Appendix H Preliminary geotechnical investigation

Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
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NATA Accredited Laboratories

ABN 53 058 315 138 ACN 058 315 138

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Foresight Group Australia
Level 5. 20 Hunter Street
Sydney, NSW 2000

Attention: Mr. Arash Zafari – Portfolio Manager

Dear Sir,

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME VILLAGE, NSW

1.0 Introduction

This report presents the results of a preliminary geotechnical investigation carried out at the location of the proposed Battery Energy Storage System (BESS) site at No. 32 Trout Farm Road, Lake Hume Village, NSW. The investigation was in response to our quotation, Q23-291REV dated 12 July 2023.

As per the Geotechnical Services brief supplied by Jacobs (refer to document IS460700-JEG-HUB-GE-SPC-0001, dated 22 May 2023), the specific details of the proposed BESS have yet to be finalised however the following elements are anticipated to be required:

- Minor access roads and general parking areas and associated pavements.
- Minor buildings (admin/maintenance/storage facilities).
- Switch yard and sub-station.
- Large hardstand/earthworks platform for main battery storage units.
- Concrete plinths/ground slabs for individual battery storage units and control units (founded on earthworks platform).
- Above ground transmission lines (conventional single pole foundations); and
- Trenched in ground cable installations.

The purpose of this preliminary investigation was to determine the nature of the subsurface soils and groundwater conditions by augering, testing and sampling across the entire subject site. Based upon the information obtained, comments and recommendations are to be made for the the suitability of the construction at the subject site. It should be noted pavement design options are outside the scope of this report therefore not provided.

2.0 Site Description

The subject site for the proposed BESS is located approximately 550m north of the existing Hume Power Station in Lake Hume Village, NSW. The subject site is bound by Trout Farm Road to the south and the Hume Weir Wastewater Treatment Plant (WWTP) to the east.

The subject site is undulating and has a general downward slope from east to west at approximately 1V(vertical):5H (horizontal) to 1V:10H and north-east to south-west at approximately 1V:10H to 1V:20H with a ground cover of grasses/weeds as noted at the time of the investigation.

It should be noted that an existing rural dwelling with associated driveway, fences, old tennis court and other structures are located across the subject site along with several small to large sized trees scattered across the subject site as noted at the time of the investigation.

3.0 Site Geology

The 1:250 000 Geological Series Sheet for Wagga Wagga (SI/55-15) indicates the Lake Hume Village area is underlain by Quaternary floodplain sediments comprising unconsolidated clay, silt, sand and gravel along drainage lines which in turn is underlain by Silurian Syn-Kinematic Hawksview Granite in accordance with 1:250,000 Scale “Metallogenic Series Sheet SI/55-15” for Wagga Wagga, NSW.

4.0 Investigation Procedure

4.1 Fieldwork

The drilling investigation was carried out between the 13 and 17 July 2023 using our trailer mounted drill rig. Ten (10) boreholes (BH1 to BH10) were drilled at the client selected locations across the subject site to the borehole depths ranging from 1.5m (borehole refusal depth) to 4.0m (borehole termination depth) at the locations as shown in the attached borehole, DCP and earth resistivity testing location plan.

The boreholes were advanced through the soil profile using soil flight augers with Dynamic Cone Penetrometer (DCP) testing undertaken from the existing surface level at each borehole location (BH1 to BH10) to assess the consistency, density and strength of the subsoil materials with representative samples recovered from the boreholes for relevant laboratory testing.

The fieldwork was supervised on a full-time basis by our Geotechnicians of Aitken Rowe Testing Laboratories Pty Ltd from Albury, NSW, who nominated the sampling and prepared continuous engineering logs of the boreholes.

The detailed borehole logs with explanatory notes and DCP test reports are herewith attached. The descriptions in the borehole logs are provided in accordance with "AS 1726 –2017 Geotechnical site investigations".

Earth Resistivity testing was also carried out at two (2) locations across the site to establish in-situ soil resistivity as shown in the attached borehole, DCP and earth resistivity testing location plan.

3.2 Laboratory Testing

To confirm and evaluate the results of the fieldwork, laboratory tests were carried out on the representative samples of the subsoil obtained from the boreholes. The relevant laboratory testing included Particle Size Distribution (PSD), Atterberg Limit, Field Moisture Content (FMC) determination, Shrink Swell (Iss), Linear Shrinkage (LS), Emerson Class (dispersion), Standard Maximum Dry Density (SMDD) and California Bearing Ratio (CBR) tests on the recovered samples, which were undertaken at our NATA accredited testing laboratory in Albury and Wagga Wagga, NSW. The samples for CBR tests were compacted at 95% of SMDD and at nearest 100% of Standard Optimum Moisture Content (SOMC).

The laboratory test reports for PSD, Atterberg Limit, LS, Emerson, FMC determination, Iss, SMDD and CBR tests are herewith attached. The test results for FMC, CBR, SOMC, Iss and LS test results are incorporated in the respective borehole logs.

The pH, Electrical Conductivity (EC), chloride and sulphate content and resistivity tests were carried out on three (3) disturbed samples recovered from the boreholes at the NATA accredited Sydney Environmental and Soil Laboratory (SESL) Pty Ltd in Sydney, NSW. Thermal resistivity tests were also carried out on three (3) disturbed samples recovered from the boreholes at the NATA accredited Geotherm Australasia Pty Ltd Laboratory in Hornsby, NSW. The test reports as received from SESL and Geothern Australasia Pty Ltd are herewith attached.

5.0 Subsurface Condition

The borehole investigation revealed that the site is generally underlain by fill (in BH1, BH2 & BH7 only) comprising topsoil to 0.1m in BH1, BH2 and BH7 and low plasticity sandy silt (in BH7 only) to 0.3m in BH7 and natura topsoil (in BH3 to BH6 & BH8 to BH10) to 0.1m overlying natural alluvial and residual material comprising low plasticity sandy silt, low, low to medium and medium plasticity sandy silty clay and fine to coarse grained silty sand to 4.0m (borehole termination depth) in BH1 to BH7 and BH10, 1.4m in BH8 and 0.5m in BH9 which is underlain by extremely weathered, extremely low strength, granite bedrock, extending to the borehole termination depth at 4.0m in BH8 and borehole refusal depth at 1.5m in BH9. The borehole refusal encountered in BH9 appeared to have

been encountered on underlying granite bedrock. The fill material encountered at the location of BH1, BH2 and BH7 appeared to have been placed “uncontrolled” and ‘’poorly” compacted.

The moisture condition of the underlying natural alluvial and residual clay-based material was noted to be generally varied from less than plastic limit to greater than plastic limit and the sand-based material moist throughout the investigation depth where encountered and the underlying granite bedrock was noted to be generally dry throughout the bedrock profile where encountered in BH8 and BH9 however moist in the lower granite profile in BH8 at the time of the investigation (refer to attached borehole logs).

No groundwater or seepage was encountered during the drilling in the boreholes drilled and the boreholes were found dry on completion of the drilling at the time of the investigation. It should however be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test results and the visual observation of the resistance by auger TC bit, the underlying natural alluvial and residual material (below fill/topsoil) is assessed to be generally varied from very loose to loose to loose density in the upper sand-based profile where encountered (refer to attached borehole logs), generally varied from very soft to firm to stiff consistency in the upper silt-based and clay-based profile to depths ranging from 0.3m to 2.4m (refer to attached borehole logs) then increasing to stiff and stiff to very stiff consistency throughout the clay-based profile within the investigation depth at the time of the investigation (refer to attached borehole logs).

The inspection of the rock cuttings from the solid flight augered boreholes indicates the underlying granite bedrock to be extremely weathered, extremely low strength throughout the investigation profile depth where encountered in BH8 and BH9 (refer to attached borehole logs). It should be noted that borehole refusal was encountered at the depth of 1.5m below the existing surface level at the location of BH9 on anticipated highly to moderately weathered, low strength or better granite bedrock.

The borehole logs with explanatory notes and DCP test reports are herewith attached.

6.0 Discussions & Comments

6.1 Site Preparation and Earthworks

In general, the following site preparation is recommended across the subject site once cuts, if any, are undertaken:

- Remove topsoil and fill material, if any, and stockpile for later use for landscaping and backfilling as appropriate. An average stripping depth of 0.1m is anticipated for the fill/topsoil across the site and 0.3m for fill material at the location of BH7.

- Remove any unsuitable material including silt-based material encountered across the subject site at the time of the construction as required.
- Once the topsoil, fill and unsuitable materials, if any, are removed as required, the exposed natural material should then be scarified to a depth of about 200mm; moisture conditioned to within 0 to -2% of Standard Optimum Moisture Content (SOMC) and compacted to a minimum of 98% of Standard Maximum Dry Density (SMDD) or 75% of Density Index (DI). **It should be noted that the underlying silty sand and sandy silt material may become "unsuitable" and difficult to compact once exposed and subjected to moisture ingress due to its silt and fine sand characteristics. Care shall therefore be exercised during the process of the preparation**. **The extent and occurrence of silty sand and sandy silt material was noted to extent to 0.3m at the location of BH1 and BH9, 0.2m at BH2, BH5, BH6 and BH7, 0.5m at BH8 and 0.8m at the location of BH10 (refer to attached borehole logs).**
- Proof roll the exposed subgrade using a minimum of 10 passes of 12 tonne dead weight roller to detect any soft, loose or heaving areas. **It should be noted the natural alluvial material was noted to be very loose and very loose to loose density in the upper sand-based material and very soft, soft, soft to firm, firm and firm to stiff consistency in the upper silt-based and clay-based profile to a depth of 2.1m at the location of BH1 and BH3, 2.4m at BH2, 2.3m in BH4 & BH6, 2.0m at BH7, 1.6m in BH5, 1.1m at BH8, 0.3m at BH9 and 1.5m at the location of BH10 across the site at the time of the investigation (refer to attached borehole logs). It should be noted that surface movement on the very loose and very loose to loose sand-based subgrade and very soft, soft, soft to firm, firm and firm to stiff silt-based and clay-based subgrade may be experienced during the construction. This material should be removed and or treated as required prior to the placement of any fill material. It is recommended that the exposed subgrade is inspected by experienced geotechnical personnel to ensure that the excavation is undertaken as required and unnecessary excavation is avoided.**
- Any soft, loose or heave areas, if detected, should be excavated down and backfilled with appropriate approved materials, compacted in 150mm thick layers to the equivalent density of minimum 98% of SMDD or 75% of DI. **It should also be noted that the depth of affected material may be varied across the site depending on the climatic condition at the time of the construction.**
- Any area of exposed subgrade, which exhibits shrinkage cracking and does not require re-compaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.

Subsequent to the above subgrade preparation, clean approved fill preferably granular material can be placed as required and compacted to the compaction requirements as given above. **Any excavated fill material, if undertaken, may be used provided any organic matter and unsuitable silt-based materials, if any, are completely removed.** The degree of compaction of any fill placement should be verified by a NATA accredited testing authority to ensure that it achieves

specified density as specified above. The boundaries of the fill areas should be sloped to a maximum batter of 1.0 Vertical to 2.0 Horizontal or retained with the retaining wall as appropriate.

The structural fill supporting any structural element of the structures shall be prepared in such a way that it achieves a minimum of 98% of Standard Maximum Dry Density in every 150mm thick compacted layers and certified by a relevant NATA accredited testing laboratory for which a safe allowable bearing pressure of 100kPa may be adopted, provided proper drainage measures are incorporated in the design, during and after the construction.

It is highly recommended the construction of any fill pad be undertaken under Level 1 supervision in accordance with "AS3798 – 2007 – Guidelines on earthworks for commercial and residential developments" if a fill pad is to be used for the foundation of any structure of the proposed residential unit development.

If the subgrade is to be stabilised then the exposed silt-based subgrade should be stabilised with slag/lime or cement-based additive and the clay-based subgrade should be stabilised with lime-based additive as required. It is anticipated that mixing 3% of appropriate additive to the soil material should provide required strength for the subgrade. We strongly recommend laboratory trial tests to ensure specified strength is achieved through stabilisation.

It would be essential to maintain drainage of the site area during any earthworks to prevent rainfall from adversely affecting the materials such that they become unsuitable for direct re-use.

6.2 Excavation and Support and Retaining Wall / Electrical Trench Backfilling

It is noted that some excavations and cuts may be involved for the construction of the proposed BESS. Based upon the subsurface conditions encountered in the boreholes, it is expected that the materials to be excavated will comprise layers of topsoil, natural sand-based, silt-based and clay-based material and extremely weathered, extremely low strength, granite bedrock, depending on the excavation depth (refer to attached borehole logs). It is therefore anticipated that all the required earthworks within the sand-based, silt-based and clay-based materials and extremely weathered granite bedrock within the investigated depth should be capable of being performed by conventional earth-moving plant such as scrapers, dozers, rollers and backhoes or excavator within the investigated depth.

It should be noted that extremely weathered, extremely low strength, granite bedrock was noted to be encountered within the investigation depth at 1.4m in BH8 and 0.5m in BH9, extending to the borehole termination depth at 4.0m in BH8 and borehole refusal depth at 1.5m in BH9.

The excavation below borehole termination depth within medium strength rock, if encountered, is likely to be undertaken by a large tracked hydraulic excavator or medium weight tracked dozer, both fitted with a ripping tyne or high-powered boring machinery, where the proposed excavation or adopted footing depth exceeds the borehole termination depth (refer to attached borehole logs). **If strong strength rock or harder is encountered below the borehole refusal depth at 1.5m in BH9,**

then it may cause difficulties in penetrating into the rock and hence high-powered machinery with rock hammer may be required for the excavation. If it is required to fully assess the type and condition of the bedrock, then coring into the bedrock is recommended.

It is recommended to provide the borehole logs and the assessment to the contractor to enable him to choose the right equipment for the excavation.

It would be essential to maintain drainage of the site area during any earthworks to prevent rainfall from adversely affecting the materials such that they become unsuitable for direct re-use. It should be noted that trafficability in the sand-based, silt-based and clay-based materials and extremely weathered bedrock for wheeled vehicles can be expected to be difficult during and following rainfall once it is exposed.

The dispersion (Emerson Class) tests carried out on the clay-based samples from BH4, BH6 and BH10 showed "Emerson Class 5" and therefore considered generally "low to non-dispersive".

The temporary batter slopes of 1(V): 1(H) and 1.5(V): 1(H) are recommended for unsupported cuts of up to 3.0m depth within natural soils and extremely weathered rock respectively.

The followings are recommended for permanent batter slopes for unsupported cuts of up to 3.0m depth in the various materials:

- Alluvial/Residual soils 1(V): 2(H)
- Extremely weathered Granite 1(V): 1.5 (H)
- Highly weathered Granite 1(V): 1(H)

The permanent batter slope of the unsupported structural fill of up to 3.0m height should not exceed 1(V): 2(H). If vertical cut with equivalent retaining wall design option is to be adopted, the following characteristic earth pressure coefficients and subsoil parameters given in Table 1 may be adopted for the design of the wall.

Table 1 Design Parameters – Retaining Wall

Design Parameters	**Natural Soil/Controlled Fill**	**Extremely Weathered Granite Bedrock**
Bulk Unit Weight (average)	16.0 kN/m^3	21.0 kN/m^3
Active Earth Pressure Coefficient, K_a	0.4	0.2
At rest Earth Pressure Coefficient, K_o	0.6	0.4
Passive Earth Pressure Coefficient, K_p	2.4	4.0
Effective cohesion, c' (kPa)	5.0	0.0
Effective Friction Angle, ϕ'	24°	38°
Average Undrained Shear Strength (for clay-based material)	30	-

An appropriate factor of safety should be applied in the design of the walls. The walls should be designed to withstand full hydrostatic pressure unless special measures are taken to introduce complete and permanent drainage of the ground behind the wall. It should be noted that similar design parameters may be used for the fill embankment provided similar quality material to the natural soil is used for the fill and the fill placement is placed under Level 1 supervision in accordance with "AS 3798 – 2007 – Guidelines on earthworks for commercial and residential developments".

Any excavation depth exceeding 1.5m should have benches of at least 1.0m wide at 1.5m height intervals. It should be noted that surcharge loadings should not be placed within a distance equivalent to the excavation depth form the crest of a batter cut or fill.

Care would be required to ensure excavation faces are cleaned of loosened and remoulded debris as it may be exposed to alluvial and residual soil and extremely weathered bedrock. The exposed subgrade base, if either sand-based, silt-based, clay-based subgrade or weathered granite bedrock, should be proof rolled to detect any soft, loose or heaving areas. Any soft, loose or heave areas should be removed. The excavation base, particularly for silt-based and clay-based material and extremely weathered granite bedrock, should not be left exposed for prolonged periods as deterioration of bases may occur when subjected to wetting and drying processes. Care should be exercised during construction to ensure water ponding does not occur since this may lead to subsequent softening of the founding materials, particularly for clay-based material and extremely weathered bedrock foundation.

Although no groundwater seepage was observed within the investigated depth in the boreholes during the site investigation, it would be prudent to expect some seepage, even at shallower depth, particularly if excavation is carried out after periods of prolonged extreme rainfall. Any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation.

It should be noted that, no matter what method of excavation support is used, some ground displacement will occur within and immediately surrounding the excavation. We recommend that the risk of architectural and structural damage to the nearby structures and buried services as a result of such excavation-induced movements, be carefully evaluated. We believe it is unlikely that excavation induced movements will significantly affect structures situated back from the excavation perimeter a distance greater than the excavation depth.

It should be noted that side collapse within any "uncontrolled fill" and natural sand-based material and very soft, soft, soft to firm, firm and firm to stiff consistency natural alluvial silt-based and clay-based material may be experienced during excavation and therefore care, and caution shall be exercised throughout the construction (refer to attached borehole logs). The adoption of benching and battering and temporary preventive measures, such as steel liners or sheet piling during the excavation may need to be required.

It should be noted that site personnel should not enter any excavation greater than 1.5m in depth without an appropriate retention system in place or approval from a qualified geotechnical engineer.

The excavated natural clay-based material may be used as "common" fill and the sand-based material, and the weathered granite bedrock may be used as "structural" fill for the proposed building pads or hardstand areas provided particles larger than 75mm in size in the weathered rock are broken down or excluded and moisture conditioned accordingly. It should be noted that the silt-based material should only be used for landscaping.

The general fill for the trench line backfill shall be compacted to 95% of SMDD over the site this being increased to 98% SMDD for compacted material in the top 0.6m of construction, particularly in areas of pavements, slabs and foundation using suitable granular select quality material. The general objective of the backfilling procedure is to restore the ground surface with a minimum risk of future settlement. Therefore, the moisture content and density of the backfill after compaction should be as near as possible to that of the undisturbed natural materials. Compaction of the backfill should be performed in layers not exceeding 150mm in compacted thickness to the specified compaction criteria.

6.3 Footing Design and Foundation

It is assessed that the "uncontrolled" fill, topsoil and natural very loose and very loose to loose density sand-based material and very soft, very soft to soft, soft, soft to firm, firm and firm to stiff consistency silt-based and clay-based material encountered across the subject site is considered "unsuitable" for any structural element of the footing system in its current state. Therefore, based on the available data, the BESS site shall be classified as **"Class P – Problem"** site in accordance with Australian Standard "AS 2870-2011 – Residential slabs and footings" if buildings or structures are to be constructed across the subject site.

However, if the "uncontrolled" fill, topsoil and unsuitable natural materials as discussed above are removed and replaced with approved structural fill **(existing fill material may be re-used provided topsoil including organic material, silt-based material and moisture affected material, if any, is excluded)** and re-compacted in such a way that it can be established as "controlled fill" as specified above or all the footings (i.e. edge beams internal beams and load support thickenings) are founded on the natural stiff consistency or medium dense ground, then **"Class "M" - Moderately reactive"** classification may be adopted (the calculated characteristic surface movement (y_s) values noted to be above 20mm and below 40mm) in accordance with the Australian Standard AS 2870 - 2011 "Residential Slab and Footings", **provided the subgrade is prepared as specified in Section 6.1.**

It should also be noted that the proposed removal of the existing dwelling, structure and trees across the subject site will likely significantly modify the soil moisture conditions under the footprint of the footing system of any proposed building or structure. Therefore, the site may have **"abnormal moisture conditions"** immediately after the removal of the existing dwelling, structure and trees

and the site shall therefore be classified as **"P-Problem site"** in accordance with the Australian Standard AS 2870 -2011 "Residential Slab and Footings" as appropriate.

We recommend that all the footings shall be designed similar to those as recommend in the Standard for "Class P" and the footing shall be designed by engineering principles. However, when the foundation material achieves equilibrium moisture condition throughout the soil profile after the removal of the existing dwelling, structures and entire footing systems and trees and entire root systems at the subject site, then the site may be deemed **"normal site"** and **"Class 'M' - Moderately reactive"** classification may be adopted **provided the subgrade is prepared as specified in Section 6.1.**

It is anticipated that equilibrium moisture conditions may be achieved within a minimum period of 3 to 6 months following the removal of the existing dwelling, structures and trees provided abnormal moisture ingress does not affect the underlying foundation material during this period. It is highly recommended to undertake additional drilling and field moisture content determination tests at or after the minimum 3 to 6 month period following the removal of the existing dwelling, structures and trees.

As noted, the existing dwelling, structures and trees are to be removed from across the subject site prior to any construction. It is therefore highly recommended to completely remove the entire footing system of the existing dwelling and structures and entire root system of the existing trees and completely allow the ground to achieve equilibrium moisture condition throughout the soil profile after the removal and then backfill in a controlled manner that it can be used as "structural fill" as required.

If fill placement is required across the site, it is highly recommended to place granular fill comprising mainly sand and well graded gravel, but caution shall be exercised not to select a 'raw' or non-plastic material that may induce erosion. It should be noted that the clay soils are subject to saturation and shrink/swell problems. **The fill shall be placed in accordance with clause 6.4.1 & 6.4.2 of AS2870, or otherwise the site classification shall be reviewed.**

If the shallow footings such as deep edge beam or pad and strip footings are to be adopted, then they may be proportioned for a maximum allowable bearing pressure of 100kPa and a subgrade reaction modulus (k) of 25kPa/mm founded on the prepared subgrade as specified in Section 6.1 as appropriate, provided proper drainage measures are incorporated around the structures during and after the construction.

As deep "unsuitable" very soft, very soft to soft, soft, soft to firm, firm and firm to stiff consistency silt-based and clay-based subgrade and very loose and very loose to loose density sand-based extends to a significant depth throughout the investigation depth, a shallow and deep pad footing system may not be appropriate at this site unless extensive earthworks is undertaken (refer to attached borehole logs).

In order to adopt a shallow footing system such as deep edge beam or pad and strip footings, it is recommended **to remove all "unsuitable" natural firm and firm to stiff consistency clay-based material and soft consistency silt-based (BH2) material to the depths as stated above in section 6.1 and replace with approved "controlled" fill as specified in Section 6.1.** The maximum allowable bearing pressure of 100kPa and a subgrade reaction modulus (k) of 25kPa/mm founded on the prepared "controlled" fill subgrade may be adopted, provided proper drainage measures are incorporated during and after the construction.

The bored and cast-in-place pile footing system, screw pile or driven pile footing system, if adopted, should be taken into the underlying stiff to very stiff consistency or better clay-based material at or below the minimum depth of 1.5m measured from the existing surface level for which an allowable end bearing pressure of 150kPa and an allowable skin friction of 15kPa may be adopted within the clay-based formation. The average skin friction of 5kPa and the average undrained shear strength of 20kPa within the clay-based formation may also be adopted. The skin friction within the top 1.5m depth of natural soil and within structural fill, if any, shall be ignored.

Alternatively, the bored and cast-in-place pile footing system, screw pile or driven pile footing system, if adopted, may be taken into the underlying extremely weathered, extremely low strength or better, granite bedrock (in BH8 & BH9), at or below a depth of 1.5m measured from the existing surface level (refer to attached borehole logs) as required and the footing system may be proportioned for an allowable end bearing pressure of 500kPa and an allowable shaft adhesion of 50kPa within the bedrock formation. The average angle of friction of 38˚ within the granite bedrock may also be adopted.

If uplift forces are to be assessed, the allowable side resistance on the footing system may be taken as equivalent to 50% of the allowable side adhesion values given above. It should be noted that a factor of safety (FOS) 2.5 was adopted for the bearing pressure and skin friction values given above.

If Pad/Column footing system is to be adopted, then footing size and depth shall be designed in such a way that it withstands lateral forces and overturning moments. Care shall be exercised in adopting the recommended design parameters given above in respect to the influenced zone of footing system.

Care would be required to ensure the bases of the pile shafts and footings must be clean and free of soft, remoulded and loose material and the sides of bored pier holes where side adhesion is adopted must be free of smear prior to concreting. To achieve this, bases of bored pier holes should be cleaned using a cleaning bucket and the sides of the pile holes should be roughed to remove the smear zone associated with drilling, or the side adhesion values given above should be reduced by 50%. Some localized seepage or pile wall instability requiring temporary liners may be expected within natural materials during the footing excavation (refer to section 6.1.2).

The slab panel, internal beams and load support thickening may be founded on the prepared subgrade as specified in Section 6.1.1 as required. The ground slab may either be suspended on the

footing system or by ground bearing slab if required. For the latter, we recommend that the structure be supported on a stiffened raft placed on the prepared subgrade, comprising a grid of reinforced beam cast integrally with the floor slab, with load bearing beams thickened to extend to the clay-based stratum as required in order to minimise the risk of significant damage from the reactive clay-based foundation. The maximum edge beam pressure of the stiffened raft slab should not exceed the allowable bearing capacity of the underlying prepared fill foundation of 100kPa.

The footing excavations, particularly in the clay-based material and extremely weathered granite bedrock material should not be left exposed for prolonged period as deterioration of footing bases may occur when subjected to wetting and drying processes. Care should be exercised during construction to ensure water ponding does not occur since this may lead to subsequent softening of the founding materials. Groundwater seepage may be encountered during the footing and any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation. In a situation of groundwater inflows during the foundation construction, correct underwater concrete placement technique should be adopted to ensure achievement of the specified concrete quality. The footing excavations shall be cleared off the debris and ponding water prior to the placement of the concrete in order to adopt the above recommended bearing pressures.

If water ponds in the base of footings or the base founding materials are affected by moisture ingress, then this material should be excavated to expose clay subgrade, which has not been exposed to moisture, and pour the concrete immediately. If a delay in pouring concrete is anticipated, then a blinding layer should be placed over the base of the footing to prevent softening of the footing base.

It is highly recommended to incorporate proper drainage measures around the perimeter of the structure to ensure surface run-off does not ingress into the founding material.

It is also highly recommended to undertake inspections of the footing construction by an experienced geotechnical engineer to ensure that the specified allowable bearing capacity is achieved for the footing system during the construction.

6.4 Settlement

We envisage that the total settlements should be minimal provided the design is made within the allowable design parameters recommended and, the maintenance of the structures and proper drainage measures are adopted around the structures.

Shallow footings proportioned in accordance with design parameters recommended above are estimated to have load induced settlements of no greater than 0.75% of the width of the footing.

Pile foundations designed in accordance with design parameters recommended above are estimated to have load induced settlements of no greater than 0.75% of the diameter of the piles.

It is anticipated that differential settlement is likely to be less than 50% of the total settlement provided the footings are designed in accordance with the design parameters given above.

6.5 Soil Aggression

The three (3) pH tests indicated pH values ranging from 7.3 to 7.8 were recorded on the underlying natural clay-based material and therefore considered "slight alkalinity". EC values ranging from of 0.02 to 0.1mS/cm were recorded on the on the same clay-based samples which are assessed to be "very low salinity". The pH values on the clay-based material are considered "non-aggressive" towards concrete due to the impermeable nature of the clay-based material and "non-corrosive" towards steel.

The sulphate contents values of <5.0mg/kg and chloride content values ranging from 30 to 400mg/kg were noted on the same clay-based samples tested and they are considered generally "low". The low sulphate levels are considered "non-aggressive" towards concrete due to the impermeable nature of the clay-based material and the low chloride levels are considered "non-corrosive" towards steel.

The resistivity values ranging from 19 to 81Ω.m were recorded on the same clay-based samples tested which are assessed to be "mild resistivity" and "high resistivity" respectively. The "mild resistivity" is considered to provide a "mildly aggressive" environment towards unprotected steel due to the impermeable nature of the clay-based material and the "high resistively" is considered to provide a "non-aggressive" environment towards unprotected steel.
The designer is therefore referred to Section 4 of AS3600-2018 (Tables 4.3, 4.4, 4.8.1, 4.8.2, 4.8.3) and Section 6 of AS2159-2009 (Tables 6.4.2C, 6.4.3, 6.5.2C, 6.5.3) for any special precautionary measures required for buried concrete and steel elements into these materials.

6.6 Site Sub-Soil Class – Earthquake Design

The site sub-soil class in accordance with Section 4.2 of AS1170.4-2007 "Part 4: Earthquake actions in Australia", is assessed to be "Class C_e- Shallow soil site".

6.7 Earth Resistivity

The location of the two (2) traverses, ERT1 and ERT2, are shown in the attached borehole, DCP and earth resistivity testing location plan. The results of the earth resistivity testing are given in Table 2 and 3 below:

Table 2 – Earth Resistivity Test Results – ERT1

Test No.	Electrode Spacing, a (m)	Electrode Penetration depth (mm)	Resistance, R (Ω)	Resistivity, ρ (Ω.m)
			R1 (S)	ρ1 (NW)
1	0.5	100	99.9	314
2	1.0	100	20.6	129
3	1.5	100	10.1	95
4	2.0	100	8.94	112
5	3.0	100	6.28	118
6	4.0	100	4.43	111
7	8.0	100	1.47	74
8	12.0	100	0.83	63
9	15.0	100	0.71	67
10	20.0	100	0.48	60
11	30.0	100	0.50	94

Note: 1. Resistivity is calculated assuming homogeneous ground
2. ρ (Ω.m) = 2πaR, where 'a' is in metres and 'R' is in ohms.

Table 3 – Earth Resistivity Test Results – ERT2

Test No.	Electrode Spacing, a (m)	Electrode Penetration depth (mm)	Resistance, R (Ω)	Resistivity, ρ (Ω.m)
			R1 (S)	ρ1 (NW)
1	0.5	100	70.1	220
2	1.0	100	19.9	125
3	1.5	100	10.4	98
4	2.0	100	8.88	112
5	3.0	100	6.17	116
6	4.0	100	4.90	123
7	8.0	100	1.50	75
8	12.0	100	0.85	64
9	15.0	100	0.69	65
10	20.0	100	0.37	47
11	30.0	100	0.49	92

Note: 1. Resistivity is calculated assuming homogeneous ground
2. ρ (Ω.m) = 2πaR, where 'a' is in metres and 'R' is in ohms.

The calculated earth resistivity values are based on the assumption of homogenous ground conditions from the surface to a depth approximately equal to the electrode spacing. It should be noted that soil resistivity changes dramatically within small areas and it is mainly influenced by the

type of soil, moisture content, the amount of electrolytes (minerals and dissolved salts) and temperature.

It should be noted that the boreholes drilled at the location shown in the attached borehole, DCP and earth resistivity testing location plan revealed that the site is generally underlain by topsoil to 0.1m overlying natural alluvial and residual material comprising low plasticity sandy silt, low, low to medium and medium plasticity sandy silty clay and fine to coarse grained silty sand which is underlain by extremely weathered, extremely low strength, granite bedrock (refer to attached borehole logs), and the temperature of the area at the time of resistivity testing was about 15˚C

6.8 Subgrade - Proposed Access and Hardstand Areas

The borehole investigation revealed that the subject site is generally underlain by fill/topsoil to 0.1m overlying natural alluvial and residual material comprising low plasticity sandy silt, low, low to medium and medium plasticity sandy silty clay and fine to coarse grained silty sand to 4.0m (borehole termination depth) in BH1 to BH7 and BH10, 1.4m in BH8 and 0.5m in BH9 which is underlain by extremely weathered, extremely low strength, granite bedrock, extending to the borehole termination depth at 4.0m in BH8 and borehole refusal depth at 1.5m in BH9 (refer to attached borehole logs).

The laboratory 4 day-soaked CBR test results indicated the CBR values of 4 and 5% on medium plasticity sandy silty clay and 8% on low plasticity sandy silty clay materials, which were compacted at 95% of SMDD and nearest 100% of SOMC. The in-situ CBR values correlated from DCP tests indicate CBR values ranging from 1 to 32% on the same clay-based subgrade material where measured.

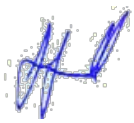
It is noted that the Lake Hume Village area has an average rainfall of less than 1000mm and the subgrade would be prepared as discussed in Section 6.1. Based on these evaluations and assumptions, the design subgrade CBR value of 4% and a subgrade reaction modulus (k) of 30kPa/mm may be adopted for the design of any proposed hardstand areas of the proposed battery site at the subject site provided drainage measures are provided and maintained around the pavement throughout the pavement life.

7.0 General Comment

Occasionally, the subsurface soil conditions in the completed borehole may be found different (or may be interpreted to be different) from those expected. This can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact us.

Should you have any queries, please do contact us.

Yours truly,



Jarrod Gornall
Senior Geotechnical Engineer

Tin Maung
Principal Geotechnical Engineer

Attachments:

- Addendum
- Site Location
- Plan showing borehole, DCP & Earth Resistivity testing locations
- Borehole logs with explanatory notes
- Dynamic Cone Penetrometer test reports
- Laboratory test reports by Aitken Rowe Testing Laboratories Pty Ltd
- Laboratory test reports by Sydney Environmental & Soil Laboratory Pty Ltd
- Laboratory test reports by Geotherm Australasia Pty Ltd

ADDENDUM

LIMITS OF INVESTIGATION

The recommendations made in this report are based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that even under optimum circumstances, actual conditions in some parts of the building site may differ from those said to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal all that is hidden by earth, rock and time.

The client should also be aware that our recommendations refer only to our test site locations and the ground level at the time of testing.

The recommendations in this report are based on the following: -

a) The information gained from our investigation.
b) The present "state of the art" in testing and design.
c) The building type and site treatment conveyed to us by the client.
d) Historical information.

Should the client or their agent have omitted to supply us with the correct relevant information, or make significant changes to the building type and/or building envelope, our report may not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.

Not withstanding the recommendations made in this report, we also recommend that whenever footings are close to any excavations or easements, that consideration should be given to deepening the footings.

Unless otherwise stated in our commission, any dimensions or slope direction and magnitude should not be used for any building costing calculations and/or positioning. Any sketch supplied should be considered as only an approximate pictorial evidence of our work.

Legend

BH = Borehole

DCP = Dynamic Cone Penetrometer

ERT = Earth Resistivity Test

R = Resistance Direction

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: AS23-87

Client: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW

Project: PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME, NSW
BOREHOLE, DCP & EARTH RESISTIVITY TESTING LOCATION PLAN

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **1**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6004861***
E: ***0502965***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	FILL/TOPSOIL: Sandy Gravelly SILT; low plasticity, fine to medium gravel, fine to coarse sand, brown		MC<PL	VS				FILL: Appears poorly compacted 'Uncontrolled'
SM	Silty SAND; fine to coarse grained, trace gracel, fines of low plasticity, brown		M	VL-L	D	1A		NATURAL
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, yellow brown	0.5	MC>PL	S-F	D	1B		FMC = 12.5%
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, orange brown			F	D	1C	8.0	
		1.0						
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, red brown				U50	1D		Iss = 1.77
		1.5			D	1E	10.0	
		2.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, red brown		MC<PL	St.-VSt.				
		2.5			D	1F		
		3.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange yellow brown				D	1G		
		3.5						
		4.0						

End of Borehole (BH1) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **2**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6004922***
E: ***0502979***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	FILL/TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, with fine to medium gravel, brown		MC<PL	S				FILL: Appears poorly compacted 'Uncontrolled'
ML	Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown							NATURAL
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, red brown		MC>PL	F	U50	2A		
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, red brown	0.5			D	2B		
		1.0			U50	2C		Iss = 2.17
		1.5						
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, orange brown				D	2D	12.0	
		2.0						← Seepage @ 2.0m to 4.0m (EOBH)
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange yellow brown				D	2E		FMC = 15.3%
		2.5		St.-VSt.				
					D	2F		
		3.0						
					D	2G		
		3.5						
		4.0						

End of Borehole (BH2) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Seepage @ 2.0m to 4.0m (EOBH)

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **3**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6004910***
E: ***0502934***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	VS				NATURAL
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, orange brown		MC>PL		D	3A		
				F-St.				
		0.5			D	3B		FMC = 20.8% SOMC = 19.0% CBR = 4% (95% SMDD / 4 Day Soak)
		1.0			U50	3C		
		1.5			U50	3D		
		2.0						
CL	Silty Sandy CLAY; low plasticity, fine to coarse sand, orange brown			St.-VSt.				
		2.5			D	3E		
		3.0						← Seepage @ 2.8m to 3.0m
CL	Silty Sandy CLAY; low plasticity, fine to coarse sand, orange grey brown		MC<PL					
		3.5			D	3F		
		4.0						

End of Borehole (BH3) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Seepage @ 2.8m to 3.0m

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **4**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6004937***
E: ***0502953***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	VS				NATURAL
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, orange brown		MC>PL	F	D	4A		FMC = 17.3% SOMC = 15.8% CBR = 5% (95% SMDD / 4 Day Soak)
		0.5			U50	4B		
		1.0						
					D	4C		
		1.5		F-St.				
		2.0						
CL	Silty Sandy CLAY; low plasticity, fine to coarse sand, orange grey brown			St.-VSt.				
		2.5			D	4D		
		3.0						
		3.5						
		4.0						

End of Borehole (BH4) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **5**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6004972***
E: ***0502939***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	F				NATURAL
ML	Sandy SILT; low plasticity, fine to coarse sand, orange brown			S				
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, orange brown		MC>PL	F	D	5A		
		0.5						
					D	5B		
		1.0						
					U50	5C		
		1.5						
				St.				
					D	5D		
		2.0						
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, orange yellow brown							
		2.5			D	5E	8.0	
		3.0						
CL	Silty Sandy CLAY; low plasticity, fine to coarse sand, orange grey brown							
		3.5			D	5F		
		4.0						

End of Borehole (BH5) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **6**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6004964***
E: ***0502982***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	S				NATURAL
ML	Sandy SILT; low plasticity, fine to coarse sand, brown				D	6A		
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, orange brown		MC>PL					
				F	U50	6B		
		0.5						
		1.0						
					D	6C		
		1.5		F-St.				
		2.0						
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, orange yellow brown			St.				
		2.5			D	6D		
		3.0						
					D	6E		
		3.5						
		4.0						

End of Borehole (BH6) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **7**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6005004***
E: ***0502985***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	FILL/TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	S				FILL: Appears poorly compacted
ML	FILL: Sandy SILT; low plasticity, fine to coarse sand, orange brown			S-F				"Uncontrolled" (Irrigation pipe exposed)
CI	Sandy Silty CLAY; medium plasticity, fine to coarse sand, orange brown	0.5	MC>PL	F	D	7A		NATURAL
				F-St.				
		1.0			U50	7B		Iss = 2.03
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, orange yellow brown	1.5			D	7C		
		2.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, yellow brown		MC<PL	St.-VSt.				
		2.5			D	7D		
		3.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange yellow brown							
		3.5			D	7E		
		4.0						

End of Borehole (BH7) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **8**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6005052***
E: ***0502973***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	VS				NATURAL
SM	Silty SAND; fine to coarse grained, fines of low plasticity, yellow brown	0.5	M	VL	D	8A		
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange yellow brown	1.0	MC>PL	S-F	D / U50	8B		FMC = 13.8% SOMC = 11.0% CBR = 8% (95% SMDD / 4 Day Soak)
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, mottled orange yellow grey brown			St.	D	8C		
	GRANITE; extremely weathered, extremely low strength, with clay bands, yellow brown	1.5	D		D	8D		
		2.0						
		2.5						
		3.0						
	GRANITE; extremely weathered, extremely low strength, with clay bands, yellow orange brown		M		D	8E		
		3.5						
		4.0						

End of Borehole (BH8) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **9**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6005057***
E: ***0502932***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	VS				NATURAL
ML	Sandy SILT; low plasticity, fine to coarse sand, trace gravel, pale grey		MC>PL	F	U50	9A		
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, yellow brown	0.5	MC<PL	St.	D	9B		
	GRANITE; extremely weathered, extremely low strength, yellow grey		D		D	9C		
		1.0						
					D	9D		
		1.5						
	End of Borehole (BH9) @ 1.5m							Refusal on Sandstone Bedrock
		2.0						
		2.5						
		3.0						
		3.5						
		4.0						

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **10**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***13-17/07/2023***
GPS N: ***6005009***
E: ***0502919***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy SILT; low plasticity, fine to coarse sand, trace gravel, brown		MC<PL	S				NATURAL
SM	Silty SAND; fine to coarse grained, trace gravel, fines of low plasticity, grey brown		M	VL-L				
					U50	10A		
		0.5						
					D	10B	1.0	
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange yellow brown		MC>PL	F-St.				
		1.0			D	10C		
					D	10D		
		1.5						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange brown		MC<PL	St.-VSt.	D	10E		
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, orange yellow brown	2.0						
					D	10F		
		2.5						
		3.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, yellow grey brown							
					D	10G		
		3.5						
		4.0						

End of Borehole (BH10) @ 4.0m

Registration No.: AS23-87

Location: Preliminary Geotechnical Investigation - Proposed Battery Energy Storage System (BESS), No. 32 Trout Farm Road, Lake Hume, NSW

Client: Foresight Group Australia - Sydney, NSW

Logged By: DRR

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	▶	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	D	Disturbed bag sample taken between the depths indicated by lines.
	U	Undisturbed 50mm diameter tube sample taken between the depths indicated by lines
Field Tests	4, 7, 10 N=17	Standard Penetration Test (S.P.T.) performed between depths indicated by lines. Individual figures show blows per 150mm penetration driven by SPT hammer.
	5 7 3	Dynamic Cone Penetration Test performed between depths indicated by lines. Individual figures show blows per 100mm penetration for 60 degree solid cone driven by 9 kg hammer.
Moisture Condition (Silt or Clay based)	MC<PL	Moisture content estimated to be less than plastic limit.
	MC=PL	Moisture content estimated to be approx. equal to plastic limit.
	MC>PL	Moisture content estimated to be greater than plastic limit.
Moisture Condition (Gravel or Sand based)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Consistency (Silt or Clay based)	VS	VERY SOFT – unconfined compressive strength less than 25kPa.
	S	SOFT – unconfined compressive strength 25-50 kPa.
	F	FIRM – unconfined compressive strength 50-100kPa.
	St.	STIFF – unconfined compressive strength 100-200kPa.
	VSt.	VERY STIFF – unconfined compressive strength 200-400kPa.
	H	HARD – unconfined compressive strength greater than 400kPa.

Relative Density (Gravel or Sand based)		Description	Density Index Range %	'N' Value Range Blows/300mm
	VL	VERY LOOSE	<15	0-5
	L	LOOSE	15-35	6-10
	MD	MEDIUM DENSE	35-65	11-30
	D	DENSE	65-85	31-60
	VD	VERY DENSE	>85	>60

Hand Penetrometer Readings	300 250 280	Numbers indicate individual test results in kPa on representative undisturbed material.
Laboratory Test	L.S. %	Linear Shrinkage (As per TfNSW Method T113)
	M.C. %	Field Moisture Content (As per Australian Standard AS1289.2.1.1 or TfNSW Method T120)
	Iss	Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)

Piezometer Construction	Fill		Piezometer	
		Bentonite		Solid Pipe
		Washed Fine Graded Gravel		Slotted Screen

Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten Carbide wing bit.

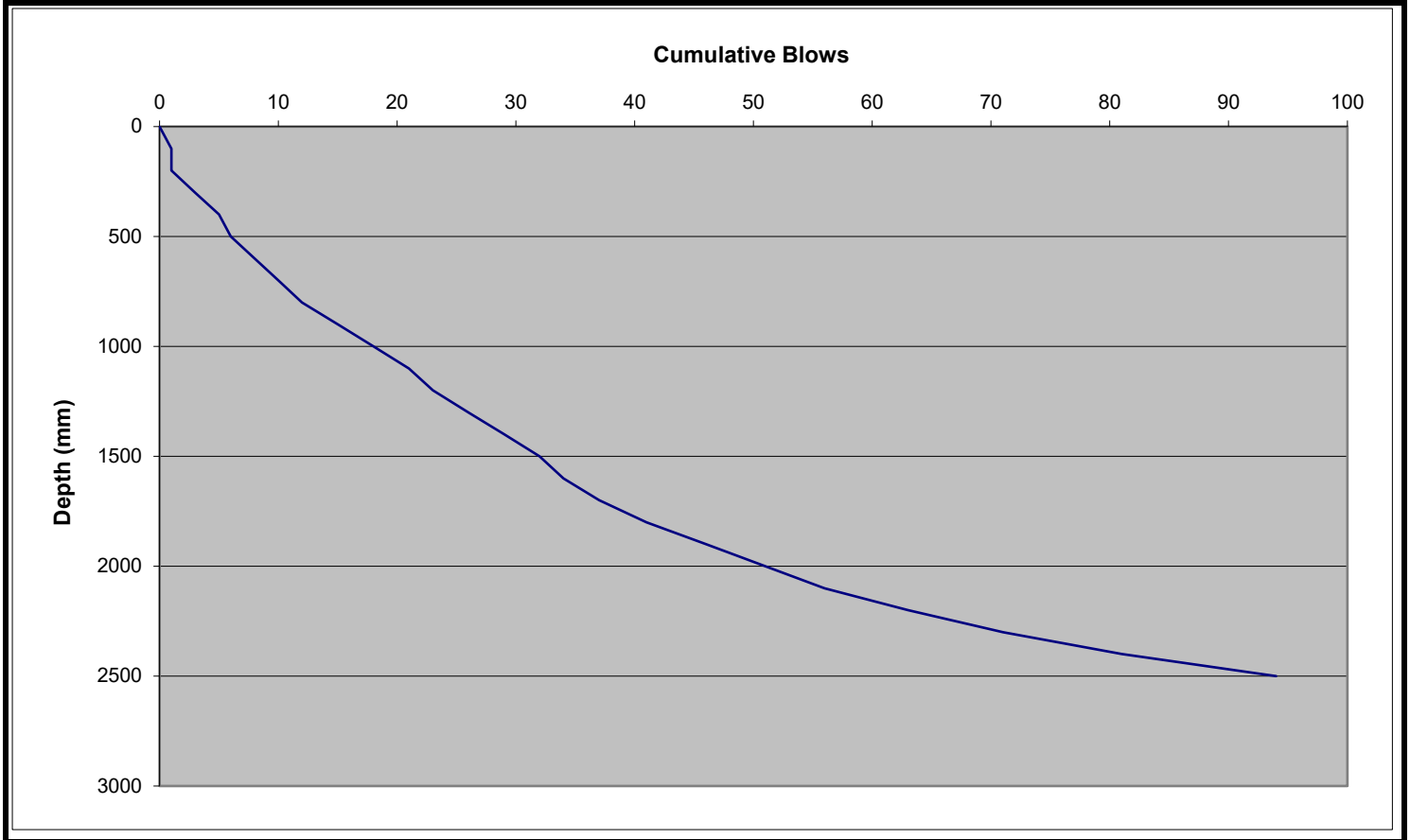
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 1 OF: 10 ***DCP: 1 (BH1)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	2	3	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2			1.6 - 1.7	3	5	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	4	7	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	5	9	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	1	1	1.9 - 2.0	5	9	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	5	9	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	2	3	2.1 - 2.2	7	14	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	2	3	2.2 - 2.3	8	17	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	3	5	2.3 - 2.4	10	23	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	3	5	2.4 - 2.5	13	32	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	3	5	2.5 - 2.6	END	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	2	3	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	3	5	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	3	5	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	3	5	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

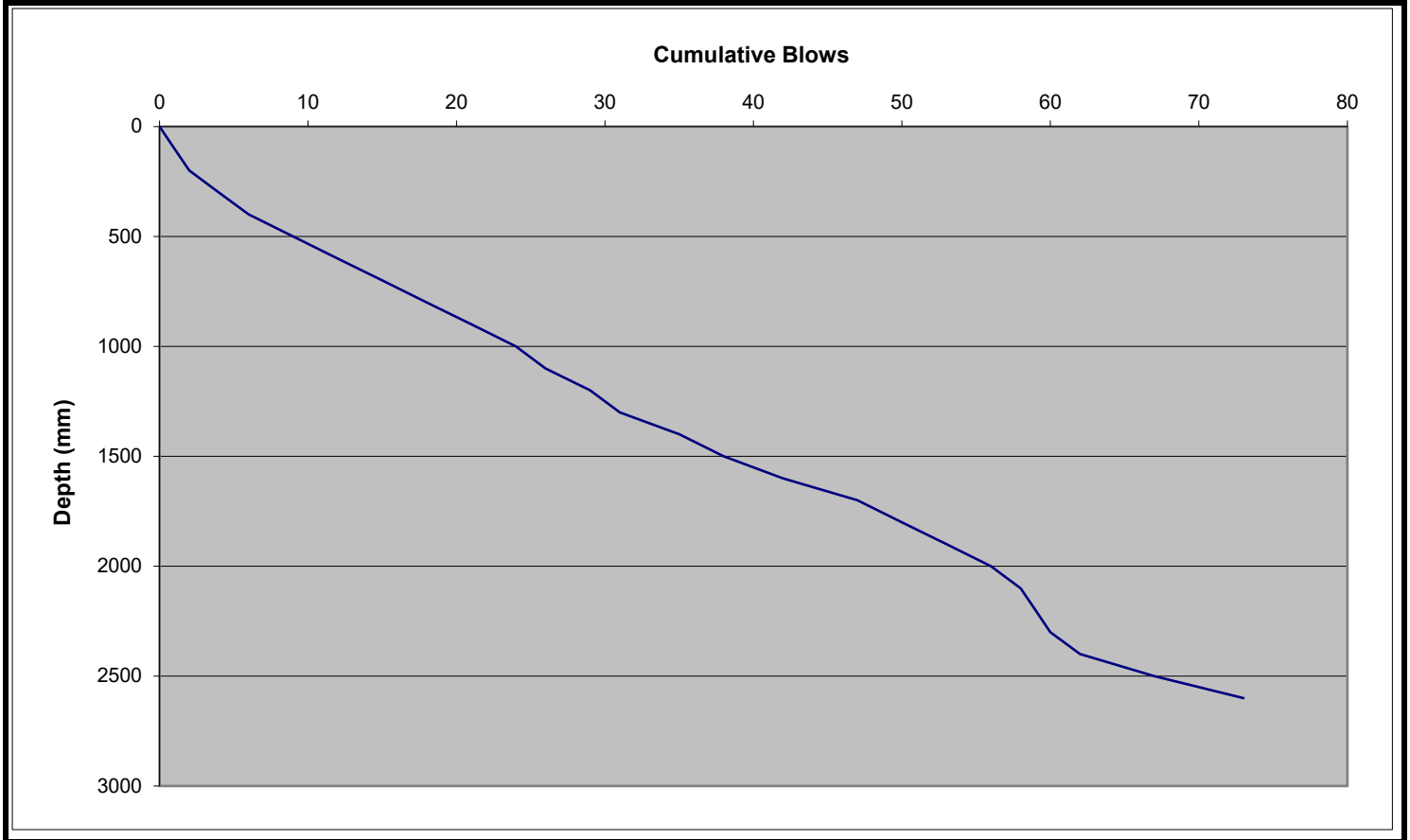
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 2 OF: 10 ***DCP: 2 (BH2)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	4	7	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	1	1	1.6 - 1.7	5	9	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	3	5	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	3	5	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	3	5	1.9 - 2.0	3	5	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	3	5	2.0 - 2.1	2	3	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	3	5	2.1 - 2.2	1	1	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	3	5	2.2 - 2.3	1	1	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	3	5	2.3 - 2.4	2	3	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	3	5	2.4 - 2.5	5	9	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	2	3	2.5 - 2.6	6	12	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	3	5	2.6 - 2.7	END	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	2	3	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	4	7	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	3	5	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

Aitken Rowe Testing Laboratories Pty Ltd

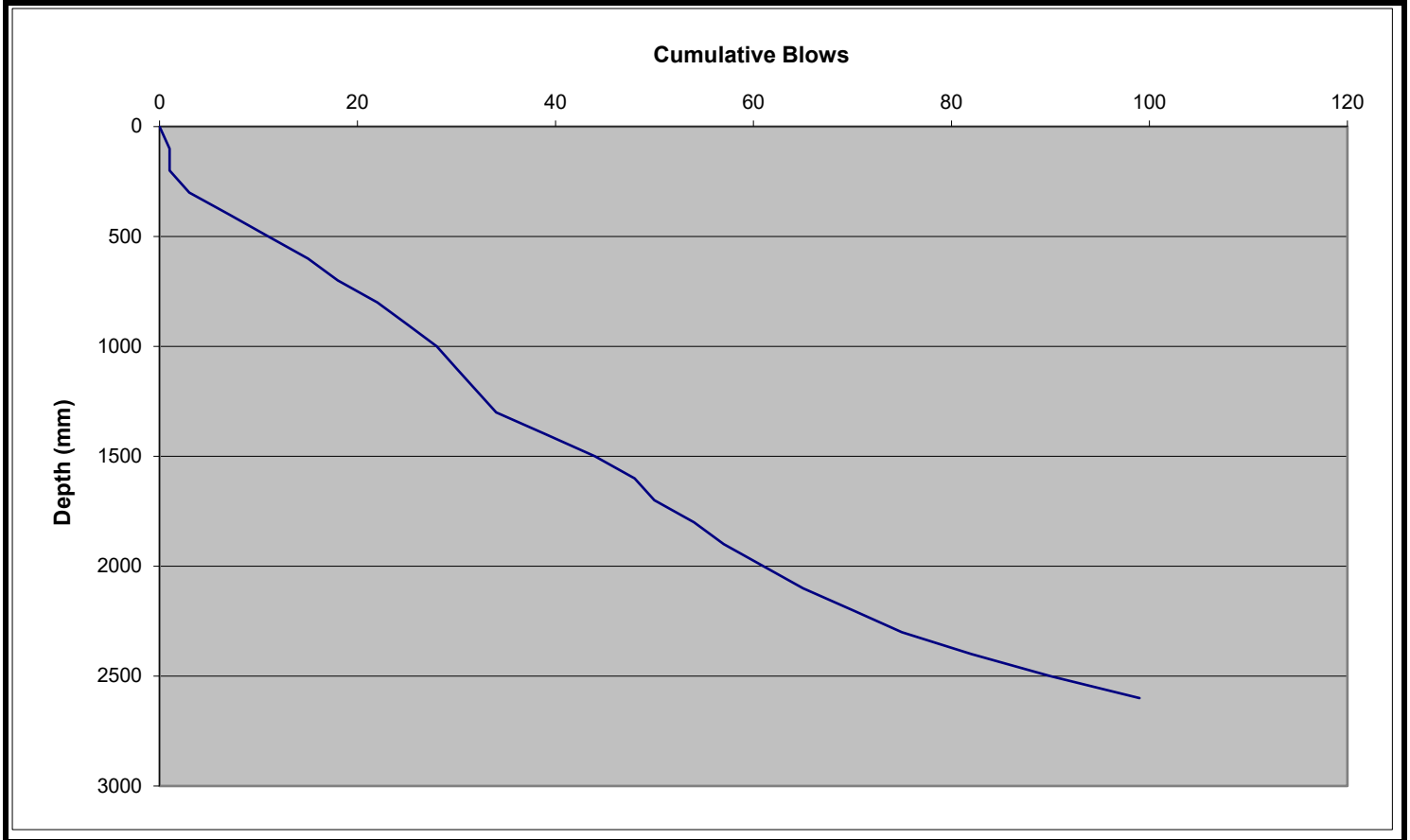
ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 3 OF: 10 ***DCP: 3 (BH3)***
REGISTRATION NO: **AS23-87**
DATE OF TEST: 13-17/07/2023
DEPTH BELOW ESL (mm): NIL
MOISTURE CONDITION: REFER TO LOGS
TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	4	7	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2			1.6 - 1.7	2	3	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	4	7	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	4	7	1.8 - 1.9	3	5	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	4	7	1.9 - 2.0	4	7	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	4	7	2.0 - 2.1	4	7	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	3	5	2.1 - 2.2	5	9	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	4	7	2.2 - 2.3	5	9	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	3	5	2.3 - 2.4	7	14	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	3	5	2.4 - 2.5	8	17	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	2	3	2.5 - 2.6	9	20	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	2	3	2.6 - 2.7	END	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	2	3	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	5	9	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	5	9	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

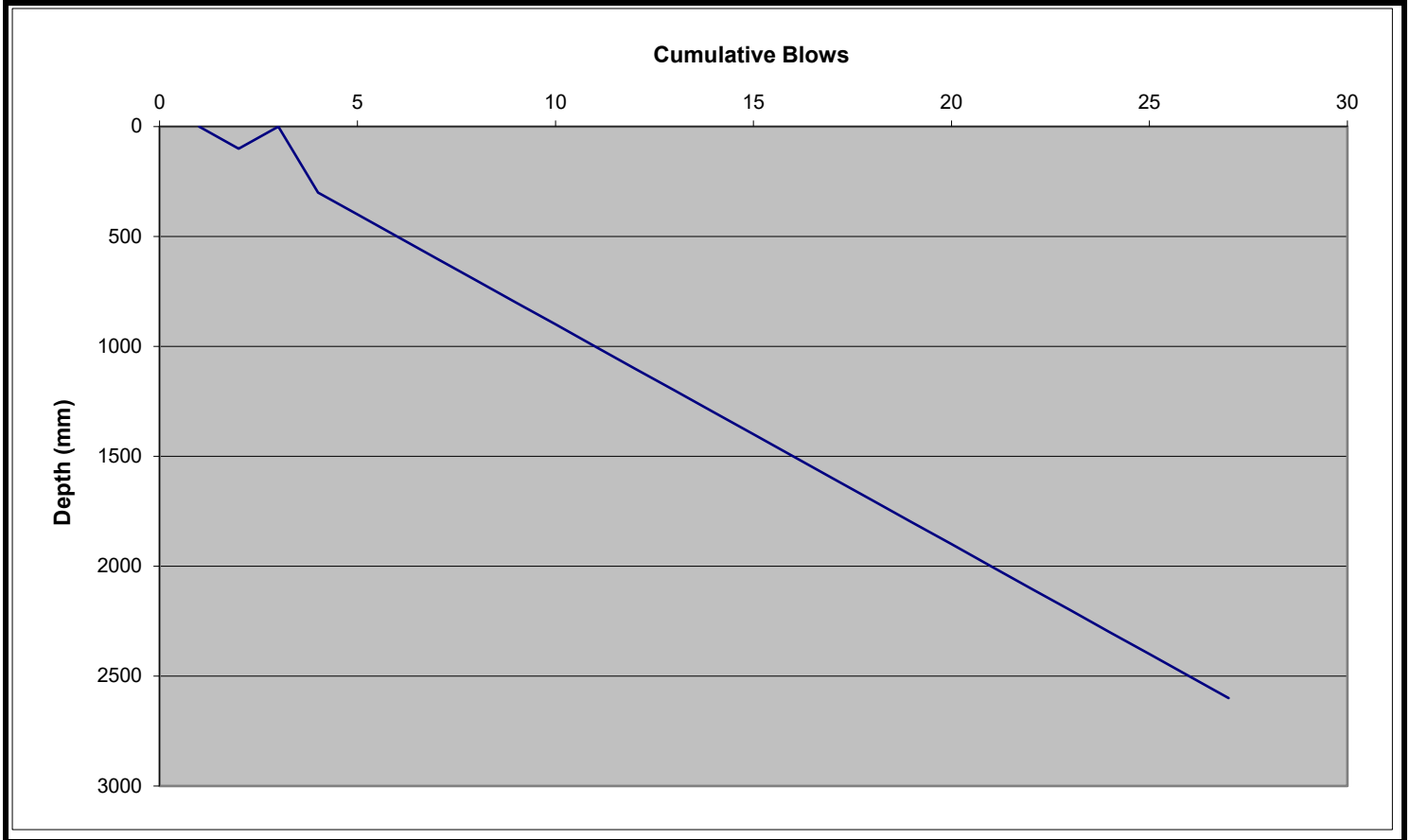
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 4 OF: 10 ***DCP: 4 (BH4)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	4	7	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	*	*	1.6 - 1.7	4	7	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	4	7	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	5	9	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	3	5	1.9 - 2.0	4	7	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	6	12	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	2	3	2.1 - 2.2	5	9	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	2	3	2.2 - 2.3	5	9	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	2	3	2.3 - 2.4	7	14	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	1	1	2.4 - 2.5	9	20	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	2	3	2.5 - 2.6	9	20	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	2	3	2.6 - 2.7	END	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	2	3	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	3	5	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	4	7	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

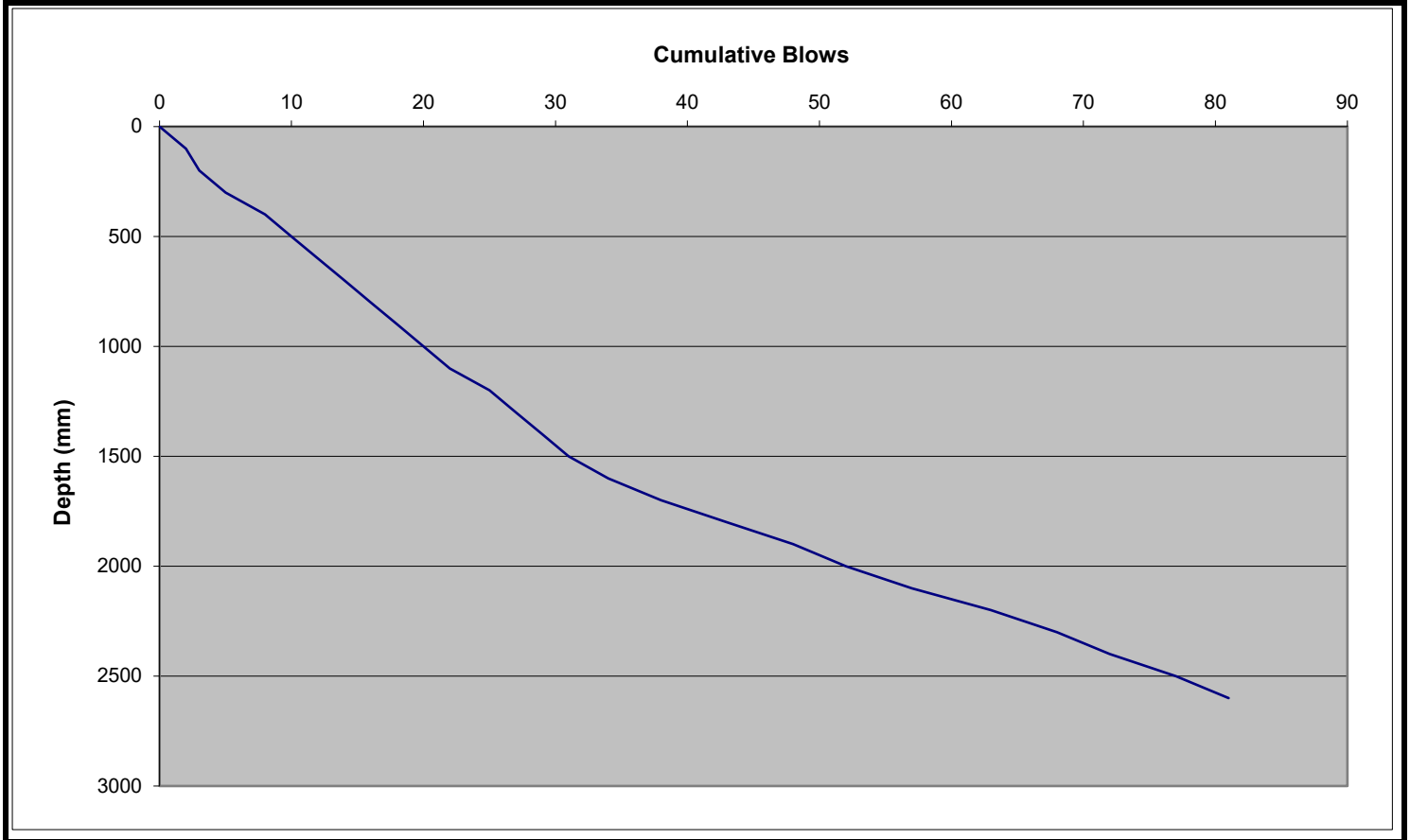
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 5 OF: 10 ***DCP: 5 (BH5)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	2	3	1.5 - 1.6	3	5	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	1	1	1.6 - 1.7	4	7	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	5	9	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	3	5	1.8 - 1.9	5	9	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	1.9 - 2.0	4	7	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	5	9	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	2	3	2.1 - 2.2	6	12	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	2	3	2.2 - 2.3	5	9	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	2	3	2.3 - 2.4	4	7	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	2	3	2.4 - 2.5	5	9	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	2	3	2.5 - 2.6	4	7	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	3	5	2.6 - 2.7	END	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	2	3	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	2	3	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	2	3	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

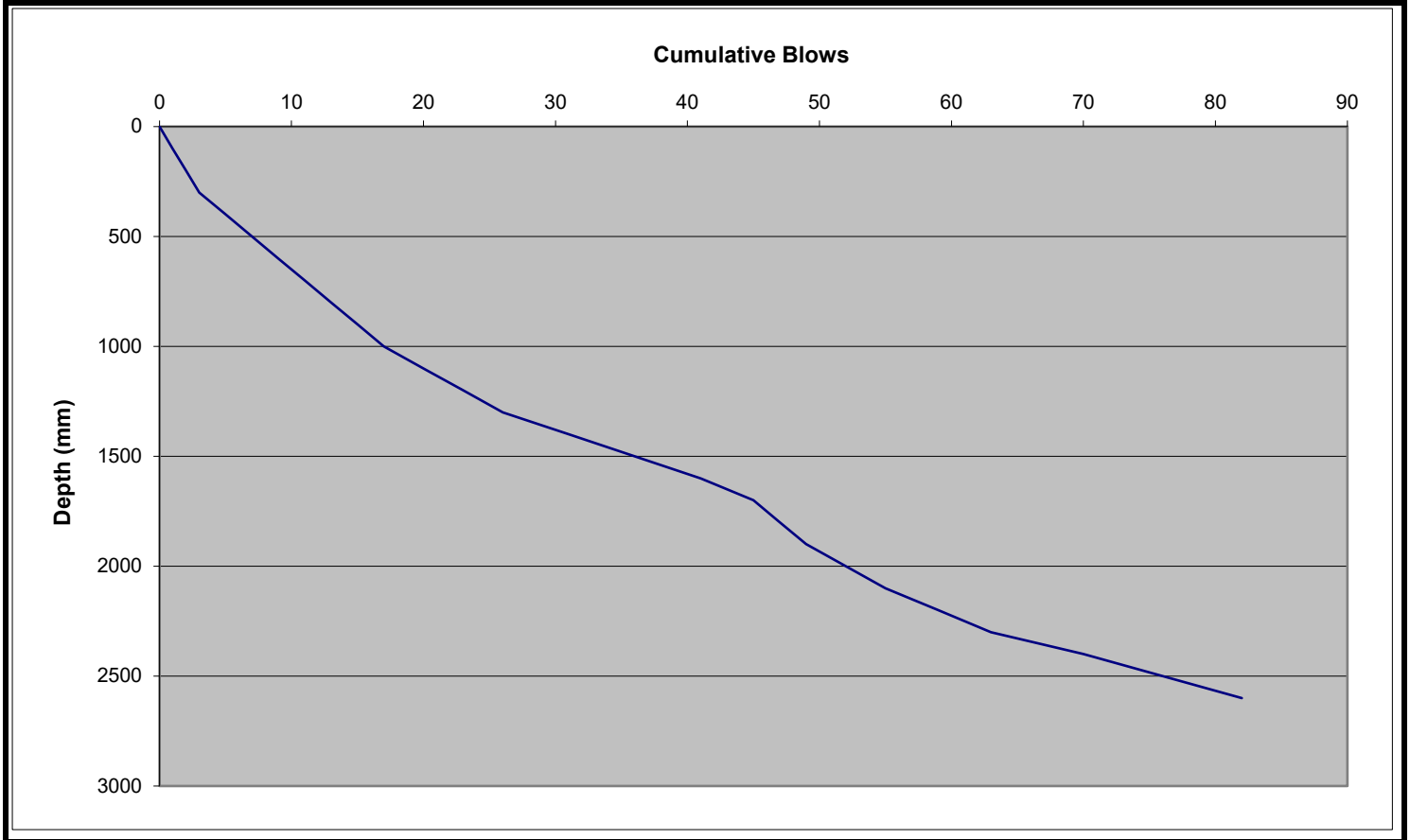
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 6 OF: 10 ***DCP: 6 (BH6)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	5	9	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	1	1	1.6 - 1.7	4	7	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	1	1	1.7 - 1.8	2	3	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	2	3	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	1.9 - 2.0	3	5	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	3	5	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	2	3	2.1 - 2.2	4	7	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	2	3	2.2 - 2.3	4	7	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	2	3	2.3 - 2.4	7	14	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	2	3	2.4 - 2.5	6	12	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	3	5	2.5 - 2.6	6	12	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	3	5	2.6 - 2.7	END	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	3	5	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	5	9	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	5	9	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

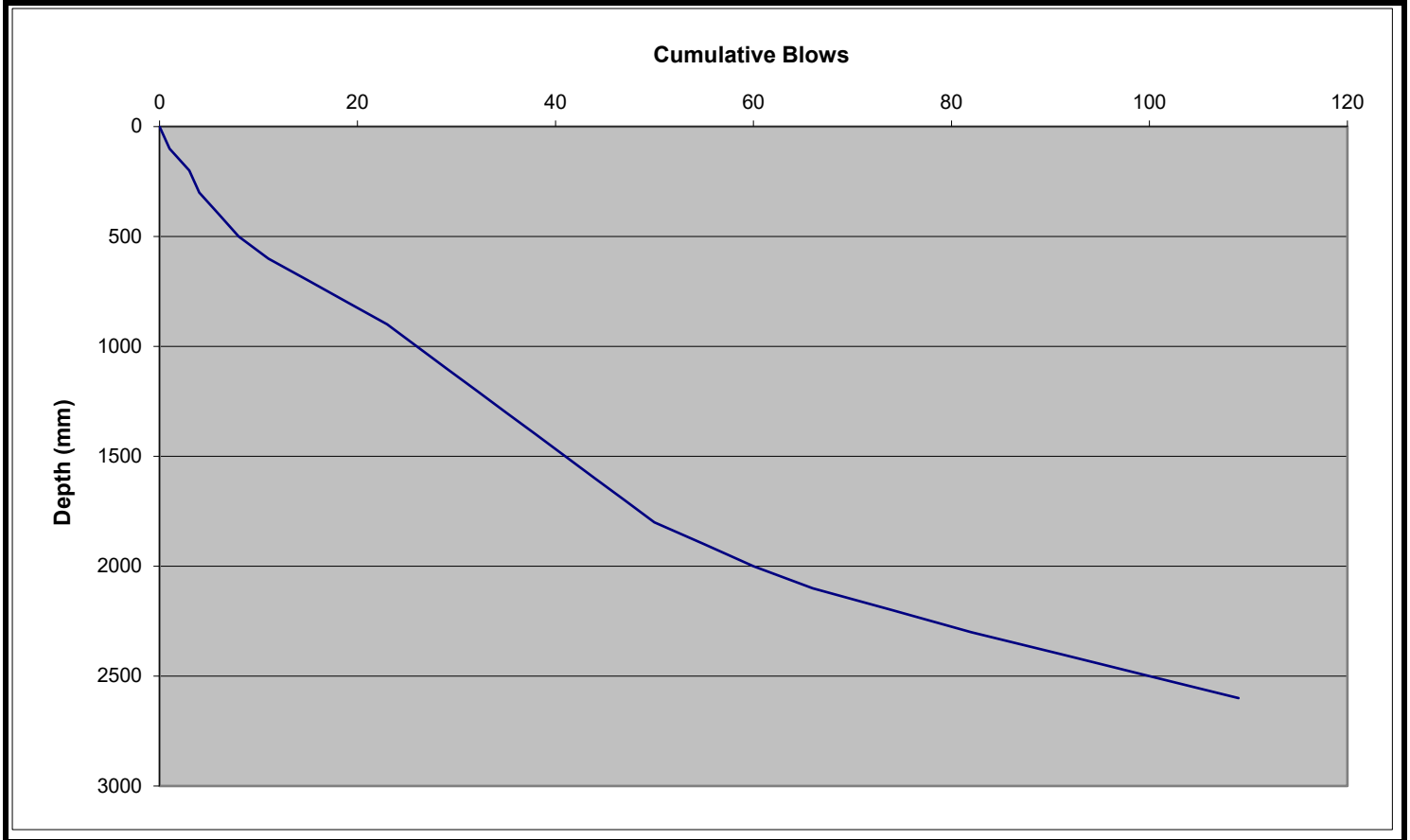
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 7 OF: 10 ***DCP: 7 (BH7)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	3	5	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	2	3	1.6 - 1.7	3	5	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	1	1	1.7 - 1.8	3	5	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	5	9	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	1.9 - 2.0	5	9	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	3	5	2.0 - 2.1	6	12	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	4	7	2.1 - 2.2	8	17	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	4	7	2.2 - 2.3	8	17	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	4	7	2.3 - 2.4	9	20	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	3	5	2.4 - 2.5	9	20	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	3	5	2.5 - 2.6	9	20	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	3	5	2.6 - 2.7	END	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	3	5	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	3	5	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	3	5	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

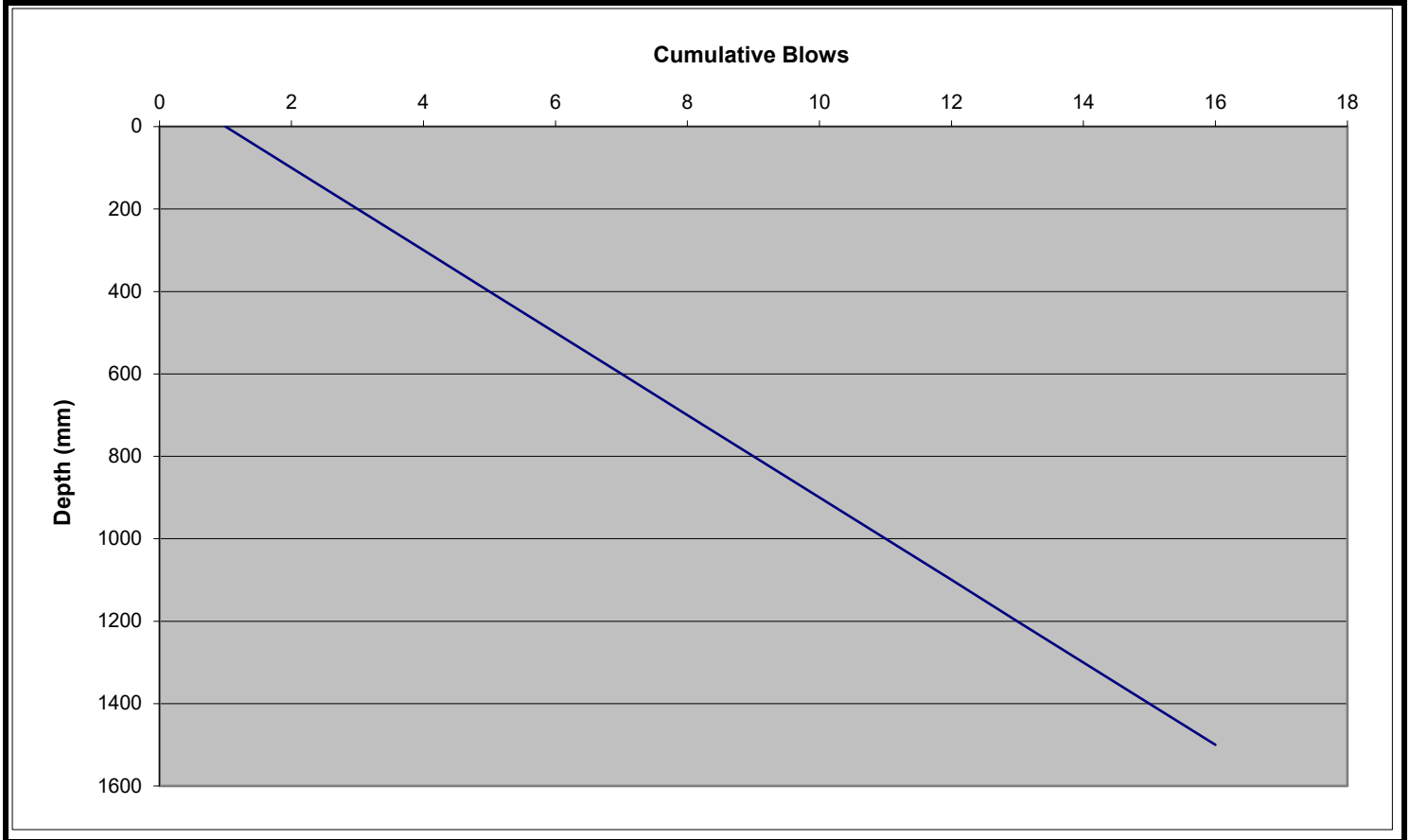
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 8 OF: 10 ***DCP: 8 (BH8)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	END	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2			1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	1	1	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	1	1	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	1	1	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	2	3	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	2	3	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	1	1	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	1	1	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	2	3	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	4	7	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	5	9	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	5	9	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	20	55	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

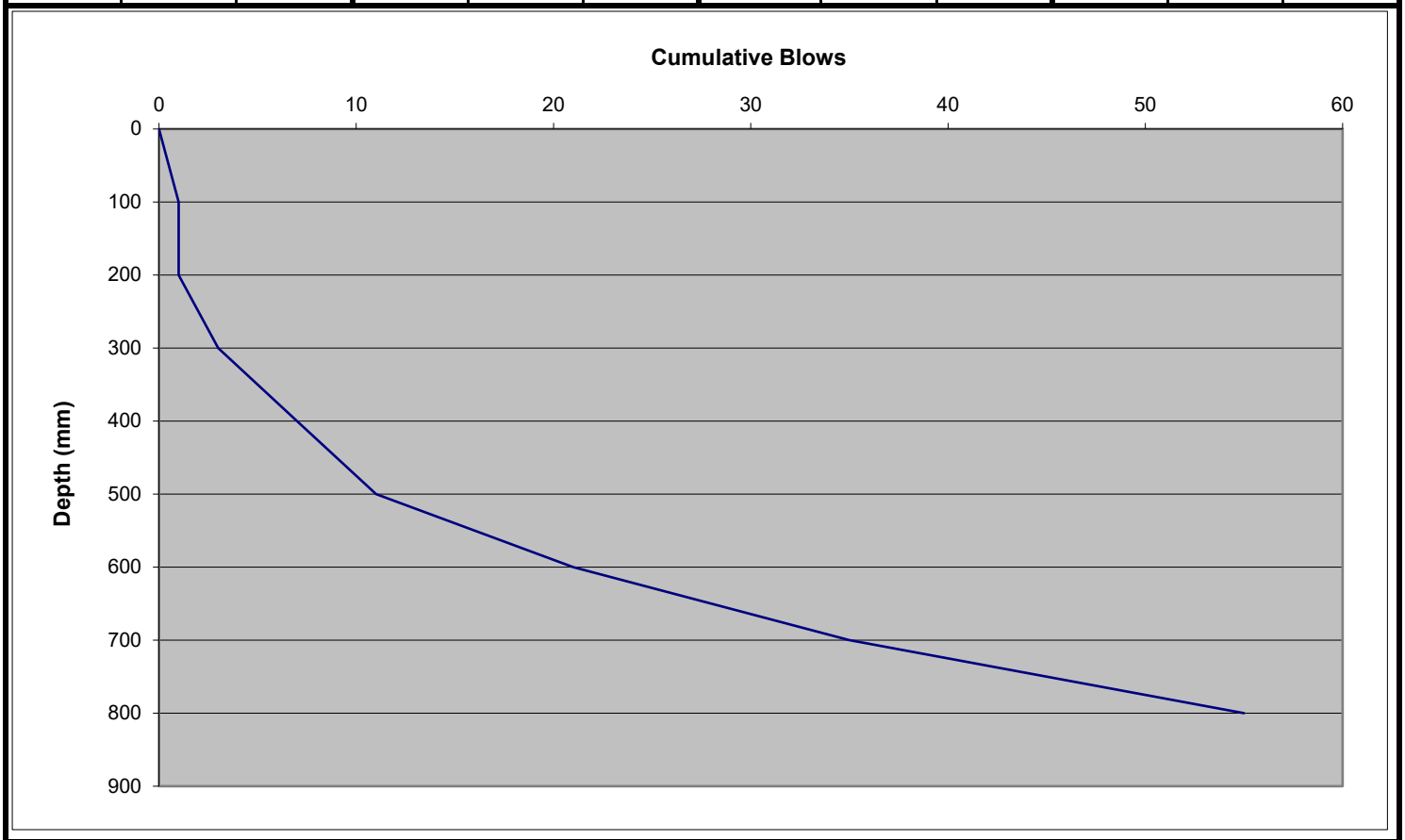
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 9 OF: 10 ***DCP: 9 (BH9)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2			1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	2	3	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	4	7	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	4	7	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	10	23	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	14	35	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	20	55	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	END	*	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	*	*	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	*	*	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	*	*	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	*	*	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	*	*	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	*	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

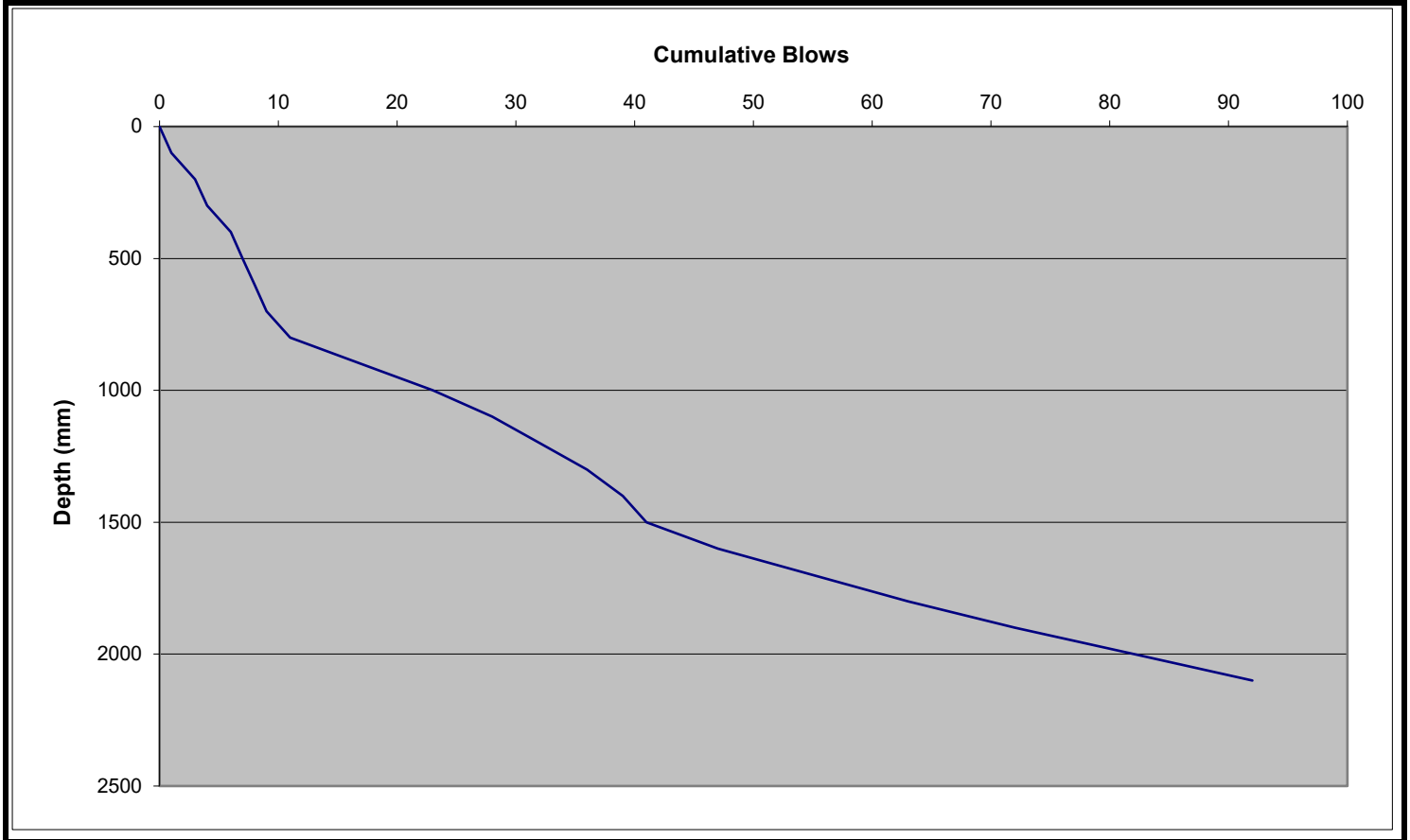
Aitken Rowe Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

DYNAMIC CONE PENETROMETER REPORT

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW	PAGE: 10 OF: 10 ***DCP: 10 (BH10)***
PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),	REGISTRATION NO: **AS23-87**
	DATE OF TEST: 13-17/07/2023
LOCATION: No. 32 TROUT FARM ROAD, LAKE HUME, NSW	DEPTH BELOW ESL (mm): NIL
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS	MOISTURE CONDITION: REFER TO LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A	TEST METHOD: AS 1289.6.3.2

Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR	Depth(m)	Blows	Est. CBR
0.0 - 0.1	1	1	1.5 - 1.6	6	12	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	2	3	1.6 - 1.7	8	17	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	1	1	1.7 - 1.8	8	17	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	2	3	1.8 - 1.9	9	20	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	1	1	1.9 - 2.0	10	23	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	1	1	2.0 - 2.1	10	23	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	1	1	2.1 - 2.2	END	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	2	3	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	6	12	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	6	12	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	5	9	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	4	7	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	4	7	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	3	5	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	2	3	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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ACCREDITATION NUMBER: 4679

REMARKS:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 20/09/2023

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

*

SAMPLED BY: ARTL

DATE SAMPLED: 13-17/07/2023

DATE SUBMITTED: 17/07/2023

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 27/07/23-9/08/23

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW

JOB DESCRIPTION : PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **AS23-87**

		SAMPLE NUMBER :	1B	1C	1E	2D	2E	3B
		SAMPLING LOCATION :	BH1	BH1	BH1	BH2	BH2	BH3
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	300-500	600-900	1600-1900	1700-2000	2100-2300	400-1000
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	*	*	*	*	100	100
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	87	91
		PASS 75 µm SIEVE %	*	*	*	*	51	65
		LESS THAN 13.5 µm %	*	*	*	*	35	51
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	87	91
		PASS 75 µm SIEVE %	*	*	*	*	51	65
		LESS THAN 13.5 µm %	*	*	*	*	35	51
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	*	*	*	*	31	43
AS1289.3.2.1		PLASTIC LIMIT %	*	*	*	*	11	17
AS1289.3.3.1		PLASTICITY INDEX	*	*	*	*	20	26
		PREPARATION METHOD	*	*	*	*	AS1289.1.1-5.3	AS1289.1.1-5.3
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	*	*	*	*	*	1.70
(NOT DRY PREPPED)		OPTIMUM MOISTURE CONTENT %	*	*	*	*	*	19.0
		OVERSIZE MATERIAL % RETAINED ON 19.0mm	*	*	*	*	*	0
		LL METHOD OF CURING TIME DETERMINATION	*	*	*	*	*	VISUAL
		CURING DURATION HOURS	*	*	*	*	*	96
AS1289.3.4.1		LINEAR SHRINKAGE %	*	8.0	10.0	12.0	*	*
(PREP-AIR DRIED)		LENGTH OF MOULD mm	*	254	254	254	*	*
		MOULDING MOISTURE CONDITIONING METHOD	*	AS1289.3.1.2	AS1289.3.1.2	AS1289.3.1.2	*	*
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	CA	CA	CA	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	12.5	*	*	*	15.3	20.8
AS1289.3.8.1		EMERSON CLASS	*	*	*	*	*	*
(AIR DRIED)		TYPE OF WATER	*	*	*	*	*	*

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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

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APPROVED SIGNATORY : .....

Jarrod Gornall

DATE: 20/09/2023

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

*

SAMPLED BY: ARTL

DATE SAMPLED: 13-17/07/2023

DATE SUBMITTED: 17/07/2023

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 27/07/23-9/08/23

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW

JOB DESCRIPTION : PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **AS23-87**

		SAMPLE NUMBER :	4A	4B	5E	6B	8B	10B
		SAMPLING LOCATION :	BH4	BH4	BH5	BH6	BH8	BH10
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	200-500	500-900	2300-2700	200-700	500-1000	500-800
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	100
		PASS 2.36mm SIEVE %	100	*	*	*	100	98
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	90	*	*	*	89	89
		PASS 75 µm SIEVE %	65	*	*	*	44	47
		LESS THAN 13.5 µm %	47	*	*	*	25	36
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	90	*	*	*	90	91
		PASS 75 µm SIEVE %	65	*	*	*	44	48
		LESS THAN 13.5 µm %	47	*	*	*	25	37
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	40	*	*	*	23	34
AS1289.3.2.1		PLASTIC LIMIT %	15	*	*	*	13	14
AS1289.3.3.1		PLASTICITY INDEX	25	*	*	*	10	20
		PREPARATION METHOD	AS1289.1.1-5.3	*	*	*	AS1289.1.1-5.3	AS1289.1.1-5.3
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	1.81	*	*	*	1.99	*
(NOT DRY PREPPED)		OPTIMUM MOISTURE CONTENT %	15.8	*	*	*	11.0	*
		OVERSIZE MATERIAL % RETAINED ON 19.0mm	0	*	*	*	0	*
		LL METHOD OF CURING TIME DETERMINATION	VISUAL	*	*	*	VISUAL	*
		CURING DURATION HOURS	96	*	*	*	96	*
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	8.0	*	*	1.0
(PREP-AIR DRIED)		LENGTH OF MOULD mm	*	*	254	*	*	254
		MOULDING MOISTURE CONDITIONING METHOD	*	*	AS1289.3.1.2	*	*	AS1289.3.1.2
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	CA	*	*	N/A
AS1289.2.1.1		FIELD MOISTURE CONTENT %	17.3	*	*	*	13.8	*
AS1289.3.8.1		EMERSON CLASS	*	5	*	5	*	*
(AIR DRIED)		TYPE OF WATER	*	DISTILLED	*	DISTILLED	*	*

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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

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APPROVED SIGNATORY : .....

Jarrod Gornall

DATE: 20/09/2023

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

*

SAMPLED BY: ARTL

DATE SAMPLED: 13-17/07/2023

DATE SUBMITTED: 17/07/2023

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 27/07/23-9/08/23

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW

JOB DESCRIPTION : PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **AS23-87**

		SAMPLE NUMBER :	10C	10E	*	*	*	*
		SAMPLING LOCATION :	BH10	BH10	*	*	*	*
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	900-1200	1500-1800	*	*	*	*
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	100	*	*	*	*	*
		PASS 2.36mm SIEVE %	98	*	*	*	*	*
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	89	*	*	*	*	*
		PASS 75 µm SIEVE %	47	*	*	*	*	*
		LESS THAN 13.5 µm %	36	*	*	*	*	*
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	91	*	*	*	*	*
		PASS 75 µm SIEVE %	48	*	*	*	*	*
		LESS THAN 13.5 µm %	37	*	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	34	*	*	*	*	*
AS1289.3.2.1		PLASTIC LIMIT %	14	*	*	*	*	*
AS1289.3.3.1		PLASTICITY INDEX	20	*	*	*	*	*
		PREPARATION METHOD	AS1289.1.1-5.3	*	*	*	*	*
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	*	*	*	*	*	*
(NOT DRY PREPPED)		OPTIMUM MOISTURE CONTENT %	*	*	*	*	*	*
		OVERSIZE MATERIAL % RETAINED ON 19.0mm	*	*	*	*	*	*
		LL METHOD OF CURING TIME DETERMINATION	*	*	*	*	*	*
		CURING DURATION HOURS	*	*	*	*	*	*
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	*	*	*	*
(PREP-AIR DRIED)		LENGTH OF MOULD mm	*	*	*	*	*	*
		MOULDING MOISTURE CONDITIONING METHOD	*	*	*	*	*	*
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	*	*	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	*	*	*	*	*	*
AS1289.3.8.1		EMERSON CLASS	*	5	*	*	*	*
(AIR DRIED)		TYPE OF WATER	*	DISTILLED	*	*	*	*

NATA

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ACCREDITATION NUMBER: 4679

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All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : ..... DATE: 20/09/2023

Jarrod Gornall

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury NSW 2640

TEST REPORT

SOIL REACTIVITY- DETERMINATION OF THE SHRINKAGE INDEX OF A SOIL

SHRINK SWELL INDEX

SAMPLED BY: ARTL
DATE SAMPLED: 13-17/07/23
DATE SUBMITTED: 17/7/2023
DATE TESTED (from): 17/07/2023
DATE TESTED (to): 25/07/2023
No. OF SAMPLES: 3
TEST METHODS: AS1289.7.1.1
AS1289.2.1.1

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW
JOB DESCRIPTION PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME, NSW

REGISTRATION NO: R26 **AS23-87**

SAMPLE No.:	1D	2C	7B
BOREHOLE No.:	BH1	BH2	BH7
DEPTH (mm):	1000-1300	1000-1300	900-1400
NATURE OF SPECIMEN (U50/REMOULDED):	U50	U50	U50
SHRINK SWELL INDEX (ISS):	**1.77**	**2.17**	**2.03**
INITIAL SWELL M.C. %:	17.3	18.3	18.1
FINAL SWELL M.C. %:	17.6	19.6	19
DESCRIPTION OF SOIL:	SILTY SANDY CLAY	SILTY SANDY CLAY	SILTY SANDY CLAY
ESTIMATED PERCENTAGE OF INERT INCLUSIONS:	<2%	<2%	<2%
EXTENT OF SOIL CRUMBLING DURING SHRINKAGE:	*	*	*
EXTENT OF CRACKING OF SHRINKAGE SPECIMEN:	*	*	*
(WHERE REMOULDED) SPECIMEN DENSITY (t/m^3):	*	*	*
MOISTURE ADDED TO ACHIEVE OMC (%):	*	*	*
COMPACTIVE EFFORT (BLOWS/ LAYER):	*	*	*
SAMPLE No.:	*	*	*
BOREHOLE No.:	*	*	*
DEPTH:	*	*	*
NATURE OF SPECIMEN (U50/REMOULDED):	*	*	*
SHRINK SWELL INDEX (ISS):	*	*	*
INITIAL SWELL M.C. %:	*	*	*
FINAL SWELL M.C. %:	*	*	*
DESCRIPTION OF SOIL:	*	*	*
ESTIMATED PERCENTAGE OF INERT INCLUSIONS:	*	*	*
EXTENT OF SOIL CRUMBLING DURING SHRINKAGE:	*	*	*
EXTENT OF CRACKING OF SHRINKAGE SPECIMEN:	*	*	*
(WHERE REMOULDED) SPECIMEN DENSITY (t/m^3):	*	*	*
MOISTURE ADDED TO ACHIEVE OMC (%):	*	*	*
COMPACTIVE EFFORT (BLOWS/ LAYER):	*	*	*

Testing completed by ARTL Wagga Laboratory.

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY: .....
Jarrod Gornall

DATE: 18/9/2023

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Albury: 1/60 Boronia Street, Albury 2640

TEST REPORT

CALIFORNIA BEARING RATIO OF SOILS AND GRAVELS

CLIENT: FORESIGHT GROUP AUSTRALIA - SYDNEY, NSW

JOB DESCRIPTION: PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS),
No. 32 TROUT FARM ROAD, LAKE HUME, NSW

SOURCE OF MATERIAL: IN-SITU BOREHOLES

PROPOSED USE: DESIGN

PAGE 1 of 1
SAMPLED BY: ARTL
DATE SAMPLED: 13/07/2023
DATE RECEIVED: 17/07/2023
TESTING COMMENCED: 28/07/2023
TESTING COMPLETED: 9/08/2023
TEST METHODS: AS1289.2.1.1
AS1289.5.1.1 AS1289.6.1.1
SAMPLING PROCEDURE: AS1289.1.2.1
SAMPLING CLAUSE: 6.5.3

LOT NO: * ORDER NO: * REGISTRATION NO : R6 **AS23-87**

SAMPLE NO:	3B	4A	8B	*	*
SITE OR LOCATION	BH3	BH4	BH8	*	*
DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm)	400-1000	200-500	500-1000	*	*
ADDITIVE IF STABILISED	N/A	N/A	N/A	*	*
AMOUNT OF ADDITIVE (%)	N/A	N/A	N/A	*	*
TYPE OF COMPACTION (Standard/Modified)	STANDARD	STANDARD	STANDARD	*	*
MATERIAL RETAINED ON THE 19.0mm SIEVE (%)	0.0	0.0	0.0	*	*
OPTIMUM MOISTURE CONTENT (%)	19.0	15.8	11.0	*	*
MAXIMUM DRY DENSITY (t/m^3)	1.70	1.81	1.99	*	*
MOULDING MOISTURE CONTENT (%)	19.2	16.0	11.1	*	*
DRY DENSITY OF TEST SPECIMEN (t/m^3)	1.61	1.72	1.88	*	*
SPECIFIED LDR (%)	95	95	95	*	*
ACTUAL LDR (%)	95	95	95	*	*
MOISTURE CONTENTS : TOP 30 mm	25.3	20.0	13.7	*	*
WHOLE SAMPLE	21.3	17.3	12.4	*	*
ABSORPTION (%)	2.1	1.3	1.3	*	*
SPECIFIED LMR (%)	100	100	100	*	*
ACTUAL LMR (%)	101	101	101	*	*
NUMBER OF DAYS SOAKING	4	4	4	*	*
SWELL (%)	0.3	0.4	0.0	*	*
CBR OBTAINED FROM PENETRATION (mm)	2.5	2.5	5.0	*	*
CALIFORNIA BEARING RATIO (%)	**4**	**5**	**8**	*	*

NOTES: *
*

COMMENTS: *

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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER:

APPROVED SIGNATORY: Jarrod Gornall

DATE: 18/09/2023

Corrosion & Scaling Assessment:

Soil Reporting Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120
Mailing Address: PO Box 357
Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 65717	Sample N°: 1	Date Received: 7/8/23	Report Status: Final

Client Name:	**Aitken Rowe Testing Laboratories (ARTL) Pty Ltd**	Project Name:	**AS23-87 - Hume BESS**
		SESL Quote N°:	
Client Contact:	**Jamie Piva**	Sample Name:	**4B**
Client Order N°:	**AS23 - 87**	Description:	**Soil**
Address:	**PO Box 5158** **WAGGA WAGGA NSW 2650**	Test Type:	**ARTL**

TEST		RESULT	COMMENTS
pH in water (1:5)		7.8	Slight alkalinity
EC mS/cm (1:5)		0.02	Very low
Texture Class		-	Did not test
Soil Condition Class (Permeability)		-	Did not test
SOLUBLE ANION ANALYSIS			
Sulphate (1:5)	mgSO_4 / kg	<5.0	Low (non to mildly aggressive)
Chloride (1:5)	mgCl / kg	30	Low (non-aggressive)
* Resistivity Ω. m		81	High (non-aggressive)

* Resistivity tested on a saturated sample/paste

(Note:- 10,000 mg/kg = 1%)

Recommendations

Analysed by SESL Australia Pty Ltd (NATA # 15633).

For the purposes of this corrosion and scaling assessment of soils towards concrete structures with steel reinforcement, concrete and steel piles, this soil shows slight alkaline pH, very low salinity, low sulphate, low chloride and high resistivity.

According to the *Australian Standard (AS) 2159-2009: Piling - Design and Installation*, the pH is considered non-aggressive to mildly aggressive towards concrete (dependent on soil permeability) and non-aggressive towards steel. The sulfate levels are considered to be non-aggressive to mildly aggressive towards concrete, and the chloride levels are considered to be non-aggressive towards steel. Resistivity is considered to be non-aggressive towards steel.

Factors affecting concrete scaling are: (a) elevated sulfate, becoming mildly aggressive at >2400 mgSO_4/kg; and (b) low pH, becoming moderately aggressive at pH of <5-6.

Factors affecting steel corrosivity are: (a) elevated chloride, becoming mildly aggressive at >5,000 mgCl/kg; and (b) low pH, becoming mildly aggressive at pH of <4-5 and (d) low resistivity, becoming mildly aggressive with resistivity values less than 50Ω.m.

Overall, according AS2159:2009 the likelihood of aggressive corrosion low to mild based on sulphate and chloride andlow based on resistivity. SESL recommends further assessment on the physical properties of the soil (texture) to more accurately determine corrosion risk to concrete and steel structures.

pH, EC, Soluble SO_4: Bradley et al., (1983); **Cl,** (4500-Cl- E; APHA, 1998);
Resistivity, AS1289.4.4.1:1997, **Texture** - PM0003 (Texture- "Northcote" (1992))

Date Report Generated
17/08/2023

Consultant:
Samuel Field

Authorised Signatory:
Samantha Grant-Vest

Corrosion & Scaling Assessment:

Soil Reporting Profile

Sample Drop Off: 16 Chilvers Road, Thornleigh NSW 2120
Mailing Address: PO Box 357, Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 65717 | **Sample N°: 2** | **Date Received: 7/8/23** | **Report Status: Final**

Client Name: **Aitken Rowe Testing Laboratories (ARTL) Pty Ltd**
Client Contact: **Jamie Piva**
Client Order N°: **AS23 - 87**
Address: **PO Box 5158 WAGGA WAGGA NSW 2650**

Project Name: **AS23-87 - Hume BESS**
SESL Quote N°:
Sample Name: **6C**
Description: **Soil**
Test Type: **ARTL**

TEST		RESULT	COMMENTS
pH in water (1:5)		7.7	Slight alkalinity
EC mS/cm (1:5)		0.02	Very low
Texture Class		-	Did not test
Soil Condition Class (Permeability)		-	Did not test
SOLUBLE ANION ANALYSIS			
Sulphate (1:5)	$mgSO_4$ / kg	<5.0	Low (non to mildly aggressive)
Chloride (1:5)	mgCl / kg	30	Low (non-aggressive)
* Resistivity Ω.	m	63	High (non-aggressive)

* Resistivity tested on a saturated sample/paste

(Note:- 10,000 mg/kg = 1%)

Recommendations

Analysed by SESL Australia Pty Ltd (NATA # 15633).

For the purposes of this corrosion and scaling assessment of soils towards concrete structures with steel reinforcement, concrete and steel piles, this soil shows slight alkaline pH, very low salinity, low sulphate, low chloride and high resistivity.

According to the *Australian Standard (AS) 2159-2009: Piling - Design and Installation*, the pH is considered non-aggressive to mildly aggressive towards concrete (dependent on soil permeability) and non-aggressive towards steel. The sulfate levels are considered to be non-aggressive to mildly aggressive towards concrete, and the chloride levels are considered to be non-aggressive towards steel. Resistivity is considered to be non-aggressive towards steel.

Factors affecting concrete scaling are: (a) elevated sulfate, becoming mildly aggressive at >2400 $mgSO_4$/kg; and (b) low pH, becoming moderately aggressive at pH of <5-6.

Factors affecting steel corrosivity are: (a) elevated chloride, becoming mildly aggressive at >5,000 mgCl/kg; and (b) low pH, becoming mildly aggressive at pH of <4-5 and (d) low resistivity, becoming mildly aggressive with resistivity values less than 50Ω.m.

Overall, according AS2159:2009 the likelihood of aggressive corrosion low to mild based on sulphate and chloride andlow based on resistivity. SESL recommends further assessment on the physical properties of the soil (texture) to more accurately determine corrosion risk to concrete and steel structures.

pH, EC, Soluble SO_4: Bradley et al., (1983); **Cl,** (4500-Cl- E; APHA, 1998);
Resistivity, AS1289.4.4.1:1997, **Texture** - PM0003 (Texture- "Northcote" (1992))

Date Report Generated
17/08/2023

Consultant:
Samuel Field

Authorised Signatory:
Samantha Grant-Vest

Corrosion & Scaling Assessment:

Soil Reporting Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120
Mailing Address: PO Box 357
Pennant Hills NSW 1715
Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 65717	Sample N°: 3	Date Received: 7/8/23	Report Status: Final

Client Name:	**Aitken Rowe Testing Laboratories (ARTL) Pty Ltd**	Project Name:	**AS23-87 - Hume BESS**
		SESL Quote N°:	
Client Contact:	**Jamie Piva**	Sample Name:	**10F**
Client Order N°:	**AS23 - 87**	Description:	**Soil**
Address:	**PO Box 5158** **WAGGA WAGGA NSW 2650**	Test Type:	**ARTL**

TEST		RESULT	COMMENTS
pH in water (1:5)		7.3	Slight alkalinity
EC mS/cm (1:5)		0.1	Very low
Texture Class		-	Did not test
Soil Condition Class (Permeability)		-	Did not test
SOLUBLE ANION ANALYSIS			
Sulphate (1:5)	mgSO_4 / kg	<5.0	Low (non to mildly aggressive)
Chloride (1:5)	mgCl / kg	400	Low (non-aggressive)
* Resistivity Ω. m		19	Mild (mildly to moderately aggressive)

* Resistivity tested on a saturated sample/paste

(Note:- 10,000 mg/kg = 1%)

Recommendations

Analysed by SESL Australia Pty Ltd (NATA # 15633).

For the purposes of this corrosion and scaling assessment of soils towards concrete structures with steel reinforcement, concrete and steel piles, this soil shows slight alkaline pH, very low salinity, low sulphate, low chloride and mild resistivity.

According to the *Australian Standard (AS) 2159-2009: Piling - Design and Installation*, the pH is considered non-aggressive to mildly aggressive towards concrete (dependent on soil permeability) and non-aggressive towards steel. The sulfate levels are considered to be non-aggressive to mildly aggressive towards concrete, and the chloride levels are considered to be non-aggressive towards steel. Resistivity is considered to be mildly to moderately aggressive towards steel.

Factors affecting concrete scaling are: (a) elevated sulfate, becoming mildly aggressive at >2400 mgSO_4/kg; and (b) low pH, becoming moderately aggressive at pH of <5-6.

Factors affecting steel corrosivity are: (a) elevated chloride, becoming mildly aggressive at >5,000 mgCl/kg; and (b) low pH, becoming mildly aggressive at pH of <4-5 and (d) low resistivity, becoming mildly aggressive with resistivity values less than 50Ω.m.

Overall, according AS2159:2009 the likelihood of aggressive corrosion is low based on the low sulphate and chloride and mild to moderate based on resistivity. SESL recommends further assessment on the physical properties of the soil (texture) to more accurately determine corrosion risk to concrete and steel structures.

pH, EC, Soluble SO_4: Bradley et al., (1983); **Cl,** (4500-Cl- E; APHA, 1998);
Resistivity, AS1289.4.4.1:1997, **Texture** - PM0003 (Texture- "Northcote" (1992))

Date Report Generated
17/08/2023

Consultant:
Samuel Field

Authorised Signatory:
Samantha Grant-Vest