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Report on
Preliminary Geotechnical Investigation

Proposed Appin (Part) Precinct
Brooks Point Road, Appin

Prepared for
Walker Corporation Pty Ltd

Project 76589.06
October 2022

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	76589.06	Document No.	R.002.Rev23
Document title	Report on Preliminary Geotechnical Investigation Proposed Appin (Part) Precinct		
Site address	Brooks Point Road, Appin		
Report prepared for	Walker Corporation Pty Ltd		
File name	76589.06.R.002.Rev3.Land Cap.docx		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Rev 0	Chris Kline	Konrad Schultz	22 March 2022
Rev 1	Chris Kline	Konrad Schultz	14 June 2022
Rev 2	Chris Kline	Konrad Schultz	15 September 2022
Rev 3	Chris Kline	Konrad Schultz	12 October 2022

Distribution of copies

Status	Electronic	Paper	Issued to
Rev 0	1	0	Walker Corporation Pty Ltd
Rev 1	1	0	Walker Corporation Pty Ltd
Rev 2	1	0	Walker Corporation Pty Ltd
Rev 3	1	0	Walker Corporation Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature		Date
Author			12 October 2022
Reviewer		for KS	12 October 2022

bsi. ISO 9001 Quality Management
FS 604853

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Table of Contents

Report on Preliminary Geotechnical Investigation
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1. The Appin Project

Greater Sydney's population is projected to grow to approximately 6.1 million by 2041 – over a million more people than currently live in the region.

The NSW Government has identified Growth Areas as major development areas that will assist in accommodating this growth. The Greater Macarthur Growth Area (**GMGA**) is one such growth area and is a logical extension of the urban form of south-west Sydney. The GMGA is divided into precincts. The Appin Precinct and North Appin Precincts are the southernmost land release precincts of the GMGA. The goal is to deliver 21,000+ dwellings.

The land is to be rezoned and released for development to achieve this goal. A submission has been prepared by Walker Corporation Pty Limited and Walker Group Holdings Pty Limited (the **Proponent**) to rezone 1,378 hectares of land (**the site**) within the Appin Precinct from *RU2 Rural Landscape* to the following zones:

Urban Development Zone

Zone 1 Urban Development (UD)

Special Purposes Zone

Zone SP2 Infrastructure (SP2)

Conservation Zone

Zone C2 Environmental Conservation (C2)

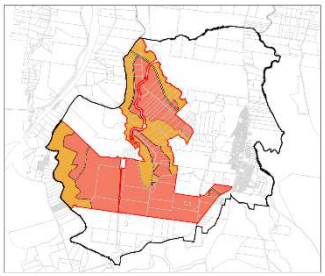
The zonings are shown on the Appin (Part) Precinct Plan (**the precinct plan**). 'The precinct plan' will be incorporated into the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* and contain the provisions (clauses and maps) that will apply to 'the site.' 'The precinct plan' envisages the delivery of 12,000+ new homes.

A structure plan has been prepared for the site and is shown on the Appin (Part) Precinct Structure Plan (**the structure plan**). It identifies staging and the first stage to be developed – Release Area 1. Release Area 1 is anticipated to deliver 3,500+ dwellings.

The submission is aligned with strategic land use planning, State and local government policies and infrastructure delivery. The development potential is tempered by a landscape-based approach that protects the environment and landscape values, shaping the character of new communities. A series of residential neighbourhoods are to be delivered within the landscape corridors of the Nepean and Cataract Rivers, supported by local amenities, transit corridors and community infrastructure.

The submission includes a hierarchy of plans. The plans and their purpose are summarised in Table 1.

Table 1: Draft Proposal Summary

(1) APPIN & NORTH APPIN PRECINCTS INDICATIVE PLAN	(2) APPIN (PART) PRECINCT PLAN (*THE PRECINCT PLAN*)	(3) APPIN (PART) PRECINCT STRUCTURE PLAN (*THE STRUCTURE PLAN*)
Broader context and for information purposes only. It has no statutory weight. It identifies: • *Higher-order transport network* • *Centres hierarchy* • *School sites* • *Conservation areas* • *Residential areas* • *Cultural sites and connections*	*It shows the land proposed to be rezoned and incorporated into a new schedule in the Western Parkland City SEPP 2021.* *The precinct plan contains the development provisions (clauses and maps) applicable to the site and is used in assessing development applications.*	*Structure plan for the site, showing staging of release areas.* *Development is to be generally consistent with the structure plan. It illustrates land use components including (but not limited to):* • *Low and medium-density residential* • *Retail and employment centres* • *School* • *Open space* • *Drainage network/basins* • *Transport network*
		
(21,000+ dwellings)	**(12,000+ dwellings)**	**(12,000+ dwellings)** **(Inc. Release Area 1 - 3,500+ dwellings)**

2. Introduction

Douglas Partners Pty Ltd (DP) have been engaged by the Proponent to prepare a Land Capability (Geotechnical) Assessment to support the Appin (Part) Precinct Plan (the precinct plan) and Appin (Part) Precinct Structure Plan (the structure plan).

The precinct and structure plan boundaries are Wilton Road to the east, the Nepean River to the west and Ousedale Creek to the north. Refer to Figure 1 and Table 2 for key attributes of the precinct plan and structure plan area.

The Appin (Part) Precinct Plan zones land for conservation, urban development and infrastructure and establishes the statutory planning framework permitting the delivery of a range of residential typologies, retail, education, business premises, recreation areas, and infrastructure services and provides development standards that development must fulfil. Within the proposed urban development zone, 12,000+ dwellings can be delivered.

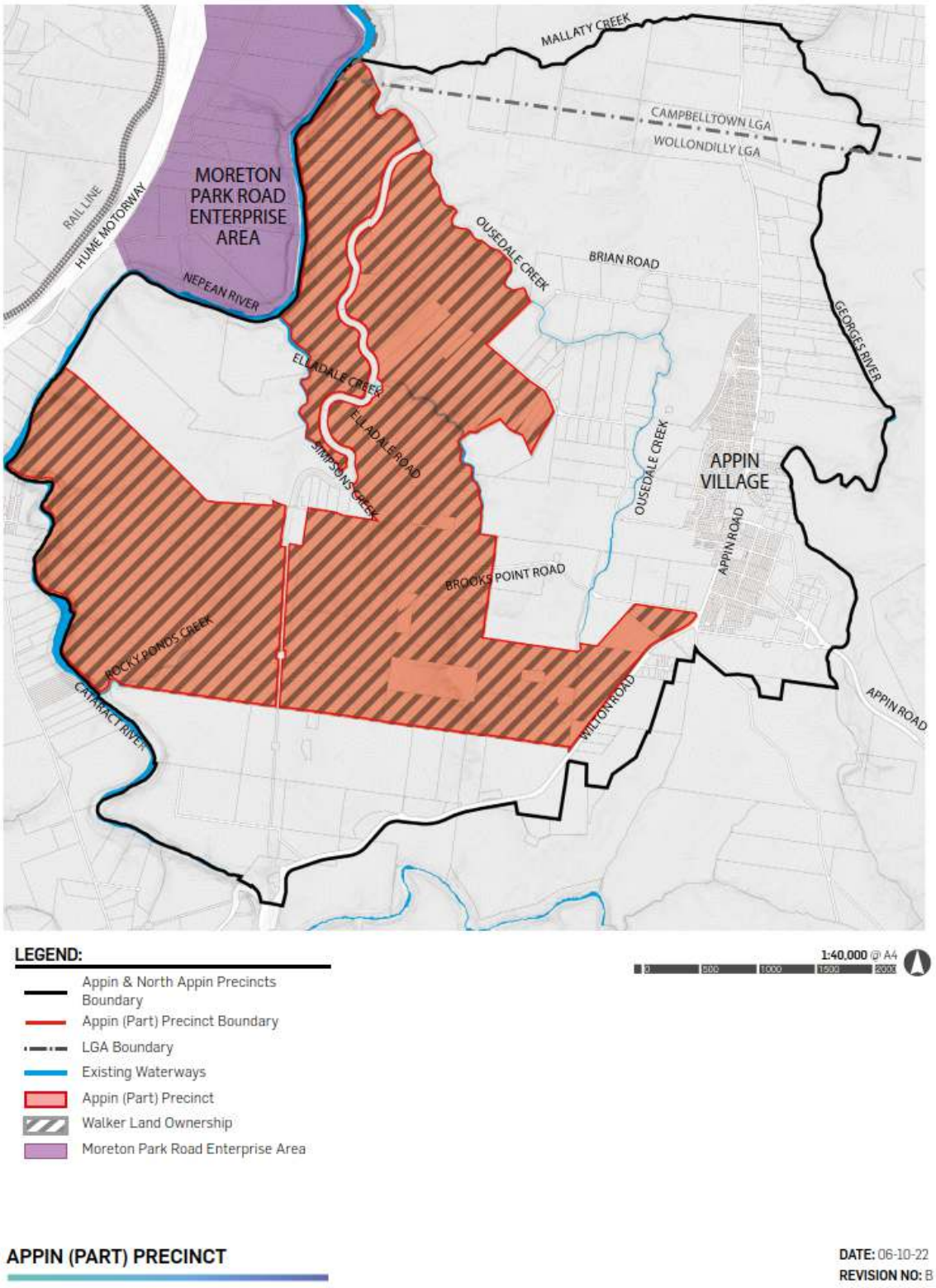
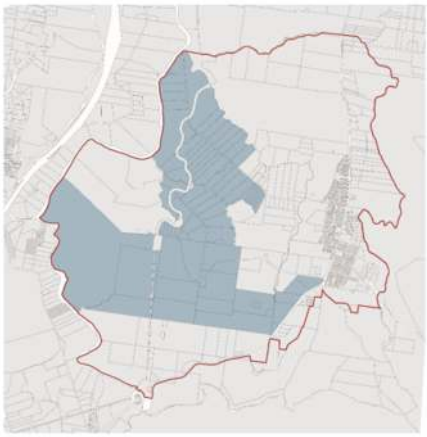


Figure 1: Appin (Part) Precinct Boundary

Table 2: Summary of Appin (Part) Precinct key attributes

	Location	Key Attributes	
Appin (Part) Precinct		**Area**	- Total - 1,378 ha - Walker – 1,248ha - Private Ownership – 94ha
		LGA	Primarily Wollondilly LGA
		Proposed Dwellings	12,000+
		Proposed Population	36,000+

The purpose of this investigation is to provide a preliminary evaluation of the geotechnical features of the site and its suitability, from a geotechnical standpoint, for future urban redevelopment. The boundary of the investigation is shown on Drawing 1, in Appendix A, which also shows inaccessible areas of the site, lots owned by other parties and a selection of vistas across the site. Further general vistas of the site are shown in Appendix B.

The investigation also included a preliminary review of the salinity characteristics of the site. This investigation was also undertaken concurrently with a preliminary site investigation (contamination) which has been reported separately (Project 76589.06.001).

3. Proposed Development

It is understood that the site is being considered for the staged urban development. The development will include approximately 12 000 residential dwellings, schools, commercial and retail facilities, community facilities, open spaces and associated roads and infrastructure, to be constructed over a period of approximately 10 – 15 years.

4. Site Location

The site, which has a total area of approximately 1450 hectares, is located in the local government area of Wollondilly Shire Council ('Council') and is currently zoned RU2 Rural Landscape, with a small portion associated with Upper Canal zoned SP2 Infrastructure. The site is currently a mix of rural residential blocks, as well as larger agricultural land holdings (dairying and agistment).

5. Regional Topography, Geology and Soil Landscapes

5.1 Topography, Hydrology and Hydrogeology

The site topography is gently undulating ranging from RL 250 m relative to Australian Height Datum (AHD) in the south west portion to approximately RL 120 m AHD near the escarpment of the Nepean River and tributaries and between approximately RL 70 and 110 m AHD along the banks of the Nepean River and tributaries.

The slope gradient generally ranges from approximately 5% in low lying generally flat areas of the site to approximately 27% along a ridgeline in the south east portion and along the flanks of the Nepean River. The average slope gradient across the site is approximately 7 to 10%. The tributaries and Nepean River have sandstone escarpments of up to 30 m in height.

Figure 1 (following page) presents regional topography mapping (10 m AHD intervals between contours) as obtained from NSW Spatial Services, key surface water features and registered groundwater bores as recorded by the NSW Department of Primary Industries (Water) and the Bureau of Meteorology Groundwater Explorer.

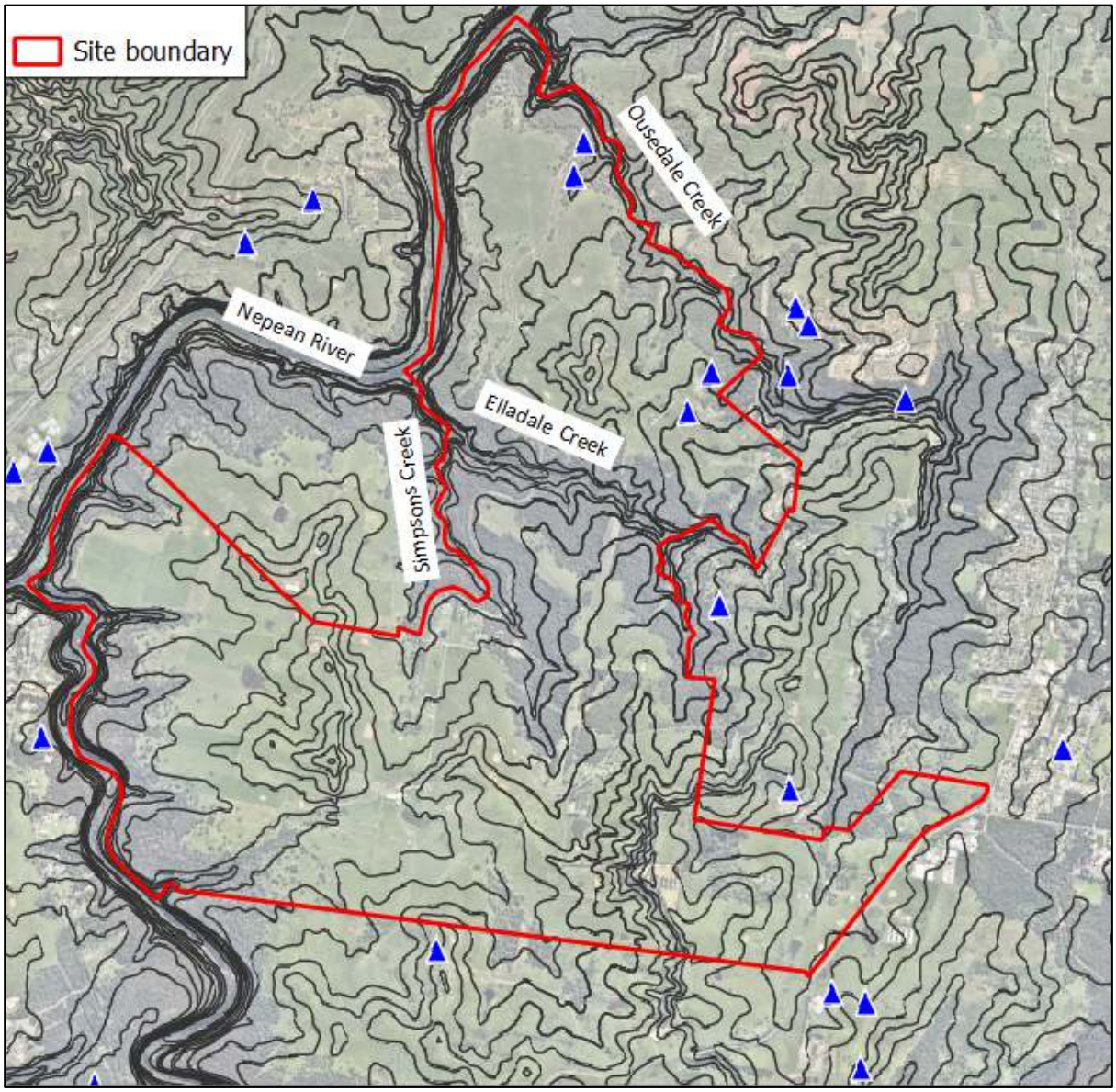


Figure 1: Site Topography (dark grey lines are 10 m intervals), Surface Water Features and Registered Groundwater Bores (blue triangles)

The Upper Canal System (UCS), a heritage-listed gravity-fed aqueduct runs through the site from the Cataract River in the south towards the north. The southern half of the UCS flows through the Cataract Tunnel and emerges near Brooks Point Road near the centre of the site, where it flows for the remainder of the site through an aqueduct. The Nepean River runs parallel with the western site boundary and towards the north. Elladale Creek and Simpsons Creek, both tributaries of the Nepean River, run east to west across the northern half of the site. Ousedale Creek, also a tributary of the Nepean River, runs parallel with the northern site boundary. Five small unnamed creeks and drainage lines are present in the south west portion of the site which drain into the Nepean River.

The above recorded bores do not include any bores previously used by BHP Billiton or South32 which are present in the general region. Whilst no groundwater depth information was made available for registered groundwater bores on, and near the site, observed geology, bore depths and installation details indicate saline groundwater is present in primarily sandstone at depths of more than 50 m.

5.2 Soils

Regional soils mapping for the site as obtained from Soil Conservation Service of NSW, *Soil Landscapes of the Penrith 1:100 000 Sheet* is presented in Figure 2, below.

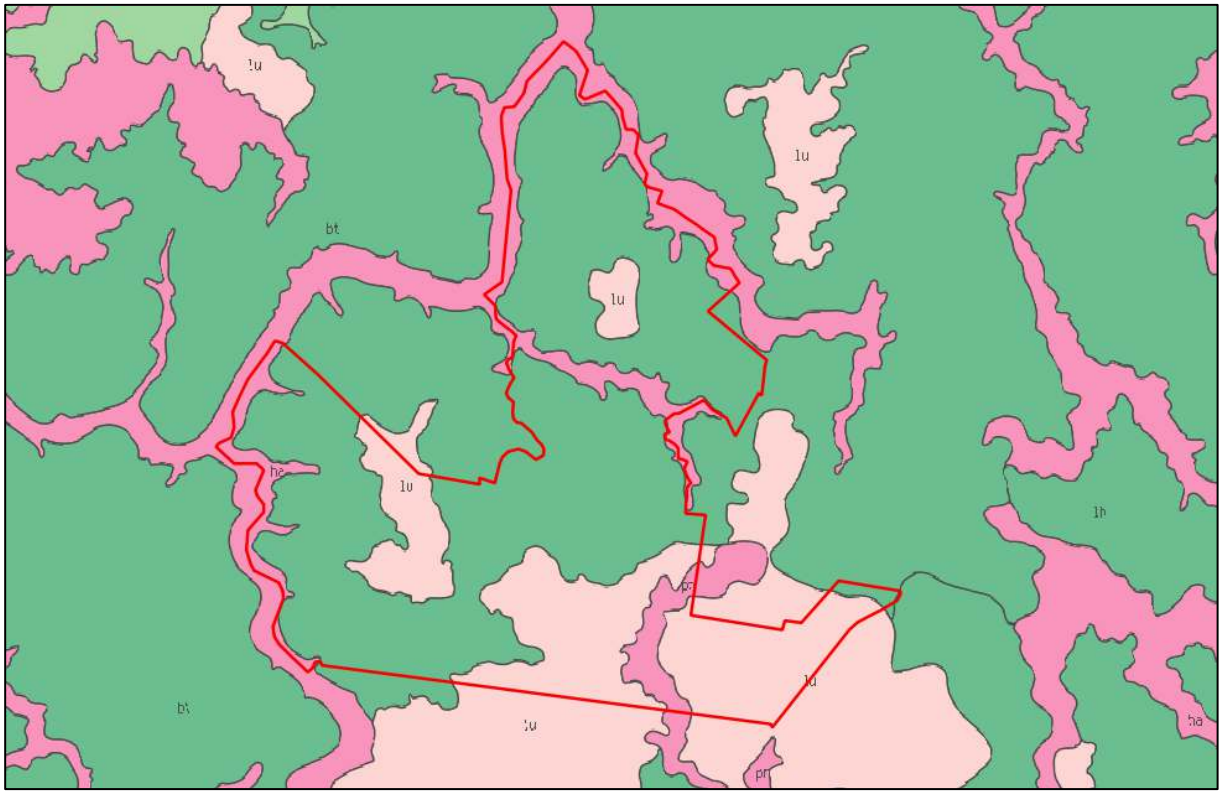


Figure 2: Regional soils mapping for the site (red boundary)

Regional soils mapping, as presented and referenced above, indicates that the majority of the site is mapped as Blacktown soils (dark green) which are associated with the gently undulating rises on Wianamatta Group shales and Hawkesbury Sandstone. Blacktown soils comprise shallow to moderately deep red and brown podzolic soils on crests, upper slopes and well drained areas and deep yellow podzolic soils and soloths on lower slopes and in areas of poor drainage. Such soils are generally moderately reactive, highly plastic subsoil of low soil fertility with poor soil drainage. Also mapped as present at the site are the following:

- Luddenham soils (light pink) in the south east and portions of the northern and western parts of the site and comprising shallow dark podzolic or massive earthy clays on crests, erosional soils. Luddenham soils are associated with undulating to rolling low hills of the Wianamatta Group shales and lower slopes and drainage lines; and

- Hawkesbury soils (dark pink) which are colluvial lithosols/siliceous sands comprising podzolic soils, siliceous sands and secondary yellow earths associated with drainage lines dissecting Hawkesbury Sandstones, along the Nepean River and tributaries.

5.3 Geology

Regional geology mapping for the site as obtained from Geological Survey of New South Wales *Wollongong – Port Hacking 1:100 000 scale Geological Series Sheet 9029 - 9129*, 1st Edition 1985 is presented in Figure 3.

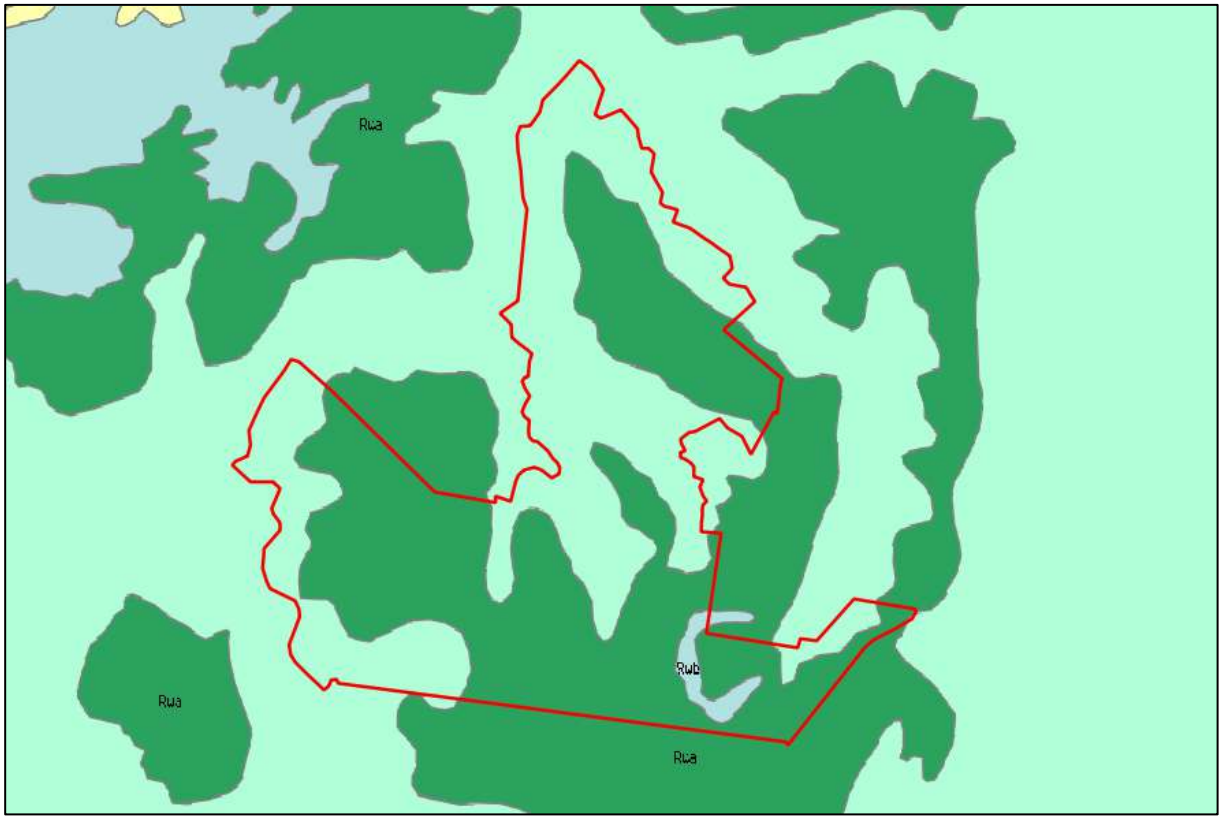


Figure 3: Regional geology mapping for the site (red boundary)

Regional geology mapping as presented and referenced above indicates that the majority of the site is underlain by Ashfield Shale of the Wianamatta Group (dark green) and Bringelly Shale in a small part of the site (light blue) comprising laminite and dark-grey siltstones primarily along ridges and topographical high-points through the site. Hawkesbury Sandstone (light green) comprising medium to coarse-grained quartz sandstone with very minor shale and laminite lenses are mapped as present around the site perimeter, including next to the Nepean River and topographical low-points across the site.

Figure 4 (following page) presents regional salinity mapping for the site as obtained from the Department of Infrastructure, Planning and Natural Resources *Salinity Potential in Western Sydney* (2002).

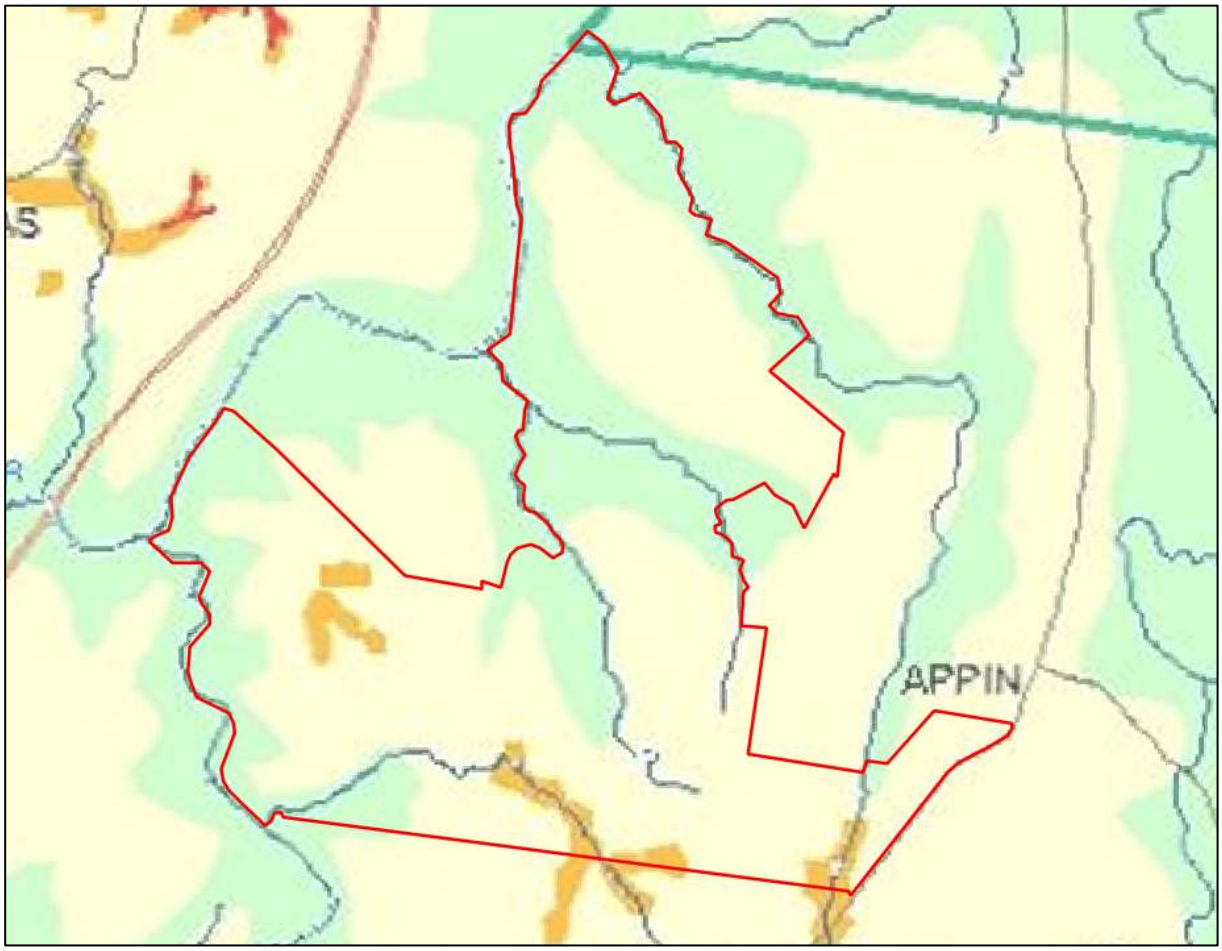


Figure 4: Regional Salinity Mapping

Regional salinity mapping as presented and referenced above indicates that the site is located in an area mapped as follows:

- Very low salinity potential (green) along the Nepean River and tributaries;
- Moderate salinity potential (pale yellow) across the majority (approximately 90%) of the site; and
- High salinity potential (orange) along the southernmost portion of Ousedale Creek, an unnamed creek in the southern portion of the site and along a ridgeline in the south west portion of the site.

5.4 Acid Sulfate Soils

The lowest elevation on site is RL 70 m AHD and this is well above the level at which Acid Sulphate soils are known to occur. For this reason, there is no government-produced mapping in this region. ASS is not considered to be a constraint to development.

6. Field Work Methods

6.1 Geotechnical

The initial stage of the geotechnical investigation comprised the collection and review of background information, predominantly from DP's database, aerial photographs and published maps. A scoping study of the site comprising a site walkover and field mapping by a Principal engineer was then undertaken to identify site areas that were considered to be potentially unstable, affected by salinity and/or erosion, and to finalise the proposed test pit locations for the subsurface investigation.

Surface and subsurface investigations included:

- Excavation of 51 test pits across the site (refer Drawing 2 for locations);
- Dynamic cone penetrometer (DCP) tests adjacent to test pits to aid the assessment of in-situ soil strength; and
- Collection of bulk and undisturbed soil samples from the test pits for geotechnical and salinity laboratory analysis.

Test pits were excavated by a backhoe fitted with a 450 mm wide toothed bucket. Test pits were excavated to a maximum depth of 3.0 m or until refusal of the bucket was noted on weathered rock. Test pits were reinstated by backfilling with the excavated soils in layers and compacting with the bucket.

Geotechnical sampling from the test pits included bulk (20 kg) samples, disturbed samples and 'undisturbed' samples in 50 mm diameter thin walled steel tubes. A selection of the samples was then tested in the laboratory for measurement of field moisture content, Atterberg limits, Emerson class number, shrink-swell index and soil texture classification.

The scope of the geotechnical investigation was designed to identify constraints to the land. These included slope instability, erosion and sedimentation and geotechnical development constraints (ie: rock depth).

6.2 Soil Salinity

The salinity assessment comprised the collection and review of background information, including aerial photographs, published maps and DP's database. A site walkover inspection by a senior geotechnical engineer was then undertaken to identify site areas that are potentially affected by salinity and to map their location.

Surface and subsurface salinity investigations included:

- Use of the test pits excavated for the geotechnical assessment for salinity purposes; and
- Collection of soil samples from the test pits for salinity laboratory analysis.

Salinity sampling from the test pits included collection of disturbed samples. A selection of the samples was then scheduled for a range of laboratory tests, including pH and electrical conductivity (EC).

7. Field Work Results

7.1 Site Observations

The observations made during the various inspections of the site undertaken during the field investigation (June/July 2020) are summarised below:

Stability

- The landform is predominantly gently sloping undulating terrain of gradual relief, although relief is significant if considering the whole of site extremes. Crests and gullies are mostly broad, although deep and steeply incised gullies are present along the major creek lines eg: Mapping Reference Point (MRP) MRP7, MRP42.
- In general, the site is considered to be stable, with slopes typically less than 5 degrees, occasionally increasing to 10 degrees and rarely 15 degrees in paddocks adjacent to ridgelines (refer Drawing 3, Appendix A).
- Two areas of instability were noted on site:
  - The south facing slopes of an area in the north of the dairy MRP44 - 47, Drawing 4, Appendix A). The land sloped at between 20 and 25 degrees to the south east, minor slumping had occurred causing erosion on the hill side (refer to the associated MRP photos in Appendix C)
  - The south facing slopes of the prominent ridge line in the south east of the site. The land sloped at 15 - 25 degrees, with some areas in excess of 45 degrees. Slumping was common in the southern portions of this ridge, with large landslide complexes present with debris lobes evident MRP26, 37, 38, 40 and 41.
- The banks of the major creek lines are typically steep (greater than 30 degrees and often vertical) especially in the areas of the site underlain by Hawkesbury Sandstone (MRP3, 7, 12, 13, 14, 27, 29 and 42). Creeks are deeply incised, especially as they approach the Nepean and Cataract Rivers, with depths of greater than 15 m noted on site.
- Steepened creek banks are predominantly colluvial with large (>3 m) boulders and cobbles overlying exposed sandstone. Some areas of the creek lines have formed cliffs. Evidence of rock fall is apparent, with fresh rock (from rock strikes), rock piles in the base of creeks and behind trees noted.
- The banks of the Nepean and Cataract Rivers have formed cliffs in Hawkesbury Sandstone of up to 30 m height (MRP10, 56).

Erosion

- Widespread erosion was not noted.
- Relatively minor gully erosion was noted at MRP22 and also surrounding a former shale pit in the southern portion of the site at MRP50.

Soil and Rock Profiles

- Soil exposures in existing farm dams across the site and at a shale pit in the MDP land, revealed a typical topsoil profile of between 0.1 m and 0.4 m (MRP6, 11 and 26) overlying rock.

- The most consistent feature of the site, especially those parts underlain by Hawkesbury Sandstone, was the presence of outcropping rock. Outcropping rock was noted at the top of all creek banks, at the base of all dams and in numerous other locations within the paddocks. Exposed rock was typically high strength medium grained sandstone (multiple MRPs, refer photoplate and Drawing 3). Shale outcrops were also noted (MRP16, 20, 21 and 50).

Stockpiles and uncontrolled fill

- Localised dumping was observed in some gullies and areas of the site which had not been secured, such as along the western portion near the Nepean River and to the rear (southern end) of lots on the eastern side of Macquariedale Road (refer the Contamination report for further detail).
- Systematic dumping was observed along Elladale Road, including construction and demolition materials (refer the Contamination report for further detail).
- Localised dumping was observed in some gullies, largely minor refuse (refer the Contamination report for further detail).
- Stockpiles were observed at the portal of the Cataract Tunnel and are likely associated with construction of the Cataract Tunnel and possibly the USC.

Unique Buried Infrastructure

- Several cement pipe networks traverse the site for irrigation purposes, these are further discussed in the preliminary contamination assessment.
- A gas collection network is present on the dairy property connected to a series of coal seam gas wells.
- The Cataract Tunnel traverses the southern portion of the site, linking the Cataract River with the Upper Sydney Canal.

Water logging and Salinity

- In dams and drainages, some water logging was noted. Salt tolerant vegetation was noted in these water logged areas (Juncus acutus). It is noted that whilst salinity tolerant Juncus is also tolerant of water logged soil.
- No other signs of dryland salinity were noted during the site walkover.

7.2 Subsurface Conditions

The subsurface conditions observed in the test pits excavated at site were logged by DP's geotechnical engineering staff. The results of the test pits and DCP tests are presented on the test pit logs included in Appendix D, together with explanation sheets describing classification methods and descriptive terms.

The test pits encountered relatively uniform conditions underlying the site, with the succession of strata broadly summarised as follows:

- TOPSOIL – silty clay topsoil, sandy clay topsoil and clayey silt topsoil encountered to depths of 0.1 m to 0.4 m;
- SILTY CLAY– silty clays and sandy clays were encountered below the topsoil layer in all pits;
- BEDROCK – weathered sandstone or shale was encountered underlying the clay in the majority of pits.

Filling was encountered in TP21, TP25, TP28, TP50, TP51 and TP52 to depths of between 0.4 m and 1.4 m.

Generally no free groundwater was observed in the test pits excavated during the field work programme. It is noted that the test pits were immediately backfilled on completion, which precluded long term monitoring of groundwater levels. Seepage was noted at the soil rock interface of four pits (TP7, TP15, TP16 and TP20)

Soil conditions were relatively uniform across the site and were generally as indicated by the soil landscape map (refer Figure 2). Sandstone was present at lower elevations about the site perimeter, whereas shales were present in the central, elevated areas of the site. This is consistent with the geology map for the site (refer Figure 3).

In addition to the above soil profiles, filling should be expected within the existing dam walls and is likely to comprise a blend of the residual soils and upper weathered rock profiles.

8. Laboratory Testing

8.1 Geotechnical Laboratory Testing

Soil and weathered rock samples were collected from the test pits during the field investigation. Samples were selected to undergo the following suite of geotechnical tests:

- Field moisture content tests;
- Atterberg limits tests; and
- Shrink-swell index tests.

The results of these tests are presented in Appendix E and are summarised in Table 3.

Table 3: Laboratory Test Results (Geotechnical)

Pit	Depth (m)	W_F (%)	W_P (%)	W_L (%)	PI (%)	I_{ss} (%/ΔpF)	ECN	Material
1	0.5 – 0.75	24.1	-	-	-	1.9	-	Silty Clay
2	0.5	15.4	14	21	7	-	5	Silty Clay
3	0.5 – 0.75	23.2	-	-	-	3.3	-	Silty Clay
4	0.5	24.7	24	52	28	-	5	Silty Clay
5	0.6 – 0.8	21.1	-	-	-	2.1	-	Silty Clay
6	0.6 – 0.85	30.4	-	-	-	2.5	-	Silty Clay
7	0.5	21.3	18	42	24	-	5	Silty Clay
8	1.0	30.1	26	58	32	-	5	Silty Clay
9	1.0	16.8	15	36	21	-	5	Silty Clay
10	0.5	27.1	23	53	30	-	3	Silty Clay
11	0.5	21.0	20	42	22	-	5	Silty Clay
12	0.7 – 0.95	29.2	-	-	-	1.7	-	Silty Clay
13	1.0	25.3	25	57	32	-	5	Silty Clay
14	0.6 – 0.85	26.6	-	-	-	1.6	-	Silty Clay
15	0.5 – 0.75	29.1	-	-	-	2.9	-	Silty Clay
15	0.5	-	-	-	-	-	3	Silty Clay
16	0.5	19.3	17	33	16	-	-	Silty Clay
17	0.5 – 0.75	22.8	-	-	-	2.1	-	Silty Clay
17	0.5	-	-	-	-	-	3	Silty Clay
18	0.5	27.4	26	52	26	-	-	Silty Clay
19	0.5	27.7	23	49	26	-	3	Silty Clay
20	0.5	22.7	21	45	24	-	-	Silty Clay
21	0.5	24.1	24	34	10	-	-	Silty Clay
22	0.5	28.4	25	53	28	-	5	Silty Clay
23	0.4 – 0.5	27.5	-	-	-	1.3	-	Silty Clay
25	0.6 – 0.85	24.7	-	-	-	2.9	-	Silty Clay
25	0.5	-	-	-	-	-	2	Silty Clay
26	1.0	18.8	19	58	39	-	2	Silty Clay
27	0.5	21.5	25	46	21	-	5	Silty Clay
28	0.5	23.1	26	55	29	-	-	Silty Clay

Pit	Depth (m)	W_F (%)	W_P (%)	W_L (%)	PI (%)	I_{ss} (%/ΔpF)	ECN	Material
30	0.6 – 0.85	26.3	-	-	-	2.8	-	Silty Clay
33	0.5	32.2	31	65	34	-	5	Silty Clay
34	0.5	18.2	18	47	29	-	3	Silty Clay
35	0.5	-	-	-	-	-	5	Silty Clay
35	0.7 – 0.95	27.6	-	-	-	2.5	-	Silty Clay
36	0.5	22.3	20	45	25	-	2	Silty Clay
37	0.6 – 0.85	24.1	-	-	-	2.7	-	Silty Clay
38	0.5	21.6	21	47	26	-	-	Silty Clay
39	0.7 – 0.95	19.4	-	-	-	1.0	-	Silty Clay
40	0.5	13.9	21	44	23	-	3	Silty Clay
41	0.5	23.5	25	51	26	-	3	Silty Clay
42	0.6 – 0.85	11.7	-	-	-	1.0	-	Silty Clay
43	1.0	28.0	28	72	44	-	5	Silty Clay
44	1.0	25.7	27	62	35	-	2	Silty Clay
45	0.5	-	-	-	-	-	5	Silty Clay
45	0.7 – 0.95	26.0	-	-	-	2.4	-	Silty Clay
46	0.5 – 0.75	23.3	-	-	-	1.2	-	Silty Clay
46	0.5	-	-	-	-	-	5	Silty Clay
47	1.5	24.0	20	55	35	-	2	Silty Clay
48	0.2	20.1	25	48	23	-	5	Silty Clay
49	0.6 – 0.85	30.4	-	-	-	2.4	-	Silty Clay
50	0.5	26.4	23	42	19	-	-	Silty Clay
51	0.5	20.4	29	44	15	-	-	Silty Clay
52	0.5	26.6	23	49	26	-	5	Silty Clay
53	0.5	23.9	26	57	31	-	5	Silty Clay
54	0.5	25.1	22	51	29	-	-	Silty Clay
55	0.6 – 0.85	27.0	-	-		1.7	-	Silty Clay
55	0.5	-	-	-	-	-	5	Silty Clay

Where: FMC = Field Moisture Content; SSI = Shrink-swell Index
LL = Liquid Limit; PL = Plastic Limit
PI = Plasticity Index; ECN = Emerson Class Number

The laboratory test results indicate medium to high plasticity, slight to moderate reactivity and some predisposition to dispersion and slaking.

The laboratory test results confirm the consistent clayey nature of the soils at the site and indicate soil classifications, in accordance with the unified soil classification system, corresponding to inorganic clays of medium to high plasticity.

California bearing ratio testing was also undertaken on 20 samples for the purposes of determining likely pavement thicknesses and the results are presented in Table 4.

Table 4: Results of California Bearing Ratio Testing

Pit No	Depth (m)	FMC (%)	OMC (%)	MDD (t/m^3)	Swell (%)	CBR (%)	Material
1	1.0	20.3	21.0	1.71	1.5	2.5	Silty Clay
3	1.5	17.5	17.5	1.75	3.0	2.0	Silty Clay
4	1.5	21.9	22.5	1.64	0.5	4.5	Silty Clay
7	1.0	20.6	17.5	1.72	2.0	3.5	Silty Clay
8	1.0	29.2	28.5	1.49	1.0	4.5	Silty Clay
12	0.5	26.0	26.0	1.54	0.0	4.0	Silty Clay
15	1.7	11.6	13.5	1.87	0.5	6.0	Sandstone
17	1.4	11.7	13.5	1.80	2.0	3.0	Sandstone
18	1.0	13.8	14.0	1.86	0.5	7.0	Sandy Clay
20	1.5	8.4	11.0	1.94	0.0	5.0	Shale
22	1.5	23.3	24.5	1.56	3.5	2.0	Silty Clay
25	1.0	24.0	24.0	1.58	1.0	3.5	Silty Clay
34	3.0	7.3	11.0	1.93	0.5	20	Shale
35	1.5	15.9	16.5	1.87	1.0	4.0	Silty Clay
37	3.0	17.4	18.5	1.74	0.5	8.0	Silty Clay
41	3.0	9.6	12.5	1.92	3.5	2.0	Shale
43	1.0	28.3	28.5	1.48	1.5	5.0	Silty Clay
45	2.0	10.0	13.0	1.93	2.0	6.0	Shale
49	1.5	17.0	18.5	1.81	0.5	5.0	Shale
55	0.5	25.5	23.5	1.61	1.0	4.5	Silty Clay

The results indicate variable CBR of 2% to 20%, with field moisture contents with 3.1% wet to 3.7% dry of Standard optimum moisture content.

8.2 Salinity Laboratory Testing

Soil salinity is typically assessed with respect to electrical conductivity of a 1:5 soil:water extract ($EC_{1:5}$). This value can be converted to ECe (electrical conductivity of a saturated extract) by multiplication with a factor dependent of soil texture ranging from 6 for heavy clays to 17 for sands. Richards (1954) and Hazelton and Murphy (1992) classify soil salinity on the basis of ECe. The salinity classes and their implications on agriculture are summarised in Table 5.

Table 5: Soil Salinity Classification

Class	ECe (dS/m)	Implication
Non Saline	<2	Salinity effects mostly negligible
Slightly Saline	2 – 4	Yields of sensitive crops affected
Moderately Saline	4 – 8	Yields of many crops affected
Very Saline	8 – 16	Only tolerant crops yield satisfactorily
Highly Saline	>16	Only a few very tolerant crops yield satisfactorily

Following the field investigation, 126 soil samples were submitted to Envirolab Services Pty Ltd (Envirolab), a NATA accredited facility, for soil tests for salinity. Where undertaken, testing generally accorded with the guidelines presented in the *Site Investigations for Urban Salinity* booklet, as published in 2002 by the then Department of Land and Water Conservation (DLWC).

Soil tests were performed for their physical and chemical properties and included pH, electrical conductivity (1:5) and soil texture classification, the latter undertaken internally by DP's staff.

The Emerson Class Number (ECN) for a soil relates to the potential for the soil to slake and disperse. Higher Emerson Class Numbers correspond to soils with a lower tendency to disperse. Emerson Class Numbers of 5 and 6 indicates a tendency for the soil to slake with a low susceptibility to dispersion. Emerson Class Numbers of 2 and 3 indicates a tendency for the soil to slake with some dispersion, possibly more when remoulded.

Detailed test reports are presented in Appendix E. A summary of the test results is presented below in Table 6.

Table 6: Results of Laboratory Testing – Chemical

Parameter	Units	Number of Tests	Range of Results
pH	pH units	126	4.8 – 9.6
Chlorides	(mg/kg)	51	10 – 670
Sulphates	(mg/kg)	51	10 – 410
Aggressivity [AS 2159] (SA, 2009)	to Concrete	51	non-aggressive – mild
	to Steel	51	non-aggressive
Exchangeable Sodium (Na)	(meq/100g)	10	<0.1 – 1.5
CEC (cation exchange capacity)	(meq/100g)	10	2 – 11
Sodicity [Na/CEC]	(ESP%)	10	1 – 23
Sodicity Class	[after DLWC]	10	Non-sodic – highly sodic
EC1:5 [Lab.]	(mS/cm)	126	10.1 – 456.2
Resistivity	Ω.cm	126	2192 – 99010
ECe [M x EC1:5] [1]	(dS/m)	126	0.1 – 3.8
Salinity Class [after Richards, 1954]	-	126	non-saline – slightly saline

Based on the testing undertaken, the results indicate that non-saline to slightly saline conditions can be expected throughout the majority of the study area and non to mildly aggressive conditions to concrete. Increased salinity and aggressivity values are expected adjacent to some creek lines in the southern portions of the site as mapped on Figure 4 and should be investigated further prior to subdivision application.

9. Comments

9.1 Slope Instability

Slope stability is not considered to be a major geotechnical constraint to the proposed development. The majority of the site is developable, with no effect from stability considerations. The following exceptions are noted:

- Deeply incised creeks and associated escarpments – rock fall is a natural process that must be considered in the development of any of the creek lines or escarpment areas. As these areas are typically outside of the development footprint, then they will not present a major constraint to development.

- Two areas associated with ridgelines in the southern portion of the site – slumping of the surface soils have been noted in these areas. This instability is not expected to be a major constraint to development and should be easily managed by good earthworks practices at the time of subdivision construction (ie: earthworks, drainage). If some of these areas are not to be subject to earthworks, then consideration will need to be given to run out distances of any identified slides. Both areas should be further investigated to assess the depth and extent of instability and provision of recommendations for rectification.

9.2 Erosion Potential

Soils of the Blacktown soil landscape are typically of moderate erodibility. The more sodic or saline soils of the Blacktown soil landscape can have a high to very high erodibility and the erosion hazard for this landscape is estimated as moderate to very high. The results of Emerson class number tests and salinity testing indicate a low to moderate risk of erosion.

It is considered that the erosion hazard within the areas proposed for urban development would be within usually accepted limits and can be managed by good engineering and land management practices.

9.3 Sub Surface Mining

The site is within the mine subsidence district of Appin. From records available on the NSW ePlanning portal, we understand that mining has already occurred across the majority of the site, with the northern portion of the site between the Nepean River and Ousedale Creek the only area where mining has not occurred.

Mining is of the Bulli seam which is at a depth of approximately 550 m. The seam is approximately 2.6 m thick in the vicinity of the site.

Subsidence Advisory (SA) NSW provide the following guideline for residential development in the area: Single or two storey brick veneer on AS 2870 footings/slabs. Maximum length of 24 m and maximum footprint of 400 sqm. Further advice should be sought from SA NSW on matters related to subsidence.

9.4 Soil Salinity

Methods of assessment of soil salinity were adopted to ground-truth the salinity potential map of DECC (2008) and included:

- A site walkover inspection to locate and map visible indicators of salinity; and
- EC_e analysis of 126 laboratory tests on soil samples collected from the test pits.

Although the salinity works undertaken during this study are preliminary in nature, it is considered that the results obtained together with DP's knowledge of the surrounding sites in similar geology provide a reasonable early indication of the actual salinity potential for the site. Further salinity studies will be necessary to achieve a greater density of test data, although the preliminary study did not identify any specific areas of concern with regards to urban development.

With respect to salinity risks, the site has been assessed, indicating that non-saline to slightly saline conditions are present. The results, however, are from a relatively small statistical sample size and although considered adequate for the current rezoning assessment, they will require additional support for any future development application before the site is considered free from salinity concern.

Preliminary salinity testing indicates that the salinity potential of this site would be within usually accepted limits, which could be managed by good engineering and land management practices. Based on the works undertaken to date, specific salinity management plans are not required for this site at this time.

9.5 Sodicity

The sodicity of the site soils (ie: the proportion of exchangeable sodium cations as a percentage of total exchangeable cations) can be elevated due to salt content and can affect properties such as dispersion, erodibility and permeability. Sodicity was assessed by measurement of the exchangeable sodium percentage and total cation exchange capacity of 10 soil samples, for classification of the soil as non-sodic (<5% sodicity), sodic (5 – 15% sodicity) or highly sodic (>15% sodicity). Samples were taken from depths of 0.4 m to 1 m.

Laboratory results indicate non-sodic to highly sodic conditions for the samples tested. Based on the presence and extent of the Blacktown soil landscape, these soils are likely to represent the whole of the site. Accordingly, management strategies will be required to manage the exposure of sodic and highly sodic soils. Strategies should include the design and implementation of an appropriate site drainage system that prevents sodic and highly sodic soils from breaking down and changing the water balance/water movement regime at the site.

9.6 Site Preparation and Earthworks

9.6.1 Topsoil

Topsoil is of a depth across the site of 0.1 – 0.4 m, (though typically 0.2 – 0.3 m). This depth should be relatively easily managed during bulk earthworks. The civil designers will need to take into account the stripped depth in their recommendations for replacement thicknesses of topsoil back on the lots so as to not generate excess topsoil.

9.6.2 Rock

Rock encountered on site was either sandstone or shale, as was expected based on the geological mapping. Rock depths varied between 0.6 m and greater than 3 m. In general rock depths around the margins of the creeks were approximately 1 m below ground surface and in the central portions of the site (especially in the south) where the mapping showed Wianamatta shales the soil profile increased to 2 – 3 m.

The rock profile is dependent on the geology type (refer Figure 3, page 5). Southern portions of the site which are underlain by Wianamatta shale typically have deeper soil profiles and significantly deeper weathering profiles. In these locations, the backhoe was able to excavate to 3 m through the rock. Cut to fill earthworks in these areas would be expected to be relatively straight forward using tractor scrapers and, possibly, light ripping with small dozers (D6 or larger) in the deeper areas or in sandstone bands.

Other areas of the site, also underlain by Wianamatta Shale, though approaching the boundary with the Hawkesbury Sandstone have soil profiles that are thinner and rock strengths that are higher and often interbedded with sandstone (likely to be the Mittagong Formation, which is typically found at the base of the Wianamatta shale). In these areas the upper 1 – 2 m will be able to be removed using scrapers, however heavier ripping using larger dozers (D9, D9L or D10) may be required. Ripping may generate oversize rock which may need to be broken down using pneumatic hammers prior to reuse in the fill. Oversize rock generated from Wianamatta shale is not suitable to use in landscaping due to its propensity to degrade and weather over time.

The margins of the site surrounding the creeklines is located on Hawkesbury Sandstone. Hawkesbury Sandstone has significantly higher strength and lower defect spacing than the Wianamatta shale. Across these areas, numerous sandstone rock outcrops were noted. Bulk removal in these areas will be difficult and low production rates must be anticipated. Where bulk removal can be undertaken using tractor scrapers, it is anticipated that high strength boulder sized “floaters” will be generated. Deeper areas of cut (>2 m) will require heavy ripping using large bulldozers (ie: D11 or equivalent). An alternative to using a dozer in these areas may be the use of a large rock hammer (3 – 5 tonne on a 30 – 45 t excavator) or an 85 tonne excavator with a ripper. Ripping will generate significant quantities of oversize. This will require breaking down using pneumatic hammers prior to crushing before reuse in the fill or reuse in landscaping areas.

To assist the conceptual design, a rock depth and strength assessment should be undertaken prior to detailed design. The rock depths noted however will not preclude development of the site.

Reference should be made to the test pit logs in Appendix D for information on rock strength and soil profiles.

As discussed in this section, cut areas and trenching in sandstone will generate significant quantities of oversize rock. This rock will not be suitable for reuse directly in fill areas and will require processing (breaking down and crushing) before being suitable for reuse as structural fill. Consideration could also be given to the reuse of some of the sandstone in landscaping areas, though further durability testing would be required to assess the suitability of the rock to withstand weathering. There is also the possibility that the rock could be reused as a select subgrade or possibly as subbase material. If this option was considered, further testing would be required to assess the quality of the rock and the

cost associated with producing a product with appropriate grading (particle size). The quality of such a product would be unlikely to meet RTA Standard 3051 for subbase and as such, would require a structural (project-specific) design of the pavements.

9.7 Pavements

Testing undertaken on the site show that the soils have typical CBR values found in western Sydney ranging from 2 – 5% (with localised cases of higher values when in the weathered rock profile). Swell values were also typical of the region and generally less than 5%. These values indicate that typical flexible pavement construction will be required. Detailed investigation of the subgrade should be undertaken prior to design to allow for optimised pavement construction in accordance with Council's design requirements.

9.8 Site Classification

Classification of individual lots or residential building areas within the site should comply with the requirements of AS 2870:2011 *"Residential Slabs and Footings"* (Standards Australia, 2011). Based on the limited work for the current investigation, the undisturbed subsurface profiles at most locations are typical of Class M (moderately reactive) and Class H (highly reactive) sites. Further delineation between Class H1 and Class H2 sites would need to be made for any subsequent construction certificate issue or prior to linen release. Where there is shallow rock classifications of A or S may be appropriate.

Laboratory Shrink-swell Index tests have low to moderately high results, indicating variable shrink swell potential across the site. The current results of Atterberg limits testing are considered more representative of the soils observed in the test pits. Prior to development construction, lot classification should be clarified and specific assessments should be made for each new residential site.

Areas with filling, such as that within the existing dam walls, will be classified as Class P. However, the construction of residences is unlikely to occur on these dams, as they will be removed during subdivision construction. Similarly, placement of filling during subdivisional earthworks may alter the classification of site areas, although with appropriate consideration during design, filled lots could be maintained as Class M or Class H (1 or 2) sites (provided all earthworks are undertaken under Level 1 inspection and testing as defined in AS 3798).

In addition, mining leases that affect the site will result in the forced issuing of Class P classifications for all new lots due to the probable future effects of mine subsidence. This potentially affects all new lots within the study area. The design of new structures on sites affected by mine subsidence will require particular structural design consideration and the assistance of the mine subsidence board to provide recommendations to designers on appropriate design parameters, such as settlement, curvature, tilt and horizontal strain. In other development areas with similar geology in terms of depths of cover to coal and seam thickness, this has required undertaking residential footing design in accordance with AS 2870 and the inclusion of additional control joints. For costing comparison purposes, a structural engineer could prepare a typical design for the mine subsidence parameters specified, as well as a standard H1 design for the same typical design.

Construction of larger buildings (eg schools, shopping centres) will require specific recommendations from Subsidence Advisory (SA NSW). Articulation is likely to be required, with large structures broken down into smaller elements.

Due to confidentiality requirements, DP has made these recommendations without reference to SA NSW.

10. Further Investigations

The results of the preliminary geotechnical assessment have not identified any issue that would preclude urban development at the site. Further investigation will be required as the project progresses to Development Application. Additional work will also be required during the project's construction phase. Specific investigation would include (but not necessarily be limited to):

- Further rock depth and rippability assessment;
- Stability assessment of the instability affected portions of the site to determine the depth and extent of unstable land and the impact on the proposed indicative layout plans.
- Additional salinity investigations for site soils and surface waters (ie: dams) to increase the density of the data obtained to date. The investigation programme should be increased to compliment the current study and augment the findings to a frequency of testing satisfying one test location per one to two hectares, including additional full depth profile sampling and laboratory analysis. A cost effective way of conducting the salinity assessment would be to measure site conductivity using an electro-magnetic (EM) transceiver mounted to an all-terrain vehicle (ATV or quad-bike), thus reducing the number of test pits required for the assessment. This method would also significantly increase the number of conductivity readings measured and thus provide greater coverage of the site.
- Additional testing of the site soils and surface water (and groundwater, if encountered) for aggressivity testing and to determine the effects on buried concrete and steel structures.
- Additional testing of site soils for erosion and dispersion for the detailed design and construction of future water bodies and the ability of the soils to be used as clay liners, or similar.
- Stability analysis of the banks of creek lines if development is proposed within these areas.
- Detailed geotechnical investigations on a stage-by-stage basis to determine pavement thickness designs and lot classifications, as well as stage specific issues, such as deep excavations and construction of roads, dwellings/structures on steeper landforms and crests.
- Routine inspections and earthworks monitoring during construction.
- Ongoing consultation with Subsidence Advisory NSW.

11. Summary of Constraints for Site Development

Based on the results of the assessment thus far, the following summary points are noted:

- Some evidence of hillside/slope instability was observed within discrete areas of the proposed development area. It is therefore considered that the potential for instability does not impose significant constraints on the proposed site development. Further assessment of creek lines where rockfall is a hazard will be required if development (including foot paths) is proposed in these areas. As recommended in Section 9, further investigation of the instability affected land will be required prior to detailed design.
- Shallow rock depth is likely to be a minor constraint to the economic and efficient development of the site, based on reduced production rates during earthworks and the requirement for additional plant (eg: large dozers, crushers etc).
- The presence of erodible soils on the site should not present significant constraints to development provided they are well managed during site preparation and earthworks.
- No significant evidence of saline soil was identified within the site. Although further salinity testing will be required, the results of the testing indicate that salinity levels are sufficiently low for this site to be considered free of significant salinity constraints.
- Although mildly aggressive soil conditions were encountered across the site, aggressivity levels are considered to be manageable, subject to appropriate design and construction considerations.
- Highly sodic and sodic soils appear widespread and will require management to reduce dispersion, erosion and to improve drainage this is typical of south western Sydney and will be managed by good engineering practice.

The results of the land capability assessment have not identified any issue that would preclude the urban development of the Appin site.

12. References

- Department of Planning, Industry and Environment 2018, *Soil Landscapes of the Penrith 1:100 000 Sheet*
- Department of Mines 1985, Geology of Wollongong – Port Hacking 1:100 000 Geological Series Sheet No 9029 – 9129.
- Richards, L. A. (ed.) 1954, *Diagnosis and Improvement of Saline and Alkaline Soils* USDA Handbook No. 60, Washington D.C.
- Hazelton, P. A. and Murphy B. W. 2007, *Interpreting Soil Test Results* Department of Natural Resources.
- Department of Infrastructure, Planning and Natural Resources, New South Wales (DIPNR) 2003, *Salinity Potential in Western Sydney 1:100 000 Sheet* (now managed by the Department of Primary Industries – DPI).
- Standards Australia 2011, AS 2870 – 1996 *Residential Slabs and Footings*.

13. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for the proposed Appin Precinct in accordance with DP's proposal dated MAC200172 and acceptance received from Walker Corporation dated 15 June 2020. The work was carried out in accordance the Consultancy Deed (Major Services). This report is provided for the exclusive use of Walker Corporation for this project only and for the purposes as described in the report. It should not be used for other projects or purposes or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the subsurface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Subsurface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations.

This report must be read in conjunction with all of the attachments and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

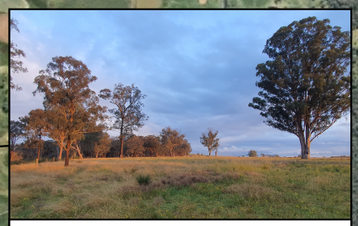
The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the (geotechnical / environmental / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Douglas Partners Pty Ltd

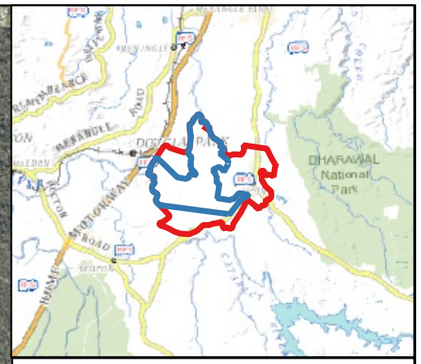
Appendix A

Drawings
About This Report

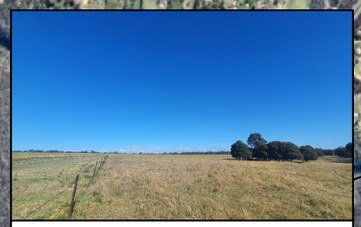
MRP2



MRP5



Site Locality



MRP17

MRP10

MRP16

MRP15

2
3
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11
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17
16
1
12
13
14
15

Legend

- Walker Land Ownership
- West Appin Precinct
- Lots owned by others
- Inaccessible Areas
- General Site MRPs

900 0 900 1800 2700 3600 m

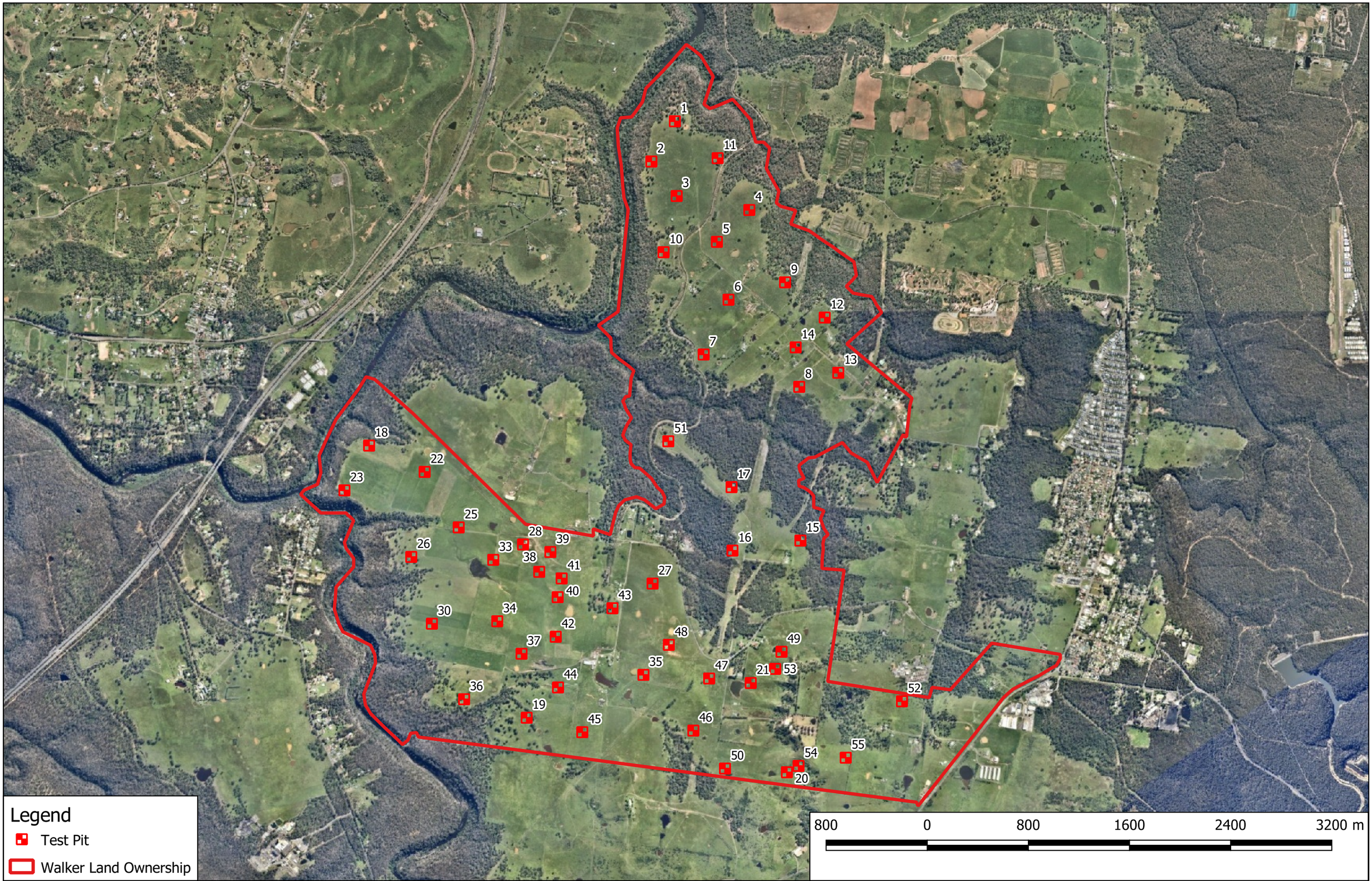
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Walker Corporation Pty Ltd		
OFFICE: Macarthur	DRAWN BY: ERN	
SCALE: As shown	DATE: 14 Sept 2020	

TITLE: **Site Location, Inaccessible Areas and General Site Photographs**
Proposed West Appin Precinct
Appin, NSW

N
MGA

PROJ. #: 76589.06	
DRAWING No:	1
REVISION:	1



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd	TITLE: **Test Pit Location Plan** **Proposed West Appin Precinct** **Appin, NSW**	N MGA
	OFFICE: Macarthur DRAWN BY: ABB		PROJ. #: 76589.06
	SCALE: As shown DATE: 14 Sept 2020		DRAWING No: 2
			REVISION: 0

Legend

Walker Land Ownership

Slope in Degrees

- 1-5
- 5-10
- 10-15
- 15-20
- 20-25
- 25-30
- >30

700 0 700 1400 2100 2800 m

N

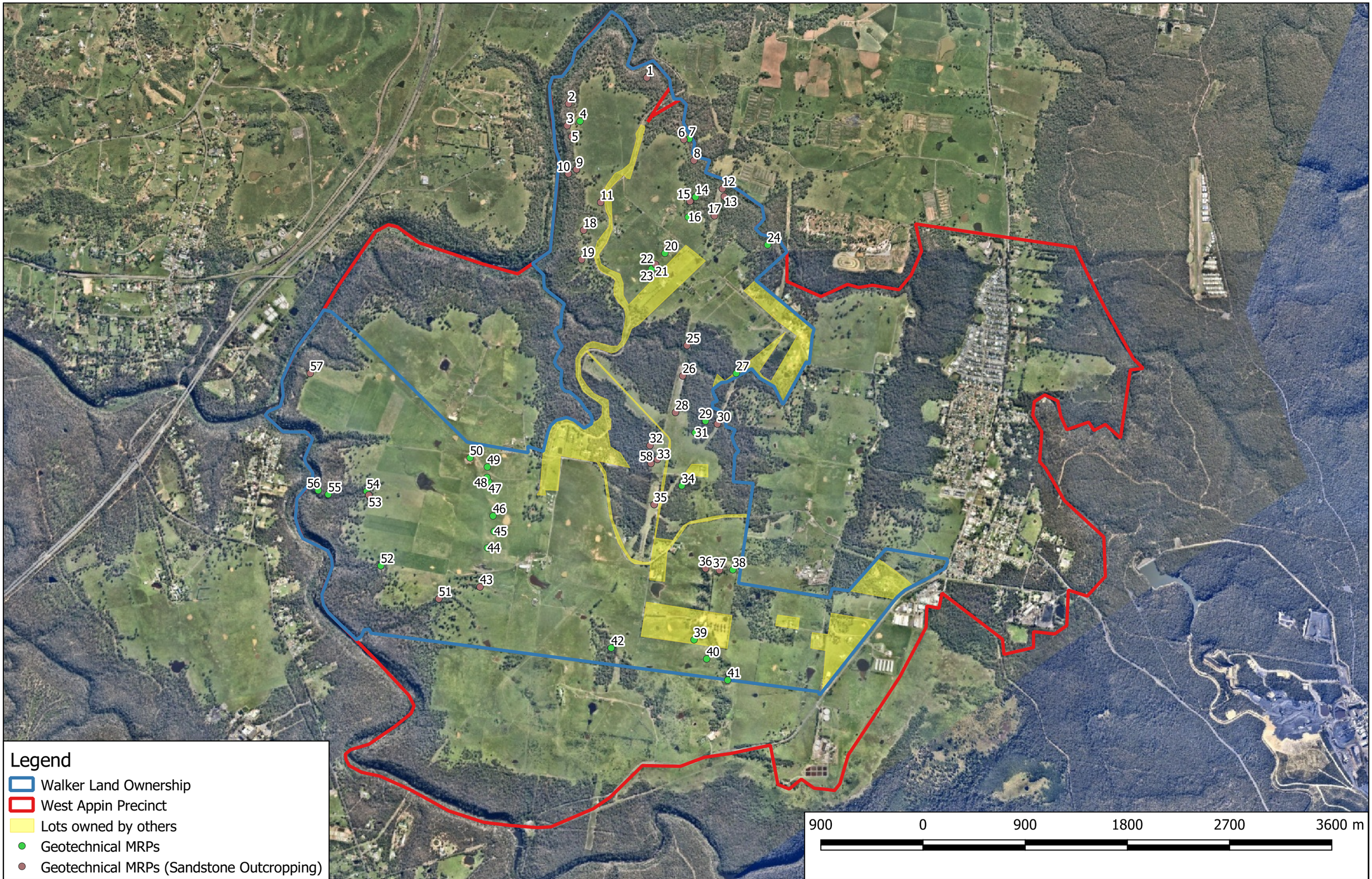
MGA

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Walker Corporation Pty Ltd		
OFFICE: Macarthur	DRAWN BY: ABB	
SCALE: As shown	DATE: 14 Sept 2020	

TITLE: **Slope Map (TIN Interpolation of 2m Contours)**
Proposed West Appin Precinct
Appin, NSW

PROJ. #: 76589.06	
DRAWING No:	3
REVISION:	0



Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Walker Corporation Pty Ltd		
OFFICE: Macarthur	DRAWN BY: ERN	
SCALE: As shown	DATE: 14 Sept 2020	

TITLE: **Geotechnical MRPs**
Proposed West Appin Precinct
Appin, NSW

N
MGA

PROJ. #:	76589.06
DRAWING No:	4
REVISION:	1

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

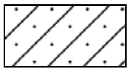
Soils


Topsoil

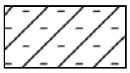

Peat


Clay

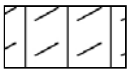

Silty clay

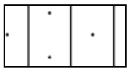

Sandy clay

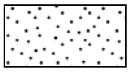

Gravelly clay

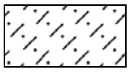

Shaly clay

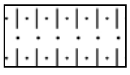

Silt


Clayey silt


Sandy silt

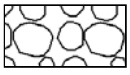

Sand

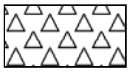

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

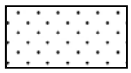

Talus

Sedimentary Rocks

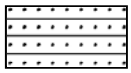

Boulder conglomerate

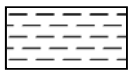

Conglomerate


Conglomeratic sandstone

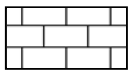

Sandstone


Siltstone


Laminite

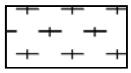

Mudstone, claystone, shale

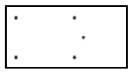

Coal


Limestone

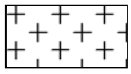
Metamorphic Rocks

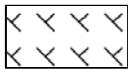

Slate, phyllite, schist

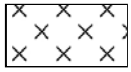

Gneiss

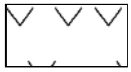

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq \text{100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Appendix B

General Site Photographs

Photo 1 - Telstra Pit (MRP1)

Photo 2 - General Vista South (MRP2)

Douglas Partners Geotechnics / Environment / Groundwater	General Site Photographs	PROJECT:	76589.06
	Proposed West Appin Precinct	PLATE No:	1
	Brooks Point Road, Appin, NSW	REV:	A
	CLIENT: Walker Corporation Pty Ltd	DATE:	Jul-20

Photo 3 - Access Road to Ousedale Creek (MRP3)

Photo 4 - Pipeline Crossing of Ousedale Creek (MRP4)

Douglas Partners Geotechnics | Environment | Groundwater	General Site Photographs Proposed West Appin Precinct Brooks Point Road, Appin, NSW CLIENT: Walker Corporation Pty Ltd	PROJECT: PLATE No: REV: DATE:	76589.06 2 A Jul-20

Photo 5 - Site Vista (MRP5)

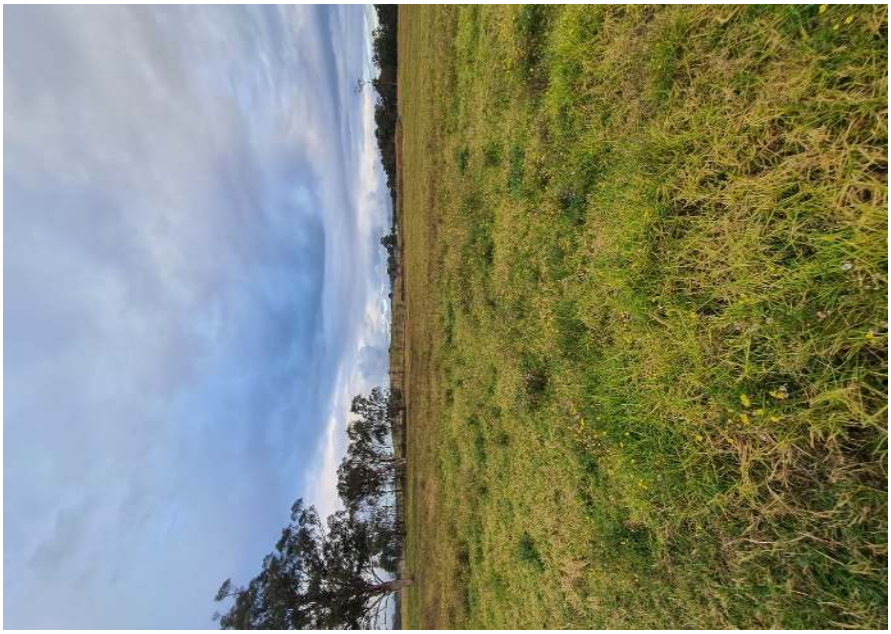


Photo 6 - Site Vista (MRP6)

Douglas Partners Geotechnics | Environment | Groundwater	General Site Photographs Proposed West Appin Precinct Brooks Point Road, Appin, NSW CLIENT: Walker Corporation Pty Ltd	PROJECT: PLATE No: REV: DATE:	76589.06 3 A Jul-20

Photo 7 - Vista (MRP7)

Photo 8 - Vista (MRP8)

Douglas Partners Geotechnics | Environment | Groundwater	General Site Photographs Proposed West Appin Precinct Brooks Point Road, Appin, NSW CLIENT: Walker Corporation Pty Ltd	PROJECT: 76589.06 PLATE No: 4 REV: A DATE: Jul-20

Photo 9 - Vista (MRP9)

Photo 10 - Vista (MRP10)

Douglas Partners Geotechnics | Environment | Groundwater	General Site Photographs Proposed West Appin Precinct Brooks Point Road, Appin, NSW CLIENT: Walker Corporation Pty Ltd	PROJECT: j8 PLATE No: 5 REV: A DATE: Jul-20

Photo 11 - Site Vista (MRP11)

Photo 12 - General Vista South (MRP12)

Douglas Partners Geotechnics / Environment / Groundwater	General Site Photographs Proposed West Appin Precinct Brooks Point Road, Appin, NSW CLIENT: Walker Corporation Pty Ltd	PROJECT: 76589.06 PLATE No: 6 REV: A DATE: Jul-20

Photo 13 - Vista of Ampitheatre (MRP13)

Photo 14 - Vista (MRP14)

Douglas Partners Geotechnics / Environment / Groundwater	General Site Photographs	PROJECT:	76589.06
	Proposed West Appin Precinct	PLATE No:	7
	Brooks Point Road, Appin, NSW	REV:	A
	CLIENT: Walker Corporation Pty Ltd	DATE:	Jul-20

Photo 15 - Vista (MRP15)

Photo 16 - Vista (MRP16)

Douglas Partners Geotechnics / Environment / Groundwater	General Site Photographs	PROJECT:	76589.06
	Proposed West Appin Precinct	PLATE No:	8
	Brooks Point Road, Appin, NSW	REV:	A
	CLIENT: Walker Corporation Pty Ltd	DATE:	Jul-20

Photo 17 - Vista (MRP17)

Photo 18 - Vista (MRP18)

Douglas Partners Geotechnics / Environment / Groundwater	General Site Photographs	PROJECT:	76589.06
	Proposed West Appin Precinct	PLATE No:	9
	Brooks Point Road, Appin, NSW	REV:	A
	CLIENT: Walker Corporation Pty Ltd	DATE:	Jul-20

Appendix C

Mapping Reference Point Photographs

Photo 1 - MRP1 outcroping sandstone continues

Photo 2 - MRP2 sandstone outcrops away from escarpment edge

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	1
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

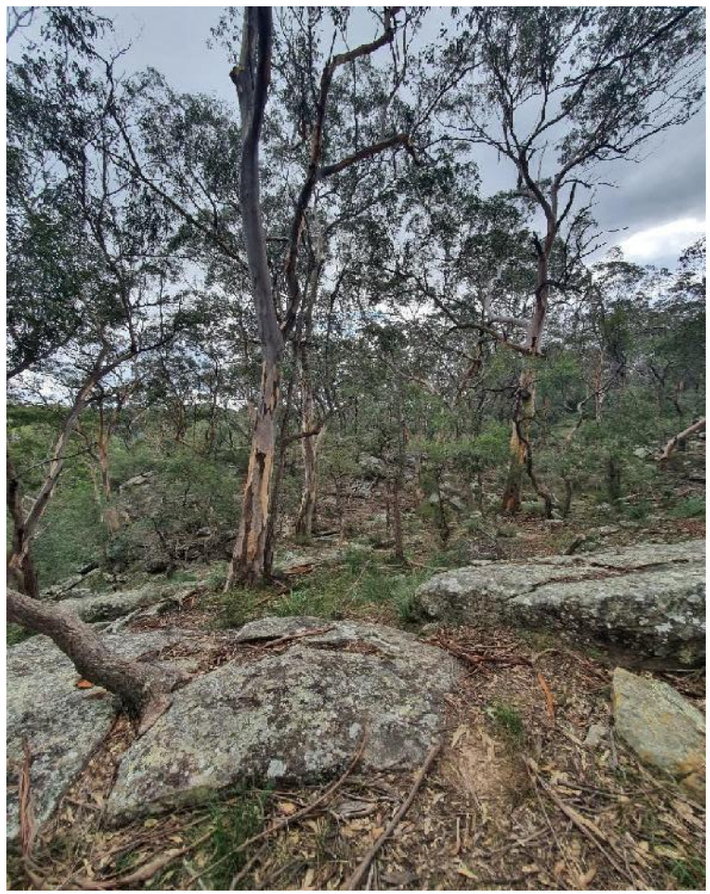


Photo 3 - MRP3 incised gully sandstone outcroping

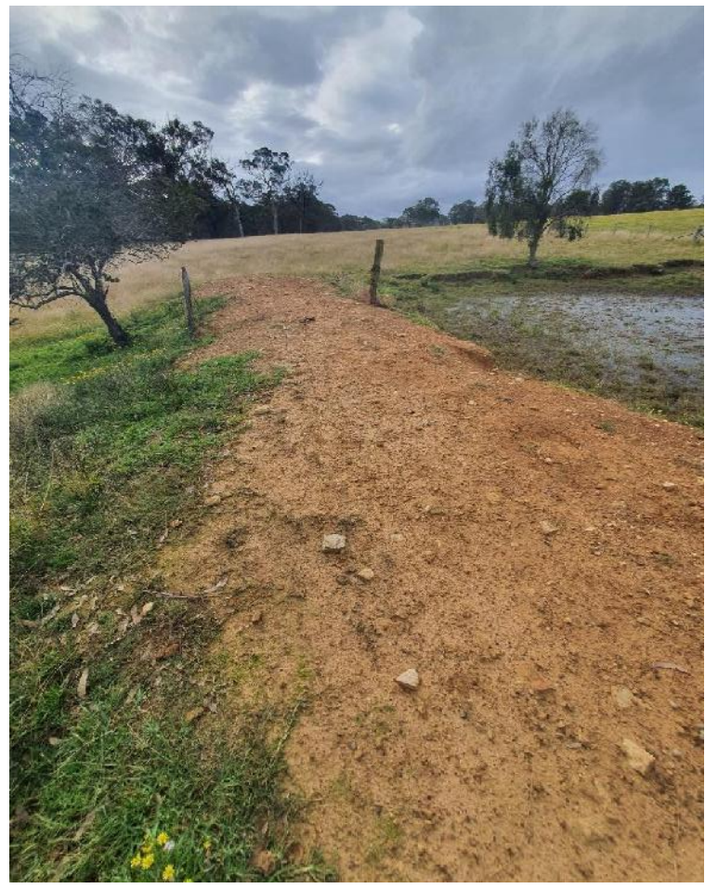


Photo 4 - MRP4 dam embankment won on site

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No: 76589.06
	OFFICE:	Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No: 2
	SCALE:	NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION: 0

Photo 5 - MRP5 sandstone outcropping continues

Photo 6 - MRP6 sandstone cobbles, dozed out from paddocks

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No: 76589.06
	OFFICE:	Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No: 3
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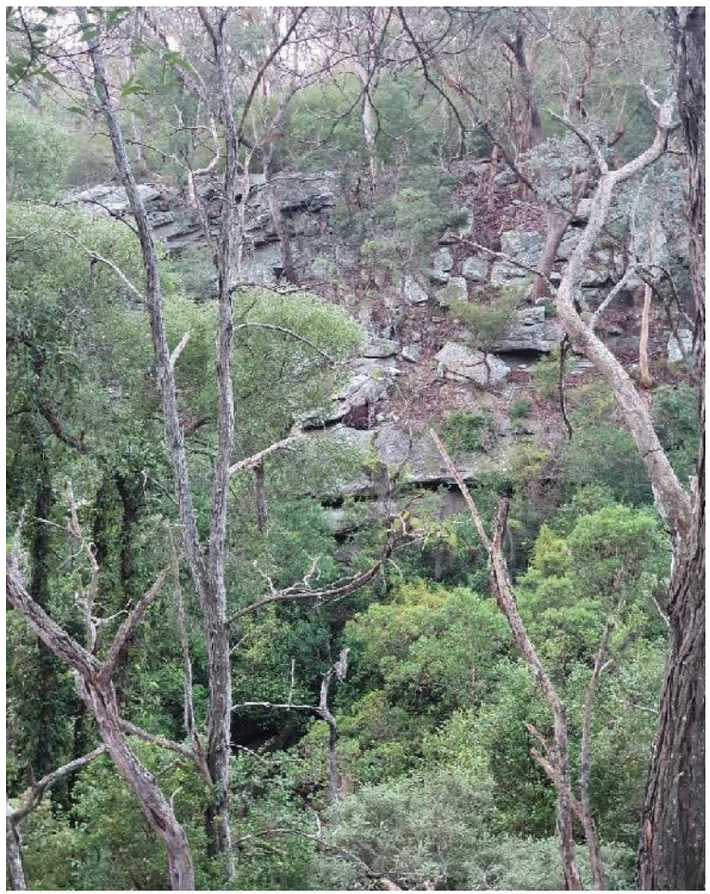

Photo 7 - MRP7 escarpment of ousdale ck

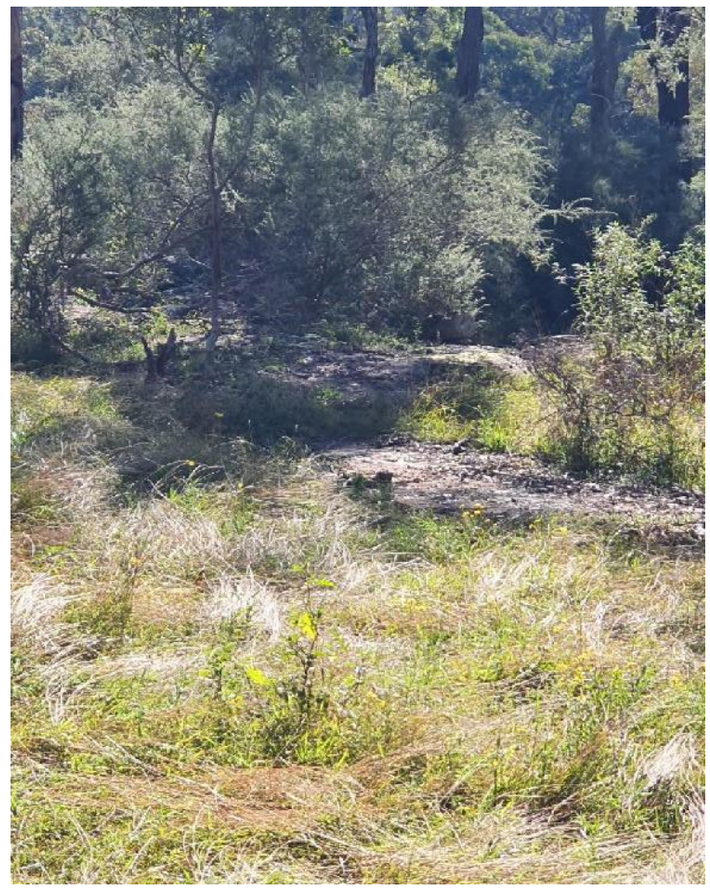

Photo 8 - MRP8 sandstone outcrop (7)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No: 76589.06
	OFFICE:	Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No: 4
	SCALE:	NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION: 0

Photo 9 - MRP9 sandstone outcrop

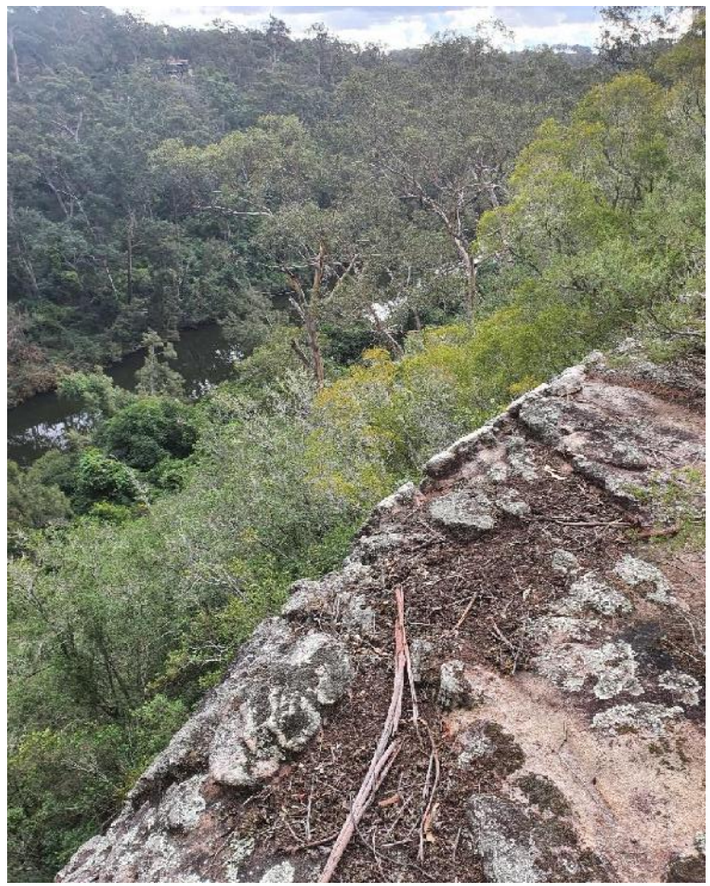

Photo 10 - MRP10 sandstone escarpment (2)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No: 76589.06
	OFFICE:	Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No: 5
	SCALE:	NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION: 0

Photo 11 - MRP11 rock outcrop

Photo 12 - MRP12 sandstone boulders on bank no major escarpment

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No: 76589.06
	OFFICE:	Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No: 6
	SCALE:	NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION: 0

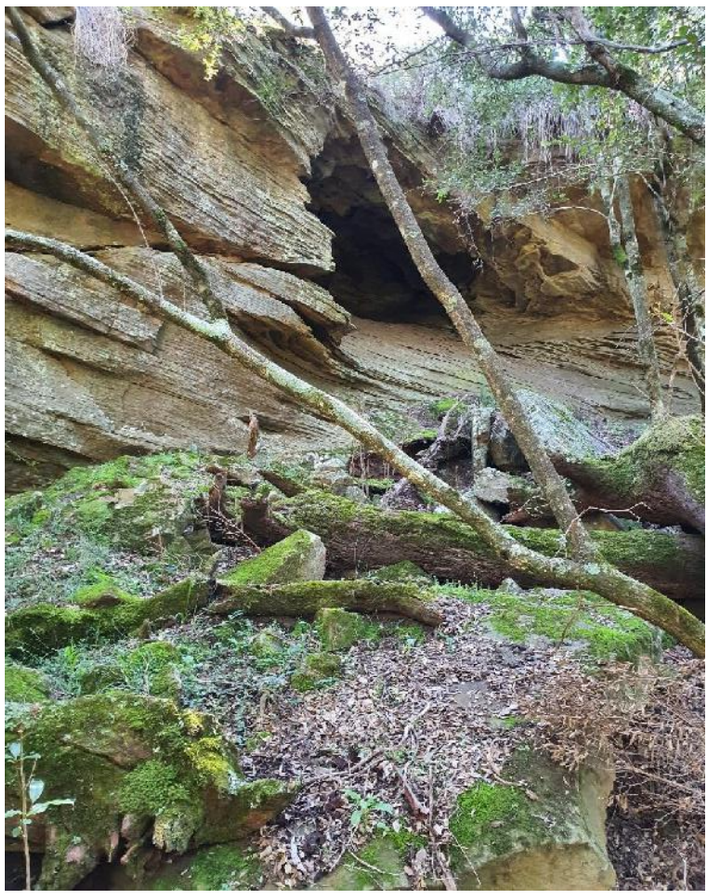

Photo 13 - MRP13 sandstone escarpment

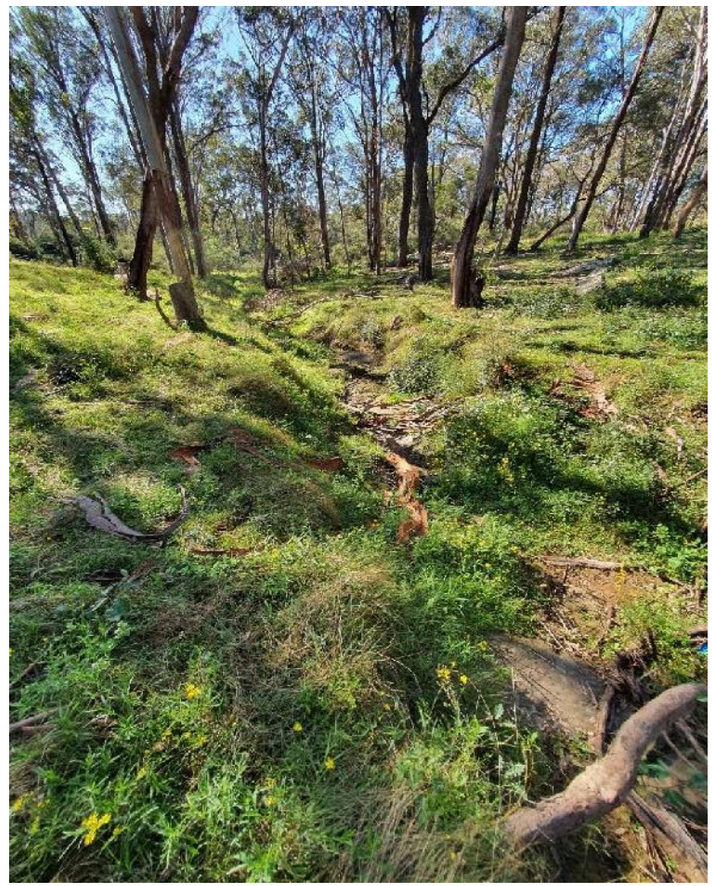

Photo 14 - MRP14 eroded creekline

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	7
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 15 - MRP15 sandstone outcrops

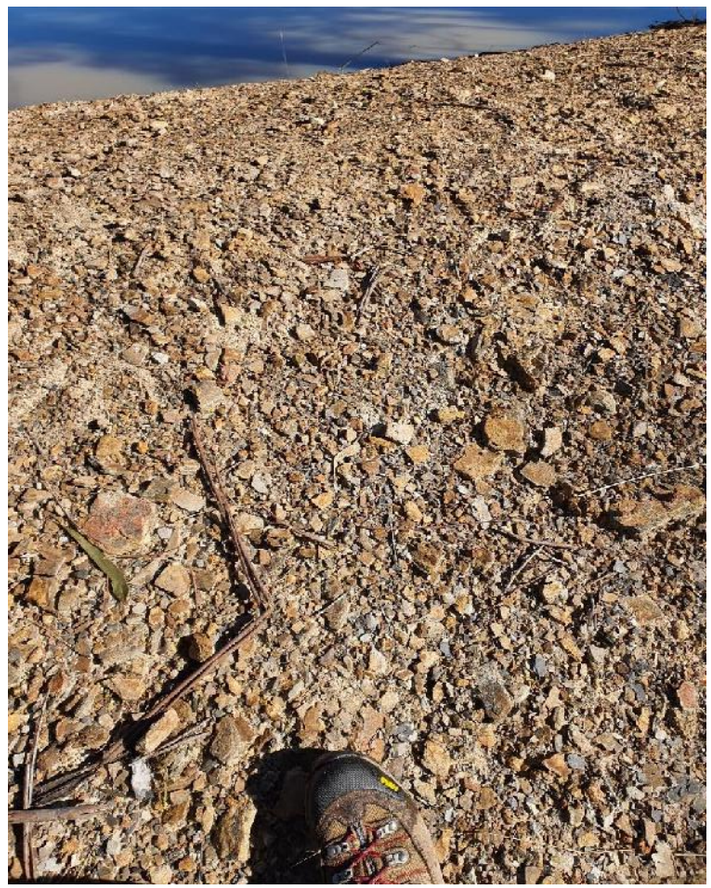

Photo 16 - MRP16 laminate excavated for dam embankment

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	8
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 17 - MRP17 sandstone outcrop (1)

Photo 18 - MRP18 sandstone outcroping

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	9
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 19 - MRP19 sandstone outcrop (2)

Photo 20 - MRP20 shale exposure

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	10
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 21 - MRP21 rock exposure

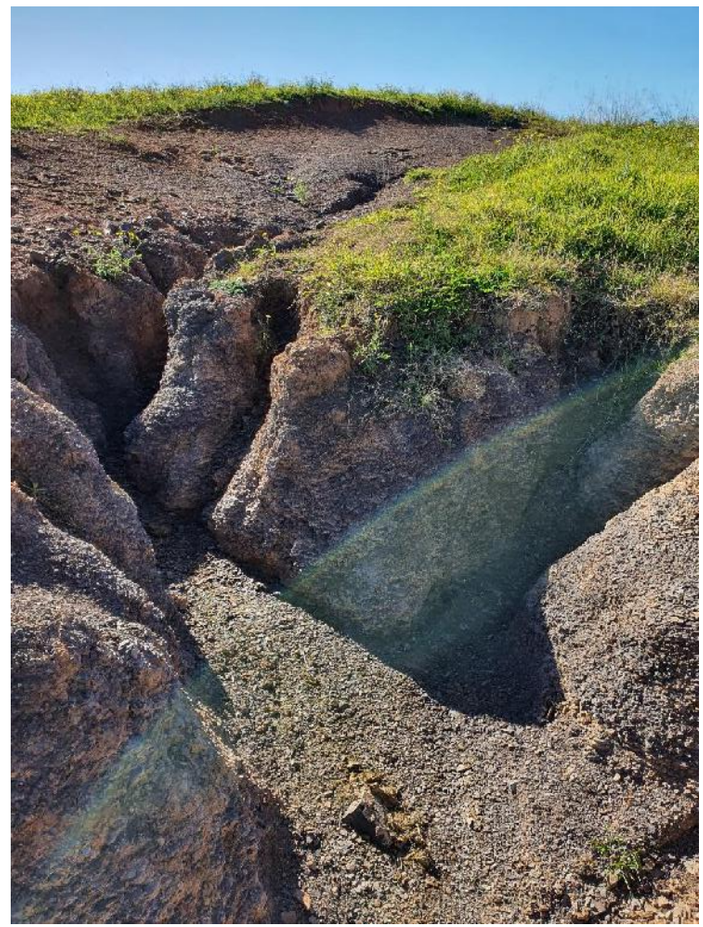

Photo 22 - MRP22 gully erosion

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	11
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 23 - MRP23 minor creep movement

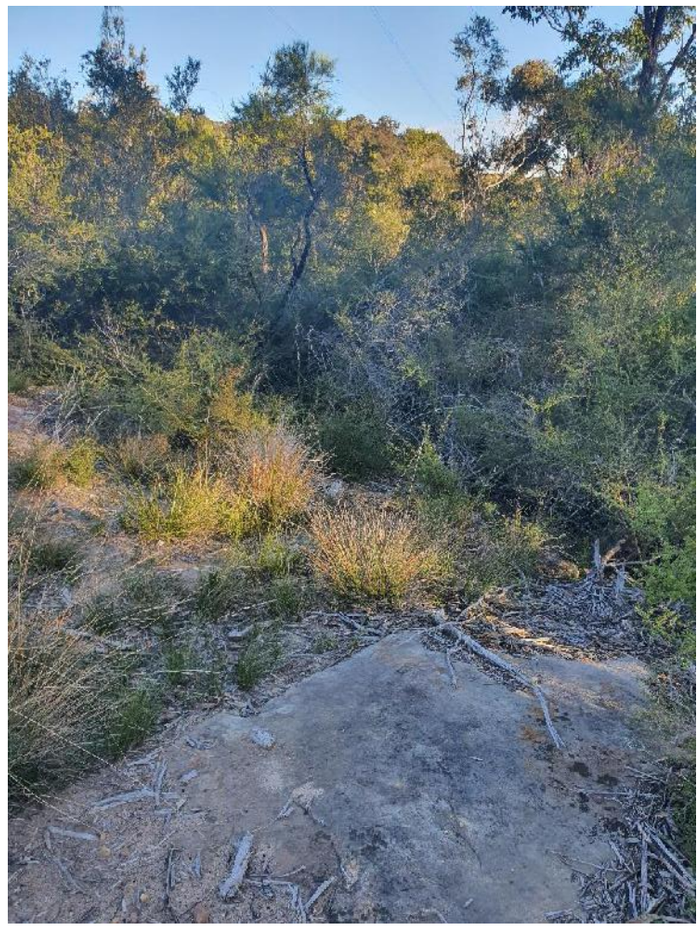

Photo 24 - MRP25 sandstone outcrop (8)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	12
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 25 - MRP26 sandstone exposure

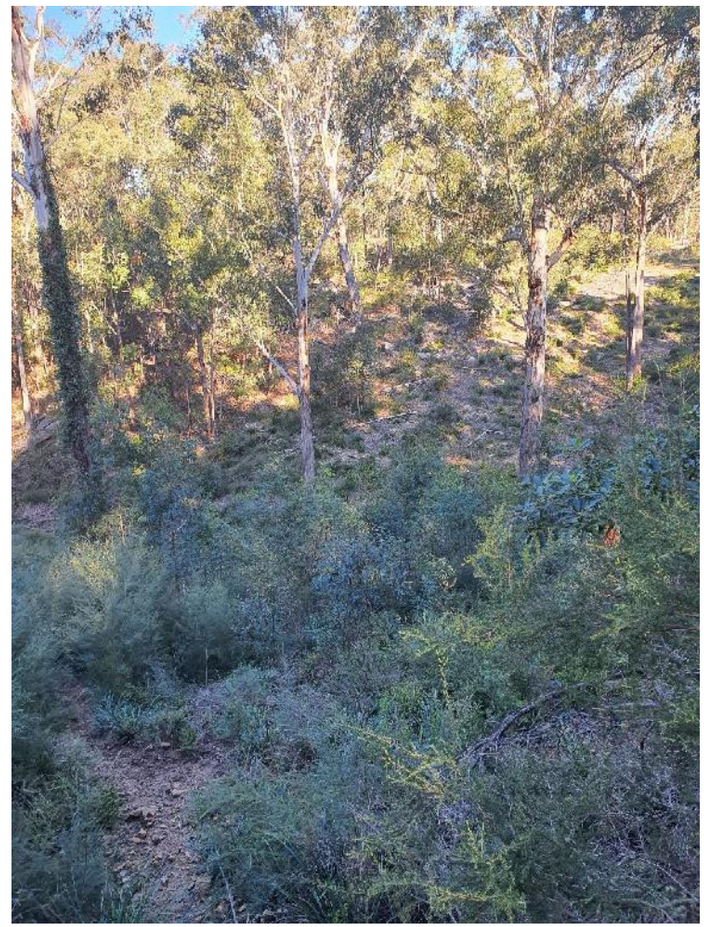

Photo 26 - MRP27 creekline (1)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	13
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 27 - MRP28 sandstone outcrop (5)

Photo 28 - MRP29 typical creek on sandstone

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	14
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 29 - MRP30 sandstone outcrop (4)

Photo 30 - MRP31 weathered shale used as dam embankment material

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	15
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

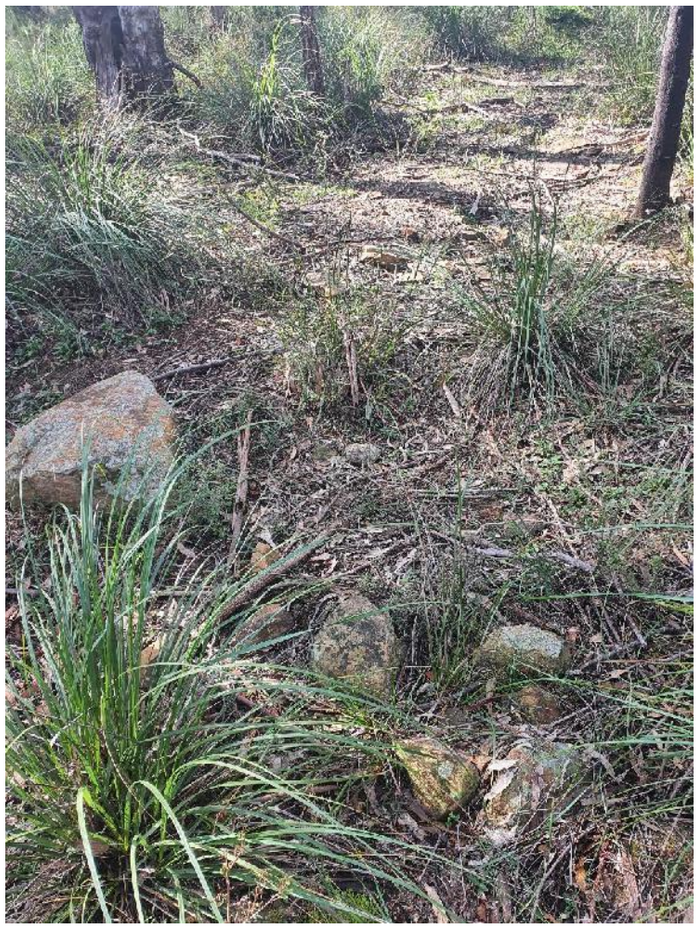

Photo 31 - MRP32 sandstone cobbles

Photo 32 - MRP33 sandstone outcrop (3)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	16
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 33 - MRP34 soil exposure deep topsoil in creekline

Photo 34 - MRP35 sandstone outcrop (6)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	17
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

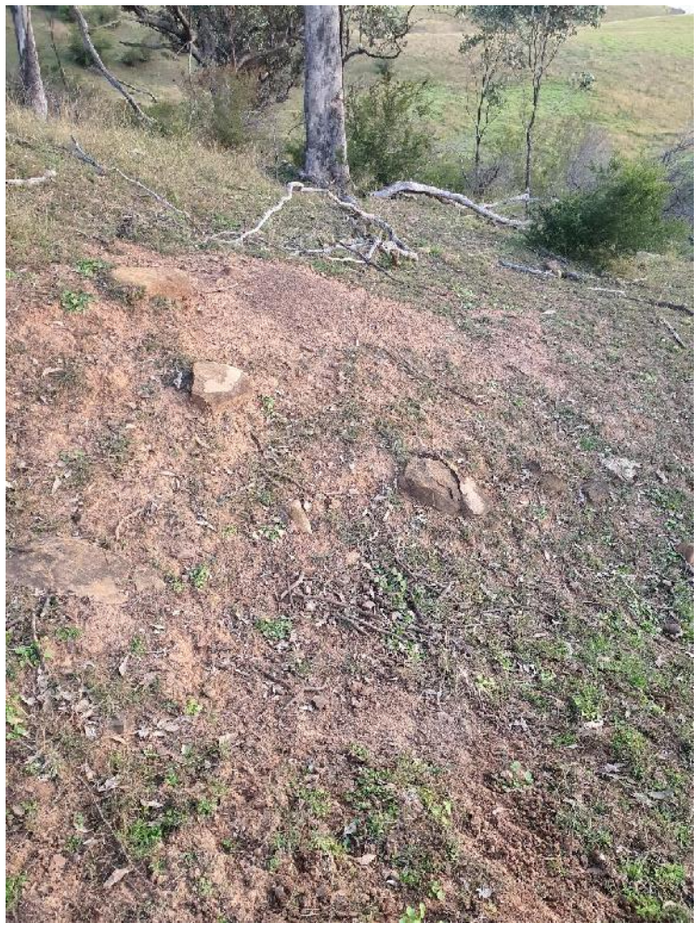

Photo 35 - MRP36 sandstone blocks on steep ground

Photo 36 - MRP37 relic slide, sandstone blocks on surface

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	18
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 37 - MRP38 creep slope (1)

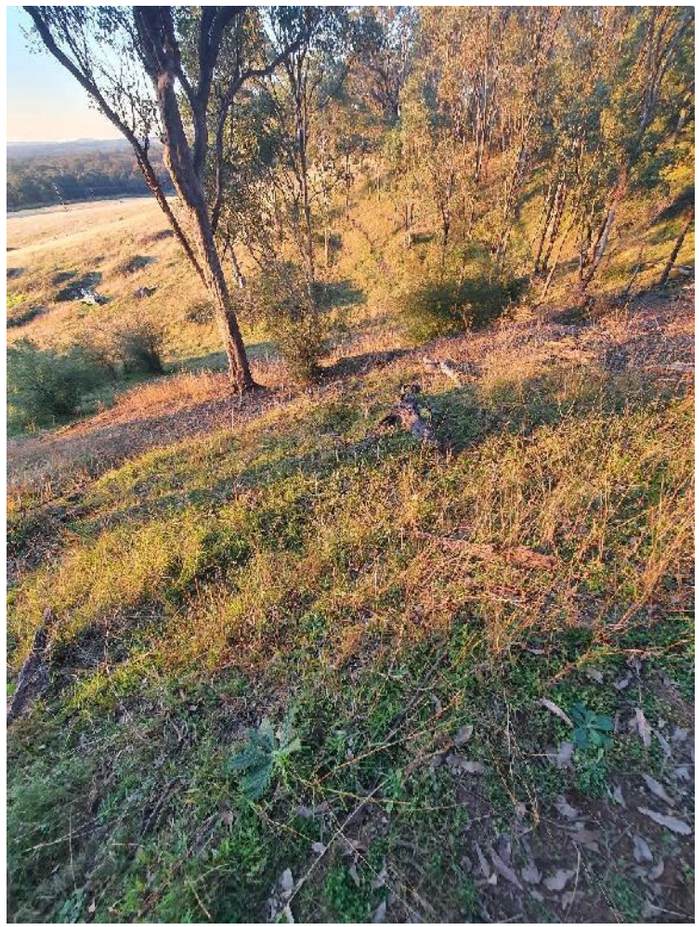

Photo 38 - MRP38 creep slope (1)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	19
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 39 - MRP40 Landslide complex

Photo 40 - MRP41 slumping (7)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	20
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 41 - MRP42 creekline (2)

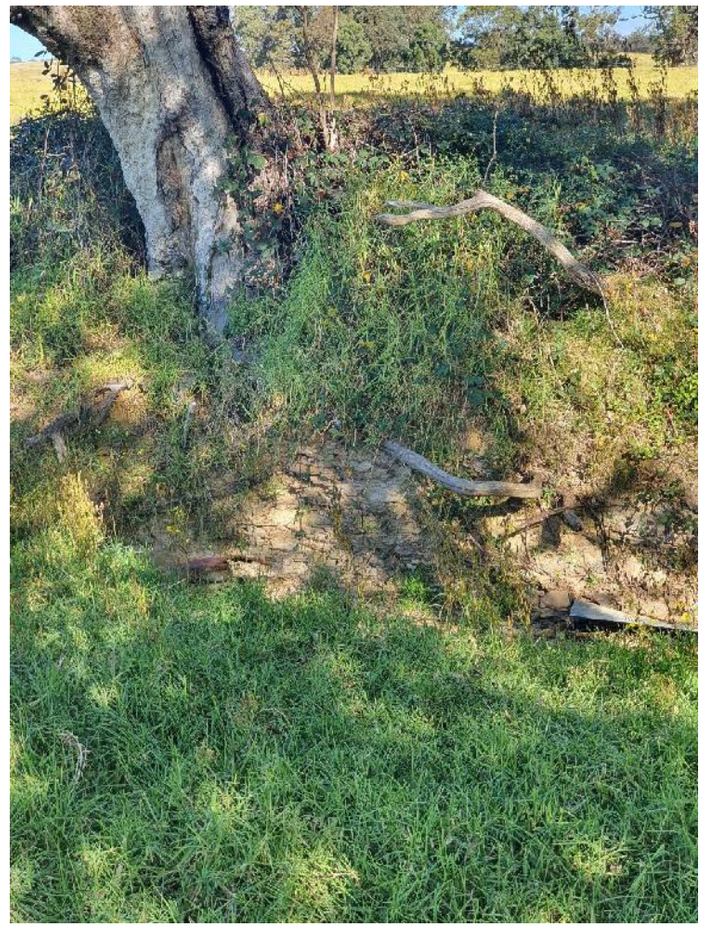

Photo 42 - MRP43 rock exposure in creek bank

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	21
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 43 - MRP44 slumping (6)

Photo 44 - MRP45 slumping (6)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	22
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 45 - MRP46 slumping (6)

Photo 46 - MRP47 slumping (6)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	23
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 47 - MRP48 slumping (6)

Photo 48 - MRP49 slumping (6)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	24
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

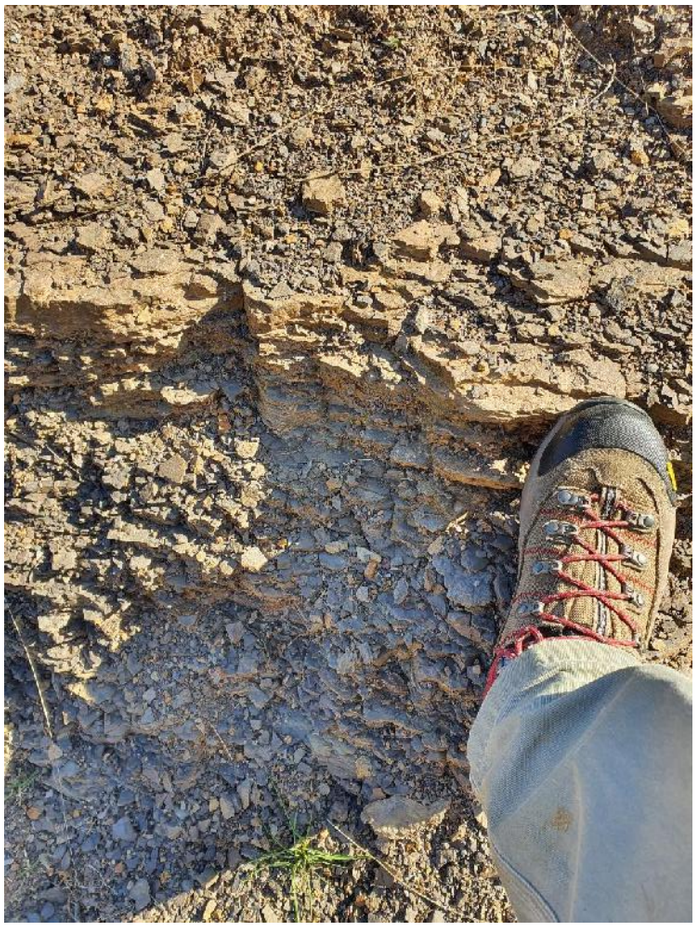

Photo 49 - MRP50 shale pit (1)

Photo 50 - MRP50 shale pit (1)

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT:	Walker Corporation Pty Ltd	Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	25
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 51 - MRP51 sandstone outcrop (9)

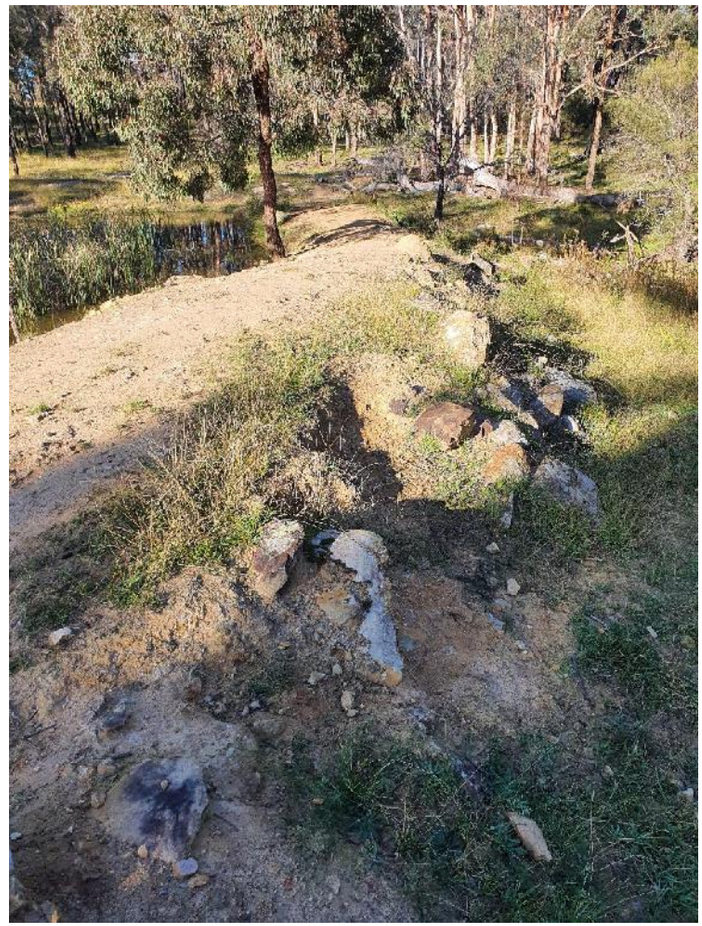

Photo 52 - MRP52 boulders in dam wall

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	26
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

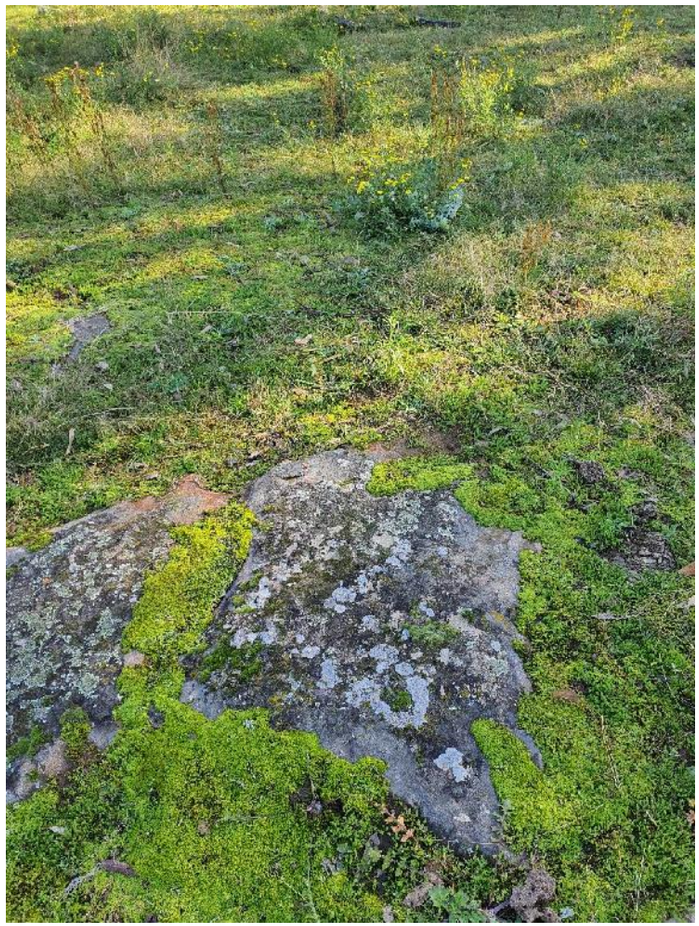

Photo 53 - MRP53 sandstone outcrop (10)

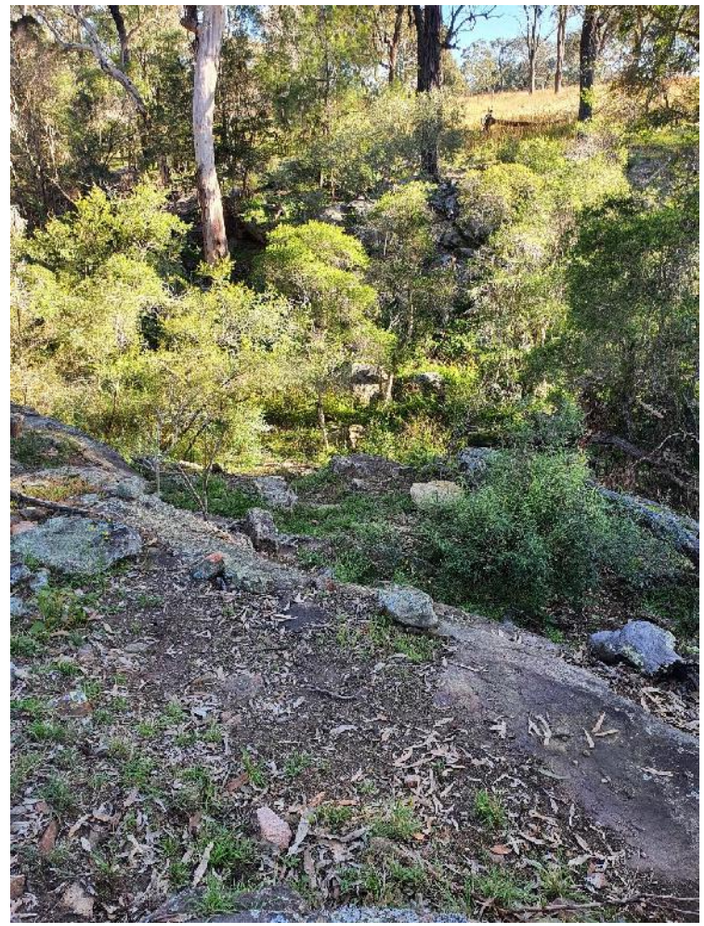

Photo 54 - MRP54 incised creeklines

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	27
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 55 - MRP55 Sandy Hawkesbury group soil

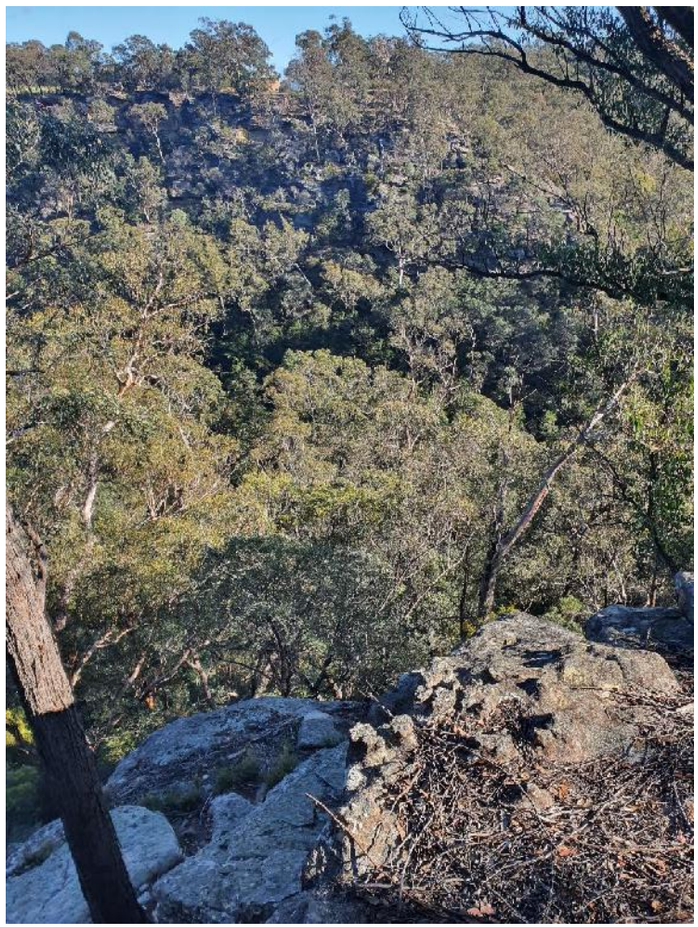

Photo 56 - MRP56 sandstone escarpments of the cataract

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	28
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Photo 57 - MRP57 sandstone outcrop (11)

Photo 58 - MRP55 Sandy Hawkesbury group soil

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Walker Corporation Pty Ltd		Site Photographs, Geotechnical MRPs	PROJECT No:	76589.06
	OFFICE: Macarthur	PREPARED BY: ERN	Proposed West Appin Precinct	PLATE No:	29
	SCALE: NTS	DATE: Jul 2020	Brooks Point Road, Appin, NSW	REVISION:	0

Appendix D

Test Pit Logs

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 129.2 mAHD
EASTING: 292816
NORTHING: 6216908
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
129	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown, w~PL, stiff to very stiff, residual		D	0.5				
				U_{50}					
		- becoming grey and red-brown, with extremely weathered shale bands below 0.7m			0.75				
	1			D/B	1.0				1
128	1.2	SHALE: grey and brown, very low strength, highly weathered with low strength, moderately weathered and extremely weathered bands							
				D	1.5				
	2			D	2.0				2
127	2.2	SANDSTONE: medium grained, grey and red, low strength, moderately weathered, with medium strength, moderately weathered bands							
				D	2.5				
	2.7	Bore discontinued at 2.7m		D	2.7				
		- refusal on medium strength sandstone							
126	3								3

5 10 15 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 123.0 mAHD
EASTING: 292630
NORTHING: 6216591
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
123		TOPSOIL/Clayey Silt ML: low plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, brown, trace gravel, w>>PL, stiff, residual		D	0.5				
122	1	- becoming very stiff below 0.9m		D	1.0				1
	1.2	SANDSTONE: fine grained, grey and brown, low strength, moderately weathered, with extremely weathered bands							
		- becoming medium strength, moderately weathered below 1.5m		D	1.5				
	1.8	Bore discontinued at 1.8m		D	1.8				
121	2	- refusal on medium strength sandstone							2
120	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 127.9 mAHD
EASTING: 292830
NORTHING: 6216318
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
127	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown and red, w~PL, stiff, residual		D	0.5				
				U_{50}	0.75				
		- becoming brown, red and grey, trace ironstone gravel below 0.8m							
	1			D	1.0				1
		- becoming brown mottled grey, with extremely weathered shale bands below 1.2m							
		- with brown and grey, medium strength, moderately weathered sandstone bands below 1.4m		D/B	1.5				
	1.7	SANDSTONE: fine grained, grey and brown, medium strength, moderately weathered, with extremely weathered bands		D	1.8				
126	1.8	Bore discontinued at 1.8m							
	2	- refusal on medium strength sandstone							2
125	3								3
124									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 132.2 mAHD
EASTING: 293405
NORTHING: 6216207
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
132	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown, w~PL, stiff, residual							
		- becoming very stiff below 0.4m		D	0.5				
		- becoming hard below 0.7m							
	1	- with red and grey, very low strength, highly weathered and low strength, moderately weathered sandstone bands below 0.9m		D	1.0				1
131		- becoming very stiff, with extremely weathered shale bands and iron indurated bands below 1.5m		D/B	1.5		pp = 200-300		
	1.9	SANDSTONE: fine grained, brown and grey, low strength, moderately weathered, with extremely weathered bands		D	2.0				2
130		- becoming brown and dark grey below 2.3m		D	2.5				
	2.7	Bore discontinued at 2.7m - refusal on medium strength sandstone							3
129									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 129.6 mAHD
EASTING: 293148
NORTHING: 6215955
DIP/AZIMUTH: 90°/--

BORE No: 5
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
129	0.25	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown mottled grey, w~PL, stiff, residual		D	0.5				
					0.6				
		- becoming brown and grey, with very stiff to hard extremely weathered shale bands below 0.6m		U_{50}					
					0.8				
	1.0	SHALE: grey, low strength, moderately weathered		D	1.0		pp = 350		
		- becoming medium strength, slightly weathered below 1.2m							
	1.3	Bore discontinued at 1.3m - refusal on medium strength shale		D	1.3				

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 144.5 mAHD
EASTING: 293240
NORTHING: 6215498
DIP/AZIMUTH: 90°/--

BORE No: 6
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, red-brown, w~PL, very stiff, residual							
144		- becoming stiff between 0.45m and 0.6m		D	0.5				
					0.6				
				U_{50}					
					0.85				
	1			D	1.0				1
		- becoming brown and grey below 1.3m							
143				D	1.5		pp = 300-400		
		- with extremely weathered shale bands below 1.8m							
	2			D	2.0		pp = 200-300		2
	2.1	SHALE: grey, low strength, slightly weathered, with medium strength, slightly weathered bands							
142	2.5	Bore discontinued at 2.5m		D	2.5				
		- refusal on medium strength shale							
	3								3
141									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 131.9 mAHD
EASTING: 293043
NORTHING: 6215065
DIP/AZIMUTH: 90°/--

BORE No: 7
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
131	0.0	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, brown, w~PL, stiff, residual		D	0.5				
	1.0	- becoming red and brown, hard below 0.9m		D/B	1.0				
	1.1	SANDSTONE: fine grained, brown and grey, low strength, moderately weathered, with extremely weathered bands						▽	
	1.5	Bore discontinued at 1.5m - refusal on medium strength sandstone		D	1.5				
130	2.0								
129	3.0								
128									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: Seepage at 1.4m

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 157.0 mAHD
EASTING: 293799
NORTHING: 6214809
DIP/AZIMUTH: 90°/--

BORE No: 8
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
157		TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, dark brown and red, w~PL, very stiff, residual		D	0.5				
		- becoming red mottled grey below 0.7m							
		- becoming stiff below 0.9m							
156	1	- with extremely weathered shale bands below 1.0m		D/B	1.0				1
	1.3	SHALE: grey and brown, low strength, moderately weathered, with very low strength, highly weathered and extremely weathered bands		D	1.5				
155	2			D	2.0				2
		- becoming medium strength, slightly weathered below 2.3m							
	2.5	Bore discontinued at 2.5m		D	2.5				
		- refusal on medium strength shale							
154	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 144.7 mAHD
EASTING: 293688
NORTHING: 6215635
DIP/AZIMUTH: 90°/--

BORE No: 9
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
144.7	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, with sandstone gravel and cobbles, w~PL, stiff, residual							
		- becoming very stiff below 0.4m		D	0.5				
		- becoming hard below 0.6m							
144	1.0	SANDSTONE: fine grained, brown and grey, very low strength, highly weathered, with extremely weathered bands		D	1.0				
		- becoming grey, low strength, moderately weathered below 1.3m		D	1.5				
143	1.7	Bore discontinued at 1.7m - refusal on medium strength sandstone		D	1.7				
142									
141									

5 10 15 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 122.2 mAHD
EASTING: 292726
NORTHING: 6215873
DIP/AZIMUTH: 90°/--

BORE No: 10
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
122	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown, w~PL, stiff, residual		D	0.5				
		- becoming red-brown and grey, with extremely weathered shale bands and iron indurated bands below 0.7m		D	1.0				
121	1.2	SANDSTONE: medium grained, grey and brown, medium strength, moderately weathered							
	1.3	Bore discontinued at 1.3m - refusal on medium strength sandstone							
120									
119									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 129.1 mAHD
EASTING: 293154
NORTHING: 6216617
DIP/AZIMUTH: 90°/--

BORE No: 11
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
129	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown and red, w~PL, stiff, residual		D	0.5				
		- with extremely weathered shale bands below 0.8m		D	1.0				
128	1.3	SANDSTONE: fine grained, brown and grey, very low strength, highly weathered, with low strength, moderately weathered bands		D	1.5				
		- becoming low strength, moderately weathered, with medium strength, moderately weathered bands below 1.7m		D	1.8				
	1.9	Bore discontinued at 1.9m - refusal on medium strength sandstone							
127									
126									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2, 3

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 149.6 mAHD
EASTING: 294001
NORTHING: 6215357
DIP/AZIMUTH: 90°/--

BORE No: 12
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
149	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown and red, w~PL, stiff, residual		D/B	0.5				
		- becoming very stiff between 0.5 - 0.8m							
	1			D	1.0				1
		- becoming brown and red mottled grey below 1.4m		D	1.5				
148	1.8	SANDSTONE: medium grained, grey, low strength, moderately weathered, with medium strength, slightly weathered bands							
	2			D	2.0				2
	2.1	Bore discontinued at 2.1m							
147		- refusal on medium strength sandstone							
	3								3
146									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 162.2 mAHD
EASTING: 294109
NORTHING: 6214920
DIP/AZIMUTH: 90°/--

BORE No: 13
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
162	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown, w~PL, stiff, residual		D	0.5				
161	1			D	1.0				1
	1.3	SHALE: brown and grey, very low strength, highly weathered, with extremely weathered bands		D	1.5				
160	2			D	2.0				2
		- becoming low strength, moderately weathered below 2.3m		D	2.5				
	2.7	Bore discontinued at 2.7m - refusal on medium strength shale							
159	3								3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 150.7 mAHD
EASTING: 293771
NORTHING: 6215121
DIP/AZIMUTH: 90°/--

BORE No: 14
PROJECT No: 76589.06
DATE: 3/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
150	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown, w~PL, stiff, residual		D	0.5				
					0.6				
				U_{50}					
		- with hard extremely weathered shale bands below 0.8m			0.85				
	1			D	1.0				1
	1.1	SHALE: grey, low strength, moderately weathered, with very low strength, highly weathered and extremely weathered bands							
149				D	1.5				
	2			D	2.0				2
				D	2.5				
148		- becoming medium strength, moderately weathered below 2.6m							
	3	3.0 Bore discontinued at 3.0m		D	3.0				3
		- limit of investigation							
147									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 179.3 mAHD
EASTING: 293809
NORTHING: 6213593
DIP/AZIMUTH: 90°/--

BORE No: 15
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
179	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red-brown, w~PL, stiff, residual		D	0.5				
		- becoming very stiff below 0.6m		U_{50}	0.75				
		- becoming hard below 0.8m							
	1			D	1.0				1
178	1.3	SANDSTONE: medium grained, red and grey, low strength, moderately weathered, with extremely weathered shale bands		D	1.5				
	1.7	- becoming medium strength, moderately weathered, with extremely weathered sandstone bands below 1.6m		D/B	1.7				
		Bore discontinued at 1.7m - refusal on medium strength sandstone							
	2								2
177									
	3								3
176									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: Seepage at 1.7m

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 155.2 mAHD
EASTING: 293272
NORTHING: 6213514
DIP/AZIMUTH: 90°/--

BORE No: 16
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
155	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets							
		Silty CLAY CI: medium plasticity, brown mottled red, w~PL, stiff to very stiff, residual		D	0.5				
		- with sandstone gravel between 0.8 - 1.1m							
	1	- becoming red-brown and grey below 1.0m		D	1.0				1
154	1.2								
	1.3	SANDSTONE: medium grained, brown and grey, low strength, moderately weathered, with extremely weathered bands and extremely weathered shale bands		D	1.3				
		Bore discontinued at 1.2m - refusal on medium strength sandstone							
	2								2
153									
	3								3
152									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: Seepage at 1.2m

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 150.7 mAHD
EASTING: 293264
NORTHING: 6214016
DIP/AZIMUTH: 90°/--

BORE No: 17
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
150	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, red, w~pl, stiff, residual		D	0.5				
				U_{50}	0.75				
		- becoming red mottled grey below 0.8m		D	1.0				
	1.2	SANDSTONE: fine grained, brown and grey, low strength, moderately weathered, with extremely weathered bands		B	1.4				
149	1.5	Bore discontinued at 1.5m - refusal on medium strength sandstone		D	1.5				
148									
147									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 127.3 mAHD
EASTING: 290397
NORTHING: 6214344
DIP/AZIMUTH: 90°/--

BORE No: 18
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
127	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w~PL, stiff, residual		D	0.5				
	0.7	Sandy CLAY CI: medium plasticity, brown, red and grey, trace sandstone gravel, w~PL, very stiff		D/B	1.0				
	1.1	SANDSTONE: medium grained, brown and grey, low strength, highly weathered, with extremely weathered bands							
126	1.3	Bore discontinued at 1.3m - refusal on medium strength sandstone		D	1.3				
125									
124									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 152.8 mAHD
EASTING: 291643
NORTHING: 6212193
DIP/AZIMUTH: 90°/--

BORE No: 19
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
152	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with sand and rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w~PL, very stiff, residual							
		- becoming very stiff below 0.5m		D	0.5		pp = 250		
	0.8	Sandy CLAY CI: medium plasticity, red-brown and grey, trace gravel, w~PL, stiff							
	1	- with extremely weathered sandstone bands below 1.0m		D	1.0		pp = 200-250		1
	1.1	Bore discontinued at 1.1m - refusal on medium strength sandstone							
151	2								2
150	3								3
149									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 205.8 mAHD
EASTING: 293702
NORTHING: 6211761
DIP/AZIMUTH: 90°/--

BORE No: 20
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
205.8	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, with shale gravel, w~PL, stiff, colluvial		D	0.5				
		- becoming very stiff below 0.5m							
205	0.8	SHALE: brown and dark grey, low strength, highly weathered to moderately weathered, with medium strength, moderately weathered and very low strength, highly weathered bands		D	1.0			▽	
	1			D/B	1.5				
204									
	2			D	2.0				
				D	2.5				
203	3								
	3.0	Bore discontinued at 3.0m - limit of investigation		D	3.0				
202									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: Seepage at 0.8m; interface of soil and rock

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 186.2 mAHD
EASTING: 293416
NORTHING: 6212467
DIP/AZIMUTH: 90°/--

BORE No: 21
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
186	0.3	FILL/TOPSOIL: Silty CLAY CI, medium plasticity, dark brown, with rootlets, w~PL							
		FILL/Silty CLAY CI: medium plasticity, dark brown, trace gravel, w<<PL, stiff		D	0.5				
	1.0	Silty CLAY CI: medium plasticity, dark brown mottled grey, w<PL, very stiff, residual		D	1.0				
185		- becoming hard below 1.5m		D	1.5		pp = 400-500		
	2			D	2.0		pp = 400-500		
184				D	2.5		pp >600		
	3.0	Bore discontinued at 3.0m - limit of investigation		D	3.0		pp = 400-500		
183									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 136.9 mAHD
EASTING: 290836
NORTHING: 6214136
DIP/AZIMUTH: 90°/--

BORE No: 22
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
		TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
	0.4	Silty CLAY CI: medium plasticity, red-brown, w<<PL, stiff to very stiff, residual		D	0.5				
136	1			D	1.0				1
		- becoming red and grey, with extremely weathered shale bands below 1.3m		D/B	1.5		pp >600		
135	2	- becoming grey mottled red below 1.9m		D	2.0		pp = 500-600		2
				D	2.5		pp >600		
134	3			D	3.0		pp >600		3
	3.0	Bore discontinued at 3.0m - limit of investigation							
133									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 134.5 mAHD
EASTING: 290202
NORTHING: 6213991
DIP/AZIMUTH: 90°/--

BORE No: 23
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
134	0.2	TOPSOIL/Sandy CLAY CI: medium plasticity, brown, with gravel, trace rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown mottled grey, w~PL, stiff, residual							
		- becoming very stiff below 0.4m		U_{50}	0.4				
	0.6			D	0.5				
	0.7	SANDSTONE: medium grained, brown and grey, medium strength, moderately weathered							
		Bore discontinued at 0.7m - refusal on medium strength sandstone							
133	1								
132	2								
131	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 135.5 mAHD
EASTING: 291106
NORTHING: 6213698
DIP/AZIMUTH: 90°/--

BORE No: 25
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
135.5	0.25	FILL/TOPSOIL: Silty CLAY CI: medium plasticity, dark brown, w~PL							
		FILL/Silty CLAY CI: medium plasticity, dark brown, w~PL, appears to be well compacted							
135	0.5	Silty CLAY CI: medium plasticity, brown, w~PL, stiff to very stiff, residual		D	0.5				
					0.6				
				U_{50}					
					0.85				
	1			D/B	1.0				1
	1.2	SANDSTONE: medium grained, brown and grey, low strength, moderately weathered, with extremely weathered bands							
134	1.5	- becoming medium strength, moderately weathered below 1.4m		D	1.5				
		Bore discontinued at 1.5m - refusal on medium strength sandstone							
	2								2
133									
	3								3
132									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 143.0 mAHD
EASTING: 290730
NORTHING: 6213464
DIP/AZIMUTH: 90°/--

BORE No: 26
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
143	0.1	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown, w<<PL, stiff, residual		D	0.5				
		- becoming brown and grey, w~PL below 0.8m							
142	1	- with extremely weathered and low strength, moderately weathered sandstone bands below 0.9m		D	1.0				1
	1.2	Bore discontinued at 1.2m		D	1.2				
		- refusal on medium strength sandstone							
141	2								2
140	3								3

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 150.0 mAHD
EASTING: 292639
NORTHING: 6213253
DIP/AZIMUTH: 90°/--

BORE No: 27
PROJECT No: 76589.06
DATE: 25/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
150	0	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.2	Silty CLAY CI: medium plasticity, brown, with shale gravel and rootlets, w~PL, stiff to very stiff, possible colluvium		D	0.5				
	0.6	SHALE: brown and grey, low strength, moderately weathered, with very low strength, highly weathered bands							
149	1			D	1.0				1
		- becoming dark grey, medium strength, slightly weathered below 1.3m		D	1.5				
148	2			D	2.0				2
	2.5	Bore discontinued at 2.5m - refusal on medium strength sandstone		D	2.5				
147	3								3

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 161.3 mAHD
EASTING: 291614
NORTHING: 6213563
DIP/AZIMUTH: 90°/--

BORE No: 28
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
161	0.15	FILL/TOPSOIL: Silty CLAY CI, medium plasticity, dark brown, with rootlets, w<<PL							
		FILL/Silty CLAY CI: medium plasticity, dark brown, with gravel, trace cobbles, w~PL, typically well compacted		D	0.5				
	1			D	1.0				1
160	1.4	Silty CLAY CI: medium plasticity, brown, trace gravel, w~PL, residual		D	1.5		pp = 250-300		
	2			D	2.0		pp = 400-500		2
	2.1	SHALE: brown and grey, low strength, moderately weathered, with medium strength, moderately weathered bands							
159				D	2.5				
	3	3.0 Bore discontinued at 3.0m - limit of investigation		D	3.0				3
158									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 153.3 mAHD
EASTING: 290894
NORTHING: 6212936
DIP/AZIMUTH: 90°/--

BORE No: 30
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
153	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown, w<<PL, stiff to very stiff, residual		D	0.5				
					0.6				
				U_{50}					
		- with low strength, moderately weathered shale bands between 0.8 - 1.3m			0.85				
	1			D	1.0				1
152		- becoming brown and grey, with extremely weathered and low strength, moderately weathered shale bands below 1.3m		D	1.5				
	1.9	SHALE: grey, low strength, moderately weathered, with medium strength, moderately weathered and very low strength, highly weathered bands							
	2			D	2.0				2
151	2.5	Bore discontinued at 2.5m		D	2.5				
		- refusal on medium strength sandstone							
	3								3
150									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 151.9 mAHD
EASTING: 291379
NORTHING: 6213441
DIP/AZIMUTH: 90°/--

BORE No: 33
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
151	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown, w<<PL, stiff to very stiff, residual		D	0.5				
	1			D	1.0				1
	1.1	SHALE: grey, low strength, medium strength, with very low strength, highly weathered and extremely weathered bands							
				D	1.5				
150	2			D	2.0				2
				D	2.5				
149		- becoming medium strength, slightly weathered below 2.6m							
	3			D	3.0				3
	3.0	Bore discontinued at 3.0m - limit of investigation							
148									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 179.1 mAHD
EASTING: 291411
NORTHING: 6212955
DIP/AZIMUTH: 90°/--

BORE No: 34
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
179	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown, w<<PL, stiff to very stiff, residual		D	0.5				
178	1	- becoming hard below 0.9m		D	1.0				1
	1.4	SHALE: dark grey, low strength, moderately weathered, with very low strength bands		D	1.5				
177	2			D	2.0				2
		- with medium strength, moderately weathered bands below 2.2m		D	2.5				
176	3	3.0 Bore discontinued at 3.0m - limit of investigation		D	3.0				3

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 167.7 mAHD
EASTING: 292567
NORTHING: 6212532
DIP/AZIMUTH: 90°/--

BORE No: 35
PROJECT No: 76589.06
DATE: 25/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
167	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown and red mottled grey, trace gravel, w<<PL, very stiff, residual		D	0.5				
		- becoming stiff below 0.6m			0.7				
				50					
	1			D	0.95 1.0				1
		- becoming extremely weathered shale with low strength, moderately weathered shale bands, stiff below 1.1m							
				D/B	1.5				
166	1.6	SHALE: dark grey, medium strength, moderately weathered, with low strength, moderately weathered bands							
	1.8	Bore discontinued at 1.8m - refusal on medium strength shale		D	1.8				
	2								2
165	3								3
164									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 154.7 mAHD
EASTING: 291148
NORTHING: 6212339
DIP/AZIMUTH: 90°/--

BORE No: 36
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
154	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w~PL, very stiff, residual		D	0.5				
		- becoming brown and grey below 0.7m							
	1	- becoming grey mottled red, hard below 1.1m		D	1.0				
153		- becoming grey mottled brown, with sand below 1.6m		D	1.5		pp = 300		
	1.8	SANDSTONE: medium grained, grey ad brown, low strength, moderately weathered, with medium strength, moderately weathered and extremely weathered bands							
	2 2.0	Bore discontinued at 2.0m - refusal on medium strength sandstone		D	2.0				
152	3								
151									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 164.1 mAHD
EASTING: 291603
NORTHING: 6212698
DIP/AZIMUTH: 90°/--

BORE No: 37
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
164		TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, brown, w~PL, stiff, residual		D	0.5				
		- becoming very stiff below 0.6m			0.6				
				U_{50}					
					0.85				
	1			D	1.0				1
163				D	1.5		pp >600		
	2			D	2.0		pp = 450		2
162		- becoming brown mottled grey below 2.2m							
				D	2.5		pp = 600		
		- trace ironstone gravel, with extremely weathered shale bands below 2.6m							
	3 3.0	Bore discontinued at 3.0m		D/B	3.0		pp = 400		3
161		- limit of investigation							

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 175.4 mAHD
EASTING: 291743
NORTHING: 6213346
DIP/AZIMUTH: 90°/--

BORE No: 38
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
175	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w<<PL, very stiff, residual		D	0.5				
	0.7	SHALE: grey and brown, very low strength, highly weathered, with extremely weathered and low strength, moderately weathered bands		D	1.0				
174	1			D	1.5				
		- becoming medium strength, moderately weathered below 1.8m		D	2.0				
173	2								
	2.5	Bore discontinued at 2.5m - refusal on medium strength shale		D	2.5				
172	3								

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 151.6 mAHD
EASTING: 291831
NORTHING: 6213503
DIP/AZIMUTH: 90°/--

BORE No: 39
PROJECT No: 76589.06
DATE: 25/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
151	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w~PL, very stiff, residual		D	0.5				
					0.7				
				U_{50}					
	1				0.95				1
				D	1.0				
150				D	1.5		pp = 350		
	1.7	SHALE: brown and grey, very low strength, highly weathered, with low strength, moderately weathered bands							
	2			D	2.0				2
149				D	2.5				
	3	3.0		D	3.0				3
		Bore discontinued at 3.0m - limit of investigation							
148									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 170.1 mAHD
EASTING: 291889
NORTHING: 6213146
DIP/AZIMUTH: 90°/--

BORE No: 40
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
170	0.0	Silty CLAY CI: medium plasticity, brown, with gravel, trace rootlets in the upper 0.1m layer, w<<PL, hard, colluvial		D	0.5				
	0.6	Silty CLAY CI: medium plasticity, pale brown, w<<PL, hard, residual		D	1.0				
169	1.1	SHALE: grey and brown, low strength, moderately weathered, with extremely weathered bands and medium strength, moderately weathered bands		D	1.5				
168	2.0	- becoming medium strength, moderately weathered below 2.0m		D	2.0				
	2.3	Bore discontinued at 2.3m - refusal on medium strength shale		D	2.3				
167	3.0								

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 152.3 mAHD
EASTING: 291920
NORTHING: 6213294
DIP/AZIMUTH: 90°/--

BORE No: 41
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
152	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown and red, trace gravel, w<<PL, very stiff, residual		D	0.5				
	1	- becoming stiff between 0.9 - 1.1m		D	1.0				1
151	1.5	SHALE: grey, very low strength, highly weathered, with brown and grey extremely weathered bands		D	1.5				
	2	- becoming low strength, moderately weathered below 1.8m		D	2.0				2
150				D	2.5				
		- becoming pale grey and brown below 2.6m							
	3 3.0	Bore discontinued at 3.0m - limit of investigation		D/B	3.0				3
149									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 176.6 mAHD
EASTING: 291873
NORTHING: 6212833
DIP/AZIMUTH: 90°/--

BORE No: 42
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
176	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w~PL, stiff, residual		D	0.5				
					0.6				
		- with shale gravel below 0.7m		U_{50}					
					0.85				
	1			D	1.0				1
	1.5	SHALE: grey and brown, low strength, moderately weathered, with medium strength, moderately weathered bands		D	1.5				
175		- becoming medium strength, moderately weathered below 1.9m		D	2.0				
	2								2
	2.5	Bore discontinued at 2.5m		D	2.5				
174		- refusal on medium strength shale							
	3								3
173									

5 10 15 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 141.2 mAHD
EASTING: 292322
NORTHING: 6213058
DIP/AZIMUTH: 90°/--

BORE No: 43
PROJECT No: 76589.06
DATE: 25/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
141	0.25	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown and grey, w<<PL, very stiff, residual							
		- small sized roots at 0.5m		D	0.5				
	1	- medium sized roots at 1.0m		D/B	1.0				1
140	1.2	SANDSTONE: medium grained, brown and grey, low strength, moderately weathered, with medium strength, moderately weathered bands							
				D	1.5				
		- becoming fine grained, dark grey below 1.6m							
	1.7	Bore discontinued at 1.7m		D	1.7				
		- refusal on medium strength sandstone							
	2								2
139									
	3								3
138									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 150.7 mAHD
EASTING: 291891
NORTHING: 6212432
DIP/AZIMUTH: 90°/--

BORE No: 44
PROJECT No: 76589.06
DATE: 24/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
150	0.15	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, w~PL, stiff, residual		D	0.5				
		- becoming very stiff below 0.6m							
	1			D	1.0				1
		- becoming brown and grey below 1.3m							
				D	1.5		pp = 300		
	1.6								
149	1.7	SANDSTONE: fine grained, dark grey and pale brown, medium strength, moderately weathered, with extremely weathered bands		D	1.7				
		Bore discontinued at 1.7m - refusal on medium strength sandstone							
	2								2
148									
	3								3
147									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 163.1 mAHD
EASTING: 292083
NORTHING: 6212078
DIP/AZIMUTH: 90°/--

BORE No: 45
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
163	0.2	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown, w<<PL, stiff, residual		D	0.5				
		- becoming very stiff below 0.6m			0.7				
				U_{50}					
	1				0.95				1
162				D	1.0				
		- becoming brown and grey, with extremely weathered shale bands below 1.2m		D	1.5				
	1.7	SHALE: grey, very low strength, moderately weathered, with very low strength, highly weathered and extremely weathered bands							
	2			D/B	2.0				2
161									
				D	2.5				
	3								3
	3.0	Bore discontinued at 3.0m		D	3.0				
160		- limit of investigation							

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 175.7 mAHD
EASTING: 292962
NORTHING: 6212091
DIP/AZIMUTH: 90°/--

BORE No: 46
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
175	0.0	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, brown, w~PL, very stiff, residual		D	0.5				
				U_{50}					
	0.7	SANDSTONE: medium grained, brown and grey, low strength, moderately weathered, with medium strength, moderately weathered bands		D	0.75 0.8				
	0.9	Bore discontinued at 0.9m - refusal on medium strength sandstone							
174	1								1
	2								2
173	3								3
172									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 173.6 mAHD
EASTING: 293087
NORTHING: 6212503
DIP/AZIMUTH: 90°/--

BORE No: 47
PROJECT No: 76589.06
DATE: 25/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
173	0.15	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w<<PL							
		Silty CLAY CI: medium plasticity, brown and red, w<<PL, very stiff, residual		D	0.5				
	1			D	1.0				1
		- becoming grey mottled brown below 1.1m							
172				D	1.5		pp = 350		
		- with extremely weathered shale bands below 1.6m							
	2			D	2.0				2
	2.2	SANDSTONE: fine grained, grey, medium strength, moderately weathered, with low strength, moderately weathered bands							
171	2.5	Bore discontinued at 2.5m		D	2.5				
		- refusal on medium strength sandstone							
	3								3
170									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 172.5 mAHD
EASTING: 292768
NORTHING: 6212769
DIP/AZIMUTH: 90°/--

BORE No: 48
PROJECT No: 76589.06
DATE: 25/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
172	0.4	Silty CLAY CI: medium plasticity, brown, with roots in the upper 100mm layer, w<<PL, very stiff, residual		D	0.2				
		SHALE: brown, low strength, moderately weathered, with extremely weathered bands		D	0.5				
		- becoming dark grey and brown, with medium strength, moderately weathered bands below 0.7m							
	1			D	1.0				1
171				D	1.5				
	2			D	2.0				2
170				D	2.5				
	3								3
	3.0	Bore discontinued at 3.0m - limit of investigation		D	3.0				
169									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 197.6 mAHD
EASTING: 293660
NORTHING: 6212714
DIP/AZIMUTH: 90°/--

BORE No: 49
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
197	0.4	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown, trace gravel, w~PL, stiff to very stiff, residual		D	0.5				
					0.6				
				U_{50}					
					0.85				
	1			D	1.0				1
		- with extremely weathered shale bands below 1.3m							
196	1.5	SHALE: grey, low strength, moderately weathered, with very low strength, highly weathered bands		D/B	1.5				
	2	- becoming medium strength, moderately weathered below 2.0m		D	2.0				2
195				D	2.5				
	3			D	3.0				3
	3.0	Bore discontinued at 3.0m - limit of investigation							
194									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 182.4 mAHD
EASTING: 293212
NORTHING: 6211791
DIP/AZIMUTH: 90°/--

BORE No: 50
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
182	0.15	FILL/TOPSOIL: Silty CLAY CI, medium plasticity, dark brown, with rootlets, w~PL							
		FILL/Silty CLAY CI: medium plasticity, dark brown, w~PL, typically stiff							
	0.5	Silty CLAY CI: medium plasticity, red-brown, w~PL, very stiff, residual		D	0.5				
	1			D	1.0				
181		- becoming brown and red mottled grey, hard below 1.2m							
				D	1.5		pp = 400-500		
		- with extremely weathered shale bands below 1.7m							
	2			D	2.0		pp = 500-600		
180		- with gravel below 2.3m							
				D	2.5		pp = 300-400		
	2.6								
	2.7	SANDSTONE: medium grained, brown and grey, medium strength, moderately weathered, with low strength, moderately weathered bands		D	2.7				
		Bore discontinued at 2.7m - refusal on medium strength sandstone							
179	3								

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 134.2 mAHD
EASTING: 292764
NORTHING: 6214379
DIP/AZIMUTH: 90°/--

BORE No: 51
PROJECT No: 76589.06
DATE: 4/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
134	0.4	FILL/TOPSOIL: Clayey SILT ML: low plasticity, dark brown, with sand and rootlets, w<<PL							
		FILL/Silty CLAY CI: medium plasticity, dark brown, trace gravel, w<<PL, typically very stiff		D	0.5				
133	1.0	Silty CLAY CI: medium plasticity, red-brown, trace gravel, w~PL, hard, residual		D	1.0		pp = 500-600		
	1.4	SANDSTONE: medium grained, brown and grey, low strength, moderately weathered, with extremely weathered bands		D	1.5				
	1.5	Bore discontinued at 1.5m - refusal on medium strength sandstone							
132									
131									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. Test pit excavated on existing stockpile

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 224.7 mAHD
EASTING: 294612
NORTHING: 6212323
DIP/AZIMUTH: 90°/--

BORE No: 52
PROJECT No: 76589.06
DATE: 6/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
224	0.25	FILL/TOPSOIL: Silty CLAY CI, medium plasticity, dark brown, with rootlets, w~PL							
	0.4	FILL/Silty CLAY CI: medium plasticity, dark brown, trace gravel, w~PL, typically very stiff							
	1	Silty CLAY CI: medium plasticity, brown, w~PL, stiff, residual - becoming very stiff below 0.7m		D	0.5				
				D	1.0				
	1.1	SHALE: grey and brown, low strength, highly weathered, with very low strength, highly weathered bands							
				D	1.5				
223	1.7	Bore discontinued at 1.7m - refusal on medium strength shale		D	1.7				
222	2								
	3								
221									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 195.7 mAHD
EASTING: 293609
NORTHING: 6212579
DIP/AZIMUTH: 90°/--

BORE No: 53
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
195	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, dark brown, w~PL, stiff, residual							
		- becoming very stiff below 0.5m		D	0.5				
		- becoming brown, trace gravel below 0.8m							
	1			D	1.0				1
		- becoming brown and dark grey, with shale gravel below 1.3m							
				D	1.5		pp = 300		
194		- with extremely weathered shale bands, w<<PL below 1.9m							
	2	- becoming hard below 2.0m		D	2.0		pp >600		2
		- becoming dark grey below 2.3m							
				D	2.5		pp >600		
193	3 3.0	Bore discontinued at 3.0m - limit of investigation		D	3.0		pp >600		3
192									

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 221.5 mAHD
EASTING: 293794
NORTHING: 6211812
DIP/AZIMUTH: 90°/--

BORE No: 54
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
221	0.3	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
		Silty CLAY CI: medium plasticity, brown mottled grey, w<<PL, stiff, residual		D	0.5				
		- becoming very stiff below 0.6m							
	1			D	1.0				1
220		- becoming hard below 1.5m		D	1.5		pp = 500		
	2	- becoming very stiff below 2.0m		D	2.0		pp = 250		2
219		- becoming hard below 2.5m		D	2.5		pp = 400		
	3 3.0	Bore discontinued at 3.0m - limit of investigation		D	3.0		pp = 400		3
218									

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Walker Corporation Pty Ltd
PROJECT: Proposed West Appin Precinct
LOCATION: Central Point at 280 Point Road, Appin, NSW

SURFACE LEVEL: 253.9 mAHD
EASTING: 294167
NORTHING: 6211877
DIP/AZIMUTH: 90°/--

BORE No: 55
PROJECT No: 76589.06
DATE: 5/8/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
253	0.0	TOPSOIL/Silty CLAY CI: medium plasticity, dark brown, with rootlets, w~PL							
	0.3	Silty CLAY CI: medium plasticity, brown and grey, with gravel, w~PL, stiff, residual		D/B	0.5				
		- becoming very stiff below 0.6m			0.6				
				U_{50}					
					0.85				
	1			D	1.0				1
	1.1	SANDSTONE: fine grained, brown and grey, low strength, highly weathered, with extremely weathered and medium strength, moderately weathered bands							
	1.5	Bore discontinued at 1.5m - refusal on medium strength sandstone		D	1.5				
252	2								2
251	3								3
250									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: John Deere backhoe - 450mm bucket **DRILLER:** **LOGGED:** ABB **CASING:**

TYPE OF BORING:

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Location coordinates are in MGA94 Zone 56. w = moisture content; PL = plastic limit

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Appendix E

Laboratory Results

Material Test Report

Report Number: **76589.06-2**
Issue Number: 1
Date Issued: 25/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3224
Dates Tested: 05/08/2020 - 10/08/2020

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Phone: (02) 4647 0075
Fax: (02) 4646 1886
Email: meregal.henakaa@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	MA-3224A	MA-3224B	MA-3224C	MA-3224D	MA-3224E
Date Sampled	04/08/2020	04/08/2020	04/08/2020	04/08/2020	04/08/2020
Date Tested	05/08/2020	05/08/2020	06/08/2020	10/08/2020	06/08/2020
Material Source	**	**	**	**	**
Sample Location	TP1 (0.5 - 0.75 m)	TP3 (0.5 - 0.75 m)	TP5 (0.6 - 0.8 m)	TP6 (0.6 - 0.85 m)	TP12 (0.7 - 0.95 m)
Inert Material Estimate (%)	1.5	0	0	0	0
Pocket Penetrometer before (kPa)	420	600	220	600	500
Pocket Penetrometer after (kPa)	400	150	120	450	350
Shrinkage Moisture Content (%)	24.5	22.3	23.2	27.1	27.8
Shrinkage (%)	**3.4**	**4.6**	**3.8**	**4.4**	**3.0**
Swell Moisture Content Before (%)	24.1	23.2	21.1	30.4	29.2
Swell Moisture Content After (%)	25.0	26.2	25.8	31.9	30.2
Swell (%)	**0.2**	**2.7**	**0.1**	**0.2**	**0.0**
Shrink Swell Index Iss (%)	**1.9**	**3.3**	**2.1**	**2.5**	**1.7**
Visual Description	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY
Cracking	SC	SC	SC	MC	MC
Crumbling	**	No	No	**	No
Remarks	**	**	**	**	**

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Material Test Report

Report Number: **76589.06-2**
Issue Number: 1
Date Issued: 25/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3224
Dates Tested: 05/08/2020 - 10/08/2020

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Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	MA-3224F	MA-3224G	MA-3224H	MA-3224I	MA-3224J
Date Sampled	04/08/2020	04/08/2020	04/08/2020	04/08/2020	04/08/2020
Date Tested	06/08/2020	05/08/2020	05/08/2020	10/08/2020	10/08/2020
Material Source	**	**	**	**	**
Sample Location	TP14 (0.6 - 0.85 m)	TP15 (0.5 - 0.75 m)	TP17 (0.5 - 0.75 m)	TP23 (0.4 - 0.5 m)	TP25 (0.6 - 0.85 m)
Inert Material Estimate (%)	0	0	0	0	0
Pocket Penetrometer before (kPa)	600	400	250	200	340
Pocket Penetrometer after (kPa)	420	300	180	200	200
Shrinkage Moisture Content (%)	28.5	28.9	22.3	30.4	24.6
Shrinkage (%)	**2.9**	**5.2**	**3.7**	**2.3**	**4.8**
Swell Moisture Content Before (%)	26.6	29.1	22.8	27.5	24.7
Swell Moisture Content After (%)	31.4	30.7	24.0	30.1	25.5
Swell (%)	**0.1**	**0.0**	**0.0**	**-0.1**	**0.9**
Shrink Swell Index Iss (%)	**1.6**	**2.9**	**2.1**	**1.3**	**2.9**
Visual Description	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY
Cracking	SC	SC	SC	MC	UC
Crumbling	No	No	No	No	No
Remarks	**	**	**	**	**

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Material Test Report

Report Number: **76589.06-2**
Issue Number: 1
Date Issued: 25/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3224
Dates Tested: 05/08/2020 - 10/08/2020

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Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	MA-3224K	MA-3224L	MA-3224M	MA-3224N	
Date Sampled	04/08/2020	04/08/2020	04/08/2020	04/08/2020	
Date Tested	10/08/2020	10/08/2020	10/08/2020	10/08/2020	
Material Source	**	**	**	**	
Sample Location	TP42 (0.6 - 0.85 m)	TP46 (0.5 - 0.75 m)	TP49 (0.6 - 0.85 m)	TP55 (0.6 - 0.85 m)	
Inert Material Estimate (%)	15	0	0	8	
Pocket Penetrometer before (kPa)	600	400	320	350	
Pocket Penetrometer after (kPa)	400	240	300	280	
Shrinkage Moisture Content (%)	9.9	22.7	29.8	23.2	
Shrinkage (%)	**1.3**	**2.1**	**4.4**	**3.1**	
Swell Moisture Content Before (%)	11.7	23.3	30.4	27.0	
Swell Moisture Content After (%)	15.3	25.4	30.5	29.3	
Swell (%)	**1.1**	**-0.1**	**0.0**	**0.0**	
Shrink Swell Index Iss (%)	**1.0**	**1.2**	**2.4**	**1.7**	
Visual Description	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY	
Cracking	UC	MC	SC	HC	
Crumbling	No	No	Yes	No	
Remarks	**	**	**	**	

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Material Test Report

Report Number: **76589.06-7**
Issue Number: 1
Date Issued: 11/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3381
Dates Tested: 27/08/2020 - 27/08/2020

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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	MA-3381A	MA-3381B	MA-3381C	MA-3381D	MA-3381E
Date Sampled	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
Date Tested	27/08/2020	27/08/2020	27/08/2020	27/08/2020	27/08/2020
Material Source	**	**	**	**	**
Sample Location	TP37 (0.6 - 0.85 m)	TP30 (0.6 - 0.85 m)	TP45 (0.7 - 0.95 m)	TP35 (0.7 - 0.95 m)	TP39 (0.7 - 0.95 m)
Inert Material Estimate (%)	0	0	0	0	0
Pocket Penetrometer before (kPa)	380	400	480	400	600
Pocket Penetrometer after (kPa)	380	280	420	350	480
Shrinkage Moisture Content (%)	24.5	27.4	26.8	30.6	19.1
Shrinkage (%)	**4.8**	**5.0**	**4.3**	**4.3**	**1.8**
Swell Moisture Content Before (%)	24.1	26.3	26.0	27.6	19.4
Swell Moisture Content After (%)	25.0	29.5	24.7	32.1	20.9
Swell (%)	**0.0**	**0.1**	**0.0**	**0.4**	**0.0**
Shrink Swell Index Iss (%)	**2.7**	**2.8**	**2.4**	**2.5**	**1.0**
Visual Description	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY	Silty CLAY
Cracking	SC	SC	SC	SC	MC
Crumbling	No	No	No	No	No
Remarks	**	**	**	**	**

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Material Test Report

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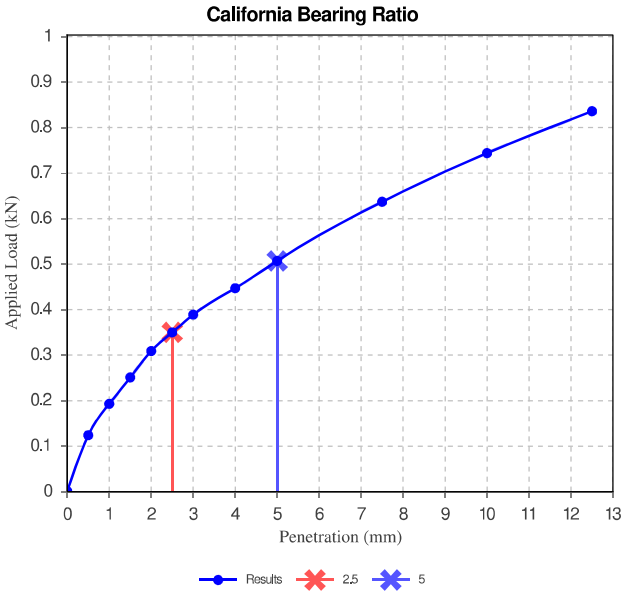
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Tim White
Lab manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247A
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP1 (1.0m)**
Material: Silty CLAY and EW shale

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 Assessment		
Maximum Dry Density (t/m^3)	1.71		
Optimum Moisture Content (%)	21.0		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.68		
Field Moisture Content (%)	20.3		
Moisture Content at Placement (%)	20.8		
Moisture Content Top 30mm (%)	25.7		
Moisture Content Rest of Sample (%)	20.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	50.3		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

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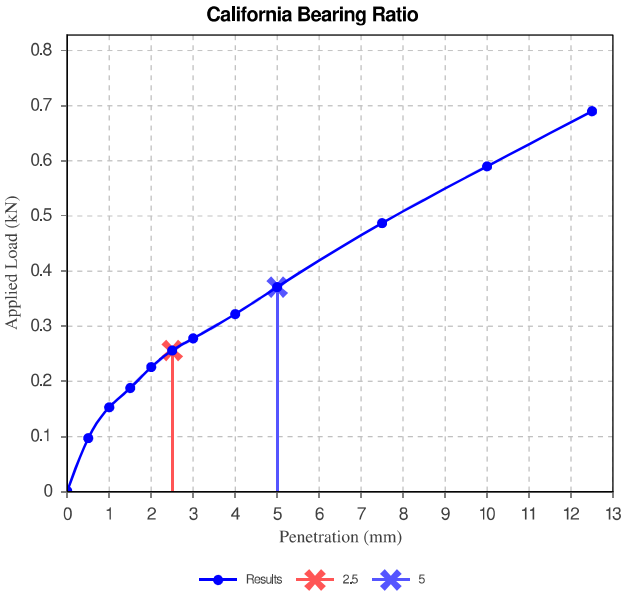
Approved Signatory: Tim White
Lab manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247B
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP3 (1.5m)**
Material: Silty CLAY with Sandstone Gravel

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**2.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.75		
Optimum Moisture Content (%)	17.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.5		
Dry Density after Soaking (t/m^3)	1.69		
Field Moisture Content (%)	17.5		
Moisture Content at Placement (%)	17.7		
Moisture Content Top 30mm (%)	24.9		
Moisture Content Rest of Sample (%)	18.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	50.3		
Swell (%)	3.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

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Approved Signatory: Tim White
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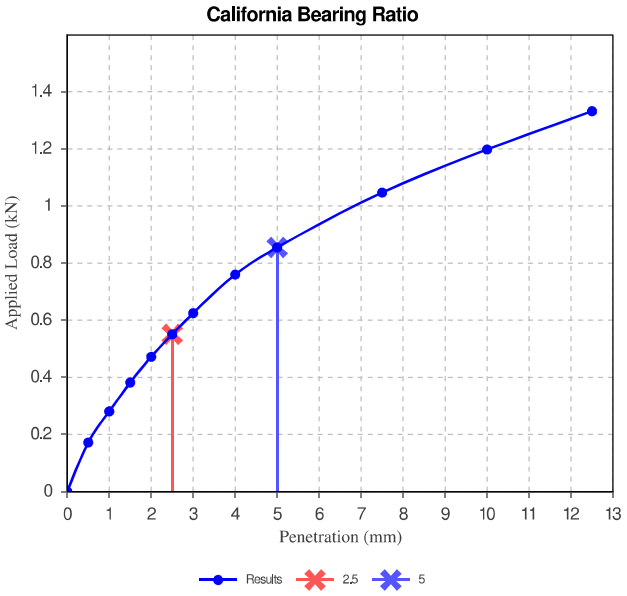
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247C
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP4 (1.5m)**
Material: Silty CLAY with Sandstone Gravel

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**4.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.64		
Optimum Moisture Content (%)	22.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.63		
Field Moisture Content (%)	21.9		
Moisture Content at Placement (%)	22.7		
Moisture Content Top 30mm (%)	26.1		
Moisture Content Rest of Sample (%)	26.0		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	52.8		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

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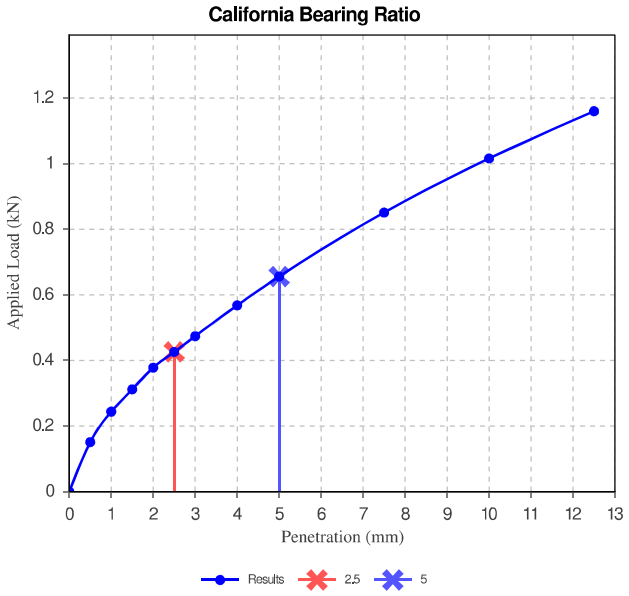
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Tim White
Lab manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247D
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP7 (1.0m)**
Material: Silty CLAY

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	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 Assessment		
Maximum Dry Density (t/m^3)	1.72		
Optimum Moisture Content (%)	17.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.69		
Field Moisture Content (%)	20.6		
Moisture Content at Placement (%)	17.7		
Moisture Content Top 30mm (%)	26.4		
Moisture Content Rest of Sample (%)	26.2		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	24.4		
Swell (%)	2.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

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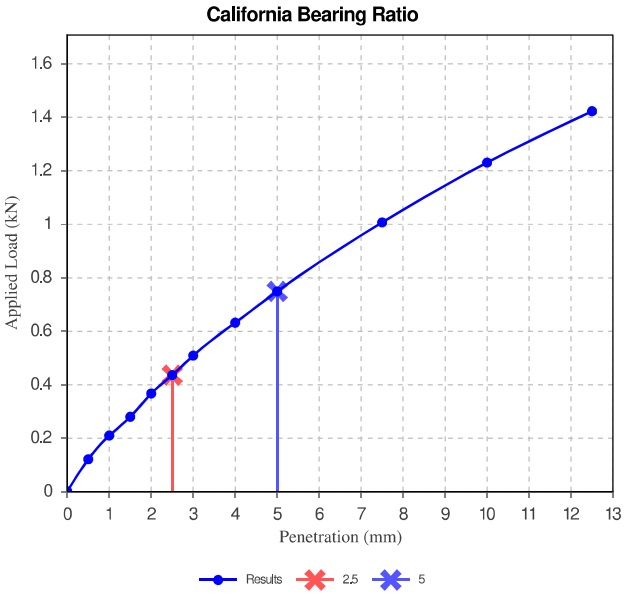
Approved Signatory: Tim White
Lab manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247E
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP12 (0.5m)**
Material: Silty CLAY

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	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 Assessment		
Maximum Dry Density (t/m^3)	1.54		
Optimum Moisture Content (%)	26.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.5		
Dry Density after Soaking (t/m^3)	1.53		
Field Moisture Content (%)	26.0		
Moisture Content at Placement (%)	26.1		
Moisture Content Top 30mm (%)	27.1		
Moisture Content Rest of Sample (%)	26.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	53.8		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

Douglas Partners
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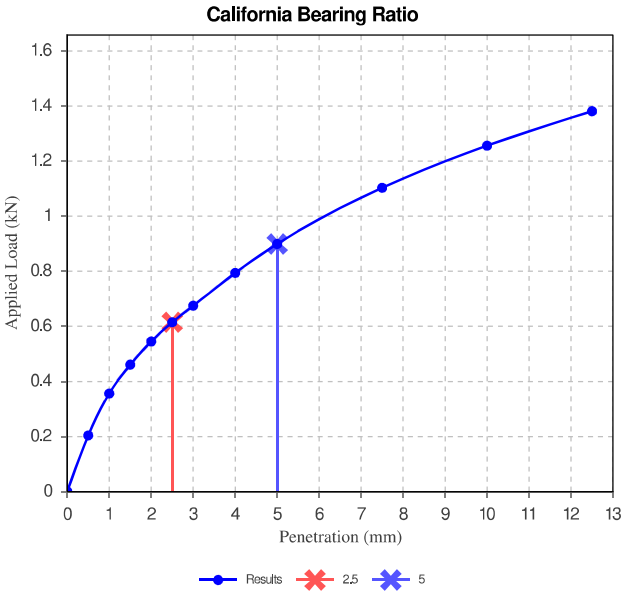
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Tim White
Lab manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247F
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 17/08/2020
Sample Location: **TP8 (1.0m)**
Material: Silty CLAY with EW Shale

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**4.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.49		
Optimum Moisture Content (%)	28.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.47		
Field Moisture Content (%)	29.2		
Moisture Content at Placement (%)	28.3		
Moisture Content Top 30mm (%)	32.2		
Moisture Content Rest of Sample (%)	29.9		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	25.8		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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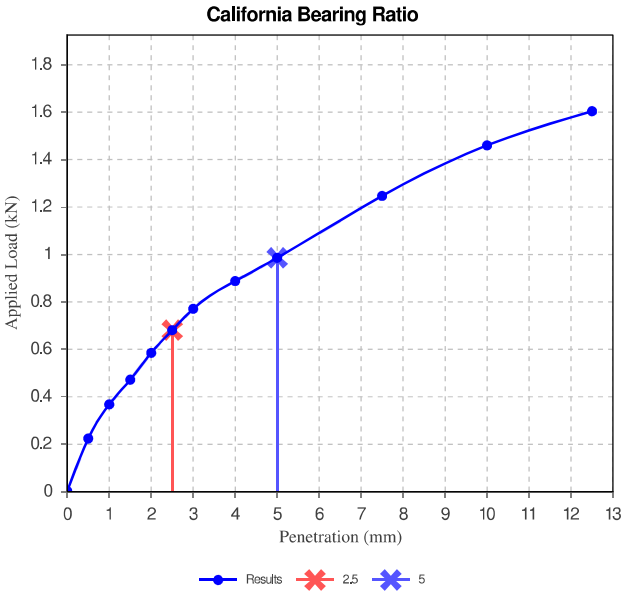
Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247G
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP49 (1.5m)**
Material: SHALE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**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 Assessment		
Maximum Dry Density (t/m^3)	1.81		
Optimum Moisture Content (%)	18.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m^3)	1.80		
Field Moisture Content (%)	17.0		
Moisture Content at Placement (%)	18.5		
Moisture Content Top 30mm (%)	20.3		
Moisture Content Rest of Sample (%)	18.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	54.8		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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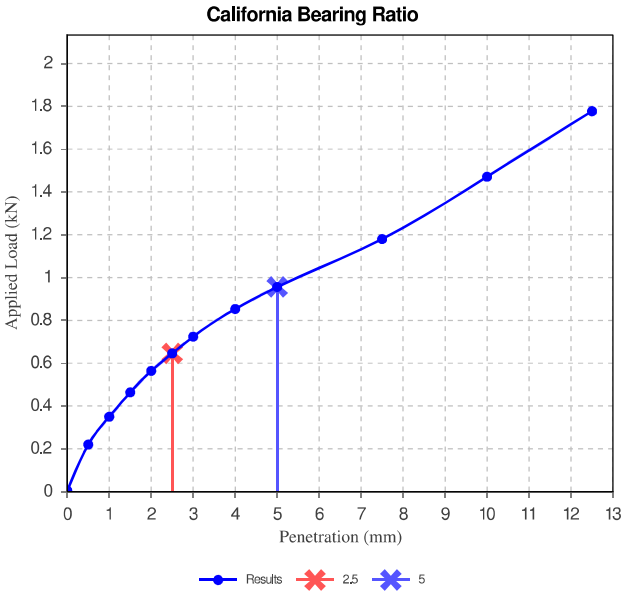
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247H
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP20 (1.5m)**
Material: SHALE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**5.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.94		
Optimum Moisture Content (%)	11.0		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.94		
Field Moisture Content (%)	8.4		
Moisture Content at Placement (%)	10.8		
Moisture Content Top 30mm (%)	11.9		
Moisture Content Rest of Sample (%)	12.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	50.8		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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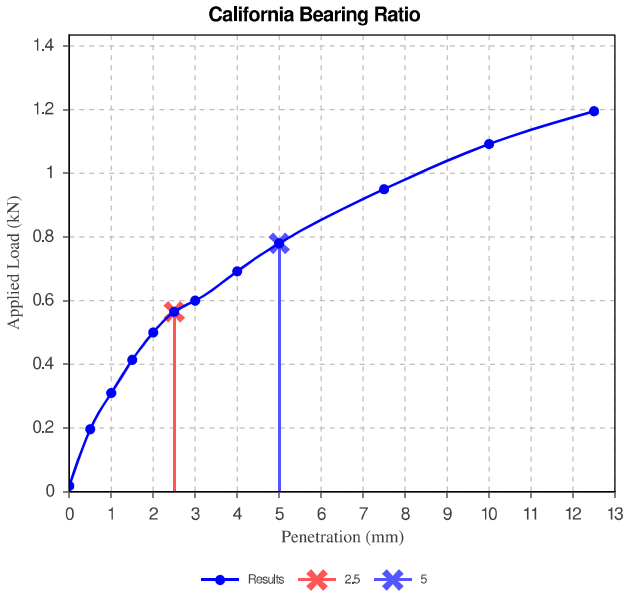
Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247I
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP55 (0.5m)**
Material: Silty CLAY

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**4.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.61		
Optimum Moisture Content (%)	23.5		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.58		
Field Moisture Content (%)	25.5		
Moisture Content at Placement (%)	23.7		
Moisture Content Top 30mm (%)	27.6		
Moisture Content Rest of Sample (%)	26.0		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	25.4		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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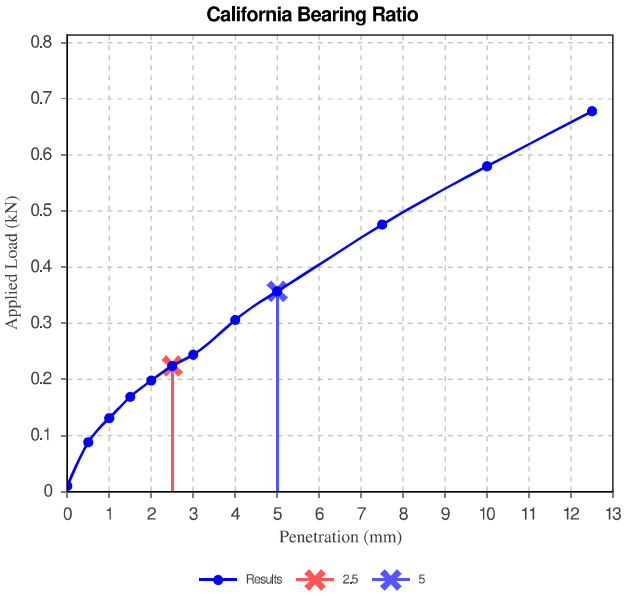
Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247J
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP41 (3.0m)**
Material: SHALE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**2.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.92		
Optimum Moisture Content (%)	12.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.86		
Field Moisture Content (%)	9.6		
Moisture Content at Placement (%)	12.3		
Moisture Content Top 30mm (%)	19.9		
Moisture Content Rest of Sample (%)	17.4		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	54.3		
Swell (%)	3.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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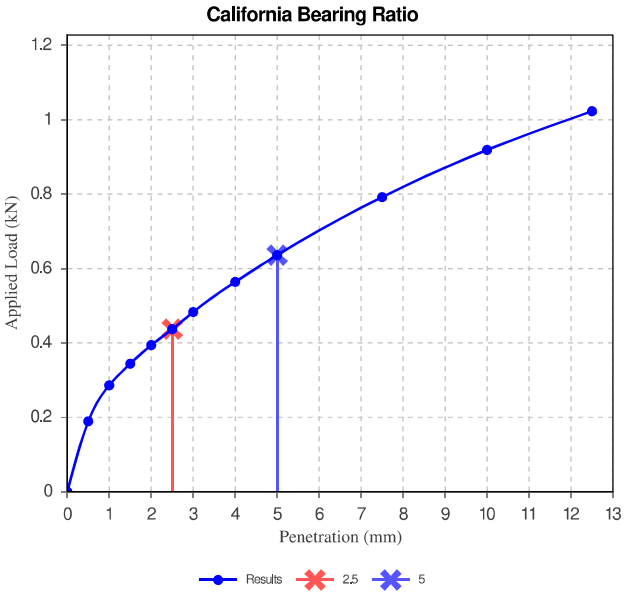
Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247K
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP25 (1.0m)**
Material: Silty CLAY

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 Assessment		
Maximum Dry Density (t/m^3)	1.58		
Optimum Moisture Content (%)	24.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.5		
Dry Density after Soaking (t/m^3)	1.56		
Field Moisture Content (%)	24.0		
Moisture Content at Placement (%)	24.1		
Moisture Content Top 30mm (%)	26.9		
Moisture Content Rest of Sample (%)	25.2		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	51.2		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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Approved Signatory: Tim White
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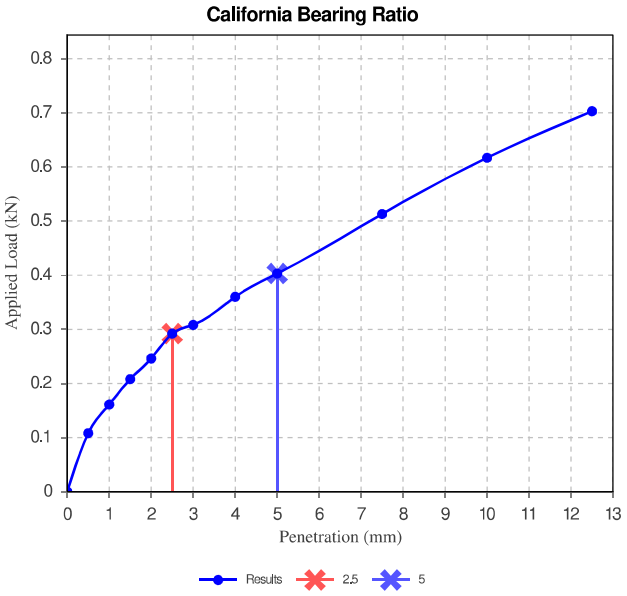
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-4**
Issue Number: 1
Date Issued: 02/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247L
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP22 (1.5m)**
Material: Silty CLAY

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**2.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.56		
Optimum Moisture Content (%)	24.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m^3)	1.50		
Field Moisture Content (%)	23.3		
Moisture Content at Placement (%)	24.4		
Moisture Content Top 30mm (%)	31.0		
Moisture Content Rest of Sample (%)	26.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	52.4		
Swell (%)	3.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

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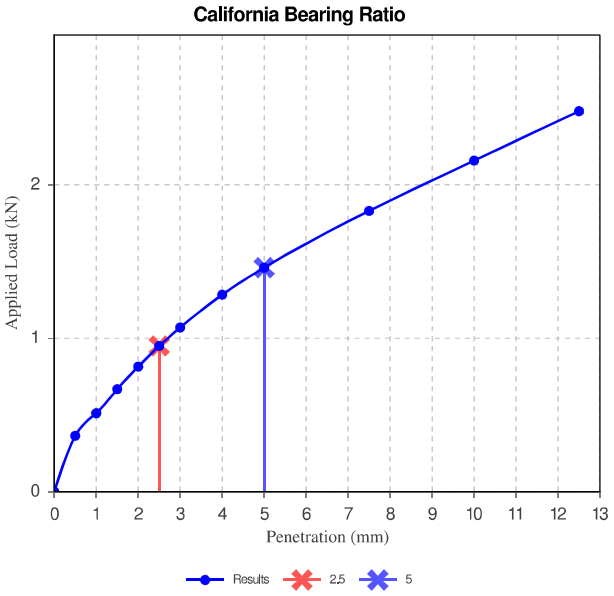
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3247
Sample Number: MA-3247M
Date Sampled: 06/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sample Location: **TP18 (1.0m)**
Material: Sandy CLAY

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	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	Visual Assessment		
Maximum Dry Density (t/m^3)	1.86		
Optimum Moisture Content (%)	14.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m^3)	1.85		
Field Moisture Content (%)	13.8		
Moisture Content at Placement (%)	14.1		
Moisture Content Top 30mm (%)	17.6		
Moisture Content Rest of Sample (%)	16.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	47.2		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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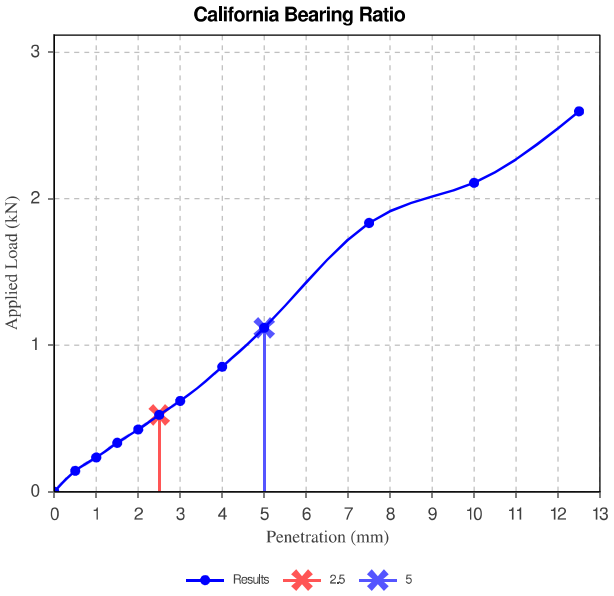
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ramon Arancibia
Assistant Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-5**
Issue Number: 2 - *This version supersedes all previous issues*
Reissue Reason: *Reviewed material description*
Date Issued: 11/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3225
Sample Number: MA-3225A
Date Sampled: 04/08/2020
Dates Tested: 05/08/2020 - 17/08/2020
Sample Location: **TP15 (1.7m)**
Material: SANDSTONE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**6**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.87		
Optimum Moisture Content (%)	13.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.86		
Field Moisture Content (%)	11.6		
Moisture Content at Placement (%)	13.5		
Moisture Content Top 30mm (%)	14.5		
Moisture Content Rest of Sample (%)	13.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	45.6		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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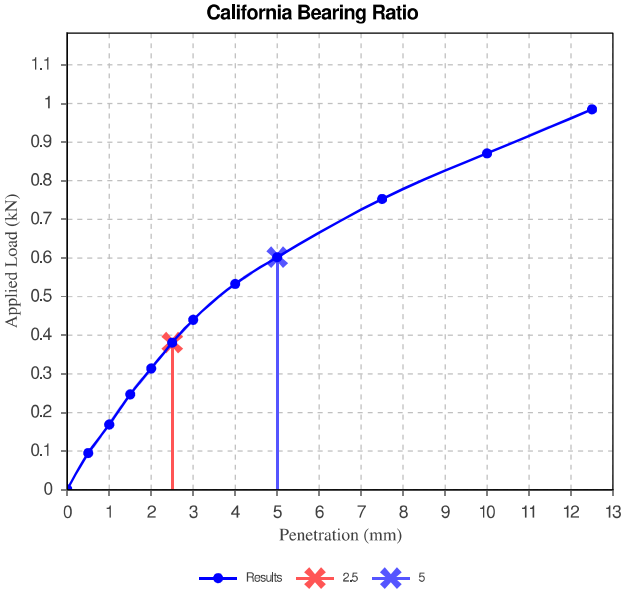
Approved Signatory: Ramon Arancibia
Assistant Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-5**
Issue Number: 2 - *This version supersedes all previous issues*
Reissue Reason: *Reviewed material description*
Date Issued: 11/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3225
Sample Number: MA-3225B
Date Sampled: 04/08/2020
Dates Tested: 05/08/2020 - 17/08/2020
Sample Location: **TP17 (1.4m)**
Material: SANDSTONE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**3.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.80		
Optimum Moisture Content (%)	13.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.77		
Field Moisture Content (%)	11.7		
Moisture Content at Placement (%)	13.4		
Moisture Content Top 30mm (%)	20.6		
Moisture Content Rest of Sample (%)	18.6		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	46.8		
Swell (%)	2.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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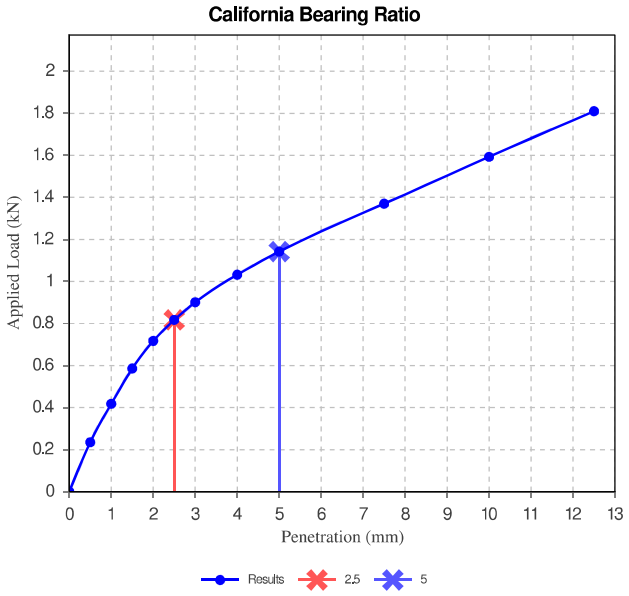
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-8**
Issue Number: 1
Date Issued: 11/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3378
Sample Number: MA-3378A
Date Sampled: 25/08/2020
Dates Tested: 27/08/2020 - 08/09/2020
Sample Location: **TP45 (2.0m)**
Material: SHALE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**6**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.93		
Optimum Moisture Content (%)	13.0		
Laboratory Density Ratio (%)	100.5		
Laboratory Moisture Ratio (%)	101.0		
Dry Density after Soaking (t/m^3)	1.91		
Field Moisture Content (%)	10.0		
Moisture Content at Placement (%)	12.9		
Moisture Content Top 30mm (%)	19.3		
Moisture Content Rest of Sample (%)	19.3		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	48.3		
Swell (%)	2.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
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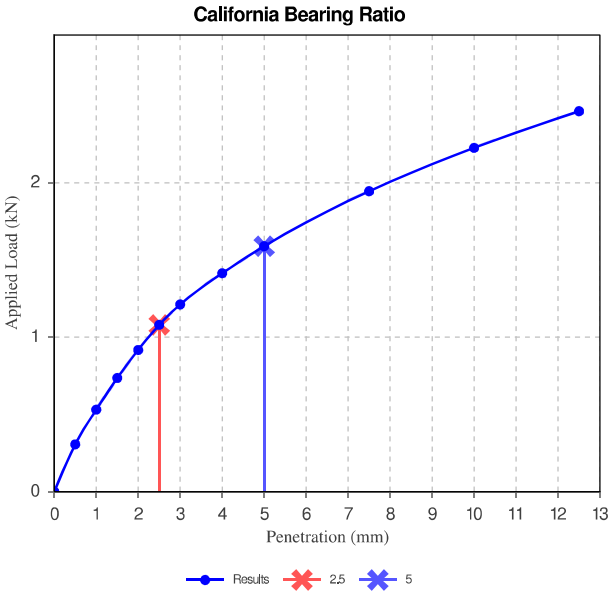
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ramon Arancibia
Assistant Laboratory Manager
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-8**
Issue Number: 1
Date Issued: 11/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3378
Sample Number: MA-3378B
Date Sampled: 25/08/2020
Dates Tested: 27/08/2020 - 08/09/2020
Sample Location: **TP37 (3.0m)**
Material: Silty CLAY

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 Assessment		
Maximum Dry Density (t/m^3)	1.74		
Optimum Moisture Content (%)	18.5		
Laboratory Density Ratio (%)	100.5		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.74		
Field Moisture Content (%)	17.4		
Moisture Content at Placement (%)	18.6		
Moisture Content Top 30mm (%)	21.1		
Moisture Content Rest of Sample (%)	19.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	48		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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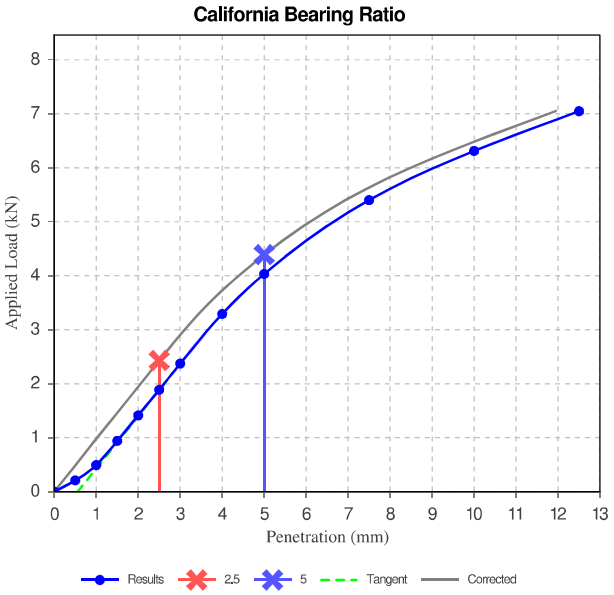
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3378
Sample Number: MA-3378C
Date Sampled: 25/08/2020
Dates Tested: 27/08/2020 - 08/09/2020
Sample Location: **TP34 (3.0m)**
Material: SHALE

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**20**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.93		
Optimum Moisture Content (%)	11.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.92		
Field Moisture Content (%)	7.3		
Moisture Content at Placement (%)	10.9		
Moisture Content Top 30mm (%)	12.6		
Moisture Content Rest of Sample (%)	12.5		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	49.6		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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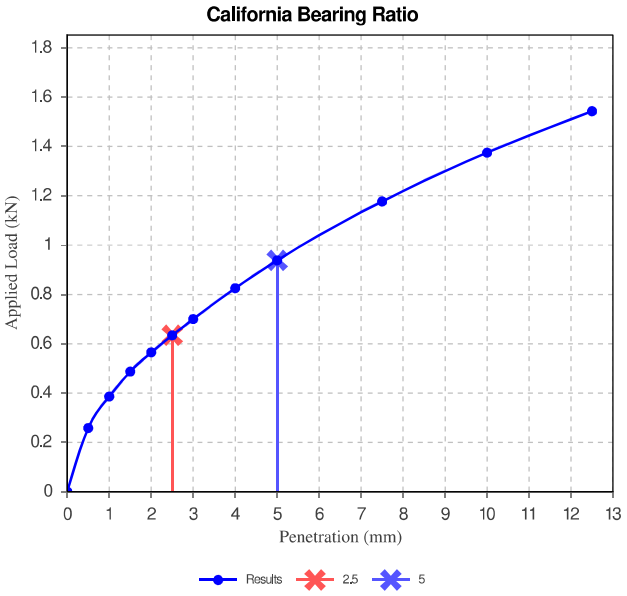
Date Issued: 11/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3378
Sample Number: MA-3378D
Date Sampled: 25/08/2020
Dates Tested: 27/08/2020 - 07/09/2020
Sample Location: **TP43 (1.0m)**
Material: Silty CLAY

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**5.0**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual Assessment		
Maximum Dry Density (t/m^3)	1.48		
Optimum Moisture Content (%)	28.5		
Laboratory Density Ratio (%)	100.5		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m^3)	1.47		
Field Moisture Content (%)	28.3		
Moisture Content at Placement (%)	28.2		
Moisture Content Top 30mm (%)	32.8		
Moisture Content Rest of Sample (%)	28.7		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	24		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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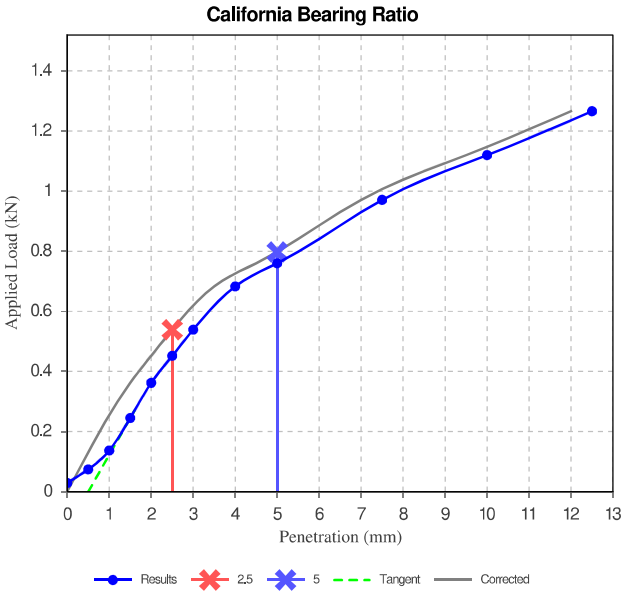
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3378
Sample Number: MA-3378E
Date Sampled: 25/08/2020
Dates Tested: 27/08/2020 - 08/09/2020
Sample Location: **TP35 (1.5m)**
Material: Silty CLAY

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 Assessment		
Maximum Dry Density (t/m^3)	1.87		
Optimum Moisture Content (%)	16.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	100.0		
Dry Density after Soaking (t/m^3)	1.85		
Field Moisture Content (%)	15.9		
Moisture Content at Placement (%)	16.7		
Moisture Content Top 30mm (%)	20.1		
Moisture Content Rest of Sample (%)	18.0		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours	48.7		
Swell (%)	1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0		



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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Meragal Henaka Arachchi
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NATA Accredited Laboratory Number: 828

Report Number: **76589.06-1**
Issue Number: 1
Date Issued: 24/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3246
Sample Number: MA-3246A
Date Sampled: 04/08/2020
Dates Tested: 07/08/2020 - 11/08/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Sample Location: **TP 2 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	21		
Plastic Limit (%)	14		
Plasticity Index (%)	**7**		
Field moisture content = 15.4%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	3.5		
Cracking Crumbling Curling	None		
Field moisture content = 15.4%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	18.0		

Material Test Report

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Report Number: **76589.06-1**
Issue Number: 1
Date Issued: 24/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3246
Sample Number: MA-3246B
Date Sampled: 04/08/2020
Dates Tested: 07/08/2020 - 11/08/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Sample Location: **TP 4 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	52		
Plastic Limit (%)	24		
Plasticity Index (%)	**28**		
Field moisture content = 24.7%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	13.5		
Cracking Crumbling Curling	None		
Field moisture content = 24.7%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	18.0		

Material Test Report

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Report Number: **76589.06-1**
Issue Number: 1
Date Issued: 24/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3246
Sample Number: MA-3246C
Date Sampled: 04/08/2020
Dates Tested: 07/08/2020 - 12/08/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Sample Location: **TP 7 (0.5 m)**
Material: Silty CLAY

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**		
Field moisture content = 21.3%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	13.0		
Cracking Crumbling Curling	None		
Field moisture content = 21.3%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	18.0		

Material Test Report

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Report Number:	**76589.06-1**
Issue Number:	1
Date Issued:	24/08/2020
Client:	Walker Corporation Pty Ltd
	Level 21, 1 Farrer Place, Sydney NSW 2000
Contact:	Nicole Topple
Project Number:	76589.06
Project Name:	Proposed West Appin Precinct
Project Location:	Central Point at 280 Point Road, Appin
Work Request:	3246
Sample Number:	MA-3246D
Date Sampled:	04/08/2020
Dates Tested:	07/08/2020 - 12/08/2020
Sampling Method:	Sampled by Engineering Department
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Sample Location:	**TP 8 (1.0 m)**
Material:	Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	58		
Plastic Limit (%)	26		
Plasticity Index (%)	**32**		
Field moisture content = 30.1%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	13.5		
Cracking Crumbling Curling	None		
Field moisture content = 30.1%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	18.0		

Material Test Report

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Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3246
Sample Number: MA-3246E
Date Sampled: 04/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Sample Location: **TP 9 (1.0 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	36		
Plastic Limit (%)	15		
Plasticity Index (%)	**21**		
Field moisture content = 16.8%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	None		
Field moisture content = 16.8%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	18.0		

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	Level 21, 1 Farrer Place, Sydney NSW 2000
Contact:	Nicole Topple
Project Number:	76589.06
Project Name:	Proposed West Appin Precinct
Project Location:	Central Point at 280 Point Road, Appin
Work Request:	3246
Sample Number:	MA-3246F
Date Sampled:	04/08/2020
Dates Tested:	07/08/2020 - 18/08/2020
Sampling Method:	Sampled by Engineering Department
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and preparation of soils
Sample Location:	**TP 11 (0.5 m)**
Material:	Silty CLAY

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 (%)	20		
Plasticity Index (%)	**22**		
Field moisture content = 21.0%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	Cracking & Curling		
Field moisture content = 21.0%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (°C)	18.0		

Material Test Report

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3246
Sample Number: MA-3246G
Date Sampled: 04/08/2020
Dates Tested: 07/08/2020 - 18/08/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and preparation of soils
Sample Location: **TP 13 (1.0 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	57		
Plastic Limit (%)	25		
Plasticity Index (%)	**32**		
Field moisture content = 25.3%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.5		
Cracking Crumbling Curling	Cracking & Curling		
Field moisture content = 25.3%			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (°C)	18.0		

Material Test Report

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3246
Sample Number: MA-3246H
Date Sampled: 04/08/2020
Dates Tested: 07/08/2020 - 20/08/2020
Sample Location: **TP 10 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	53		
Plastic Limit (%)	23		
Plasticity Index (%)	**30**		
Field Moisture Content = 27.1 %			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.5		
Cracking Crumbling Curling	Cracking & Curling		
Field Moisture Content = 27.1 %			

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	23		

Material Test Report

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NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CK
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP15 (0.5 m)**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

Material Test Report

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CL
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 20/08/2020
Sample Location: **TP17 (0.5 m)**
Material: Silty Clay

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CM
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 26/08/2020
Sample Location: **TP22 (0.5 m)**
Material: Silty Clay , red brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled		
Temperature of Water (^{o}C)	17.0		

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CN
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP25 (0.5 m)**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CO
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP40 (0.5 m)**
Material: Silty clay, red brown

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CP
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP41 (0.5 m)**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CQ
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 20/08/2020
Sample Location: **TP46 (0.5 m)**
Material: Silty Clay

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Work Request: 3264
Sample Number: MA-3264CR
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 20/08/2020
Sample Location: **TP52 (0.5 m)**
Material: Silty Clay

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CS
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP53 (0.5 m)**
Material: Silty Clay

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CT
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 20/08/2020
Sample Location: **TP55 (0.5 m)**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (°C)	23		

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Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CU
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 21/08/2020
Sample Location: **TP16 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	33		
Plastic Limit (%)	17		
Plasticity Index (%)	**16**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	8.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	19.3

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Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CV
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP18 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	52		
Plastic Limit (%)	26		
Plasticity Index (%)	**26**		
Field moisture content = 27.4%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.0		
Cracking Crumbling Curling	Cracking & Curling		
Field moisture content = 27.4%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	27.4

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Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CW
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP20 (0.5 m)**
Material: Silty Clay

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 (%)	21		
Plasticity Index (%)	**24**		
Field moisture content = 22.7%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.0		
Cracking Crumbling Curling	None		
Field moisture content = 22.7%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	22.7

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CX
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP21 (0.5 m)**
Material: Silty Clay

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 (%)	24		
Plasticity Index (%)	**10**		
Field moisture content = 24.1%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	6.5		
Cracking Crumbling Curling	None		
Field moisture content = 24.1%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	24.1

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CY
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 26/08/2020
Sample Location: **TP22 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	53		
Plastic Limit (%)	25		
Plasticity Index (%)	**28**		
Field moisture content = 28.4%			

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		
Field moisture content = 28.4%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	28.4

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264CZ
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 24/08/2020
Sample Location: **TP28 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	55		
Plastic Limit (%)	26		
Plasticity Index (%)	**29**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	23.1

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Work Request: 3264
Sample Number: MA-3264DA
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 26/08/2020
Sample Location: **TP38 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	47		
Plastic Limit (%)	21		
Plasticity Index (%)	**26**		
Field moisture content = 21.6%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.5		
Cracking Crumbling Curling	None		
Field moisture content = 21.6%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	21.6

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Work Request: 3264
Sample Number: MA-3264DB
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 25/08/2020
Sample Location: **TP40 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	44		
Plastic Limit (%)	21		
Plasticity Index (%)	**23**		
Field moisture content = 13.9%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1 / AS 1289.3.1.2 / AS 1289.3.9.1 / AS 1289.3.9.2		
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	None		
Field moisture content = 13.9%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	13.9

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264DC
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 25/08/2020
Sample Location: **TP41 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	51		
Plastic Limit (%)	25		
Plasticity Index (%)	**26**		
Field moisture content = 23.5%			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	13.5		
Cracking Crumbling Curling	None		
Field moisture content = 23.5%			

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	23.5

Material Test Report

Douglas Partners
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Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264DE
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 21/08/2020
Sample Location: **TP50 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	23		
Plasticity Index (%)	**19**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	7.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	26.4

Material Test Report

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Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264DF
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 21/08/2020
Sample Location: **TP51 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	44		
Plastic Limit (%)	29		
Plasticity Index (%)	**15**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	3.5		
Cracking Crumbling Curling	Cracking		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	20.4

Material Test Report

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Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264DG
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 21/08/2020
Sample Location: **TP52 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	49		
Plastic Limit (%)	23		
Plasticity Index (%)	**26**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	8.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	26.6

Material Test Report

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Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264DH
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 21/08/2020
Sample Location: **TP53 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	57		
Plastic Limit (%)	26		
Plasticity Index (%)	**31**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	23.9

Material Test Report

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Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Sample Number: MA-3264DI
Date Sampled: 04/08/2020
Dates Tested: 14/08/2020 - 27/08/2020
Sample Location: **TP54 (0.5 m)**
Material: Silty Clay

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	51		
Plastic Limit (%)	22		
Plasticity Index (%)	**29**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	13.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	25.1

Material Test Report

Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Dates Tested: 14/08/2020 - 18/08/2020

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NATA Accredited Laboratory Number: 828

Determination of EC of Soil (In-House) DP MAC2				
Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-3264A	TP1	0.5	Soil	26.90
MA-3264B	TP1	1.5	Soil	132.10
MA-3264C	TP1	2.5	Soil	189.90
MA-3264D	TP2	0.5	Soil	10.10
MA-3264E	TP2	1.5	Soil	16.20
MA-3264F	TP3	0.5	Soil	49.90
MA-3264G	TP3	1.5	Soil	375.20
MA-3264H	TP4	0.5	Soil	51.90
MA-3264I	TP4	1.5	Soil	28.40
MA-3264J	TP4	2.5	Soil	126.80
MA-3264K	TP5	0.5	Soil	21.90
MA-3264L	TP5	1.3	Soil	47.10
MA-3264M	TP6	0.5	Soil	15.10
MA-3264N	TP6	1.5	Soil	44.20
MA-3264O	TP6	2.5	Soil	35.60
MA-3264P	TP7	0.5	Soil	92.00
MA-3264Q	TP7	1.5	Soil	313.40
MA-3264R	TP8	0.5	Soil	15.70
MA-3264S	TP8	1.5	Soil	32.20
MA-3264T	TP8	2.5	Soil	39.30
MA-3264U	TP9	0.5	Soil	14.90
MA-3264V	TP9	1.5	Soil	65.90
MA-3264W	TP10	0.5	Soil	23.30
MA-3264X	TP11	0.5	Soil	29.20
MA-3264Y	TP11	1.5	Soil	54.60
MA-3264Z	TP12	0.5	Soil	14.60
MA-3264AA	TP12	1.5	Soil	48.00
MA-3264AB	TP12	2.5	Soil	42.00
MA-3264AC	TP13	0.5	Soil	15.40
MA-3264AD	TP13	1.5	Soil	129.30
MA-3264AE	TP13	2.5	Soil	321.90
MA-3264AF	TP14	0.5	Soil	23.60
MA-3264AG	TP14	1.5	Soil	63.30
MA-3264AH	TP14	2.5	Soil	77.20
MA-3264AI	TP15	0.5	Soil	12.60

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-3264AJ	TP15	1.5	Soil	26.70
MA-3264AK	TP16	0.5	Soil	16.30
MA-3264AL	TP16	1.3	Soil	77.40
MA-3264AM	TP17	0.5	Soil	30.00
MA-3264AN	TP17	1.5	Soil	275.20
MA-3264AO	TP18	0.5	Soil	40.00
MA-3264AP	TP18	1.3	Soil	28.90
MA-3264AQ	TP20	0.5	Soil	12.50
MA-3264AR	TP20	1.5	Soil	26.60
MA-3264AS	TP20	2.5	Soil	45.70
MA-3264AT	TP21	0.5	Soil	18.90
MA-3264AU	TP21	1.5	Soil	27.50
MA-3264AV	TP21	2.5	Soil	34.40
MA-3264AW	TP22	0.5	Soil	30.70
MA-3264AX	TP22	1.5	Soil	167.70
MA-3264AY	TP22	2.5	Soil	137.80
MA-3264AZ	TP23	0.5	Soil	40.00
MA-3264BA	TP25	0.5	Soil	22.80
MA-3264BB	TP25	1.5	Soil	61.70
MA-3264BC	TP28	0.5	Soil	62.90
MA-3264BD	TP28	1.5	Soil	42.80
MA-3264BE	TP28	2.5	Soil	24.70
MA-3264BF	TP38	0.5	Soil	22.90
MA-3264BG	TP38	1.5	Soil	33.10
MA-3264BH	TP38	2.5	Soil	123.20
MA-3264BI	TP40	0.5	Soil	70.60
MA-3264BJ	TP40	1.5	Soil	97.00
MA-3264BK	TP40	2.3	Soil	55.80
MA-3264BL	TP41	0.5	Soil	17.10
MA-3264BM	TP41	1.5	Soil	166.70
MA-3264BN	TP41	2.5	Soil	239.90
MA-3264BO	TP42	0.5	Soil	18.00
MA-3264BP	TP42	1.5	Soil	20.60
MA-3264BQ	TP42	2.5	Soil	39.60
MA-3264BR	TP46	0.5	Soil	18.50
MA-3264BS	TP49	0.5	Soil	13.30
MA-3264BT	TP49	1.5	Soil	22.30
MA-3264BU	TP49	2.5	Soil	18.30
MA-3264BV	TP50	0.5	Soil	17.10
MA-3264BW	TP50	1.5	Soil	34.20
MA-3264BX	TP50	2.5	Soil	22.50
MA-3264BY	TP51	0.5	Soil	384.40
MA-3264BZ	TP51	1.5	Soil	78.80
MA-3264CA	TP52	0.5	Soil	16.60
MA-3264CB	TP52	1.5	Soil	23.40
MA-3264CC	TP53	0.5	Soil	17.20
MA-3264CD	TP53	1.5	Soil	34.60

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-3264CE	TP53	2.5	Soil	102.70
MA-3264CF	TP54	0.5	Soil	16.20
MA-3264CG	TP54	1.5	Soil	36.80
MA-3264CH	TP54	2.5	Soil	55.00
MA-3264CI	TP55	0.5	Soil	18.10
MA-3264CJ	TP55	1.5	Soil	11.60

Material Test Report

Report Number: **76589.06-3**
Issue Number: 1
Date Issued: 28/08/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3264
Dates Tested: 14/08/2020 - 18/08/2020

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Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Determination of pH of Soil (In-House) DP MAC1				
Sample Number	Location	Depth (m)	Material	pH Value
MA-3264A	TP1	0.5	Soil	5.5
MA-3264B	TP1	1.5	Soil	5.4
MA-3264C	TP1	2.5	Soil	5.4
MA-3264D	TP2	0.5	Soil	5.8
MA-3264E	TP2	1.5	Soil	5.5
MA-3264F	TP3	0.5	Soil	5.9
MA-3264G	TP3	1.5	Soil	6.7
MA-3264H	TP4	0.5	Soil	5.4
MA-3264I	TP4	1.5	Soil	5.5
MA-3264J	TP4	2.5	Soil	8.6
MA-3264K	TP5	0.5	Soil	6.5
MA-3264L	TP5	1.3	Soil	6.7
MA-3264M	TP6	0.5	Soil	6.4
MA-3264N	TP6	1.5	Soil	5.6
MA-3264O	TP6	2.5	Soil	5.8
MA-3264P	TP7	0.5	Soil	6.3
MA-3264Q	TP7	1.5	Soil	9.6
MA-3264R	TP8	0.5	Soil	6.5
MA-3264S	TP8	1.5	Soil	5.6
MA-3264T	TP8	2.5	Soil	5.7
MA-3264U	TP9	0.5	Soil	6.3
MA-3264V	TP9	1.5	Soil	9.2
MA-3264W	TP10	0.5	Soil	6.7
MA-3264X	TP11	0.5	Soil	6.2
MA-3264Y	TP11	1.5	Soil	5.9
MA-3264Z	TP12	0.5	Soil	6.2
MA-3264AA	TP12	1.5	Soil	5.6
MA-3264AB	TP12	2.5	Soil	5.6
MA-3264AC	TP13	0.5	Soil	6.4
MA-3264AD	TP13	1.5	Soil	7.2
MA-3264AE	TP13	2.5	Soil	9.3
MA-3264AF	TP14	0.5	Soil	6.0
MA-3264AG	TP14	1.5	Soil	5.3
MA-3264AH	TP14	2.5	Soil	6.2
MA-3264AI	TP15	0.5	Soil	6.4

Sample Number	Location	Depth (m)	Material	pH Value
MA-3264AJ	TP15	1.5	Soil	5.9
MA-3264AK	TP16	0.5	Soil	6.2
MA-3264AL	TP16	1.3	Soil	5.4
MA-3264AM	TP17	0.5	Soil	6.0
MA-3264AN	TP17	1.5	Soil	7.1
MA-3264AO	TP18	0.5	Soil	5.8
MA-3264AP	TP18	1.3	Soil	5.6
MA-3264AQ	TP20	0.5	Soil	6.7
MA-3264AR	TP20	1.5	Soil	5.8
MA-3264AS	TP20	2.5	Soil	6.3
MA-3264AT	TP21	0.5	Soil	6.4
MA-3264AU	TP21	1.5	Soil	6.1
MA-3264AV	TP21	2.5	Soil	6.2
MA-3264AW	TP22	0.5	Soil	5.9
MA-3264AX	TP22	1.5	Soil	5.2
MA-3264AY	TP22	2.5	Soil	5.2
MA-3264AZ	TP23	0.5	Soil	5.5
MA-3264BA	TP25	0.5	Soil	7.5
MA-3264BB	TP25	1.5	Soil	9.6
MA-3264BC	TP28	0.5	Soil	8.7
MA-3264BD	TP28	1.5	Soil	7.1
MA-3264BE	TP28	2.5	Soil	6.1
MA-3264BF	TP38	0.5	Soil	5.9
MA-3264BG	TP38	1.5	Soil	5.4
MA-3264BH	TP38	2.5	Soil	7.8
MA-3264BI	TP40	0.5	Soil	7.7
MA-3264BJ	TP40	1.5	Soil	7.6
MA-3264BK	TP40	2.3	Soil	7.1
MA-3264BL	TP41	0.5	Soil	7.0
MA-3264BM	TP41	1.5	Soil	7.2
MA-3264BN	TP41	2.5	Soil	9.5
MA-3264BO	TP42	0.5	Soil	8.3
MA-3264BP	TP42	1.5	Soil	7.2
MA-3264BQ	TP42	2.5	Soil	7.4
MA-3264BR	TP46	0.5	Soil	5.9
MA-3264BS	TP49	0.5	Soil	6.7
MA-3264BT	TP49	1.5	Soil	6.0
MA-3264BU	TP49	2.5	Soil	5.9
MA-3264BV	TP50	0.5	Soil	5.9
MA-3264BW	TP50	1.5	Soil	5.9
MA-3264BX	TP50	2.5	Soil	6.0
MA-3264BY	TP51	0.5	Soil	4.8
MA-3264BZ	TP51	1.5	Soil	5.7
MA-3264CA	TP52	0.5	Soil	5.9
MA-3264CB	TP52	1.5	Soil	5.9
MA-3264CC	TP53	0.5	Soil	7.1
MA-3264CD	TP53	1.5	Soil	9.1

Sample Number	Location	Depth (m)	Material	pH Value
MA-3264CE	TP53	2.5	Soil	8.9
MA-3264CF	TP54	0.5	Soil	7.7
MA-3264CG	TP54	1.5	Soil	7.6
MA-3264CH	TP54	2.5	Soil	7.0
MA-3264CI	TP55	0.5	Soil	5.3
MA-3264CJ	TP55	1.5	Soil	6.7

Material Test Report

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NATA Accredited Laboratory Number: 828

Report Number: **76589.06-6**
Issue Number: 1
Date Issued: 10/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415A
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP19 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	49		
Plastic Limit (%)	23		
Plasticity Index (%)	**26**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	27.7

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Report Number: **76589.06-6**
Issue Number: 1
Date Issued: 10/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415B
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP44 (1.0 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	62		
Plastic Limit (%)	27		
Plasticity Index (%)	**35**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	15.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	25.7

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Contact: Nicole Topple
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Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415C
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP36 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	45		
Plastic Limit (%)	20		
Plasticity Index (%)	**25**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	10.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	22.3

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Approved Signatory: Meragal Henaka Arachchi
clean lab
NATA Accredited Laboratory Number: 828

Report Number: **76589.06-6**
Issue Number: 1
Date Issued: 10/09/2020
Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415D
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 09/09/2020
Sample Location: **TP34 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	47		
Plastic Limit (%)	18		
Plasticity Index (%)	**29**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	18.2

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415E
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 09/09/2020
Sample Location: **TP26 (1.0 m)**
Material: Silty CLAY with sand

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	58		
Plastic Limit (%)	19		
Plasticity Index (%)	**39**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	10.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	18.8

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415F
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP33 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	65		
Plastic Limit (%)	31		
Plasticity Index (%)	**34**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	14.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	32.2

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Report Number: **76589.06-6**
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Client: Walker Corporation Pty Ltd
Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415G
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP27 (0.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	46		
Plastic Limit (%)	25		
Plasticity Index (%)	**21**		

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

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	21.5

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

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Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415H
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP43 (1.0 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	72		
Plastic Limit (%)	28		
Plasticity Index (%)	**44**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	17.5		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	28.0

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415I
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP48 (0.2 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	48		
Plastic Limit (%)	25		
Plasticity Index (%)	**23**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	10.0		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	20.1

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415J
Date Sampled: 24/09/2020
Dates Tested: 01/09/2020 - 10/09/2020
Sample Location: **TP47 (1.5 m)**
Material: Silty CLAY

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	55		
Plastic Limit (%)	20		
Plasticity Index (%)	**35**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.0		
Cracking Crumbling Curling	Curling		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	24.0

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**2**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415K
Date Sampled: 24/09/2020
Dates Tested: 10/09/2020 - 10/09/2020
Sample Location: **TP45 (0.5 m)**
Material: Silty CLAY

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As bove		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

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Level 21, 1 Farrer Place, Sydney NSW 2000
Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Sample Number: MA-3415L
Date Sampled: 24/09/2020
Dates Tested: 10/09/2020 - 10/09/2020
Sample Location: **TP35 (0.5 m)**
Material: Silty CLAY

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	As above		
Nature of Water	Distilled water		
Temperature of Water (^{o}C)	23		

Material Test Report

Report Number: **76589.06-6**
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Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Dates Tested: 01/09/2020 - 01/09/2020

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Moisture Content AS 1289 2.1.1			
Sample Number	Sample Location	Moisture Content (%)	Material
MA-3415A	TP19 (0.5 m)	27.7 %	Silty CLAY
MA-3415B	TP44 (1.0 m)	25.7 %	Silty CLAY
MA-3415C	TP36 (0.5 m)	22.3 %	Silty CLAY
MA-3415D	TP34 (0.5 m)	18.2 %	Silty CLAY
MA-3415E	TP26 (1.0 m)	18.8 %	Silty CLAY with sand
MA-3415F	TP33 (0.5 m)	32.2 %	Silty CLAY
MA-3415G	TP27 (0.5 m)	21.5 %	Silty CLAY
MA-3415H	TP43 (1.0 m)	28.0 %	Silty CLAY
MA-3415I	TP48 (0.2 m)	20.1 %	Silty CLAY
MA-3415J	TP47 (1.5 m)	24.0 %	Silty CLAY

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Contact: Nicole Topple
Project Number: 76589.06
Project Name: Proposed West Appin Precinct
Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Dates Tested: 01/09/2020 - 07/09/2020

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Determination of EC of Soil (In-House) DP MAC2				
Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-3415M	TP19	0.5	Soil	33.40
MA-3415N	TP26	0.5	Soil	66.60
MA-3415O	TP26	1.2	Soil	430.00
MA-3415P	TP27	0.5	Soil	29.50
MA-3415Q	TP27	1.5	Soil	161.60
MA-3415R	TP27	2.5	Soil	89.30
MA-3415S	TP30	0.5	Soil	67.30
MA-3415T	TP30	1.5	Soil	456.20
MA-3415U	TP30	2.5	Soil	223.20
MA-3415V	TP33	0.5	Soil	55.50
MA-3415W	TP33	1.5	Soil	78.30
MA-3415X	TP33	2.5	Soil	94.80
MA-3415Y	TP34	0.5	Soil	17.20
MA-3415Z	TP34	1.5	Soil	118.30
MA-3415AA	TP34	2.5	Soil	125.20
MA-3415AB	TP35	0.5	Soil	53.70
MA-3415AC	TP35	1.5	Soil	58.30
MA-3415AD	TP36	0.5	Soil	19.20
MA-3415AE	TP36	1.5	Soil	28.80
MA-3415AF	TP37	0.5	Soil	16.50
MA-3415AG	TP37	1.5	Soil	54.60
MA-3415AH	TP37	2.5	Soil	56.20
MA-3415AI	TP39	0.5	Soil	61.50
MA-3415AJ	TP39	1.5	Soil	122.50
MA-3415AK	TP39	2.5	Soil	26.30
MA-3415AL	TP43	0.5	Soil	23.20
MA-3415AM	TP43	1.5	Soil	43.10
MA-3415AN	TP44	0.5	Soil	49.00
MA-3415AO	TP44	1.5	Soil	99.00
MA-3415AP	TP45	0.5	Soil	56.20
MA-3415AQ	TP45	1.5	Soil	193.50
MA-3415AR	TP45	2.5	Soil	128.80
MA-3415AS	TP47	0.5	Soil	40.60
MA-3415AT	TP47	1.5	Soil	139.20
MA-3415AU	TP47	2.5	Soil	69.80

Sample Number	Location	Depth (m)	Material	EC Value (µS/cm)
MA-3415AV	TP48	0.5	Soil	52.60
MA-3415AW	TP48	1.5	Soil	25.90
MA-3415AX	TP48	2.5	Soil	39.10

Material Test Report

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Project Location: Central Point at 280 Point Road, Appin
Work Request: 3415
Dates Tested: 01/09/2020 - 07/09/2020

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Determination of pH of Soil (In-House) DP MAC1				
Sample Number	Location	Depth (m)	Material	pH Value
MA-3415M	TP19	0.5	Soil	6.2
MA-3415N	TP26	0.5	Soil	6.7
MA-3415O	TP26	1.2	Soil	7.4
MA-3415P	TP27	0.5	Soil	6.1
MA-3415Q	TP27	1.5	Soil	6.4
MA-3415R	TP27	2.5	Soil	7.0
MA-3415S	TP30	0.5	Soil	6.1
MA-3415T	TP30	1.5	Soil	4.9
MA-3415U	TP30	2.5	Soil	5.6
MA-3415V	TP33	0.5	Soil	5.1
MA-3415W	TP33	1.5	Soil	5.5
MA-3415X	TP33	2.5	Soil	5.4
MA-3415Y	TP34	0.5	Soil	5.8
MA-3415Z	TP34	1.5	Soil	9.3
MA-3415AA	TP34	2.5	Soil	8.9
MA-3415AB	TP35	0.5	Soil	5.4
MA-3415AC	TP35	1.5	Soil	5.6
MA-3415AD	TP36	0.5	Soil	6.0
MA-3415AE	TP36	1.5	Soil	5.8
MA-3415AF	TP37	0.5	Soil	6.3
MA-3415AG	TP37	1.5	Soil	5.6
MA-3415AH	TP37	2.5	Soil	5.6
MA-3415AI	TP39	0.5	Soil	7.1
MA-3415AJ	TP39	1.5	Soil	6.3
MA-3415AK	TP39	2.5	Soil	5.9
MA-3415AL	TP43	0.5	Soil	5.9
MA-3415AM	TP43	1.5	Soil	5.6
MA-3415AN	TP44	0.5	Soil	5.6
MA-3415AO	TP44	1.5	Soil	5.5
MA-3415AP	TP45	0.5	Soil	6.3
MA-3415AQ	TP45	1.5	Soil	5.7
MA-3415AR	TP45	2.5	Soil	6.6
MA-3415AS	TP47	0.5	Soil	5.6
MA-3415AT	TP47	1.5	Soil	5.2
MA-3415AU	TP47	2.5	Soil	5.8

Sample Number	Location	Depth (m)	Material	pH Value
MA-3415AV	TP48	0.5	Soil	5.4
MA-3415AW	TP48	1.5	Soil	5.5
MA-3415AX	TP48	2.5	Soil	5.8

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CERTIFICATE OF ANALYSIS 249450

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	Emily McGinty
Address	18 Waler Crescent, Smeaton Grange, NSW, 2567

Sample Details

Your Reference	**76589.06, APPIN, West Appin Precinct**
Number of Samples	36 Soil
Date samples received	20/08/2020
Date completed instructions received	20/08/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	27/08/2020
Date of Issue	27/08/2020

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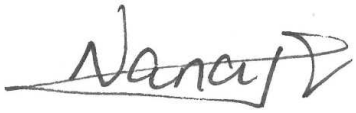
Results Approved By
Jaimie Loa-Kum-Cheung, Metals Supervisor
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		249450-1	249450-2	249450-3	249450-4	249450-5
Your Reference	UNITS	TP1/1.5	TP2/0.5	TP3/1.5	TP4/1.5	TP5/1.5 (0.5)
Date Sampled		04/08/2020	04/08/2020	04/08/2020	03/08/2020	03/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	68	<10	600	31	<10
Sulphate, SO4 1:5 soil:water	mg/kg	73	<10	410	20	23

Misc Inorg - Soil						
Our Reference		249450-6	249450-7	249450-8	249450-9	249450-10
Your Reference	UNITS	TP6/1.5	TP7/0.5 (TP60.5)	TP8/0.5	TP9/1.5	TP10/0.5
Date Sampled		03/08/2020	03/08/2020	03/08/2020	03/08/2020	04/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	45	<10	<10	<10	10
Sulphate, SO4 1:5 soil:water	mg/kg	<10	<10	23	<10	41

Misc Inorg - Soil						
Our Reference		249450-11	249450-12	249450-13	249450-14	249450-15
Your Reference	UNITS	TP11/0/5	TP12/1.5	TP13/1.5	TP14/0.5	TP15/0.5
Date Sampled		04/08/2020	03/08/2020	03/08/2020	03/08/2020	04/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	<10	38	89	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	32	44	24	20	10

Misc Inorg - Soil						
Our Reference		249450-16	249450-17	249450-18	249450-19	249450-20
Your Reference	UNITS	TP16/0.5	TP17/0.5	TP18/0.5	TP20/2.5	TP21/1.5
Date Sampled		04/08/2020	04/08/2020	06/08/2020	05/08/2020	05/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	<10	10	44	33	25
Sulphate, SO4 1:5 soil:water	mg/kg	20	21	120	20	20

Misc Inorg - Soil						
Our Reference		249450-21	249450-22	249450-23	249450-24	249450-25
Your Reference	UNITS	TP22/1.5	TP23/0.5	TP25/1.5	TP28/2.5	TP38/1.5
Date Sampled		06/08/2020	06/08/2020	06/08/2020	06/08/2020	06/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	250	10	<10	23	<10
Sulphate, SO4 1:5 soil:water	mg/kg	39	59	<10	20	10

Misc Inorg - Soil						
Our Reference		249450-26	249450-27	249450-28	249450-29	249450-30
Your Reference	UNITS	TP40/1.5	TP41/2.5	TP42/0.5	TP46/0.5	TP49/0.5
Date Sampled		06/08/2020	06/08/2020	06/08/2020	05/08/2020	05/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	72	94	<10	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	30	10	<10	28	20

Misc Inorg - Soil						
Our Reference		249450-31	249450-32	249450-33	249450-34	249450-35
Your Reference	UNITS	TP50/2.5	TP51/1.5	TP52/0.5	TP53/2.5	TP54/1.5
Date Sampled		05/08/2020	04/08/2020	06/08/2020	05/08/2020	05/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Date analysed	-	25/08/2020	25/08/2020	25/08/2020	25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	<10	10	<10	76	36
Sulphate, SO4 1:5 soil:water	mg/kg	35	32	22	20	10

Misc Inorg - Soil		
Our Reference		249450-36
Your Reference	UNITS	TP55/0.5
Date Sampled		05/08/2020
Type of sample		Soil
Date prepared	-	25/08/2020
Date analysed	-	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	<10
Sulphate, SO4 1:5 soil:water	mg/kg	20

ESP/CEC						
Our Reference		249450-2	249450-7	249450-14	249450-17	249450-29
Your Reference	UNITS	TP2/0.5	TP7/0.5 (TP60.5)	TP14/0.5	TP17/0.5	TP46/0.5
Date Sampled		04/08/2020	03/08/2020	03/08/2020	04/08/2020	05/08/2020
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
Date analysed	-	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
Exchangeable Ca	meq/100g	0.4	5.3	1.7	3.4	1.5
Exchangeable K	meq/100g	0.2	0.2	0.1	0.2	0.1
Exchangeable Mg	meq/100g	1.4	3.6	4.2	6.9	6.0
Exchangeable Na	meq/100g	<0.1	0.11	0.46	0.50	0.28
Cation Exchange Capacity	meq/100g	2.0	9.1	6.5	11	8.0
ESP	%	[NT]	1	7	5	3

ESP/CEC			
Our Reference		249450-30	249450-33
Your Reference	UNITS	TP49/0.5	TP52/0.5
Date Sampled		05/08/2020	06/08/2020
Type of sample		Soil	Soil
Date prepared	-	24/08/2020	24/08/2020
Date analysed	-	24/08/2020	24/08/2020
Exchangeable Ca	meq/100g	3.7	1.4
Exchangeable K	meq/100g	0.1	0.1
Exchangeable Mg	meq/100g	5.5	2.9
Exchangeable Na	meq/100g	0.69	0.28
Cation Exchange Capacity	meq/100g	10	4.7
ESP	%	7	6

Method ID	Methodology Summary
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	249450-5
Date prepared	-			25/08/2020	2	25/08/2020	25/08/2020		25/08/2020	25/08/2020
Date analysed	-			25/08/2020	2	25/08/2020	25/08/2020		25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	2	<10	<10	0	91	88
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	2	<10	10	0	93	87

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	249450-24
Date prepared	-			[NT]	3	25/08/2020	25/08/2020		25/08/2020	25/08/2020
Date analysed	-			[NT]	3	25/08/2020	25/08/2020		25/08/2020	25/08/2020
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	3	600	610	2	89	94
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	3	410	400	2	97	102

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	12	25/08/2020	25/08/2020		[NT]	[NT]
Date analysed	-			[NT]	12	25/08/2020	25/08/2020		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	12	38	35	8	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	12	44	47	7	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	22	25/08/2020	25/08/2020		[NT]	[NT]
Date analysed	-			[NT]	22	25/08/2020	25/08/2020		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	22	10	10	0	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	22	59	60	2	[NT]	[NT]

QUALITY CONTROL: ESP/CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			24/08/2020	2	24/08/2020	24/08/2020		24/08/2020	[NT]
Date analysed	-			24/08/2020	2	24/08/2020	24/08/2020		24/08/2020	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	2	0.4	0.4	0	109	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	2	0.2	0.2	0	116	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	2	1.4	1.6	13	109	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	2	<0.1	<0.1	0	120	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

ESP: Where the exchangeable Sodium is less than the PQL and CEC is less than 10meq/100g, the ESP cannot be calculated.

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CERTIFICATE OF ANALYSIS 249933

Client Details

Client	Douglas Partners Pty Ltd Smeaton Grange
Attention	Adad Barkho
Address	18 Waler Crescent, Smeaton Grange, NSW, 2567

Sample Details

Your Reference	**76589.06, Appin, West Appin Precinct**
Number of Samples	15 soil
Date samples received	27/08/2020
Date completed instructions received	27/08/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	03/09/2020
Date of Issue	03/09/2020

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Hannah Nguyen, Senior Chemist
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Misc Inorg - Soil						
Our Reference		249933-1	249933-2	249933-3	249933-4	249933-5
Your Reference	UNITS	TP19	TP26	TP27	TP30	TP33
Depth		0.5	0.5	0.5	1.5	0.5
Date Sampled		24/08/2020	24/08/2020	25/08/2020	24/08/2020	24/08/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	02/09/2020	02/09/2020	02/09/2020	02/09/2020	02/09/2020
Date analysed	-	02/09/2020	02/09/2020	02/09/2020	02/09/2020	02/09/2020
Chloride, Cl 1:5 soil:water	mg/kg	<10	43	21	670	<10
Sulphate, SO4 1:5 soil:water	mg/kg	43	70	<10	59	84

Misc Inorg - Soil						
Our Reference		249933-6	249933-7	249933-8	249933-9	249933-10
Your Reference	UNITS	TP34	TP35	TP36	TP37	TP39
Depth		0.5	1.5	0.5	2.5	1.5
Date Sampled		24/08/2020	25/08/2020	24/08/2020	24/08/2020	25/08/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	02/09/2020	02/09/2020	02/09/2020	02/09/2020	02/09/2020
Date analysed	-	02/09/2020	02/09/2020	02/09/2020	02/09/2020	02/09/2020
Chloride, Cl 1:5 soil:water	mg/kg	<10	49	21	21	58
Sulphate, SO4 1:5 soil:water	mg/kg	21	10	21	73	32

Misc Inorg - Soil						
Our Reference		249933-11	249933-12	249933-13	249933-14	249933-15
Your Reference	UNITS	TP43	TP44	TP45	TP47	TP48
Depth		0.5	0.5	2.5	1.5	2.5
Date Sampled		25/08/2020	24/08/2020	24/08/2020	25/08/2020	25/08/2020
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	02/09/2020	02/09/2020	02/09/2020	02/09/2020	02/09/2020
Date analysed	-	02/09/2020	02/09/2020	02/09/2020	02/09/2020	02/09/2020
Chloride, Cl 1:5 soil:water	mg/kg	10	<10	130	190	<10
Sulphate, SO4 1:5 soil:water	mg/kg	27	68	30	20	26

ESP/CEC				
Our Reference		249933-1	249933-5	249933-14
Your Reference	UNITS	TP19	TP33	TP47
Depth		0.5	0.5	1.5
Date Sampled		24/08/2020	24/08/2020	25/08/2020
Type of sample		soil	soil	soil
Date prepared	-	03/09/2020	03/09/2020	03/09/2020
Date analysed	-	03/09/2020	03/09/2020	03/09/2020
Exchangeable Ca	meq/100g	3.7	3.5	<0.1
Exchangeable K	meq/100g	0.2	0.4	0.3
Exchangeable Mg	meq/100g	2.6	3.9	4.7
Exchangeable Na	meq/100g	<0.1	0.10	1.5
Cation Exchange Capacity	meq/100g	6.7	7.9	6.6
ESP	%	[NT]	1	23

Method ID	Methodology Summary
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	249933-2
Date prepared	-			02/09/2020	1	02/09/2020	02/09/2020		02/09/2020	02/09/2020
Date analysed	-			02/09/2020	1	02/09/2020	02/09/2020		02/09/2020	02/09/2020
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	<10	<10	0	104	97
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	43	47	9	111	121

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	10	02/09/2020	02/09/2020		[NT]	[NT]
Date analysed	-			[NT]	10	02/09/2020	02/09/2020		[NT]	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	10	58	56	4	[NT]	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	[NT]	10	32	31	3	[NT]	[NT]

QUALITY CONTROL: ESP/CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/09/2020	[NT]	[NT]	[NT]	[NT]	03/09/2020	[NT]
Date analysed	-			03/09/2020	[NT]	[NT]	[NT]	[NT]	03/09/2020	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	112	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]

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Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

ESP: Where the exchangeable Sodium is less than the PQL and CEC is less than 10meq/100g, the ESP cannot be calculated.

Appendix F

Salinity Summary Table

Appendix F: Summary Table - Laboratory Tests and Assessments

Test Pit	Sample Depth	pH	Chloride Concentration	Sulphate Concentration	Resistivity	Soil Condition	Sample Aggressivity Class					Exchangeable Sodium (Na) Concentration	Cation Exchange Capacity	Sodicity	Sodicity Class	Soil Texture Group	Textural Factor (M)	$EC_{1:5}$	EC_e	Sample Salinity Class
					By inversion of EC1:5		Aggr. to Concrete - from sample pH	Aggr. to Concrete - from Sulphate conc.	Aggr. to Steel - from sample pH	Aggr. to Steel - from Chloride conc.	Aggr. to Steel - from sample Resistivity			[Na/CEC]		(for detailed soil logs see Report Appendix)		[Lab.]	[M x $EC_{1:5}$]	(Based on sample ECe)
	(m bgl)	(pH units)	(mg/kg)	(mg/kg)	Ω.cm	[AS2159-2009]	[AS2159-2009]					(meq/100g)	(meq/100g)	(%)	[after DLWC]	[after DLWC]	[after DLWC]	(microS/cm)	(deciS/m)	[Richards 1954]
TP1	0.5	5.5			37175	B	Mild		Non-Aggressive		Non-Aggressive					Light clay	8.5	26.9	0.2	Non-Saline
TP1	1.5	5.4	68	73	7570	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Clay loam	9	132.1	1.2	Non-Saline
TP1	2.5	5.4			5266	B	Mild		Non-Aggressive		Non-Aggressive					Clay loam	9	189.9	1.7	Non-Saline
TP2	0.5	5.8	10	10	99010	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	<0.1	2			Medium clay	7	10.1	0.1	Non-Saline
TP2	1.5	5.5			61728	B	Mild		Non-Aggressive		Non-Aggressive					Clay loam	9	16.2	0.1	Non-Saline
TP3	0.5	5.9			20040	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	49.9	0.3	Non-Saline
TP3	1.5	6.7	600	410	2665	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	375.2	2.6	Slightly Saline
TP4	0.5	5.4			19268	B	Mild		Non-Aggressive		Non-Aggressive					Heavy clay	6	51.9	0.3	Non-Saline
TP4	1.5	5.5	31	20	35211	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	28.4	0.2	Non-Saline
TP4	2.5	8.6			7886	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	126.8	0.9	Non-Saline
TP5	0.5	6.5	10	23	45662	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	21.9	0.2	Non-Saline
TP5	1.3	6.7			21231	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	47.1	0.3	Non-Saline
TP6	0.5	6.4			66225	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	15.1	0.1	Non-Saline
TP6	1.5	5.6	45	10	22624	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Clay loam	9	44.2	0.4	Non-Saline
TP6	2.5	5.8			28090	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	35.6	0.2	Non-Saline
TP7	0.5	6.3	10	10	10870	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.11	9.1	1	Non-Sodic	Medium clay	7	92	0.6	Non-Saline
TP7	1.5	9.6			3191	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	313.4	2.2	Slightly Saline
TP8	0.5	6.5	10	23	63694	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light clay	8.5	15.7	0.1	Non-Saline
TP8	1.5	5.6			31056	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	32.2	0.2	Non-Saline
TP8	2.5	5.7			25445	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	39.3	0.3	Non-Saline
TP9	0.5	6.3			67114	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Loam	10	14.9	0.1	Non-Saline
TP9	1.5	9.2	10	10	15175	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Sandy loam	14	65.9	0.9	Non-Saline
TP10	0.5	6.7	10	41	42918	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	23.3	0.2	Non-Saline
TP11	0.5	6.2	10	32	34247	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Clay loam	9	29.2	0.3	Non-Saline
TP11	1.5	5.9			18315	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	54.6	0.4	Non-Saline
TP12	0.5	6.2			68493	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light clay	8.5	14.6	0.1	Non-Saline
TP12	1.5	5.6	38	44	20833	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	48	0.4	Non-Saline
TP12	2.5	5.6			23810	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	42	0.3	Non-Saline
TP13	0.5	6.4			64935	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	15.4	0.1	Non-Saline
TP13	1.5	7.2	89	24	7734	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Clay loam	9	129.3	1.2	Non-Saline
TP13	2.5	9.3			3107	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	321.9	2.3	Slightly Saline
TP14	0.5	6	10	20	42373	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.46	6.5	7	Sodic	Light clay	8.5	23.6	0.2	Non-Saline
TP14	1.5	5.3			15798	B	Mild		Non-Aggressive		Non-Aggressive					Medium clay	7	63.3	0.4	Non-Saline
TP14	2.5	6.2			12953	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	77.2	0.5	Non-Saline
TP15	0.5	6.4	10	10	79365	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light clay	8.5	12.6	0.1	Non-Saline
TP15	1.5	5.9			37453	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	26.7	0.2	Non-Saline
TP16	0.5	6.2	10	20	61350	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Clay loam	9	16.3	0.1	Non-Saline

Appendix F: Summary Table - Laboratory Tests and Assessments

Test Pit	Sample Depth	pH	Chloride Concentration	Sulphate Concentration	Resistivity	Soil Condition	Sample Aggressivity Class					Exchangeable Sodium (Na) Concentration	Cation Exchange Capacity	Sodicity	Sodicity Class	Soil Texture Group	Textural Factor (M)	$EC_{1:5}$	EC_e	Sample Salinity Class
					By inversion of EC1:5		Aggr. to Concrete - from sample pH	Aggr. to Concrete - from Sulphate conc.	Aggr. to Steel - from sample pH	Aggr. to Steel - from Chloride conc.	Aggr. to Steel - from sample Resistivity			[Na/CEC]		(for detailed soil logs see Report Appendix)		[Lab.]	[M x $EC_{1:5}$]	(Based on sample ECe)
	(m bgl)	(pH units)	(mg/kg)	(mg/kg)	Ω.cm	[AS2159-2009]	[AS2159-2009]					(meq/100g)	(meq/100g)	(%)	[after DLWC]	[after DLWC]	[after DLWC]	(microS/cm)	(deciS/m)	[Richards 1954]
TP16	1.3	5.4			12920	B	Mild		Non-Aggressive		Non-Aggressive					Clay loam	9	77.4	0.7	Non-Saline
TP17	0.5	6	10	21	33333	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.5	11	5	Non-Sodic	Medium clay	7	30	0.2	Non-Saline
TP17	1.5	7.1			3634	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	275.2	2.5	Slightly Saline
TP18	0.5	5.8	44	120	25000	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Loam	10	40	0.4	Non-Saline
TP18	1.3	5.6			34602	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	28.9	0.3	Non-Saline
TP20	0.5	6.7	33	20	80000	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Heavy clay	6	12.5	0.1	Non-Saline
TP20	1.5	5.8			37594	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	26.6	0.2	Non-Saline
TP20	2.5	6.3			21882	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	45.7	0.3	Non-Saline
TP21	0.5	6.4			52910	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Heavy clay	6	18.9	0.1	Non-Saline
TP21	1.5	6.1	25	20	36364	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	27.5	0.2	Non-Saline
TP21	2.5	6.2			29070	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	34.4	0.2	Non-Saline
TP22	0.5	5.9			32573	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	30.7	0.3	Non-Saline
TP22	1.5	5.2	250	39	5963	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	167.7	1.3	Non-Saline
TP22	2.5	5.2			7257	B	Mild		Non-Aggressive		Non-Aggressive					Light medium clay	8	137.8	1.1	Non-Saline
TP23	0.5	5.5	10	59	25000	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Clay loam	9	40	0.4	Non-Saline
TP25	0.5	7.5			43860	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	22.8	0.2	Non-Saline
TP25	1.5	9.6	10	10	16207	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	61.7	0.4	Non-Saline
TP28	0.5	8.7			15898	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	62.9	0.4	Non-Saline
TP28	1.5	7.1			23364	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	42.8	0.3	Non-Saline
TP28	2.5	6.1	23	20	40486	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	24.7	0.2	Non-Saline
TP38	0.5	5.9			43668	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	22.9	0.2	Non-Saline
TP38	1.5	5.4	10	10	30211	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	33.1	0.2	Non-Saline
TP38	2.5	7.8			8117	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	123.2	0.9	Non-Saline
TP40	0.5	7.7			14164	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	70.6	0.6	Non-Saline
TP40	1.5	7.6	72	30	10309	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	97	0.7	Non-Saline
TP40	2.3	7.1			17921	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	55.8	0.4	Non-Saline
TP41	0.5	7			58480	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	17.1	0.1	Non-Saline
TP41	1.5	7.2			5999	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	166.7	1.2	Non-Saline
TP41	2.5	9.5	94	10	4168	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	239.9	1.7	Non-Saline
TP42	0.5	8.3	10	10	55556	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	18	0.1	Non-Saline
TP42	1.5	7.2			48544	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	20.6	0.1	Non-Saline
TP42	2.5	7.4			25253	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	39.6	0.3	Non-Saline
TP46	0.5	5.9	10	28	54054	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.28	8	4	Non-Sodic	Heavy clay	6	18.5	0.1	Non-Saline
TP49	0.5	6.7	10	20	75188	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.69	10	7	Sodic	Heavy clay	6	13.3	0.1	Non-Saline
TP49	1.5	6			44843	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	22.3	0.2	Non-Saline
TP49	2.5	5.9			54645	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	18.3	0.1	Non-Saline
TP50	0.5	5.9			58480	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	17.1	0.1	Non-Saline

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Test Pit	Sample Depth	pH	Chloride Concentration	Sulphate Concentration	Resistivity	Soil Condition	Sample Aggressivity Class					Exchangeable Sodium (Na) Concentration	Cation Exchange Capacity	Sodicity	Sodicity Class	Soil Texture Group	Textural Factor (M)	$EC_{1:5}$	EC_e	Sample Salinity Class
					By inversion of EC1:5		Aggr. to Concrete - from sample pH	Aggr. to Concrete - from Sulphate conc.	Aggr. to Steel - from sample pH	Aggr. to Steel - from Chloride conc.	Aggr. to Steel - from sample Resistivity			[Na/CEC]		(for detailed soil logs see Report Appendix)		[Lab.]	[M x $EC_{1:5}$]	(Based on sample ECe)
	(m bgl)	(pH units)	(mg/kg)	(mg/kg)	Ω.cm	[AS2159-2009]	[AS2159-2009]					(meq/100g)	(meq/100g)	(%)	[after DLWC]	[after DLWC]	[after DLWC]	(microS/cm)	(deciS/m)	[Richards 1954]
TP50	1.5	5.9			29240	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	34.2	0.3	Non-Saline
TP50	2.5	6	10	35	44444	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light clay	8.5	22.5	0.2	Non-Saline
TP51	0.5	4.8			2601	B	Mild		Non-Aggressive		Non-Aggressive					Loam	10	384.4	3.8	Slightly Saline
TP51	1.5	5.7	10	32	12690	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	78.8	0.6	Non-Saline
TP52	0.5	5.9	10	22	60241	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.28	4.7	6	Sodic	Clay loam	9	16.6	0.1	Non-Saline
TP52	1.5	5.9			42735	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	23.4	0.2	Non-Saline
TP53	0.5	7.1			58140	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	17.2	0.1	Non-Saline
TP53	1.5	9.1			28902	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light clay	8.5	34.6	0.3	Non-Saline
TP53	2.5	8.9	76	20	9737	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light clay	8.5	102.7	0.9	Non-Saline
TP54	0.5	7.7			61728	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Heavy clay	6	16.2	0.1	Non-Saline
TP54	1.5	7.6	36	10	27174	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	36.8	0.3	Non-Saline
TP54	2.5	7			18182	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	55	0.4	Non-Saline
TP55	0.5	5.3	10	20	55249	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Heavy clay	6	18.1	0.1	Non-Saline
TP55	1.5	6.7			86207	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	11.6	0.1	Non-Saline
TP19	0.5	6.2	10	43	29940	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	<0.1	6.7			Medium clay	7	33.4	0.2	Non-Saline
TP26	0.5	6.7	43	70	15015	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Heavy clay	6	66.6	0.4	Non-Saline
TP26	1.2	7.4			2326	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	430	3.0	Slightly Saline
TP27	0.5	6.1	21	10	33898	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	29.5	0.2	Non-Saline
TP27	1.5	6.4			6188	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	161.6	1.1	Non-Saline
TP27	2.5	7			11198	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	89.3	0.6	Non-Saline
TP30	0.5	6.1			14859	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	67.3	0.5	Non-Saline
TP30	1.5	4.9	670	59	2192	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	456.2	3.2	Slightly Saline
TP30	2.5	5.6			4480	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	223.2	1.6	Non-Saline
TP33	0.5	5.1	10	84	18018	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	0.1	7.9	1	Non-Sodic	Medium clay	7	55.5	0.4	Non-Saline
TP33	1.5	5.5			12771	B	Mild		Non-Aggressive		Non-Aggressive					Medium clay	7	78.3	0.5	Non-Saline
TP33	2.5	5.4			10549	B	Mild		Non-Aggressive		Non-Aggressive					Medium clay	7	94.8	0.7	Non-Saline
TP34	0.5	5.8	10	21	58140	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	17.2	0.1	Non-Saline
TP34	1.5	9.3			8453	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Clay loam	9	118.3	1.1	Non-Saline
TP34	2.5	8.9			7987	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	125.2	0.9	Non-Saline
TP35	0.5	5.4			18622	B	Mild		Non-Aggressive		Non-Aggressive					Light medium clay	8	53.7	0.4	Non-Saline
TP35	1.5	5.6	49	10	17153	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	58.3	0.4	Non-Saline
TP36	0.5	6	21	21	52083	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	19.2	0.2	Non-Saline
TP36	1.5	5.8			34722	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	28.8	0.2	Non-Saline
TP37	0.5	6.3			60606	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	16.5	0.1	Non-Saline
TP37	1.5	5.6			18315	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	54.6	0.4	Non-Saline
TP37	2.5	5.6	21	73	17794	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	56.2	0.4	Non-Saline
TP39	0.5	7.1			16260	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	61.5	0.4	Non-Saline

Appendix F: Summary Table - Laboratory Tests and Assessments

Test Pit	Sample Depth	pH	Chloride Concentration	Sulphate Concentration	Resistivity	Soil Condition	Sample Aggressivity Class					Exchangeable Sodium (Na) Concentration	Cation Exchange Capacity	Sodicity	Sodicity Class	Soil Texture Group	Textural Factor (M)	$EC_{1:5}$	EC_e	Sample Salinity Class
					By inversion of EC1:5		Aggr. to Concrete - from sample pH	Aggr. to Concrete - from Sulphate conc.	Aggr. to Steel - from sample pH	Aggr. to Steel - from Chloride conc.	Aggr. to Steel - from sample Resistivity			[Na/CEC]		(for detailed soil logs see Report Appendix)		[Lab.]	[M x $EC_{1:5}$]	(Based on sample ECe)
	(m bgl)	(pH units)	(mg/kg)	(mg/kg)	Ω.cm	[AS2159-2009]	[AS2159-2009]					(meq/100g)	(meq/100g)	(%)	[after DLWC]	[after DLWC]	[after DLWC]	(microS/cm)	(deciS/m)	[Richards 1954]
TP39	1.5	6.3	58	32	8163	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light medium clay	8	122.5	1.0	Non-Saline
TP39	2.5	5.9			38023	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	26.3	0.2	Non-Saline
TP43	0.5	5.9	10	27	43103	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	23.2	0.2	Non-Saline
TP43	1.5	5.6			23202	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	43.1	0.3	Non-Saline
TP44	0.5	5.6	10	68	20408	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	49	0.3	Non-Saline
TP44	1.5	5.5			10101	B	Mild		Non-Aggressive		Non-Aggressive					Light medium clay	8	99	0.8	Non-Saline
TP45	0.5	6.3			17794	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Light medium clay	8	56.2	0.4	Non-Saline
TP45	1.5	5.7			5168	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	193.5	1.4	Non-Saline
TP45	2.5	6.6	130	30	7764	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Light clay	8.5	128.8	1.1	Non-Saline
TP47	0.5	5.6			24631	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	40.6	0.3	Non-Saline
TP47	1.5	5.2	190	20	7184	B	Mild	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	1.5	6.6	23	Highly Sodic	Medium clay	7	139.2	1.0	Non-Saline
TP47	2.5	5.8			14327	B	Non-Aggressive		Non-Aggressive		Non-Aggressive					Medium clay	7	69.8	0.5	Non-Saline
TP48	0.5	5.4			19011	B	Mild		Non-Aggressive		Non-Aggressive					Medium clay	7	52.6	0.4	Non-Saline
TP48	1.5	5.5			38610	B	Mild		Non-Aggressive		Non-Aggressive					Medium clay	7	25.9	0.2	Non-Saline
TP48	2.5	5.8	10	26	25575	B	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive	Non-Aggressive					Medium clay	7	39.1	0.3	Non-Saline