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Geotechnical Investigation

Proposed Splash Park
Lions Park - Lot 10 on B74477
308 Gladstone Road, Biloela, QLD 4715

Prepared for:
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Report Number: J002010-002-R-Rev0

September 2023

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1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out by AMB Geotech SQS Pty Ltd (SQS) for a proposed splash park at the Callide Valley Lions Park, located at 308 Gladstone Road, Biloela.

The work was carried out for Banana Shire Council (BSC) in accordance with our proposal reference: S23C-0058-FP-Banana-Lions Park Splash Pad-Biloela-Rev0, dated 7 June 2023.

Presented in this report are the methods and results of the investigation, together with geotechnical comments and recommendations for the proposed works. The recommendations provided herein should be considered preliminary in nature and will depend on the findings and recommendations of the contamination assessment (ref. report prepared under separate cover, report ref. J002010-001-R-Rev0). A revision of the recommendations provided herein may be required.

2.0 PROPOSED WORKS

We understand that the proposed works involve the development of the northern portion of the site into a splash park, together with a changeroom facility and destination playground. No details regarding the development layout or structures and associated loads have been provided at the time of reporting, however we anticipate the structures will be relatively light weight. Earthworks (if any) are also anticipated to be limited to minor cutting and filling (i.e. less than 0.5 m).

3.0 SITE DESCRIPTION

At the time of our investigation the site formed part of the Callide Valley Lions Park. Our investigation targeted the northern part of the park which is currently an open grassed area with a few scattered large trees towards the boundaries. The area was relatively flat with a gradual slope towards the east that steepened towards the eastern boundary.

The southern portion of the site comprised the Lions Club building, amenity blocks, barbeque areas, shelter structures, basketball court, playground area with shade sails, paved footpaths and several large trees.

The site was bound by Cooper Street to the south, Lookerbie Street to the west, Dawson Highway to the east and Eden Park to the north (ref. Image 1).

Image 1: Site location (Aerial image sourced from Nearmap Pty Ltd, taken on 26 May 2023, annotations by Core).

Site conditions at the time of our fieldwork on 11 July 2023 are provided in Photograph 1 to Photograph 3.

Photograph 1: Looking south towards borehole BH4.

Photograph 2: Looking north towards borehole BH4.

Photograph 3: Looking south towards borehole BH3.

4.0 METHOD OF INVESTIGATION

4.1 Published Information

A desktop review of the published geological map for the area was undertaken which included the 1:100,000 QLD Geology Dataset, Department of Natural Resources, Mines and Energy 2018.

The findings of the desktop review and our local knowledge of the area were used to help refine the fieldwork investigation methods, including the sampling frequency. The findings from the desktop assessment are presented in Section 5.1 below.

4.2 Fieldwork

Fieldwork was conducted on 10 and 11 July 2023.

Seven boreholes (designated BH1 to BH7) were drilled across the site, approximately at the locations nominated by BSC, as shown on the attached Figure 1 (Appendix A). The boreholes were drilled to depths between 1.5 m and 4.45 m below ground level (BGL).

A combination of standard penetration testing (SPT), dynamic cone penetration (DCP) testing and pocket penetrometer (PP) testing was undertaken within the boreholes to assess the consistency/density of the soils.

Soil samples were recovered from the boreholes for subsequent laboratory testing (refer Sections 4.3 and 5.2).

The boreholes were backfilled on completion with compacted soil.

Coordinates were recorded in the field using a hand-held GPS unit, with a reported accuracy of ±3 m.

Fieldwork was carried out in the presence of an experienced geotechnical engineer representing AMB Geotech SQS (seconded from Core Consultants Pty Ltd), who logged the subsurface conditions in accordance with Australian Standard AS1726-2017 *Geotechnical site investigations*.

Reports of Boreholes and explanatory notes are attached in Appendix B. Subsurface conditions are discussed in Section 5.3.

4.3 Geotechnical Laboratory Testing

Soil samples were dispatched to the NATA accredited laboratory of SQS. Laboratory testing was undertaken in accordance with Australian Standard AS1289 *Method for Testing Soils for Engineering Purposes*. Laboratory testing comprised:

- Particle size distribution by sieve
- Atterberg Limits, including linear shrinkage
- California Bearing Ratio (CBR)
- Moisture content

Laboratory results are summarised in Section 5.2 and test certificates are attached in Appendix C.

5.0 INVESTIGATION FINDINGS

5.1 Published Geological Information

Published information[1] indicates that the area is underlain by the Eocene age Biloela formation (To) consisting of "*mudstone, siltstone, oil shale, carbonaceous mudstone and sandstone, minor lignite, coal and limestone".* An extract of the regional geology map is shown below in Image 2.

Image 2: Extract of QLD geology dataset.

The subsurface conditions encountered in the boreholes (refer Section 5.3) were generally consistent with published geological information.

5.2 Geotechnical Laboratory Testing

Laboratory test results are summarised in Table 1, and laboratory test reports are attached in Appendix C.

Table 1: Summary of geotechnical laboratory test results

Sample Location	Sample Depth (m BGL)	Origin	Atterberg Limits and Linear Shrinkage			CBR (%)	Particle Size Distribution			Field Moisture Content (%)	Optimum Moisture Content (%)
			Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)		Fines (clay/silt) (%)	Sand (%)	Gravel (%)		
BH1	0.3-0.7	FILL	34	19	11.5	2.5	35	36	29	8.7	13.5
BH2	0.1-0.4		42	24	13.5	7	36	37	27	9.8	13.5
BH3	0.1-0.5		42	26	14	3.5	49	29	22	13.1	17.5
BH4	0.1-0.5		41	27	15.5	3.5	49	39	12	11.9	15.5
BH5	0.1-0.6		34	22	13	2.5	48	33	19	9.6	16
BH6	0.1-0.6		31	15	9	8	36	43	21	8.5	13
BH7	0.1-0.6		45	31	16	4	47	24	29	13.1	18.5

The laboratory test results generally confirm the field soil classifications.

[1] 1:100,000 QLD Geology Dataset. Department of Natural Resources, Mines and Energy. 2018.

5.3 Subsurface Conditions

The subsurface conditions encountered in the boreholes are summarised in Table 2 and in the summary below, with further detail provided on the Reports of Boreholes attached in Appendix B.

Table 2: Summary of subsurface conditions

Origin	Depth Interval (m BGL)						
	BH1	BH2	BH3	BH4	BH5	BH6	BH7
Topsoil	0 - 0.05	0 – 0.1	0 – 0.05	0 – 0.08	0 – 0.8	0 – 0.05	0 – 0.1
Uncontrolled Fill	0.05 – 0.3	0.1 – 1.0	0.05 – 0.5	0.08 – 0.5	0.8 – 1.5**	0.05 – 1.0	0.1 – 1.0
Mixture of Waste & Soil	0.3 – 2.6	1.0 – 3.0	0.5 – 2.0**	NE	-	1.0 – 2.6	1.0 – 3.5
Residual Soil	2.6 – 3.0**	3.0 – 4.45*	-	NE	-	NE	NE
Extremely Weathered Sandstone	-	-	-	0.5 – 0.8	-	NE	3.5 – 4.15
Sandstone	-	-	-	0.8 – 1.5**	-	2.6 – 2.7**	4.15 – 4.23*

Notes:
Target Depth *
Auger Refusal **
NE - Not Encountered

The subsurface conditions generally comprised:

- **Uncontrolled Fill*:** generally comprised stiff to hard clay and silty/sandy clay; and dense sandy gravel. Cobbles were encountered throughout the fill in boreholes BH1 to BH4, and BH6**.** The depth of uncontrolled fill ranged from 0.3 m to 1.5 m BGL (possibly thicker in borehole BH5 where auger refusal was encountered on a cobble within the fill).
- **Mixture of Waste & Soil*:** generally comprising a mixture of waste and soil, estimated visually in the field to range from about 2% and 10% waste. The waste consisted of mostly glass and concrete pieces, however pieces of steel, steel wire, PVC pipe fragments, wood and organics were also encountered. Waste was encountered to depths ranging between 2 m to 3.5 m depth.
- **Residual Soil & Extremely Weathered Sandstone:** comprised residual and extremely weathered materials of sedimentary rock origin (inferred sandstone). The residual soils comprised stiff to very stiff, medium plasticity silty sandy clay and clay; and dense to very dense silty/gravelly sand. The extremely weathered materials were classified as very dense silty sand.
- **Sandstone:** highly weathered, very low to low strength (inferred from SPT testing and drilling resistance).

* Based on our review of the site history (ref. Report Number J002010-001-R-Rev0), we understand that the disposal of waste and filling occurred in the 1960's. The fill and mixture of waste and soil are considered to have been placed in an uncontrolled manner in accordance with Australian Standard AS3798-2007 for the purpose of this report.

5.4 Groundwater

Groundwater was not encountered in any of the boreholes during drilling.

All soils encountered in the boreholes were noted to be dry or with moisture contents less than the estimated plastic limit (i.e., wet or saturated soils were not encountered).

The fieldwork was undertaken following a period of minimal rainfall. Our experience and observations suggest that the soil moistures and groundwater level will be influenced by seasonal weather conditions and human influences (e.g., drainage, drawdown).

6.0 GEOTECHNICAL COMMENTS & RECOMMENDATIONS

The conclusions and recommendations of the Stage 1 Preliminary Site Investigation (ref. report number J002010-001-R-Rev0) indicate that based on the current findings, and the presence of landfill waste materials (including asbestos) within 0.3 m of the ground surface, a moderate to high risk of contamination is posed to potential users in the sites current state. Further investigations have been recommended to assess the extent of former landfill and to further assess existing landfill cap thickness. This will also allow for further assessment of asbestos risk and to assess potential safe areas for future development.

Based on those findings and recommendations, the geotechnical recommendations provided herein should be considered preliminary and general in nature and will depend on the findings and recommendations of the future investigations (discussed above). We understand these could either include additional filling to provide adequate capping of the waste, or potentially the use of a non-permeable liner/barrier across the proposed development footprint.

6.1 Earthworks

6.1.1 Site Preparation & Trafficability

Site preparation in proposed development areas should include the following:

- Strip the surface of vegetation, organic matter, organic rich soils (topsoils) and severely root affected soils. Based on the results of our investigation, stripping depths of about 0.05 m to 0.1 m depth are anticipated.
- ‘Proof roll’ the stripped surface by several passes of a minimum 10 tonne roller to identify loose or soft areas.

A suitably qualified and experienced geotechnical engineer should carry out an assessment of the subgrade 'proof roll'.

Loose/soft areas identified by proof rolling will require treatment by either of the following methods:

- Over-excavation and replacement with suitable fill compacted in layers, or;
- Re-compaction of the loose or soft material provided that it does not contain substantial organic matter or deleterious substances.

Due to the potential for poor trafficability across the site following rainfall, it would be prudent to allow for the placement of a compacted granular fill layer.

Working platform assessments must be carried out by a suitably qualified person (RPEQ) for heavy machinery or equipment (e.g. crane or piling rig) should they be required.

6.1.2 Excavations

Excavations are anticipated to be limited to the upper 0.5 m to 1 m BGL for high level footings and service trenches.

Based on the materials encountered in the boreholes, excavations in the upper 1 m of the existing profile are expected to encounter mostly stiff to hard clays and dense to very dense sands/gravels, and possibly very low to low strength sandstone.

Excavatability in the anticipated soil/rock should be achievable using conventional small to medium earthmoving equipment such as 6 to 20 tonne excavators. Larger equipment could be used to improve production rates. The use of a ripper or hydraulic breaking attachment may be required if footings/trenches are required to extend into the underlying sandstone.

6.1.3 Filling

If additional filling is proposed, from a geotechnical viewpoint, the following recommendations should be considered for fill material placement and compaction:

- Fill should be compacted at moisture contents within ±2% of OMC for Standard Compaction. The variation of moisture content to achieve the specified compaction will depend on the material type(s) used.
- Confirmatory compaction testing must be carried out at regular intervals. Details regarding recommended test frequencies are provided in Table 8.1 of AS3798-2007 *Guidelines on earthworks for commercial and residential developments.*
- Fill should have a maximum particle size of 75 mm for an uncompacted layer thickness of 250 mm and shall be compacted by repeated rolling.
- Fill should be compacted to achieve a dry density ratio of at least 98% of the Maximum Standard Dry Density for cohesive soils, or 75% Dry Density Index for cohesionless soils. Higher grades of compaction may be required for pavement base courses.
- Fill embankments should be 'over built' then trimmed back to the well compacted material.
- Imported fill for embankment construction should be cohesive in nature and have a plasticity index of < 15%, and a soaked CBR value of > 10%.

Further details for control and testing of fill are given in Australian Standard AS 3798-2007. It is recommended that earthworks be undertaken in accordance with 'Level 1' standards.

6.1.4 Re-use of Materials

Where excavations are proposed (e.g. for footings, service trenches etc.), any fill and waste materials disturbed may need to be further assessed/characterised by Core to assess if they are suitable for re-use, or if they will need to be disposed to landfill.

Providing the existing fill is considered suitable for re-use (from a contamination viewpoint), the fill and underlying residual soils won from excavations would generally be suitable for re-use as fill (from a geotechnical viewpoint), providing any materials containing organic matter, deleterious substances (i.e. waste) and over-size particles are removed from the fill. Depending on the volume of oversized particles (i.e. cobbles >75 mm diameter) and waste encountered within the uncontrolled fill during excavations, it may be more economical to dispose of these materials and import suitable fill.

6.1.5 Batter Slopes

For short-term construction periods, excavated unsurcharged faces could be battered at 1V:2H in the existing uncontrolled fill and waste materials, and 1V:1H in stiff (or stiffer) / medium dense (or denser) residual soils and weathered sandstone. Flatter batters or temporary support systems (e.g. 'shields' or 'shoring boxes' for trenches) may be required if significant groundwater seepage or leachate is encountered, or if exposed faces are not protected from erosion by rainfall. Temporary batter slopes should be assessed and confirmed by a suitably qualified and experienced geotechnical engineer (RPEQ) during construction.

Shoring will be required to enable safe personnel entry into trenches (with vertical sides or batter slopes steeper than the above recommendations) deeper than 1 m.

The above recommendations do not supersede any existing safety regulations or legislation applicable to excavations (e.g. limits on personnel entry into trenches).

Permanent fill batters in controlled fill should be formed no steeper than 1V:2H, and should be protected from erosion with some form of surface protection (e.g. revegetation or geotextile matting) and drainage.

Positive support by engineer designed retained structures will be required where space restrictions prevent trimming of batters to safe slopes and where slopes are surcharged or near movement sensitive structures.

6.2 Retaining Walls

The design of flexible retaining walls (e.g. fully cantilevered) may be undertaken using a triangular pressure distribution and the earth pressure coefficients given below in Table 3.

Flexible walls are those which are free to rotate or tilt (i.e. cantilevered walls or single anchored or propped walls) and should be designed using an 'active' earth pressure coefficient (K_a). Where the walls are rigid and cannot rotate or tilt, then an 'at-rest' earth pressure coefficient (K_0) should be used.

Passive pressure should be ignored where there is potential for in-ground services trenches (or similar) in front of the wall.

Table 3: Lateral Earth Pressure Coefficients

Retained Material	Bulk Density (kN/m^3)	Friction Angle, Ø' (degrees)	Cohesion c_u (kPa)	Lateral Earth Pressure Coefficients		
				K_a	K_p	K_o
Existing Uncontrolled Fill	18	25	50	0.46	2.20	0.63
Stiff Clay	18	25	50	0.41	2.46	0.58
Very Stiff Clay	19	28	100	0.36	2.77	0.53
Hard Clay	20	32	200	0.31	3.25	0.47
Very Dense Sand	20	34	-	0.28	3.54	0.44
Very Low Strength (or stronger) Sandstone	21	40	-	0.22	4.5	0.35
Fill (future)	*	*	*	*	*	*

Notes:
* Depends on fill material type and level of compaction

K_a - active; K_o - at rest; K_p - passive

For yielding walls active state develops when: Deflection > 0.001H to 0.004H (granular soil), or deflection > 0.01H to 0.04H (cohesive soil)

Active earth pressure coefficients are calculated based on Coulomb earth pressure theory; with the assumption that there is zero friction between the wall and the backfill material.

An allowance of 10 kPa (minimum) should also be made for lateral stress induced by compaction plant operating behind the walls. The effects of surcharge should be included by multiplying the vertical pressure developed by the surcharge by the appropriate lateral earth pressure coefficient from Table 3. Allowance should be made for sloping backfill if applicable.

Drainage material behind the wall should be installed for the full height of the wall, for a width of at least 0.3 m. The material must be free draining and granular and have a perforated or slotted drainage pipe at the heel of the wall to rapidly remove the water into the stormwater system. Alternatively, the wall will need to be designed for full hydrostatic pressure.

Footings for retaining walls should be founded in accordance with the recommendations in Section 6.3. The proposed founding materials should be assessed by a suitably qualified and experienced geotechnical engineer to confirm the required allowable bearing pressure has been achieved.

An assessment of global stability of proposed retaining walls should be carried out during the design process.

6.3 Foundation Design

6.3.1 Site Classification

Site classification derived in accordance with Australian Standard *AS2870-2011 Residential slabs and footings* can provide an indication of the likely magnitude of reactive (shrink and swell) movements associated with normal seasonal moisture variations.

The estimated range of y_s is calculated in accordance with the methodology presented in AS2870-2011, by assessment of the soil suction change, factored for lateral restraint multiplied by the soil layer thickness and the instability index (estimated from Shrink-Swell index (I_{ss})).

For the Biloela region, AS2870-2011 recommends a depth of design suction change (H_s) of 3 m.

The fill encountered in the boreholes is considered 'uncontrolled' which results in a *Class P* classification in accordance with AS 2870-2011. However, as the existing fill is assumed at the time of this report to be maintained in its current state and remain 'uncontrolled', we have assessed the characteristic surface movement (i.e. y_s) based on the existing subsurface profile (i.e. uncontrolled fill). Based on the results of the investigation, the soil reactivity is within the range of *Class M*, with an estimated 'ys' value in the range of 30 mm to 40 mm.

The predicted order of movement is based on the existing fill profile being greater than 5 years old (i.e. placed in the 1960's), and moisture content changes within soils due to normal seasonal moisture variations only (i.e. does not consider soil settlement)).

6.3.2 High Level Footings

Due to the presence of uncontrolled fill, the site in its present condition would generally be classified as *Class P*, and this classification typically requires footings to extend through the fill and into the underlying natural strata. However, as a geotechnical investigation has been carried out to assess both the fill and underlying natural soils, and assessed using engineering principles, the site may be reclassified as *Class M* for footing design purposes.

High-level strip and/or pad footing systems supported by the existing stiff (or stiffer) clay fill could be designed using an allowable bearing pressure of 100 kPa for design purposes. To achieve the recommended allowable bearing pressure, founding materials must be dry and cleaned of any loose, disturbed or saturated materials prior to pouring concrete.

At the pressure nominated above, footing settlements would not be expected to exceed around 1% of footing width for strips and pads, under serviceability loads. Differential settlements between adjacent footings would not be expected to exceed approximately 50 % of the total settlement for individual footings. This excludes settlements from additional fill that may be placed on site. Further advice should be sort from Core if further filling is proposed.

Due to the potential variability in the strength of the existing fill, allowance should be made for compaction in the base of footing excavations using a plate compactor (i.e. 'wacker packer'). Following compaction, footing excavations will need to be inspected by a suitably qualified and experienced geotechnical engineer (RPEQ) to confirm the foundation material meets the design pressure requirements. As a part of the inspection, DCP testing will need to be carried out to assess the density/consistency of the compacted fill materials.

6.3.3 Piles

Alternatively, if deeper piled footings are required to provide additional load carrying capacity, structures could be supported by piles extending into the underlying stiff and medium dense (or stronger) residual soils and/or weathered sandstone.

Bored or screw piles are all considered suitable piling types. Piles could be designed using the ultimate geotechnical strength parameters presented in Table 4 and must be confirmed by the piling contractor.

Table 4: Estimated ultimate geotechnical parameters for piles

Material Type	Ultimate Pressures	
	Base Resistance, F_b	Average Shaft Friction, F_s
Existing Fill & Waste	NR	NR
Stiff Clay	450 kPa	10 kPa
Very Stiff Clay	900 kPa	30 kPa
Hard Clay	1,800 kPa	50 kPa
Very Dense Sand	2,000 kPa	80 kPa
Very Low Strength (or stronger) Sandstone	2,500 kPa	150 kPa

Notes:

1) Ultimate end bearing pressures in cohesive soils assumes a 'deep' pile action where pile length/diameter ratio is greater than 4.0
2) Shaft adhesion capacity should be neglected for fill layers. NR denotes not recommended.
3) Skin friction should be discounted for sections of pile shafts where liners are in place and in the fill material.
4) The F_s and F_b values given above are defined in AS 2159-2009 *"Piling – Design and Installation"*, with F_s being the average shaft friction for the condition of full mobilisation, and F_b being the ultimate base pressure. For Limit State design it is suggested that ultimate values be multiplied by a Geotechnical Strength Reduction Factor (φ_a) of 0.4 to determine "*design*" values. To determine allowable parameters for "*working*" loads the ultimate values given above should be multiplied by 0.33 (i.e. *factor of safety* of 3).

Detailed advice regarding the installation and working loads of piles should be obtained from a specialist piling contractor.

6.3.4 General Comments on Footings

To achieve the recommended design bearing pressures, founding materials must be dry and cleaned of any loose, disturbed or saturated materials prior to pouring concrete. Footing excavations must be assessed by a suitably qualified and experienced geotechnical engineer to confirm the foundation material meets the design pressure requirements, prior to placement of blinding/mass concrete or steel reinforcement.

If any soil conditions encountered during footing construction are found to differ from those noted in this geotechnical investigation, Core should be notified immediately, and further assessment carried out to determine if changes to footing design are required.

All footings should found such that they are not adversely affected by any adjacent excavations batter slopes, trenches, or retaining walls that are not designed to support building loads. To minimise the potential for any adverse interaction effects, footings should found at least below a plane extending 1 m horizontally from the base of trenches/batter slopes/excavations/retaining walls, then rising up at 1V:1H. This requirement is illustrated in Diagram 1.

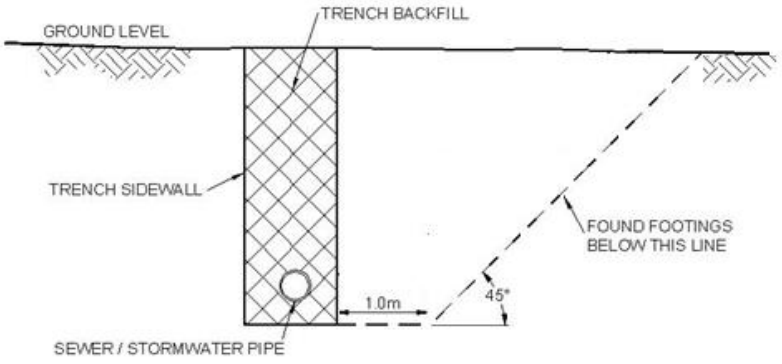

Diagram 1: Exclusion zone for base of footings

Adequate site drainage should be carried out to ensure that natural runoff is directed off construction area platforms and away from any footings. If water is allowed to pond on the platform, associated softening of the soil may occur, and the allowable bearing pressure is likely to be less than those values given above. Increased soil reactivity may also result.

6.4 Preliminary Pavement Design (CBR) Parameters

Design parameters for pavements will depend on the subgrade materials present after earthworks, and the type, depth and quality of new fill (if any) used to bring the area to design levels.

The anticipated subgrade is expected to comprise the stiff (or stronger) existing clay fill materials.

Laboratory test results indicate CBR values ranging between 2.5% and 8% for the existing fill material tested (refer Section 5.2). Based on our experience with similar materials, a preliminary design CBR value of 2.5% could be adopted for the existing fill.

The preliminary pavement design value given above is applicable for properly drained subgrades only and should be confirmed by further CBR testing and inspection during earthworks. Properly drained subgrades should allow for open graded drains that shed water and prevent ponding.

Rolling of the subgrade materials must be carried out prior to any fill placement. If subgrade materials are allowed to 'dry out', significant softening (and resulting subgrade strength less than nominated above) could occur on 'wetting up'.

Compaction testing should be carried out on pavement subgrades to confirm in situ densities prior to pavement construction. Areas of subgrade not compacted to the minimum relative dry density ratio should be moisture conditioned and recompacted to achieve performance in line with that inferred from recommended CBR design values.

6.5 Drainage

Site drainage should be designed to readily remove surface water and to prevent ponding of water on subgrade areas during construction and also adjacent to foundations, perimeter slabs, and driveways once construction is completed.

7.0 LIMITATIONS

Should you require any further information please contact the undersigned. We draw your attention to the document, Limitations, which is included in Appendix D.

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Appendix A
Geotechnical Test Location Plan

LEGEND

- Site Area (Lot Boundary)
- Borehole Locations (approximate)

Aerial image sourced from Nearmap Pty Ltd. Image dated 26th May 2023. Annotations by Core Consultants Pty Ltd.

core consultants pty ltd

clarity • commitment • passion

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CLIENT: BANANA SHIRE COUNCIL				PROJECT: LIONS PARK - LOT 10 ON B74477, BILOELA				
DRAWN BY: JZ	DATE: 12/07/2023			DRAWING TITLE: GEOTECHNICAL TEST LOCATION PLAN				
CHECKED BY: CK	DATE: 21/08/2023							
SCALE: AS SHOWN	SHEET SIZE: A3	PROJECT No: J002010	DOC No: 002	DOC TYPE: R	FIGURE No: 001	REVISION: 0	Sheet 1 of 1	

Plot Date: 24 August 2023 Time:12:56:13 PM By: Justine Zoljan Path: J:\2023 - J1851 -\J002010 - SQS-Env\Geo Inv-Lions Park\PHASE 1000\Figures Drawings - File Name:J2010-001-R-Rev0-F001 - Site Locality (Geo).dwg

Appendix B
Reports of Boreholes & Explanatory Notes

REPORT OF BOREHOLE: BH1

core consultants pty ltd

Client	Banana Shire Council	East	248571.0 m	Sheet	1 OF 1
Project	Stage 1 Preliminary Site Investigation	North	7300086.0 m MGA94 Zone 56	Logged:	HO
Location	308 Gladstone Rd, Biloela	Surface RL	190.00 m AHD	Logged Date:	10/07/23
Job No.	J002010	Contractor	Contract Drilling	Checked:	BH
		Drill Rig	Edson CP1	Checked Date:	25/08/23
		Inclination	-90° Hole Dia. 100/250 mm		

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY
ADT	L	Not Encountered	0.0	0.05 189.95	ES 0.00-0.20 m			CI	TOPSOIL Silty CLAY with rootlets: medium plasticity, brown.		VSt
								CI	FILL CLAY trace sand: medium plasticity, dark brown; sand fine to medium grained; with cobbles up to 200mm in diameter.		
				0.30 189.70	BDS 0.30-0.70 m			CL	FILL Mixture of soil = 95%,Waste = 5%: Soil is Sandy Clay with gravel: low plasticity, dark brown; sand fine to coarse grained, sub-angular, gravel fine to medium grained, sub-angular, Waste is Glass and pvc pipe fragments		
	M-H		0.5		ES 0.40-0.50 m						H
					ES 0.90-1.00 m						
			1.0	1.00 189.00	SPT 1.00-1.45 m 3,4,8 N=12			CI	Soil is: Silty Gravelly Clay with sand: medium plasticity, dark brown; gravel fine to medium grained, sub-angular; sand fine to medium grained	w < PL	
			1.5								St
	M		2.0		ES 1.90-2.00 m PID = 1.2 PPM						
			2.5	2.60 187.40	SPT 2.50-2.95 m 2,10,25 N=35			SM	Silty Gravelly SAND (RESIDUAL SOIL): medium to coarse grained, sub-angular, orange brown; gravel fine to medium grained, sub-angular.	D	D
			3.0		ES 2.90-3.00 m PID = 0.2 PPM						
	M-H			3.30							
			3.5						Hole Terminated at 3.30 m Auger Refusal on Possible Rock Backfilled		
			4.0								
			4.5								
			5.0								

DCP TEST
Blows per 100 mm
0 5 10 15 20 25
20/80

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REPORT OF BOREHOLE: BH2

core consultants pty ltd

Client	Banana Shire Council	East	248608.0 m	Sheet	1 OF 1
Project	Stage 1 Preliminary Site Investigation	North	7300071.0 m MGA94 Zone 56	Logged:	HO
Location	308 Gladstone Rd, Biloela	Surface RL	189.00 m AHD	Logged Date:	10/07/23
Job No.	J002010	Contractor	Contract Drilling	Checked:	BH
		Drill Rig	Edson CP1	Checked Date:	25/08/23
		Inclination	-90° Hole Dia. 100/250 mm		

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY
ADT	L	Not Encountered	0.0	189.00	ES 0.00-0.20 m			CI	TOPSOIL Silty CLAY with rootlets: medium plasticity, brown.	w < PL	St
	M			0.10							
				188.90	BDS 0.10-0.40 m			CI	FILL CLAY with cobbles trace gravel: medium plasticity, dark brown; gravel fine to medium grained, angular.	w ≈ PL	VSt
				0.20							
				188.80				CI	FILL Sandy Silty CLAY with gravel trace cobbles: medium plasticity, dark brown; sand fine to medium grained; gravel fine to coarse grained, sub-angular and sub-rounded.		
			0.5		ES 0.40-0.50 m PID = 0.4 PPM						H
					ES 0.90-1.00 m						
			1.0	1.00							
				188.00	SPT 1.00-1.45 m 5,7,7 N=14			CI	FILL Mixture of soil = 95%,Waste = 5%: Soil is Silty CLAY with gravel trace cobbles: medium plasticity, dark brown; gravel fine to coarse grained, sub-angular; Waste is Metal pieces approximately 50mm and Glass pieces approximately 5-20 mm		
			1.5								
			2.0		ES 1.90-2.00 m PID = 0.2 PPM					w < PL	St
	M-H		2.5	2.50							
				186.50	SPT 2.50-2.95 m 2,4,8 N=12				Waste (10%) is pvc pipe fragments and concrete fragments		
			3.0	3.00	ES 2.90-3.00 m						
				186.00				CI	Silty Sandy CLAY (RESIDUAL SOIL): medium plasticity, brown and pale brown; sand fine to coarse grained.		
			3.5	3.50							
				185.50				CI	CLAY (RESIDUAL SOIL): medium plasticity, orange brown and grey.		
			4.0		ES 3.90-4.00 m PID = 0.4 PPM SPT 4.00-4.45 m 6,11,14 N=25						VSt
				4.45	ES 4.40-4.45 m						
			4.5						Hole Terminated at 4.45 m Target depth Backfilled		
			5.0								

DCP TEST
Blows per 100 mm
0 5 10 15 20 25
20/50 HB

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REPORT OF BOREHOLE: BH3

core consultants pty ltd

Client	Banana Shire Council
Project	Stage 1 Preliminary Site Investigation
Location	308 Gladstone Rd, Biloela
Job No.	J002010

East	248605.0 m
North	7300045.0 m MGA94 Zone 56
Surface RL	189.00 m AHD
Contractor	Contract Drilling
Drill Rig	Edson CP1
Inclination	-90° Hole Dia. 100/250 mm

Sheet	1 OF 1
Logged:	HO
Logged Date:	11/07/23
Checked:	BH
Checked Date:	25/08/23

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP TEST Blows per 100 mm
ADT	M	Not Encountered	0.0	0.05 188.95	ES 0.00-0.20 m BDS 0.10-0.50 m			CI CI	TOPSOIL Silty CLAY with rootlets: medium plasticity, dark brown. FILL Silty CLAY with gravel with cobbles: medium plasticity, dark brown; gravel fine to coarse graied, sub-angular; trace sand, fine to medium grained.		St	
			0.5	0.50 188.50	ES 0.40-0.50 m			CI	FILL Mixture of soil = 90%,Waste = 10%: Soil is Silty CLAY with gravel with cobbles with sand: medium plasticity, dark brown; gravel fine to coarse grained, sub-angular; Waste is Scrap Metal pieces approximately 50mm, metal wire, glass fragments approximately 5-20 mm and possible ACM		VSt	
			1.0		ES 0.90-1.00 m DS 1.00-1.50 m SPT 1.00-1.45 m 2,3,11 N=14					w < PL	St / VSt	
			1.5								St	20/90
	M-H		2.00		ES 1.90-2.00 m				Hole Terminated at 2.00 m Auger Refusal on Possible Concrete Backfilled			
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

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REPORT OF BOREHOLE: BH4

core consultants pty ltd

Client	Banana Shire Council	East	248554.0 m		
Project	Stage 1 Preliminary Site Investigation	North	7300073.0 m MGA94 Zone 56	Sheet	1 OF 1
Location	308 Gladstone Rd, Biloela	Surface RL	191.00 m AHD	Logged:	HO
Job No.	J002010	Contractor	Contract Drilling	Logged Date:	11/07/23
		Drill Rig	Edson CP1	Checked:	BH
		Inclination	-90° Hole Dia. 100/250 mm	Checked Date:	25/08/23

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP TEST Blows per 100 mm (0 5 10 15 20 25)
ADT	M	Not Encountered	0.0	0.08 190.92	ES 0.00-0.20 m BDS 0.10-0.50 m			CI CI	TOPSOIL Silty CLAY with rootlets with cobbles: medium plasticity, dark brown. FILL Silty Sandy CLAY with cobbles trace gravel: medium plasticity, dark brown; sand fine to medium grained.	w < PL	St VSt H	
	M-H		0.5	0.50 190.50	ES 0.40-0.50 m			SM	Silty SAND (EXTREMELY WEATHERED SANDSTONE): fine to medium grained, orange brown.		VD	20/90
	H		1.0	0.80 190.20	ES 0.90-1.00 m SPT 1.00-1.29 m 20,30/140mm N=R				SANDSTONE: fine to medium grained, orange brown, very low strength, highly weathered.	D		
			1.5	1.50	ES 1.40-1.50 m				Hole Terminated at 1.50 m Auger Refusal on Rock Backfilled			
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

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REPORT OF BOREHOLE: BH5

core consultants pty ltd

Client	Banana Shire Council
Project	Stage 1 Preliminary Site Investigation
Location	308 Gladstone Rd, Biloela
Job No.	J002010

East	248524.0 m
North	7300086.0 m MGA94 Zone 56
Surface RL	192.00 m AHD
Contractor	Contract Drilling
Drill Rig	Edson CP1
Inclination	-90° Hole Dia. 100/250 mm

Sheet	1 OF 1
Logged:	HO
Logged Date:	11/07/23
Checked:	BH
Checked Date:	25/08/23

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP TEST Blows per 100 mm
ADT	M	Not Encountered	0.0	192.00	ES 0.00-0.20 m BDS 0.10-0.60 m			CL	FILL Sandy CLAY with gravel: low plasticity, brown and dark brown; sand medium to coarse grained; gravel fine to coarse grained, sub-angular to sub-rounded.	w < PL	H	
			0.5	0.50 191.50	ES 0.40-0.50 m PID = 0.4 PPM DS 0.50-0.60 m				Possible ACM.			
	H		1.0	0.80 191.20	ES 0.90-1.00 m PID = 0.3 PPM SPT 1.00-1.45 m 18,19,17 N=36			GP	Possibly FILL Sandy GRAVEL: fine to coarse grained, sub-angular, pale brown; sand medium to coarse grained; trace fines.	D	D	
			1.5	1.50	ES 1.40-1.50 m				Hole Terminated at 1.50 m Auger Refusal on Cobble Backfilled			
			2.0									
			2.5									
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

DCP TEST: 0 5 10 15 20 25

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REPORT OF BOREHOLE: BH6

core consultants pty ltd

Client	Banana Shire Council	East	248568.0 m	Sheet	1 OF 1
Project	Stage 1 Preliminary Site Investigation	North	7300045.0 m MGA94 Zone 56	Logged:	HO
Location	308 Gladstone Rd, Biloela	Surface RL	190.00 m AHD	Logged Date:	11/07/23
Job No.	J002010	Contractor	Contract Drilling	Checked:	BH
		Drill Rig	Edson CP1	Checked Date:	25/08/23
		Inclination	-90° Hole Dia. 100/250 mm		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP TEST Blows per 100 mm
ADT	H	Not Encountered	0.0	0.05 189.95	ES 0.00-0.20 m			CI CL	TOPSOIL Silty CLAY with cobbles with rootlets: medium plasticity, dark brown.		St	
					BDS 0.10-0.60 m				FILL Sandy CLAY with gravel with cobbles: low plasticity, dark brown; sand fine to medium grained; gravel fine to medium grained, sub-angular; trace organics.		VSt	
			0.5		ES 0.40-0.50 m						H	20/80
			1.0	1.00 189.00	ES 0.90-1.00 m SPT 1.00-1.45 m 11,11,10 N=21			CI	FILL Mixture of soil = 98%,Waste = 2%: Soil is Silty CLAY with gravel: medium plasticity, brown and dark brown; gravel fine to medium grained, sub-angular; Waste is glass fragments approximately 5-20 mm, timber and ceramic pieces	w < PL		
	M		1.5								VSt	
			2.0		ES 1.90-2.00 m PID = 0.5 PPM							
			2.5	2.60 187.40	SPT 2.50-2.75 m 10,30/100mm							
	H			2.70	N=R				SANDSTONE: fine to medium grained, pale orange brown, very low strength, highly weathered.	D		
									Hole Terminated at 2.70 m Auger Refusal on Rock Backfilled			
			3.0									
			3.5									
			4.0									
			4.5									
			5.0									

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REPORT OF BOREHOLE: BH7

core consultants pty ltd

Client	Banana Shire Council	East	248570.0 m	Sheet	1 OF 1
Project	Stage 1 Preliminary Site Investigation	North	7300008.0 m MGA94 Zone 56	Logged:	HO
Location	308 Gladstone Rd, Biloela	Surface RL	191.00 m AHD	Logged Date:	11/07/23
Job No.	J002010	Contractor	Contract Drilling	Checked:	BH
		Drill Rig	Edson CP1	Checked Date:	25/08/23
		Inclination	-90° Hole Dia. 100/250 mm		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	DCP TEST Blows per 100 mm
ADT	M	Not Encountered	0.0	191.00	ES 0.00-0.20 m			CI	TOPSOIL Silty CLAY with rootlets: medium plasticity, dark brown.		VSt	
				0.10								
				190.90	BDS 0.10-0.60 m			CI	FILL Silty CLAY with gravel with sand: medium plasticity, dark brown; gravel fine to medium grained; sand fine to coarse grained.			>20
			0.5		ES 0.40-0.50 m							
					ES 0.90-1.00 m							
				1.00								
			1.0	190.00	SPT 1.00-1.27 m 5,30/120mm N=R			CI	FILL Mixture of soil = 90%,Waste = 10%: Soil is Silty Sandy CLAY: medium plasticity, dark brown; sand fine to medium grained; Waste is glass fragments, timber (possible tree root/branch) and possible concrete			
	H										H	
			1.5									
					ES 1.90-2.00 m PID = 0.5 PPM					w < PL		
			2.0									
	M											
			2.5		SPT 2.50-2.95 m 4,2,6 N=8							
					ES 2.90-3.00 m PID = 0.0 PPM						F / St	
			3.0									
				3.50								
			3.5	187.50				CI	Silty Sandy CLAY (EXTREMELY WEATHERED SANDSTONE): medium plasticity, pale brown; sand fine to medium grained.			
	H										VSt	
					ES 3.90-4.00 m							
			4.0		SPT 4.00-4.23 m 16,30/80mm N=R							
				4.15								
				4.23	ES 4.20-4.23 m				SANDSTONE: fine to medium grained, pale yellow brown, low strength, highly weathered.	D		
									Hole Terminated at 4.23 m Target depth Backfilled			
			4.5									
			5.0									

EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT REPORTS

DRILLING/EXCAVATION METHOD

AS	Auger Screwing	RD	Rotary blade or drag bit	NQ	Diamond Core - 47 mm
AD	Auger Drilling	RT	Rotary Tricone bit	NMLC	Diamond Core - 52 mm
*V	V - Bit	RAB	Rotary Air Blast	HQ	Diamond Core - 63 mm
T	TC - Bit, e.g. ADT	RC	Reverse Circulation	HMLC	Diamond Core – 63mm
HA	Hand Auger	PT	Push Tube	BH	Tractor Mounted Backhoe
ADH	Hollow Auger	CT	Cable Tool Rig	EX	Tracked Hydraulic Excavator
DTC	Diatubre Coring	JET	Jetting	EE	Existing Excavation
WB	Washbore or Bailer	NDD	Non-destructive digging	HAND	Excavated by Hand Methods

PENETRATION/EXCAVATION RESISTANCE

L **Low resistance** . Rapid penetration possible with little effort from the equipment used

M **Medium resistance.** Excavation possible at an acceptable rate with moderate effort from equipment used

H **High resistance to penetration/excavation**. Further penetration is possible at a slow rate

R **Refusal or Practical Refusal.** No further progress possible without the risk of damage or unacceptable wear to the digging implement or machine.

These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.

WATER

▽	Water level shown at date	◁	Partial water loss
▷	Water inflow	◀	Complete water loss

GROUNDWATER NOT OBSERVED	The observation of groundwater whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.
GROUND WATER NOT ENCOUNTERED	The borehole/test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18	4,7,11 = Blows per 150mm N = Blows per 300mm penetration following 150mm seating
30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
DS	Disturbed Sample
BDS	Bulk disturbed sample
G	Gas Sample
W	Water sample
FP	Field permeability test over section noted
FV	Field vane shear test expressed as uncorrected shear strength (sv = peak value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket penetrometer test expressed as instrument reading in kPa
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres
WPT	Water pressure tests
DCP	Dynamic cone penetration test
CPT	Dynamic cone penetration test
CPTu	Static cone penetration test with pore pressure (u) measurement

ROCK CORE RECOVERY

TCR = Total Core Recovery (%)

$$= \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100$$

SCR = Solid Core Recovery (%)

$$= \frac{\sum \text{Length of cylindrical core recovered}}{\text{Length of core run}} \times 100$$

RQD = Rock Quantity Designation (%)

$$= \frac{\sum \text{Axial lengths of core} > 100\text{ mm}}{\text{Length of core run}} \times 100$$

METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT REPORTS

	FILL		CLAY (CL,CI, or CH)
	GRAVEL (GP or SW)		ORGANIC SOILS (OL or OH or Pt)
	SAND (SP or SW)		COBBLES or BOULDERS
	SILT (ML or MH)		

Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay.

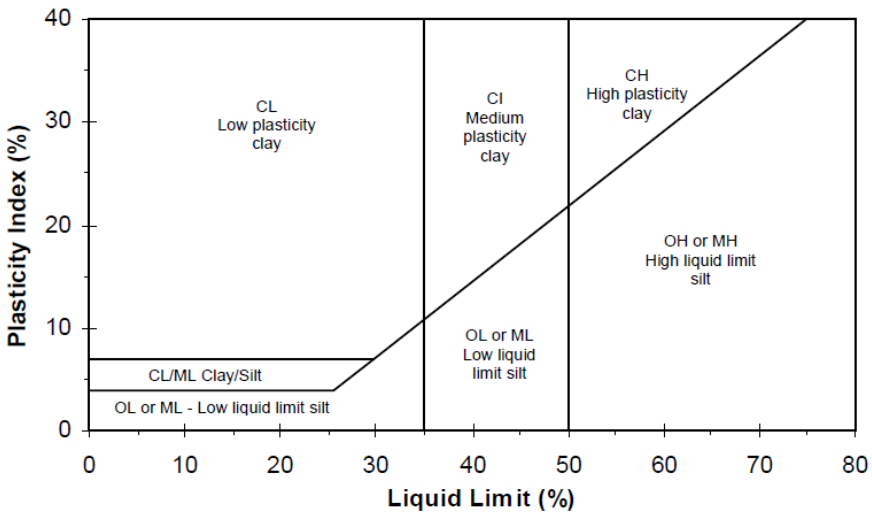
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil and Rock is classified and described in Reports of Boreholes and Test Pits using the preferred method given in AS 1726 - 2017. The material properties are assessed in the field by visual/tactile methods.

PARTICLE SIZE

Major Division	Sub Division	Particle Size
Boulders		>200 mm
Cobbles		63 - 200 mm
Gravel	Coarse	20 - 63 mm
Gravel	Medium	6.7 - 20 mm
Gravel	Fine	2.36 - 6.7 mm
Sand	Coarse	0.6 - 2.36 mm
Sand	Medium	0.21 - 0.6 mm
Sand	Fine	0.075 - 0.21 mm
Silt		0.002 - 0.075 mm
Clay		<0.002 mm

PLASTIC PROPERTIES



MOISTURE CONDITION FOR COARSE GRAINED SOIL — AS 1726 - 2017

Symbol	Term	Description
D	Dry	Non-cohesive and free running
M	Moist	Soil feels cool, darkened in colour, tends to stick together
W	Wet	Soil feels cool, darkened in colour, soil sticks together, free water forms when handling

MOISTURE CONDITION FOR FINE GRAINED SOIL — AS1726 - 2017

Symbol	Term	Description
W<PL	Moist dry of liquid limit	Hard and friable or powdery
W = PL	Moist near plastic limit	Soils can be molded at a moisture condition approximately equal to the plastic limit
W >PL	Moist, wet of plastic limit	Soils usually weakened and free water forms on hands when handling
W = LL	Wet near plastic limit	
W > LL	Wet, wet of liquid limit	

CONSISTENCY TERMS FOR COHESIVE SOILS — AS1726—2017

Symbol	Term	Undrained Shear Strength
VS	Very Soft	0 to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa
H	Hard	Above 200 kPa

RELATIVE DENSITY OF COARSE GRAINED SOILS — AS1726—2017

Symbol	Term	Density Index %	SPT 'N' #
VL	Very Loose	Less than 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Dense	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	Above 85	Above 50

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.

TERMS FOR ROCK MATERIAL STRENGTH & WEATHERING AND ABBREVIATIONS FOR DEFECT DESCRIPTIONS

ROCK MATERIAL STRENGTH CLASSIFICATION				AS1726—2017
Symbol	**Term**	**Uniaxial Compressive Strength (MPa)**	**Point Load Strength $I_{s\ (50)}$ (MPa)**	**Field Guide**
VL	Very Low Strength	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick. Pieces up to 30 mm thick can be broken with finger pressure.
L	Low Strength	2 to 6	0.1 to 0.3	Easily scored with knife. Indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point. A piece of core 150 mm by 50 mm may be broken by hand. Sharp edges of core are friable and break during handling.
M	Medium Strength	6 to 20	0.3 to 1	Readily scored with a knife. A piece of core 150 mm by 50 mm can be broken by hand with difficulty.
H	High Strength	20 to 60	1 to 3	A piece of core 150 mm by 50 mm cannot be broken by hand but can be broken by a pick with a single firm blow. Rock rings under hammer.
VH	Very High Strength	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow. Rock rings under hammer.
EH	Extremely High Strength	Above 200	Above 10	Specimen requires many blows with geological pick to break through intact material. Rock rings under hammer.

● = Diametral Point Load Test ▼ = Axial Point Load Test

CLASSIFICATION OF MATERIAL WEATHERING		AS1726—2017
Symbol	**Term**	**Field Guide**
RS	Residual Soil *(Note 1)*	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible but the soil has not been significantly transported.
XW	Extremely Weathered *(Note 1)*	Material is weathered to such an extent that is has soil properties. Mass structure and material texture and fabric of original rock are still visible.
HW	Highly Weathered *(Note 2)*	The whole rock mass is discoloured, usually by iron staining or beaching to the extent that the colour of the original rock is not recognizable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
MH	Moderately Weathered *(Note 2)*	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable, but shows little or no change in strength from fresh rock.
SW	Slightly Weathered	Pock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
FR	Fresh	Rock shows no signs of decomposition of individual minerals or colour change.
Note 1	The term 'Extremely Weathered rock' is misleading as the material has soil properties. The word 'rock' should be replaced with the name of the original rock of the word 'material', eg. Extremely Weathered granite or Extremely Weathered material.	
Note 2	Where it is not possible to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock the term 'Distinctly Weathered' may be used.	

DEFECT TYPE/DESCRIPTION			
B	Bedding Parting	V	Vein
J	Joint	HB/DB	Handling/Drilling Break
EW	Extremely Weathered Seam	C	Contact
FZ	Fracture Zone	L	Cleavage
CZ/S	Crushed Zone/Seam	X	Foliation
IS	Infilled Seam	S	Schistocity
SZ/S	Sheared Zone/Seam		

DEFECT PROFILE	
Symbol	**Description**
PL	Planar
St	Stepped
Un	Undulating

DEFECT INFILL DESCRIPTION	
Symbol	**Description**
Cn	Clean: No visible coating
Sn	Stain: Coated 1 to 3 mm
Vr	Veneer: < 1 mm
Ct	Coating: 1 to 3 mm

DEFECT ROUGHNESS DESCRIPTION	
Symbol	**Description**
Sl	Slickenside
Sm	Smooth
Ro	Rough

Vertical Boreholes - The dip (inclination from horizontal) for the defect is given.

Inclined Boreholes - The inclination is measured as the acute angle to the core axis.

Appendix C
Geotechnical Laboratory Test Certificates

Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411A
Date Sampled: 10/07/2023
Dates Tested: 20/07/2023 - 02/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH1 , Depth: BDS (0.3-0.7 m)**
Material: Clay (FILL)

SQS
SOIL QUALITY SERVICES
AMB Geotech SQS Pty Ltd
ABN 36 631 788 620
www.sqs.net.au

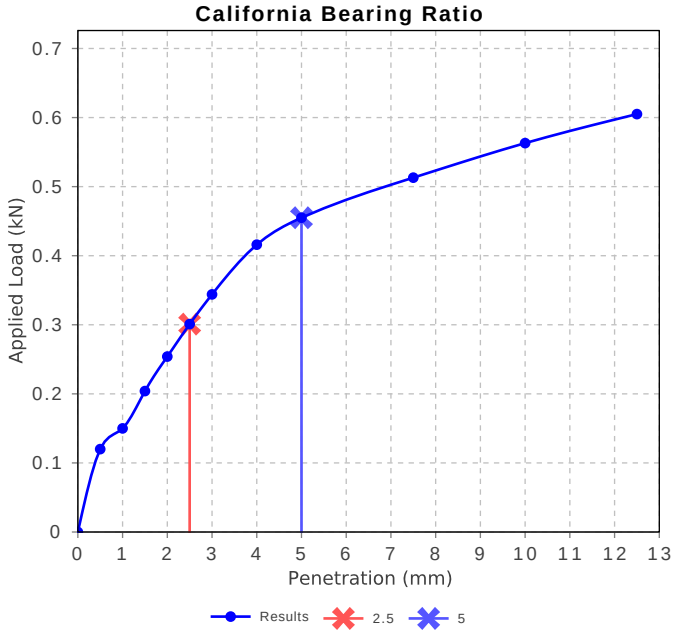
SQS
Brisbane Laboratory
105 Granite Street Geebung QLD 4034
Phone: (07) 3284 8766
Email: Brisbane@sqs.net.au

Accredited for compliance with ISO/IEC 17025 - Testing

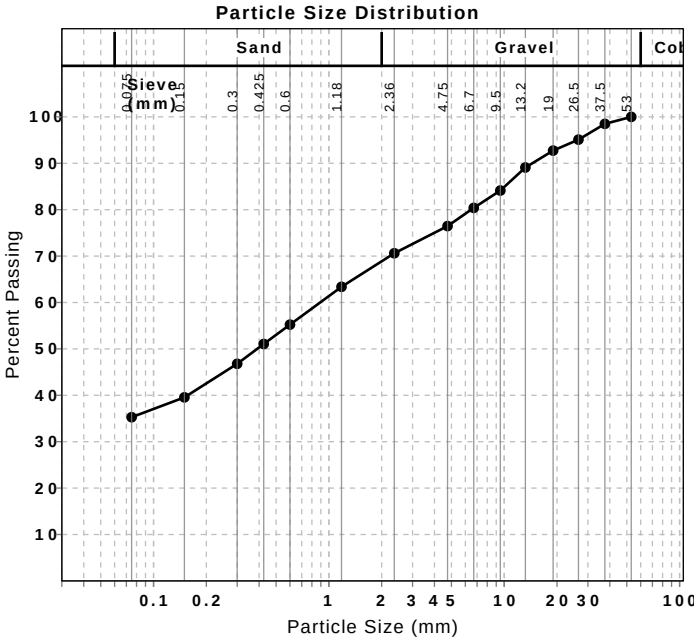
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Samuel Taylor
Senior Technician
NATA Accredited Laboratory Number: 2911

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**2.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.83		
Optimum Moisture Content (%)	13.5		
Laboratory Density Ratio (%)	95.0		
Laboratory Moisture Ratio (%)	98.5		
Dry Density after Soaking (t/m^3)	1.69		
Field Moisture Content (%)	8.7		
Moisture Content at Placement (%)	13.1		
Moisture Content Top 30mm (%)	23.6		
Moisture Content Rest of Sample (%)	18.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	50.5		
Swell (%)	2.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	7.3		



Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
53 mm	**100**		
37.5 mm	**98**		
26.5 mm	**95**		
19 mm	**93**		
13.2 mm	**89**		
9.5 mm	**84**		
6.7 mm	**80**		
4.75 mm	**76**		
2.36 mm	**71**		
1.18 mm	**63**		
0.6 mm	**55**		
0.425 mm	**51**		
0.3 mm	**47**		
0.15 mm	**40**		
0.075 mm	**35**		



Material Test Report

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SOIL QUALITY SERVICES
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ABN 36 631 788 620

SQS
Brisbane Laboratory
105 Granite Street Geebung QLD 4034
Phone: (07) 3284 8766
Email: Brisbane@sqs.net.au

Report Number:	**B-23-428-1**
Issue Number:	1
Date Issued:	07/08/2023
Client:	Banana Shire Council P.O Box 412, Biloela Qld 4715
Project Number:	B-23-428
Project Name:	Lions Park Splash Pad Biloela
Project Location:	Geotechnical Investigation & Contamination Assessment
Client Reference:	J2010
Work Request:	12411
Sample Number:	B-12411A
Date Sampled:	10/07/2023
Dates Tested:	20/07/2023 - 02/08/2023
Sampling Method:	Sampled by Client - Tested as Received *The results apply to the sample as received*
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**BH1 , Depth: BDS (0.3-0.7 m)**
Material:	Clay (FILL)

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Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	34		
Plastic Limit (%)	15		
Plasticity Index (%)	**19**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**11.5**		
Cracking Crumbling Curling	Curling		

Material Test Report

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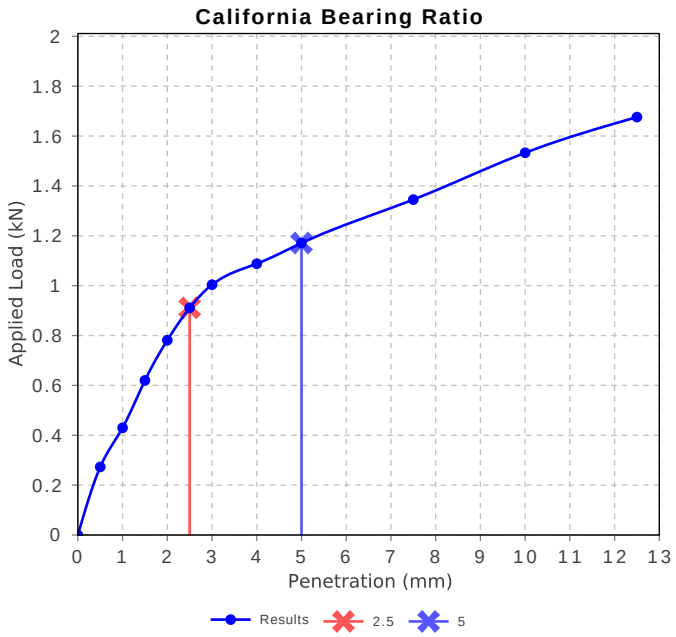
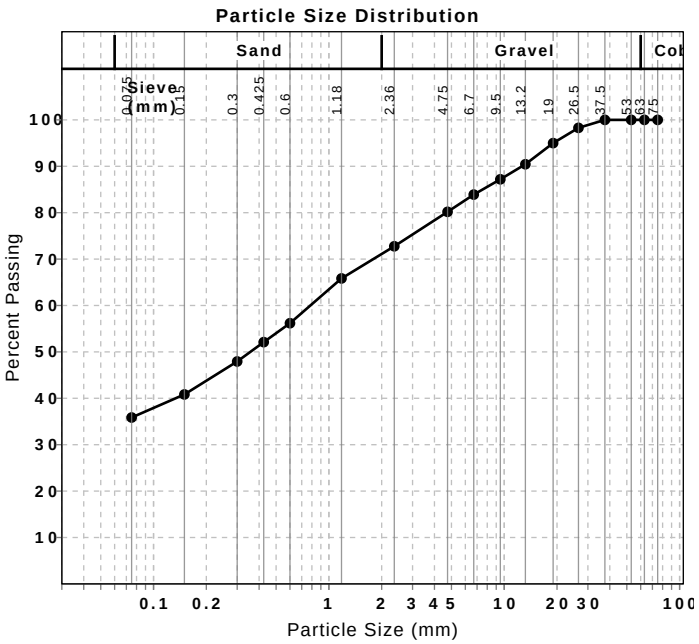
Approved Signatory: Samuel Taylor
Senior Technician
NATA Accredited Laboratory Number: 2911

Report Number: **B-23-428-1**
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411B
Date Sampled: 10/07/2023
Dates Tested: 20/07/2023 - 04/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH2 , Depth: BDS (0.1-0.4 m)**
Material: Sandy Silt (FILL)

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**7**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m^3)	1.84		
Optimum Moisture Content (%)	13.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.82		
Field Moisture Content (%)	9.8		
Moisture Content at Placement (%)	13.4		
Moisture Content Top 30mm (%)	17.3		
Moisture Content Rest of Sample (%)	15.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	50.4		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	5.0		

Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
75 mm	**100**		
63 mm	**100**		
53 mm	**100**		
37.5 mm	**100**		
26.5 mm	**98**		
19 mm	**95**		
13.2 mm	**90**		
9.5 mm	**87**		
6.7 mm	**84**		
4.75 mm	**80**		
2.36 mm	**73**		
1.18 mm	**66**		
0.6 mm	**56**		
0.425 mm	**52**		
0.3 mm	**48**		
0.15 mm	**41**		
0.075 mm	**36**		





Material Test Report

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Report Number:	**B-23-428-1**
Issue Number:	1
Date Issued:	07/08/2023
Client:	Banana Shire Council P.O Box 412, Biloela Qld 4715
Project Number:	B-23-428
Project Name:	Lions Park Splash Pad Biloela
Project Location:	Geotechnical Investigation & Contamination Assessment
Client Reference:	J2010
Work Request:	12411
Sample Number:	B-12411B
Date Sampled:	10/07/2023
Dates Tested:	20/07/2023 - 04/08/2023
Sampling Method:	Sampled by Client - Tested as Received *The results apply to the sample as received*
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**BH2 , Depth: BDS (0.1-0.4 m)**
Material:	Sandy Silt (FILL)

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	18		
Plasticity Index (%)	**24**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**13.5**		
Cracking Crumbling Curling	Curling		

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Senior Technician
NATA Accredited Laboratory Number: 2911

Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411C
Date Sampled: 11/07/2023
Dates Tested: 20/07/2023 - 04/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH3 , Depth: BDS (0.1-0.5 m)**
Material: Silty CLAY (FILL)

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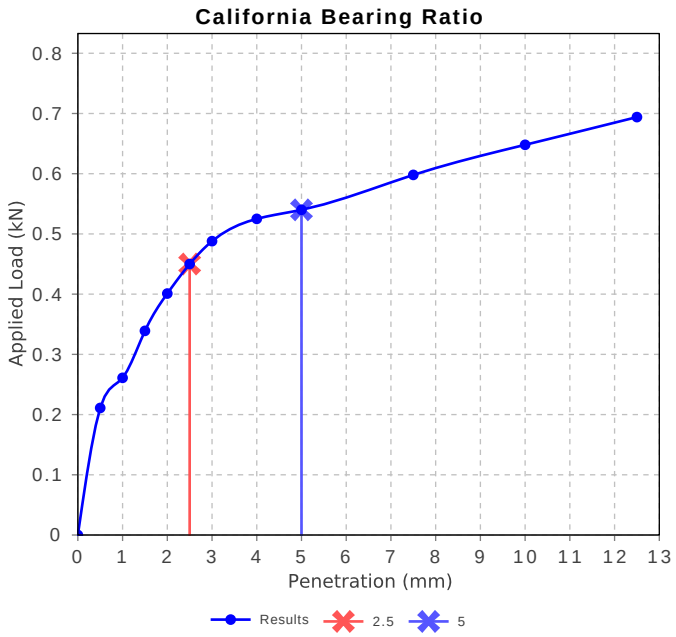
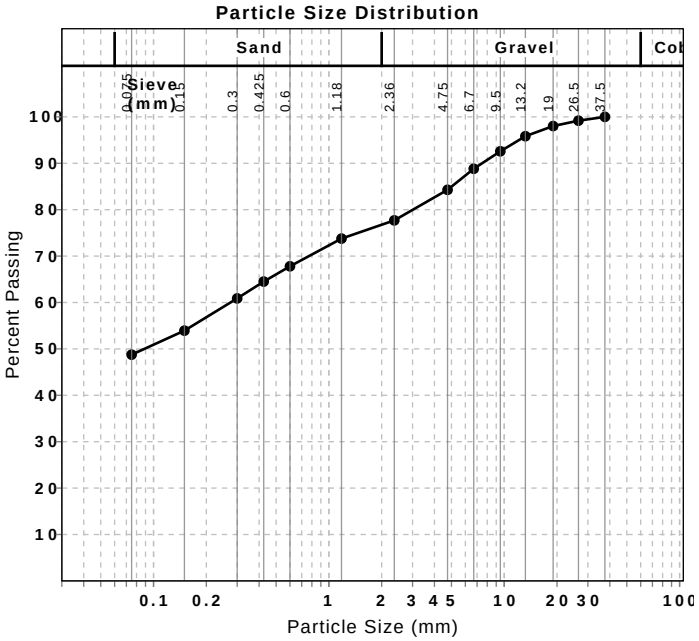
California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**3.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.74		
Optimum Moisture Content (%)	17.5		
Laboratory Density Ratio (%)	95.0		
Laboratory Moisture Ratio (%)	102.0		
Dry Density after Soaking (t/m^3)	1.61		
Field Moisture Content (%)	13.1		
Moisture Content at Placement (%)	17.9		
Moisture Content Top 30mm (%)	23.8		
Moisture Content Rest of Sample (%)	20.2		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	167.1		
Swell (%)	2.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	2.0		



Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
37.5 mm	**100**		
26.5 mm	**99**		
19 mm	**98**		
13.2 mm	**96**		
9.5 mm	**93**		
6.7 mm	**89**		
4.75 mm	**84**		
2.36 mm	**78**		
1.18 mm	**74**		
0.6 mm	**68**		
0.425 mm	**65**		
0.3 mm	**61**		
0.15 mm	**54**		
0.075 mm	**49**		



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Report Number:	**B-23-428-1**
Issue Number:	1
Date Issued:	07/08/2023
Client:	Banana Shire Council P.O Box 412, Biloela Qld 4715
Project Number:	B-23-428
Project Name:	Lions Park Splash Pad Biloela
Project Location:	Geotechnical Investigation & Contamination Assessment
Client Reference:	J2010
Work Request:	12411
Sample Number:	B-12411C
Date Sampled:	11/07/2023
Dates Tested:	20/07/2023 - 04/08/2023
Sampling Method:	Sampled by Client - Tested as Received *The results apply to the sample as received*
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**BH3 , Depth: BDS (0.1-0.5 m)**
Material:	Silty CLAY (FILL)

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	16		
Plasticity Index (%)	**26**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**14.0**		
Cracking Crumbling Curling	Curling		

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Senior Technician
NATA Accredited Laboratory Number: 2911

Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411D
Date Sampled: 11/07/2023
Dates Tested: 20/07/2023 - 04/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH4 , Depth: BDS (0.1-0.5 m)**
Material: Silty CLAY (FILL)

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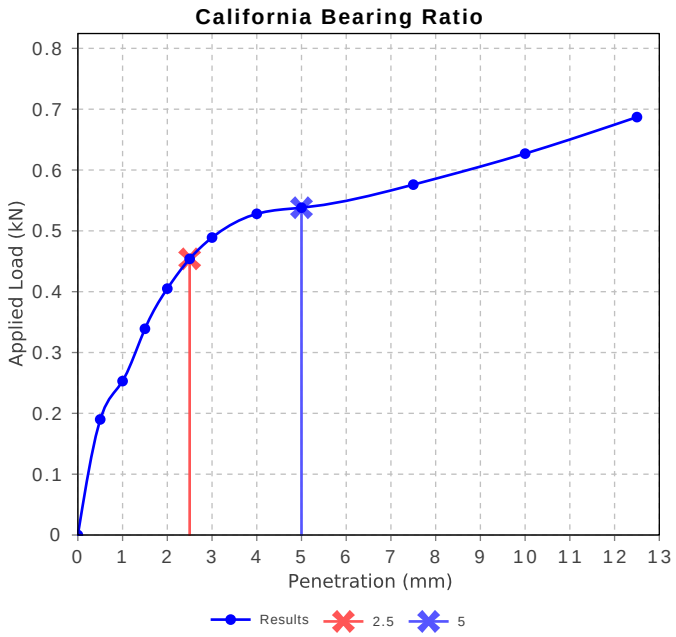
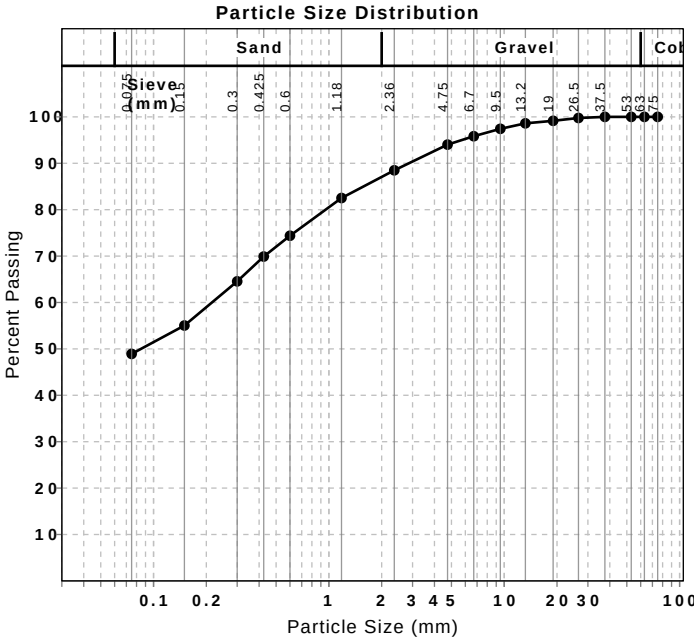
California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**3.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.80		
Optimum Moisture Content (%)	15.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	98.0		
Dry Density after Soaking (t/m^3)	1.76		
Field Moisture Content (%)	11.9		
Moisture Content at Placement (%)	15.2		
Moisture Content Top 30mm (%)	22.8		
Moisture Content Rest of Sample (%)	18.4		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	142.5		
Swell (%)	2.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	1.0		



Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
75 mm	**100**		
63 mm	**100**		
53 mm	**100**		
37.5 mm	**100**		
26.5 mm	**100**		
19 mm	**99**		
13.2 mm	**99**		
9.5 mm	**97**		
6.7 mm	**96**		
4.75 mm	**94**		
2.36 mm	**88**		
1.18 mm	**83**		
0.6 mm	**74**		
0.425 mm	**70**		
0.3 mm	**65**		
0.15 mm	**55**		
0.075 mm	**49**		



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Report Number:	**B-23-428-1**
Issue Number:	1
Date Issued:	07/08/2023
Client:	Banana Shire Council P.O Box 412, Biloela Qld 4715
Project Number:	B-23-428
Project Name:	Lions Park Splash Pad Biloela
Project Location:	Geotechnical Investigation & Contamination Assessment
Client Reference:	J2010
Work Request:	12411
Sample Number:	B-12411D
Date Sampled:	11/07/2023
Dates Tested:	20/07/2023 - 04/08/2023
Sampling Method:	Sampled by Client - Tested as Received *The results apply to the sample as received*
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**BH4 , Depth: BDS (0.1-0.5 m)**
Material:	Silty CLAY (FILL)

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Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	41		
Plastic Limit (%)	14		
Plasticity Index (%)	**27**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**15.5**		
Cracking Crumbling Curling	Curling		

Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411E
Date Sampled: 11/07/2023
Dates Tested: 20/07/2023 - 07/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH5 , Depth: BDS (0.1-0.6 m)**
Material: Gravelly CLAY (FILL)

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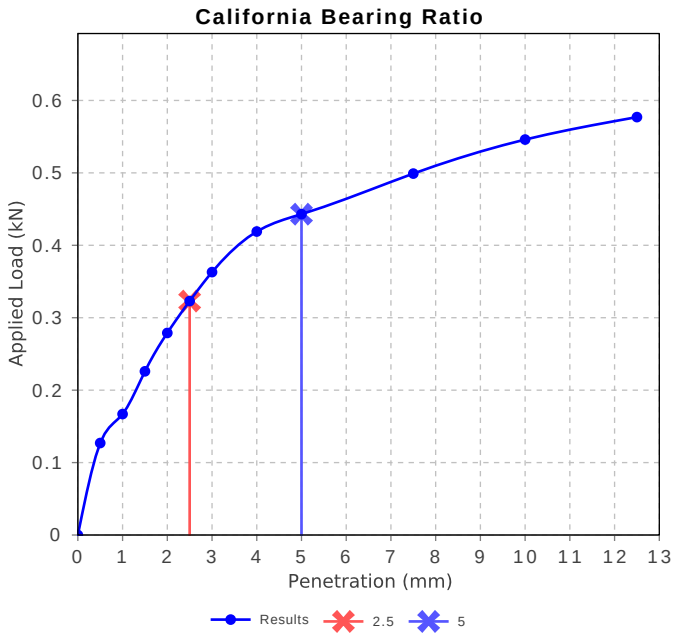
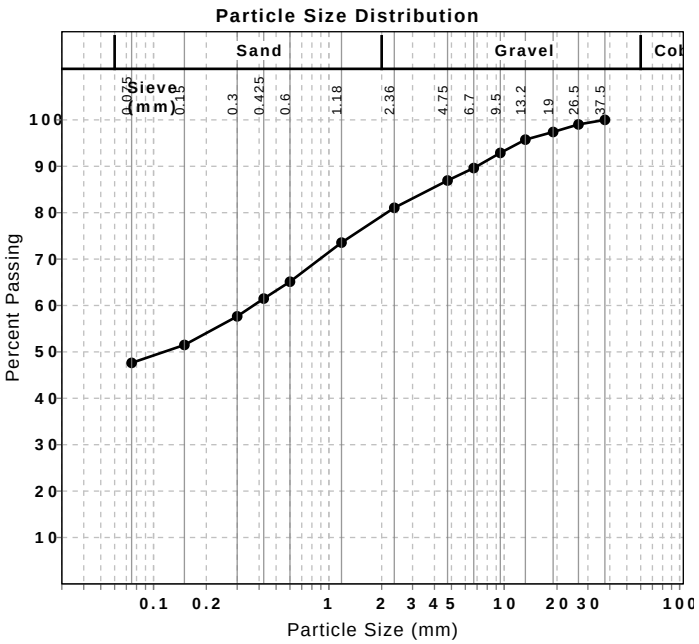
California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**2.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.80		
Optimum Moisture Content (%)	16.0		
Laboratory Density Ratio (%)	95.5		
Laboratory Moisture Ratio (%)	96.0		
Dry Density after Soaking (t/m^3)	1.68		
Field Moisture Content (%)	9.6		
Moisture Content at Placement (%)	15.3		
Moisture Content Top 30mm (%)	23.9		
Moisture Content Rest of Sample (%)	19.0		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	50.9		
Swell (%)	2.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	3.0		

Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
37.5 mm	**100**		
26.5 mm	**99**		
19 mm	**97**		
13.2 mm	**96**		
9.5 mm	**93**		
6.7 mm	**90**		
4.75 mm	**87**		
2.36 mm	**81**		
1.18 mm	**74**		
0.6 mm	**65**		
0.425 mm	**61**		
0.3 mm	**58**		
0.15 mm	**51**		
0.075 mm	**48**		





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Senior Technician
NATA Accredited Laboratory Number: 2911

Report Number: **B-23-428-1**
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411E
Date Sampled: 11/07/2023
Dates Tested: 20/07/2023 - 07/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH5 , Depth: BDS (0.1-0.6 m)**
Material: Gravelly CLAY (FILL)

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	34		
Plastic Limit (%)	12		
Plasticity Index (%)	**22**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**13.0**		
Cracking Crumbling Curling	Curling		

Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411F
Date Sampled: 11/07/2023
Dates Tested: 20/07/2023 - 03/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH6 , Depth: BDS (0.1-0.6 m)**
Material: Silty CLAY (FILL)

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SOIL QUALITY SERVICES
AMB Geotech SQS Pty Ltd
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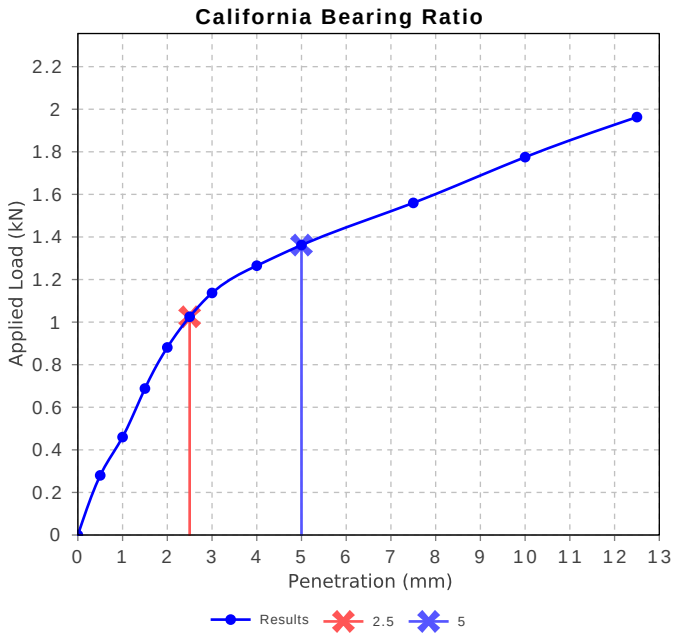
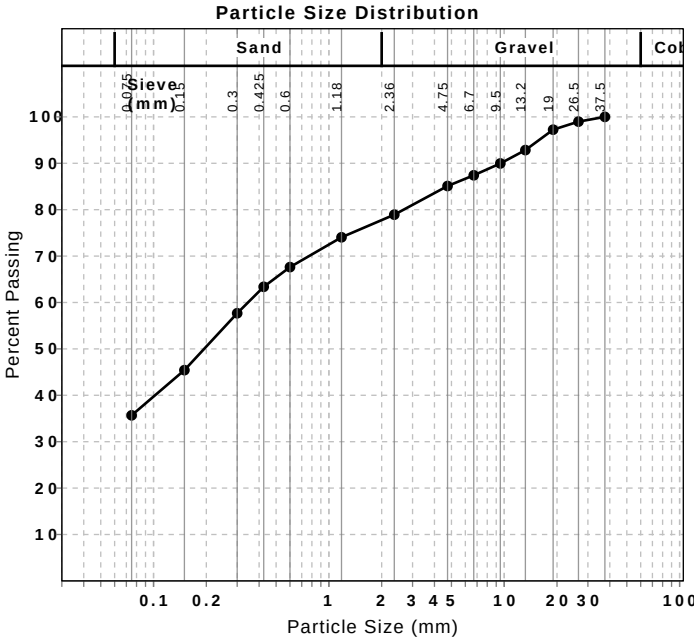
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Samuel Taylor
Senior Technician
NATA Accredited Laboratory Number: 2911

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**8**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.86		
Optimum Moisture Content (%)	13.0		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	104.0		
Dry Density after Soaking (t/m^3)	1.83		
Field Moisture Content (%)	8.5		
Moisture Content at Placement (%)	13.6		
Moisture Content Top 30mm (%)	18.3		
Moisture Content Rest of Sample (%)	14.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	49.8		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	2.8		



Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
37.5 mm	**100**		
26.5 mm	**99**		
19 mm	**97**		
13.2 mm	**93**		
9.5 mm	**90**		
6.7 mm	**87**		
4.75 mm	**85**		
2.36 mm	**79**		
1.18 mm	**74**		
0.6 mm	**68**		
0.425 mm	**63**		
0.3 mm	**58**		
0.15 mm	**45**		
0.075 mm	**36**		



Material Test Report

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Report Number:	**B-23-428-1**
Issue Number:	1
Date Issued:	07/08/2023
Client:	Banana Shire Council P.O Box 412, Biloela Qld 4715
Project Number:	B-23-428
Project Name:	Lions Park Splash Pad Biloela
Project Location:	Geotechnical Investigation & Contamination Assessment
Client Reference:	J2010
Work Request:	12411
Sample Number:	B-12411F
Date Sampled:	11/07/2023
Dates Tested:	20/07/2023 - 03/08/2023
Sampling Method:	Sampled by Client - Tested as Received *The results apply to the sample as received*
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**BH6 , Depth: BDS (0.1-0.6 m)**
Material:	Silty CLAY (FILL)

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	31		
Plastic Limit (%)	16		
Plasticity Index (%)	**15**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**9.0**		
Cracking Crumbling Curling	Curling		

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Senior Technician
NATA Accredited Laboratory Number: 2911

Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Sample Number: B-12411G
Date Sampled: 11/07/2023
Dates Tested: 20/07/2023 - 03/08/2023
Sampling Method: Sampled by Client - Tested as Received
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Site Selection: Selected by Client
Sample Location: **BH7 , Depth: BDS (0.1-0.6 m)**
Material: Silty CLAY (FILL)

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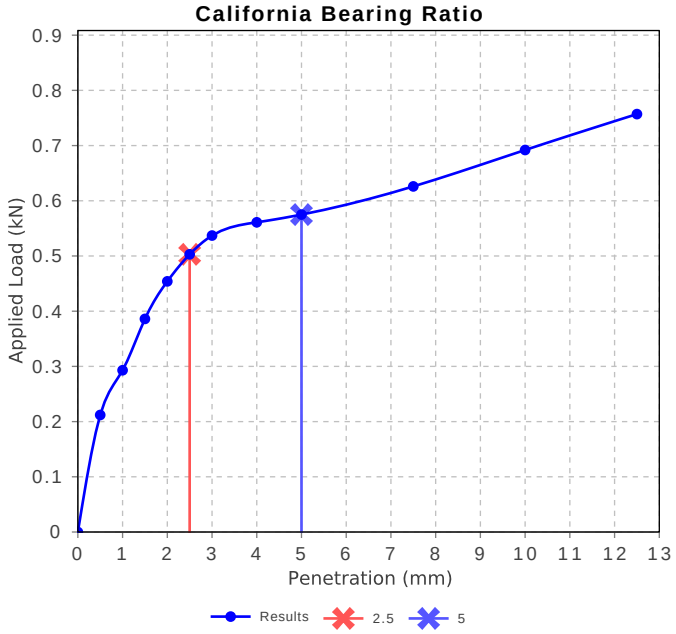
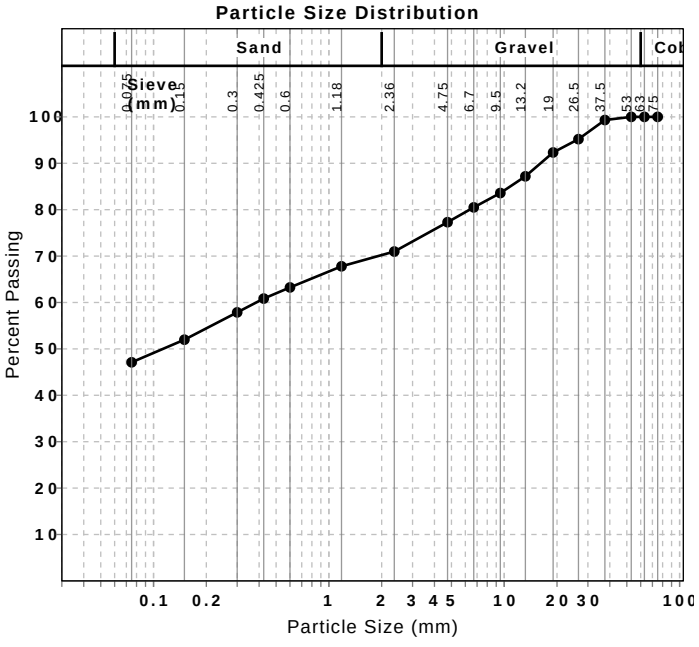
California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**4.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.69		
Optimum Moisture Content (%)	18.5		
Laboratory Density Ratio (%)	95.5		
Laboratory Moisture Ratio (%)	96.5		
Dry Density after Soaking (t/m^3)	1.57		
Field Moisture Content (%)	13.1		
Moisture Content at Placement (%)	17.7		
Moisture Content Top 30mm (%)	24.6		
Moisture Content Rest of Sample (%)	23.2		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	49.0		
Swell (%)	2.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	7.7		



Particle Size Distribution (AS1289 3.6.1)			
Sieve	Passed %	Passing Limits	
75 mm	**100**		
63 mm	**100**		
53 mm	**100**		
37.5 mm	**99**		
26.5 mm	**95**		
19 mm	**92**		
13.2 mm	**87**		
9.5 mm	**84**		
6.7 mm	**80**		
4.75 mm	**77**		
2.36 mm	**71**		
1.18 mm	**68**		
0.6 mm	**63**		
0.425 mm	**61**		
0.3 mm	**58**		
0.15 mm	**52**		
0.075 mm	**47**		



Material Test Report

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Report Number:	**B-23-428-1**
Issue Number:	1
Date Issued:	07/08/2023
Client:	Banana Shire Council P.O Box 412, Biloela Qld 4715
Project Number:	B-23-428
Project Name:	Lions Park Splash Pad Biloela
Project Location:	Geotechnical Investigation & Contamination Assessment
Client Reference:	J2010
Work Request:	12411
Sample Number:	B-12411G
Date Sampled:	11/07/2023
Dates Tested:	20/07/2023 - 03/08/2023
Sampling Method:	Sampled by Client - Tested as Received *The results apply to the sample as received*
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Site Selection:	Selected by Client
Sample Location:	**BH7 , Depth: BDS (0.1-0.6 m)**
Material:	Silty CLAY (FILL)

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	45		
Plastic Limit (%)	14		
Plasticity Index (%)	**31**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	**16.0**		
Cracking Crumbling Curling	Curling		

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Material Test Report

Report Number: B-23-428-1
Issue Number: 1
Date Issued: 07/08/2023
Client: Banana Shire Council
P.O Box 412, Biloela Qld 4715
Project Number: B-23-428
Project Name: Lions Park Splash Pad Biloela
Project Location: Geotechnical Investigation & Contamination Assessment
Client Reference: J2010
Work Request: 12411
Dates Tested: 20/07/2023 - 26/07/2023
Location: Geotechnical Investigation & Contamination Assessment

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Moisture Content AS 1289 2.1.1

Sample Number	Sample Location	Moisture Content (%)	Min	Max	Material
B-12411A	BH1 , Depth: BDS (0.3-0.7 m)	8.7 %	**	**	Clay (FILL)
B-12411B	BH2 , Depth: BDS (0.1-0.4 m)	9.8 %	**	**	Sandy Silt (FILL)
B-12411C	BH3 , Depth: BDS (0.1-0.5 m)	13.1 %	**	**	Silty CLAY (FILL)
B-12411D	BH4 , Depth: BDS (0.1-0.5 m)	11.9 %	**	**	Silty CLAY (FILL)
B-12411E	BH5 , Depth: BDS (0.1-0.6 m)	9.6 %	**	**	Gravelly CLAY (FILL)
B-12411F	BH6 , Depth: BDS (0.1-0.6 m)	8.5 %	**	**	Silty CLAY (FILL)
B-12411G	BH7 , Depth: BDS (0.1-0.6 m)	13.1 %	**	**	Silty CLAY (FILL)

Appendix D
Limitations

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ABN: 36631788620

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