.5 be applied to any adopted value for detailed design purposes;
- A geotechnical practitioner who is familiar with the findings of this report should inspect the base of any soakage area during earthworks construction;
- Provision should be included for long-term inspection and routine maintenance of any soakage system;
- An emergency overflow/overland flowpath should be identified for extreme storm events where surcharging is possible.



6 Conclusions and Recommendations

- The site is underlain by topsoil and loess overlying interbedded deltaic sand and gravel. The deltaic sand and gravel were observed to the base of all deep test pits however nearby ORC wells indicate sand and gravel is present to at least 67 m depth;
- The regional groundwater table was not encountered in any of the test pit excavations and based on borehole data is expected to lie at depths of 39-51 m below the site.
- 14 test pits including five soakage tests were undertaken within the proposed stormwater management areas to assess the suitability of stormwater soakage to ground for the proposed development. Infiltration rates have been provided within Table 1;
- To allow for any loss of soakage performance over time we recommend a reduction factor of at least 0.5 be applied to any adopted value for design purposes;
- It is recommended that a geotechnical practitioner should inspect the base of any soakage pit constructed within the subdivision to confirm conditions are in accordance with the findings of this report and there are no issues which may limit future stormwater soakage.



7 Applicability

This report has been prepared for the benefit of Queenstown Lakes District Council with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

This testing and report is intended for preliminary purposes only and should be followed up with further testing and analysis during detailed design.

It is important that we be contacted if there is any variation in subsoil conditions from those described in this report.

Report prepared by:

Marte Stalland

Marte Stemland Engineering Geologist

Reviewed for GeoSolve Ltd by:

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Mike Plunket

Geotechnical Engineer

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Fraser Wilson Senior Engineering Geologist

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Appendix A: Site Investigation Plan





Appendix B: Test Pit and Soakage Pit Logs



EXCAVATION NUMBER:

JOB NUMB	3ER: 200353.01
LOCATION: See Site Plan INCLINATION: Vertical	
EASTING: EQUIPMENT: 14 T wheel digger OPERATOR: John	nny
NORTHING: COORD. SYSTEM: COMPANY: Parc	cell Contracting
ELEVATION: EXCAV. DATUM: Ground Level HOLE STARTED: 12/0	04/2021
METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/0	04/2021
Soil / Rock Type Description Graphic Log U Had O	Scala Penetrometer
TOPSOIL SILT with some organics; light brown, sub-horizontal. Firm; dry to UM X X 0.0 maintuniform; top 50mm rootlate	
$\begin{bmatrix} \text{LOESS} \\ 0.5m \end{bmatrix} \times \begin{bmatrix} \text{SILI}; \text{ tan brown, sub-norizontal. Stiff to very stiff; dry; uniform.} \\ 0.5m \end{bmatrix} \times \begin{bmatrix} 0.3 \\ -0.4 \end{bmatrix}$	
DELTAIC GRAVEL Sandy fine to coarse GRAVEL; grey, sub-horizontal. Loose; dry; poorly graded; sand, medium to coarse; gravel, subangular to	
angular.	
DELTAIC SAND Fine SAND with minor silt; grey, sub-horizontal. Loose; dry;	
DELTAIC GRAVEL Fine to coarse GRAVEL with some to minor sand and cobbles;	
grey, mottled orange, sub-horizontal. Loose; dry; sand, medium to	
to subangular, up to 150 mm diameter.	
2m 2m 4.5° 4.1	
DELTAIC SAND Fine to medium SAND; grey, sub-horizontal. Loose; dry.	
- DELTAIC GRAVEL Sandy fine to coarse GRAVEL; grey, sub-horizontal. Loose; dry; ^{2.1m}	
ا sand, fine to coarse.	
DELITALC SAND Fine to medium SAND: grey sub-borizontal Loose: dry	
3m 30 30 30 -	
L DELTAIC GRAVEL Sandy fine to coarse GRAVEL; grey, sub-horizontal. Loose; dry;	
3.4m 4074 3.4 W	
L DELTAIC SAND SAND; grey, sub-horizontal. Loose; dry.	
3.8m (2000, 3.7) 3.8m (2000, 3.8) 2	

COMMENT:		LOGGED BY:	MBS
	Test pit dry. Test pit terminated - side wall collapse.	CHECKED DATE:	03/05/2021
		SHEET:	1 of 1



EXCAVATION NUMBER:

PROJECT:	Ladies Mile Soakage						JOB NUMBER: 200353.01			200353.01
LOCATION:	See S	bite Plan		DN: Vertical						
EASTING:			EQUIPMENT:	14 T wheel digger		OPERA	TOR:	Jo	bhnny	-
			COORD. SYSTEM:	Cround Loval				Pa	arcell (
METHOD:	Aoria	l Photography		Ground Level					2/04/2	021
	Aena		ACCONACT.					· 12	2/04/2	021
Soil / Rock Ty	/pe		Description			Grapi Loc			Groundwater / Seepage	cala Penetrometer
		Organic SILT; light bro	own, sub-horizonta	al. Firm; moist; uniform;	0m		<u>v</u> 0. v	D 1 —		
- LOESS - LOESS 		SILT; tan brown, sub-ł	norizontal. Stiff to	very stiff; dry; uniform.	0.1m		× 0.	2 — 3 — 4 — 5 — 6 — 7 —		
DELTAIC GRA	VEL	Sandy fine to coarse (poorly graded; sand, r angular.	GRAVEL; grey, sub nedium to coarse;	-horizontal. Loose; dry; gravel, subangular to	1.15	0 4 0 4 0 0 0 4	0-0. -0. -1.	8 — 9 — 0 — 1 —		
DELTAIC SAN	ID	Fine to medium SANE); grey, sub-horizo	ntal. Loose; dry; uniform.	1.6m		— 1. — 1. — 1. — 1.	2 — 3 — 4 — 5 —		
DELTAIC GRA	VEL	Sandy fine to coarse (poorly graded; sand, r angular.	GRAVEL; grey, sub nedium to coarse;	-horizontal. Loose; dry; gravel, subangular to	2m	0.000		5 — 7 — 8 — 9 —		
DELTAIC SAN	D	Fine SAND with minor uniform.	r silt; grey, sub-hoi	izontal. Loose; dry;	2.9m					
DELTAIC SILT/SAND		Sandy SILT to silty fin dry.	e SAND; grey, sub	-horizontal. Loose/stiff;	3.5m		X 3. X 3. X 3.	2		
DELTAIC SAN	ID	Fine SAND with minor sub-horizontal. Loose	r to some silt to si ; dry; uniform.	lty SAND; grey,	4m		- 3. - 3. - 3. - 3. - 3. - 3. - 4.	6 — 7 — 8 — 9 —	NO SEEPAGE	
		Total Excavation Dept	th = 4.0 m							

		LOGGED BY:	MBS
COMMENT:	Test pit dry. Walls remained stable during excavation.	CHECKED DATE:	03/05/2021
		SHEET:	1 of 1



EXCAVATION NUMBER:

PROJECT:	Ladie	Ladies Mile Soakage							200353.01
LOCATION:	See S	Site Plan	JOBIN	IUWBEN	. 200355.01				
EASTING:			EQUIPMENT:	14 T wheel digger	OPI	ERAT	OR:	Johnny	
NORTHING:			COORD. SYSTEM:		CO	MPA	NY:	Parcell	Contracting
ELEVATION:			EXCAV. DATUM:	Ground Level	HOLE	E STA	RTED:	12/04/2	2021
METHOD:	Aeria	l Photography	ACCURACY:		HOLE	E FINI	SHED:	12/04/2	2021
Soil / Rock Ty	pe		Description		G	Graphi Log	Depth (m)	Groundwater / Seepage	cala Penetrometer
LOESS		SILT with some orgar moist; uniform; top 5 SILT; tan brown, sub-	nics; light brown, s 0mm rootlets. horizontal. Stiff to	ub-horizontal. Firm; dry to ^{0r} very stiff; dry; uniform.	n) 1m)		0.0 0.1 - 0.2 - 0.3 - 0.4 - 0.5 -		
DELTAIC GRAVEL Sandy fine to coarse coarse; gravel, suban		GRAVEL; grey. Loc gular to angular.	ose; sand, medium to 0.	om /		0.6-			
DELTAIC SAN	D	Fine to medium SANI	D; grey. Loose.	1	5m				
DELTAIC GRAVEL S		Sandy fine to coarse coarse; gravel, suban	GRAVEL; grey. Loc gular to angular.	ose; sand, medium to	n n		1.5 - 1.6 - 1.7 - 1.7 - 1.8 - 1.9 - 2.0	NO SEEPAGE	
		Total Excavation Dep	th = 2.0 m						
							LOGGE	ED BY:	MBS
COMMENT:	Soak	age test @ 1.4 m de	pth.				CHECKE	D DATE:	03/05/2021
							SHE	ET:	11 of 1



EXCAVATION NUMBER:

PROJECT:	Ladies Mile Soakage						JOB NUMBER: 200353.01			B [.] 200353.01
LOCATION:	See Site Plan INCLINATION: Vertical									1. 200000.01
EASTING:			EQUIPMENT:	14 T wheel digger		OPERATOR		TOR: Johnny		у
NORTHING:			COORD. SYSTEM:			COMP	MPANY:		Parcell Contracting	
ELEVATION:	. ·		EXCAV. DATUM:	Ground Level	⊦ 	HOLE ST	ART	ED:	12/04	/2021
METHOD:	Aeria	I Photography	ACCURACY:		ŀ		1ISF	IED:	12/04	/2021
Soil / Rock Ty	/pe		Description		0.77	Graph Log	hic J	Depth (m)	Groundwater / Seepage	Scala Penetrometer
TOPSOIL		Organic SILT with a tr	ace of rootlets; da	ırk brown. Firm.	UM	~~	~	-0.0 -0.1 -		
 LOESS -		Silty fine SAND; light l moist.	brown, massive. L	oose to medium dense;	0.25		¥ X	- 0.2 - - 0.3 - - 0.4 - - 0.5 - - 0.6 -		
DELTAIC SAN	ID	Fine SAND with some	silt; grey, massive	e. Loose to medium	0.711			— 0.7 — — 0.8 —		
H		dense; dry.			1			— 0.9 —		
DELTAIC GRA	VEL	Sandy fine to coarse (Loose to medium den	GRAVEL with a tra se; dry; sand, fine	ce of silt; grey, bedded. to coarse.	1 4m		P.0.0	- 1.0 - - 1.1 - - 1.2 - - 1.3 -		
DELTAIC SAN	ID	Fine SAND with some dense; dry.	silt; light grey, ma	assive. Loose to medium	2.7m			-1.4 - 1.5 - 1.6 - 1.7 - 1.8 - 1.9 - 2.0 - 2.1 - 2.2 - 2.3 - 2.4 - 2.5 - 2.5 - 2.5 - 2.6 - 2.7 - 2.7 - 2.7 - 2.7 - 2.7 - 2.6 - 2.7		
DELTAIC GRA	VEL	Sandy fine to coarse (bedded. Loose to mec	GRAVEL with a tra lium dense; dry; sa	ce of silt; brown grey, and, fine to coarse.	<u>3.2m</u>	0.0000	5. NO.0	- 2.8 - - 2.9 - - 3.0 - - 3.1 -		
DELTAIC SAN	ID	Silty fine SAND; light o	grey, massive. Loc	ose to medium dense; dry.	4m	× × × × ×	X	- 3.2 - - 3.3 - - 3.4 - - 3.5 - - 3.6 - - 3.7 - - 3.8 - - 3.9 - 4.0	NO SEEPAGE	
	_	I Utal Excavation Dept	.11 - 4.0 111							

		LOGGED BY:	MBS
COMMENT:	Test pit dry. Walls remained stable during excavation.	CHECKED DATE: 03/05/202	
		SHEET:	1 of 1



EXCAVATION NUMBER:

PROJECT:	Ladie	es Mile Soakage		JOB NUMBER: 200353.01			
LOCATION:	See S	Site Plan INCLINATION: Vertical		5001			
EASTING:		EQUIPMENT: 14 T wheel digger	(OPERA	TOR:	Johnny	y
NORTHING:		COORD. SYSTEM:		COMPA	ANY:	Parcell Contracting	
ELEVATION:		EXCAV. DATUM: Ground Level	H	OLE ST	ARTED:	12/04/	2021
METHOD:	Aeria	I Photography ACCURACY:	H	OLE FIN	IISHED:	12/04/	2021
Soil / Rock Ty	/pe	Description	0	Graph Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer
TOPSOIL		Organic SILT with a trace of rootlets; dark brown. Firm.	0.0	~ ~	0.1		
LOESS		Silty fine SAND; light brown, massive. Loose to medium dense; moist.	0.2m 0.6m	×	0.2 - - 0.3 - - 0.4 - - 0.5 -		
DELTAIC GRA	VEL	Sandy fine to coarse GRAVEL with a trace of silt; light brown, bedded. Loose; dry.	0.85m	0,	0.7		
DELTAIC SAN	D	Silty fine SAND; light grey, massive. Loose; dry.	1m	X	- 0.9		
DELTAIC GRA	VEL	Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. Loose to medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse.	1.6m	0° 00 000	- 1.0 - 1.1 - 1.2 - 1.3 - 1.3 - 1.4 - 1.5		
DELTAIC SAN	D	Fine SAND with some silt; grey, massive. Loose to medium dense; dry.	1.0111	PA 0	1.6		
DELTAIC SAN	D	Fine to coarse SAND with some gravel and minor silt; grey, bedded. Loose to medium dense; dry; gravel, fine to coarse.	1.8m		- 1.9 - 1.9 - 2.0 - 2.1 - 2.2 - 2.3 - 2.3 - 2.4 - 2.5 - 2.6 - 2.7 - 2.7 - 2.8		
DELTAIC GRAVEL		Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. Medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse.			-2.9 -3.0 -3.1 -3.2 -3.3 -3.4 -3.4 -3.5		
DELTAIC SAN	D	Silty fine SAND; grey, massive. Loose to medium dense; dry.	3.8m		3.6	– <u> </u>	
☐	VEL	Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. Medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse.	<u>4m</u>		3.7 3.8 3.9 4.0	NO SEEPAC	
		Total Excavation Depth = 4.0 m					
					LOGG	ED BY:	MBS

		LOUGED DI.	INDS
COMMENT:	Test pit dry. Walls remained stable during excavation.	CHECKED DATE:	03/05/2021
		SHEET:	1 of 1



EXCAVATION NUMBER:

LOCATION: See Site Plan INCLINATION: Vertical USD NUMBER: 20033301 EASTING: EQUIPMENT: 14 T wheel digger OPERATOR: Johnny NORTHING: COORD.SYSTEM: COMPANY: Parcell Contracting ELEVATION: EXCAV. DATUM: Ground Level HOLE STARTED: 12/04/2021 METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/04/2021 Soil / Rock Type Description Graphic Eg Bg Bg Scala Penetrometer LOESS Silty fine SAND; light brown, massive. Loose to medium dense; moist. 0m 0.5m	PROJECT:	Ladie	es Mile Soakage	Mile Soakage						-R. 200353 01
EASTING: EQUIPMENT: 14 T wheel digger OPERATOR: Johnny NORTHING: COORD. SYSTEM: COMPANY: Parcell Contracting ELEVATION: EXCAV. DATUM: Ground Level HOLE STARTED: 12/04/2021 METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/04/2021 METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/04/2021 Soil / Rock Type Description Graphic	LOCATION:	See S	Site Plan	INCLINATIO	DN: Vertical			JOBI		_n. 200355.01
NORTHING: COORD.SYSTEM: COMPANY: Parcell Contracting ELEVATION: EXCAV. DATUM: Ground Level HOLE STARTED: 12/04/2021 METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/04/2021 Soil / Rock Type Description Graphic Image: Company of the company of	EASTING:			EQUIPMENT:	14 T wheel digger	(OPERA	TOR:	John	ny
ELEVATION: EXCAV. DATUM: Ground Level HOLE STARTED: 12/04/2021 METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/04/2021 Soil / Rock Type Description Graphic Log Image: Comparison of the compar	NORTHING:			COORD. SYSTEM:			СОМРА	ANY:	Parce	ell Contracting
METHOD: Aerial Photography ACCURACY: HOLE FINISHED: 12/04/2021 Soil / Rock Type Description Graphic Log Image: Comparison of the second seco	ELEVATION:			EXCAV. DATUM:	Ground Level	Н	OLE STA	ARTED:	12/04	4/2021
Soil / Rock Type Description Graphic Log Scala Penetrometer TOPSOIL Organic SILT with a trace of rootlets; dark brown. Firm. 0m 0.2m 0.0 0.2m 0.0 0.2m 0.0 0.2m LOESS Silty fine SAND; light brown, massive. Loose to medium dense; moist. 0.5m 0.5m 0.4 DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; light brown, bedded. Loose to medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse. 0.7m 0.7m 0.4 DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. 0.7m 0.9m 0.4 0.5 0.6 DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. 0.7m 0.9m 0.4 0.5 0.6 DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. 0.7m 0.9m 0.4 0.5 0.4 DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. 0.7m 0.9m 0.4 0.4 0.5 0.4	METHOD:	Aeria	l Photography	ACCURACY:		Н	OLE FIN	ISHED:	12/04	4/2021
TOPSOIL Organic SILT with a trace of rootlets; dark brown. Firm. 0m 0.0 0.0 LOESS Silty fine SAND; light brown, massive. Loose to medium dense; moist. 0.5m 0.2 0.3 DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; light brown, bedded. Loose to medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse. 0.7m 0.6 0.6 DELTAIC SAND Silty fine SAND; light grey. Loose; dry. 0.7m 0.7m 0.8 0.9m DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. 0.7m 0.9m 0.9m 0.9m 0.9m	Soil / Rock Ty	Rock Type					Graph Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer
LOESS Silty fine SAND; light brown, massive. Loose to medium dense; moist. DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; light brown, bedded. Loose to medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse. DELTAIC SAND Silty fine SAND; light grey. Loose; dry. DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded.	TOPSOIL		Organic SILT with a tra	ace of rootlets; da	ark brown. Firm.	0m 0.2m	<u>د</u>	0.0	-	
DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; light brown, bedded. Loose to medium dense; dry; gravel, subrounded to subangular; sand, fine to coarse. 0.4 0.5 DELTAIC SAND Silty fine SAND; light grey. Loose; dry. 0.7m 0.7m 0.7m DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. 0.7m 0.7m 0.7m	LOESS		Silty fine SAND; light b moist.	prown, massive. L	oose to medium dense;	0.5m	X	0.2 -	-	
DELTAIC SAND Silty fine SAND; light grey. Loose; dry.	DELTAIC GRA	VEL	Sandy fine to coarse G bedded. Loose to med subangular; sand, fine	GRAVEL with a tra lium dense; dry; g to coarse.	ce of silt; light brown, ravel, subrounded to			0.4 - 0.5 - 0.5 - 0.6 - 0.6 - 0.7 - 0.6 - 0.7 - 0		
DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded.	DELTAIC SAN	D	Silty fine SAND; light g	grey. Loose; dry.		0.7m 0.9m	X	- 0.8	щ	
Loose to medium dense; dry; gravel, subrounded to subangular;	DELTAIC GRAVEL Sandy fine to coarse GRA Loose to medium dense; o sand, fine to coarse.		GRAVEL with a tra se; dry; gravel, sul	ce of silt; grey, bedded. brounded to subangular;	1.2m	0.0	0.9- 0-1.0- 0-1.1- 1.2	NO SEEPAC		
Total Excavation Depth = 1.2 m			Total Excavation Dept	h = 1.2 m						
LOGGED BY: MBS								LOGG	ED BY:	MBS
COMMENT: Soakage testing @ 1.2 m depth.	COMMENT:	Soak	age testing @ 1.2 m	depth.				CHECK	ED DAT	E: 03/05/2021



EXCAVATION NUMBER:

PROJECT:	Ladie	es Mile Soakage				JOB I	B NUMBER: 200353.01 Johnny Parcell Contracting D: $12/04/2021$ D: $12/04/2021$ (ii) $9000000000000000000000000000000000000$		
				14 T wheel digger				Johnny	
			EQUIPINIENT.	14 T wheel digger				Darcal	
FI EVATION:			FXCAV. DATUM:	Ground Level	Н		ARTED:	12/04/	2021
METHOD:	Aeria	l Photography	ACCURACY:		НС	DLE FIN	IISHED:	12/04/	2021
Soil / Rock Ty	rpe		Description			Graph Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer
TOPSOIL		Organic SILT with a tr	ace of rootlets; da	ırk brown. Soft; moist.	0m	\mathbb{N}		-	
LOESS		Silty fine SAND; yellov dry.	v brown, massive.	Loose to medium dense;	0.2m		-0.2 -0.3 -0.4 -0.5 -0.6		
DELTAIC GRA	VEL	Sandy fine to coarse (bedded. Loose to meo subangular; sand, fine	GRAVEL with a tra lium dense; dry; g e to coarse.	ce of silt; light brown, ravel, subrounded to	1.25m	0.0000	-0.7 -0.8 -0.9 -1.0 -1.1		
DELTAIC SAN	D	Silty fine SAND; light	grey, massive. Loc	ose; dry.	1.4m	X	-1.3	-	
DELTAIC GRA	VEL	Sandy fine to coarse (Loose to medium den sand, fine to coarse.	GRAVEL with a tra se; dry; gravel, sul	ce of silt; grey, bedded. brounded to subangular;	2.5m				
DELTAIC SAN	D	Silty fine SAND; grey,	massive. Loose; d	lry.		X	2.5]	
DELTAIC GRA	VEL	Sandy fine to coarse (Loose to medium den sand, fine to coarse.	GRAVEL with a tra se; dry; gravel, sul	ce of silt; grey, bedded. brounded to subangular;	<u>2.7m</u>	0.	2.7		
DELTAIC SAN	D	Silty fine SAND; grey,	massive. Loose; d	lry.	3m 3 3m	X	-3.1 X -3.2		
DELTAIC GRA	VEL	Sandy GRAVEL; grey,	bedded. Medium d	dense; dry.	3.9m	0.000	3.3 	NO SEEPAGE	
		Total Excavation Dept	th = 3.9 m						i
COMMENT:	Test	pit dry. Walls remain	ed stable during	excavation.			LOGG CHECK SH	ED BY: ED DATE EET:	MBS : 03/05/2021 1 of 1



EXCAVATION NUMBER:

PROJECT: LOCATION:	CT: Ladies Mile Soakage ION: See Site Plan INCLINATION: Vertical							IUMBI	ER: 200353.01
EASTING:			EQUIPMENT:	14 T wheel digger	C	PERAT	FOR:	John	ny
NORTHING:			COORD. SYSTEM:		(COMPA	NY:	Parce	ell Contracting
ELEVATION:			EXCAV. DATUM:	Ground Level	НС	DLE STA	RTED:	12/04	4/2021
METHOD:	Aeria	l Photography	ACCURACY:		НС	DLE FINI	SHED:	12/04	4/2021
Soil / Rock Ty	pe		Description		_	Graphi Log	Depth (m)	Groundwater / Seepage	Scala Penetrometer
TOPSOIL		Organic SILT with a tr	ace of rootlets; da	ırk brown. Soft; moist.	Um	\sim	-0.0	-	
LOESS		Silty fine SAND; yellow dry.	w brown, massive.	Loose to medium dense;	0.2m		0.2 - 0.3 - 0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 0.9 -		
DELTAIC GRA	VEL	Sandy fine to coarse	GRAVEL with a tra	ce of silt: light brown.	0.95m	0		-	
		bedded. Loose to med subangular; sand, find	dium dense; dry; g e to coarse.	ravel, subrounded to		\$ \$	-1.1-		
DELTAIC SAN	D	Silty fine SAND; light	grey, massive. Loc	ose; dry.	<u>1.3m</u>	X	1.3-		
H					1.6m	\times >	K - 1.5-	-	
DELTAIC SAN	D	Gravelly fine to coars	e SAND; grey, bed	ded. Loose to meidum		0,0	1.6- 0-1.7-		
	<u>ח</u>	dense; dry; gravel, fin	e to coarse, subrol	Inded to subangular.	1.8m	<u>к</u>	1.8-	-	
	D	Sitty file SAND, grey,	massive. 2003e, u		2m	<u></u>	2.0		
DELTAIC GRA	VEL	Sandy fine to coarse	GRAVEL with a tra	ce of silt; grey, bedded.		O_{*}	0-2.1-	-	
H		to coarse.	ravel, subrounded	to subangular, sanu, inte		\$ 0	2.2		
A						400	2.3	-	
H						စိုလိုစို	2.5-	-	
Ī						*° 0 *	2.6-		
H						4	-2.8-	-	
H						0.4	<u>(</u> _2.9-	1	
Π					3.1m	.00.	3.0-	1	
DELTAIC SAN	D	Fine to medium SANE) with some silt an	nd a trace of gravel; grey,			- 3.2 -	-	
Ц		111/2011 100 10 10 10 10 10 10 10 10 10 10 10	and in dense, dry; (yravel, inte to medium.			- 3.3 -	1	
Н							- 3.4 -	AGE	
H							- 3.6 -	SEF	
Π					<u>3.8m</u>		- 3.7 - 3.8	ů N	
		Total Excavation Dep	th = 3.8 m						

		LOGGED BY:	MBS
COMMENT:	Test pit dry. Walls remained stable during excavation.	CHECKED DATE:	MBS 03/05/2021 1 of 1
		SHEET:	1 of 1



EXCAVATION NUMBER:

PROJECT:	Ladie	es Mile Soakage							200353.01
LOCATION:	See S	Site Plan	INCLINATIO	DN: Vertical			3001		200333.01
EASTING:			EQUIPMENT:	14 T wheel digger		OPERA	TOR:	Johnny	,
NORTHING:			COORD. SYSTEM:			COMPA	ANY:	Parcell	Contracting
ELEVATION:			EXCAV. DATUM:	Ground Level	F	IOLE STA	ARTED:	12/04/2	2021
METHOD:	Aeria	l Photography	ACCURACY:		H	IOLE FIN	ISHED:	12/04/2	2021
Soil / Rock Ty	ре		Description			Graph Log	ji Depth (m)	Groundwater / Seepage	scala Penetrometer
TOPSOIL		Organic SILT with a tr	ace of rootlets; da	rk brown. Soft; moist.	0m 0.2m	٤.	0.0	-	
LOESS		Silty fine SAND; yellov dry.	w brown, massive.	Loose to medium dense;	<u>0.7m</u>	× × ×	- 0.3 - 0.4 - 0.5 - 0.6 - 0.6		
DELTAIC GRA	VEL	Sandy fine to coarse bedded. Loose to med subangular; sand, fine	GRAVEL with a tra dium dense; dry; g e to coarse.	ce of silt; light brown, ravel, subrounded to	_1.3m	0.* 0.*	0.8- 0.9- 0.9-		
DELTAIC SAN	D	Silty fine SAND; light	grey, massive. Loc	ose; dry.	1.5m	400	4 	-	
DELTAIC GRA	VEL	Sandy fine to coarse bedded. Loose to med subangular; sand, fine	GRAVEL with a tra dium dense; dry; g e to coarse.	ce of silt; light brown, ravel, subrounded to	_1.7m	ŶŎ.	1.2-		
DELTAIC SAN	D	Silty fine SAND; light	grey, massive. Loc	ose; dry.	1.80	Ô,	0-1.6-	щ	
DELTAIC GRA	VEL	Sandy fine to coarse bedded. Loose to med subangular; sand, fine	GRAVEL with a tra dium dense; dry; g e to coarse.	ce of silt; light brown, ravel, subrounded to	2m	0.4	1.7 - 1.8 - 1.9 - 2.0	NO SEEPAG	
		Total Excavation Dep	th = 2.0 m						
							LOGG	ED BY:	MBS
COMMENT:	Soak	age testing @ 2.0 m	depth.				CHECKE	D DATE:	03/05/2021
							SHE	ET:	1 of 1



EXCAVATION NUMBER:

PROJECT:	Ladie	es Mile Soakage					JOB N	B NUMBER: 200353.01 Di Johnny Parcell Contracting Di 12/04/2021 Di 12/04/2021 Parcell Contracting Di 12/04/2021 Scala Penetrometer 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.2 1.2 1.2 1.2 1.2 1.2		
	See S	Site Plan						1.1		
EASTING:			EQUIPMENT:	14 T wheel digger				NUMBER: 200353.01		
ELEVATION:			EXCAV. DATUM:	Ground Level	НО		RTED:	12/04/	2021	
METHOD:	Aeria	l Photography	ACCURACY:		НО	LE FIN	ISHED:	12/04/	2021	
Soil / Rock Ty	/pe		Description			Graph Log	ы Depth (m)	Groundwater / Seepage	Scala Penetrometer	
TOPSOIL		Organic SILT with a tra	ace of rootlets; da	rk brown. Soft; moist.	0m	ζ ³	0.0			
LOESS	D	Silty fine SAND; yellov dry. Fine SAND with some dense; dry.	v brown, massive. silt; grey, massive	Loose to medium dense; e. Loose to medium	<u>1.1m</u>		0.2- 0.3- 0.4- 0.5- 0.6- 0.7- 0.8- 0.9- 1.0- 1.1- 1.2- 1.3- 1.4-			
DELTAIC GRA	VEL	Sandy fine to coarse G Loose to medium den	GRAVEL with a tra se; dry; sand, fine	ce of silt; grey, bedded. to coarse.	2.2m 2.5m	0.00	- 1.6 - - 1.7 - - 1.8 - - 1.9 - - 2.0 - - 2.1 - - 2.2 - - 2.2 - - 2.3 - - 2.4 - - 2.4 -			
DELTAIC SAN	ID	Fine SAND with some dense; dry.	silt; grey, massive	e. Loose to medium	3.3m		2.5 - 2.6 - 2.7 - 2.8 - 2.9 - 3.0 - 3.1 - 3.2 - 3.3 -			
DELTAIC GRA	VEL	Sandy fine to coarse 0 Medium dense; dry; sa	GRAVEL with a tra	ce of silt; grey, bedded. a.	<u>3.9m</u>		3.4- 3.5- 3.6- 3.7- 3.8- 3.8- 3.9	NO SEEPAGE		
	i	Total Excavation Dept	h = 3.9 m							
COMMENT:	Test	pit dry. Walls remain	ed stable during	excavation.		(LOGGI CHECKE SHE	ED BY: D DATE ET:	MBS : 03/05/2021 1 of 1	



EXCAVATION NUMBER:

PROJECT: LOCATION:	Ladie See S	es Mile Soakage Site Plan	INCLINATIO	DN: Vertical			JOB N	NUMBE	R: 200353.01
EASTING:			EOUIPMENT:	14 T wheel diager		OPERA	TOR:	Johnn	 IV
NORTHING:			COORD. SYSTEM:			COMPA	ANY:	Parce	ll Contracting
ELEVATION:			EXCAV. DATUM:	Ground Level	F	IOLE STA	ARTED:	12/04	/2021
METHOD:	Aeria	l Photography	ACCURACY:		F	IOLE FIN	ISHED:	12/04	/2021
Soil / Rock Ty	rpe		Description		0	Graph Log	⊃⊡ Depth (m)	Groundwater / Seepage	Scala Penetrometer
LOESS		Organic SILT with a tr Silty fine SAND; yellov dry.	ace of rootlets; da w brown, massive.	ark brown. Soft; moist. Loose to medium dense;	0m <u>0.2m</u>	$\langle \mathbf{x} \times \mathbf{x} \times \mathbf{x} \rangle$	0.0 0.1 - 0.2 - 0.3 - 0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 0.9 -		
DELTAIC SAN	D	Fine SAND with some dense; dry.	silt; grey, massive	e. Loose to medium			1.0- 		
DELTAIC GRA	VEL	Sandy fine to coarse (Loose to medium den gravel, fine to coarse.	GRAVEL with a tra se; dry; gravel, sul	ce of silt; grey, bedded. brounded to subangular;	1.2m 2.6m		-1.3- -1.4- -1.4- -1.5- 		
DELTAIC SAN	D	Fine SAND with some	silt; grey, massivo	e. Medium dense; dry.	<u>3m</u>		- 2.7 - - 2.7 - - 2.8 - - 2.9 - 3 0 -		
DELTAIC GRA	VEL	Sandy fine to coarse (Medium dense; dry; g fine to coarse.	GRAVEL with a tra ravel, subrounded	ce of silt; grey, bedded. to subangular; gravel,	3.8m		3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8	NO SEEPAGE	
	<u> </u>		= 0.0 m			r			

		LOGGED BY:	MBS
COMMENT:	Test pit dry. Walls remained stable during excavation.	CHECKED DATE:	03/05/2021
		SHEET:	1 of 1



EXCAVATION NUMBER:

PROJECT:	Ladie	es Mile Soakage					200353.01		
LOCATION:	See S	Site Plan	INCLINATIO	DN: Vertical			300 1		1. 200333.01
EASTING:			EQUIPMENT:	14 T wheel digger	С	PERA	TOR:	Johnn	у
NORTHING:			COORD. SYSTEM:		0	COMPA	ANY:	Parcel	Contracting
ELEVATION:			EXCAV. DATUM:	Ground Level	НС	DLE STA	ARTED:	12/04/	2021
METHOD:	Aeria	l Photography	ACCURACY:		HC	DLE FIN	ISHED:	12/04/	2021
Soil / Rock Ty	pe		Description			Graph Log	ы Depth (m)	Groundwater / Seepage	Scala Penetrometer
TOPSOIL Organic SILT with a trace of rootlets; dark brown. Soft; moist.				32	0.0				
LOESS		Silty fine SAND; yellov dry.	w brown, massive.	Loose to medium dense;	0.8m		0.2 - 0.3 - 0.4 - 0.5 - 0.6 - 0.7 -		
DELTAIC SAN	D	Fine SAND with some dense; dry.	e silt; grey, massive	e. Loose to medium	1.1m		— 0.9 - — 1.0 -		
DELTAIC GRAVEL Sandy fine to coarse GRAVEL with a trace of silt; grey, bedded. Loose to medium dense; dry; gravel, subrounded to subangular; gravel, fine to coarse.					-1.2- -1.3- -1.4- 1.5	NO SEEPAGE			
		Total Excavation Dep	th = 1.5 m						-
							LOGG	ED BY:	MBS
COMMENT:	Soak	age testing @ 1.5 m	depth			(CHECKE	D DATE	: 03/05/2021
							SHE	ET:	1 of 1



EXCAVATION NUMBER:

TP 13

SHEET:

1 of 1

PROJECT:	Ladie	es Mile Soakage						-D. 200252 01		
LOCATION:	See S	Site Plan	INCLINATIO	DN: Vertical			JOB		JMBER: 200353.01	
EASTING:			EQUIPMENT:	14 T wheel digger		OPERA	TOR:	John	ny	
NORTHING:			COORD. SYSTEM:			COMP	ANY:	Parce	ell Contracting	
ELEVATION:			EXCAV. DATUM:	Ground Level	F	IOLE ST.	ARTED	12/04	4/2021	
METHOD:	Aeria	l Photography	ACCURACY:		H	IOLE FIN	IISHED	12/04	4/2021	
Soil / Rock Ty	pe		Description			Graph Lo <u>c</u>	Depth (m)	Groundwater / Seepage	Scala Penetrometer	
TOPSOIL		Organic SILT; dark bro	own. Soft; moist.		0m	\sim	0.0	_		
LOESS	D	Silty fine SAND; yellov dry. Fine SAND with some dense; dry.	v brown, massive.	Loose to medium dense; e. Loose to medium	<u>0.2m</u>		0.0 0.2 0.2 0.3 0.4 0.5 0.4 0.5 0.6 0.7 0.8 0.9 0.9 0.1 0.1 1.1 1.1 1.1 1.1 1.1 1.1			
DELTAIC GRA	VEL	Sandy fine to coarse (Loose to medium den gravel, fine to coarse.	GRAVEL with a tra se; dry; gravel, sub	ce of silt; grey, bedded. orounded to subangular;	<u>2.5m</u>		2.2 2.2 2.2 2.4 2.4 2.5 2.6 2.7 2.6 2.7 2.6 2.7 2.6 2.7 2.6 2.7 2.6 2.7 2.6 2.7 2.6 2.7 3.0 2.6 2.7 3.0 2.6 2.7 3.0 2.6 2.7 3.0 2.6 2.7 3.0 2.6 2.7 3.0 2.6 2.7 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	I I I I I I I I I I I I I I I I I I I		
		Total Excavation Dept	th = 4.0 m				1.0.5			
COMMENT:	Test	pit dry. Walls remain	ed stable during	excavation.			CHECK		E: 03/05/2021	



EXCAVATION NUMBER:

TP 14

1 of 1

SHEET:

PROJECT: LOCATION:	Ladie See S	es Mile Soakage Site Plan	INCLINATIO	DN: Vertical			JOB N	IUMBEI	MBER: 200353.01 ohnny arcell Contracting 2/04/2021 2/04/2021 arcell Scala Penetrometer Scala Penetrometer	
EASTING:			EQUIPMENT:	14 T wheel digger	C	PERA	TOR:	Johnn	y	
NORTHING:			COORD. SYSTEM:		(COMPA	NY:	Parcel	Contracting	
ELEVATION:			EXCAV. DATUM:	Ground Level	НС	DLE STA	ARTED:	12/04/	2021	
METHOD:	Aeria	l Photography	ACCURACY:		НС	DLE FIN	ISHED:	12/04/	2021	
Soil / Rock Ty	/pe		Description			Graph Log	о: Depth (m)	Groundwater / Seepage	Scala Penetrometer	
TOPSOIL		Organic SILT; dark bro	own. Soft; moist.		0m 0.2m	33.	0.0			
LOESS		Silty fine SAND; yello dry.	w brown, massive.	Loose to medium dense;	<u>1.5m</u>		0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.1 1.2 1.3 1.4 1.5	NO SEEPAGE		
	i	Total Excavation Dep	th = 1.5 m						•	
						Ļ	LOGG	ED BY:	MBS	
COMMENT:	Test	pit dry. Walls remair	ned stable during	g excavation.		0	CHECKE	ED DATE	: 03/05/2021	



Appendix C: Soakage Test Results



