Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Supplementary Geotechnical Investigation

Proposed Industrial Subdivision
290-308 Aldington Rd, 59-63 Abbotts Rd & 1030-1064 Mamre Rd, Kemps Creek

Prepared for
ESR Australia Pty Ltd

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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.

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Report on Supplementary Geotechnical Investigation
Proposed Industrial Subdivision
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1. Introduction

This report presents the results of a supplementary geotechnical investigation undertaken by Douglas Partners Pty Ltd (DP) for a proposed industrial subdivision at 290-308 Aldington Rd, 59-63 Abbotts Rd & 1030-1064 Mamre Rd, Kemps Creek. The investigation was commissioned in an email dated 9 August 2022 by Daniel Galea of ESR Australia Pty Ltd and was undertaken in accordance with DP's proposal 92352.03.P.001.Rev1 dated 9 August 2022.

The report supplements previous geotechnical investigations undertaken on the site by DP, including:

- Geotechnical Report – 59-63 Abbotts Rd (92352.00.R.002.Rev0, dated 19/8/19, DP 2019);
- Geotechnical Report – 1030-1048 Mamre Rd (211619.00.R.001.Rev0 dated 30/3/22, DP 2021); and
- Geotechnical Report – 1050-1064 Mamre Rd (207450.00.R.001.Rev0 dated 20/12/21, DP 2022).

The report provides further details on rock classification, strength and excavatability for the revised excavation depths proposed in the eastern part of the site following the issue of the previous report. In addition, further measurements of the existing topsoil thicknesses across the site have been undertaken during this phase of investigation.

The investigation included the drilling of six boreholes, the excavation of fifty-two test pits and laboratory testing of selected samples. The details of the field work are presented in this report, together with comments and recommendations relevant to the proposed excavation.

2. Field Work

2.1 Field Work Methods

The field work was undertaken over five days between 15 and 19 August 2022, and included:

- Set out and scanning of borehole and test pit locations for buried services.
- Drilling of six boreholes (BH101 to BH106) using a track mounded drilling rig. The boreholes were positioned on topographic high points across the site which essentially represent the greatest depths of excavation along the undulating eastern side of the site. The boreholes were initially progressed using solid flight augers to the top of rock and were then extended using NMLC diamond coring methods to depth of between 14.5 m and 28.5 m below ground level.
- Standard penetration tests (SPT) carried out at regular depth intervals during auger drilling of the boreholes to assess in situ strength and subsoil consistency.

- Excavation of fifty-two test pits (TP1 to TP50, including TP3A and TP28A) using a 5-tonne excavator fitted with a 600 mm wide bucket. The test pits were excavated of depths of up to 0.7 m below ground level to identify topsoil thicknesses across the site.
- Four dynamic cone penetrometer (DCP) tests were undertaken along the western site boundary adjacent to Mamre Road to assess subsurface soil consistency within the western edge of the proposed fill area where soft soils had previously been identified during recent fencing works.

The ground surface levels at the boreholes and test pit locations were measured relative to Australian height datum (AHD) using a differential global positioning system (dGPS) receiver, which is generally accurate to within ±0.2 m. Coordinates for each borehole and test pit are with reference to Map Grid of Australia MGA94, Zone 56. For one of the test pit locations (TP38) the coordinates and reduced level were estimated using aerial imagery and contour mapping. Coordinates and ground surface levels are recorded on the borehole and test pit log descriptions included in Appendix C. The borehole and test pit locations are shown on Drawing 1, in Appendix B.

2.2 Field Work Results

The subsurface conditions encountered in the geotechnical boreholes and test pits are given in the borehole and test pit log descriptions in Appendix C, together with notes defining classification methods and descriptive terms.

A summary of the typical sequence of subsurface conditions encountered at site is presented below:

Fill and Topsoil:	Brown, dark brown, grey and grey-brown clay and silty clay with traces of gravel in some locations. With grass cover at surface and rootlets. Encountered at all borehole and test pit locations.
Residual Soils:	Stiff to very stiff, brown, orange-brown and grey-brown clay and silty clay. Generally medium to low plasticity. Trace fine and medium siltstone gravel was noted in some locations.
Rock:	Generally, low and medium strength with some very low and high strength (or stronger) bands, highly to slightly weathered, brown and grey sandstone and brown and dark grey siltstone.

Groundwater was not identified in the boreholes during auger drilling, after which the necessary introduction of water into the boreholes to facilitate rock core drilling precluded any further groundwater observations. Notwithstanding the above, it should be noted that groundwater levels can vary over time particularly after periods of heavy rainfall.

3. Laboratory Testing

The results of point load strength index testing ($Is_{(50)}$), carried out at regular intervals on rock cores, are shown on the borehole logs in Appendix C. The $Is_{(50)}$ results range from 0.1 MPa to 4.1 MPa in the underlying bedrock. The results of point load strength index testing against depth are shown in Figure 1 below.

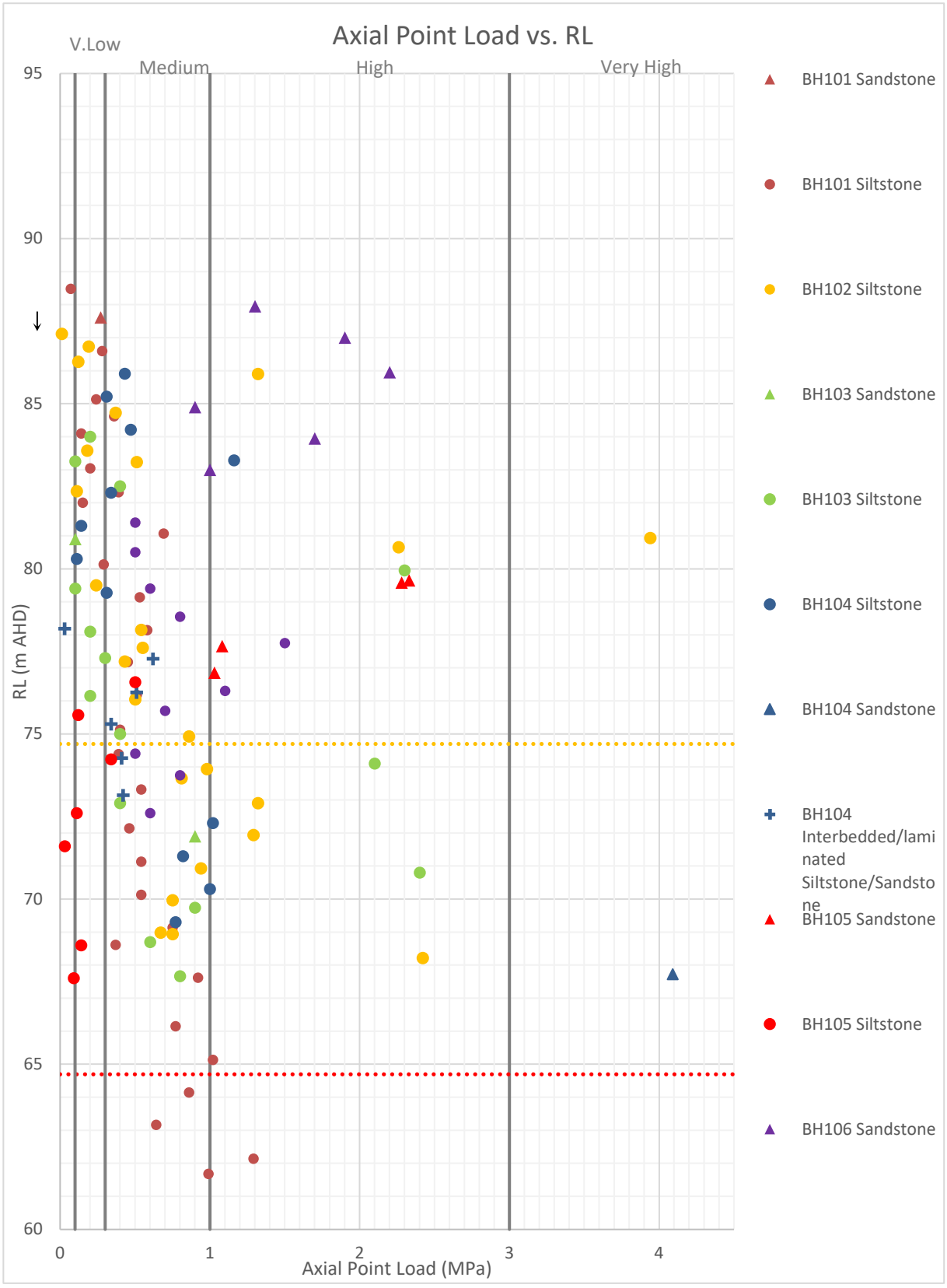


Figure 1: Axial Point Load Values vs Relative Level (m AHD)

The $Is_{(50)}$ values were used to provide an estimate of the uniaxial compressive strength (UCS) of the rock, based on a commonly adopted UCS:$Is_{(50)}$ ratio of 20:1. The estimated UCS values for the siltstone typically ranged from 0.2 MPa to 79 MPa, indicating that the rock tested ranged from very low strength to very high strength. The estimated UCS values for the sandstone ranged from 2 MPa to 81.8 MPa, indicating that the rock tested ranged from low strength to very high strength. The estimated UCS values for the interbedded/interlaminated siltstone and sandstone typically ranged from 0.6 MPa to 12.4 MPa, indicating that the rock tested ranged from very low strength to medium strength. For assessment of foundations, batters and rock faces it is recommended that a conversion ratio of no more than 16:1 is used.

4. Geotechnical Model

Based on the findings of the recent investigation and with reference to the previous investigations undertaken in 2019, 2021 and 2022, it is apparent that discreet areas of existing fill are present to depths in excess of 2 m. The fill is primarily present in the form of embankments, near residences and other structures/sheds, access driveways/road, within or adjacent to existing dams and at locations indicating previously backfilled dams or landfill. The filling generally comprises mostly clayey soils with gravels, cobbles and the occasional boulder with some foreign building rubble inclusions also evident. Elsewhere, the site is covered with silty and clayey topsoil, typically between 0.1 m to 0.6 m thick. The topsoil and fill were typically underlain by stiff to very stiff residual clay to depths of between 0.7 m and more than 3 m. Alluvial clay was also noted in the lower western parts of the site adjacent to Mamre Road.

Bedrock comprised variable layers of siltstone and sandstone, as well as interbedded and interlaminated units comprising both materials, identified as being part of the Bringelly Shale formation. The various rock types are generally of very low to low strength initially and then grade to medium strength with depth. Bands and distinct beds of lower and higher strength rock were observed throughout the borehole depths with rock strengths of high and very high strength noted.

Groundwater seepage was not observed in any of the boreholes but was observed in three test pits excavated within low lying areas of 1030-1048 Mamre Road. Notwithstanding the above, seepage is anticipated along the soil-rock interface and along bedding planes/joints within the upper rock mass. It should be noted that groundwater levels are transient and may fluctuate over time, particularly, following periods of heavy rainfall.

A summary of the geotechnical model is presented within Tables 1 to 4 below with reference to geotechnical Units 1 to 5, as defined in the tables.

Table 1: Summary of Geotechnical Model Boreholes

Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit									
		Previous Investigation Boreholes (BH) (DP 2019)				Current Investigation Boreholes (BH)					
		01	02	04	05	101	102	103	104	105	106
1	Fill/Topsoil and Topsoil	[0] (88.4)	[0] (88.9)	[0] (77.1)	[0] (67.0)	[0] (90.1)	[0] (88.9)	[0] (87.6)	[0] (88.3)	[0] (81.6)	[0] (91.0)
2	Residual Soil	[0.1] (88.3)	[0.1] (88.8)	[0.1] (77.0)	[0.1] (66.9)	[0.3] (89.8)	[0.3] (88.6)	[0.2] (87.4)	[0.3] (88.0)	[0.4] (81.2)	[0.4] (90.6)
3	VL Rock (Class IV/V)	[0.8] (87.6)	[0.7] (88.2)	[0.8] (76.3)	[1.1] (65.9)	[1.2] (88.9)	[1.5] (87.4)	NE	[1.2] (87.1)	[1.2] (80.4)	[2.7] (89.3)
4	L Rock (Class III)	[2.7] (85.7)	[8.6] (80.3)	[2.8] (74.3)	[4.3] (62.7)	[3.4] (86.7)	[2.3] (86.3)	[3.0] (84.6)	[2.3] (86.0)	[3.0] (78.6)	[7.5] (83.5)
5	M or Stronger Rock (Class II)	[6.2] (82.2)	NE	NE	[6.4] (60.6)	[7.3] (82.7)	[6.8] (82.1)	[7.0] (80.6)	[11.0] (77.3)	NE	[12.6] (78.8)

Notes: NE – Not Encountered, VL – Very Low Strength, L - Low Strength, M – Medium Strength

Table 2: Summary of Geotechnical Model – Previous Investigation Test Pits

Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit										
		Previous Investigation Test Pits (TP) (DP 2019)										
		1	2	3	4	5	6	7	8	9	10	11
1	Fill/Topsoil and Topsoil	[0] (54.3)	[0] (57.6)	[0] (57.6)	[0] (58.6)	[0] (58.1)	[0] (67.1)	[0] (60.6)	[0] (68.4)	[0] (67.9)	[0] (77.3)	[0] (74.5)
2	Residual Soil	NE	[0.4] (57.2)	[0.6] (57.0)	[0.1] (58.5)	[0.3] (57.8)	[0.3] (66.8)	[0.3] (60.3)	[0.3] (68.1)	[0.6] (67.3)	[0.6] (76.7)	[0.5] (74.0)
3-5	Rock	NE	NE	NE	NE	NE	[2.0] (65.1)	NE	[1.8] (66.4)	NE	[2.1] (75.2)	NE

Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit										
		Previous Investigation Test Pits (TP) (DP 2019)										
		12	13	14	15	16	16DW	17	18	19	20	21	22
1	Fill/Topsoil and Topsoil	[0] (80.9)	[0] (76.4)	[0] (67.7)	[0] (73.2)	[0] (66.3)	[0] (66.3)	[0] (77.3)	[0] (68.0)	[0] (63.7)	[0] (58.0)	[0] (56.8)	[0] (69.1)
2	Residual Soil	[0.3] (80.6)	[0.2] (76.4)	[0.1] (67.6)	[0.1] (73.1)	[0.6] (65.7)	NE	[0.3] (77.0)	[0.5] (67.5)	NE	[0.5] (57.5)	[0.1] (56.7)	NE
3-5	Rock	NE	NE	NE	NE	NE	NE	NE	NE	NE	[2.8] (55.2)	NE	NE

Notes: NE – Not Encountered

Table 3: Summary of Geotechnical Model – Previous Investigation Test Pits

Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit												
		Previous Investigation Test Pits (TP) (DP 2021)												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Fill/Topsoil and Topsoil	[0] (43.1)	[0] (45.7)	[0] (47.7)	[0] (52.1)	[0] (57.4}	[0] (60.5)	[0] (83.1)	[0] (89.1)	[0] (93.3)	[0] (93.3)	[0] (67.9)	[0] (67.7)	[0] (64.7)
2	Residual Soil	[0.2] (42.9)	(0.3) (45.4)	[0.3] (47.4)	[0.3] (51.8)	[0.3] (57.1)	[0.3] (60.2)	[0.2] (82.9)	[0.4] (88.7)	[0.6] (92.7)	[0.3] (93.0)	[0.2] (67.7)	[0.2] (67.5)	[0.2] (64.5)
3-5	Rock	[2.5] (40.6)	[2.1] (43.6)	NE	[1.0] (51.1)	[1.5] (55.9)	[1.3] (59.2)	[1.5] (81.6)	[1.6] (87.5)	[1.5] (91.8)	NE	NE	NE	NE
Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit												
		Previous Investigation Test Pits (TP) (DP 2022)												
		1	2	3	4	5	6	7	8	9	10	11	16	21
1	Fill/Topsoil and Topsoil	(0) 58.9	(0) 61.7	-	-	(0) 47.7	(0) 45.4	(0) 42.4	(0) 52.8	(0) 47.1	-	(0) 42.2	(0) 45.7	(0) 55.2
2	Residual Soil	(0.2) 58.7	(0.2) 61.5	(0) 56.5	(0) 53.6	(0.2) 47.5	(0.1) 45.3	(0.1) 42.3	(0.2) 52.6	(0.15) 46.95	(0) 43.7	(0.1) 42.1	(0.7) 45.0	(0.3) 54.9
3-5	Rock	NE	(1.8) 59.9	(1.9) 54.6	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE – Not Encountered

Table 4: Summary of Geotechnical Model – Current Investigation Test Pits

Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit												
		Current Investigation Test Pits (TP)												
		1	2	3	3A	4	5	6	7	8	9	10	11	12
1	Fill/Topsoil and Topsoil	[0] (54.9)	[0] (52.2)	[0] (58.4)	[0] (58.4)	[0] (63.4)	[0] (63.4)	[0] (67.9)	[0] (73.1)	[0] (87.8)	[0] (88.8)	[0] (82.8)	[0] (56.6)	[0] (63.1)
2	Residual Soil	NE	NE	[0.2] (58.2)	[0.2] (58.2)	[0.3] (63.1)	[0.4] (63.0)	[0.3] (67.6)	[0.3] (72.8)	[0.5] (87.3)	[0.1] (88.7)	[0.5] (82.3)	[0.2] (56.4)	[0.2] (62.9)
3-5	Rock	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Unit	**Material**	**Depth [m] Reduced Level (m AHD) To Top of Each Unit**												
		Current Investigation Test Pits (TP)												
		13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
1	Fill/Topsoil and Topsoil	[0] (74.5)	[0] (88.5)	[0] (84.5)	[0] (86.2)	[0] (74.0)	[0] (68.9)	[0] (64.1)	[0] (60.0)	[0] (55.2)	[0] (57.3)	[0] (64.8)	[0] (62.8)	[0] (70.5)
2	Residual Soil	[0.2] (74.3)	[0.1] (88.4)	[0.2] (84.3)	[0.2] (86.0)	[0.2] (73.8)	[0.2] (68.7)	[0.1] (64.0)	[0.2] (59.8)	[0.2] (55.0)	[0.5] (56.8)	[0.2] (64.6)	[0.4] (62.4)	[0.2] (70.3)
3-5	Rock	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE – Not Encountered

Table 4: Summary of Geotechnical Model – Current Investigation Test Pits (Continued)

Unit	Material	Depth [m] Reduced Level (m AHD) To Top of Each Unit												
		Current Investigation Test Pits (TP)												
		26	27	28	28A	29	30	31	32	33	34	35	36	37
1	Fill/Topsoil and Topsoil	[0] (71.0)	[0] (78.8)	[0] (67.4)	[0] (67.4)	[0] (72.0)	[0] (83.6)	[0] (91.4)	[0] (82.7)	[0] (81.9)	[0] (68.2)	[0] (72.7)	[0] (62.4)	[0] (58.3)
2	Residual Soil	[0.5] (70.5)	[0.3] (78.5)	[0.5] (66.9)	[0.4] (67.0)	[0.3] (71.7)	[0.4] (83.2)	[0.2] (91.2)	[0.2] (82.5)	[0.2] (81.7)	[0.2] (68.0)	[0.1] (72.6)	[0.2] (62.2)	[0.2] (58.1)
3-5	Rock	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Unit	**Material**	**Depth [m] Reduced Level (m AHD) To Top of Each Unit**												
		Current Investigation Test Pits (TP)												
		38	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
1	Fill/Topsoil and Topsoil	[0] (49.2)	[0] (43.3)	[0] (44.9)	[0] (43.4)	[0] (44.0)	[0] (45.9)	[0] (48.8)	[0] (50.8)	[0] (47.9)	[0] (46.4)	[0] (50.1)	[0] (53.3)	[0] (61.1)
2	Residual Soil	[0.1] (49.1)	[0.2] (43.1)	[0.1] (44.8)	[0.1] (43.3)	[0.1] (43.9)	[0.2] (45.7)	[0.1] (48.7)	[0.2] (50.6)	[0.2] (47.7)	[0.2] (46.2)	[0.2) (49.9)	[0.1] (53.2)	[0.1] (61.0)
3-5	Rock	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes: NE – Not Encountered

5. Proposed Development

It is understood that the site will be developed for industrial warehouse purposes. Reference to the provided bulk earthworks plan (Ref: 20-748-SKC100, Issue A) indicates that the proposed development will likely include seven warehouse structures constructed on separate building platforms. The bench levels range from RL 44.7 m to RL 74.7 m AHD with those within the eastern deeper areas of cut ranging between RL 64.7 m and RL 74.7 m AHD. The ground surface elevations measured at the borehole locations, which target the topographic high points on the eastern side of the site, ranged from RL 91 m to RL 82 m. Based on the information provided and the measured elevations, excavation depths of up to 26 m will required to create a series of near-level benches for warehouse construction.

Given the geotechnical model, the specific needs of the project in regard to deep excavations in rock relate to rock excavatability and the need to retain the cut faces around the excavation perimeters.

6. Comments

6.1 Excavation

Based on the borehole logs, the proposed bulk excavation works are anticipated to extend through all geotechnical Units (soil and rock) outlined in Section 4. The excavatability of the materials that will likely be encountered during the bulk excavation works are summarised in Table 5 below. For the detailed excavation of footings, services and sidewalls within low strength or stronger rock will generally require the use of a rotary rock saws or grinders, or hydraulic rock hammers.

Reference to Figure 1 indicates that the majority of the material to be excavated is expected to be within medium strength rock. The excavation rate that can be achieved, particularly within medium and high strength rock, varies considerably and is dependent upon the degree of jointing in the rock, the rock strength, the type of machinery being used and the skill of the operator. It is suggested that bulk excavation tenderers be required to make their own assessment of the equipment required to carry out the work.

It should be noted that any off-site disposal of spoil will generally require assessment for re-use or classification in accordance with current *Waste Classification Guidelines* (NSW EPA 2014)

Table 5: Summary of Soil and Rock Excavatability

Unit	Material	Excavatability
1	Fill/Topsoil and Topsoil	Readily excavated by conventional earthmoving equipment such as hydraulic excavators with bucket attachments and scrapers. Some relatively shallow boggy ground conditions may be present in the lower lying western parts of the site adjacent to Mamre Road.
2	Residual Soil	
3	VL Rock (Class IV/V)	Readily excavated by conventional earthmoving equipment such as hydraulic excavators with bucket attachments fitted with rock teeth and scrapers following light to moderate pre-ripping.
4	L Rock (Class III)	Moderate ripping using a large 'bulldozer' plant (such as a D9 or larger), or excavators fitted with buckets and rock teeth. Moderate to heavy ripping may be required prior to removal by scrapers. Some rock hammer use may be necessary.
5	M or Stronger Rock (Class II)	Hard ripping using a large 'bulldozer' (such as a D11 or larger), or excavators fitted with either ripping tynes or rock hammers. Rock hammers or saws/grinders are generally required for effective excavation of slightly fractured and unbroken rock. Some of the less fractured, high to very high strength bands/beds may require additional effort with slow productivity subject to in-ground rock defect spacing, which is likely to be more generally widely spaced than outlined in the borehole logs. Rock in this category may need to undergo additional treatment to break down the rock into an appropriate maximum particle size suitable for fill placement.

Notes: NE – Not Encountered, VL – Very Low Strength, L - Low Strength, M – Medium Strength

A summary of the anticipated depths to the top of each geotechnical unit at each borehole location is presented in Table 1 in Section 4.

6.2 Vibration

Noise and vibration will be caused by excavation work in rock, the effects of which are largely dependent on the timing of the work and the types and locations of structures on the adjoining sites at that time.

Precautions may be required when excavating close to site boundaries, particularly where adjacent buildings are nearby. The level of acceptable vibration is dependent on various factors including the type of building/structure (e.g. reinforced concrete, brick, etc.), its structural condition, the frequency range of vibrations produced by the construction equipment, the natural frequency of the building and the vibration transmitting medium.

Ground vibration can be strongly perceptible to humans at levels above 2.5 mm/s peak particle velocity (PPVi). This is generally much lower than the vibration levels required to cause structural damage to buildings. The Australian Standard AS2670.2-1990 *Evaluation of human exposure to whole-body vibrations – continuous and shock induced vibrations in buildings (1-80 Hz)* indicates an acceptable day time limit of 8 mm/s PPVi for human comfort.

Based on the experience of DP and with reference to AS2670, it is suggested that a maximum PPVi of 8 mm/s (applicable at the foundation level of existing buildings) be adopted at this site for both architectural and human comfort considerations, although this vibration limit may need to be reduced if there are sensitive structures or equipment in the area. It is noted, however, that the site is currently within a rural environment with few structures nearby. Accordingly, a higher vibration limit may be permissible (i.e. 10-20 mm/s PPVi) subject to further site-specific assessment.

Subject to the conditions of the adjoining sites at the time of rock excavation the need for a vibration trial should be assessed to determine if smaller or different types of excavation equipment should be used for bulk (or detailed) excavation purposes.

6.3 Batter Slopes and Retaining Walls

During bulk excavation and earthworks, it is recommended that temporary batters of up to 4 m in height do not exceed the grades outlined in Table 6.

Table 6: Recommended Maximum Batter Grades for Exposed Material (up to 4 m high)

Units	Exposed Material	Maximum Temporary Batter Grade (H:V)	Maximum Permanent Batter Grade (H:V)
1	Fill/Topsoil and Topsoil	1.5:1	2:1
2	Residual Soils	1:1	2:1
3	VL Rock (Class IV/V)	0.75:1*	1:1
4	L Rock (Class III)	0.5:1*	1:1*
5	M or Stronger Rock (Class II)	0.25:1 to Vertical*	0.25:1*

Note: VL – Very Low Strength, L - Low Strength, M – Medium Strength
* Subject to geotechnical inspection during construction

For batters exceeding 4 m in height, DP's preliminary advice is that 4 m wide level benches should be created at maximum height intervals of 4 m, which should be verified during construction by detailed geotechnical slope stability analysis. For permanent batters up to 4 m high, a flatter grade of 3H:1V (18 degrees) should be adopted if maintenance access is required (i.e. mowing, or similar).

All near vertical faces in all rock types should be inspected by an experienced geotechnical engineer or engineering geologist as the excavation progresses in depth intervals of no deeper than 1.5 m. The purpose of the inspection is to check for the presence of any adverse defects that daylight into the excavation face, which may require additional stabilisation measures (such as rock bolts and/or shotcrete). It is recommended that a provisional allowance for some rock stabilisation is made within the site development budget.

The deep excavations proposed for the site will result in cut faces along the northern, southern and eastern sides of the site. The bulk earthworks plan indicates that the retaining walls will be positioned close the northern and southern boundaries but offset from the eastern boundary. It is currently understood that anchored/bolted and shotcreted walls are preferred for the lower cut faces in competent rock (i.e. Class IV, III and II) and a mix of batters and reinforced block walls for upper cut faces formed in soil and rock of up to Class IV. It is considered that this approach is most suited to the site conditions.

Where possible, the geometry of the walls should consider off-setting the cut faces from the property boundaries at depth so that the lower faces are shotcreted and anchored/bolted below an overlying stepped bench that is excavated closer to the boundary to form a foundation bench in Class IV rock on which the reinforced walls are constructed.

Retaining walls may be designed on the basis of the parameters outlined in Table 7.

Table 7: Recommended Design Parameters for Retaining Walls

Unit	Material	Unit Weight (kN/m3)	Earth Pressure Coefficient		Effective Cohesion c' (kPa)	Effective Friction Angle (Degrees)
			Active (K_a)	At Rest (K_o)		
1	Fill/Topsoil and Topsoil	20	0.4	0.6	0	20
2	Residual Soil	20	0.3	0.5	0	25
3	VL-L Rock (Class IV)	22	0.2	0.25	10	25
4	L Rock (Class III)	22	0.2	0.25	15	25
5	M or stronger Rock (Class II)	24	0.2 to 0	0.25 to 0	20	30

Notes: VL = Very Low Strength, L = Low Strength, M = Medium Strength, H = High Strength
* Subject to jointing assessment by experienced Geotechnical Engineer/Engineering Geologist

In addition, a coefficient of passive earth pressure (K_p) equal to 2.5 may be assumed within very stiff to hard clay, to which a factor of safety must be applied in recognition of the fact that large movements are required to mobilise the full passive resistance. Ultimate passive pressures for rock may be taken as equal to 400 kPa in Unit 3 material and 2000 kPa in Units 4 and 5 materials.

The design for lateral earth pressures where multiple rows of anchors or propping are used (i.e. two rows or more of anchors or props) may be based on a trapezoidal earth pressure distribution. The following earth pressure magnitudes are considered appropriate, where H is the height of soil and very low to low strength rock to be retained, in metres:

- 4H kPa, where some lateral movement is allowed; and
- 6H kPa, where lateral movements need to be limited (e.g. next to buildings and services).

In each case the maximum pressure generally acts over the central 60% of the wall, reducing to zero at the top and base of the wall.

The above parameters do not include any allowance for hydrostatic pressure due to groundwater behind retaining walls, which should be included in the design unless adequate drainage is provided to prevent the build-up of hydrostatic pressures.

The design of batter slopes and retaining walls should account for surcharge loads, including storage of construction materials, adjacent pavements, access roads, buildings or similar. Design should also consider the effects of plant operating above the excavation and/or retaining wall during construction.

6.4 Ground Anchors

The design of temporary and permanent ground anchors/rock bolts for the support of excavations and/or shoring systems may be carried out on the basis of the maximum bond stresses given in Table 8.

Table 8: Preliminary Bond Stresses for Rock Anchor Design

Unit	Material Description	Maximum Allowable Bond Stress (kPa)	Maximum Ultimate Bond Stress (kPa)
3	VL-L Rock (Class IV)	100	100
4	L Rock (Class III)	200	300
5	M or stronger Rock (Class II)	500	1000

The parameters given in Table 8 assume that the drilled holes are clean and adequately flushed. The anchors should be bonded behind a line drawn up at 45 degrees from the base of the shoring or the top of free-standing medium strength or stronger rock, and 'lift-off' tests should be carried out to confirm the anchor capacities. It is suggested that ground anchors should be proof loaded to 125% of the design working load and locked-off at no higher than 80% of the working load.

The use of permanent anchors/rock bolts requires careful attention to corrosion protection including full column grouting and the use of an internal corrugated sheathing over the full length of the anchor. A detailed specification would need to be prepared for the installation and stressing of permanent anchors.

6.5 Footings

The results of the investigation have shown that the site is underlain by isolated areas of uncontrolled filling and natural clay soils and then weathered siltstone and sandstone bedrock. Accordingly, it is anticipated that footings for the new warehouses will most likely comprise shallow pads founding within, natural clays and weathered bedrock in fill areas and shallow excavations, and rock of up to medium strength (and possibly high strength) in deep excavations. Alternatively, bored piles founding within the upper 1 m to 2 m of bedrock could be adopted, particularly in areas of deep filling, to offset the effects of differential settlement subject to column loads.

The parameters listed in Table 9 are suggested for footing design.

Table 9: Suggested Footing Design Parameters

Unit	Material	End Bearing		Shaft Adhesion	
		Allowable	Ultimate	Allowable	Ultimate
1	Fill/Topsoil and Topsoil	0	0	0	0
2	Residual Soil	150	500	15	25
3	VL-L Rock (Class IV)	1000	3000	100	150
4	L Rock (Class III)	2000	10 000	150	350
5	M or stronger Rock (Class II)	3500	20 000	350	600

Notes: The values listed in Table 9 are subject to confirmation during construction.

To confirm the appropriateness of the adopted design footing parameters, it is recommended that all footing excavations are subjected to geotechnical inspection and dynamic cone penetrometer testing (DCP, where applicable) during construction to verify that the listed bearing pressures are available.

Shallow footings founding near excavations (lift wells/pits, service trenches or similar) must have all loads transferred to below an influence line inclined upwards at 45 degrees commencing from the lowest and closest side of the excavation or trench base. Pad footings can be deepened to accommodate this load transfer or alternatively pile footings may be used.

Local variations in rock strength and depth may occur across the site. All pile or footing excavations in weathered rock should be inspected by a geotechnical engineer or engineering geologist and approved prior to concreting to confirm reduced pressures are not warranted due to extensively weathered or jointed zones.

Footings designed in accordance with the parameters listed in Table 9 can be considered to undergo elastic settlements in the order of 1% of the footing width.

7. Limitations

Douglas Partners (DP) has prepared this report for this project at 290-308 Aldington Rd, 59-63 Abbotts Rd & 1030-1064 Mamre Rd, Kemps Creek in accordance with DP's proposal dated 9 August 2022 and acceptance received from Daniel Galea dated 9 August 2022. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of ESR Australia Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site 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 sub-surface 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. Sub-surface 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. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached 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.

8. References

AS 2670.1. (2001). *Evaluation of human exposure to whole-body vibration - General requirements.* Reconfirmed 2016: Standards Australia.

AS 2670.2. (1990). *Evaluation of Human Exposure to whole-body vibration, Part 2: Continuous and shock-induced vibrations in buildings (1 to 80 Hz).* Standards Australia.

NSW EPA. (2014). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

Pells, P. J., Mostyn, G., & Walker, B. F. (1998). Foundations on Sandstone and Shale in the Sydney Region. *Australian Geomechanics, No 33 Part 3*, 17-29.

Douglas Partners Pty Ltd

Appendix A

About This Report

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

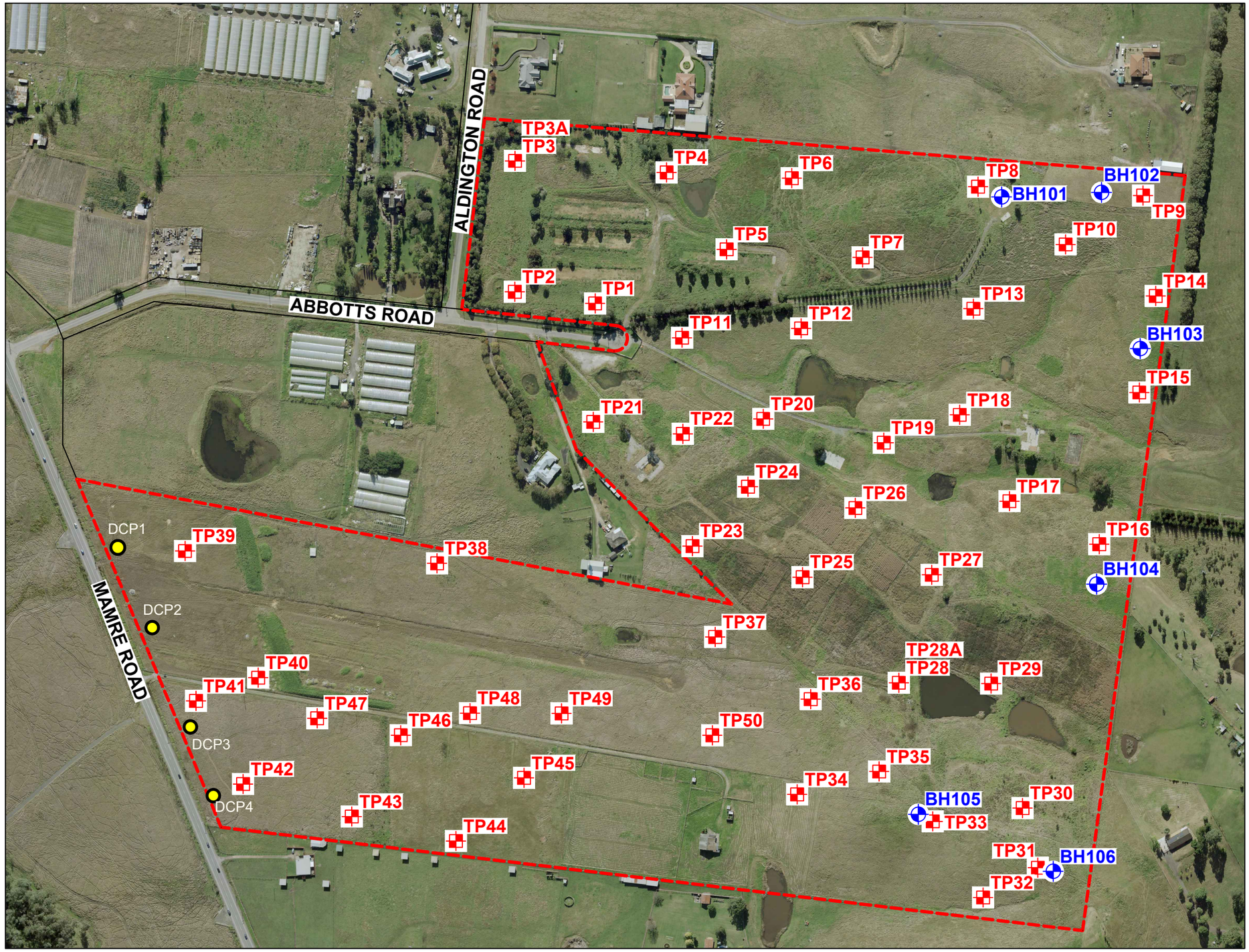
Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate 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.

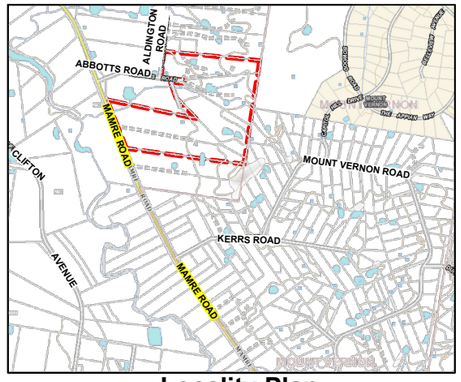
Site Inspection

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.

Appendix B

Drawings





Locality Plan

NOTE:
1: Base image from MetroMap.com.au (Dated 29.05.2022)

0 20 40 60 80 100 150 200 300 400m
1:4000 @ A3

LEGEND

- Approximate Site Boundary
- Approximate Borehole Test Location
- Test Pit Location and Number

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: ESR Australia		TITLE: **Borehole and Test Pit Location Plan** **Proposed Industrial Subdivision** **59-63 Abbotts Road, Kemps Creek**
OFFICE: Sydney	DRAWN BY: CC	
SCALE: 1:4000 @ A3	DATE: 01.09.2022	

N

PROJECT No:	92352.03
DRAWING No:	1
REVISION:	0

Appendix C

Field Work Results

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.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. 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	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

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

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

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
Friable	Fr	-

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	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

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;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it 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 Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

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

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

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 occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

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

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

where 'sound' rock is assessed to be rock of low strength or stronger. 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

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

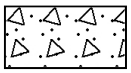
Symbols & Abbreviations

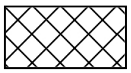
Graphic Symbols for Soil and Rock

General

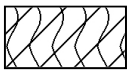

Asphalt

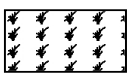

Road base

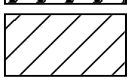

Concrete


Filling

Soils


Topsoil

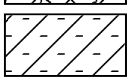

Peat


Clay


Silty clay

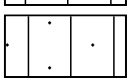

Sandy clay

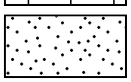

Gravelly clay

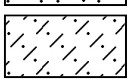

Shaly clay

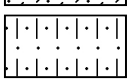

Silt


Clayey silt


Sandy silt

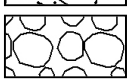

Sand


Clayey sand


Silty sand


Gravel

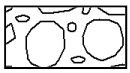

Sandy gravel


Cobbles, boulders

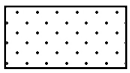

Talus

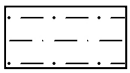
Sedimentary Rocks

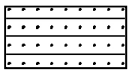

Boulder conglomerate

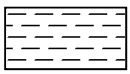

Conglomerate


Conglomeratic sandstone

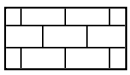

Sandstone


Siltstone

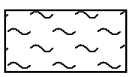

Laminite

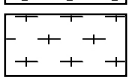

Mudstone, claystone, shale

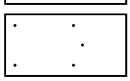

Coal


Limestone

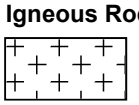
Metamorphic Rocks

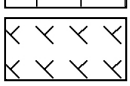

Slate, phyllite, schist

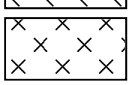

Gneiss

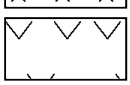

Quartzite

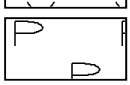
Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 90.1 AHD
EASTING: 296570.6
NORTHING: 6251623.1
DIP/AZIMUTH: 90°/--

BORE No: BH101
PROJECT No: 92352.03
DATE: 18 - 19/8/2022
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
90	0.3	TOPSOIL/Sandy CLAY CL: low plasticity, dark brown, with silt, trace roots, w<PL							D			
		Silty CLAY CL: low plasticity, brown and pale orange-brown, w<PL, residual						Unless otherwise stated, rock is fractured along smooth planar bedding dipping 0°-10°	D			
89	1	Below 0.8m: trace fine and medium, sub-rounded siltstone gravel							D			16,B refusal
	1.15								S			
		INTERBEDDED AND INTERLAMINATED SILTSTONE AND SANDSTONE: 70-80% dark grey and brown siltstone interbedded/interlaminated with 20-30% fine grained, grey sandstone, low to medium strength with some very low strength bands, highly weathered, fractured to slightly fractured, Bringelly Shale										PL(A) = 0.1
88	2							1.77m: Cs 10mm 1.95m: J70°, pl, ro, he, ti 2.06m: J45°-90°, ir, he, ti 2.28m: J70°, pl, ro, ti, cly	C	100	88	
												PL(A) = 0.3
87	3							2.53-2.74m: J70°-90°, cu, ro, ti, cly 2.90-3.07m: J80°, pl, ro, cly inf 5-10mm 3.17m: Cs 10mm				PL(A) = 0.3
86	4								C	100	70	
								4.24m: Cs 10mm 4.39m: Cs 10mm 4.48-4.74m: J80°-90°, ir, ro, fe				
85	5							4.88m: J20°, pl, ro, cly, fe 5.14m: J70°, pl, sm, fe				PL(A) = 0.2
								5.47m: J85°-90°, pl, sm				PL(A) = 0.4
84	6											PL(A) = 0.1
								6.14-6.21m: J90°, pl, sm, cly 10-20mm				
83	7								C	100	88	PL(A) = 0.2
	7.34	At 7.25m: possible carbonaceous seams										
		SILTSTONE: dark grey, medium strength with some low and high strength bands, moderately weathered to fresh stained, fractured to slightly fractured, Bringelly Shale										PL(A) = 0.4
82	8											PL(A) = 0.1
								8.5m: J80°, pl, sm 8.64m: J60°, pl, sm, fe 8.67m: J20°, pl, sm 8.85-9.03m: J80°, pl, sm, fe				PL(A) = 0.7
81	9							9.25m: Cs 5mm 9.28m: Cs 10mm 9.41m: J30°, pl, sm, ti, he	C	100	89	
	10.0											

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.15m

TYPE OF BORING: Solid Flight Auger to 1.15m, NMLC Coring to 28.45m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 90.1 AHD
EASTING: 296570.6
NORTHING: 6251623.1
DIP/AZIMUTH: 90°/--

BORE No: BH101
PROJECT No: 92352.03
DATE: 18 - 19/8/2022
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
80		SILTSTONE: dark grey, medium strength with some low and high strength bands, moderately weathered to fresh stained, fractured to slightly fractured, Bringelly Shale										PL(A) = 0.3
79	11								C	100	89	PL(A) = 0.5
78	12							11.78m: J85°, pl, sm 12.06-12.17m: J80-90°(x2), ir, sm 12.5m: J80°, pl, sm, ti, he				PL(A) = 0.6
77	13								C	100	59	PL(A) = 0.5
76	14											PL(A) = 0.5
75	15											PL(A) = 0.4
74	16								C	100	79	PL(A) = 0.4
73	17											PL(A) = 0.5
		Below 17.73m: fresh										
72	18											PL(A) = 0.5
71	19								C	100	98	PL(A) = 0.5
	20.0							19.84m: J90°, pl, sm				

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.15m

TYPE OF BORING: Solid Flight Auger to 1.15m, NMLC Coring to 28.45m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 90.1 AHD
EASTING: 296570.6
NORTHING: 6251623.1
DIP/AZIMUTH: 90°/--

BORE No: BH101
PROJECT No: 92352.03
DATE: 18 - 19/8/2022
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low / Very Low / Low / Medium / High / Very High / Ex High)	Water	Fracture Spacing (m) (0.01 / 0.05 / 0.10 / 0.50 / 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
70		SILTSTONE: dark grey, medium strength with some low and high strength bands, fresh, fractured to slightly fractured, Bringelly Shale										PL(A) = 0.5
									C	100	98	
69	21											PL(A) = 0.7
												PL(A) = 0.4
68	22							22.17m: J60°-80°, ir, sm				
								22.39m: J85°-90°, cu, sm	C	100	64	PL(A) = 0.9
		Below 22.52m: possible pyrite coating noted on joint surface						22.51m: J70°-90°, ir, sm, ti				
67	23							23.19m: J45°, pl, sm				
								23.31m: J50°, pl, sm, ti, he				
								23.67m: J0°-45°, ir, sm				
66	24											PL(A) = 0.8
65	25											PL(A) = 1
									C	100	87	
64	26											PL(A) = 0.9
63	27	Below 26.84m: unbroken						26.85m: J0°-45°, pl, sm				PL(A) = 0.6
									C	100	100	
62	28											PL(A) = 1.3
	28.45	Bore discontinued at 28.45m Target depth reached										PL(A) = 1
61	29											

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.15m

TYPE OF BORING: Solid Flight Auger to 1.15m, NMLC Coring to 28.45m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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

BORE: BH101 PROJECT: KEMPS CREEK AUGUST 2022

1.15 – 5.00m

BORE: BH101 PROJECT: KEMPS CREEK AUGUST 2022

5.00 –10.00m

BORE: BH101 PROJECT: KEMPS CREEK AUGUST 2022

10.00 – 15.00m

BORE: BH101 PROJECT: KEMPS CREEK AUGUST 2022

15.00 – 20.00m

BORE: BH101 PROJECT: KEMPS CREEK AUGUST 2022

20.00 – 25.00m

BORE: BH101 PROJECT: KEMPS CREEK AUGUST 2022

25.00 – 28.45m

BOREHOLE LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.9 AHD
EASTING: 296668
NORTHING: 6251627.6
DIP/AZIMUTH: 90°/--

BORE No: BH102
PROJECT No: 92352.03
DATE: 18-8-2022
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
88	0.3	TOPSOIL/CLAY CI: medium plasticity, dark brown and dark orange-brown, trace rootlets, w<PL							D			
	0.6	CLAY CI: medium plasticity, orange-brown, w~PL, residual							D			
	1	Silty CLAY CL: low plasticity, brown becoming orange-brown and grey mottled with depth, trace ironstone gravel, w<PL, very stiff, residual						Unless otherwise stated, rock is fractured along smooth planar bedding dipping 0°-10°	D			
	1.5								S			10,10,14 N = 24
87	2	SILTSTONE: dark grey and brown, very low and low strength with some medium and high strength bands, highly weathered, fractured to slightly fractured, Bringelly Shale						1.53m: Cs <5mm 1.57m: Cs <5mm 1.63m: Cs <5mm (x2) 1.66m: J70°, pl, sm, ti 1.73m: J70°-90°, ir, sm, ti 1.77m: J20°, pl, sm, cly 1.98m: J85°, pl, sm 2.38m: J20°, pl, sm, he 2.46m: J45°, pl, sm 2.74m: Cs 5mm 2.83m: J80°, pl, sm, ti 2.85m: Cs 20mm 2.92m: J80°-90°, ir, sm, fe 3.49m: Cs 10mm	C	100	50	PL(A) = 0 PL(A) = 0.2
86	3											PL(A) = 0.1 PL(A) = 1.3
85	4							4.11m: J60°, pl, sm, ti 4.45m: Cs 10mm	C	100	88	PL(A) = 0.4
84	5							5.42m: J70°, pl, sm				PL(A) = 0.2
83	6							5.78m: J45°, pl, sm 6.05m: J90°, pl, sm, ti, fe				PL(A) = 0.5 PL(A) = 0.1
82	6.77	SANDSTONE: fine grained, grey, high to very high strength, slightly weathered, slightly fractured, Bringelly Shale							C	100	86	
81	8							8.06m: J85°, pl, ro 8.08m: Cs 10mm 8.34-8.44m: J70°(x2), pl, ro, ti, he				PL(A) = 3.9 PL(A) = 2.3
80	9							8.53m: J60°, pl, ro, fe 8.55-9.17m: J70°-90°, ir, ro, fe, ti, he				
	9.2	SANDSTONE: fine grained, brown, high to very high strength, slightly weathered, slightly fractured, Bringelly Shale						9.10-9.20m: cbs seam 5mm (x2) 9.41m: J20°, pl, sm, cly 9.53m: J45°, pl, sm 9.58m: Cs 5mm 9.75m: J30°, pl, sm	C	100	56	PL(A) = 0.2
79	10.0											

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.5m

TYPE OF BORING: Solid Flight Auger to 1.5m, NMLC Coring to 20.72m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface. 1.25 - 1.5m: Silty CLAY recovered in core run.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.9 AHD
EASTING: 296668
NORTHING: 6251627.6
DIP/AZIMUTH: 90°/--

BORE No: BH102
PROJECT No: 92352.03
DATE: 18-8-2022
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	10.12	SANDSTONE: as above										
78	11	SILTSTONE: grey to dark grey, with 10-20% fine grained sandstone laminations, medium strength with some low and high strength bands, slightly weatehred to fresh stained, fractured to slightly fractured, Bringelly Shale						10.1m: J50°, pl, sm, ti	C	100	56	PL(A) = 0.5
								10.84m: Cs 5mm 10.98m: Cs 20mm 11.03m: J45°, pl, sm 11.08m: J30°, pl, sm 11.15m: J30°, pl, sm 11.18m: J30°, pl, sm 11.44m: J0°-45°, ir, sm				PL(A) = 0.6
77	12											PL(A) = 0.4
								12.47m: J60°, pl, sm 12.5m: J60°-90°, ir, sm, ti				
76	13								C	100	95	PL(A) = 0.5
75	14											PL(A) = 0.9
74	15											PL(A) = 1 PL(A) = 0.8
								15.41m: J60°, pl, sm, ti 15.5m: J30°, pl, sm				
73	16								C	100	75	PL(A) = 1.3
								16.46m: Cs 50mm				
72	17											PL(A) = 1.3
71	18											PL(A) = 0.9
70	19								C	100	96	PL(A) = 0.8
69	20.0											PL(A) = 0.7

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.5m

TYPE OF BORING: Solid Flight Auger to 1.5m, NMLC Coring to 20.72m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface. 1.25 - 1.5m: Silty CLAY recovered in core run.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.9 AHD
EASTING: 296668
NORTHING: 6251627.6
DIP/AZIMUTH: 90°/--

BORE No: BH102
PROJECT No: 92352.03
DATE: 18-8-2022
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		SILTSTONE: as above						19.97m: Cs 5mm	C	100	96	PL(A) = 0.7
	20.72											PL(A) = 2.4
68	21	Bore discontinued at 20.72m Target depth reached										
67	22											
66	23											
65	24											
64	25											
63	26											
62	27											
61	28											
60	29											
59												

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.5m

TYPE OF BORING: Solid Flight Auger to 1.5m, NMLC Coring to 20.72m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface. 1.25 - 1.5m: Silty CLAY recovered in core run.

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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BORE: BH102 PROJECT: KEMPS CREEK AUGUST 2022

1.25 – 5.00m

BORE: BH102 PROJECT: KEMPS CREEK AUGUST 2022

5.00 –10.00m

BORE: BH102 PROJECT: KEMPS CREEK AUGUST 2022

10.00 – 15.00m

BORE: BH102 PROJECT: KEMPS CREEK AUGUST 2022

15.00 – 20.00m

BORE: BH102 PROJECT: KEMPS CREEK AUGUST 2022

20.00 – 20.72m

BOREHOLE LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 87.6 AHD
EASTING: 296705.9
NORTHING: 6251475.3
DIP/AZIMUTH: 90°/--

BORE No: BH103
PROJECT No: 92352.03
DATE: 17-8-2022
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
87	0.2	TOPSOIL/CLAY CI: medium plasticity, dark brown and orange-brown, trace rootlets, w~PL							D			
	0.7	CLAY CI: medium plasticity, orange-brown, trace medium, subrounded siltstone gravel, w<PL, residual							D			
86	1	Silty CLAY CI: medium plasticity, pale brown and orange brown, trace medium, sub-rounded ironstone gravel, w>PL, stiff to very stiff, residual							D			
		Below 1.0m: becoming pale grey and red-brown mottled							S			4,6,9 N = 15
	2							Unless otherwise stated, rock is fractured along smooth planar bedding diipping 0°-10°				
85									S			10,25/115 refusal
	3											
	3.0	INTERLAMINATED SANDSTONE AND SILTSTONE: 40-50% fine grained, brown sandstone interlaminated with 50-60% dark grey siltstone, medium to high strength, moderately to slightly weathered, fractured to slightly fractured, Bringelly Shale						3.36m: J20°-30°(x2), pl, ro, cly 5mm 3.47m: J30°, pl, ro, cly	C	100	71	PL(A) = 1.3
84	4							4.17m: J65°, pl, ro				PL(A) = 1.9
									C	100	83	
83	5											PL(A) = 2.2
								5.3m: J60°, pl, ro 5.44m: J20°-70°, ir, ro, fe 5.55m: J90°, pl, ro, cly 5.82m: J90°(x2), pl, ro				
82	6							6.21m: B0°-20°, ir, ro, fe 6.36m: J70°, pl, ro, cly, fe				PL(A) = 0.9
								6.82m: Cs 10mm	C	100	65	PL(A) = 1.7
81	7							7.32-7.90m: J45°-90°, ir, ro, fe				
								7.94m: J85°, pl, ro				PL(A) = 1
80	8							8.24m: J70°, pl, ro, fe 8.42-8.80m: J70°-80°(x2), pl, ro, fe				
79	9							8.95m: J60°-90°(x2), ir, ro, fe, ti 9.00-9.30m: J70°-90°, ir, sm, fe 9.4m: J90°, pl, sm, fe, ti	C	100	68	
	9.0	SILTSTONE: grey to dark grey, medium strength with some high strength bands, slightly fractured to unbroken, Bringelly Shale										PL(A) = 0.5
78												

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 3.0m

TYPE OF BORING: Solid Flight Auger to 3.0m, NMLC Coring to 18.69m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface. 2.66 - 3.0m: Silty CLAY recovered in core run.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 87.6 AHD
EASTING: 296705.9
NORTHING: 6251475.3
DIP/AZIMUTH: 90°/--

BORE No: BH103
PROJECT No: 92352.03
DATE: 17-8-2022
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
77		SILTSTONE: grey to dark grey, medium strength with some high strength bands, slightly fractured to unbroken, Bringelly Shale *(continued)*						10.31m: J20°, pl, sm, fe, ti 10.83m: J80°, pl, sm, ti, fe, he	C	100	68	PL(A) = 0.5
	11											
76												PL(A) = 0.6
	12											PL(A) = 0.8
75		Between 12.75-13.40m: with 30-40% fine grained sandstone laminations							C	100	63	
	13											PL(A) = 1.5
74												
	14											
73												PL(A) = 1.1
	15											PL(A) = 0.7
72									C	100	99	
	16							16.3m: Cs 10mm				
71												PL(A) = 0.5
	17							16.75m: Cs 40mm				PL(A) = 0.8
70												
	18								C	100	95	
69												PL(A) = 0.6
	18.69	Bore discontinued at 18.69m Target depth reached										
	19											
68												

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 3.0m

TYPE OF BORING: Solid Flight Auger to 3.0m, NMLC Coring to 18.69m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface. 2.66 - 3.0m: Silty CLAY recovered in core run.

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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BORE: BH103 PROJECT: KEMPS CREEK AUGUST 2022

2.66 – 7.00m

BORE: BH103 PROJECT: KEMPS CREEK AUGUST 2022

7.00 –12.00m

BORE: BH103 PROJECT: KEMPS CREEK AUGUST 2022

12.00 – 17.00m

BORE: BH103 PROJECT: KEMPS CREEK AUGUST 2022

17.00 – 18.69.00m

BOREHOLE LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.3 AHD
EASTING: 296663.2
NORTHING: 6251245.7
DIP/AZIMUTH: 90°/--

BORE No: BH104
PROJECT No: 92352.03
DATE: 16 - 17/8/2022
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
88	0.3	TOPSOIL/CLAY CI: medium plasticity, dark brown and dark orange-brown, trace rootlets, w~PL							D			
	0.8	CLAY CI: medium plasticity, orange-brown, w<PL, residual						Unless otherwise stated, rock is fractured along smooth planar bedding diipping 0°-10°	D			
87	1.3	Silty CLAY CL: low plasticity, grey-brown, trace fine and medium, subrounded siltstone gravel, w<PL, residual							D S			10,22/B refusal
	1.43							1.3m: CORE LOSS: 130mm 1.58m: J45°, pl, sm, ti, he 1.64m: Cs 50mm 1.66m: J60°, pl, sm, ti, he, fe 1.75m: J45°, pl, he, inf, with calcite 1.77m: J35°, pl, ro, cly vn 1.88-2.12m: J80°, pl, sm, cly inf 5mm 2.19-2.29m: J70°, pl, ro, cly inf <5mm 2.45m: J85°, pl, sm 2.7m: Cs 5mm 2.9m: Cs 5mm 3.03m: J0°-30°, ir, sm, cly 3.34m: Cs 10mm 3.95m: Cs 10mm 4.5m: J70°, pl, sm, cly 4.58m: J20°-90°, st, ro 4.99m: J85°, pl, sm 6.11m: J20°, pl, sm, fe 7.25m: Cs 10mm 7.35m: Cs 5mm 8.53m: J70°, pl, sm 8.95m: J90°, pl, sm 9.35m: J60°-90°, ir, sm, ti, fe 9.57m: Cs 5mm	C	89	36	PL(A) = 0.4
86	2											
	3								C	100	77	PL(A) = 0.3 PL(A) = 0.5
85	4											
84	5											PL(A) = 1.2
83	6											PL(A) = 0.3
82	6.7	SILTSTONE: dark grey, low to medium strength, slightly weathered, fractured to slightly fractured, Bringelly Shale							C	100	96	PL(A) = 0.1
81	7											
80	8											PL(A) = 0.1
79	9								C	100	86	PL(A) = 0.3

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.3m

TYPE OF BORING: Solid Flight Auger to 1.3m, NMLC Coring to 20.64m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.3 AHD
EASTING: 296663.2
NORTHING: 6251245.7
DIP/AZIMUTH: 90°/--

BORE No: BH104
PROJECT No: 92352.03
DATE: 16 - 17/8/2022
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
78		SILTSTONE: dark grey, low to medium strength, slightly weathered, fractured to slightly fractured, Bringelly Shale *(continued)*										PL(A) = 0
	10.95								C	100	86	
77	11	INTERLAMINATED SILTSTONE AND SANDSTONE: 70-90% dark grey siltstone interbedded and interlaminated with 10-30% fine grained, grey and pale grey sandstone, medium to high strength with some low and very high strength bands, slightly weathered to fresh stained, Bringelly Shale										PL(A) = 0.6
								11.37m: J90°, pl, sm, fe				
76	12											PL(A) = 0.5
								12.19m: J90°, pl, sm, fe 12.33m: Cs <5mm 12.49m: Cs <5mm				
75	13								C	100	95	PL(A) = 0.3
								13.15m: J20°, pl, sm, ti 13.24m: J60°, pl, sm 13.46m: J30°, pl, sm, ti				
74	14											PL(A) = 0.4
73	15											PL(A) = 0.4
72	16								C	100	100	PL(A) = 1
71	17											PL(A) = 0.8
70	18											PL(A) = 1
									C	100	67	
69	19	Below 19.05m: 30-40% siltstone interlaminated with 60-70% sandstone										PL(A) = 0.8

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.3m

TYPE OF BORING: Solid Flight Auger to 1.3m, NMLC Coring to 20.64m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.3 AHD
EASTING: 296663.2
NORTHING: 6251245.7
DIP/AZIMUTH: 90°/--

BORE No: BH104
PROJECT No: 92352.03
DATE: 16 - 17/8/2022
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
68		INTERLAMINATED SILTSTONE AND SANDSTONE: as above *(Continued)*							C	100	67	PL(A) = 4.1
	20.64	Bore discontinued at 20.64m Target depth reached										
67	21											
66	22											
65	23											
64	24											
63	25											
62	26											
61	27											
60	28											
59	29											

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.3m

TYPE OF BORING: Solid Flight Auger to 1.3m, NMLC Coring to 20.64m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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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BORE: BH104 PROJECT: KEMPS CREEK AUGUST 2022

1.30 – 5.00m

BORE: BH104 PROJECT: KEMPS CREEK AUGUST 2022

5.00 –10.00m

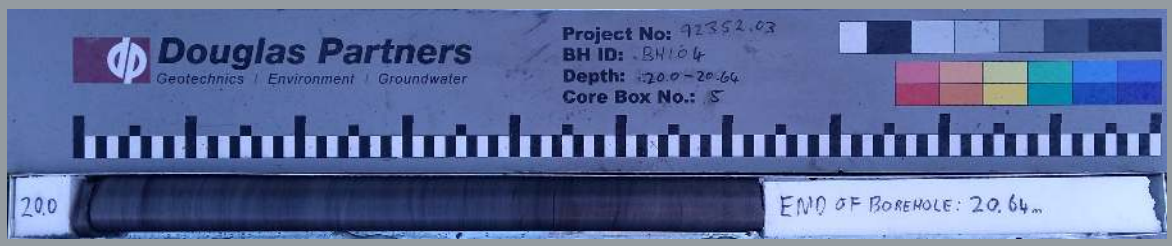
BORE: BH104 PROJECT: KEMPS CREEK AUGUST 2022

10.00 – 15.00m

BORE: BH104 PROJECT: KEMPS CREEK AUGUST 2022

15.00 – 20.00m

BORE: BH104 PROJECT: KEMPS CREEK AUGUST 2022



20.00 – 20.64m

BOREHOLE LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 81.6 AHD
EASTING: 296489.4
NORTHING: 6251021.4
DIP/AZIMUTH: 90°/--

BORE No: BH105
PROJECT No: 92352.03
DATE: 16-8-2022
SHEET 1 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
81	0.4	TOPSOIL/CLAY CI: medium plasticity, dark orange-brown, trace rootlets, w>PL							D			
		Silty CLAY CL: low plasticity, orange-brown, trace fine to medium sand, w<PL, residual						Unless otherwise stated, rock is fractured along smooth planar bedding dipping 0°-10°	D			
	1								D			12,35/50 refusal
	1.2								S			
80		SANDSTONE: grey and grey-brown with 10-20% dark grey laminations, medium and high strength with some very low strength bands and infilled joints, moderately weathered, fractured to slightly fractured, Bringelly Shale						1.79m: Cs 30mm	C	100	72	PL(A) = 2.3
	2							2.11m: J90°, pl, ro, fe, he 2.12m: Cs 40mm 2.20-3.00m: J80°-90°, ir, ro, cly inf 10-20mm				PL(A) = 2.3
79	3							3.4m: Cs 5mm 3.67m: J60°, pl, ro, fe cly <5mm	C	100	73	PL(A) = 1.1
78	4											PL(A) = 1
77	5							4.8m: J60°, pl, ro, fe cly 5mm				PL(A) = 0.5
76	5.72	SILTSTONE: grey-brown, low strength with some very low and low to medium strength bands and infilled joints, highly to moderately weathered, fractured to slightly fractured with some fragmented bands, Bringelly Shale						5.35m: J20°, pl, ro, fe 5.38m: J80°, pl, ro, fe 5.72-5.94m: J80°-90°, ir, ro, cly inf 10mm 6.16m: Cs 70mm 6.3m: J80°, pl, sm 6.6m: J85°, pl, sm 6.75m: J80°, pl, sm, ti 6.82m: J60°, pl, sm, fe 6.98m: J20°, pl, sm 7.1m: J70°, pl, sm 7.24m: J80°, pl, sm 7.28m: J20°, pl, sm, ti, fe 7.64m: J20°, pl, sm 7.75m: J20°, pl, sm, ti 7.9m: J85°-90°, ir, sm, fe 8.15m: J20°, pl, sm 8.27m: J30°, pl, sm 8.33m: J70°-80°(x3), pl, sm 8.48m: J20°, pl, sm, fe 8.51m: Cs 5mm 8.61m: J30°, pl, sm, fe 8.68m: J70°, pl, sm, fe 8.72m: J80°-90°, ir, sm, ti	C	100	55	PL(A) = 0.1
75	7											PL(A) = 0.3
74	8											
	8.0	SILTSTONE: dark grey, low strength with very low strength bands, moderately weathered, fractured to slightly fractured with some fragmented bands, Bringelly Shale							C	100	77	PL(A) = 0.1
73	9											
72												

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.2m

TYPE OF BORING: Solid Flight Auger to 1.2m, NMLC Coring to 14.55m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 81.6 AHD
EASTING: 296489.4
NORTHING: 6251021.4
DIP/AZIMUTH: 90°/--

BORE No: BH105
PROJECT No: 92352.03
DATE: 16-8-2022
SHEET 2 OF 2

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
71	11	SILTSTONE: dark grey, low strength with very low strength bands, moderately weathered, fractured to slightly fractured with some fragmented bands, Bringelly Shale *(continued)*						10.33m: J70°, pl, sm 10.97m: J20°, pl, sm	C	100	77	PL(A) = 0
70	12											
69	13								C	100	75	PL(A) = 0.1
68	13.0	SANDSTONE: fine grained, grey-brown, with 5-10% dark grey laminations, low strength, moderately weathered, fractured, Bringelly Shale						13.15m: J60°, pl, ro, fe 13.45-13.87m: J70°-90°(x2), pl, co, fe				
	13.8	SILTSTONE: dark grey, low strength, moderately weathered, fractured, Bringelly Shale										
67	14							13.93m: J20°, pl, sm				PL(A) = 0.1
	14.55	Bore discontinued at 14.55m Target depth reached										
66	15											
65	16											
64	17											
63	18											
62	19											

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 1.2m

TYPE OF BORING: Solid Flight Auger to 1.2m, NMLC Coring to 14.55m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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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BORE: BH105 PROJECT: KEMPS CREEK AUGUST 2022

1.20 – 5.00m

BORE: BH105 PROJECT: KEMPS CREEK AUGUST 2022

5.00 –10.00m

BORE: BH105 PROJECT: KEMPS CREEK AUGUST 2022

10.00 – 14.55m

BOREHOLE LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 91.0 AHD
EASTING: 296620.9
NORTHING: 6250965.8
DIP/AZIMUTH: 90°/--

BORE No: BH106
PROJECT No: 92352.03
DATE: 15 - 16/8/2022
SHEET 1 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
91	0.4	TOPSOIL/CLAY CI: medium plasticity, dark brown, trace coarse sand and rootlets, w~PL							D			
		CLAY CI: medium plasticity, orange-brown, w~PL, residual							D			
	0.8	Silty CLAY CL: low plasticity, grey-brown, trace fine sub-rounded siltstone gravel, w<PL, stiff, residual							D			
90	1								S			3,5,10 N = 15
89	2							Unless otherwise stated, rock is fractured along smooth, planar bedding dipping 0°-10°				
	2.65	SILTSTONE: extremely weathered, Bringelly Shale							S			6,20,25/50 refusal
88	2.85	SILTSTONE: brown and dark grey, very low and low strength with some medium strength bands, highly weathered, fragmented to highly fractured, Bringelly Shale						3.12m: J20°, pl, sm, cly 30mm 3.16m: Cs 30mm 3.23m: Cs 5mm 20° 3.29m: CORE LOSS: 60mm	C	95	37	PL(A) = 0.2
87	3.35							3.46m: Cs 50mm 3.79m: J20°, pl, sm 3.86m: J70°-85°, ir, sm, ti, fe 3.97m: J60°, pl, sm 4.34m: Cs 10mm 4.4m: J70°, pl, sm, fe 4.5m: J70°-90°, ir, sm, fe 4.74m: J45°, pl, sm 4.82m: J60°-90°, ir, sm 5.32m: J90°, pl, sm	C	100	31	PL(A) = 0.1 PL(A) = 0.4
86	4							5.71m: J60°, pl, sm				
85	5							6.32m: J70°-90°, ir, sm, fe				PL(A) = 0.1
84	6							6.97m: J20°, pl, sm 7.12m: J60°, pl, sm 7.17m: J45°, pl, sm				
	7							7.53m: Cs 10mm				PL(A) = 2.3
	7.55	INTERLAMINATED SILTSTONE AND SANDSTONE: 50-60% dark grey siltstone interlaminated with 40-50% fine grained, pale grey sandstone, high strength, slightly weathered, slightly fractured, Bringelly Shale						7.95m: J70°, pl, sm, fe 8.17m: J85°, pl, sm, fe				PL(A) = 0.1
83	7.84							8.41m: J60°, pl, sm, fe 8.64m: J60°-70°, cu, sm 8.76m: J60°, pl, sm	C	100	66	
	8											
82	9	SILTSTONE: dark grey, low and medium strength, moderately weathered, Bringelly Shale										PL(A) = 0.2
								9.81m: J80°, pl, sm				

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 2.85m

TYPE OF BORING: Solid Flight Auger to 2.85m, NMLC Coring to 22.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 91.0 AHD
EASTING: 296620.9
NORTHING: 6250965.8
DIP/AZIMUTH: 90°/--

BORE No: BH106
PROJECT No: 92352.03
DATE: 15 - 16/8/2022
SHEET 2 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
81		SILTSTONE: dark grey, low and medium strength, moderately weathered, Bringelly Shale *(continued)*						10.23m: J85°-90°, ir, sm 10.59m: J60°-80°, ir, sm				PL(A) = 0.3
80	11								C	100	78	PL(A) = 0.2
79	12											PL(A) = 0.4
78	13											
	13.15	INTERBEDDED AND INTERLAMINATED SILTSTONE AND SANDSTONE: 60-70% dark grey siltstone interbedded and interlaminated with 30-40% fine grained, pale grey and grey sandstone, medium and high strength, fresh, slightly fractured, Bringelly Shale										PL(A) = 2.1
77	14							14.02m: J30°, pl, sm				
76	15								C	100	88	PL(A) = 0.4
								15.34m: J45°, pl, sm				PL(A) = 0.9
75	16							15.82m: J20°, pl, sm 16.12m: J60°-70°, ir, ro				
74	17											PL(A) = 2.4
	17.65	SILTSTONE: dark grey, medium strength, fresh stained to fresh, slightly fractured to unbroken, Bringelly Shale							C	100	100	PL(A) = 0.9
73	18											
72	19											PL(A) = 0.6
								19.36m: J45°, pl, sm, ti	C	100	84	PL(A) = 0.8

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 2.85m

TYPE OF BORING: Solid Flight Auger to 2.85m, NMLC Coring to 22.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 91.0 AHD
EASTING: 296620.9
NORTHING: 6250965.8
DIP/AZIMUTH: 90°/--

BORE No: BH106
PROJECT No: 92352.03
DATE: 15 - 16/8/2022
SHEET 3 OF 3

RL	Depth (m)	Description of Strata	Degree of Weathering (XW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding, J - Joint, S - Shear, F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
71		SILTSTONE: dark grey, medium strength, fresh stained to fresh, slightly fractured to unbroken, Bringelly Shale *(continued)*										
70	21								C	100	84	PL(A) = 0.8
69	22 22.0											PL(A) = 0.7
		Bore discontinued at 22.0m Target depth reached										
68	23											
67	24											
66	25											
65	26											
64	27											
63	28											
62	29											

RIG: Comacchio 305 **DRILLER:** Matrix Drilling **LOGGED:** JC **CASING:** HW to 2.85m

TYPE OF BORING: Solid Flight Auger to 2.85m, NMLC Coring to 22.0m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Location coordinates are in MGA94 Zone 56. Grass cover at surface.

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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BORE: BH106 PROJECT: KEMPS CREEK AUGUST 2022

2.85 – 7.00m

BORE: BH106 PROJECT: KEMPS CREEK AUGUST 2022

7.00 –12.00m

BORE: BH106 PROJECT: KEMPS CREEK AUGUST 2022

12.00 – 17.00m

BORE: BH106 PROJECT: KEMPS CREEK AUGUST 2022

17.00 – 22.00m

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 54.9 AHD
EASTING: 296174.2
NORTHING: 6251519.3

PIT No: 1
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: medium plasticity, grey, w~PL, moist, apparently soft to firm Between 0-0.15m: grass roots							
	0.3	Pit discontinued at 0.3m discontinued at 0.30m							
54	1								1
53									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 52.2 AHD
EASTING: 296095.8
NORTHING: 6251530.7

PIT No: 2
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
52	0.2	TOPSOIL/Silty CLAY: low to medium plasticity, grey, trace grass roots to 150mm, w~PL, apparently soft to firm							
		Pit discontinued at 0.2m							
51	1								1

5 10 15 20

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 58.4 AHD
EASTING: 296096
NORTHING: 6251658.2

PIT No: 3
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
58		TOPSOIL/Silty CLAY: medium plasticity, grey, with grass roots, w~PL, apparently soft to firm							
	0.15	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.45	Pit discontinued at 0.45m							
	1								1
57									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 58.4 AHD
EASTING: 296096
NORTHING: 6251658.2

PIT No: 3A
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: medium plasticity, grey, with grass roots, w~PL, apparently soft to firm							
	0.2	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
58	0.4	Pit discontinued at 0.4m							
	1								1
57									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 63.4 AHD
EASTING: 296243.9
NORTHING: 6251647

PIT No: 4
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
63		TOPSOIL/Silty CLAY: low plasticity, grey, grass/plant roots, w~PL, apparently soft to firm							
	0.3	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
	1								1
62									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 63.4 AHD
EASTING: 296302.4
NORTHING: 6251572

PIT No: 5
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
63	0.0	FILL/CLAY: high plasticity, brown, trace ripped shale gravel, w~PL, moist, apparently stiff Between 0-0.1m: grass roots							
	0.4	CLAY CI: medium plasticity, pale brown, w~PL, stiff to very stiff, residual							
	0.5	Pit discontinued at 0.5m							
	1								1
62									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 67.9 AHD
EASTING: 296366
NORTHING: 6251641.4

PIT No: 6
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft of firm							
	0.25	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
67	1								1
66									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 73.1 AHD
EASTING: 296435
NORTHING: 6251564.2

PIT No: 7
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
73		TOPSOIL/Silty CLAY: medium plasticity, grey, trace grass roots, w~PL, moist, apparently soft to firm							
	0.25	CLAY CH: high plasticity, brown, w~PL, firm to stiff, residual							
	0.4	Pit discontinued at 0.4m							
	1								1
72									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 87.8 AHD
EASTING: 296547.6
NORTHING: 6251633.1

PIT No: 8
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		FILL/TOPSOIL/Silty CLAY: low plasticity, pale grey, trace grass roots, w~PL, moist, apparently soft to firm							
	0.2	FILL/CLAY: medium plasticity, grey-brown,w~PL, moist, apparently firm							
	0.5	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.6	Pit discontinued at 0.6m							
87									
	1								1
86									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.8 AHD
EASTING: 296708.5
NORTHING: 6251624.5

PIT No: 9
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL: low plasticity, grey-brown, trace grass roots, w~PL, moist, soft to firm							
	0.1	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.3	Pit discontinued at 0.3m							
88									
	1								1
87									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 82.8 AHD
EASTING: 296633
NORTHING: 6251576.8

PIT No: 10
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: low / medium plasticity, grey, trace grass root to 0.2m, w~PL, moist, apparently soft to firm							
		Between 0.2-0.5m: no grass root							
	0.5	CLAY CH: high plasticity, brown, w-PL, stiff, residual							
	0.7	Pit discontinued at 0.7m							
82	1								1
81									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 56.6 AHD
EASTING: 296259
NORTHING: 6251485.9

PIT No: 11
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: low plasticity, grey-brown, trace grass roots, w~PL, moist, soft							
	0.15	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.3	Pit discontinued at 0.3m							
56									
	1								1
55									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 63.1 AHD
EASTING: 296375
NORTHING: 6251495

PIT No: 12
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
63		TOPSOIL/Silty CLAY: low / medium plasticity, grey, trace grass roots, w~PL, moist, soft							
	0.2	CLAY CH: high plasticity, brown, w~PL, soft, residual							
	0.4	Pit discontinued at 0.4m							
	1								1
62									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 74.5 AHD
EASTING: 296543.1
NORTHING: 6251514.2

PIT No: 13
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL: medium plasticity, grey, trace grass roots, w~PL, moist, soft							
	0.15	CLAY CH: high plasticity, mottled brown pale grey, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
74	1								1
73									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 88.5 AHD
EASTING: 296720.9
NORTHING: 6251526.6

PIT No: 14
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: medium plasticity, grey-brown, trace grass root, w~PL, moist, soft							
	0.1	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.3	Pit discontinued at 0.3m							
88									
	1								1
87									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 84.5 AHD
EASTING: 296704.9
NORTHING: 6251432.5

PIT No: 15
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: low plasticity, grey-brown, trace grass roots, w~PL, moist, soft							
	0.15	CLAY CI: medium plasticity, brown, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
84									
	1								1
83									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 86.2 AHD
EASTING: 296665.8
NORTHING: 6251284.7

PIT No: 16
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
86	0.15	TOPSOIL/Silty CLAY: medium plasticity, grey-brown, trace grass roots, w~PL, moist, apparently soft to firm							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.35	Pit discontinued at 0.35m							
	1								1
85									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 74.0 AHD
EASTING: 296578.2
NORTHING: 6251326.5

PIT No: 17
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
74		TOPSOIL/Silty CLAY: medium plasticity, grey brown, trace grass root, w~PL, moist, soft							
	0.2	CLAY CI: medium plasticity, pale brown, w~PL, firm to stiff, residual							
	0.5	Pit discontinued at 0.5m							
73	1								1

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 68.9 AHD
EASTING: 296529.7
NORTHING: 6251410.7

PIT No: 18
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: medium plasticity, grey-brown, trace grass roots, w~PL, moist, soft to firm							
	0.15	CLAY CH: high plasticity, pale grey-brown, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
68	1								1
67									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 64.1 AHD
EASTING: 296455.6
NORTHING: 6251383.6

PIT No: 19
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
64	0.1	TOPSOIL/Silty CLAY: low plasticity, pale grey-brown, trace grass roots, w~PL, moist, firm to soft							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
	1								1
63									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 60.0 AHD
EASTING: 296338.1
NORTHING: 6251406.8

PIT No: 20
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
60		TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, soft to firm							
	0.2	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
59	1								1

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 55.2 AHD
EASTING: 296172.3
NORTHING: 6251403.8

PIT No: 21
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
55	0.2	TOPSOIL/Silty CLAY: medium plasticity, grey, trace grass roots, w~PL, moist, soft							
		CLAY CH: high plasticity, pale brown, w~PL, firm to stiff, residual							
	0.55	Pit discontinued at 0.55m							
	1								1
54									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 57.3 AHD
EASTING: 296259.7
NORTHING: 6251392.2

PIT No: 22
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
57	0.2	FILL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
	0.5	FILL/CLAY: low plasticity, grey, with plastic and brick gravel, w~PL, apparently soft							
	0.7	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
56	1	Pit discontinued at 0.7m							1

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 64.8 AHD
EASTING: 296269.1
NORTHING: 6251282.8

PIT No: 23
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
64	0.2	TOPSOIL/Silty CLAY: grey, with grass roots, moist, apparently soft							
		CLAY CH: high plasticity, brown, stiff, residual							
	0.4	Pit discontinued at 0.4m							
	1								1
63									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 62.8 AHD
EASTING: 296323.3
NORTHING: 6251340.7

PIT No: 24
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
	0.1	FILL/TOPSOIL/Silty CLAY: medium plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
		FILL/CLAY: medium plasticity, mottled brown pale grey, w~PL, moist, apparently firm							
	0.4	CLAY CH: high plasticity, pale brown, w~PL, stiff, residual							
62	0.5	Pit discontinued at 0.5m							
	1								1
61									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 70.5 AHD
EASTING: 296376.5
NORTHING: 6251252.5

PIT No: 25
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
70	0.15	FILL/TOPSOIL/Silty CLAY: low plasticity, grey-brown, trace grass root, w~PL, moist, apparently soft to firm							
	0.5	FILL/CLAY: medium plasticity, pale grey-brown, w~PL, moist, apparently firm							
	0.7	CLAY CH: high plasticity, mottled brown pale grey, w~PL, stiff, residual							
69	1	Pit discontinued at 0.7m							1

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 71.0 AHD
EASTING: 296427.9
NORTHING: 6251320

PIT No: 26
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
71		TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
	0.2	FILL/CLAY : medium plasticity, brown, with some gravel to boulder size rock fragments, w~PL, moist, apparently firm to hard							
	0.5	CLAY CH: high plasticity, brown, w~PL, hard, residual, extremely weathered rocks							
	0.7	Pit discontinued at 0.7m							
70	1								1

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 78.8 AHD
EASTING: 296502.5
NORTHING: 6251254.8

PIT No: 27
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		FILL/TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft to firm							
	0.1	FILL/CLAY: medium plasticity, brown, trace gravel to boulder size rock fragments, w~PL, moist, apparently soft to firm							
	0.3	CLAY CH: high plasticity, pale brown, w~PL, stiff to very stiff, residual							
	0.4	Pit discontinued at 0.4m							
78									
	1								1
77									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 67.4 AHD
EASTING: 296470.3
NORTHING: 6251149.6

PIT No: 28
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
67	0.2	FILL/TOPSOIL/Silty CLAY: grey, with grass roots, moist, apparently soft to firm							
	0.5	FILL/CLAY: medium plasticity, brown, trace gravel to boulders size rock fragments, w~PL, moist, apparently soft to firm							
	0.7	CLAY CI: medium plasticity, pale brown, w<PL, hard, residual							
66	1	Pit discontinued at 0.7m							1

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 67.4 AHD
EASTING: 296470.3
NORTHING: 6251149.6

PIT No: 28A
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
67	0.0	TOPSOIL/Silty Clay: low / medium plasticity, grey, trace grass roots, w~PL, moist to wet, apparently soft							
	0.4	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
	1								1
66									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 72.0 AHD
EASTING: 296560.4
NORTHING: 6251148.8

PIT No: 29
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
72		TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots to 0.2m, w~PL, moist, soft							
	0.3	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
71	1								1

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 83.6 AHD
EASTING: 296591
NORTHING: 6251027.4

PIT No: 30
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
83	0.4	TOPSOIL/Silty CLAY: low plasticity, grey, trace grass root to 0.25m, w~PL, moist, apparently soft							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.7	Pit discontinued at 0.7m							
	1								1
82									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 91.4 AHD
EASTING: 296605.9
NORTHING: 6250969.3

PIT No: 31
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
91	0.15	TOPSOIL/Silty CLAY: low plasticity, grey-brown, trace grass roots, w~PL, moist, soft							
	0.4	CLAY CH: high plasticity, brown, trace rock fragments, w~PL, hard, residual							
	0.5	CLAY CH: high plasticity, brown, w~PL, stiff to very stiff, residual							
	1	Pit discontinued at 0.5m							1
90									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 82.7 AHD
EASTING: 296552.5
NORTHING: 6250940.3

PIT No: 32
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft to firm							
	0.15	CLAY CH: high plasticity, brown, stiff, residual							
	0.35	Pit discontinued at 0.35m							

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

82

1

81

1

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 81.9 AHD
EASTING: 296503.4
NORTHING: 6251014.4

PIT No: 33
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: low plasticity, grey, trace grass root and organic matter, w~PL, moist, soft							
	0.2	CLAY CH: high plasticity, pale brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
81	1								1
80									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 68.2 AHD
EASTING: 296371.2
NORTHING: 6251040.8

PIT No: 34
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
68	0.15	TOPSOIL/Silty CLAY: grey, with grass roots, moist, soft							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
	1								1
67									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 72.7 AHD
EASTING: 296451.2
NORTHING: 6251063.1

PIT No: 35
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
72	0.1	TOPSOIL/Silty CLAY: low plasticity, pale grey, trace grass roots, w~PL, moist, soft							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.35	Pit discontinued at 0.35m							
	1								1
71									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 62.4 AHD
EASTING: 296384.4
NORTHING: 6251133.6

PIT No: 36
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
62	0.2	TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, soft							
	0.35	CLAY: medium to high plasticity, brown, stiff, residual							
	1	Pit discontinued at 0.35m							1
61									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 58.3 AHD
EASTING: 296291.2
NORTHING: 6251194.2

PIT No: 37
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
58	0.2	TOPSOIL/Silty CLAY: low to medium plasticity, grey, trace grass roots, w~PL, moist, apparently soft to firm							
	0.5	CLAY CH: high plasticity, pale grey-brown, w~PL, firm to stiff, residual							
57	1	Pit discontinued at 0.5m							1

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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
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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 49.2 AHD
EASTING: 296020
NORTHING: 6251266

PIT No: 38
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
49	0.1	TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
		CLAY CI: medium plasticity, grey, slightly silty, w~PL, firm, residual							
	0.35	Pit discontinued at 0.35m							
	1								1
48									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS: Coordinates and elevation estimated from Metro Map aerial imagry and available contour mapping.

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 43.3 AHD
EASTING: 295774.2
NORTHING: 6251278

PIT No: 39
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
43		TOPSOIL/Silty CLAY: low/medium plasticity, grey, trace grass roots,w~PL, moist, apparently soft							
	0.2	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.5	Pit discontinued at 0.5m							
	1								1
42									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 44.9 AHD
EASTING: 295845.5
NORTHING: 6251154.5

PIT No: 40
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: grey-brown, trace grass roots, moist, apparently soft							
	0.1	CLAY CI: medium plasticity, orange-brown, w~PL, firm, possible alluvial							
	0.25	Pit discontinued at 0.25m							
44	1								1
43									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 43.4 AHD
EASTING: 295784.9
NORTHING: 6251131.9

PIT No: 41
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
	0.05	TOPSOIL/Silty CLAY: pale grey, trace grass roots, moist, apparently soft							
		Silty CLAY CL/CI: low / medium plasticity, orange-brown, w~PL, firm, possible alluvial							
	0.25	Pit discontinued at 0.25m							
43									
	1								1
42									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 44.0 AHD
EASTING: 295830.8
NORTHING: 6251050.8

PIT No: 42
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
44		TOPSOIL/Silty CLAY: grey, with grass roots, moist, apparently soft to firm							
	0.1	CLAY CI/CH: medium / high plasticity, orange-brown, stiff, w~PL, residual							
	0.4	Pit discontinued at 0.4m							
43	1								1

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 45.9 AHD
EASTING: 295936.8
NORTHING: 6251019.2

PIT No: 43
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: low / medium plasticity, grey, trace grass roots, moist, apparently soft							
	0.15	CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.3	Pit discontinued at 0.3m							
45	1								1
44									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 48.8 AHD
EASTING: 296038.4
NORTHING: 6250995.3

PIT No: 44
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
	0.1	TOPSOIL/Silty CLAY: low plasticity, pale grey, trace grass roots, w~PL, moist, apparently soft							
		CLAY CH: high plasticity, brown, stiff, residual							
	0.4	Pit discontinued at 0.4m							
48									
	1								1
47									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 50.8 AHD
EASTING: 296104.8
NORTHING: 6251056.8

PIT No: 45
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: low plasticity, grey-brown, trace grass roots, w~PL, moist, apparently soft							
	0.2	CLAY CH: high plasticity, orange-brown, w~PL, firm to stiff, residual							
	0.45	Pit discontinued at 0.45m							
50									
	1								1
49									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 47.9 AHD
EASTING: 295984.6
NORTHING: 6251098.4

PIT No: 46
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
		TOPSOIL/Silty CLAY: low/medium plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
	0.15	CLAY CH: high plasticity, pale brown, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
47	1								1
46									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 46.4 AHD
EASTING: 295903.1
NORTHING: 6251114.9

PIT No: 47
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
		TOPSOIL/Silty CLAY: low plasticity, pale grey-brown, trace grass roots, w~PL, moist, apparently soft							
	0.15	CLAY CH: high plasticity, brown, stiff, residual							
46	0.4	Pit discontinued at 0.4m							
	1								1
45									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 50.1 AHD
EASTING: 296052.1
NORTHING: 6251119.9

PIT No: 48
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
50	0.15	TOPSOIL/Silty CLAY: low / medium plasticity, grey, trace grass root, w~PL, moist, apparently soft							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.4	Pit discontinued at 0.4m							
49	1								1

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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

TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 53.3 AHD
EASTING: 296141.4
NORTHING: 6251119.7

PIT No: 49
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm)
53	0.1	TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
		CLAY CH: high plasticity, pale grey-brown, w~PL, stiff, residual							
	0.3	Pit discontinued at 0.3m							
	1								1
52									

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

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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TEST PIT LOG

CLIENT: ESR Australia
PROJECT: Proposed Industrial Subdivision
LOCATION: 59-63 Abbotts Road, Kemps Creek

SURFACE LEVEL: 61.1 AHD
EASTING: 296288.5
NORTHING: 6251098.4

PIT No: 50
PROJECT No: 92352.03
DATE: 16/8/2022
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 mm) 5 10 15 20
61	0.1	TOPSOIL/Silty CLAY: low plasticity, grey, trace grass roots, w~PL, moist, apparently soft							
		CLAY CH: high plasticity, brown, w~PL, stiff, residual							
	0.3	Pit discontinued at 0.3m							
	1								1
60									

RIG: 5t Excavator with 600mm bucket

LOGGED: SI

SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free ground water observed

REMARKS:

☐ 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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Results of Dynamic Penetrometer Tests

Client ESR Australia

Project Proposed Industrial Subdivision

Location 59-63 Abbotts Road, Kemps Creek

Project No. 92352.03

Date 16/08/2022

Page No. 1 of 1

Test	DCP01	DCP02	DCP03	DCP04							
RL of Test											
Depth (m)	**Penetration Resistance** Blows/150 mm										
0 - 0.15	1	1	0	1							
0.15 - 0.30	1	2	2	1							
0.30 - 0.45	2	3	3	2							
0.45 - 0.60	5	5	3	5							
0.60 - 0.75	4	8	5	7							
0.75 - 0.90	4	9	10	10							
0.90 - 1.05	6	9	14	12							
1.05 - 1.20	10	12	15	14							
1.20 - 1.35											
1.35 - 1.50											
1.50 - 1.65											
1.65 - 1.80											
1.80 - 1.95											
1.95 - 2.10											
2.10 - 2.25											
2.25 - 2.40											
2.40 - 2.55											
2.55 - 2.70											
2.70 - 2.85											
2.85 - 3.00											

Test Method AS 1289.6.3.2, Cone Penetrometer ☒

AS 1289.6.3.3, Flat End Penetrometer ☐

Tested By SI

Checked By RCB

Remarks R = Refusal, 25/110 indicates 25 blows for 110 mm penetration

B = Bouncing