Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
Environmental Consultancy
Soil Concrete Aggregate Testing
NATA Accredited Laboratories

ABN 53 058 315 138 ACN 058 315 138

19 November 2018 Reg. No.: S18-390

Albury City Council
553 Kiewa Street
Albury, NSW 2640

Attn: Mr. Michael Stanton – Team Leader Leisure Facilities

Dear Sir,

**GEOTECHNICAL INVESTIGATION – PROPOSED UPGRADES,
LAUREN JACKSON SPORTS CENTRE, NORTH STREET, EAST ALBURY, NSW**

Further to your request in response to our quotation, Q18-351 dated 7 September 2018, the field investigation was carried out at the location of the proposed development at the above site on 4 and 5 October 2018.

The purpose of the investigation was to determine the nature of the subsurface soil and groundwater conditions by augering, sampling and testing across the proposed site of the development which included a building extension, new stadium and car park/pavement areas at the locations as marked on the plan by the client. Based upon the information obtained, comments and recommendations for the proposed development are to be made. It should be noted that pavement design options were outside the scope of this investigation and therefore not provided.

It should also be noted the above quotation allowed for coring and hand augering at three locations within the existing stadium as requested by the client however due to the existing flooring and timber under-layering system, coring was abandoned at the first core location, as requested by the onsite council representative. It was also noted the existing stadium and buildings (reportedly built in 1983) are showing signs of distress with cracking and differential movement.

1.0 SITE & PROJECT DESCRIPTION

The subject site is located at Lot 1 to 10, Section 112, DP758013, No. 229 North Street, East Albury, NSW and is bound by North Street to the north, East Street to the east, Andrew Street to the south and Keene Street to the west. It is noted that the proposed development includes the

construction of a multi-level new stadium, extensions to existing building, refurbishment of existing stadium and building and the construction of new car park/pavement areas.

The sports centre site is noted as generally flat and developed with an existing multi story stadium with adjoining single story buildings in the north west corner of the site, a PCYC building and associated infrastructure in the south west corner of the site, tennis courts east of the PCYC building and associated infrastructure, a bitumen car park directly north of the tennis courts and east of the existing stadium, vacant land in the north west corner of the site directly east of the bitumen car park and pavement areas including entry and exit driveway and car parking spaces directly north of the existing stadium located off North Street. It should also be noted that small to large sized trees and lawn were noted to surround the existing stadium and buildings particularly on the north, north east and south western sides of the stadium with shallow gravel pavement fill for vehicle access noted at the south west side of the stadium at the time of the investigation.

It is also noted that an existing outdoor building structure and trees are to be removed prior to the new construction of the proposed development at the location of the new stadium and building extension area at the north east corner of the existing stadium.

2.0 SITE GEOLOGY

The 1:250 000 Geological Series Sheet for Wagga Wagga (SI/55-15) indicates the area is underlain by Cainozoic aged terrestrial sedimentation associated with aggrading stream systems comprising unconsolidated clay, sand, silt and gravel (flood plain sediments). The borehole investigation revealed that the site is underlain by alluvium material comprising silt and clay based material.

3.0 INVESTIGATION PROCEDURE

3.1 Fieldwork

The fieldwork for the investigation consisted of the logging and sampling of two (2) boreholes (BH1 & BH2) across the proposed main car park location (eastern area of the subject site) to the depths of 3.0m, five (5) boreholes (BH4 to BH8) across the proposed pavement/car park locations (north west and south of the existing stadium) to the depths of 3.0m, one (1) borehole (BH3) at the proposed building extension location (north east corner of existing stadium) to the depth of 3.0m and three (3) boreholes (BH9 to BH11) across the proposed new stadium (directly east of the existing stadium) to the depths of 6.0m and they were augered with our trailer mounted drilling rig at the locations as shown in the attached borehole and DCP test location plan. Small and bulk samples were recovered at various depths from the boreholes for relevant laboratory testing. It should be noted that BH9 was terminated just below the surface due to underground services in this location and therefore was not completed (refer to borehole and DCP test location plan).

The fieldwork was carried out on 4 and 5 October 2018 by the Senior Geotechnician of Aitken Rowe Testing Laboratories Pty Ltd, who nominated the sampling and prepared engineering logs of the boreholes. The boreholes were advanced through the soil profile using flight augers with

Dynamic Cone Penetrometer (DCP) tests undertaken at the surface at each borehole location and Standard Penetration Tests (SPT) at every 1.5m interval from 1.5m at the borehole locations of BH10 and BH11 to assess the consistency of the subsoil materials. The representative samples were recovered from the boreholes for relevant laboratory testing.

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

3.2 Laboratory Testing

To confirm and evaluate the results of the fieldwork, some laboratory tests were carried out on the recovered soil samples from the boreholes. The laboratory tests included particle size distribution, field moisture content determination, Atterberg limit, shrink swell, linear shrinkage, Standard Maximum Dry Density (SMDD) and California Bearing Ratio (CBR) and they were carried out at our NATA accredited testing laboratory in Albury and Wagga Wagga, NSW. The samples for CBR testing were compacted at 95% of Standard Maximum Dry Density (SMDD) and at nearest 100% of Standard Optimum Moisture Content (SOMC).

The pH, electrical conductivity (EC), chloride and sulphate content and resistivity tests were also carried out on a recovered sample from the boreholes at Sydney Environmental and Soil Laboratory (SESL) in Sydney, NSW. The test report as received from SESL is herewith attached.

The test report on particle size distribution, field moisture content determination, Atterberg Limit, shrink swell, linear shrinkage, SMDD and CBR tests are herewith attached. Linear shrinkage and field moisture content determination test results are also incorporated in the respective borehole logs.

4.0 SUBSURFACE CONDITION

4.1 Proposed Car Park/Pavement Areas

BH1, BH2, BH4, BH5, BH6, BH7 and BH8 cover the proposed car park/pavement areas. It should be noted that the borehole were drilled at the location as marked by the client. The boreholes drilled revealed that the sites are underlain by natural topsoil (in BH1 and BH2 only) to 0.1m in BH1 and BH2 and fill comprising topsoil (in BH4, BH5, BH6 and BH8) to 0.1m in BH4, BH5, BH6 and BH8 and low plasticity silt, sandy silt, silty clay, high plasticity clay, fine to medium grained silty sand and sandy gravel (refer to borehole logs) to 0.4m in BH4, BH6, BH7 and BH8 and 0.6m in BH5 overlying natural alluvial material comprising low plasticity silt and silty clay, which in turn is underlain by medium and high plasticity clays, extending to the borehole termination depth at 3.0m in BH1, BH2, BH4, BH5, BH6, BH7 and BH8. The fill material encountered across the site appeared to have been placed "uncontrolled" and assessed to be "moderately compacted".

The moisture condition of the underlying natural material was noted to be generally varied being from less than plastic limit to greater than plastic limit throughout the tested profiles in BH1, BH2, BH4, BH5, BH6, BH7 and BH8 at the time of the investigation. It should be noted the upper natural profiles in BH4, BH7 and BH8 were assessed as equal to or greater than optimum moisture content (OMC) at the time of the investigation. No groundwater or seepage was encountered during the drilling in all boreholes at the time of the investigation. It should however be noted that the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test results and visual observation of the resistance by auger TC bit during the drilling investigation, the underlying natural material (below topsoil and fill) is assessed to be generally firm to stiff consistency in the upper to 0.6m in BH1, 0.5m in BH2, firm and firm to stiff consistency to 1.9m in BH4, firm consistency to 1.7m in BH7 and soft to firm consistency to 0.9m in BH8 then increasing to very stiff consistency throughout the tested profile in BH1, BH2, BH5, BH6 and BH8 and then stiff & very stiff consistency throughout the tested profile depth in BH1 to BH8 at the time of the investigation.

The borehole logs with explanatory note and DCP test report are herewith attached.

4.2 Proposed Building Extension

BH3 covers the proposed building extension area. It should be noted that the borehole was drilled at the location as marked by the client. The borehole drilled revealed that the site is underlain by topsoil to 0.1m overlying natural alluvial material comprising low plasticity sandy silt to 0.3m and low plasticity silty clay to 0.7m in BH3 which in turn is underlain high plasticity clay to 2.1m then low to medium plasticity sandy clay material, extending to the borehole termination depth at 3.0m in BH3.

The moisture condition of the underlying natural material was generally greater than plastic limit in the upper profile and equal to or less than plastic limit in the lower profile within the tested profile depth in BH3 at the time of the investigation. No groundwater or seepage was encountered during the drilling in the boreholes drilled, however it should be noted that the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test results and visual observation of the resistance by auger TC bit during the drilling investigation, the underlying natural material (below topsoil) is assessed to be generally firm to stiff consistency in the upper to 0.7m then increasing to stiff and very stiff consistency with depth throughout the tested profile depth in BH13 at the time of the investigation.

The borehole logs with explanatory note and DCP test report are herewith attached.

4.3 Proposed New Stadium

BH9, BH10 and BH11 cover the proposed new stadium area. It should be noted that the borehole were drilled at the locations as marked by the client. It should also be noted that BH9 was

terminated just below the surface due to underground services in this location and therefore was not completed. The boreholes drilled revealed that the site is underlain by fill material (in BH11 only) comprising a bitumen seal to 0.04m and fine to coarse grained sandy gravel to 0.3m in BH11 and natural topsoil (in BH10 only) to 0.1m in BH10 overlying natural alluvial material comprising low plasticity silt (in BH10 only) to 0.2m in BH10 which is underlain by medium and high plasticity clays, extending to the borehole termination depth at 6.0m in BH10 and BH11. The fill material encountered at the location of BH11 appeared to have been placed "uncontrolled" and assessed to be "moderately" compacted.

The moisture condition of the underlying natural material was generally greater than plastic limit throughout the tested profile depth in BH10 and BH11 at the time of the investigation. No groundwater or seepage was encountered during the drilling in the boreholes drilled, however it should be noted that the water table level could fluctuate with changes to the season, temperature and rainfall.

The DCP & SPT test results indicate the underlying natural material to be generally soft to firm and firm consistency in the upper profile to 0.7m then increasing to stiff to very stiff, very stiff, very stiff to hard and hard consistency with depth throughout the tested profile depth in BH10 and soft to firm consistency in the upper profile to 0.7m then increasing to stiff, stiff to very stiff and hard consistency with depth to 5.3m then decreasing to stiff consistency throughout the tested profile depth in BH11 at the time of the investigation.

The borehole logs incorporating SPT results with explanatory note and DCP test report are herewith attached.

5.0 DISCUSSIONS AND COMMENTS

5.1 Site Preparation and Earthworks

The fill material encountered across the site appeared to have been placed "uncontrolled" and therefore considered "not suitable" to use as subgrade or foundation of any structure in its current state. We therefore recommend removal of this material in the areas of the proposed building extension, new stadium and car park/pavement areas and replace and re-compact with approved fill material in such a way that it achieves a minimum of 98% of Standard Maximum Dry Density (SMDD) if to be used as subgrade or foundation for the proposed development.

In general, the following site preparation is recommended once cuts if required are undertaken for the proposed building extension, new stadium and car park/pavement areas.

- Remove bitumen, topsoil, trees 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 topsoil and 0.3 to 0.6m is anticipated for the fill where encountered (refer to borehole logs).

- Remove any unsuitable material, including silt, encountered at the time of the construction as required unless silt material has a minimum cover of 0.6m of compacted fill material placed in the car park/pavement areas. It should be noted that silt material was encountered to depths of 0.1 to 0.6m in areas across the site (refer to 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 silt and clay material was noted to be soft to firm, firm and firm to stiff consistency and affected with moisture and generally equal to or greater than optimum moisture content in the upper profile to a depth of approximately 0.5 to 1.9m in BH1, BH2, BH3, BH4, BH7, BH8, BH10 and BH11 across the site at the time of the investigation (refer to borehole logs). It should be noted that surface movement on the soft to firm, firm and firm to stiff consistency moisture affected subgrade may be experienced during the construction. This material should be removed and treated as required prior to the placement of any fill material.**
- 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% Density Index. **It should be noted that the depth and location of the moisture affected material may be varied depending on the climatic condition at the time of the construction.**
- Replace and re-compact with approved fill material as specified above.
- 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 materials can be placed as required and compacted to the compaction requirements as given above. The degree of compaction of any fill placement should be verified by a NATA accredited testing authority to ensure that it achieves the specified density. As the fill is likely to be laid on the clay formation, the compaction shall be carried out with minimum amount of water required to achieve the required density. The boundaries of the fill areas should be sloped to a maximum batter of 1.0 Vertical to 2.0 Horizontal as required or retained with a properly designed retaining wall.

The structural fill supporting any structural element of the structures and car park/pavement areas 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 to undertake the construction of fill pads under Level 1 supervision in accordance with "AS3798 – 2007 – Guidelines on earthworks for commercial and residential developments" if fill pads are to be used for the foundation of any structure or subgrade or cark park/pavement areas.

If the subgrade is to be stabilized, then the exposed silt based subgrade should be stabilized with slag/lime additive and the clay based subgrade be stabilized with lime based additive as required. It is anticipated that mixing of 3% of appropriate additive to the soil material should provide required strength for the subgrade. We however strongly recommend laboratory trial test to ensure specified strength is achieved through stabilization.

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-us.

5.2 Footing Design and Foundation – Proposed Building

It should be noted that the presence of an existing outdoor building structure and tree adjacent to the location of BH3 (within the footprint of the proposed building extension), trees near the location of BH9 (northern end of new stadium) and bitumen car park at the location of BH11 (southern end of new stadium) at the subject site is likely to have significantly modified the soil moisture conditions under the footprint of the proposed new building extension and new stadium areas.

Therefore the site may have **"abnormal moisture conditions"** after the removal of the existing outdoor building structure, trees and bitumen car park, and shall therefore be classified as **"P - Problem site"** in accordance with the Australian Standard AS 2870 - 2011 "Residential Slab and Footings". We recommend that all the footings may be designed similar to those as recommend in the Standard for "Class P" and the footing system shall be designed by engineering principles. However, when the foundation materials are deemed to have achieved equilibrium moisture condition throughout the soil profile, then the site may be deemed **"normal site"** and **"Class 'H2-D' - Highly reactive deep drying"** classification may be adopted provided existing fill and unsuitable material, if any, is removed and the subgrade is prepared as specified in Section 5.1.

If fill placement is required across the site, it is highly recommended to removed existing fill, silt and moisture affected material, if any, and 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.

As noted above, the existing outdoor building structure is to be demolished and removed prior to the new construction. It is therefore highly recommended to completely remove the entire footing system of the existing structure, 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.

It is noted that medium sized trees are located near the proposed new building and stadium and therefore the new building extension and stadium should be sited away from the trees at a distance equivalent to at least 100% of the mature height of the trees. If the trees are to be removed, it is highly recommended to remove the entire tree including root system and allow the ground to achieve equilibrium moisture condition prior to construction. If any trees are to be retained and the new building extension and stadium is to be built within the distance equivalent to 100% of the mature height of the trees, then the footing system shall be designed for "Class P – Problem site" classification.

The shallow footings such as deep edge beam or pad and strip footings may be adopted and they may be proportioned for a maximum allowable bearing pressure of 100kPa and a subgrade reaction modulus (k) of 20kPa/mm founded on **stiff consistency natural clay material at or below 0.7m** in depth measured from the existing ground surface (refer to borehole logs) or founded on the prepared structural fill subgrade as specified in Section 5.1, provided proper drainage measures are incorporated during and after the construction.

The deep pad, bored and cast-in-place pile footing system, if adopted, should be taken into underlying natural stiff, stiff to very stiff, very stiff or hard consistency material. The design parameters given in Table 1 below may be adopted for the design of the deep footing system. It should be noted that the geotechnical design parameters given in Table 1 were estimated from the DCP and SPT test results and visual observation of the soil cuttings from the boreholes.

Table 1 Geotechnical Design Parameters

Location	Depth (m)	Material Description	ABP (kPa)	ASA (C) (kPa)	AOF (°)	USS (kPa)	Density (kN/m^3)
BH3	0.7-1.5	Clay	100	10*	-	30	16.0
	1.5-3.0#	Clay/Sandy Clay	200	20	-	60	17.0
BH10	0.7-0.9	Clay	150	15*	-	45	16.5
	0.9-1.5	Clay	200	20	-	60	17.0
	1.5-3.7	Clay	300	30	-	90	18.0
	3.7-6.0#	Clay	350	35	-	100	19.0
BH11	0.7-3.7	Clay	100	10*	-	30	16.0
	3.7-6.0#	Clay	350	35	-	100	18.0

Note:

ABP - Allowable (End) Bearing Pressure
ASA(C) - Allowable Side Adhesion (Compression)
AOF - Angle of Friction
USS - Undrained Shear Strength

Density - Density (at in-situ moisture)

The borehole termination depth.
* The side adhesion within the top 1.5m depth of natural soil shall be ignored.

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 in Table 1 for the clay based material.

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 pile holes where side adhesion is adopted must be free of smear prior to concreting. To achieve this, bases of bored pile 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 the natural alluvial materials.

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.

The slab panel, internal beams and load support thickening may be founded on the prepared fill subgrade as specified in Section 5.1 or on the natural ground 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 fill subgrade or natural ground, comprising a grid of reinforced beam cast integrally with the floor slab, with load bearing beams thickened to extend to the clay stratum as required in order to minimise the risk of significant damage from the reactive clay foundation. The maximum edge beam pressure of the stiffened raft slab should not exceed the allowable bearing capacity of the underlying natural clay foundation of 100kPa or the prepared structural fill subgrade as specified in Section 5.1.

A minimum of 100 mm thick of approved granular fill materials should be placed on the prepared subgrade before the construction of the slab to cater surface movements, such as shrink/swell movements as the natural clays are considered moderately to highly reactive.

The footing excavations should not be left exposed for prolonged periods 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 in the footing excavation. Any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation as appropriate. 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 the natural subgrade, which has not been exposed to moisture, and pour the concrete immediately. If a delay in pouring the 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.

5.3 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 foundation 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.

It should be noted that although the aforementioned design parameters given above are in terms of allowable limit, their use should be checked against settlement, using deformation characteristics values of the underlying clayey silt material given in Table 2. It should be noted that differential settlement should not exceed 50% of the total settlement.

Table 2 Deformation Characteristics Values[1]

Parameters	Stiff Clay	Very Stiff Clay
Bulk Density (kN/m^3)	17.0	18.0
Elastic Modulus (Drained) - E'	7.0	12.0
Coefficient of Volume Compressibility - (m^2/MN) - m_v	0.07	0.07

Note: 1 - These values are estimated from the field DCP & SPT test results and visual assessment of the recovered samples.

5.4 Soil Aggression

The pH test carried out on a clay sample recovered from BH10 indicated a pH value of 8.9 and therefore the underlying soil is considered "strong alkalinity". The EC value of 0.43mS/cm was recorded on the clay sample tested, which is assessed to be "moderate salinity". The "strong alkalinity" is considered "non-aggressive" towards concrete and "non-corrosive" towards steel.

The sulphate content of 100mg/kg and chloride content of 460mg/kg were recorded on the same sample tested and are considered generally low. The low chloride and sulphate levels in the clay material are considered "non-aggressive" towards concrete and "non-corrosive" towards steel due to its impermeable nature.

The resistivity value of 5.33Ω.m was recorded on the same sample tested, which is assessed to be "low resistivity". The "low resistivity" in the clay material is considered to provide a "moderately aggressive" environment towards unprotected steel due to its impermeable nature.

The designer is therefore referred to the Cement and Concrete Association of Australia Technical Note 57 for any special precautionary measures required for buried concrete and steel elements.

5.5 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".

5.6 Subgrade

The natural subgrade alluvial material across the site comprises low plasticity silt and silty clay, low to medium plasticity sandy clay and medium and high plasticity clay materials. The laboratory 4 day soaked CBR test indicated CBR value of 4% on medium to high plasticity clay material, 5% on medium plasticity clay material and 7% on low plasticity silty clay material, which were compacted at 95% of SMDD and at 100% SOMC. The in-situ CBR values correlated from DCP tests indicate CBR values ranging from 1 to 55% on the same subgrade material.

It is noted that the Albury area has an annual average rainfall of <1000mm, the moisture content of the materials would be generally less than Optimum Moisture Content with provision of drainage measures across the site. It is assumed that similar quality material to the site won material would be used for the fill placement as required and the subgrade would be prepared as specified in Section 5.1.

Based on these evaluations and assumption, the design subgrade CBR value of 3% is recommended for the subgrade material across the proposed car park and pavement areas of the subject site.

6.0 GENERAL COMMENT

- Occasionally, the subsurface soil conditions between the completed boreholes 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.
- It is highly recommended that an adequate drainage system should be formed to maintain constant moisture conditions in the pavement and subgrade below the pavement. It is also highly recommended to place interface trench drain at the joints between existing and new pavement if the existing materials are found different from new materials, particularly if the existing or new pavement has a heavily bound layer. The trench drain of 300x300mm shall be placed below heavily bound layer and be extended to about 300mm.
- It should be noted that site preparation may expose wet subgrade material. Trafficability in the silt/clay materials for wheeled vehicles can be expected to be slightly difficult during and following rainfall, if it is exposed. Caution shall therefore be exercised during the construction.

Should you have any queries, please do contact us.

Yours truly,

Tin Maung
Senior Geotechnical Engineer

Attachments:

- Addendum
- Plan showing Borehole & DCP test locations
- Borehole Logs with Explanatory Note
- Dynamic Cone Penetrometer test reports
- Laboratory test report by Aitken Rowe Testing Laboratories Pty Ltd
- Laboratory test report by Sydney Environmental & Soil Laboratory 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.

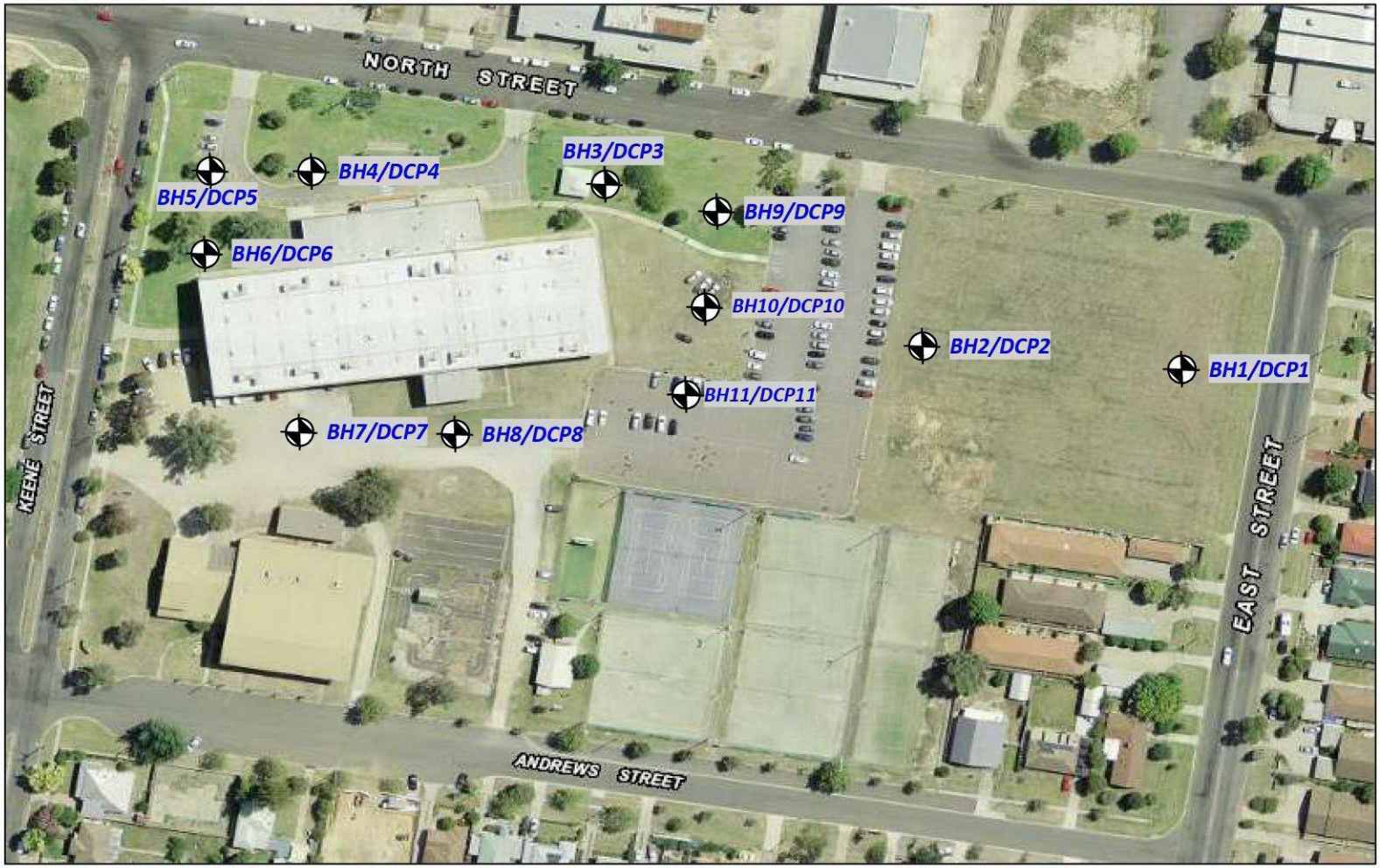
The recommendations in this report are based on the following: -

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.



AITKEN ROWE TESTING LABORATORIES PTY LTD

Registration Number: S18-390

Client: ALBURY CITY COUNCIL – ALBURY, NSW

Project: GEOTECHNICAL INVESTIGATION - PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE, NORTH STREET, EAST ALBURY, NSW

BOREHOLE & DCP TEST 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: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	TOPSOIL: SILT; low plasticity, with fine to medium sand, pale brown		MC<PL	F-St.				NATURAL
ML	SILT; low plasticity, with fine to coarse sand, trace gravel, orange brown	0.5			D	1A		FMC = 10.9%
CI	CLAY; medium plasticity, trace sand, orange brown				D	1B		
CH	CLAY; high plasticity, trace sand, yellow orange brown	1.0	MC<PL	VSt.	D	1C		FMC = 15.0%
CH	CLAY; high plasticity, trace sand, yellow grey brown	1.5			D	1D		
CH	CLAY; high plasticity, with fine to coarse sand, trace gravel, grey brown	2.0			D	1E		
	End of borehole (BH1) @ 3.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	TOPSOIL: SILT; low plasticity, with fine to medium sand, pale brown		MC>PL	F-St.				NATURAL
ML	SILT; low plasticity, with fine to coarse sand, orange brown				D	2A		
ML	SILT; low plasticity, with fine to coarse sand, trace gravel, orange brown	0.5			D	2B		
CI	CLAY; medium plasticity, trace sand, trace gravel, orange brown		MC≤PL	VSt.				
		1.0			D	2C		FMC = 13.1%
CH	CLAY; high plasticity, trace sand, yellow grey brown		MC<PL					
		1.5			D	2D		
		2.0						
CH	CLAY; high plasticity, with fine to coarse sand, trace gravel, grey brown							
		2.5			D	2E		
		3.0						
	End of borehole (BH2) @ 3.0m							
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, NSW

Logged By: DRR
Scale: As shown
Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

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

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	TOPSOIL: SILT; low plasticity, with fine to medium sand, brown		MC>PL	S				NATURAL
ML	SILT; low plasticity, with fine to coarse sand, trace gravel, brown			F-St.	D	3A		
CL	Silty CLAY; low plasticity, with fine to coarse sand, yellow brown	0.5						2-3% >OMC
					D	3B		FMC = 19.3%
CH	CLAY; high plasticity, trace sand, trace gravel, mottled yellow orange grey brown			St.				1-2% <OMC
		1.0			D	3C		
		1.5						
CH	CLAY; high plasticity, with fine to coarse sand, trace gravel, grey yellow brown		MC≤PL	VSt.				
		2.0			D	3D		
CL-CI	Sandy CLAY; low to medium plasticity, fine to coarse sand, with fine to medium gravel, grey brown		MC<PL					
		2.5			D	3E		
		3.0						
	End of Borehole (BH3) @ 3.0m	3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, NSW

Logged By: DRR
Scale: As shown
Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

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

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	FILL/TOPSOIL: SILT; low plasticity, with fine to medium sand, brown		MC>PL	S				
ML	FILL: SILT; low plasticity, with fine to medium sand, brown				D	4A		FILL: Appears moderately compacted
CL	FILL: Sandy CLAY; low plasticity, fine to coarse sand, with fine to medium gravel, brown			St.	D	4B		'Uncontrolled'
CL	Silty CLAY; low plasticity, with fine to coarse sand, trace gravel, grey brown	0.5		F				NATURAL
					D	4C		LS = 4.0% FMC = 14.5% OMC
		1.0						
CL	Silty CLAY; low plasticity, with fine to medium sand, grey brown							
		1.5			D	4D		LS = 3.5% FMC = 13.5% OMC
CH	CLAY; high plasticity, trace sand, yellow grey brown	2.0		St.				
					D	4E		LS = 14.0% FMC = 21.8%
		2.5						
		3.0						
	End of Borehole (BH4) @ 3.0m							
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	FILL/TOPSOIL: Sandy SILT; low plasticity, fine to medium sand, brown		MC<PL	F				FILL: Appears moderately compacted 'Uncontrolled'
ML	FILL: Sandy SILT; low plasticity, fine to medium sand, brown			St.	D	5A		
CL	FILL: Silty CLAY; low plasticity, with fine to coarse sand, with fine to medium gravel, trace brick fragments, trace root fibres, brown	0.5		St.-VSt.	D	5B		
CH	CLAY; high plasticity, trace sand, yellow brown			VSt.	D	5C		NATURAL
CH	CLAY; high plasticity, trace sand, grey brown	1.0	MC≤PL					
					D	5D		
		1.5						
CH	CLAY; high plasticity, trace sand, yellow grey brown	2.0	MC<PL					
					D	5E		
		2.5						
		3.0						
	End of Borehole (BH5) @ 3.0m	3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	FILL/TOPSOIL: Sandy SILT; low plasticity, fine to medium sand, brown		MC<PL	F				FILL: Appears moderately compacted
SM	FILL: Silty SAND; fine to coarse grained, trace gravel, fines of low plasticity, trace root fibres, orange brown		D-M	MD	D	6A		'Uncontrolled'
CH	CLAY; high plasticity, trace sand, grey brown	0.5	MC≤PL	VSt.				NATURAL
		1.0			D	6B		
		1.5						
CH	CLAY; high plasticity, trace sand, grey yellow				D	6C		
		2.0						
CH	CLAY; high plasticity, tracesand, trace gravel, grey brown		MC<PL					
		2.5			D	6D		
		3.0						
	End of Borehole (BH6) @ 3.0m	3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
GP-GM	FILL: Sandy GRAVEL; fine to medium gravel, fine to coarse sand, with silt fines of low plasticity, grey		D	MD	D	7A		FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, grey	0.5	MC>PL	F	D	7B		NATURAL LS = 18.0% FMC = 28.2% 1-2% >OMC
		1.0			D	7C		LS = 18.5% FMC = 28.5% 1-2% >OMC
		1.5						
		2.0		St.				
CH	CLAY; high plastcity, trace sand, trace gravel, yellow brown	2.5			D	7D		LS = 16.5% FMC = 25.9% OMC
		3.0						
	End of Borehole (BH7) @ 3.0m	3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 4/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	FILL/TOPSOIL: SILT; low plasticity, with fine to medium sand, brown		MC<PL	F				FILL: Appears moderately compacted 'Uncontrolled'
CH	FILL: CLAY; high plasticity, with fine to coarse sand, trace gravel, mottled orange yellow brown		MC>PL	St.-VSt.	D	8A		
CI	CLAY; medium plasticity, with fine to medium sand, grey brown	0.5		S-F				NATURAL
					D	8B		LS = 10.5% FMC = 16.6% 2% >OMC
CH	CLAY; high plasticity, trace sand, trace gravel, grey brown	1.0		VSt.				
					D	8C		OMC
		1.5						
CH	CLAY; high plasticity, trace sand, trace gravel, yellow brown		MC≤PL					
		2.0			D	8D		
CH	CLAY; high plasticity, trace sand, trace gravel, orange yellow brown		MC≥PL					
		2.5			D	8E		
		3.0						
	End of Borehole (BH8) @ 3.0m	3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 5/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
	Borehole not drilled due to underground services	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0						

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, 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: 5/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
ML	TOPSOIL: SILT; low plasticity, with fine to medium sand, brown		MC>PL	S-F				NATURAL
ML	SILT; low plasticity, with fine to coarse sand, trace gravel, brown				D	10A		
CI	CLAY; medium plasticity, trace sand, yellow grey brown							
		0.5		F	D	10B		LS = 10.5 FMC = 21.5% 1% >OMC
CH	CLAY; high plasticity, trace sand, grey brown			St.				
		1.0		VSt.	D	10C		
		1.5					1.5	
				VSt.	D	10D	SPT 8,12,16 N = 28	
		2.0					1.95	
					D	10E		
		2.5						
		3.0					3.0	
CH	CLAY; high plasticity, tracesand, grey orange brown			VSt.-H	D	10F	SPT 7,11,20 N = 31	
		3.5					3.45	
CI	CLAY; medium plasticity, with fine to coarse sand, trace gravel, red orange brown			H	D	10G		
		4.0						
		4.5					1.5	
					D	10H	SPT 20,20 N = >40	Double bouncing @ 20 blows 150mm stick up
		5.0					4.8	
					D	10I		FMC = 17.2%
CI	CLAY; medium plasticity, with fine to coarse sand, with fine to medium gravel, orange brown	5.5					5.55	
					D	10J	SPT 20,25 N = >45	Double bouncing @ 25 blows 150mm stick up
		6.0					5.85	
	End of Borehole (BH10) @ 6.0m							Logged By: DRR

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, NSW

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **11**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: 5/10/2018

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Field Test S.P.T.	Remarks & Field Records
	Bitumen 40mm							
GP	FILL: Sandy GRAVEL; fine to medium gravel, fine to coarse sand, trace silt fines of low plasticity, grey brown		M	MD	D	11A		FILL: Appears moderately compacted 'Uncontrolled'
CI	CLAY; medium plasticity, trace sand, grey brown	0.5	MC>PL	S-F				NATURAL
					D	11B		FMC = 19.2%
				St.				OMC
		1.0						
CH	CLAY; high plasticity, trace sand, trace gravel, yellow grey brown				D	11C		
		1.5					1.5	
CH	CLAY; high plasticity, trace sand, yellow brown				D	11D	SPT 3,5,7 N = 12	
		2.0					1.95	
					U50	11E		LS = 15.0% Iss = 3.6
		2.5						
					D	11F		
		3.0					3.0	
					D	11G	SPT 4,5,10 N = 15	
		3.5					3.45	
CI	CLAY; medium plasticity, with fine to coarse sand, trace gravel, red orange brown			H	D	11H		
		4.0						
		4.5					4.5	
					D	11I	SPT 10,16 N = >26	Double bouncing @ 16 blows 150mm stick up
		5.0					4.8	
					D	11J		
CI	CLAY; medium plasticity, with fine to coarse sand, with fine to medium gravel, orange brown	5.5					5.55	
					D	11K	SPT 11,18,20 N = 38	
		6.0						
	End of Borehole (BH11) @ 6.0m							Logged By: DRR

Registration No.: S18-390
Project/Location: Geotechnical Investigation - Proposed Upgrades, Lauren Jackson Sports Centre, North Street, East Albury, NSW
Client: Albury City Council - Albury, NSW

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

LOG SYMBOLS

LOG COLUMN	SYMBOLS	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	Small disturbed bag sample taken between the depths indicated by lines.
	B	Bulk disturbed sample taken between the depths indicated by lines.
	U	Undisturbed 50mm diameter tube sample taken between the depths indicated by lines
Field Tests	N=17 4, 7, 10	Standard Penetration Test (S.P.T.) performed between depths indicated by lines. Individual figures show blows per 150mm penetration driven by SPT hammer.
	N_c 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 (Cohesive Soils) (Cohensionless Soils)	MC>PL	Moisture content estimated to be greater than plastic limit.
	MC=PL	Moisture content estimated to be approx. equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
	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 (Cohesive Soils)	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 (Cohensionless Soils)		Description	Density Index Range % S.P.T.	'N' Value Range Blows/300mm
	VL	VERY LOOSE	<15	0-4
	L	LOOSE	15-35	4-10
	MD	MEDIUM DENSE	35-65	10-30
	D	DENSE	65-85	30-50
	VD	VERY DENSE	>85	> 50

Hand Penetrometer Readings	300 250 280	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Laboratory Test	L.S. %	Linear Shrinkage (As per RTA Method T113)
	M.C. %	Field Moisture Content (As per Australian Standard AS1289.2.1.1 or RTA Method T120)
	I_{ss}	Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten Carbide wing bit.
	T^{60}	Penetration of auger string in mm under static load of rig rear axle without rotation of augers.

Aitken Rowe Testing Laboratories Pty Ltd

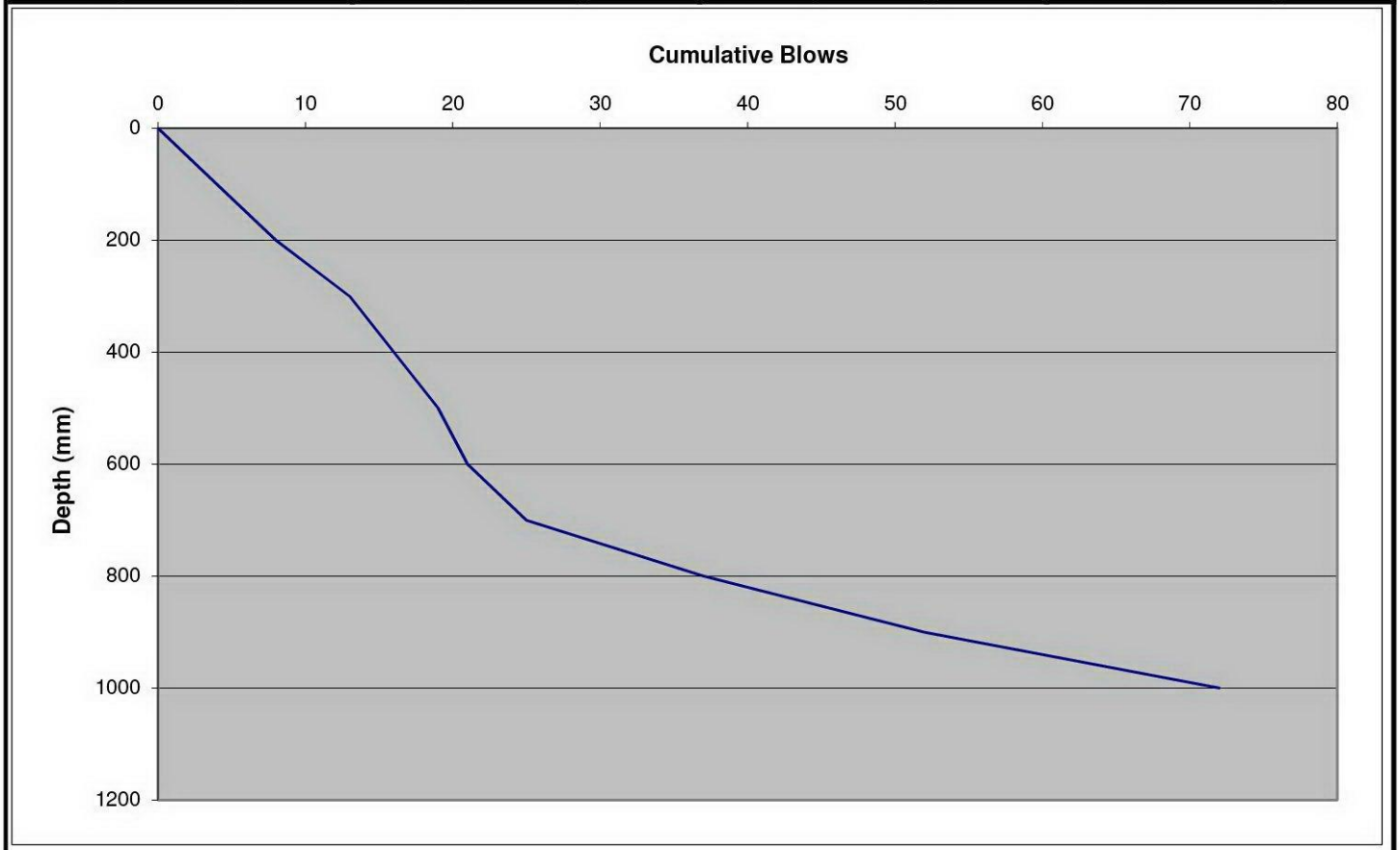
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ABLURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 1 (BH1)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 1 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	4	7	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	4	7	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	5	9	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	3	5	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	3	5	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	4	7	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	12	28	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	15	38	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	20	55	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	END	*	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	*	*



NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Report R13 V3 Revised 23/08/2018

DOC21/1626

Aitken Rowe Testing Laboratories Pty Ltd

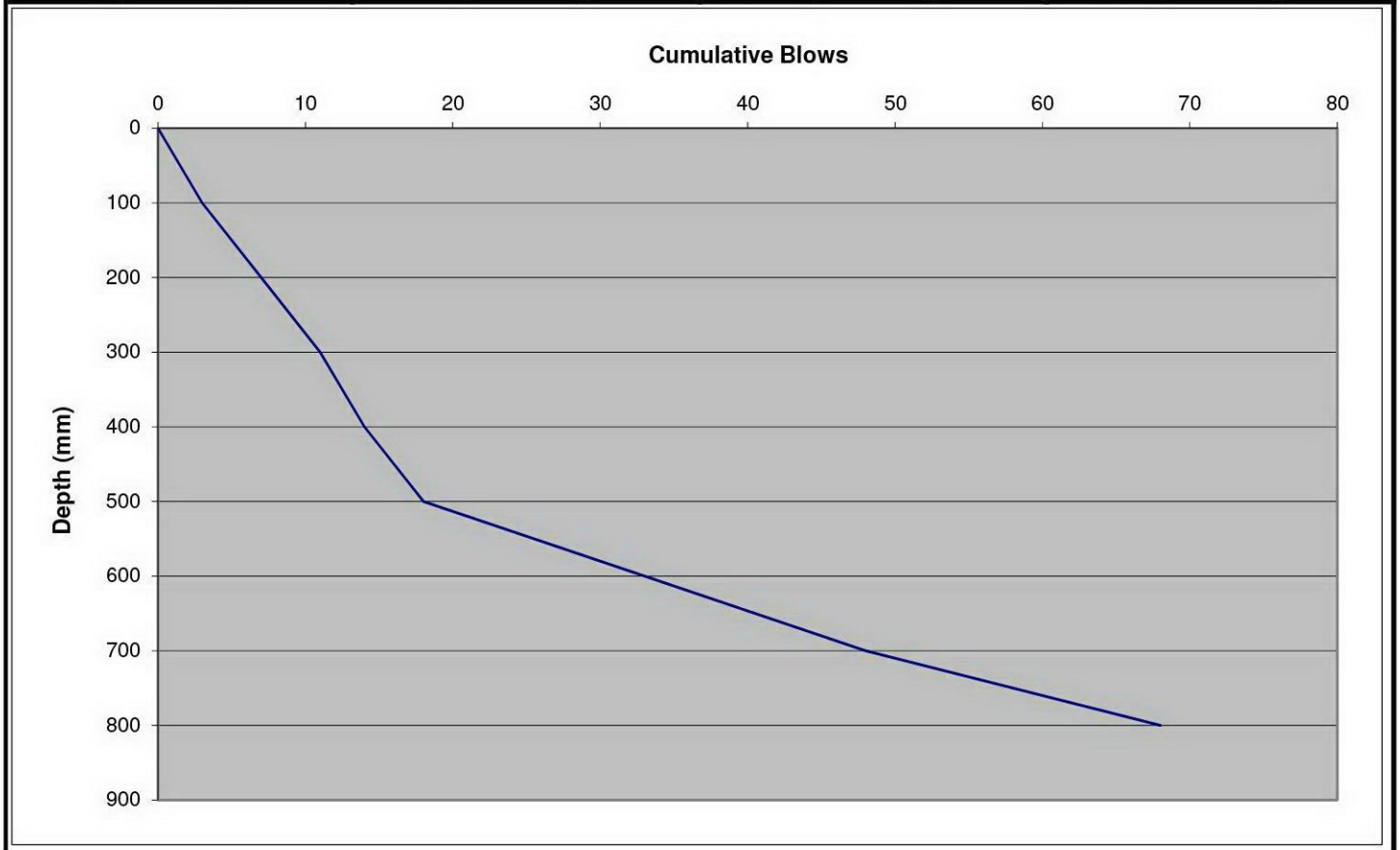
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ABLURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 2 (BH2)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 2 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	3	5	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	4	7	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	4	7	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	3	5	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	15	38	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	15	38	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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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Aitken Rowe Testing Laboratories Pty Ltd

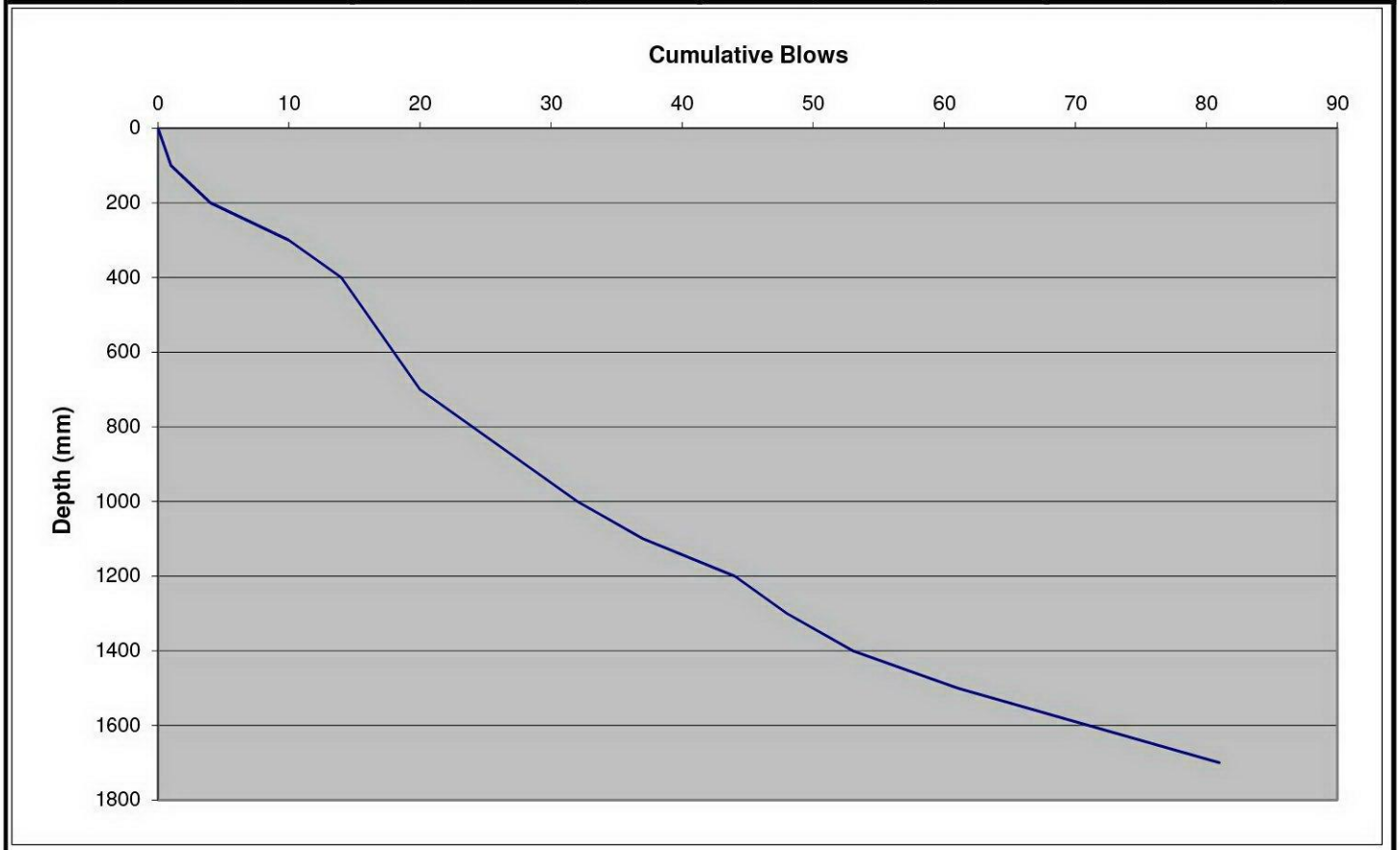
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ABLURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 3 (BH3)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 3 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	8	17	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	3	5	1.6 - 1.7	10	23	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	6	12	1.7 - 1.8	END	*	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	2	3	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	4	7	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	4	7	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	4	7	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	7	14	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	5	9	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	7	14	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Report R13 V3 Revised 23/08/2018

DOC21/1626

Aitken Rowe Testing Laboratories Pty Ltd

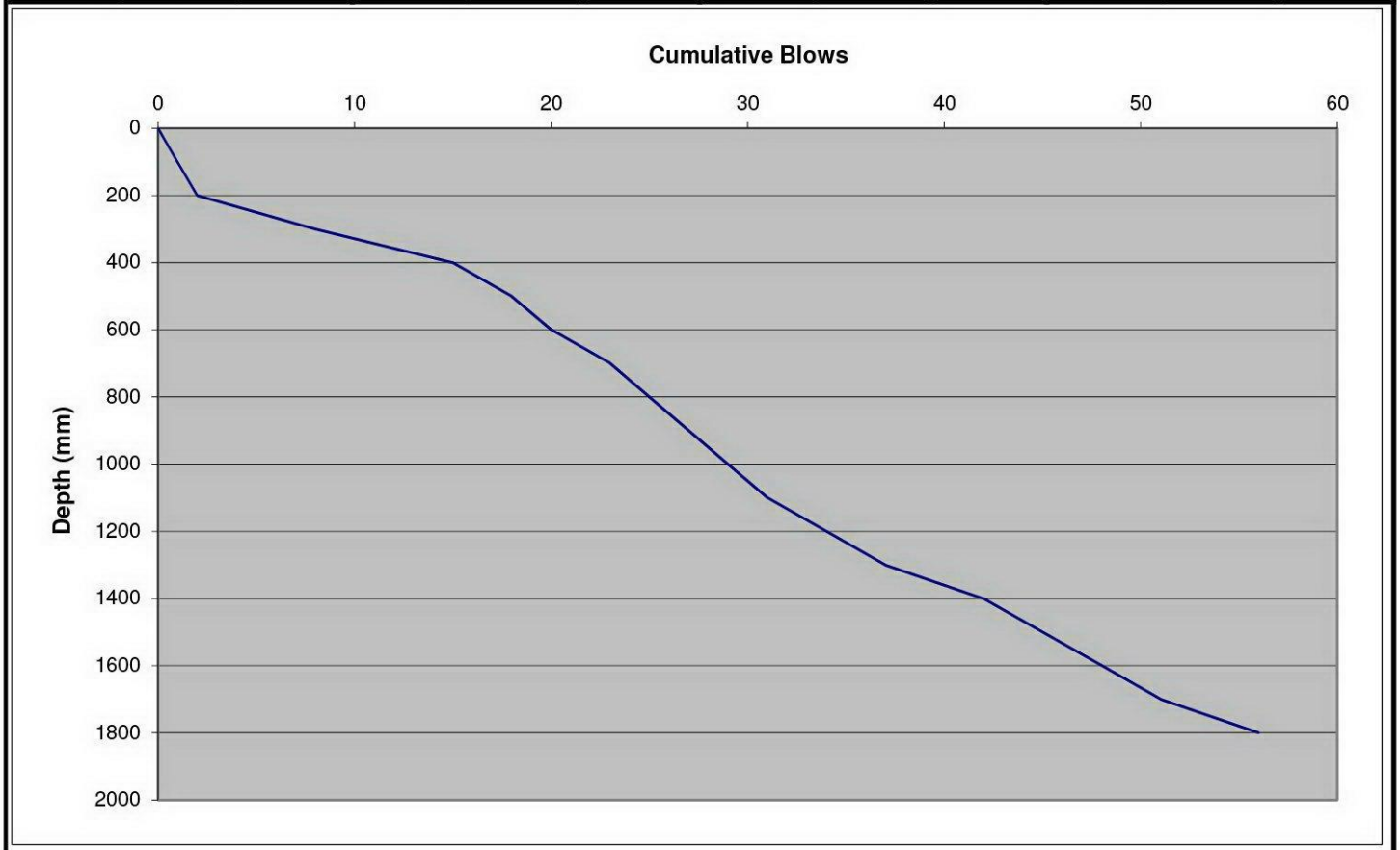
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ABLURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 4 (BH4)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 4 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	3	5	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	1	1	1.6 - 1.7	3	5	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	6	12	1.7 - 1.8	5	9	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	7	14	1.8 - 1.9	END	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	3	5	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	3	5	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	2	3	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	2	3	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	3	5	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	5	9	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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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Report R13 V3 Revised 23/08/2018

DOC21/1626

Aitken Rowe Testing Laboratories Pty Ltd

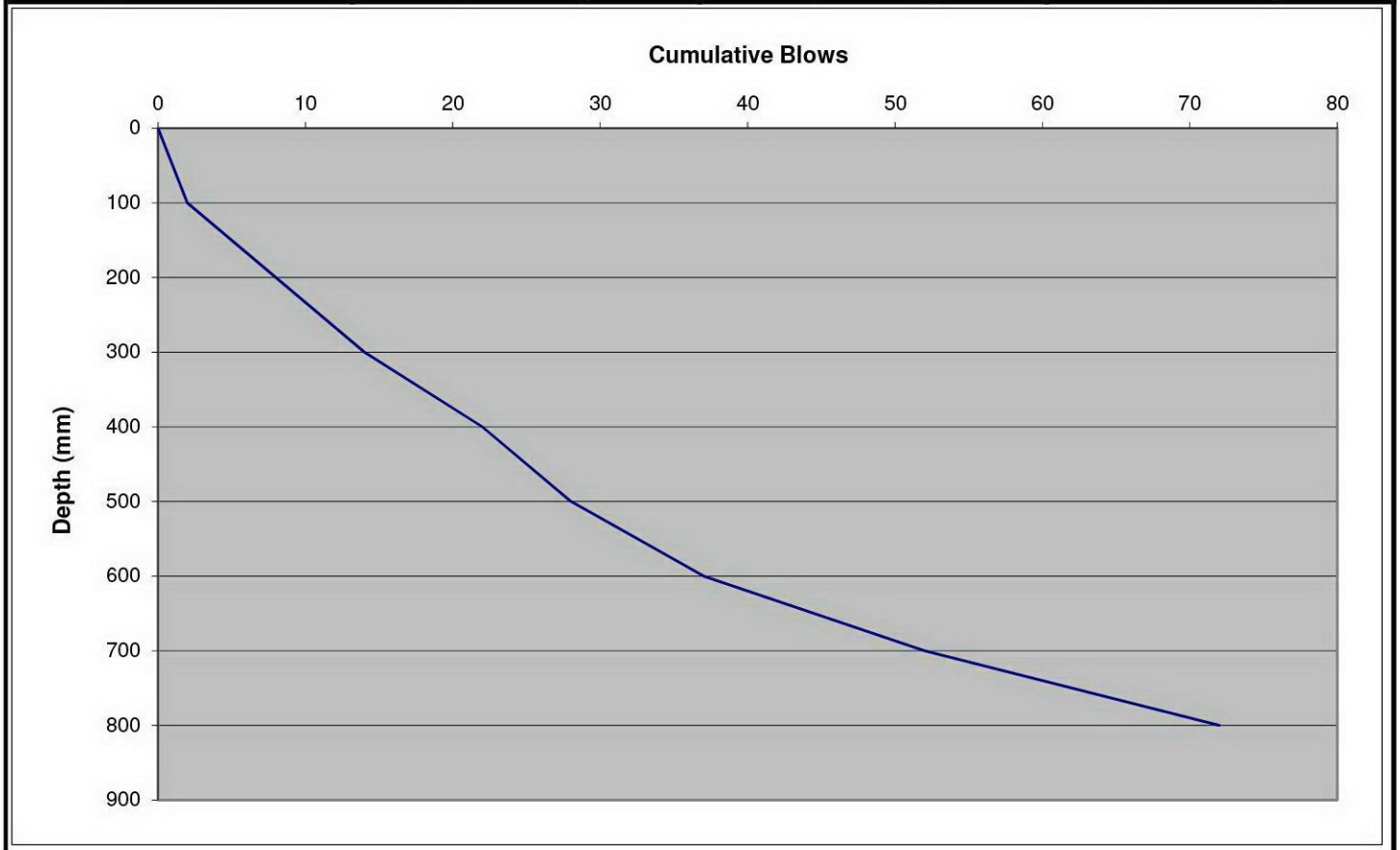
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 5 (BH5)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 5 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	2	3	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	6	12	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	6	12	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	8	17	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	6	12	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	9	20	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	15	38	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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Number: 4679

REMARKS:

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Jarrod Gornall
DATE: 17/10/2018

Aitken Rowe Testing Laboratories Pty Ltd

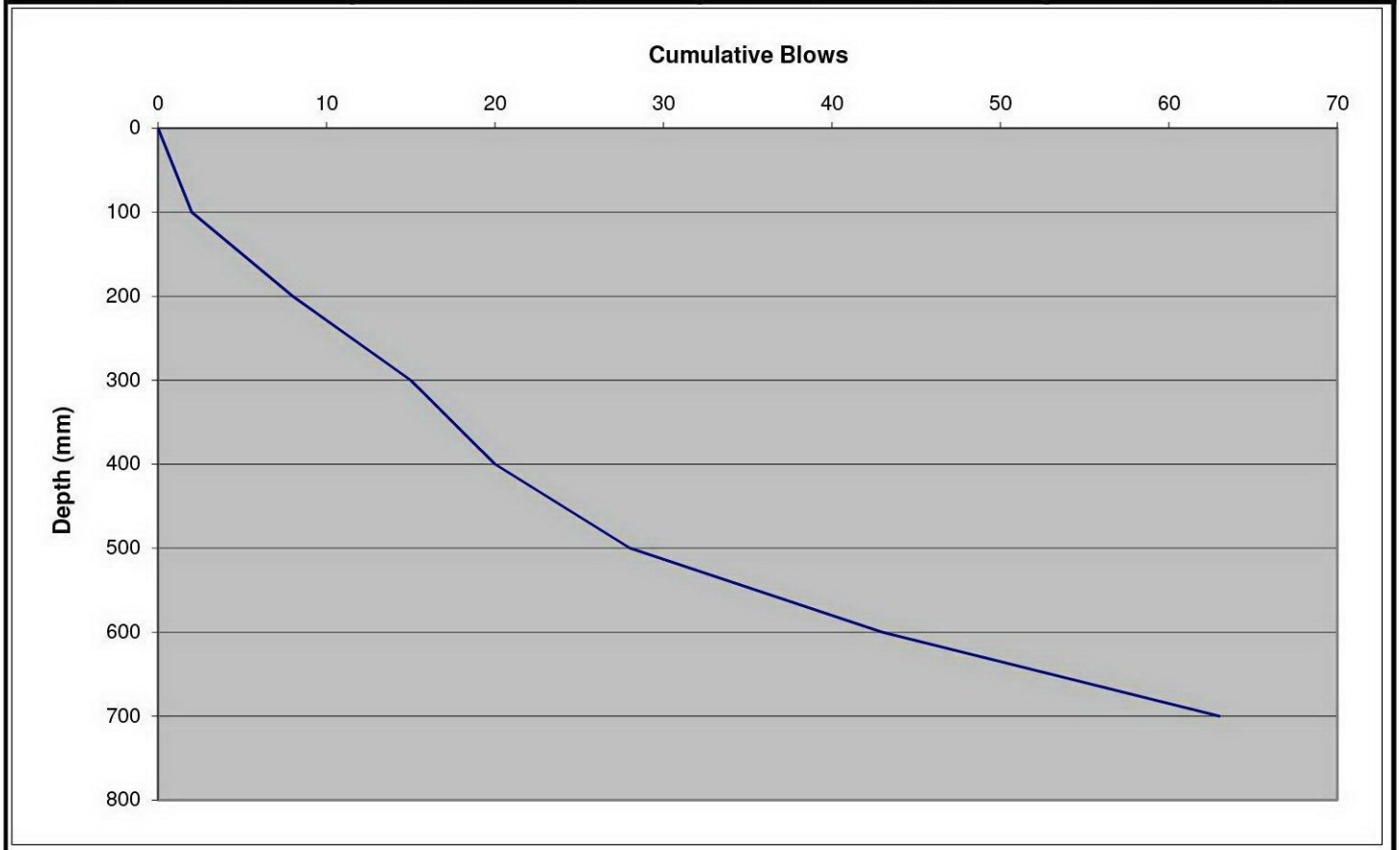
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ABLURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 6 (BH6)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 6 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	2	3	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	6	12	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	7	14	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	5	9	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	8	17	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	15	38	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	20	55	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	END	*	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	*	*	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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Number: 4679

REMARKS:

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Jarrod Gornall
DATE: 17/10/2018

Aitken Rowe Testing Laboratories Pty Ltd

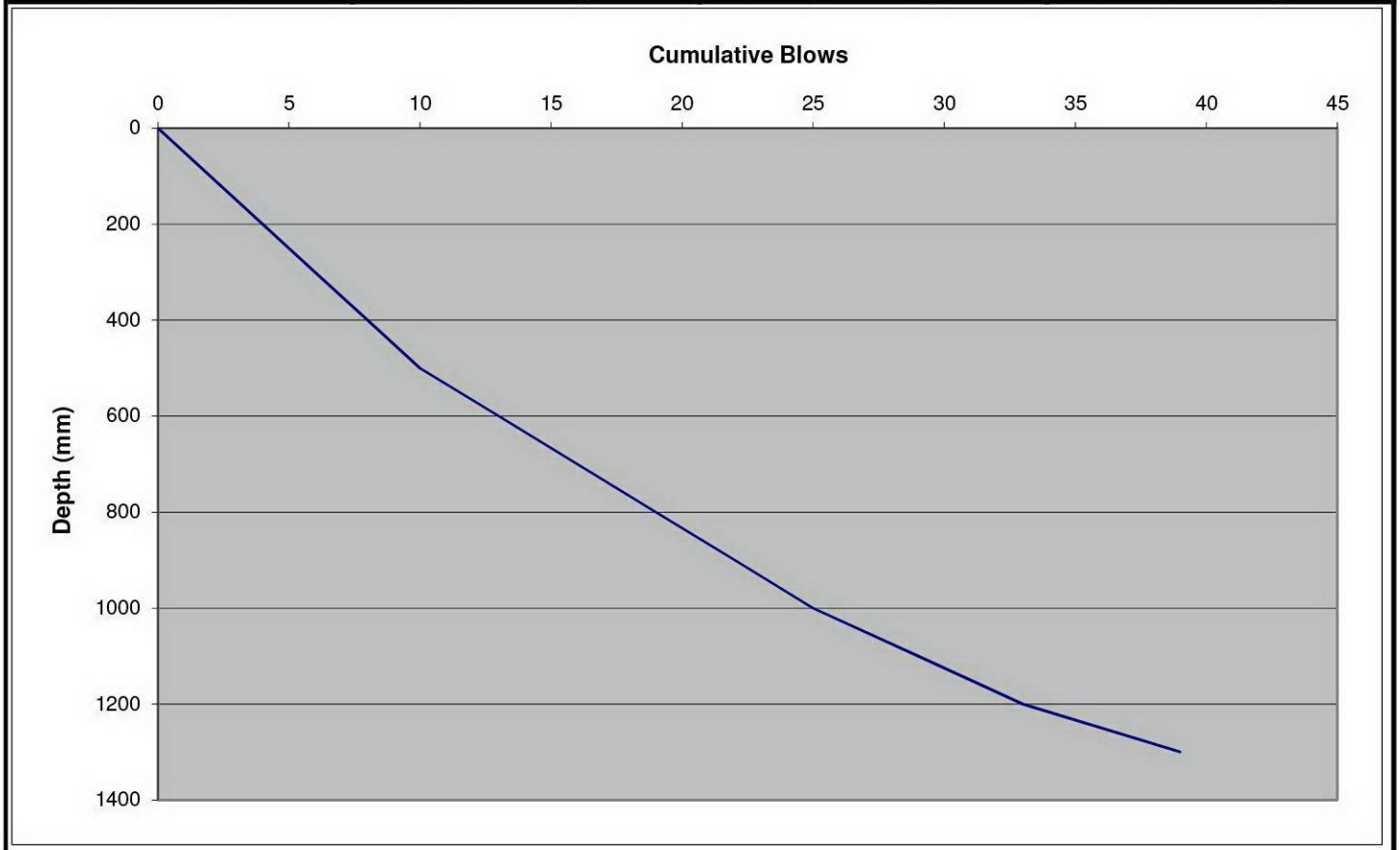
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION, PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 7 (BH7)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 7 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (mm): 400
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	2	3	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	2	3	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	2	3	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	3	5	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	3	5	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	3	5	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	3	5	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	3	5	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	4	7	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	6	12	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	END	*	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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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Report R13 V3 Revised 23/08/2018

DOC21/1626

Aitken Rowe Testing Laboratories Pty Ltd

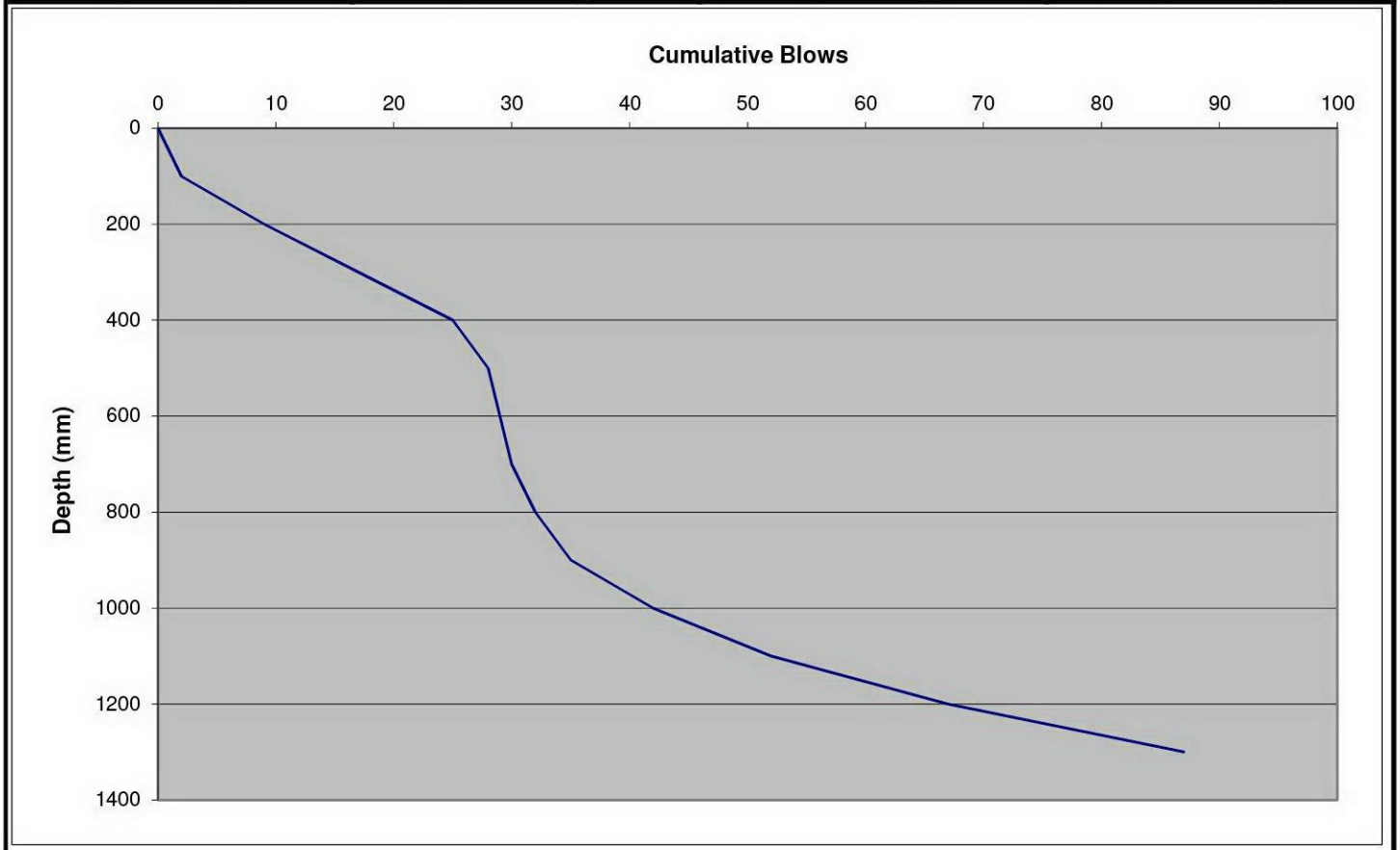
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION,
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 8 (BH8)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 8 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 4/10/2018
DEPTH BELOW FSL (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	2	3	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	7	14	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	8	17	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	8	17	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	3	5	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	1	1	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	1	1	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	3	5	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	7	14	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	10	23	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	15	38	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	20	55	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	END	*	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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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Aitken Rowe Testing Laboratories Pty Ltd

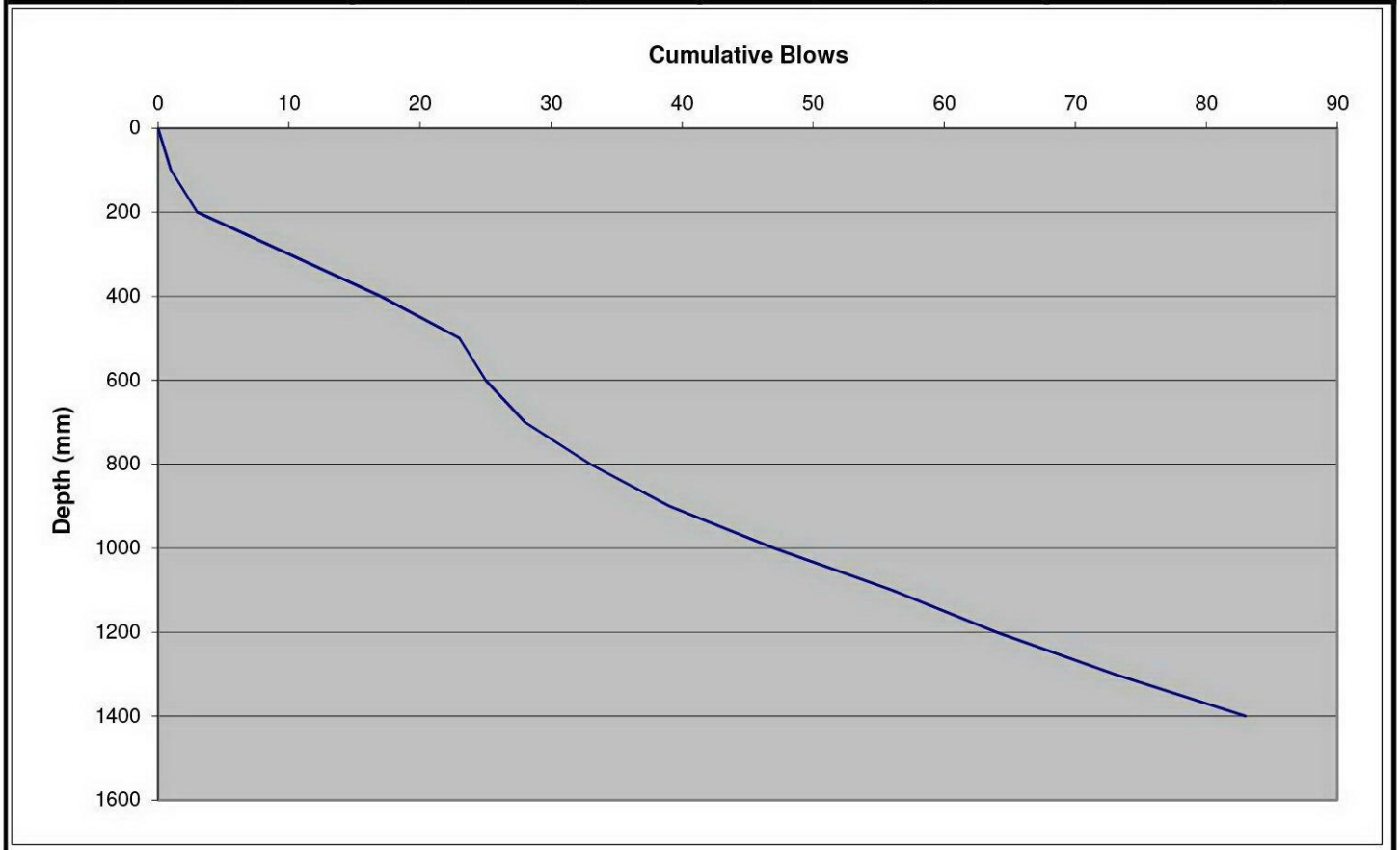
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION, PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 9 (BH9)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 9 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 5/10/2018
DEPTH BELOW FSL (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	END	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	2	3	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	7	14	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	7	14	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	6	12	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	3	5	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	5	9	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	8	17	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	9	20	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	8	17	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	9	20	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	10	23	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	10	23	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



NATA
ACCREDITED FOR TECHNICAL COMPETENCE

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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Report R13 V3 Revised 23/08/2018

DOC21/1626

Aitken Rowe Testing Laboratories Pty Ltd

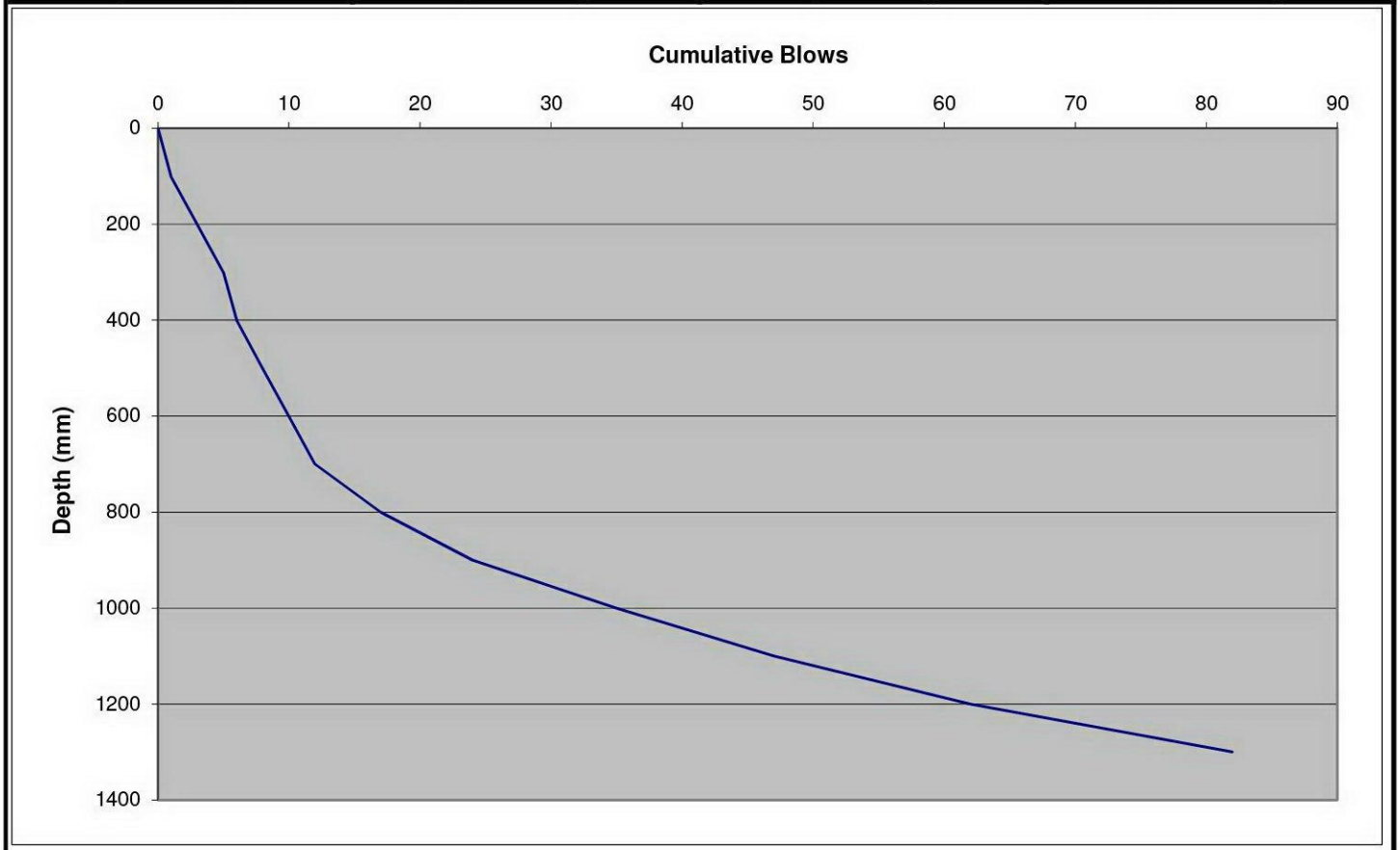
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION, PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 10 (BH10)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 10 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 5/10/2018
DEPTH BELOW FSL (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	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	2	3	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	1	1	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	2	3	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	5	9	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	7	14	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	11	25	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	12	28	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	15	38	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	20	55	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	END	*	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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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

Report R13 V3 Revised 23/08/2018

DOC21/1626

Aitken Rowe Testing Laboratories Pty Ltd

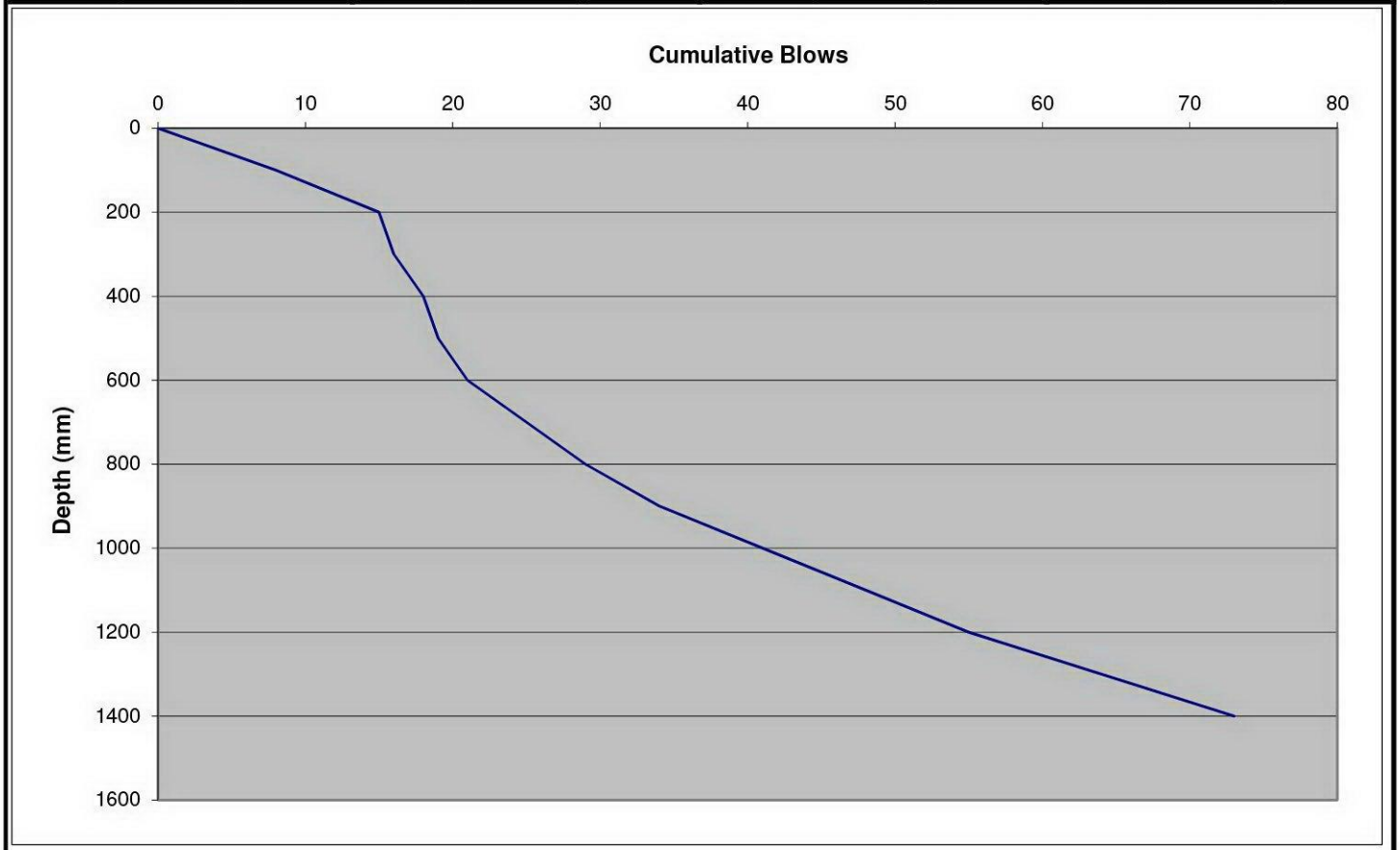
ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
PROJECT: GEOTECHNICAL INVESTIGATION, PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
LOCATION: NORTH STREET, EAST ALBURY, NSW ***DCP: 11 (BH11)***
SOIL DESCRIPTION: REFER TO BORHOLE LOGS
DEPTH OF GROUND WATER TABLE IF INTERSECTED: N/A

PAGE: 11 OF: 11
REGISTRATION NO: **S18-390**
DATE OF TEST: 5/10/2018
DEPTH BELOW FSL (mm): 100
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	8	17	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	7	14	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	2	3	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	4	7	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	4	7	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	5	9	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	7	14	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	7	14	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	7	14	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	9	20	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	9	20	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	END	*	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*



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Number: 4679

REMARKS:

APPROVED SIGNATORY: .....
Jarrod Gornall
DATE: 17/10/2018

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

*

SUBMITTED BY : ARTL
DATE SAMPLED: 3-5/10/18
DATE SUBMITTED: 5/10/2018
SAMPLING METHOD: AS1289 1.2.1
SAMPLING CLAUSE: 6.5.3
ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : ALBURY CITY COUNCIL - ALBURY, NSW
JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
NORTH STREET, ALBURY, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES
MATERIAL TYPE : REFER TO BOREHOLE LOGS
PROPOSED USE : DESIGN

REGISTRATION No : R28 S18-390

		SAMPLE NUMBER :	1A	1B/1C	2C	3B	4C	4D
		SAMPLING LOCATION :	BH1	BH1/BH2	BH2	BH3	BH4	BH4
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	100-300	600-1200	700-1000	400-600	600-900	1400-1700
TESTS	TEST ELEMENT		*	*	*	*	*	*
T106		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	*	100	*	*	*
		PASS 2.36mm SIEVE %	96	100	99	100	*	*
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	85	94	92	90	*	*
		PASS 75 µm SIEVE %	70	85	82	77	*	*
		LESS THAN 13.5 µm %	28	53	51	40	*	*
T107	-2.36mm	PASS 425 µm SIEVE %	88	95	93	91	*	*
		PASS 75 µm SIEVE %	73	85	83	77	*	*
		LESS THAN 13.5 µm %	29	54	51	40	*	*
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	88	95	93	91	*	*
	B-	PASS 75/425 µm %	82	90	89	85	*	*
	C-	BELOW 13.5/75 µm %	40	63	62	52	*	*
AS1289.3.1.2		LIQUID LIMIT %	24	40	41	33	*	*
AS1289.3.2.1		PLASTIC LIMIT %	18	15	13	13	*	*
AS1289.3.3.1		PLASTICITY INDEX	6	25	28	20	*	*
		PREPARATION METHOD	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	*	*
T111		STANDARD MAX. DRY DENSITY (1L MLD, A.1ii) t/m^3	*	1.76	1.81	1.86	*	*
		OPTIMUM MOISTURE CONTENT %	*	18.0	15.8	14.7	*	*
T113		LINEAR SHRINKAGE %	*	*	*	*	4.0	3.5
AS1289.2.1.1		FIELD MOISTURE CONTENT %	10.9	15.0	13.1	19.3	14.5	13.5

All samples tested by ARTL Albury Laboratory. Report reference AS18-119

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

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ACCREDITATION NUMBER 4679

APPROVED SIGNATORY : Jarrod Gornall

DATE: 24/10/2018

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

*

SUBMITTED BY : ARTL
DATE SAMPLED: 3-5/10/18
DATE SUBMITTED: 5/10/2018
SAMPLING METHOD: AS1289 1.2.1
SAMPLING CLAUSE: 6.5.3
ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : ALBURY CITY COUNCIL - ALBURY, NSW
JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
NORTH STREET, ALBURY, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES
MATERIAL TYPE : REFER TO BOREHOLE LOGS
PROPOSED USE : DESIGN

REGISTRATION No : R28 S18-390

		SAMPLE NUMBER :	4E	7B	7C	7D	8B	10B
		SAMPLING LOCATION :	BH4	BH7	BH7	BH7	BH8	BH10
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	2200-2500	500-800	1000-1300	2300-2600	500-800	300-600
TESTS	TEST ELEMENT		*	*	*	*	*	*
T106		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
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	*	97
		PASS 75 µm SIEVE %	*	*	*	*	*	87
		LESS THAN 13.5 µm %	*	*	*	*	*	52
T107	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	*	97
		PASS 75 µm SIEVE %	*	*	*	*	*	87
		LESS THAN 13.5 µm %	*	*	*	*	*	52
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	*	*	*	*	*	97
	B-	PASS 75/425 µm %	*	*	*	*	*	90
	C-	BELOW 13.5/75 µm %	*	*	*	*	*	60
AS1289.3.1.2		LIQUID LIMIT %	*	*	*	*	*	45
AS1289.3.2.1		PLASTIC LIMIT %	*	*	*	*	*	14
AS1289.3.3.1		PLASTICITY INDEX	*	*	*	*	*	31
		PREPARATION METHOD	*	*	*	*	*	AS1289.1.1-5.3
T111		STANDARD MAX. DRY DENSITY (1L MLD, A.1ii) t/m^3	*	*	*	*	*	*
		OPTIMUM MOISTURE CONTENT %	*	*	*	*	*	*
T113		LINEAR SHRINKAGE %	14.0	18.0	18.5	16.5	10.5	10.5
AS1289.2.1.1		FIELD MOISTURE CONTENT %	21.8	28.2	28.5	25.9	16.6	21.2

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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 : Jarrod Gornall DATE: 24/10/2018

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

*

SUBMITTED BY : ARTL
DATE SAMPLED: 3-5/10/18
DATE SUBMITTED: 5/10/2018
SAMPLING METHOD: AS1289 1.2.1
SAMPLING CLAUSE: 6.5.3
ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : ALBURY CITY COUNCIL - ALBURY, NSW
JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
NORTH STREET, ALBURY, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES
MATERIAL TYPE : REFER TO BOREHOLE LOGS
PROPOSED USE : DESIGN

REGISTRATION No : R28 S18-390

		SAMPLE NUMBER :	10I	11B	11E	*	*	*
		SAMPLING LOCATION :	BH10	BH11	BH11	*	*	*
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	5000-5300	500-800	2100-2500	*	*	*
TESTS	TEST ELEMENT		*	*	*	*	*	*
T106		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 %	99	*	*	*	*	*
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	85	*	*	*	*	*
		PASS 75 µm SIEVE %	70	*	*	*	*	*
		LESS THAN 13.5 µm %	50	*	*	*	*	*
T107	-2.36mm	PASS 425 µm SIEVE %	85	*	*	*	*	*
		PASS 75 µm SIEVE %	71	*	*	*	*	*
		LESS THAN 13.5 µm %	51	*	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	85	*	*	*	*	*
	B-	PASS 75/425 µm %	84	*	*	*	*	*
	C-	BELOW 13.5/75 µm %	72	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	41	*	*	*	*	*
AS1289.3.2.1		PLASTIC LIMIT %	13	*	*	*	*	*
AS1289.3.3.1		PLASTICITY INDEX	28	*	*	*	*	*
		PREPARATION METHOD	AS1289.1.1-5.3	AS1289.1.1-5.3	*	*	*	*
T111	STANDARD MAX. DRY DENSITY (1L MLD, A.1ii) t/m^3		*	*	*	*	*	*
	OPTIMUM MOISTURE CONTENT %		*	*	*	*	*	*
T113	LINEAR SHRINKAGE %		*	*	15.0	*	*	*
AS1289.2.1.1	FIELD MOISTURE CONTENT %		17.2	19.2	*	*	*	*

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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 : Jarrod Gornall

DATE: 24/10/2018

AITKEN ROWE Testing Laboratories Pty Ltd

Laboratory Address: 4/2 Riedell Street, Wagga Wagga NSW 2650
*

PAGE: 1
OF: 1
SUBMITTED BY : ARTL
NO OF SAMPLES : 3
DATE RECEIVED : 03-05/10/2018
TEST METHODS : T105/T111
* T117/T120
SAMPLING PROCEDURE: AS1289.1.2.1
SAMPLING CLAUSE: 6.5.3
REGISTRATION NO : R6 **S18-390**

TEST REPORT: CALIFORNIA BEARING RATIO OF SOILS AND GRAVELS

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW
JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE,
NORTH STREET, EAST ALBURY, NSW
SOURCE OF MATERIAL : IN-SITU BOREHOLES LOT NO: *
PROPOSED USE: DESIGN

SAMPLE NO:	1B/1C	2C	3B	*	*
SITE OR LOCATION	BH1	BH2	BH3	*	*
DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm)	600-1200	700-1000	400-600	*	*
ADDITIVE IF STABILISED	*	*	*	*	*
AMOUNT OF ADDITIVE (%)	*	*	*	*	*
TYPE OF COMPACTION (Standard/modified)	STANDARD	STANDARD	STANDARD	*	*
MATERIAL RETAINED ON THE 19.0mm SIEVE (%)	*	*	*	*	*
OPTIMUM MOISTURE CONTENT (%)	18.0	15.8	14.7	*	*
MAXIMUM DRY DENSITY (t/m^3)	1.76	1.81	1.86	*	*
MOULDING MOISTURE CONTENT (%)	18.0	16.0	14.8	*	*
DRY DENSITY OF TEST SPECIMEN (t/m^3)	1.67	1.71	1.76	*	*
SPECIFIED LDR (%)	95	95	95	*	*
ACTUAL LDR (%)	95	95	95	*	*
MOISTURE CONTENTS : TOP 30 mm	22.0	20.3	17.4	*	*
WHOLE SAMPLE	21.0	19.0	16.8	*	*
ABSORPTION (%)	3.1	3.1	1.9	*	*
SPECIFIED LMR (%)	100	100	100	*	*
ACTUAL LMR (%)	100	101	101	*	*
NUMBER OF DAYS SOAKING	10	10	10	*	*
SWELL (%)	0.3	0.7	0.2	*	*
CBR OBTAINED FROM PENETRATION (mm)	2.5	2.5	5.0	*	*
CALIFORNIA BEARING RATIO (%)	**4**	**5**	**7**	*	*

NOTES: T117 specifications: LMR - 3% to +2%
LDR ± 1%

COMMENTS: All samples tested by ARTL Albury Laboratory. Report reference AS18-119

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Number: 4679

APPROVED SIGNATORY: Jarrod Gornall
DATE: 24/10/2018

Form R6a V2 Revised 22/03/2017

DOC21/1626

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

PAGE: 1

OF: 1

TEST REPORT

SUBMITTED BY : ARTL

SOIL REACTIVITY- DETERMINATION OF THE SHRINKAGE INDEX OF A SOIL

SHRINK SWELL INDEX

DATE SUBMITTED: 5/10/2018

NO OF SAMPLES : 1

CLIENT: ALBURY CITY COUNCIL - ALBURY, NSW

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION - PROPOSED UPGRADES, LAUREN JACKSON SPORTS CENTRE, NORTH STREET, EAST ALBURY, NSW

TEST METHODS: AS1289.7.1.1
AS1289.2.1.1

REGISTRATION NO: R26 **S18-390**

SAMPLE NO:	11E
BOREHOLE No:	BH11
DEPTH:	2100-2500
SHRINK SWELL INDEX (ISS)	3.38
INITIAL SWELL M.C. %	23.0
FINAL SWELL M.C. %	25.8
DESCRIPTION OF SOIL:	CLAY
ESTIMATED PERCENTAGE OF INERT INCLUSIONS:	>5%
EXTENT OF SOIL CRUMBLING DURING SHRINKAGE:	N/A
EXTENT OF CRACKING OF SHRINKAGE SPECIMEN:	MAJOR
SAMPLE NO:	*
BOREHOLE No:	*
DEPTH:	*
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:	*

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Number: 4679

APPROVED SIGNATORY: 

Jarrod Gornall

DATE: 24/10/2018

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°: 50037	Sample N°: 1	Date Received: 12/10/18	Report Status: Final

Client Name:	**Aitken Rowe Testing Laboratories (ARTL) Pty Ltd**	Project Name:	**S18-390**
		SESL Quote N°:	
Client Contact:	**Reports**	Sample Name:	**1E**
Client Order N°:		Description:	**Soil**
Address:	**PO Box 5158 WAGGA WAGGA NSW 2650**	Test Type:	**ARTL**

TEST		RESULT	COMMENTS
pH in water (1:5)		8.9	Strong alkalinity
EC mS/cm (1:5)		0.43	Moderate
Texture Class		-	Did not test
Soil Condition Class (Permeability)		-	Did not test
SOLUBLE ANION ANALYSIS			
Sulphate (1:5)	mgSO_4 / kg	100	Low (non to mildly aggressive)
Chloride (1:5)	mgCl / kg	460	Low (non-aggressive)
* Resistivity Ω.	m	5.33	Low (moderately to severely 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 strong alkalinity, moderate salinity, low sulphate, low chloride and low resistivity.

According to Australian Standard (AS) 2159-2009, the pH is considered to be non to mildly-aggressive towards concrete and non-aggressive towards steel due to lack of permeability class. The sulphate levels are considered to be non to mildly aggressive towards concrete due to the lack of permeability class. The chloride levels are considered to be non-aggressive towards steel. The resistivity is considered to be moderately to severely aggressive towards steel due to the lack of permeability class.

Factors affecting concrete scaling are: (a) elevated sulphate, becoming mildly aggressive at >2400mg/kg SO4; and (b) low pH, becoming mildly aggressive at pH of <5-6. It is noted that if sulphate are above 600mg/kg, this can be aggressive towards concrete if combined with elevated magnesium.

Factors affecting steel corrosivity are: (a) elevated chloride, becoming mildly aggressive at >5,000mg/kg Cl; 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 moderate to severe.

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
22/10/2018

Consultant: Michelle Murphy

Authorised Signatory: Kelly Lee