

Geotechnical investigation and road pavement design

The intersection of Hartwood Street and Milford Street on Priory Tank Road,
Nymagee NSW

Ref: R14212-1.1g
Date: 23 May 2014

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Environmental
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Date: 23 May 2014

Report Number: R14212-1.1g

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Contents

	page
1. Introduction.....	4
2. Objectives.....	4
3. Site location.....	4
4. General site description.....	4
5. Site condition and environment.....	4
6. Investigation methods.....	4
7. Results.....	6
8. Recommendations.....	7
9. Limitations of the investigation.....	10
10. References.....	11
Figures.....	12
Figure 1. Site locality	
Figure 2. Aerial photograph	
Figure 3. Sampling locations	
Figure 4. Photographs of the site	
Appendices.....	16
Appendix 1 Bore logs	
Appendix 2 California bearing ratio (CBR) laboratory report	
Appendix 3 Dynamic cone penetrometer (DCP) test report	
Appendix 4 Soil index properties test report	

1. Introduction

The Hera-Nymagee Project is a mine located approximately 4km south of the village of Nymagee and approximately 80km southwest Hermidale, NSW. Mine concentrate from Hera-Nymagee Project is required to be transported by road to Hermidale siding.

The proposed haulage route from Hera-Nymagee Project to Hermidale Siding utilises Priory Tank Road including the Hartwood Street and Milford Street intersection at Nymagee NSW.

A geotechnical assessment and pavement condition review is required for the Hartwood Street and Milford Street intersection at Nymagee NSW. The assessment is required as part of an amendment to the environmental assessment.

2. Objectives

Envirowest Consulting Pty Ltd was commissioned by Geolyse Pty Ltd on behalf of YTC Resources to undertake road pavement geotechnical investigation at the Hartwood Street and Milford Street intersection at Nymagee NSW.

The investigation is required to satisfy the Department of Planning and Infrastructure approval of the haulage route conditions. The investigation objective is assessment of the intersection condition and upgrade recommendations. The assessment includes appropriate upgrade and pavement repair recommendations to ensure that the roads and intersection comply with applicable AUSTRROADS standards taking into account the type, volume and direction of mine-related traffic.

3. Site location

The site is located at the Hartwood Street and Milford Street intersection on Priory Tank Road, Nymagee NSW.

4. General site description

The site is an existing sealed pavement intersection with unsealed road shoulders.

5. Site condition and environment

5.1 Surface cover

The surface cover on the intersection was densely graded bitumen seal with 7mm granite aggregate. The surface cover adjacent to the road was gravel, pasture grasses and weeds.

5.2 Topography

The site is located on a flat to with a south eastern aspect and a slight inclination of 2-3%.

5.3 Soils and geology

Natural soils from the boreholes were dry to moist clayey sand and gravelly clayey sands with colour ranging from pale yellow brown to dark yellow brown. Subsoils have low plasticity and medium density. Shale, sandstone and quartz gravel were commonly encountered in the profile. The consistency of the subsoil was stiff to very stiff.

The Nymagee region contains a wide range of soil types. Sands, sandy earths, yellow and red earth soils are dominant in the upland areas. The footslopes and lower areas are predominantly colluvial and aeolian (wind deposited) sediments with alluvial sediments associated along streams (Brunker 1967).

The geology on the site is the Cobar Group slate, shale, sandstone and greywacke overlain by quaternary alluvium (Brunker 1967).

5.4 Surface water and groundwater

Surface water and groundwater generally flows south and east.

6. Investigation methods

A site inspection and field assessment was conducted on 1 May 2014.

The surface of the pavement area was described and failures identified.

Two boreholes (BH1 to BH2) were constructed up to a depth of 1.5m in different areas of the intersection and sampling undertaken to determine soil engineering properties. The boreholes were constructed with a truck mounted EVH auger drill. The profile of each borehole was described along with moisture, consistency, density, plasticity and rock strength.

The soil was investigated for pavement factors at the two locations in the area of the intersection. Soil was bored to a depth of 1.5m and samples collected from the design subgrade depth. The California Bearing Ratio (CBR) was determined on the samples by the 4 day soak method. The CBR parameter was used in pavement design. Dynamic cone penetrometer (DCP) tests were undertaken adjacent to the CBR boreholes to confirm the soil strength.

Samples were collected from the boreholes for laboratory analysis of liquid limit, plastic limit and plastic index to assess the shrink swell properties of the subgrade.

Pavement design recommendations were made using Austroads guidelines.

The sampling locations and the tests undertaken are given in Table 1 and Figure 2.

Soil sampling was undertaken according to the Australian Standards 2870, by qualified field and laboratory personnel. Soil analysis was undertaken at the NATA accredited laboratory of Envirowest Testing Services.

Table 1. Sampling location and tests undertaken

Borehole (Figure 3)	Location (Figure 3)	Tests undertaken	Testing depths (m)	Investigation total depth (m)
Borehole 1	Southeast corner of intersection	Soil properties description	0 to 1.5	1.5
		DCP	0 to 0.9	
		Index tests	1.0	
		CBR (S14-276)	0.2 to 1.0	
Borehole 2	Northeast corner of intersection	Soil properties description	0 to 1.5	1.5
		DCP	0 to 0.9	
		Index tests	1.0	
		CBR (S14-277)	0.3 to 1.2	

7. Results

7.1 Historical traffic movements

The historical traffic movements for the intersection are expected to be less than 1×10^5 equivalent standard axles (ESA) per year with occasional heavy vehicle movement.

7.2 Existing pavement conditions

The existing intersection pavement was a densely graded granite aggregate bitumen seal. The bitumen seal was estimated to be 20mm in depth. The pavement wearing layer contained some minor cracking and deformation. Pavement shape loss was observed in the south east section of the intersection in an area of approximately 5m by 2m with surface water pooling.

The road shoulders were gravel with no table drains.

The base and subbase for the intersection was approximately 200mm sandy gravel material. Subgrade was natural clayey sand with gravels.

7.3 Soil profile and subsurface conditions

The soil in the area of the pavement contains dry to moist clayey sand to gravelly clayey sand to the drilling depth of 1.5m. Subsoils have low plasticity. Shale, sandstone and quartz gravels were encountered in the profile. The consistency of the subsoil was stiff to very stiff with moderate density.

7.4 Californian bearing ratio (CBR)

The CBR samples were collected from representative subgrade depths in the areas of the existing pavement.

The CBR for the samples analysed ranged from 4.5% to 6% (Table 2). The limiting CBR result is 4.5%. The CBR laboratory report is presented in Appendix 2.

Table 2. CBR test results

Borehole (Figure 3)	Location	Sample ID	Sampling depth (m)	Soil type	CBR(%)
1	Southeast corner of intersection	S14-276	0.2 to 1.0	CLAYEY SAND	6
2	Northeast corner of intersection	S14-277	0.3 to 1.2	CLAYEY SAND	4.5

7.5 Soil index tests

Soil on the site had a low linear shrinkage, liquid limit, plastic limit and plastic index (Table 3). The soil index properties laboratory report is presented in Appendix 4.

Table 3. Soil index test summary

Borehole (Figure 3)	Location	Depth (mm)	Soil description	Liquid limit (%)	Plastic limit (%)	Plastic index (%)	Linear shrinkage (%)
1	Southeast corner of intersection	1000	CLAYEY SAND	31	16	15	7.0
2	Northeast corner of intersection	1000	CLAYEY SAND	33	18	15	6.0

7.6 Dynamic cone penetrometer (DCP) tests

DCP test were undertaken in locations adjacent to the CBR boreholes to confirm the soil consistency.

The DCP results are outlined in Appendix 3. The DCP results indicate the soil consistency is very stiff to hard.

7.7 Groundwater and surface water

No groundwater was encountered in the boreholes. Surface water flows off the hard pavement on to road shoulders. The main surface flow direction is south and east. No table drains are located on the roads.

8. Recommendations

8.1 Existing pavement suitability

The existing pavement contains 200mm of road base and subbase and is not suitable to adequately manage the increased axle movements and vehicle loads at the intersection. Upgrade to the intersection is recommended.

8.2 Pavement upgrade design

8.2.1 Site preparation

The existing intersection pavement wearing layer, base and subbase requires stripping to a design subgrade level.

8.2.1 Subgrade preparation

Subgrade preparation should include:

- Adjust the in-situ moisture of the subgrade to within 2% of optimum moisture content.
- The exposed subgrade should be compacted to 98% of the dry density ratio. The exposed compacted surface should be rolled to detect soft spots.
- Any soft, weak or saturated material should be removed and replaced by suitable fill material and compacted in layers less than 150mm within 2% of optimum moisture content and to within 98% of the dry density ratio.
- All service trenches and other excavations should be backfilled with suitable material and compacted in layers less than 150mm within 2% of optimum moisture content and to within 98% of the dry density ratio.

8.2.2 Subgrade strength

The CBR samples were collected from the subgrade depth for the intersection upgrade.

The design subgrade (most limiting CBR result) strength is low with a limiting CBR of 4.5%. The subgrade is not expansive and has a low to moderate plasticity.

8.2.3 Pavement thickness

Pavements, based on information contained within the project brief, are expected to contain moderate heavy vehicle movement.

Design Equivalent Standard Axles (DESA) for flexible pavement traffic is estimated to be 5×10^5 . The DESA takes into account the vehicle types, traffic frequency and traffic axles loading.

Recommended pavement parameters are outlined in Table 4.

Table 4. Flexible pavement parameters for traffic design of 5×10^5 (CBR 4.5%)

Pavement parameter	5×10^5 ESA
Surface layer	75mm densely graded asphalt
Base	150mm granular material (DGB20 or equivalent)
Sub-base	250mm granular material (DGS40 or equivalent)
Total	400mm
Design subgrade CBR strength	4.5%

8.2.4 Pavement materials

Pavement materials shall be in accordance with Cobar Council engineering construction material requirements.

8.2.5 Road shoulders

Sealing of road shoulders is recommended to minimise migration of water into the pavement layers and to provide structural support on the pavement edge.

8.2.6 Table drains

Roadside table drains should be constructed to divert water from the pavement.

8.2.7 Extent of works

The extent of upgrade works is the intersection and immediate approaches.

8.3 Earthworks

Vegetation, topsoil and material containing organic matter should be removed prior to construction of the pavement areas. Wet material from low lying areas is not suitable for fill. The topsoil on the site is suitable for use in landscaping works.

The natural material on the site is suitable for use as engineered general fill. The fill should not contain material over 70mm diameter.

Soil should be compacted in layers less than 150mm and be compacted at optimum moisture content to a minimum standard compaction density ratio of 98% in accordance with AS3798.

8.4 Excavations

The natural material up to depths of 1.5m is not expected to pose an excavation limitation.

Shallow rock is known to occur in the area and may require the use of percussion hammer if encountered.

8.5 Fill

Suitable general fill material shall consist of gravelly clay with specifications in accordance with RTA QA Specification 3071.

8.6 Groundwater

No groundwater was encountered in the boreholes constructed on the site. Roadside table drains and sealed road shoulders are recommended to divert water and prevent seepage from entering the pavement courses.

8.7 Geotechnical testing

Pavement courses should be inspected by a suitably qualified person at the time of excavation and placement to confirm accordance with design parameters. The specification, execution and control testing of earthworks and site preparation should be undertaken according to AS3798.

Subgrade should be compacted to a minimum 98% of the dry density ratio and no deflection with an 8 tonne roller. Subbase and base courses should be compacted to a minimum 100% of the dry density ratio and no deflection with an 8 tonne roller.

Trenches should be compacted to a comparable condition as the surrounding ground.

Imported fill should be in accordance with AS3798. Type 1 earthworks frequency of field density tests is recommended (AS3798).

9. Limitations of the investigation

The engineering logs describe subsurface conditions only at a specific borehole location and inferred boundaries between geotechnical units may vary.

Ground conditions can vary over relatively short distances and it may be necessary to carry out additional investigations for specific excavation and building sites. Once specific proposals are known a geotechnical review should be undertaken and if necessary additional investigations commissioned to provide the level of information required for assessing design parameters. A geotechnical engineer should be engaged to review subsurface condition during construction stages to confirm that subsurface conditions are consistent with design assumptions.

This report has been prepared for the use of the client to achieve the objectives given the client requirements and cost constraints. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the investigation and its likely impact on the proposed new roads. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus import to understand the limitations of the investigation and recognise that Envirowest Consulting Pty Ltd are not responsible for these limitations.

This report including data contained and its findings and conclusions remain the intellectual property of Envirowest Consulting Pty Ltd. This report should not be used by persons or for purposes other than stated and not reproduced without permission.

10. References

AS2870 (2011) *Residential Slabs and Footings - Construction* (Standards Australia: Homebush)

AS3798 (2007) *Guidance on earthworks for commercial and residential buildings* (Standards Australia: Homebush)

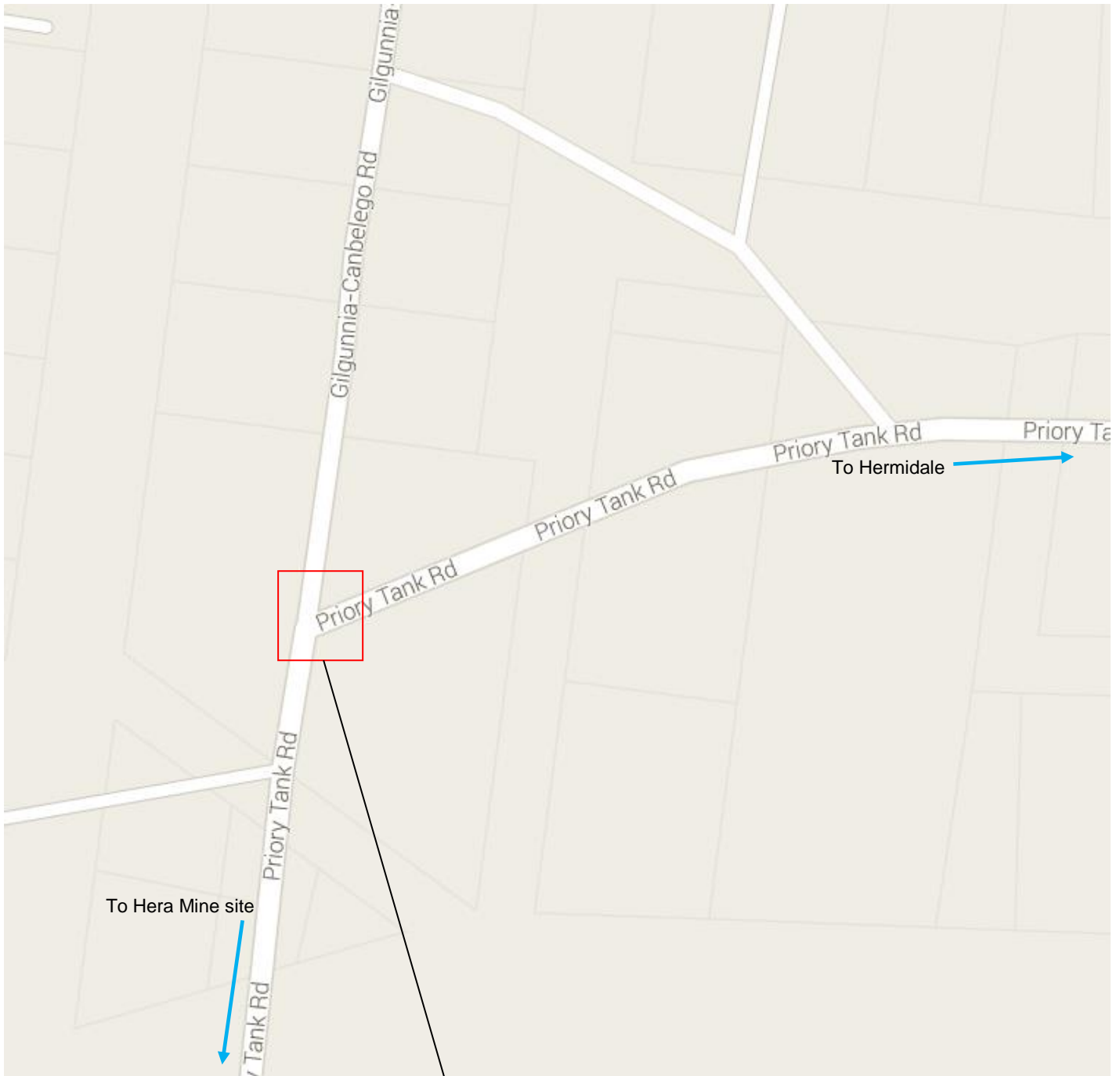
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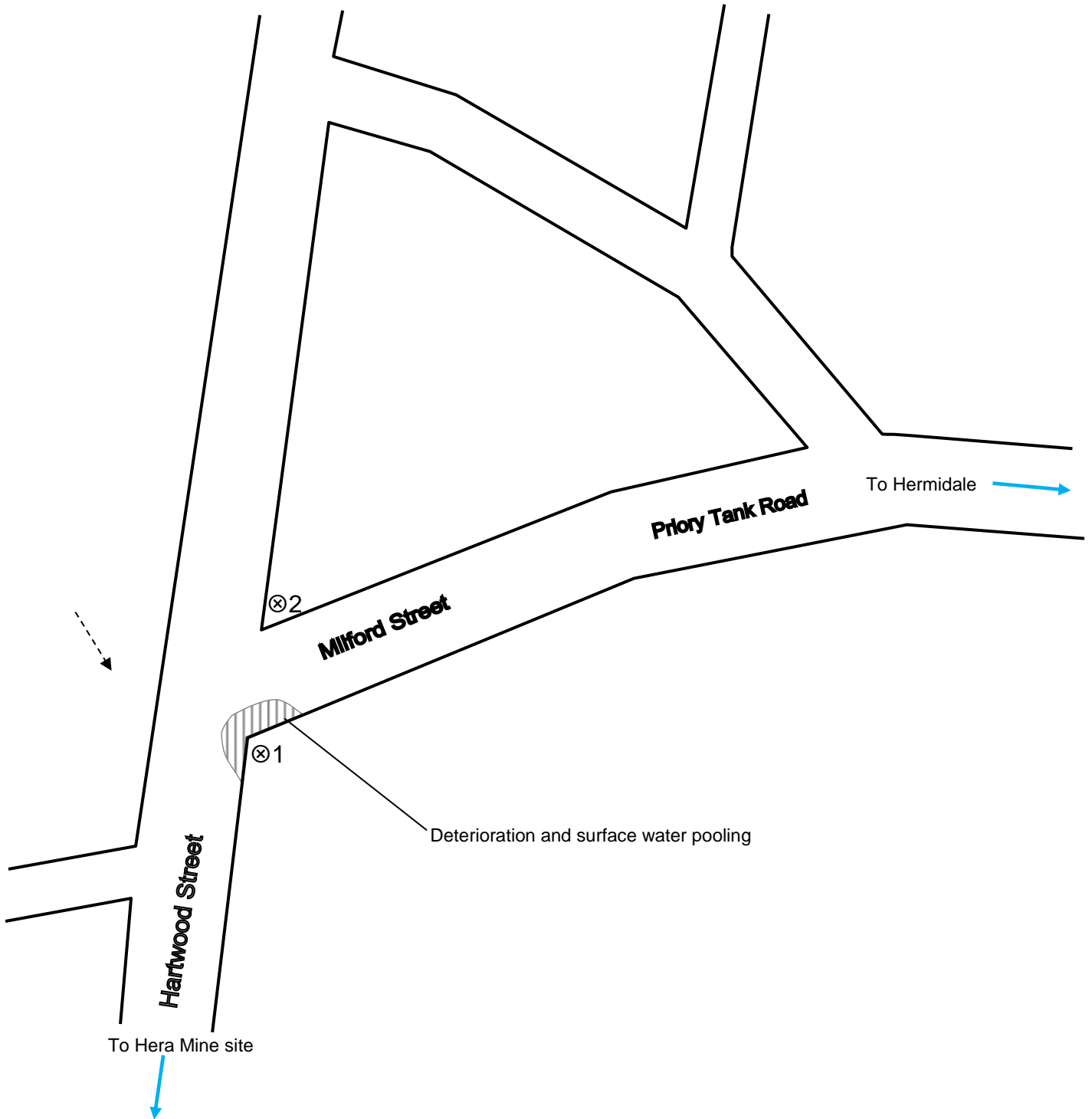
Intersection of Hartwood Street and Milford Street, Priory Tank Road, Nymagee

Figure 1. Site locality		
Proposed intersection upgrade, intersection of Hartwood Street and Milford Street, Priory Tank Road, Nymagee NSW		
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Job: R14212-1g	Drawn by: JH	Date: 8/05/2014



Intersection of Hartwood Street and Milford Street, Priory Tank Road, Nymagee

Figure 2: Aerial photograph		
Proposed intersection upgrade, intersection of Hartwood Street and Milford Street, Priory Tank Road, Nymagee NSW		
	Envirowest Consulting Pty Ltd	
Job: R14212-1g	Drawn by: JH	Date: 8/05/2014



Legend

- ⊗ Borehole and sampling location
- ← - - - Slope

Figure 3. Site plan and sampling location

Proposed intersection upgrade, intersection of Hartwood Street and Milford Street, Priory Tank Road, Nymagee NSW



Envirowest Consulting Pty Ltd

Job: R14212-1g

Drawn by: JH

Date: 8/05/2014

Figure 4. Photographs of the site



Looking south west over the intersection



Water pooling at southeast section of the intersection

Appendices

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Bore logs

California bearing ratio (CBR) laboratory report

Dynamic cone penetrometer (DCP) test report

Soil index properties test report

Appendix 1.

Bore Log Sheet

Job: R14212-1g Client: Geolyse Site: Intersection of Hartwood Street and Milford Street, Nymagee NSW		Borehole No: 1 Location: Eastern section		Sampling method: EVH auger drill Logged by: AR Date: 1/05/2014							
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components			Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description
		FILL- SANDY GRAVEL, yellowish red with quartz Road base and subbase			GP	DCP	D	VSt	M	VL	-
		CLAYEY SAND, dark reddish brown			SL	CBR	M	St	M	L	-
		light yellowish brown				D					
		GRAVELLY CLAYEY SAND, yellowish brown Quartz and shale gravel			SC		M	VSt	M	VL	-
0.5		End of hole									
1.0											
1.5											
2.0											
2.5											
3.0											
3.5											
4.0											
Soil classification: Slope/nature of surface: Flat Ground water: No free water identified in soil profile Soil salinity: Nil					Remarks (fill, odour, root holes): Fill to 200mm						

Samples U - undisturbed D - disturbed W - water sample B - bulk E - environmental sample CBR - California bearing ratio DCP - dynamic cone penetrometer	Moisture D - Dry M - Moist, can be moulded W - Wet, free water on hands Wp - plastic limit Wl - liquid limit	Consistency <u>Shear strength (kPa)</u> VS - very soft, (<25) S - soft (<50) F - firm (<100) St - stiff (<150) VSt - very stiff (<200) H - hard (>200)	Density VL - very loose L - loose M - medium D - dense VD - very dense	Plasticity NP - non plastic T - trace VL - very low L - low M - medium H - high VH - very high	Rock strength <u>Point load (mPa)</u> EL - extremely low (<0.03) VL - very low (<0.1) L - low (<0.3) M - medium (<1.0) H - high (<3.0) VH - very high (<10) EH - extremely high (>10)
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Envirowest Consulting Pty Ltd, 9 Cameron PI, NSW

Bore Log Sheet

Job: R14212-1g Client: Geolyse Site: Intersection of Hartwood Street and Milford Street, Nymagee NSW		Borehole No: 2 Location: Eastern section		Sampling method: EVH auger drill Logged by: AR Date: 1/05/2014							
Depth (m)	Graphic log strata	DESCRIPTION. Soil type/rock, grain size, structure, colour, minor components			Unified symbol	Samples	Moisture	Consistency	Density	Plasticity	Rock description
		FILL- SILTY GRAVEL, dark brown Road base and subbase			GP	DCP	D	VSt	M	VL	-
0.5		CLAYEY SAND, yellow brown			SC	CBR	M	St	M	L	-
1.0		Quartz and sandstone gravel yellowish brown					D	VSt			
1.5		Shale gravel pale yellowish brown									
2.0		End of hole									
2.5											
3.0											
3.5											
4.0											
Soil classification: Slope/nature of surface: Flat Ground water: No free water identified in soil profile Soil salinity: Nil					Remarks (fill, odour, root holes):						

Samples U - undisturbed D - disturbed W - water sample B - bulk E - environmental sample CBR - California bearing ratio DCP - dynamic cone penetrometer	Moisture D - Dry M - Moist, can be moulded W - Wet, free water on hands Wp - plastic limit Wl - liquid limit	Consistency <u>Shear strength (kPa)</u> VS - very soft (<25) S - soft (<50) F - firm (<100) St - stiff (<150) VSt - very stiff (<200) H - hard (>200)	Density VL - very loose L - loose M - medium D - dense VD - very dense	Plasticity NP - non plastic T - trace VL - very low L - low M - medium H - high VH - very high	Rock strength <u>Point load (mPa)</u> EL - extremely low (<0.03) VL - very low (<0.1) L - low (<0.3) M - medium (<1.0) H - high (<3.0) VH - very high (<10) EH - extremely high (>10)
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Appendix 2. California Bearing Ratio laboratory report

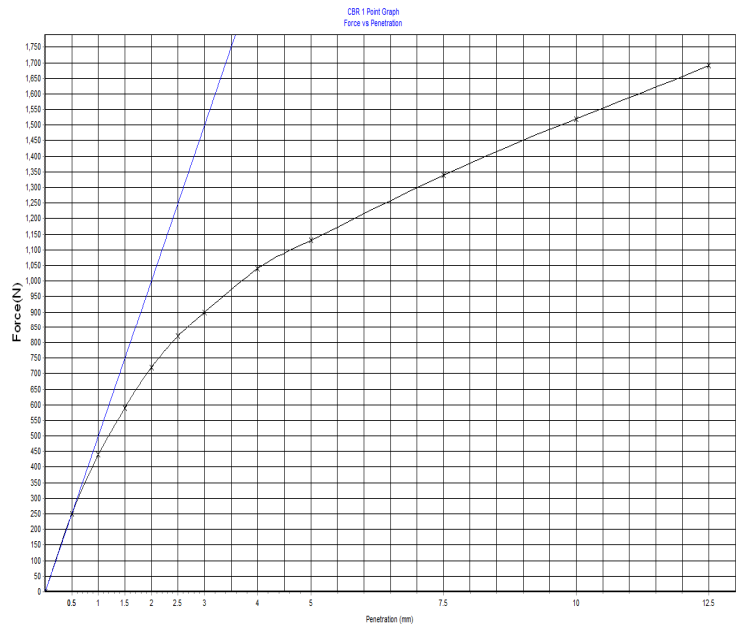


California Bearing Ratio Report (1 Point)

Client : Geolyse Address : PO Box 1963, Orange, NSW, 2800 Project Number : 14212 Project Name : Hermidale/Nymagee Location:	Report Number: LR14212-1cbr Report Date : 15/05/2014 Order Number : Test Method : AS1289.6.1.1 <p style="text-align: right;">Page 3 of 4</p>
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Sample Number : S14-276 Date Sampled : 1/05/2014 Date Tested : 13/05/2014 Sampled By : Terry Beasley Sampling Method : AS 1289.1.2.1 (clause 6.5.3) Material Source : Material Type : Remarks :	<p style="text-align: center;">SAMPLE LOCATION</p> Borehole: B H 3 Depth: 200 - 1000mm Location: Nymagee Desc: Subgrade Lot Number : Test Number : 0105-303 #REF!
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Moisture Method :	AS1289.2.1.1
Maximum Dry Density (t/m ³) :	1.782
Optimum Moisture Content (%) :	14.5
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	103.0
Dry Density Before Soak (t/m ³) :	1.78
Dry Density After Soak (t/m ³) :	1.776
Moisture Content Before Soak (%) :	14.9
Moisture Content After Soak (%) :	17.7
Density Ratio After Soak (%) :	100
Field Moisture Content (%) :	10.8
Top Moisture Content - After Penetration (%) :	19.4
Total Moisture Content - After Penetration (%) :	
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	0.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	
Oversize Material Replaced (%) :	



CBR Surcharge (kg) :	4.5	CBR 2.5mm (%) :	6
Oversize (%) :		CBR 5.0mm (%) :	6
Oversize Material Replaced (%) :		CBR Value (%) :	6

Site Selection :	Client Selected
Soil Description :	Clayey sand, red



Accredited for compliance with ISO/IEC 17025.

APPROVED SIGNATORY

T. Beasley

Terry Beasley - Laboratory Manager
 NATA Accreditation Number :
 15372

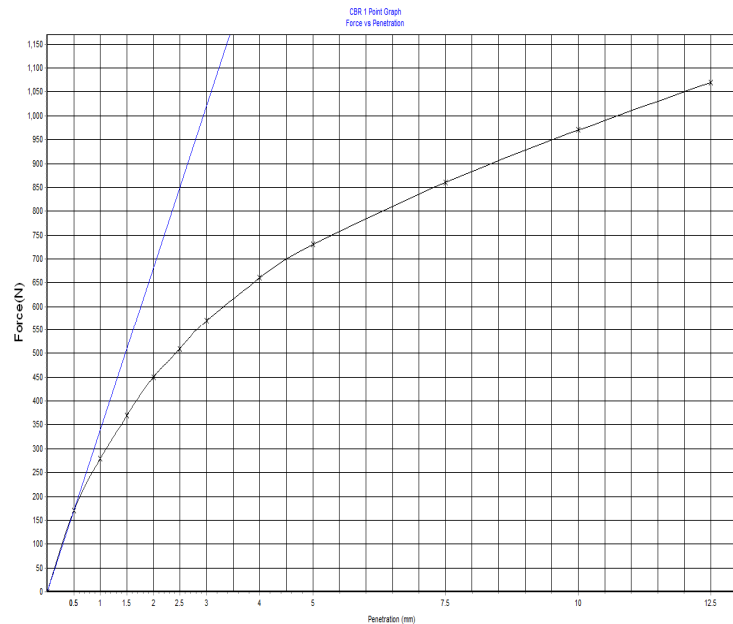


California Bearing Ratio Report (1 Point)

Client : Geolyse Address : PO Box 1963, Orange, NSW, 2800 Project Number : 14212 Project Name : Hermidale/Nymagee Location:	Report Number: LR14212-1cbr Report Date : 15/05/2014 Order Number : Test Method : AS1289.6.1.1 <p style="text-align: right;">Page 4 of 4</p>
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Sample Number : S14-277 Date Sampled : 1/05/2014 Date Tested : 13/05/2014 Sampled By : Terry Beasley Sampling Method : AS 1289.1.2.1 (clause 6.5.3) Material Source : Material Type : Remarks :	SAMPLE LOCATION Borehole: BH 4 Depth: 200 - 800mm Location: Nymagee Desc: Subgrade Lot Number : Test Number : 0105-304 #REF!
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Moisture Method :	AS1289.2.1.1
Maximum Dry Density (t/m ³) :	1.853
Optimum Moisture Content (%) :	14.6
Compactive Effort :	Standard
Nominated Percentage of MDD :	100
Nominated Percentage of OMC :	100
Achieved Percentage of MDD :	100
Achieved Percentage of OMC :	101.0
Dry Density Before Soak (t/m ³) :	1.851
Dry Density After Soak (t/m ³) :	1.847
Moisture Content Before Soak (%) :	14.7
Moisture Content After Soak (%) :	16.2
Density Ratio After Soak (%) :	100
Field Moisture Content (%) :	9.6
Top Moisture Content - After Penetration (%) :	18.5
Total Moisture Content - After Penetration (%) :	
Soak Condition :	Soaked
Soak Period (days) :	4
Swell (%) :	0.0
CBR Surcharge (kg) :	4.5
Oversize (%) :	
Oversize Material Replaced (%) :	



CBR 2.5mm (%) :	4
CBR 5.0mm (%) :	3.5
CBR Value (%) :	4

Site Selection :	Client Selected
Soil Description :	Clayey sand, red



Accredited for compliance with ISO/IEC 17025.

APPROVED SIGNATORY

T. Beasley

Terry Beasley - Laboratory Manager
 NATA Accreditation Number :
 15372



Dynamic cone penetrometer - Test report

Client	Geolyse Pty Ltd	Report no.	LR14212-1
Address	PO Box 1963 Orange NSW	Site location	The intersection of Hartwood Street and Milford Street on Priory Tank Road, Nymagee NSW

Test information: Date 1/5/14

Test location	Borehole 1	Borehole 2
Commencement of penetration	0mm	0mm
Soil description	Sandy gravel clayey sand	Sandy gravel clayey sand
Soil Moisture	Dry to moist	Dry to moist
Groundwater	Nil	Nil

Results

Depth (mm)	Penetration resistance (number of blows)	Penetration resistance (number of blows)
0-100	12	15
100-200	15	15
200-300	8	10
300-400	6	6
400-500	5	6
500-600	12	6
600-700	20	18
700-800	-	20
800-900	-	-
900-1000	-	-
1000-1100	-	-
1100-1200	-	-
1200-1300	-	-
1300-1400	-	-
1400-1500	-	-
1500-1600	-	-
1600-1700	-	-
1700-1800	-	-
1800-1900	-	-
1900-2000	-	-

Method AS1289.6.3.2-1997 Method of testing soil for engineering purposes Method 6.3.2: Soil strength and consolidation tests-Determination of the penetration resistance of a – 9 kg dynamic cone penetrometer test. >20 indicates test discontinued due to refusal

Test authorised by:

G. Madafiglio PhD Date: 11/5/14



Rec 51002 Soil Index Properties - Test Report

Client Geolyse Pty Ltd Report no. LR14212-1
 Address PO Box 1963 Site The intersection of Hartwood Street and Milford
 Orange NSW location Street on Priory Tank Road, Nymagee NSW

Borehole		1	2
Location		-	-
Depth (mm)		1000	1000
Tests	Methods		
Liquid Limit (%)	AS 1289.3.1.2	31	33
Plastic limit (%)	AS 1289.3.2.1	16	18
Plasticity index (%)	AS 1289.3.3.1	15	15
Linear Shrinkage (%)	AS 1289.3.4.1	7.0	6.0
-characteristics (curling or crumbling)		curling	curling
Field Moisture (%)	AS 1289.2.1.1	-	-
I _{ss}	AS 1289.7.1	-	-
USCS	AS 1726*	SC	SC
Description	AS 1726 *	CLAYEY SAND	CLAYEY SAND
Colour	AS 1726*	Light yellowish brown	Yellowish brown

Disturbed samples

Sample preparation: -drying Air Oven Natural state
 -sieving Wet Dry
 -material Pass 2.36 mm Pass 425 µm
 Linear shrinkage: -mould 250 mm 125 mm
 Liquid Limit: -method Standard One Point

Undisturbed samples

Inert inclusions in specimen %
 Soil crumbling during shrinkage affecting mass Yes No
 Extent of cracking of sample Major Minor Nil
 Samples tested as received
 * Not NATA accredited test

Test authorised by:

G. Madafiglio PhD
 Date: 16/5/2014



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