

19 November 2014

Reg. No.: S14-352

Nash Bros Builders Pty Ltd
PO Box 5158
Wagga Wagga, NSW 2650

Attention: Mr. Chris Nash - Director

Dear Chris,

**GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN - PROPOSED WAGGA LEAGUES CLUB
REDEVELOPMENT, GURWOOD STREET, WAGGA WAGGA, NSW**

Further to your request in response to our quotation, Q14-278a dated 9 October 2014 to undertake the geotechnical investigation & pavement design for the proposed development at the above site, we drilled eighteen boreholes, being BH1 to BH12 to the depths of 4.5m and BH13 to BH18 to the depth of 1.5m at the locations as shown in the attached plan using our trailer-mounted drill rig on 28 October and 7 November 2014. Dynamic Cone Penetrometer testing (DCP) was also carried out at fifteen borehole locations to assess the strength of the underlying material. Disturbed samples were recovered from the boreholes for relevant laboratory testing.

The purpose of the investigation is to assess the type and condition of the underlying soil material and make recommendation for the proposed development. The proposed redevelopment includes the removal of the existing leagues club multi-story building, amenities building and grandstand, bowling greens, netball courts and sporting ground embankments. New construction is to include multi-storey residential dwellings & internal roads. It should be noted that the pavement design options for the roads have been incorporated in this report as requested.

1.0 Site Description

The site for the proposed subdivision is located approximately 2km west of the central business district of Wagga Wagga, NSW. Part of the site was previously used as sporting grounds (Eric Weissel Oval and bowling greens) with infrastructure including a multi-storey brick leagues club, amenities building with overhead grandstand, light towers, concrete drainage structures, bowling greens, demountable class rooms, asphalt netball courts and concrete kerb & gutter. The site is bound by Kincaid Street to the north, Shaw Street to the east, Thomas Street to the east and Gurwood Street to the South. The site is generally

flat with groundcover of thick overgrown weeds/grasses and, trees were witnessed across parts of the site at the time of the investigation.

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).

3.0 Subsurface Condition

3.1 Proposed Residential Dwellings

The boreholes (BH1 to BH12) drilled across the site (proposed dwelling locations) revealed that the site is underlain by fill comprising topsoil, fine to coarse grained silty sand, fine grained sand and sandy gravel, fine to coarse grained gravelly silty sand, low plasticity clayey silt and low to medium plasticity sandy silty clay to 0.1m to 0.7m (refer to borehole logs) overlying natural alluvial material comprising low plasticity clayey silt, low to medium & medium plasticity silty clay, fine to medium grained silty sand/clayey sand and fine to coarse grained sand, extending to the borehole termination depth at 4.5m in all boreholes. The fill material encountered across the site appeared to have been placed “uncontrolled” and assessed to be “poorly to moderately compacted”.

The moisture condition of the underlying fill and natural material generally varied but less than optimum moisture content throughout the tested profile across the site at the time of the investigation. No groundwater or seepage was encountered during the course of the drilling, however it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test result and visual observation of the resistance by auger TC bit, the underlying fill material is assessed to vary from loose to medium dense and firm to very stiff consistency throughout the fill depth and the natural soil material is assessed to vary from firm to very stiff, medium dense and very stiff to hard consistency throughout the natural profile within the investigated depth at the time of the investigation.

3.2 Proposed Internal Roads

The boreholes (BH13 to BH18) drilled across the proposed internal roads revealed that the site is underlain by fill comprising topsoil to 0.1m, fine to coarse grained sandy silty gravel/sandy gravel/sandy clayey gravel and fine to medium grained silty sand to 0.1m to 0.4m (refer to borehole logs) overlying natural alluvial material comprising low plasticity clayey silt and medium plasticity silty clay, extending to the borehole termination depth at 1.5m in all boreholes. The fill material encountered across the site appeared to have been placed “uncontrolled” and assessed to be “poorly compacted”.

The moisture condition of the underlying fill and natural material generally varied but less than optimum moisture content throughout the profile across the site at the time of the investigation. No groundwater or

seepage was encountered during the course of the drilling, however it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

As per the DCP test result and visual observation of the resistance by auger TC bit, the underlying fill material is assessed to vary from loose to medium dense throughout the fill depth and the natural soil material is assessed to vary from firm to very stiff consistency throughout the natural profile within the investigated depth at the time of the investigation.

4.0 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. Laboratory testing included linear shrinkage, particle size distribution, Atterberg Limit and moisture content and they were carried out at our NATA accredited testing laboratory in Wagga Wagga.

The pH, Electrical Conductivity (EC), chloride and sulphate content and resistivity tests were carried out on a recovered sample from the borehole at the NATA accredited 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, Atterberg Limit and moisture content test is herewith attached. Linear shrinkage test results are incorporated in the respective borehole logs.

5.0 Discussion & Comment

5.1 Site Preparation and Earthworks – Proposed Dwellings & Internal Roads

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 excavation of these materials 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) or 75% of Density Index if it is to be used as subgrade and foundation for the proposed construction. It should be noted that the excavated fill material may be re-used in the construction provided topsoil associated with root fibers are excluded.

It is noted that existing infrastructure as noted above will need to be removed for the redevelopment. The following is recommended for the preparation of the subgrade across the site if shallow footing system or slab-on-ground system is to be adopted;

- Remove topsoil and fill material completely and stockpile for later use for landscaping and backfilling as appropriate. An average stripping depth of 0.1m for topsoil and 0.3 to 0.7m for “uncontrolled fill” is anticipated (refer to borehole logs). However, it should be noted that the fill material may extend deeper underneath the existing buildings & structures.
- All building rubble, footing systems, concrete drainage and asphalt (netball courts) will need to be completely removed and allow the ground to achieve equilibrium moisture condition throughout the soil profile after the removal.

- The exposed natural material should then be scarified to a depth of about 200mm; moisture conditioned to within -2 to 0% of Standard Optimum Moisture Content (SOMC) and compacted to a minimum of 98% of Standard Maximum Dry Density (SMDD). **It should be noted that the underlying clayey 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.**
- Proof roll the exposed natural subgrade using a minimum of 10 passes of 12 tonne dead weight roller to detect any soft, loose or heaving areas.
- Any soft or heave areas, if detected during the process, should be excavated down and backfilled with appropriate approved materials compacted in 150mm thick layers to the minimum equivalent density of 98% of SMDD or 75% Density Index. It should be noted the natural sand material was noted to be affected with moisture and greater than optimum moisture content across the site at the time of the investigation.
- **It should be noted that surface movement on the moisture affected subgrade may be experienced during the construction. The material if affected should be removed and treated as required prior to the placement of any fill material.**
- Replace and re-compact the approved fill material, preferably granular material as specified above.
- Any area of exposed subgrade, which exhibits shrinkage cracking and does not require recompaction, 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 specified density. The boundaries of the fill areas should be sloped to a maximum batter of 1.0 Vertical to 2.0 Horizontal.

The structural fill is to be prepared in such a way that it achieves a minimum of 98% of SMDD or 75% Density Index 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 fill pad 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 the any structure.

If the natural subgrade is to be stabilized, then the exposed clayey silt/silty clay subgrade should be stabilized with lime based additive. It is anticipated that mixing 3% of appropriate additive to the soil material should provide required strength for the subgrade.

5.2 Proposed Dwelling Foundations

It should be noted the existing buildings & structures at the subject site is likely to have significantly modified the soil moisture conditions under the footprints of the proposed new dwellings. Therefore parts of the site may have **“abnormal moisture conditions”** after the removal of the existing buildings & structures 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 shall 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 ‘M-D’ - Moderately reactive deep drying”** classification may be adopted.

It is assessed that the “uncontrolled” fill material encountered across the site is considered “unsuitable” for any structural element of the footing system in its current state. Based on the field and laboratory investigation, the sites not affected by the existing buildings & structures, shall be classified as **“M-D – Moderately reactive deep drying”** in accordance with the Australian Standard AS 2870 -2011 “Residential Slab and Footings”. The footing system may be founded on the prepared subgrade as specified in Section 5.1 or into natural ground. If fill, other than sand and gravel is to be used for filling, then the site classification shall be reviewed.

If the existing 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 building is to be built within the distance equivalent to 75% 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 30kPa/mm founded on natural stiff silty clay material at or below **0.45 to 0.9m** depth from the existing surface (refer borehole logs) or on the prepared subgrade as specified in Section 5.1, provided proper drainage measures are incorporated during and after the construction.

The deep pad footing system, if adopted, may be taken into the underlying very stiff silty clay material at or below 0.8m below existing ground level as required and the footing system may be proportioned for an allowable bearing pressure of 200kPa.

The bored and cast-in-place pile footing system, if adopted, should be taken into the underlying very stiff to hard silty clay material at or below 2.0m below existing ground level as required and the footing system may be proportioned for an allowable end bearing pressure of 300kPa and an allowable shaft adhesion of 30kPa. The skin friction within the top 1.0m depth of natural soil and within structural fill shall be ignored. The average undrained shear strength of 60kPa within natural clay material may be adopted.

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 encountered within natural materials if footing excavations are carried out after prolonged period of rainfall.

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.

The slab panel, internal beams and load support thickening may be founded on the prepared subgrade as specified in Section 5.1 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. The maximum edge beam pressure of the stiffened raft slab should not exceed the allowable bearing capacity of the underlying sand foundation of 100kPa.

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 encountered during the course of the drilling may be encountered and also if the footing excavation is carried out after periods of extreme rainfall. Any such seepage should be readily controllable by conventional sump and pump dewatering systems installed at the base of the excavation. 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 building to ensure surface run-off does not ingress into the founding material. The footing excavations shall be inspected by experienced geotechnical personnel to ensure they achieve the above recommended bearing pressures.

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 structure 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.

5.4 Soil Aggression

The pH value on the underlying natural material was recorded as 8.0 and the soil is therefore considered “slightly alkaline”. EC value of 0.07mS/cm was recorded on the same sample tested, which is assessed to be “low salinity”. The “alkaline nature” of the silty clay material is considered “non-aggressive” towards concrete and “non-corrosive” towards steel. The sulphate content of 20mg/kg and chloride content of 130mg/kg were noted on the same samples tested and they are considered generally low. The low sulphate and chloride levels of the clay material are considered “non-aggressive” towards concrete and “non-corrosive” towards steel. The resistivity value of 20.57Ω.m was recorded on the same silty clay sample tested, which is assessed to be “moderate resistivity”. The “moderate resistivity” is considered to provide a “mildly aggressive” environment towards unprotected steel.

Therefore, the designer is referred to the Cement and Concrete Association of Australia Technical Note 57 for any special precautionary measures required for buried concrete and steel elements into these material.

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 for Internal Roads

The boreholes (BH13 to BH18) revealed that the site is generally underlain by fill comprising topsoil to 0.1m and fine to coarse grained sandy silty gravel/sandy gravel/sandy clayey gravel and fine to medium grained silty sand fill to 0.1m to 0.4m overlying natural alluvial material comprising low plasticity clayey silt and medium plasticity silty clay, extending to the borehole termination depth at 1.5m in all boreholes.

The laboratory 4 day soaked CBR tests indicated CBR values of 3% on medium plasticity silty clay subgrade material, which were compacted at 95% of SMDD and at nearest 100% OMC. The in-situ CBR values correlated from DCP tests indicate CBR values ranging from 3 to 45% on the same subgrade material where measured.

It is assumed that the Wagga Wagga area has an average annual rainfall of less than 1000mm and the subgrade would be prepared as discussed in Section 5.1. Based on these evaluations and assumptions, the design subgrade CBR value of 3.0% and a subgrade reaction modulus (k) of 50kPa/mm is recommended for the pavement design of the proposed pavement areas provided strict control on drainage measures is maintained throughout the pavement life.

It should be noted that the underlying subgrade in its natural state is considered “not suitable” for vehicle movements. We therefore highly recommend preparation of the subgrade as specified in Section 5.1 and pavement shall be constructed on the top of the prepared subgrade as required.

6.0 Pavement Design

The client representative recommends to adopt the design traffic of 5×10^5 ESA for all roads. In adopting the design subgrade CBR value of 3.0% as discussed above and the design traffic given, one of the following pavement designs, as a minimum, may be adopted.

Design Option 1 – Pavement with Asphalt Concrete & Granular Material (DGS20 & Select Fill)

30mm Asphalt (AC10) – 1100Mpa
120mm RMS DGS20 or equivalent (Ev= 250Mpa)
130mm RMS DGS40 or equivalent (Ev= 250Mpa)
240mm Select Fill material* (Ev=150Mpa)
Subgrade CBR 3%

Note: * - (i) Select fill material should have a CBR \geq 20% and a plasticity index (PI) <12% in its original state before addition of additive.

(ii) Select fill material should be modified with 2% hydrated lime if CBR <20% and/or PI>12%.

The above pavement will give a design life of 30 years, according to Circlly 5.0u, using the given design parameters, provided proper drainage measures are incorporated at the site. It should be noted that this does not allow any tolerance on pavement layers.

Design Option 2 – Pavement with Asphalt Concrete, Granular Material (DGS20) & Stabilised Subgrade

30mm Asphalt (AC10) – 1100Mpa
120mm RMS DGS 20 or equivalent (Ev= 250Mpa)
130mm RMS DGS40 or equivalent (Ev= 250Mpa)
250mm Stabilised Silt/Clay subgrade layer (stabilized with 3% lime based additive as appropriate) (Ev= 100Mpa)
Subgrade CBR 3.0%

The above pavement will give a design life of 30 years, according to Circlly 5.0u, using the given design parameters, provided proper drainage measures are incorporated at the site. It should be noted that this does not allow any tolerance on pavement layers.

Design Option 3 – Granular Pavement (DGS20 & Select Fill material) with 2 Coat Spray Seal

7mm Primerseal followed by 14mm Seal

140mm RMS DGS20 or equivalent (Ev=250Mpa)
130mm RMS DGS40 or equivalent (Ev= 250Mpa)
250mm Select Fill material* (Ev=150Mpa)
Subgrade CBR 3%

Note: * - (i) Select fill material should have a CBR \geq 20% and a plasticity index (PI) <12% in its original state before addition of additive.

(ii) Select fill material should be modified with 2% hydrated lime if CBR <20% and/or PI>12%.

The above pavement will give a design life of 35 years, according to Circlly 5.0u, using the given parameters, provided proper drainage measures are incorporated at the site. It should be noted that no tolerance is allowed on pavement layers.

Design Option 4 – Granular Pavement (DGS20) & Stabilised Subgrade with 2 Coat Spray Seal

7mm Primerseal followed by 14mm Seal

150mm RMS DGS20 or equivalent (Ev=250Mpa)
130mm RMS DGS40 or equivalent (Ev= 250Mpa)
250mm Stabilised Silt/Clay subgrade layer (stabilized with 3% lime based additive as appropriate) (Ev= 100Mpa)
Subgrade CBR 3%

The above pavement will give a design life of 35 years, according to Circlly 5.0u, using the given parameters, provided proper drainage measures are incorporated at the site. It should be noted that no tolerance is allowed on pavement layers.

7.0 General Comment

- The material specified as pavement material as per above designs may be used provided the material meets all criteria as shown in Table 242.3 and 242.4 of AusSpec for NGS20/NGS40 or RMS DGS20 specification. It is therefore highly recommended to use those similar quality materials and to undertake on-going quality control test to ensure that the material quality is maintained throughout the construction.
- The pavement materials shall be compacted to a minimum of 102% SMDD for base and 100% SMDD for sub-base and select fill or as per Council Specification. It is highly recommended that the degree of compaction shall be verified by relevant NATA accredited testing laboratory.

- An adequate drainage system must be formed to maintain constant moisture conditions in the pavement and subgrade below the pavement. It should be noted that if the pavement material in the existing adjoining pavement is found to be different from the material proposed in the above pavement designs, then interface trench drain should be incorporated at the joints between existing and new pavements as required. The trench drain of 300x300mm may be placed below base layer and be extended to about 300mm.
- It should be noted that site preparation might expose wet subgrade material if excavation is carried out after prolonged period of rainfall. Trafficability in the clayey silt/silty clay materials for wheeled vehicles can be expected to be difficult during and following rainfall if 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 Locations
- Borehole logs & Material Schedule with Explanatory Note
- Dynamic Cone Penetrometer Test Report
- Laboratory Test Reports by Aitken Rowe Testing Laboratories Pty Ltd
- Laboratory Test Report by Sydney Environmental & Soil Laboratory Pty Ltd
- Circly Pavement Design Printouts

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.

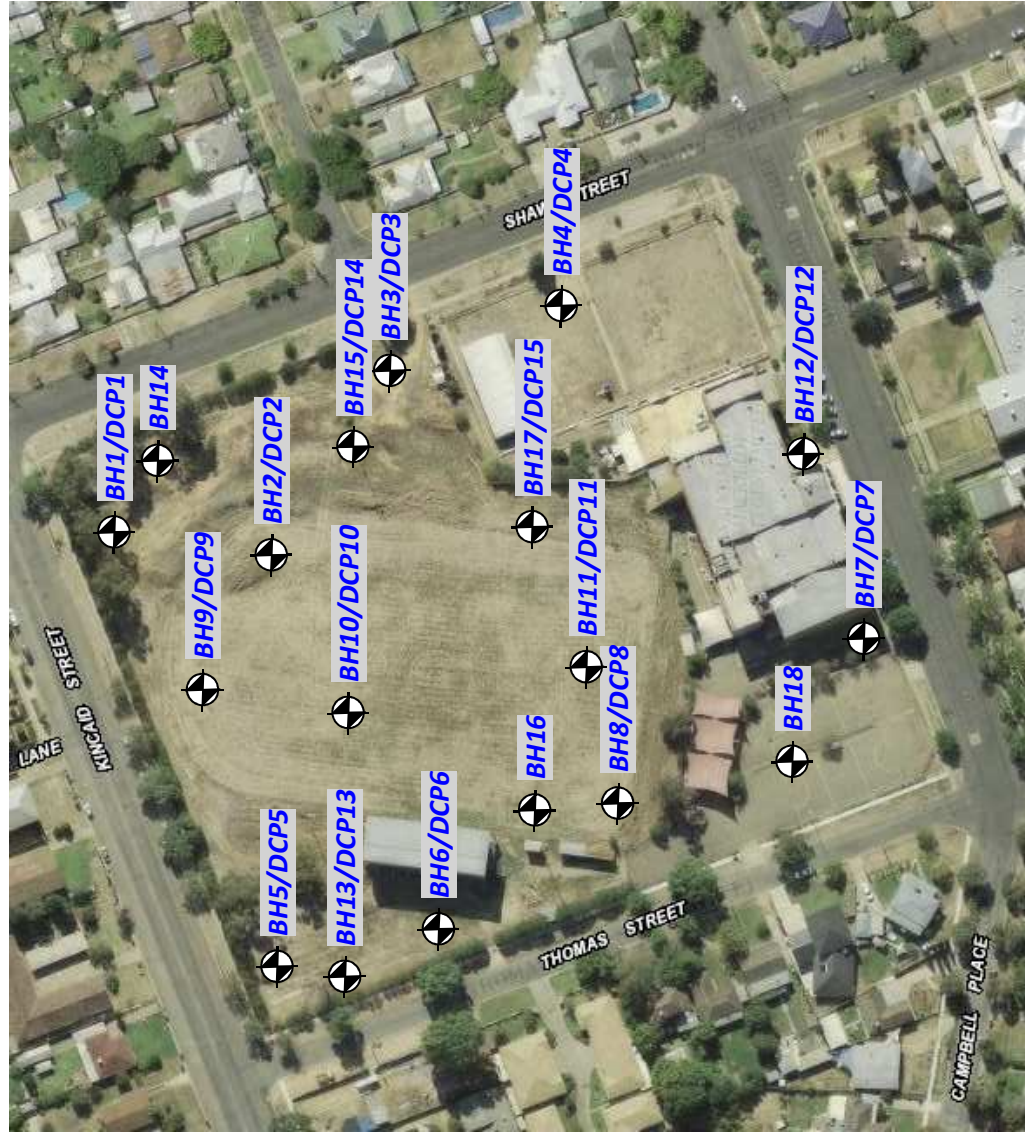
The recommendations in this report are based on the following: -

- 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 his 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.

Notwithstanding 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: S14-352

Client: NASH BROS BUILDERS PTY LTD – WAGGA WAGGA, NSW
Project: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN –
WAGGA LEAGUES CLUB REDEVELOPMENT, GURWOOD
STREET, WAGGA WAGGA, NSW
BOREHOLE & DCP TEST LOCATION PLAN

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: 5

Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: 28/10/2014

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample		Lab. Test	Remarks & Field Records
					Type	No.	L.S. %	
ML	FILL/TOPSOIL: Clayey SILT; low plasticity, brown, with fine sand		MC<PL	F				FILL: Appears poorly compacted 'Uncontrolled'
ML	Clayey SILT; low plasticity, brown, with fine sand			St.	D	5A	4.5	NATURAL
CL-CI	Silty CLAY; low to medium plasticity, brown, trace sand	0.5		VSt.				
					D	5B	8.5	
CI	Silty CLAY; medium plasticity, grey brown, trace sand	1.0		VSt.-H				
					D	5C	10.0	
CL-CI	Silty CLAY; low to medium plasticity, brown, trace sand	1.5						
					D	5D	8.5	
		2.0						
CI	Silty CLAY; medium plasticity, yellow brown, trace sand	2.5			D	5E	11.0	
			D	MD				
SC	Clayey SAND; fine grained, light brown, fines of low plasticity	3.0			D	5F	6.0	
		3.5						
SP	SAND; fine grained, yellow brown, with fines of low plasticity	4.0						
SP	SAND; fine to coarse grained, cream brown, with non plastic fines	4.5						
	End of Borehole (BHS) @ 4.5m							
		5.0						
		5.5						
Registration No.: S14-352 Project/Location: Geotechnical Investigation and Pavement Design - Wagga Leagues Club Redevelopment, Gurwood Street, Wagga Wagga Client: Nash Bros Builders Pty Ltd							Logged By: J.L.G	
							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: 7/11/2014		
USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/Rel. Density	Sample		Lab. Test	Remarks & Field Records
					Type	No.		
SM	FILL/TOPSOIL: Silty SAND; fine grained, brown, fines of low plasticity	0.5	D-M	L-MD				FILL: Appears moderately compacted 'Uncontrolled'
SM	FILL: Silty SAND; fine to medium grained, brown, fines of low plasticity		M					
SM	FILL: Gravelly Silty SAND; fine to coarse grained, dark brown, fine to medium gravel, fines of low plasticity							
SC	FILL: Clayey SAND; fine to medium grained, mottled grey orange brown, fines of low plasticity	MC>PL	St.	NATURAL				
ML	Clayey SILT; low plasticity, grey, with fine sand							
CL-CI	Silty CLAY; low to medium plasticity, brown, with fine sand							
CI	Silty CLAY; medium plasticity, grey brown, trace sand	MC<PL	VSt.					
CI	Silty CLAY; medium plasticity, orange brown, trace sand							VSt.-H
CI	Silty CLAY; medium plasticity, light brown, trace sand							
CI	Silty CLAY; medium plasticity, yellow brown, trace sand	3.5	D					
SM	Silty SAND; fine grained, light brown, fines of low plasticity							
	End of Borehole (BH10) @ 4.5m							
		5.0						
		5.5						
Registration No.: S14-352 Project/Location: Geotechnical Investigation and Pavement Design - Wagga Leagues Club Redevelopment, Gurwood Street, Wagga Wagga Client: Nash Bros Builders Pty Ltd							Logged By: J.L.G	
							Scale: As shown	
							Dry on completion	

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga NSW 2650

Pavement & Subgrade Investigation - Materials Schedule and Log



CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW					PAGE: 1 OF 2									
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN					DATE: 28/10/2014									
WAGGA LEAGUES CLUB REDEVELOPMENT, GURWOOD STREET, WAGGA WAGGA, NSW					REGO. NO.: S14-352									
STAFF: J.L.G					Other Comments									
SAMPLING METHOD : AS1289.1.2.1					CLAUSE : 6.5.3									
Borehole No. and Location	Layer Sample No.	Depth (mm)	Group Symbol	Field Description (layer, type, plasticity / particle size, colour, secondary components)	Moisture Conditions	Strength Comments	Moistures (FMC=Field MC) (OMC=Optimum MC) (FMC/OMC=Moisture Ratio)			Dynamic Cone Penetrometer (NB not equiv. to lab soaked CBR)		(CBR%)	Other Comments	
					OMC	FMC	FMC/ OMC			Depth In Subgrade (mm)	Equiv. CBR %	4 day (95% Rel. Comp.)		
BH13		0-100	ML	FILL/TOPSOIL: Sandy SILT; low plasticity, brown, fine to medium sand	<PL	F							FILL Appears poorly compacted	
		100-200	GL	FILL: Sandy Silty GRAVEL; fine to coarse grained, grey, fine to coarse sand, fines low plasticity	D-M	L							'Uncontrolled'	
	13A	200-500	ML	Clayey SILT; low plasticity, grey brown, with fine sand	MC>PL	F	23.5			200-500	3		NATURAL	
	13B	500-700	CI	Silty CLAY; medium plasticity, grey brown, trace sand	MC>PL	St.	18.7			500-700	7			
	13C	700-1300	CI	Silty CLAY; medium plasticity, grey, trace sand	MC<PL	VSt.				700-1100	35			
	13D	1300-1500	CI	Silty CLAY; medium plasticity, light brown, trace sand	MC<PL	VSt.				1100-1500	42			
				End of Borehole (BH13) @ 1.5m										
BH14		0-100		FILL: Sandy GRAVEL; fine to coarse grained, orange brown, fine to coarse sand, with non plastic fines	D	L							FILL Appears poorly compacted	
													'Uncontrolled'	
		100-400	ML	Clayey SILT; low plasticity, grey brown, with fine sand	MC<PL	St.							NATURAL	
	14A	400-1100	CI	Silty CLAY; medium plasticity, brown, trace sand & gravel	MC<PL	VSt.	20.1	13.1	0.65			3.0		
		1100-1500	CI	Silty CLAY; medium plasticity, orange brown, trace sand	MC<PL	VSt.								
				End of Borehole (BH14) @ 1.5m										
BH15		0-100	CI	FILL/TOPSOIL: Silty CLAY; medium plasticity, mottled red orange brown, with fine sand	MC>PL	F							FILL Appears poorly compacted	
													'Uncontrolled'	
		100-400	SM	FILL: Silty SAND; fine to medium grained, grey, fines of low plasticity	M-W	L								
		400-500	ML	Clayey SILT; low plasticity, grey, with fine sand	MC>PL	F							NATURAL	
		500-1300	CI	Silty CLAY; medium plasticity, grey, trace sand	MC>PL	F-St.				400-1300	5			
		1300-1500	CI	Silty CLAY; medium plasticity, light grey, trace sand	MC<PL	VSt.				1300-1500	32			
				End of Borehole (BH15) @ 1.5m										

Pavement & Subgrade Investigation - Materials Schedule and Log

[illegible]

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	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.
	5	
	7	
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 M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Consistency (Cohesive Soils)	VS S F St. V.St. H	VERY SOFT – unconfined compressive strength less than 25kPa. SOFT – unconfined compressive strength 25-50 kPa. FIRM – unconfined compressive strength 50-100kPa. STIFF – unconfined compressive strength 100-200kPa. VERY STIFF – unconfined compressive strength 200 – 400kPa. HARD – unconfined compressive strength greater than 400kPa.
Relative Density (Cohensionless Soils)	VL L MD D VD	ID – Density index Range % S.P.T. 'N' Value Range Blows/300mm Very Loose <15 0-4 Loose 15-35 4-10 Medium Dense 35-65 10-30 Dense 65-85 30-50 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. % I_{ss}	Linear Shrinkage (As per RTA Method T113) Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)
Remarks	'V' bit 'TC' bit T⁶⁰	Hardened steel 'V' shaped bit. Tungsten Carbide wing bit. Penetration of auger string in mm under static load of rig rear axle without rotation of augers.

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 1 (BH1)

PAGE: 1 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

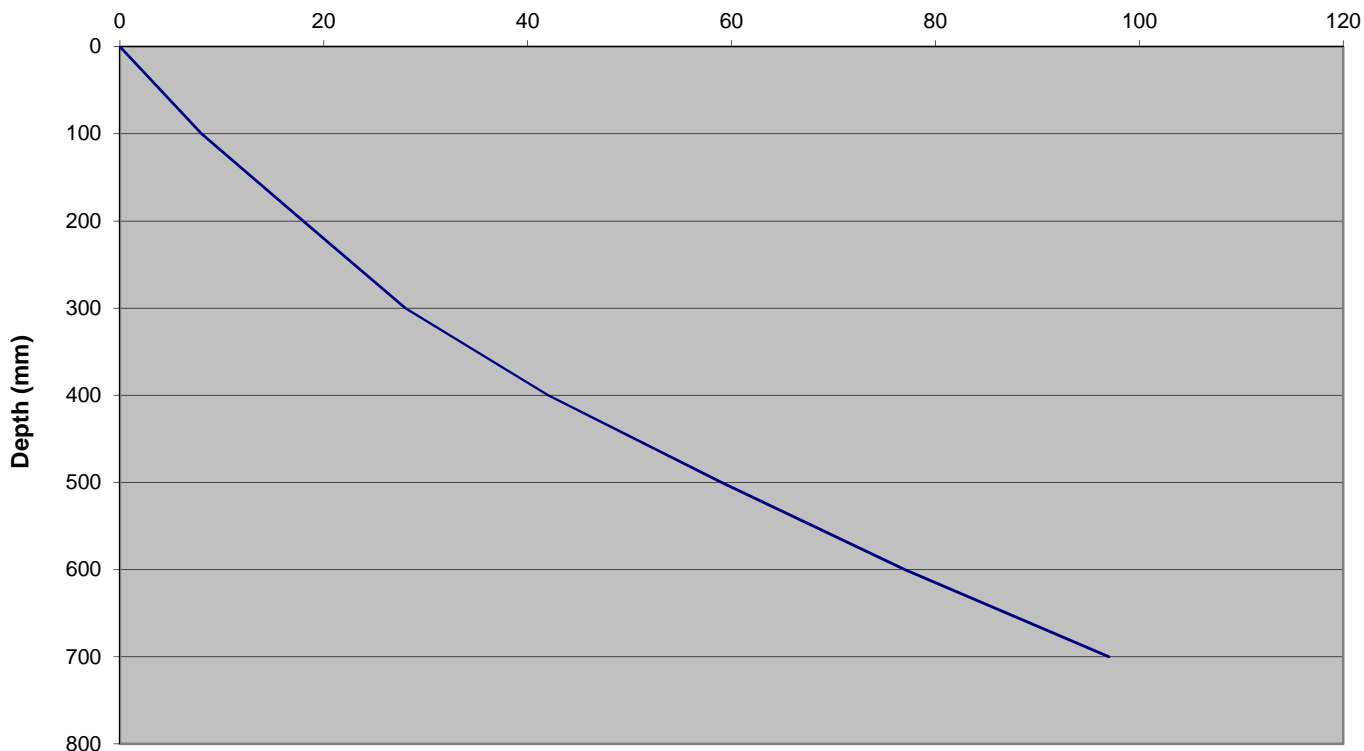
MOISTURE CONDITION: REFER TO BH LOGS

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	8	17	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	10	23	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	10	23	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	14	35	1.8 - 1.9	*	*	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	17	44	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	18	48	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	*	*

Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 2 (BH2)

PAGE: 2 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

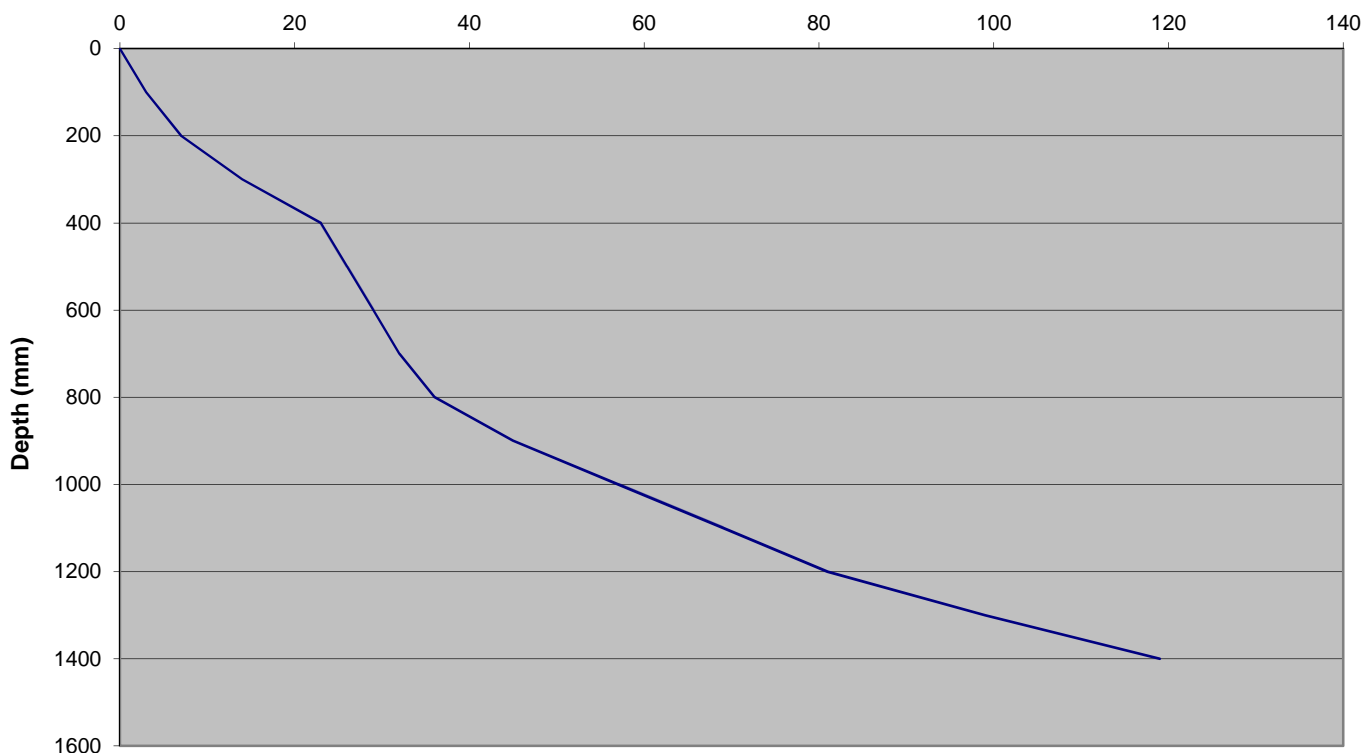
MOISTURE CONDITION: REFER TO BH LOGS

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	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	7	14	1.7 - 1.8	*	*	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	9	20	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	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	4	7	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	9	20	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	12	28	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	12	28	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	18	48	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	20	55	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	*	*


Cumulative Blows



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DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 3 (BH3)

PAGE: 3 OF: 15

REGISTRATION NO: S14-352

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

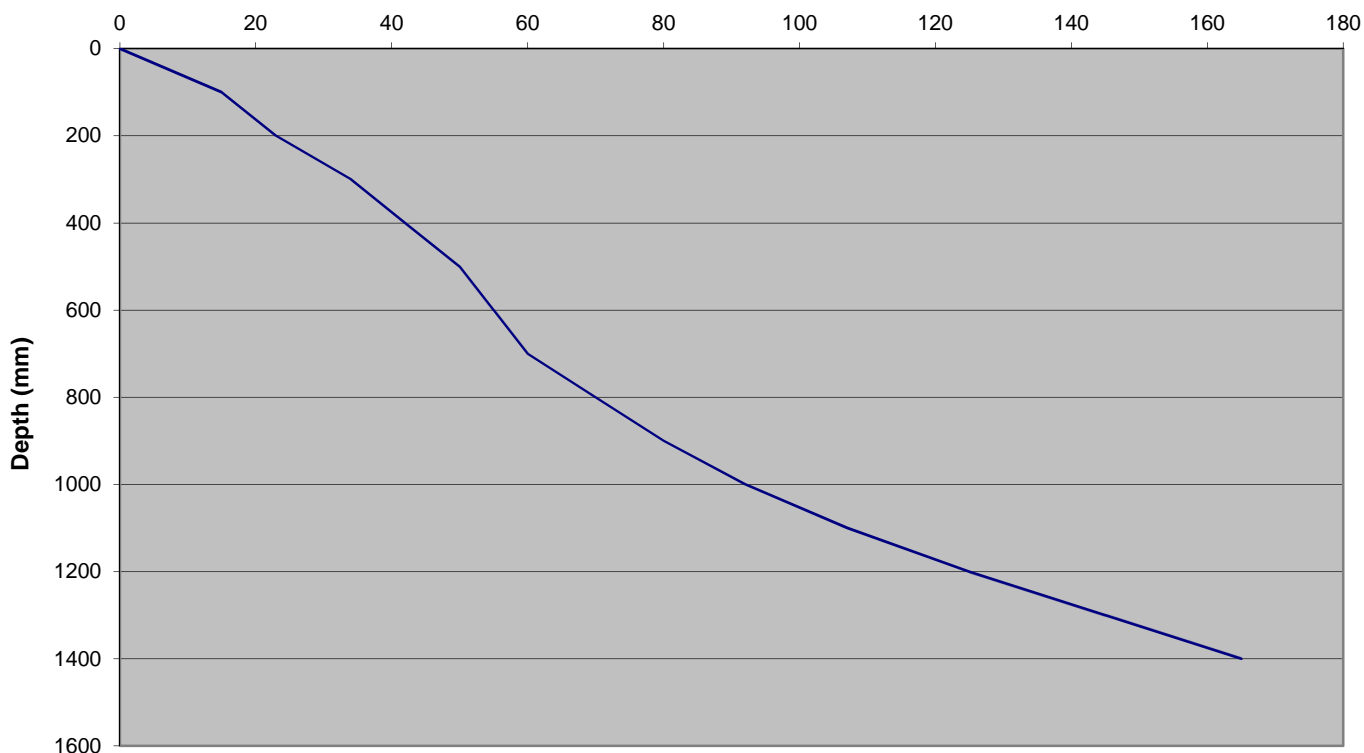
MOISTURE CONDITION: REFER TO BH LOGS

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	15	38	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	8	17	1.6 - 1.7	*	*	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	11	25	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	8	17	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	5	9	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	5	9	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	10	23	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	10	23	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	12	28	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	15	38	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	18	48	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	20	55	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	*	*


Cumulative Blows



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Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 4 (BH4)

PAGE: 4 OF: 15

REGISTRATION NO: S14-352

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

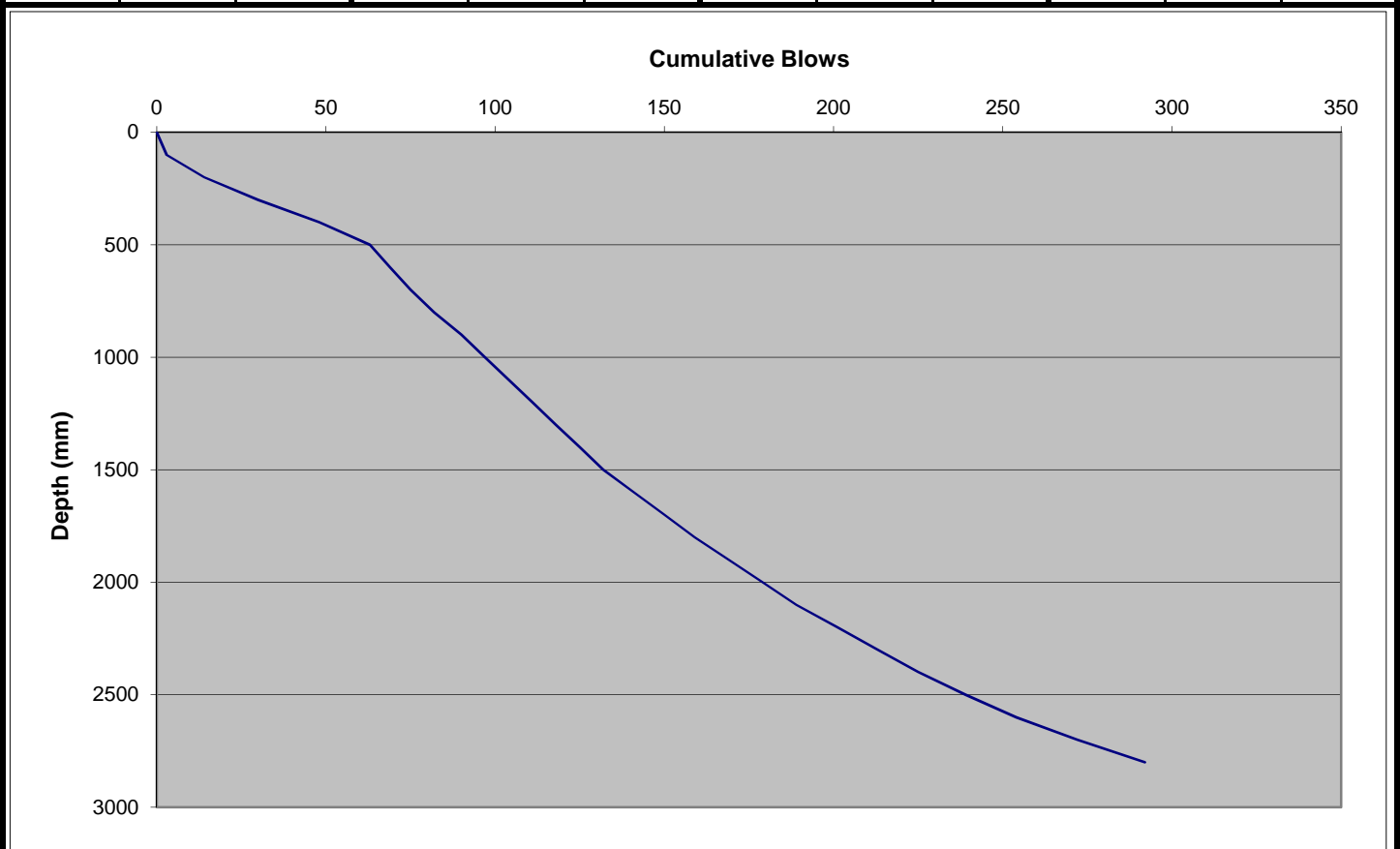
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

MOISTURE CONDITION: REFER TO BH 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	3	5	1.5 - 1.6	7	14	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	11	25	1.6 - 1.7	9	20	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	16	41	1.7 - 1.8	9	20	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	18	48	1.8 - 1.9	10	23	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	15	38	1.9 - 2.0	10	23	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	6	12	2.0 - 2.1	10	23	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	6	12	2.1 - 2.2	12	28	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	7	14	2.2 - 2.3	12	28	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	8	17	2.3 - 2.4	12	28	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	7	14	2.4 - 2.5	14	35	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	7	14	2.5 - 2.6	15	38	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	7	14	2.6 - 2.7	18	48	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	7	14	2.7 - 2.8	20	55	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	7	14	2.8 - 2.9	END	*	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: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 5 (BH5)

PAGE: 5 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

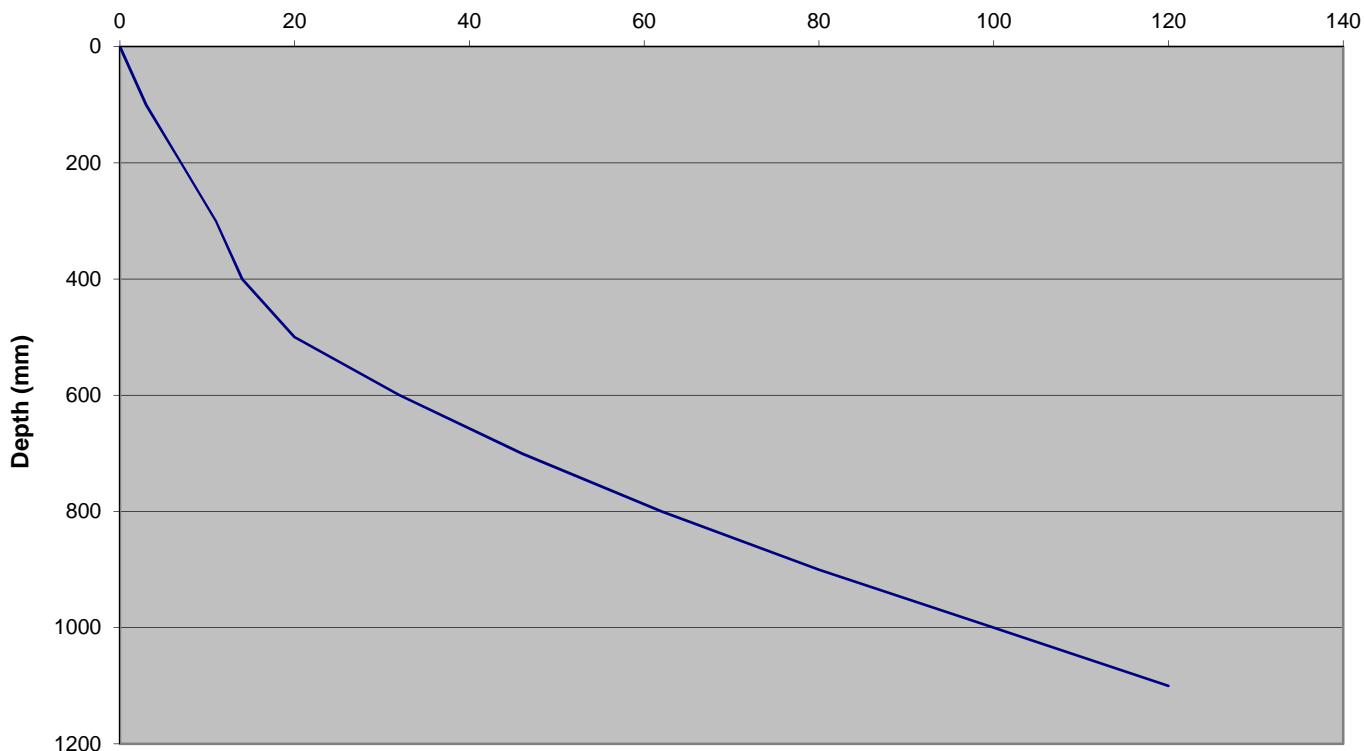
MOISTURE CONDITION: REFER TO BH LOGS

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	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	6	12	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	12	28	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	16	41	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	18	48	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	20	55	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	END	*	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	*	*

Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 6 (BH6)

PAGE: 6 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

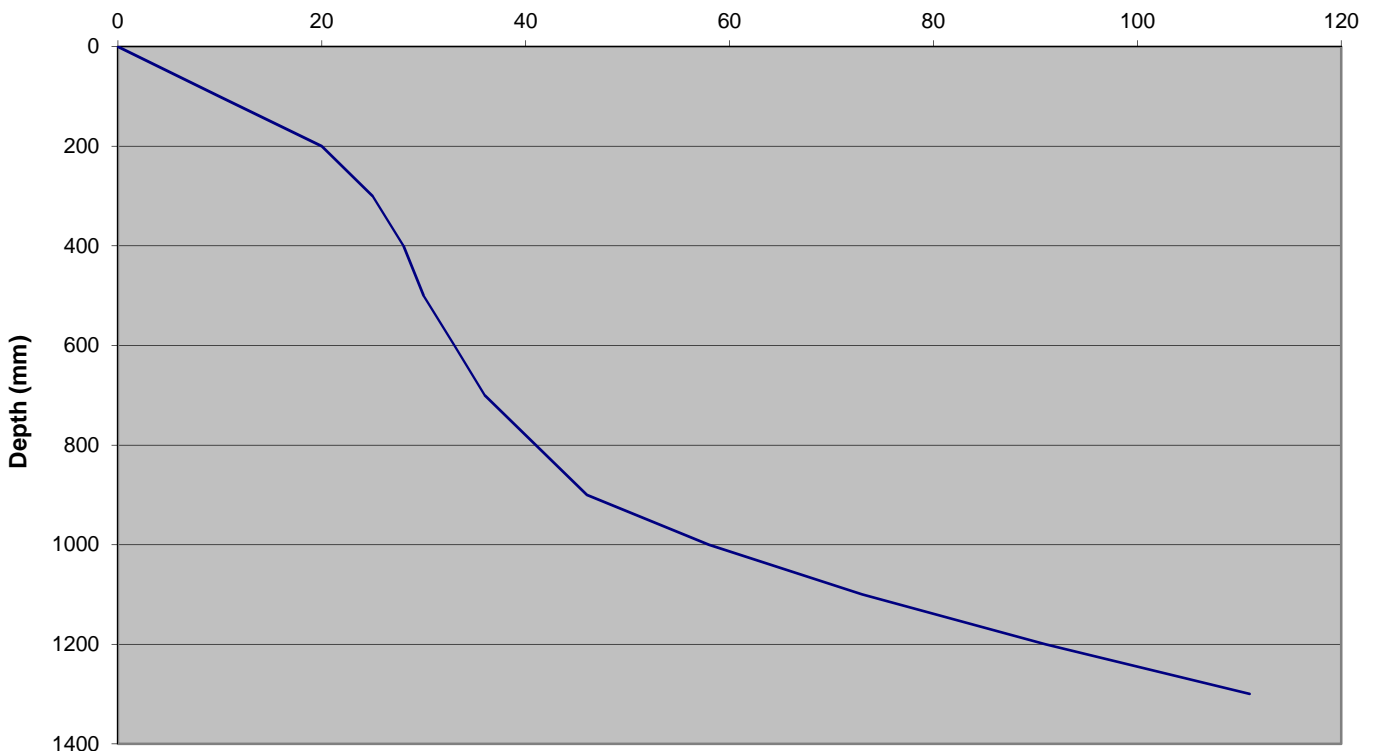
MOISTURE CONDITION: REFER TO BH LOGS

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	10	23	1.5 - 1.6	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	10	23	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	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	5	9	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	12	28	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	15	38	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	18	48	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	*	*

Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 7 (BH7)

PAGE: 7 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

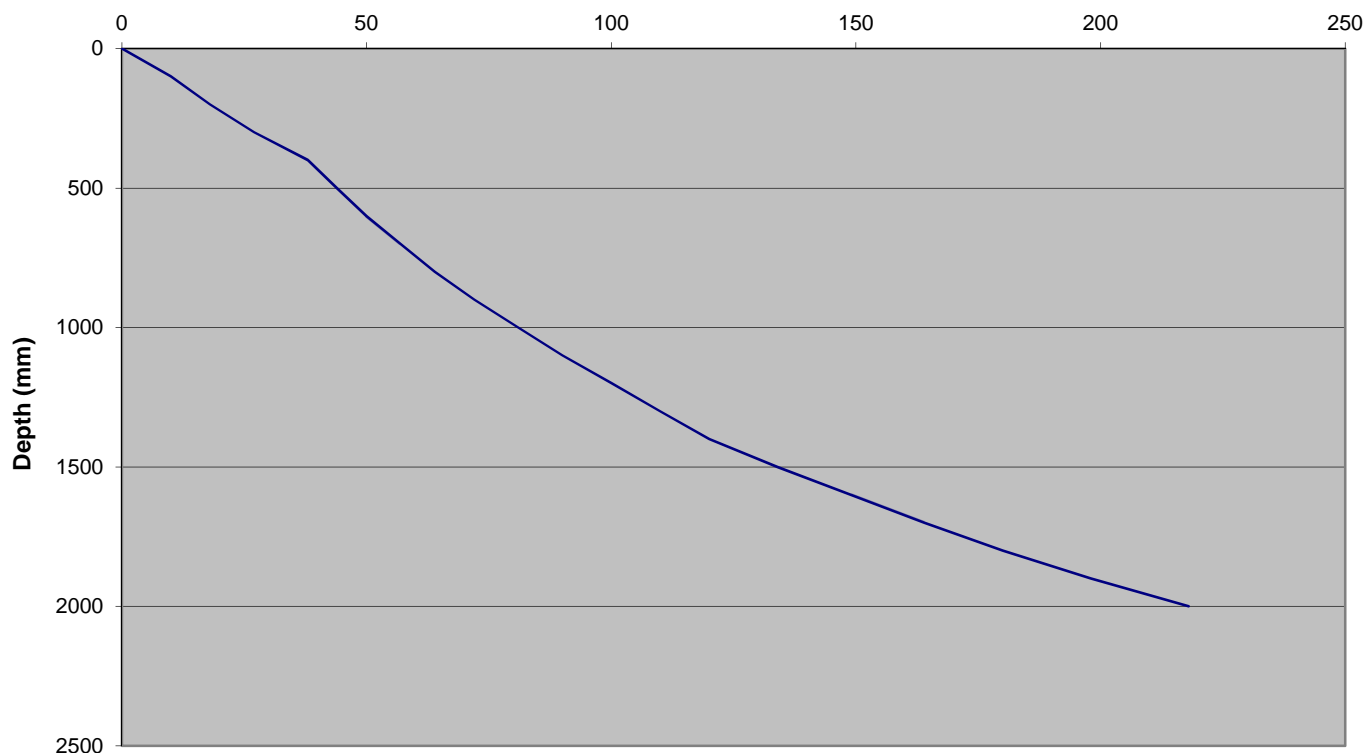
MOISTURE CONDITION: REFER TO BH LOGS

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	10	23	1.5 - 1.6	14	35	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	8	17	1.6 - 1.7	15	38	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	9	20	1.7 - 1.8	16	41	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	11	25	1.8 - 1.9	18	48	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	6	12	1.9 - 2.0	20	55	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	6	12	2.0 - 2.1	END	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	7	14	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	7	14	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	8	17	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	9	20	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	10	23	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	10	23	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	*	*


Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 8 (BH8)

PAGE: 8 OF: 15

REGISTRATION NO: S14-352

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

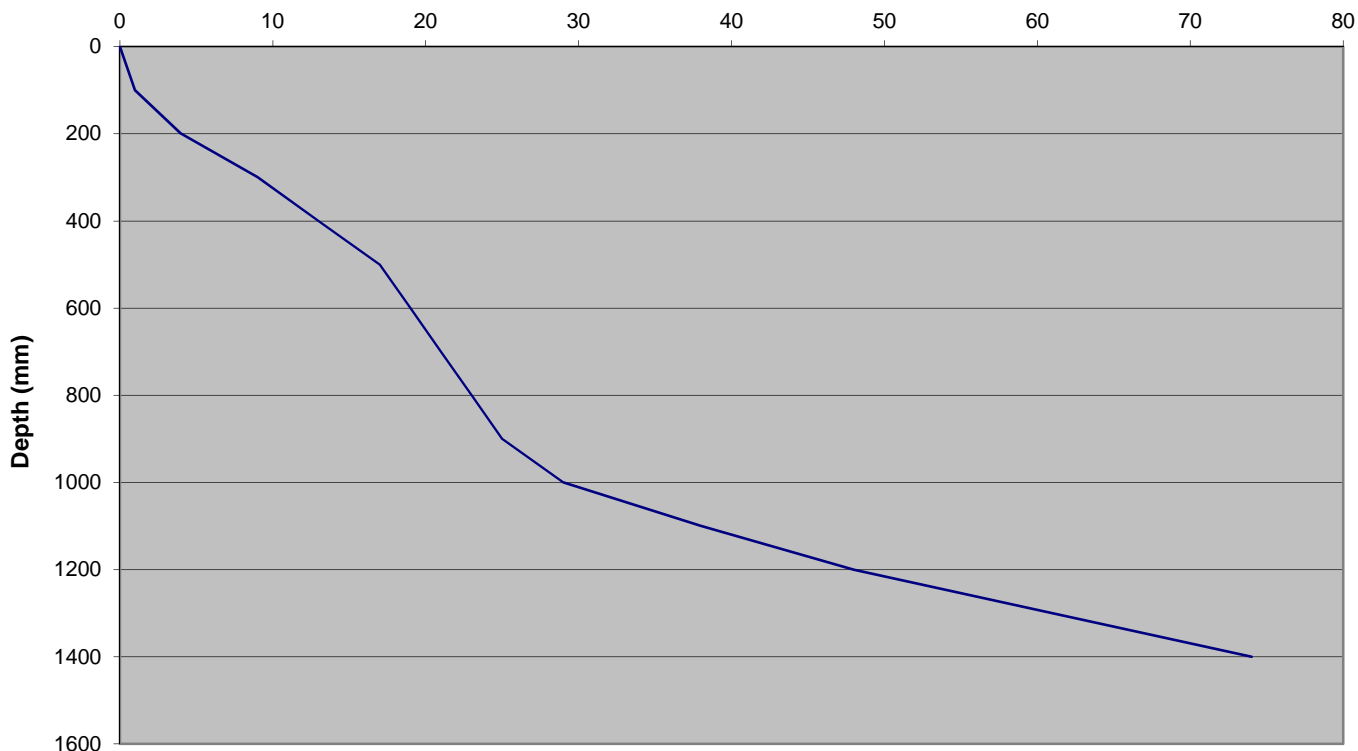
MOISTURE CONDITION: REFER TO BH LOGS

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	3	5	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	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	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	2	3	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	9	20	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	10	23	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	13	32	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	13	32	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	15	38	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*


Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 9 (BH9)

PAGE: 9 OF: 15

REGISTRATION NO: S14-352

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

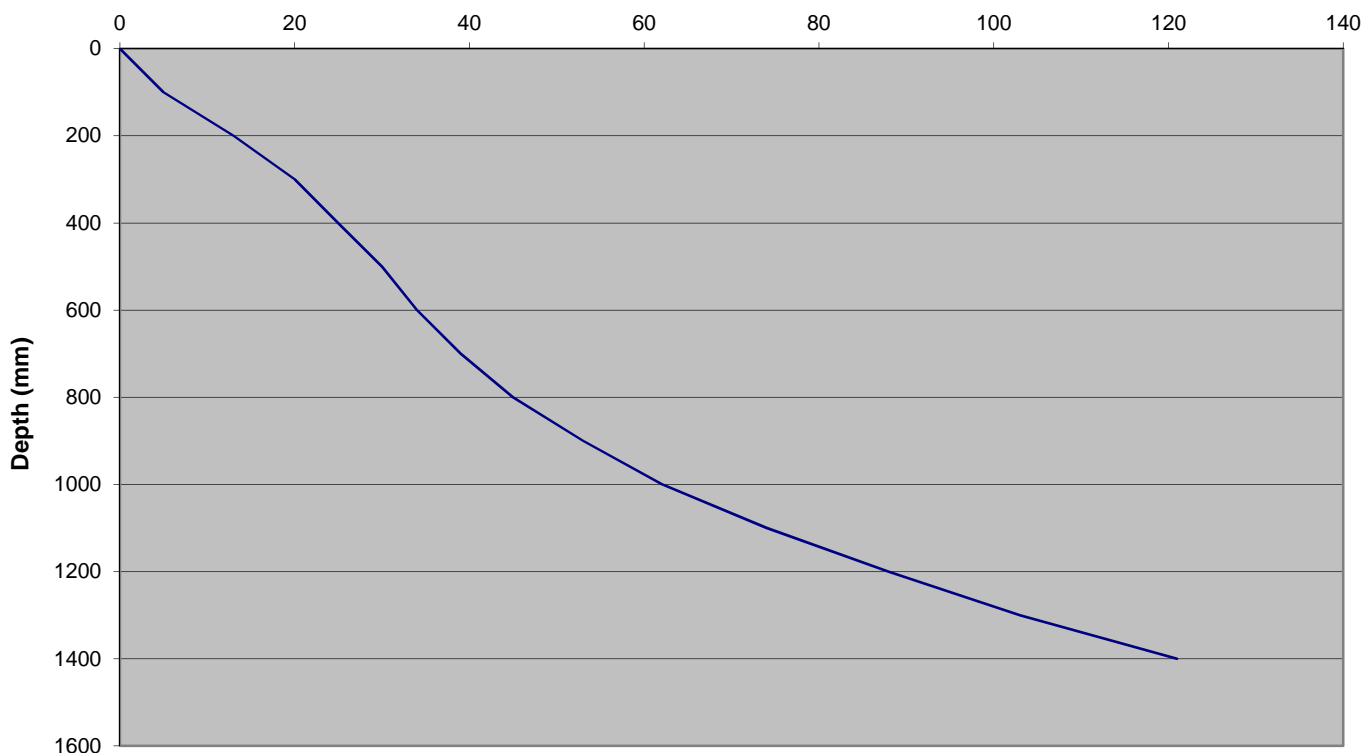
MOISTURE CONDITION: REFER TO BH LOGS

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	5	9	1.5 - 1.6	END	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	8	17	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	5	9	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	4	7	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	5	9	2.1 - 2.2	*	*	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	6	12	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	8	17	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	9	20	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	14	35	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	15	38	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	18	48	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	*	*


Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 10 (BH10)

PAGE: 10 OF: 15

REGISTRATION NO: S14-352

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

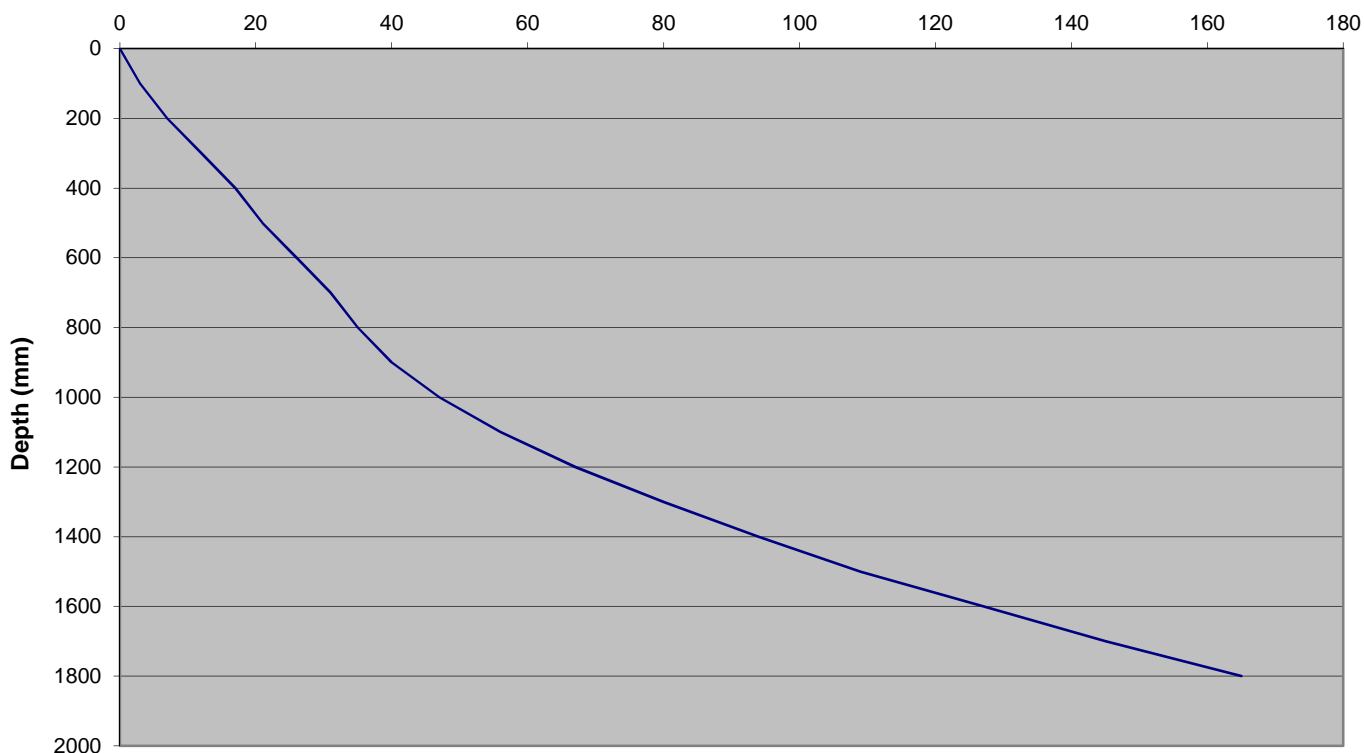
MOISTURE CONDITION: REFER TO BH LOGS

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	3	5	1.5 - 1.6	15	38	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	4	7	1.6 - 1.7	18	48	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	5	9	1.7 - 1.8	20	55	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	5	9	1.8 - 1.9	END	*	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	5	9	2.0 - 2.1	*	*	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	5	9	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	9	20	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	11	25	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	13	32	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	14	35	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	15	38	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*


Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 11 (BH11)

PAGE: 11 OF: 15

REGISTRATION NO: S14-352

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

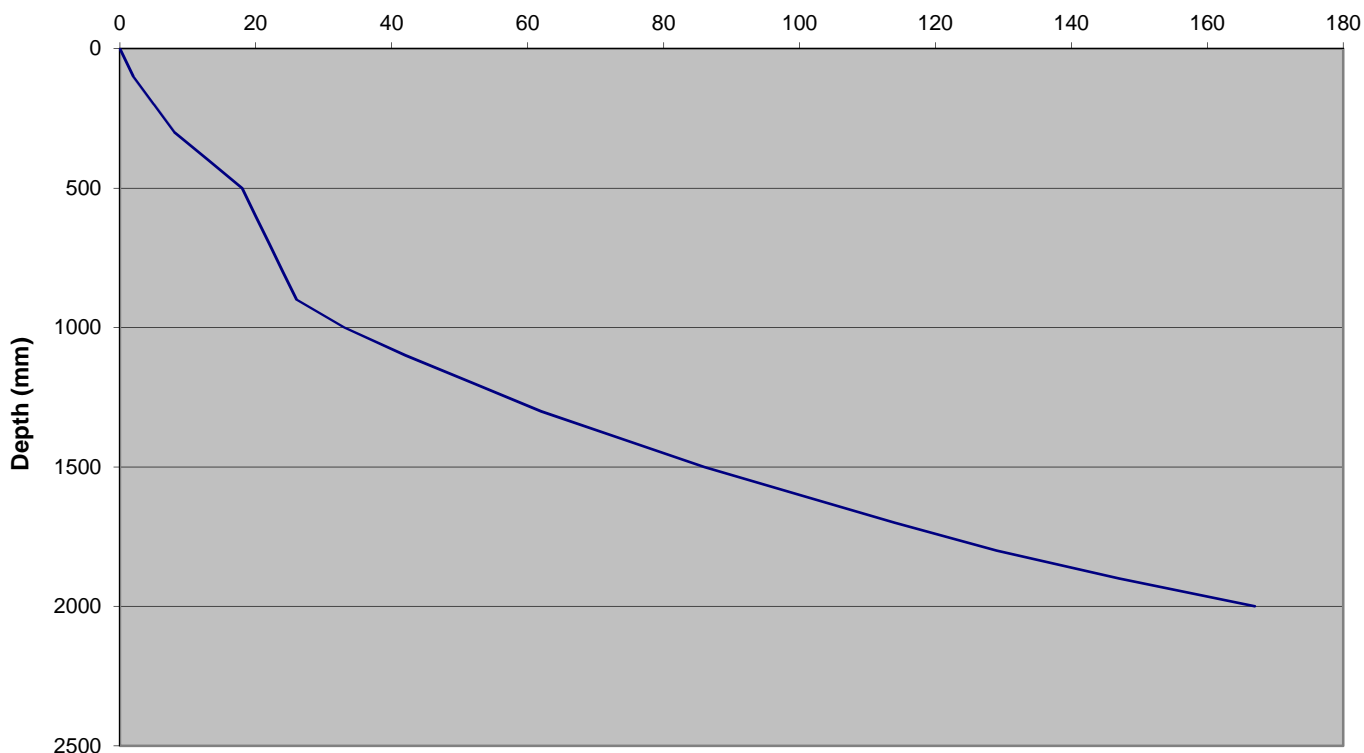
MOISTURE CONDITION: REFER TO BH LOGS

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	12	28	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	3	5	1.6 - 1.7	14	35	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	3	5	1.7 - 1.8	15	38	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	5	9	1.8 - 1.9	18	48	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	5	9	1.9 - 2.0	20	55	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	2	3	2.0 - 2.1	END	*	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	2	3	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	9	20	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	10	23	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	10	23	2.7 - 2.8	*	*	4.2 - 4.3	*	*	5.7 - 5.8	*	*
1.3 - 1.4	12	28	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	12	28	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*


Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 12 (BH12)

PAGE: 12 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 7/11/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

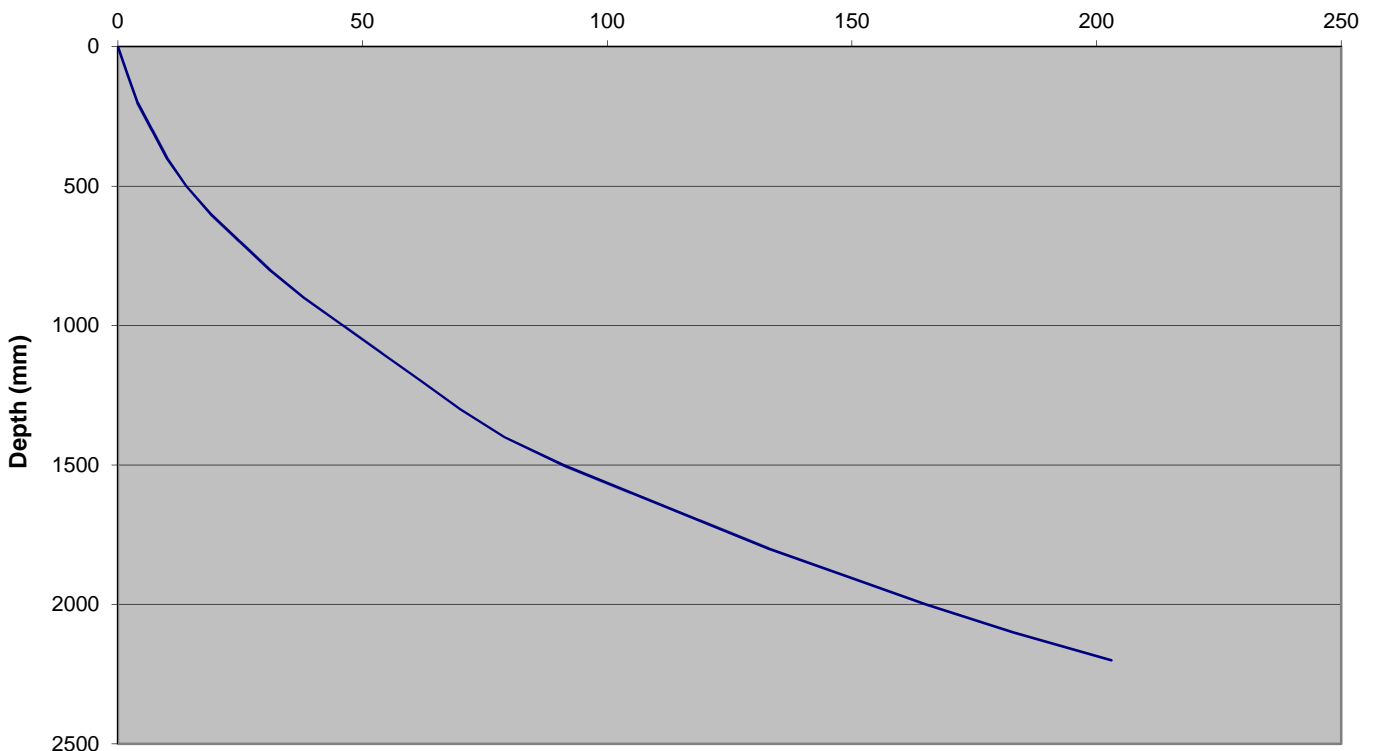
MOISTURE CONDITION: REFER TO BH LOGS

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	12	28	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	2	3	1.6 - 1.7	14	35	3.1 - 3.2	*	*	4.6 - 4.7	*	*
0.2 - 0.3	3	5	1.7 - 1.8	14	35	3.2 - 3.3	*	*	4.7 - 4.8	*	*
0.3 - 0.4	3	5	1.8 - 1.9	16	41	3.3 - 3.4	*	*	4.8 - 4.9	*	*
0.4 - 0.5	4	7	1.9 - 2.0	16	41	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	5	9	2.0 - 2.1	18	48	3.5 - 3.6	*	*	5.0 - 5.1	*	*
0.6 - 0.7	6	12	2.1 - 2.2	20	55	3.6 - 3.7	*	*	5.1 - 5.2	*	*
0.7 - 0.8	6	12	2.2 - 2.3	END	*	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	8	17	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	8	17	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	8	17	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	9	20	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*

Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 13 (BH13)

PAGE: 13 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

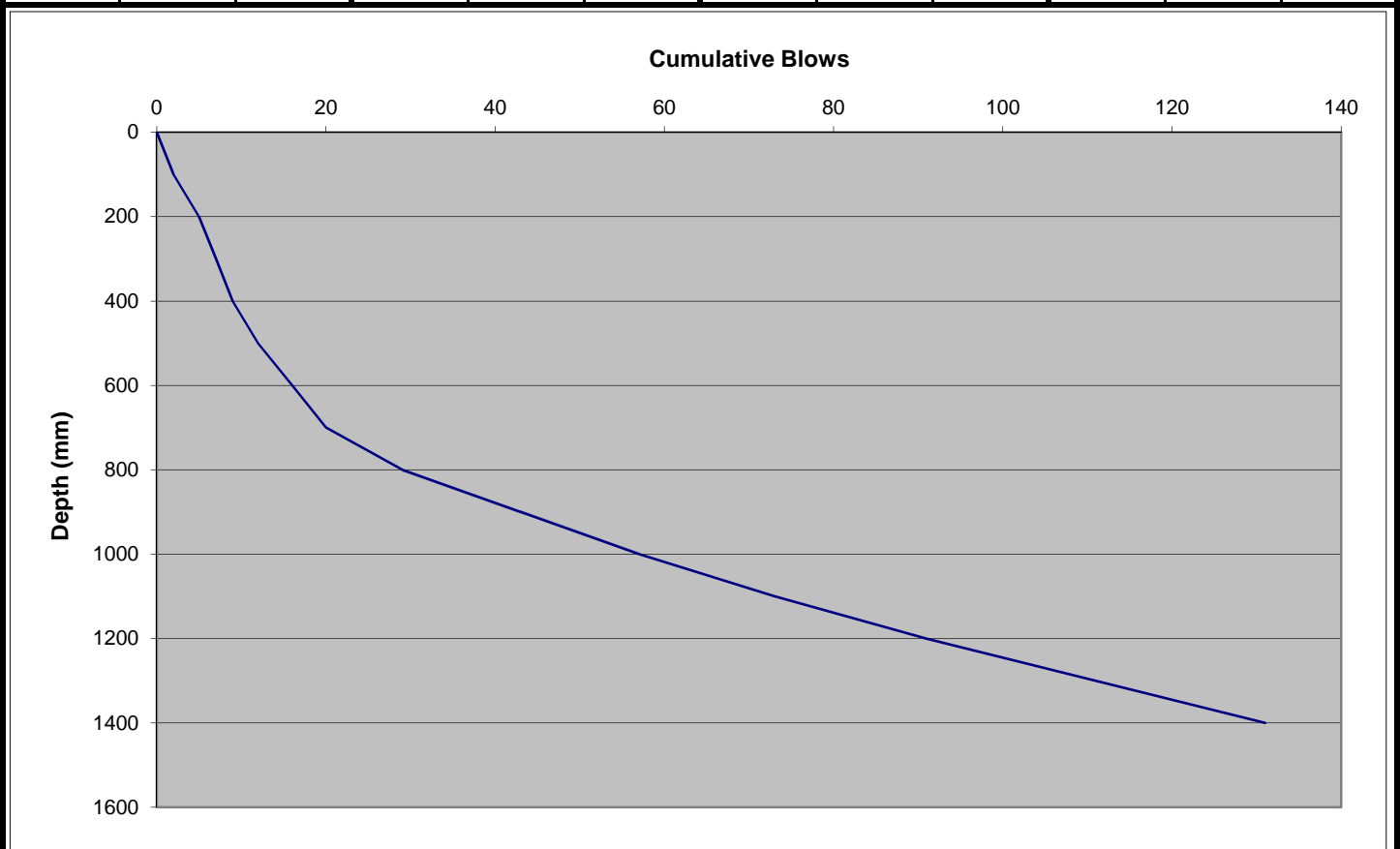
SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

MOISTURE CONDITION: REFER TO BH 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	*	*	3.0 - 3.1	*	*	4.5 - 4.6	*	*
0.1 - 0.2	3	5	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	3	5	1.9 - 2.0	*	*	3.4 - 3.5	*	*	4.9 - 5.0	*	*
0.5 - 0.6	4	7	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	9	20	2.2 - 2.3	*	*	3.7 - 3.8	*	*	5.2 - 5.3	*	*
0.8 - 0.9	14	35	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	14	35	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	16	41	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	18	48	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	20	55	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	*	*



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 14 (BH15)

PAGE: 14 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

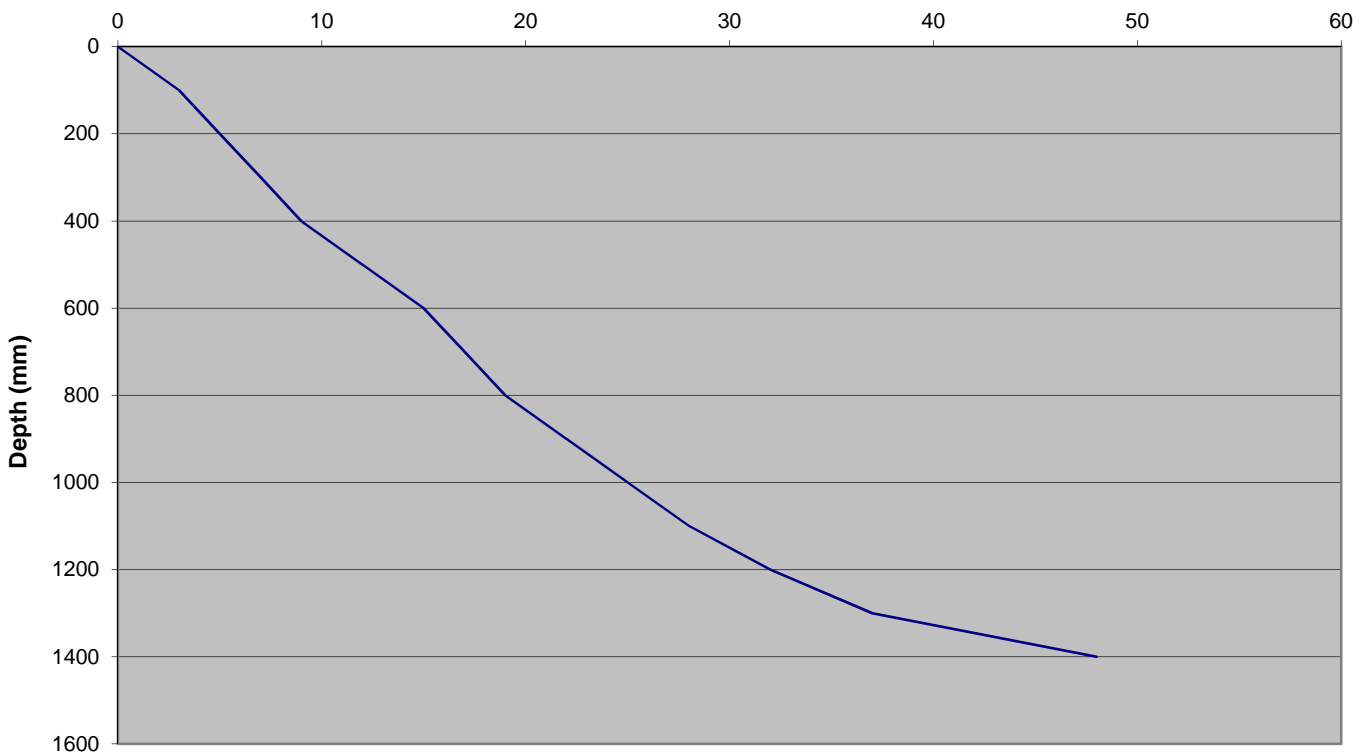
MOISTURE CONDITION: REFER TO BH LOGS

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	3	5	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	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	3	5	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	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	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	3	5	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	11	25	2.8 - 2.9	*	*	4.3 - 4.4	*	*	5.8 - 5.9	*	*
1.4 - 1.5	15	38	2.9 - 3.0	*	*	4.4 - 4.5	*	*	5.9 - 6.0	*	*

Cumulative Blows



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Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

Aitken Rowe Testing Laboratories Pty Ltd

4/2 Riedell Street, Wagga Wagga 2650

DYNAMIC CONE PENETROMETER REPORT

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
PROJECT: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
LOCATION: GURWOOD STREET, WAGGA WAGGA, NSW DCP: 15 (BH17)

PAGE: 15 OF: 15

REGISTRATION NO: **S14-352**

DATE OF TEST: 28/10/2014

DEPTH BELOW FSL (mm): NIL

SOIL DESCRIPTION: REFER TO BOREHOLE LOGS

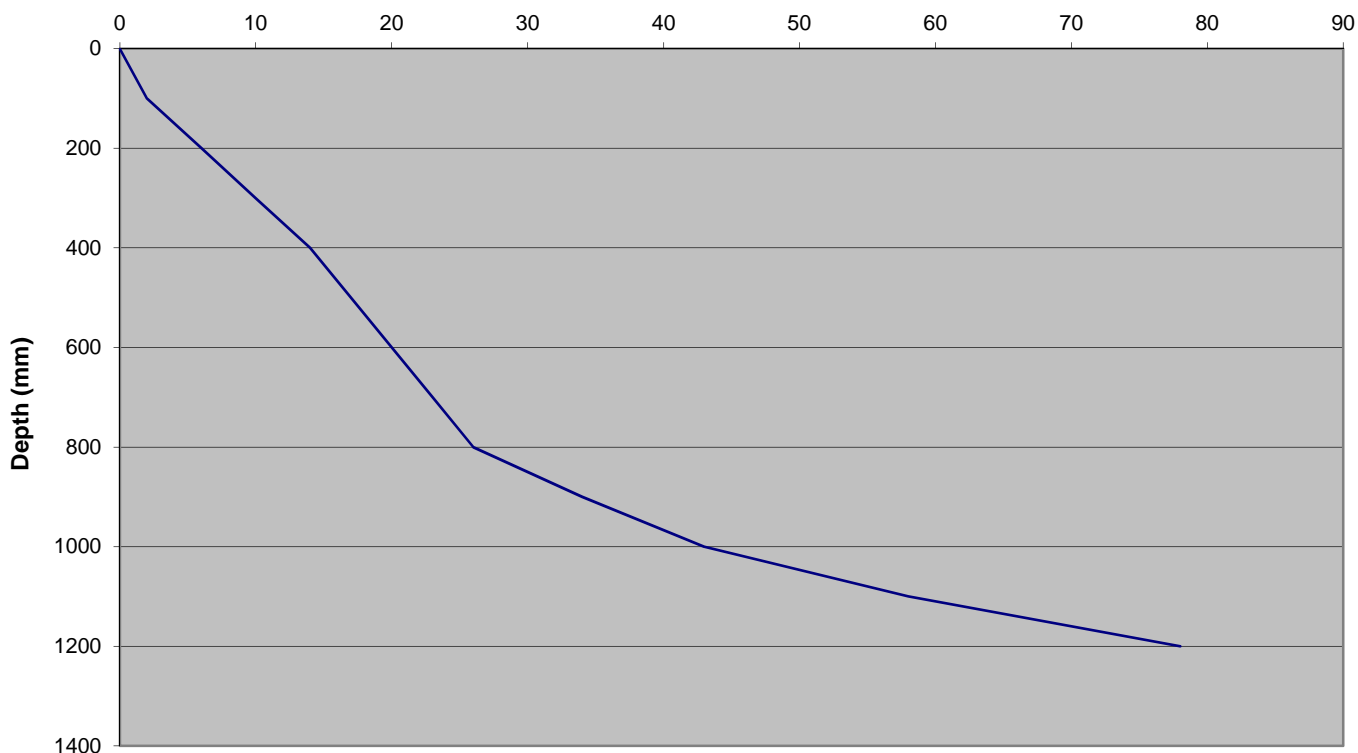
MOISTURE CONDITION: REFER TO BH LOGS

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	*	*	3.0 - 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	4	7	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	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	8	17	2.3 - 2.4	*	*	3.8 - 3.9	*	*	5.3 - 5.4	*	*
0.9 - 1.0	9	20	2.4 - 2.5	*	*	3.9 - 4.0	*	*	5.4 - 5.5	*	*
1.0 - 1.1	15	38	2.5 - 2.6	*	*	4.0 - 4.1	*	*	5.5 - 5.6	*	*
1.1 - 1.2	20	55	2.6 - 2.7	*	*	4.1 - 4.2	*	*	5.6 - 5.7	*	*
1.2 - 1.3	END	*	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	*	*


Cumulative Blows



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

Number: 4679

REMARKS:

APPROVED SIGNATORY: 

J. GORNALL

DATE: 11/11/2014

**AITKEN ROWE Testing Laboratories Pty Ltd**

4/2 Riedell St. Wagga Wagga N.S.W. 2650

TEST REPORT**GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS**

CLIENT : NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
 JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
 WAGGA LEAGUES CLUB REDEVELOPMENT
 GURWOOD STREET, WAGGA WAGGA, NSW

PAGE: 1

OF: 2

SUBMITTED BY : ARTL
 DATE SAMPLED: 28/10/14 & 7/11/14
 DATE SUBMITTED: 28/10/14 & 7/11/14
 SAMPLING METHOD: AS1289.1.2.1
 SAMPLING CLAUSE: 6.5.3
 ORDER No.: 200

MATERIAL SOURCE : IN SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : CLAYEY SILT/SILTY CLAY

REGISTRATION No : **S14-352**

SAMPLE NUMBER :			1A	1B	5A	5B	13A	13B
SAMPLING LOCATION :			BH1	BH1	BH5	BH5	BH13	BH13
DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :			200-400	600-1000	100-400	600-800	200-500	500-700
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 %		*	*	*	*	*	*
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
T107	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	*	*	*	*	*	*
	B-	PASS 75/425 µm %	*	*	*	*	*	*
	C-	BELOW 13.5/75 µm %	*	*	*	*	*	*
AS1289.3.1.2	LIQUID LIMIT %		*	*	*	*	*	*
AS1289.3.2.1	PLASTIC LIMIT %		*	*	*	*	*	*
AS1289.3.3.1	PLASTICITY INDEX		*	*	*	*	*	*
	PREPARATION METHOD		*	*	*	*	*	*
T111	STANDARD MAX. DRY DENSITY (1L MLD, A.1ii) t/m ³		*	*	*	*	*	*
	OPTIMUM MOISTURE CONTENT %		*	*	*	*	*	*
T113	LINEAR SHRINKAGE %		*	*	*	*	*	*
T120	FIELD MOISTURE CONTENT %		10.2	12.4	16.1	15.7	23.5	18.7
AS1289.3.8.1 (AIR DRIED)	EMERSON CLASS		*	*	*	*	*	*
	TYPE OF WATER		*	*	*	*	*	*
	TEMPERATURE OF WATER °C		*	*	*	*	*	*
AS1289.6.7.2 FALLING HEAD	COEFFICIENT OF PERMEABILITY m/sec.		*	*	*	*	*	*
	LABORATORY MOISTURE RATIO %		*	*	*	*	*	*
	LABORATORY DENSITY RATIO %		*	*	*	*	*	*
	% OVERSIZE DISCARDED (+19.0mm)		*	*	*	*	*	*
	SURCHARGE MASS APPLIED (1L MOULD, 3kPa)		*	*	*	*	*	*

ACCREDITED FOR
**TECHNICAL
COMPETENCE**

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

Number: 4679

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

APPROVED SIGNATORY :

Jarrod Gornall

DATE: 11/11/2014

**AITKEN ROWE Testing Laboratories Pty Ltd**

4/2 Riedell St. Wagga Wagga N.S.W. 2650

TEST REPORT**GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS**

CLIENT : NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
 JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
 WAGGA LEAGUES CLUB REDEVELOPMENT
 GURWOOD STREET, WAGGA WAGGA, NSW

PAGE: 2

OF: 2

SUBMITTED BY : ARTL
 DATE SAMPLED: 28/10/14 & 7/11/14
 DATE SUBMITTED: 28/10/14 & 7/11/14
 SAMPLING METHOD: AS1289.1.2.1
 SAMPLING CLAUSE: 6.5.3
 ORDER No.: 200

MATERIAL SOURCE : IN SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : SILTY CLAY

REGISTRATION No : **S14-352**

SAMPLE NUMBER :			14A	16A	*	*	*	*
SAMPLING LOCATION :			BH14	BH16	*	*	*	*
DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :			400-1100	600-1400	*	*	*	*
TESTS	TEST ELEMENT		*	*	*	*	*	*
T106	PASS 75.0mm SIEVE %		*	*	*	*	*	*
	PASS 53.0mm SIEVE %		*	*	*	*	*	*
	PASS 37.5mm SIEVE %		*	*	*	*	*	*
	PASS 26.5mm SIEVE %		*	*	*	*	*	*
	PASS 19.0mm SIEVE %		100	*	*	*	*	*
	PASS 13.2mm SIEVE %		99	*	*	*	*	*
	PASS 9.50mm SIEVE %		98	*	*	*	*	*
	PASS 6.70mm SIEVE %		98	*	*	*	*	*
	PASS 4.75mm SIEVE %		98	*	*	*	*	*
	PASS 2.36mm SIEVE %		97	100	*	*	*	*
T107	WHOLE SAMPLE	PASS 425 µm SIEVE %	96	97	*	*	*	*
		PASS 75 µm SIEVE %	92	92	*	*	*	*
		LESS THAN 13.5 µm %	73	75	*	*	*	*
T107	-2.36mm	PASS 425 µm SIEVE %	98	97	*	*	*	*
		PASS 75 µm SIEVE %	95	92	*	*	*	*
		LESS THAN 13.5 µm %	75	75	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
RATIOS	A-	PASS 425 µm %	98	97	*	*	*	*
	B-	PASS 75/425 µm %	96	95	*	*	*	*
	C-	BELOW 13.5/75 µm %	80	81	*	*	*	*
AS1289.3.1.2	LIQUID LIMIT %		43	45	*	*	*	*
AS1289.3.2.1	PLASTIC LIMIT %		20	19	*	*	*	*
AS1289.3.3.1	PLASTICITY INDEX		23	26	*	*	*	*
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 %		*	*	*	*	*	*
T120	FIELD MOISTURE CONTENT %		13.1	14.4	*	*	*	*
AS1289.3.8.1 (AIR DRIED)	EMERSON CLASS		*	*	*	*	*	*
	TYPE OF WATER		*	*	*	*	*	*
	TEMPERATURE OF WATER °C		*	*	*	*	*	*
AS1289.6.7.2 FALLING HEAD	COEFFICIENT OF PERMEABILITY m/sec.		*	*	*	*	*	*
	LABORATORY MOISTURE RATIO %		*	*	*	*	*	*
	LABORATORY DENSITY RATIO %		*	*	*	*	*	*
	% OVERSIZE DISCARDED (+19.0mm)		*	*	*	*	*	*
	SURCHARGE MASS APPLIED (1L MOULD, 3kPa)		*	*	*	*	*	*

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 Australian/national standards.

Number: 4679

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

APPROVED SIGNATORY :

Jarrod Gornall

DATE: 11/11/2014

AITKEN ROWE Testing Laboratories Pty Ltd

4/2 Riedell St. Wagga Wagga N.S.W. 2650

TEST REPORT**CALIFORNIA BEARING RATIO OF SOILS AND GRAVELS**

CLIENT: NASH BROS BUILDERS PTY LTD - WAGGA WAGGA, NSW
JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION & PAVEMENT DESIGN
WAGGA LEAGUES CLUB REDEVELOPMENT
GURWOOD STREET, WAGGA WAGGA, NSW

SOURCE OF MATERIAL : IN-SITU BOREHOLES

LOT NO:

PROPOSED USE: DESIGN

ORDER No.: 200

PAGE: 1

OF: 1

SUBMITTED BY : ARTL

NO OF SAMPLES : 2

DATE RECEIVED : 7/11/2014

TEST METHODS : T111

T117

SAMPLING PROCEDURE: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

REGISTRATION NO : R6 **S14-352**

SAMPLE NO:	14A	16A	*	*	*
SITE OR LOCATION	BH14	BH16	*	*	*
DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm)	400-1100	600-1400	*	*	*
ADDITIVE IF STABILISED	*	*	*	*	*
AMOUNT OF ADDITIVE (%)	*	*	*	*	*
TYPE OF COMPACTION (Standard/modified)	STANDARD	STANDARD	*	*	*
MATERIAL RETAINED ON THE 19.0mm SIEVE (%)	0.0	0.0	*	*	*
OPTIMUM MOISTURE CONTENT (%)	20.1	19.9	*	*	*
MAXIMUM DRY DENSITY (t/m ³)	1.68	1.72	*	*	*
MOULDING MOISTURE CONTENT (%)	20.2	19.7	*	*	*
DRY DENSITY OF TEST SPECIMEN (t/m ³)	1.60	1.63	*	*	*
SPECIFIED LDR (%)	95	95	*	*	*
ACTUAL LDR (%)	95	95	*	*	*
MOISTURE CONTENTS : TOP 30 mm	25.0	26.4	*	*	*
WHOLE SAMPLE	23.8	22.2	*	*	*
ABSORPTION (%)	3.6	2.5	*	*	*
SPECIFIED LMR (%)	100	100	*	*	*
ACTUAL LMR (%)	101	99	*	*	*
NUMBER OF DAYS SOAKING	4	4	*	*	*
SWELL (%)	1.7	2.4	*	*	*
CBR OBTAINED FROM PENETRATION (mm)	2.5	2.5	*	*	*
CALIFORNIA BEARING RATIO (%)	3	3	*	*	*

NOTES: T117 specifications: LMR - 3% to +2%

LDR ± 1%

COMMENTS: *



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

Number: 4679

APPROVED SIGNATORY : 

J. GORNALL

DATE : 11/11/2014



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°: 32481 Sample N°: 1 Date Received: 31/10/14 Report Status: ☐ Draft ☒ Final

Client Name: Aitken Rowe Testing Laboratories Project Name: REF: S14-352
Client Contact: Gary Lyons SESL Quote N°:
Client Job N°: Sample Name: 1C
Client Order N°: Description: Soil
Address: PO Box 5158 Test Type: ARTL
WAGGA WAGGA NSW 2650

TEST	RESULT	COMMENTS
pH in water (1:5)	8.0	Slight Alkalinity
EC mS/cm (1:5)	0.07	Low Salinity
Texture Class		
Soil Permeability Class		Did Not Test
SOLUBLE ANION ANALYSIS		
Sulphate (1:5) mgSO ₄ / kg	20	Low (non to mildly aggressive)
Chloride (1:5) mgCl / kg	130	Low (non-aggressive)
* Resistivity Ω. m	20.57	Moderate Resistivity (non to mildly aggressive)
* Resistivity tested on a saturated sample/paste		(Note:- 10,000 mg/kg = 1%)

Recommendations

For the purposes of this corrosion and scaling assessment of soils towards concrete structures with steel reinforcement, concrete and steel piles, this soil shows a slight alkalinity, low salinity, low sulphate, low chloride and moderate 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 non to mildly 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.

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 low to mild.

pH, EC, Soluble SO₄: Bradley et al., (1983); Cl, (4500-Cl- E; APHA, 1998);
Resistivity, AS1289.4.4.1:1997, Texture - PM0003 (Texture- "Northcote" (1992))

Date Report Generated
7/11/2014

Consultant:
Andrew Jacovides

Authorised Signatory:
Kelly Lee

CIRCLY Version 5.0u (8 April 2013)

Job Title: S14-352 Proposed Wagga Leagues Club Redevelopment, Gurwood Street, Wagga Wagga, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:

One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Load No.	Load ID	Movements
1	ESA75-Full	5.00E+05

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:

Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Asph1100	Iso.	1.10E+03	0.40			
2	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
3	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
4	rough	Gran_150	Aniso.	1.50E+02	0.35	1.11E+02	7.50E+01	0.35
5	rough	Sub_CBR3	Aniso.	3.00E+01	0.45	2.07E+01	1.50E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
1	bottom	Asph2000	ETH	0.004322	5.000	1.100
5	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors: Not Used.

Details of Layers to be sublayered:

Layer no. 2: Austroads (2004) sublayering
Layer no. 3: Austroads (2004) sublayering
Layer no. 4: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	30.00	Asph1100	ESA75-Full	-3.38E-04	1.60E+00
2	120.00	Gran_250		n/a	n/a
3	130.00	Gran_250		n/a	n/a
4	240.00	Gran_150		n/a	n/a
5	0.00	Sub_CBR3	ESA75-Full	1.08E-03	2.21E-01

CIRCLY Version 5.0u (8 April 2013)

Job Title: S14-352 Proposed Wagga Leagues Club Redevelopment, Gurwood Street, Wagga Wagga, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:

One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Load No.	Load ID	Movements
1	ESA75-Full	5.00E+05

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:

Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Asph1100	Iso.	1.10E+03	0.40			
2	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
3	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
4	rough	subsltCB10	Aniso.	1.00E+02	0.45	6.90E+01	5.00E+01	0.45
5	rough	Sub_CBR3	Aniso.	3.00E+01	0.45	2.07E+01	1.50E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
1	bottom	Asph2000	ETH	0.004322	5.000	1.100
4	top	selAus2004	EZZ	0.009300	7.000	1.600
5	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors: Not Used.

Details of Layers to be sublayered:

Layer no. 2: Austroads (2004) sublayering
Layer no. 3: Austroads (2004) sublayering
Layer no. 4: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	30.00	Asph1100	ESA75-Full	-3.55E-04	2.05E+00
2	120.00	Gran_250		n/a	n/a
3	130.00	Gran_250		n/a	n/a
4	250.00	subsltCB10	ESA75-Full	1.02E-03	1.49E-01
5	0.00	Sub_CBR3	ESA75-Full	1.07E-03	2.09E-01

CIRCLY Version 5.0u (8 April 2013)

Job Title: S14-352 Proposed Wagga Leagues Club Redevelopment, Gurwood Street, Wagga Wagga, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:

One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Load No.	Load ID	Movements
1	ESA75-Full	5.00E+05

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:

Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
2	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
3	rough	Gran_150	Aniso.	1.50E+02	0.35	1.11E+02	7.50E+01	0.35
4	rough	Sub_CBR3	Aniso.	3.00E+01	0.45	2.07E+01	1.50E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
4	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors: Not Used.

Details of Layers to be sublayered:

Layer no. 1: Austroads (2004) sublayering
Layer no. 2: Austroads (2004) sublayering
Layer no. 3: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	140.00	Gran_250		n/a	n/a
2	130.00	Gran_250		n/a	n/a
3	250.00	Gran_150		n/a	n/a
4	0.00	Sub_CBR3	ESA75-Full	1.30E-03	8.47E-01

CIRCLY Version 5.0u (8 April 2013)

Job Title: S14-352 Proposed Wagga Leagues Club Redevelopment, Gurwood Street, Wagga Wagga, NSW

Damage Factor Calculation

Assumed number of damage pulses per movement:

One pulse per axle (i.e. use NROWS)

Traffic Spectrum Details:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Load No.	Load ID	Movements
1	ESA75-Full	5.00E+05

Details of Load Groups:

Load No.	Load ID	Load Category	Load Type	Radius	Pressure/Ref. stress	Exponent
1	ESA75-Full	SA750-Full	Vertical Force	92.1	0.75	0.00

Load Locations:

Location No.	Load ID	Gear No.	X	Y	Scaling Factor	Theta
1	ESA75-Full	1	-165.0	0.0	1.00E+00	0.00
2	ESA75-Full	1	165.0	0.0	1.00E+00	0.00
3	ESA75-Full	1	1635.0	0.0	1.00E+00	0.00
4	ESA75-Full	1	1965.0	0.0	1.00E+00	0.00

Layout of result points on horizontal plane:

Xmin: 0 Xmax: 165 Xdel: 10
Y: 0

Details of Layered System:

ID: S14-352 Title: Roads - Wagga Leagues Club Redevelopment

Layer No.	Lower i/face	Material ID	Isotropy	Modulus (or Ev)	P.Ratio (or vvh)	F	Eh	vh
1	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
2	rough	Gran_250	Aniso.	2.50E+02	0.35	1.90E+02	1.25E+02	0.35
3	rough	subsltCB10	Aniso.	1.00E+02	0.45	6.90E+01	5.00E+01	0.45
4	rough	Sub_CBR3	Aniso.	3.00E+01	0.45	2.07E+01	1.50E+01	0.45

Performance Relationships:

Layer No.	Location	Performance ID	Component	Perform. Constant	Perform. Exponent	Traffic Multiplier
3	top	selAus2004	EZZ	0.009300	7.000	1.600
4	top	Sub_2004	EZZ	0.009300	7.000	1.600

Reliability Factors: Not Used.

Details of Layers to be sublayered:

Layer no. 1: Austroads (2004) sublayering
Layer no. 2: Austroads (2004) sublayering
Layer no. 3: Austroads (2004) sublayering

Results:

Layer No.	Thickness	Material ID	Load ID	Critical Strain	CDF
1	150.00	Gran_250		n/a	n/a
2	130.00	Gran_250		n/a	n/a
3	250.00	subsltCB10	ESA75-Full	1.17E-03	4.09E-01
4	0.00	Sub_CBR3	ESA75-Full	1.31E-03	8.59E-01