APPENDIX A QUARRY INVESTIGATIONS





Eurobodalla Southern Storage - Technical Note							
Technical Note No.:	ESS-TN-02 Date: 23 June 2017						
Title:	Eurobodalla Quarry Geotechnical Investigations						
Project Ref.:	30012127 Rev.: 03						
Originator:	SMEC Design Team Reviewer: Dave Evans						
Discipline:	Storage						

1. Introduction

Geotechnical investigations were undertaken at Eurobodalla Quarry on 18 and 19 January 2017. The investigations were targeted at confirming the volume and suitability of available earthfill material for potential use in construction of the new earth and rockfill embankment, as part of the Eurobodalla Southern Storage project.

Eurobodalla Quarry is located off Nerrigundah Mountain Rd, as shown in Figure 1. It is estimated to be approximately 5 km north-west of the proposed water supply storage site.

This technical note documents the investigations and provides an estimate of the volume of available earthfill at the site.



Figure 1: Eurobodalla Quarry Location (Bing Maps)



2. Geological Conditions

Eurobodalla Quarry is located within the Commerong Volcanics which include Rhyolite, Dolerite and interbedded meta-sediments (DoC, 2006). Quarrying predominantly Dolerite for production of crushed rock products, servicing the local concrete and pavement industry.

Overburden materials comprise residual soils and XW/HW Dolerite classifying as CH and CL Clay, Sandy/ Gravelly Clay, SC and GC. These materials have been classified as dispersive clays when tested in distilled water (ECN 1 and 2).

3. Previous Investigations

Feasibility Design Stage Geotechnical Investigations (DoC, 2005)

The investigations were targeted at developing an interpreted geological model of the storage site, assessing embankment and spillway foundation conditions and identifying potential borrow sources for embankment construction.

The investigations included:

- Excavation of 25 test pits (EQTP1 to EQTP25) at Eurobodalla Quarry;
- 35 test pits (SCTP1 to SCTP35) along the centreline of the proposed embankment, spillway channel and upstream and downstream of the proposed embankment;
- Shallow seismic refraction survey along the proposed alignment of the embankment and spillway channel.

Site investigations determined that there are no suitable low permeability clay soils on the storage site, with the limited quantity of alluvials and hillwash soils in the lower slopes and gullies determined to be dispersive and of low clay content.

Off-site earthfill sources were investigated by DoC (2005, 2006), and identified two feasible commercial sources:

- Eurobodalla Quarry, currently identified as the preferred source
- Spring Water Quarry, alternative source

Concept Design Stage Geotechnical Investigations (DoC, 2006a)

Investigations undertaken during the 2006 concept design stage were targeted at confirming the extent of the potential earthfill source at Eurobodalla Quarry; identifying alternative sources of earthfill in the region; assessment of sources of filter material; and assessing the erodibility and dispersity of material within the storage and the proposed spillway channel.

The scope of investigations included excavation of an additional 30 test pits at the Eurobodalla Quarry (EQTP26 to EQTP55), hand augering of materials on the dam site to test for dispersion, hand augering at other potential earthfill borrow locations, and sampling of quarry products from various commercial sites around the region.

A total reserve volume of 140,000 m³ of earthfill suitable for use in the embankment core was estimated to be present at the Eurobodalla Quarry and the area immediately to the north of the existing quarry workings. This was based on the assumption that CH residual soils and the underlying extremely to highly weathered dolerite (typically classifying as SC) could be mixed to create a relatively homogeneous material. Potential issues with mixing these materials in the field was identified.



Memorandum: Stony Creek Dam Trial Embankment (DoC, 2006c)

A trial embankment was constructed using material sourced from the Eurobodalla Quarry overburden soils. The trial embankment was constructed from approximately equal proportions of residual soil (classifying as CH with a liquid limit of 81%) and extremely weathered to highly weathered Dolerite (classifying as GC with a liquid limit of 56%). The aim of the trial was to assess the suitability of the combined material for use in the core of the dam.

The earthfill was compacted in approximately 150 mm thick (compacted) lifts using a 3 tonne twin (smooth) drum roller. It is understood that minimal moisture conditioning of the material was undertaken, with only light spraying of the lift prior to placement of the subsequent lift. Despite the high plasticity of the individual materials, they were observed to be reasonably workable during placement.

Field density and permeability testing was undertaken on the completed embankment. Hilf density ratios of between 94.2% to 99.3% with a moisture range of 0.1% wet to 0.4% dry of optimum based on four test results, however the trial is understood to have followed a period of consistently wet weather. In-situ permeability testing undertaken on the compacted trial embankment resulted in a permeability range of between 1.0x10-9 m/s to 3.0x10-9 m/s.

Four bulk samples were taken of the material, one from each of the different sources (residual soil and weathered Dolerite) and two from the combined samples following compaction. The combined samples classified as CH sandy, gravelly clay with fines contents of 62% and 63% and both tested as ECN 1 in distilled water. The results of the testing are summarised in Table 1.



Table 1: Summary of Trial Embankment Test Results (DoC, 2006c)

Table 1. Summary C	i illai Ellibalikillelit	Test Results (DOC, 2006))	
	Residual Soil Stockpile (2721)	Weathered Rock Stockpile (2722)	Combined Sample (2723)	Combined Sample (2724)
Description	High plasticity clay	Clayey sandy gravel	High plasticity clay with sand and gravel	High plasticity clay with sand and gravel
Classification	СН	GC	СН	СН
Cobble size (%)	0	3	3	0
Gravel size (%)	8	33	25	14
Sand size (%)	11	30	19	22
Silt size (%)	25	14	29	21
Clay size (%)	56	20	33	43
Liquid Limit (%)	81	56	65	70
Plastic Limit (%)	28	27	27	27
Plasticity Index (%)	53	29	38	43
Emerson Class No.	2	2	1	1

4. Current Investigations

Objectives

The objectives of the geotechnical investigations undertaken on 18 and 19 January 2017 at Eurobodalla Quarry were to:

- Confirm findings from previous investigations. Conducting similar test pitting to confirm previous outcomes and suitability of observed materials.
- Confirm quantities: A decade has passed since initial investigations. The availability of materials will need to be re-investigated.
- Understand variability of material.

Methodology

The investigations involved test pitting within and to the north of the current quarrying area as shown in Figure 1, Figure 5 and Figure 6. A total of 18 test pits were excavated using a 16T excavator. Test pits were logged by a SMEC geotechnical engineer.



The location of the test pits were selected to be nearby the previously excavated test pits for comparison with previous logging, or at locations to give greater coverage for estimation of potential earthfill volume. The location of test pits was recorded with a hand-held GPS with an accuracy of approximately +/- 10m.

Test pits were typically excavated to an approximate dimension of 4 m x 3 m. Topsoil was initially stripped and stockpiled, with excavated materials stockpiled separately for logging and sampling.

Backfilling of the test pits was undertaken in approximately 0.5 m lifts and compacted by tamping with the excavator bucket. Once the excavation was completely backfilled, the topsoil was replaced and the test pit track-rolled with the excavator.

Ground Conditions

Topsoil depths were found to range between 0.15 m to 0.3 m and was encountered in all test pits except for TP-EQ04 which was excavated in an area of fill. Topsoil was commonly underlain to a depth of up to 0.5m by colluvial material (encountered in TP-EQ07, 08, 09, 10, 12, 13, 14, 16, 17) and typically described as angular cobbles within a sandy gravel matrix.

Residual soil and weathered Dolerite rock was typically encountered within the test pits. Test pits were generally terminated on or near refusal within highly to moderately weathered Dolerite assessed as being not suitable for use as earthfill in the core of the embankment. The only exceptions to this were TP-EQ08 which refused on suspected shale; TP-EQ13 which was terminated in suspected highly weathered Rhyolite; and TP-EQ15 which was terminated in extremely weathered Dolerite at the limit of reach of the excavator (5.4 m depth).

The depth of weathered zones varied significantly between test pits, however greater depths of weathering were typically observed within natural gullies. A summary of the classification of the major material zones encountered in the test pits is provided below. An example of this profile is shown in Figure 2. The test pit logs are provided in Appendix A to this technical note.

Residual Soil: typically classified as high plasticity Clay (CH), red-brown, commonly with trace sand and gravel, typically moist (MC<PL, at the time of the investigations), very stiff.

Extremely Weathered Dolerite: material classified as CH Clay/ Sandy Clay, CL Clay/ Sandy Clay and SC Clayey Sand, mottled brown, orange and grey, with minor constituents of less weathered Dolerite gravels and cobbles. Material was typically found to be moist at close to the plastic limit (at the time of the investigations) and of stiff to very stiff consistency.

Highly Weathered Dolerite: material was typically recovered as fractured rock consisting of gravels and cobbles within a clayey sand matrix. The strength of the intact rock was estimated to be typically high strength but ranged between medium to very high strength.

The boundary between residual soil and extremely weathered Dolerite was often gradational, while the boundary between extremely and highly weathered Dolerite was typically more distinct although occasional gravels and cobbles were encountered towards the base of the extremely weathered zone.

No groundwater was encountered during the investigations.



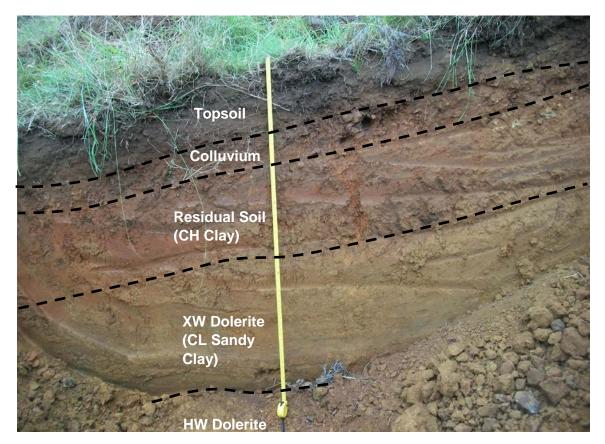


Figure 2: TP-EQ16 ground conditions

5. Laboratory Testing

General

Select samples were retrieved for laboratory testing from the test pitting at Eurobodalla Quarry as well material sampled from Springwater Quarry and Cadgee Quarry. Testing was undertaken at the NATA accredited geotechnical testing facility Civil Geotechnical Services in Melbourne.

Table 2 summarising the testing undertaken on the sampled materials with laboratory certificated provided in Appendix B.



Table 2: Laboratory testing

Laboratory Test	No. of Tests
Particle Size Distribution	 Three tests on sampled Residual Soil (RS) Nine tests on sampled Extremely Weathered (XW) material Four tests on combined RS and XW material One test on sample Highly Weathered Dolerite Two tests on sampled unprocessed material from Springwater Quarry (potentially for use as a fine filter) One test on sampled processed material from Cadgee Quarry (potentially for use as a fine filter)
Atterberg Limits and Emerson Class (inclusive of LL, PL, PI, LS, FMC and ECN)	 Three tests on sampled Residual Soil (RS) Nine tests on sampled Extremely Weathered (XW) material Four tests on combined RS and XW material One test on sample Highly Weathered Dolerite
Standard Compaction	 One test on sampled Extremely Weathered (XW) material Four tests on combined RS and XW material
Triaxial Tests (multi-stage Consolidated Undrained with pore pressure measurement)	 One test on sampled Extremely Weathered (XW) material Four tests on combined RS and XW material
Permeability Tests (Constant head)	■ Two tests on combined RS and XW material

Classification Testing

Classification testing comprised:

- field moisture content;
- Atterberg Limits including Liquid Limit, Plastic Limit, Plasticity Index and Linear Shrinkage;
- particle size distribution; and
- Emerson Class Number.

The results of the classification testing undertaken are presented in Table 3, Figure 3 and Figure 4.

The test results indicate:

- Residual Soil classifies as SM Silty Sand and CH Clay/ Silty Clay with Liquid Limits ranging between 51% to 69% and fines content ranging between 47% to 84% based on three tests.
- Extremely weathered material classifies as CI Clay/ Silty Clay, GC Clayey Gravel, CH Clay/ Sandy Clay/ Silty Clay and MH Silt. Based on the results of nine tests the Liquid Limits ranging between 44% to 91% and the fines contents range between 22% to 91%.



- Samples combined from residual soil and extremely weathered material classified as CH Clay/ Silty Clay/ Gravelly Clay. Based on the results of four tests the Liquid Limits ranging between 61% to 82% and the fines contents range between 57% to 76%.
- Sampled materials are potentially dispersive, when tested in distilled water, with two of 17
 results producing Emerson Class Numbers (ECN) of 2. Seven tests produced results of ECN3
 indicating they are dispersive after remoulding and eight tests produced results of ECN5 (nondispersive).



Table 3: Summary laboratory test results – Eurobodalla Quarry potential earthfill borrow source

Testpit	Depth	Material Classification	Field Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Passing 0.075mm sieve (%)	Emerson Class Number
TP-EQ01	0.3-1.2m	CH Gravelly CLAY (combined RS and XW material)	28	82	31	51	18	66	3
TP-EQ03	0.25-2.2m	CI CLAY (XW material)	24.3	47	21	26	12.5	78	3
TP-EQ03	2.6-3.1m	GC Clayey GRAVEL (HW rock)	19	46	22	24	12	23	2
TP-EQ04	1.6-2.0m	GC Clayey GRAVEL (XW material)	17.7	44	22	22	11	22	3
TP-EQ07	0.5-1.0m	SM Silty SAND (Residual Soil)	31.5	52	34	18	11.5	47	3
TP-EQ07	1.0 -2.5m	CH Silty CLAY (XW material)	31.8	74	32	42	18.5	71	5
TP-EQ07	0.5-2.5m	CH Clay (combined RS and XW material)	32.1	65	30	35	15.5	74	5
TP-EQ10	0.8-1.4m	GC Clayey GRAVEL (XW material)	20.1	52	28	24	11.5	37	3
TP-EQ10	0.3-1.4m	CH Clay (combined RS and XW material)	25.4	61	28	33	12.5	57	3
TP-EQ11	0.2-1.3m	CH CLAY (XW material)	35.9	91	35	56	22.5	91	5
TP-EQ12	0.5-1.5m	CH CLAY (Residual Soil)	18.6	51	21	30	13.5	72	2
TP-EQ15	0.75-5.4m	MH SILT (XW material)	44.4	66	35	31	16	88	5
TP-EQ16	0.4-0.8m	CH Silty CLAY (Residual Soil)	31.9	69	31	38	16.5	84	5
TP-EQ16	0.8-1.5m	CH Sandy CLAY (XW material)	32.9	53	29	24	13.5	59	3
TP-EQ16	0.4-1.5m	CH Clay (combined RS and XW material)	32.3	66	29	37	15	76	5



Testpit	Depth	Material Classification	Field Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Passing 0.075mm sieve (%)	Emerson Class Number
TP-EQ17	1.7-3.6m	CI Silty CLAY (XW material)	24.6	49	27	22	12	53	5
TP-EQ18	0.3-1.5m	CH CLAY (XW material)	19.5	55	24	31	14	78	5



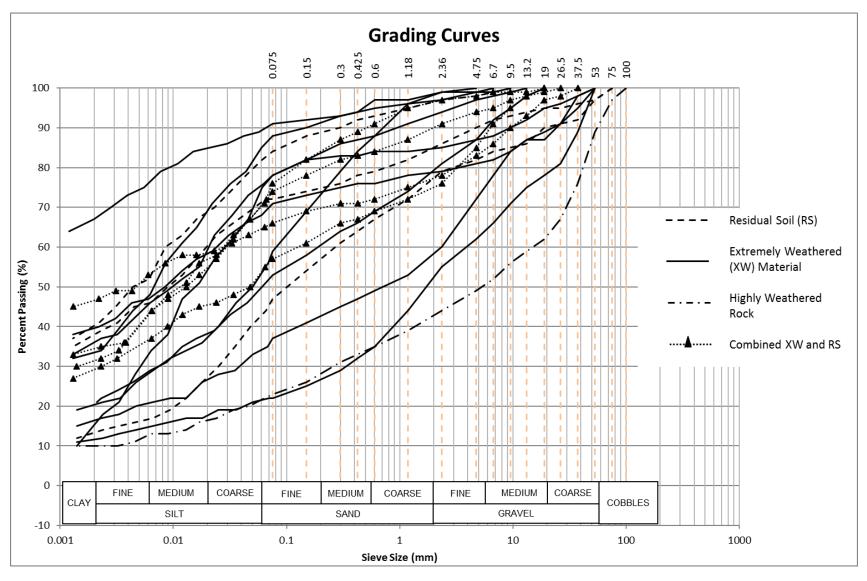


Figure 3: Particle Size Distribution - Eurobodalla Quarry potential earthfill borrow source



Atterberg Limits

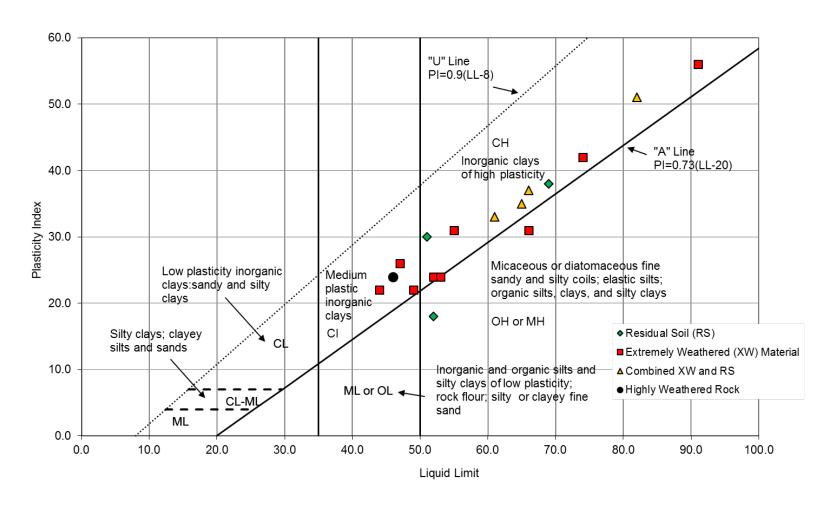


Figure 4: Atterberg Limits - Eurobodalla Quarry potential earthfill borrow source



Standard Compaction

Five standard compaction tests were undertaken to estimate the potential density of the earthfill and field moisture content relative to Optimum Moisture Content (OMC).

At the time of sampling the materials (between 18 and 19 of January 2017) and based on a limited number of four tests undertaken on combined residual soil and extremely weathered material, the field moisture content ranged between 2.5% dry to approximately OMC.

During construction of the trial embankment in 2006 (DoC), the material was also noted to be at or close to OMC.

The one standard compaction test undertaken on extremely weathered material sampled from TP- EQ15 excavated at up to 5.4m depth, indicated the material was approximately 7% wet of OMC.

It is noted that these results may differ during construction work depending on the depth of excavation, climatic conditions and groundwater levels at the time of the works.

Table 4: Standard compaction results - Eurobodalla Quarry potential earthfill borrow source

Testpit	Depth	Material Classification	Field Moisture Content (date of sample)	Standard Optimum Moisture Content	Standard Maximum Dry Density (T/m³)
TP-EQ01	0.3-1.2m	CH Gravelly Clay (combined RS and XW Sample)	28.0% (19/1/17)	30.5%	1.41
TP-EQ07	0.5-2.5m	CH Clay (combined RS and XW Sample)	32.1% (18/1/17)	32.0%	1.39
TP-EQ10	0.3-1.4m	CH Clay (combined RS and XW Sample)	25.4% (18/1/17)	27.0%	1.48
TP-EQ15	0.75- 5.4m	MH Silt (XW Dolerite)	44.4% (18/1/17)	37.5%	1.26
TP-EQ16	0.4-1.5m	CH Clay (combined RS and XW Sample)	32.3% (18/1/17)	32.5%	1.37

Permeability

Two constant head permeability tests were undertaken on combined samples of residual soil and extremely weathered material and are presented in Table 5. The two tests were undertaken on high plasticity clay and gravelly clay and indicated that the material is very low permeability with a coefficient of permeability estimated at $2x10^{-11}$ and $4x10^{-11}$ m/s.



Table 5: Constant head permeability test results - Eurobodalla Quarry potential earthfill borrow source

Testpit	Depth	Material Classification	Constant Head Permeability (m/s)
TP-EQ01	0.3-1.2m	CH Gravelly Clay (combined RS and XW Sample)	4x10 ⁻¹¹
TP-EQ07	0.5-2.5m	CH Clay (combined RS and XW Sample)	2x10 ⁻¹¹



6. Estimation of Available Earthfill

Licensing Considerations

Following conversations with Troy Hollis of Eurobodalla Quarry, it is understood that the quarry was applying for an extended licence (in January 2017) into the paddock to the north of the existing quarrying operation. It is understood that the license includes a request to extend the annual extraction rate from 100,000 tonnes to 170,000 tonnes. The licence would be required to maintain a 40 m clearance from Swampy Creek and is therefore proposed to not extend north of the existing farm dams located in the northern paddock.

It is also understood that the license has recently been extended to the East, however the details of this are not known.

Estimation of In-situ Material

The information collected from the current investigations was combined with the data from previous investigations (DoC 2005 and 2006a) to estimate the potential earthfill volume available at Eurobodalla Quarry. Volume estimates were based on material classified as either residual soil or extremely weathered Dolerite. Less weathered material (i.e. high weathered or 'better') has not been considered as part of this estimate as it was assessed as being unlikely to be suitable for use in the core of the embankment due to the high gravel and cobble content (and of relatively high strength).

Table 6 summarises the approximate depth of potential earthfill zones (residual soil and XW Dolerite).



Table 6: Summary of potential earthfill depths

Test pit	Hole Depth (m)	Residual Soil Thickness (m)	XW Rock Thickness (m)	Total Potential Earthfill Thickness (m)
TP-EQ01	2.4	0.5	0.4	0.9
TP-EQ02	1.3	0.2	0.4	0.6
TP-EQ03	3.3	2.0	0.4	2.4
TP-EQ04	2.3	0.5	0.4	0.9
TP-EQ05	1.6	0.6	0.3	0.9
TP-EQ06	1.2	0.0	0.0	0.0
TP-EQ07	3.2	1.0	1.7	2.7
TP-EQ08	1.6	0.0	0.7	0.7
TP-EQ09	3.4	2.1	0.5	2.6
TP-EQ10	1.6	0.5	0.6	1.1
TP-EQ11	1.5	0.0	1.1	1.1
TP-EQ12	1.7	1.0	0.0	1.0
TP-EQ13	1.2	0.0	0.0	0.0
TP-EQ14	1.2	0.0	0.0	0.0
TP-EQ15	5.4	0.5	4.6	5.1
TP-EQ16	1.8	0.4	0.7	1.1
TP-EQ17	4.0	0.7	2.5	3.2
TP-EQ18	1.6	0.0	1.2	1.2

Estimated thicknesses of the respective material zones were plotted against the previous investigations (DoC 2005 and 2006a) as shown in Figure 5 and Figure 6. The magenta coloured test pits indicate the current investigations with the green test pits representing the previous investigations. The Cyan boxes represent the areas considered for the volume estimates presented in Table 7.

Volume estimates have been undertaken by dividing the quarry into areas based on similar depths of potential earthfill. These areas were then multiplied by average thickness of combined residual soil and XW Dolerite (thickness adopted to be on the conservative side) to estimate the volume of potential earthfill. Where possible, the naming convention for areas used to estimate the material volume has been adopted to be consistent with that used in DoC 2006a to enable comparison.



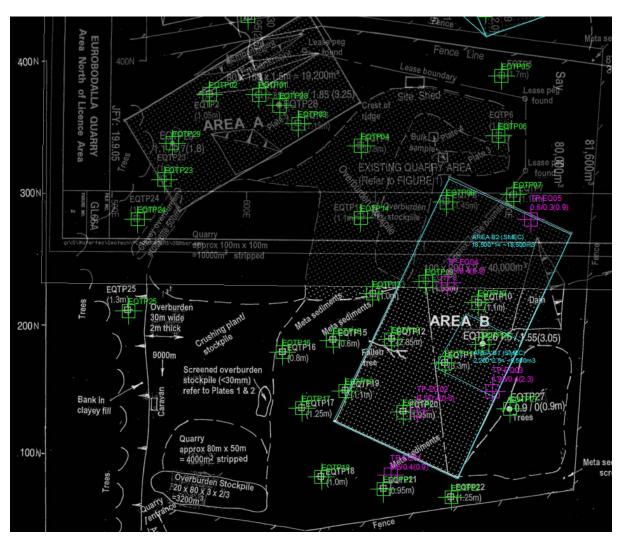


Figure 5: Southern paddock volume estimate – current estimates shown in cyan, current test pits shown in magenta (adapted from DoC 2006a)





Figure 6: Northern paddock volume estimate – current estimates shown in cyan, current test pits shown in magenta (adapted from DoC 2006a)



Table 7: Potential earthfill volume estimates

Area ID	DoC Volume		Current Est	imate	Comment
	Estimate (m³)	Area (m²)	Approx Depth (m)	Volume Estimate (m³)	
Area A	19,200			-	Area has now been partially quarried with haul routes now established in the area. Small volume expected to be available.
Area B1 (US of dam)	40,000	2,200	2.5	5,500	Separated into region within gully where greater depth expected (2.5m) with shallower depth adopted elsewhere (1.0m).
Area B2 (remainder)		18,500	1.0	18,500	
Area C1 (SMEC)	24,000	9,000	4.5	40,500	Separated into Northern region where deeper earthfill expected, with Southern region further separated into gully region (deeper weathering)
Area C2 (SMEC)		5,300	1.0	5,300	and shallow material on slope.
Area C3 (SMEC)		7,000	3.0	21,000	
Area D	6,400			-	Now accounted for within C2 and C3
Area E	32,000	30,000	2.0	60,000	Consistent with DoC assessment, however length previously underestimated
Area F	4,800	6,800	1.0	6,800	Updated from DoC
Area G	8,800	8,800	1.0	8,800	Consistent with DoC assessment
Area H	5,600	5,600	1.0	5,600	Consistent with DoC assessment
Area I (SMEC)	-	3,600	1.0	3,600	Additional area
Total	140,800			175,600	Excluding area B (outside of proposed) total estimated volume is approximately 150,000 m³



Based on the revised quantity estimates, the total volume of potential earthfill available at Eurobodalla Quarry is estimated to be approximately 175,000 m³. This includes Areas B1 and B2, which is understood to partially fall out of the current and proposed future lease boundary. Furthermore, B1 is a relatively large area to be working for an expected low yield of earthfill. Excluding these areas i.e. only allowing for material to be won from the paddock to the northern extent of the existing lease area reduces the estimate of the potential earthfill volume to 150,000 m³. This compares to the currently estimated volume of approximately 110,000 m³ of earthfill required for construction of the core of the embankment. Note this volume is an in-bank (compacted) volume and does not allow for any over-placement, losses during handling and deterioration of the earthfill due to contamination of moisture content.

Stockpiled Material

Some stockpiles understood to consist of overburden material are located around the existing quarry. These stockpiles were estimated to total less than 4,000 m³ by DoC (2006a). Based on conversations with the quarry owner (Troy Hollis) the stockpiles have not been added to since these previous investigations.

These stockpiles have not been accounted for within the volume estimate provided in this document due to the relatively small estimated volumes and potentially variable nature of the stockpiles. No testpitting was undertaken within the existing stockpiled material, however it is understood, based on conversations with the quarry owner, that the overburden material was excavated and placed using scrapers. It is likely that this resulted in poor quality control of the material during excavation and hence the stockpiles are expected to consist of inconsistent materials.

7. Other Quarry Products

In addition to the investigations undertaken at Eurobodalla Quarry, other material suppliers were visited on 20 January 2017 to understand their available products for potential use in construction of the embankment. These included:

- Congo Sand Pit Quarry was not visited; however available products were discussed with owner (Norm Shepherd as for Springwater Quarry)
- Bay Sand and Gravel
- Springwater Quarry quarrying sand with some potential earthfill material available
- Cadgee Quarry Concrete

Eurobodalla Quarry

Based on discussion with the Quarry Owner (Troy Hollis) the other products produced from Dolerite rock at Eurobodalla Quarry are understood to include:

- 5 mm minus crusher dust
- 14/20 aggregate
- 7/10 aggregate
- 40 mm minus crushed rock
- 80 to 20 mm Gabion basket rockfill

Following a blast undertaken within the pit, the resulting rockfill was observed to be well-graded between approximately 20 mm to 400 mm. This material would likely be suitable for use as rockfill zones for embankment construction with minimal processing, subject to confirmation of suitability from laboratory testing.





Figure 7: Rockfill stockpile following blast at Eurobodalla Quarry 17/1/17

It is also understood that the quarry sells lesser quantities of 1-2 mm alluvial sand, rhyolite rock and has plans to expand into an area of Siltsone.

Springwater Quarry

Springwater Quarry is approximately 42 km north of the proposed storage site. The quarry operates within a sequence of tertiary sediments that include Sandstones, conglomerate and Claystone (DoC 2006a). The quarry produces a gravelly sand (based on visual classification) that prior to processing is understood to have a fines content ranging between 8 to 15% (based on conversations with quarry owner Norm Shepherd). Two samples of this product were collected for testing. The licence limit at the Springwater Quarry was reported to be 30,000 m³/annum.

At the time of visiting, the quarry was not in operation and had not been in operation for several years. Plans were in place to upgrade the plant and this was projected to be completed by June 2017. The upgraded plant is planned to include a cyclone with the capacity to reduce the fines content of the processed sand to approximately 2 to 3%.

The quarry is also understood to have material potentially suitable for use as earthfill, however the quantity and variability of this material is not known. Based on previous testing undertaken at the site (DoC, 2006a) this material classified as SC (three tests), CH (one test) and MH (one test).

Congo Sand Pit

This quarry was not visited, however available products were discussed with the owner (Norm Shepherd for Springwater Quarry). It is understood that material available from Congo Sand Pit is a poorly graded single sized 0.3 mm sand. This would not be suitable for use as a fine filter to the core of the embankment.



Cadgee Quarry Concrete

A concrete plant in Dalmeny was visited with samples of 'Coarse River Sand' collected and tested. Based on discussions with operators at the plant, it is understood that the quarry is located on the Tuross River near Cadgee. Quarried material includes alluvial sand and cobbles. The river sand goes through very little processing and is sold as 'Coarse River Sand'. Based on visual classification the material grades as a medium to coarse sand, would likely be missing the coarse end of the grading to be suitable for use a fine filter.

In the process, the alluvial cobbles are crushed to produce a gravel product.

Bay Sand and Gravel

Basalt Quarry supplying aggregates and rockfill products. This material would likely be suitable for use as a coarse filter (Zone 2B) and rockfill zones, subject to confirmation of material properties from laboratory testing. At the time of visiting the plant was producing approximately 200 mm rockfill as shown in Figure 8.



Figure 8: Rockfill stockpile at Bay Sand and Gravel 20/1/17



8. Conclusions

- Based on visual classification and laboratory testing of the materials, the residual soil and XW
 Dolerite available at Eurobodalla Quarry would likely be suitable for use as the earthfill core
 during construction of the Eurobodalla Southern Storage. However, the materials are
 expected to be sensitive to moisture content due to the high plasticity and are potentially
 dispersive.
- Some materials display characteristics of Halloysite, a tubular clay structure that when remoulded can release interstitial water resulting in a large increase in the moisture content.
 X-ray diffraction of the material has not been completed to determine if Halloysite is present.
- There is likely to be adequate volume of earthfill available for construction of Stage 1 of the Eurobodalla Southern Storage, provided the overburden material is not quarried or stockpiled without appropriate quality control. This would require residual soil material and XW Dolerite to be mixed. The estimated volume of in-bank material required for construction of the Stage 1 embankment is currently estimated to be approximately 110,000 m³. This compares to approximately 150,000 m³ of material estimated to be available to the north of the existing quarry area within the proposed licence extension area.
- To meet demand for earthfill for construction of the core will require mixing of the residual soil and XW material. Generally the residual soil classifies as high plasticity clay/ cilt, with the extremely weathered material typically classifying as a medium to high plasticity clay/ silt and clay-gravel mixtures. Mixing of the residual soil and extremely weathered materials to create a homogeneous, low permeability fill, may be challenging given the high plasticity of the materials.
- Subject to confirmation from laboratory testing, it is expected that the coarse filter will be able to be sourced from Eurobodalla Quarry or Bay Sand and Gravel or alternative commercial quarries in the area.
- A potential source of fine filter has not yet been confirmed and is subject to the result of material testing from Springwater Quarry. Additional testing would be required to demonstrate that the Quarry could consistently meet the grading requirement for the fine filter.



REFERENCES

- NSW Department of Commerce. "Eurobodalla water supply augmentation. Stony Creek Dam Site 2. Feasibility Design Stage Geotechnical Investigation." Report No. 04-GJ67A. May 2005.
- NSW Department of Commerce. "Eurobodalla water supply augmentation. Stony Creek Dam Site 2. Concept Design Stage Geotechnical Investigation." Report No. 05-GL66A. January 2006.
- NSW Department of Commerce. "Stony Creek Storage. Concept Design Report." Report No. DC05202. March 2006.
- NSW Department of Commerce. "Stony Creek Dam Trial Embankment." Memorandum No. GM37A-S1. Sept 2006.



APPENDIX A. TESTPIT LOGS

Technical Note: ESS-TN- 01

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ01 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767708.000, N: 5998089.000 (55 MGA94) SURFACE ELEVATION: 73.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST GRAPHIC LOG CLASSIFICATION PENETRATION SUPPORT GROUND WATE LEVELS MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL 16 0.30m RESIDUAL SOIL CH CLAY, high plasticity, red-brown, trace gravel, moist MC<PL, very stiff. M (<PL) 0.5 ٧St EXTREMELY WEATHERED ROCK SC CLAYEY SAND, fine to coarse, angular, mottled yellow and orange, high plasticity fines, with gravel, moist, dense, XW DOLERITE. 0.1.0 Σ Ω GNE 1.20m WEATHERED ROCK DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured, rock cobbles recovered within a clayey 1.5 17 EXCAVATION TP-EQ01 TERMINATED AT 2.40 m 2.5 o 3.0 3.5 0 4.0 4.5 ල 5.0 සූ 5.5 PHOTOGRAPHS NOTES YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak - Medium Dense - Dense - Very Dense SUPPORT MD water inflow R-Remouded (uncorrected kPa Timbering D VD Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ

WITH FENCE TOOL

1 LIB 08

4GS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ02 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767728.000, N: 5998138.000 (55 MGA94) SURFACE ELEVATION: 66.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-300 © METER ELEVATION (RL) DEPTH (m) GRAPHIC LOG MOISTURE CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST CLASSIFICATION PENETRATION SUPPORT GROUND WATI MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL 16 RESIDUAL SOIL CH CLAY, high plasticity, red-brown, moist MC<PL, very stiff. ΥP ΛSt 0.5 EXTREMELY WEATHERED ROCK CH SANDY CLAY, high plasticity, mottled yellow and orange, sand is fine to coarse, trace gravel, moist MC~PL, stiff to very stiff, XW DOLERITE. St to VSt Ы ე ⊠ DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured, rock cobbles recovered within a clayey sand matrix. WEATHERED ROCK 0.59 EXCAVATION TP-EQ02 TERMINATED AT 1.30 m Target depth 1.5 0. 2.0 2.5 o 3.0 3.5 4.5 O. 5.0 5.5 PHOTOGRAPHS NOTES ∑ [®]YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, - Medium Dense - Dense - Very Dense SUPPORT MD water inflow R-Remouded (uncorrected kPa Timbering D VD Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:52 8.2.900

WITH FENCE TOOL

1 LIB 08

4GS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ03 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767785.000, N: 5998152.000 (55 MGA94) SURFACE ELEVATION: 63.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.00 m LONG 2.00 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER SONSISTENCY RELATIVE DENSITY ELEVATION (RL) DEPTH (m) MOISTURE SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT GROUND WATI MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL 16 0.25m EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled grey and orange, trace sand, moist MC>PL, stiff to very stiff, XW DOLERITE. 0.5 0.10 γ. $\tilde{\mathbf{z}}$ 1.5 GNE 2.20m SC CLAYEY SAND, fine to coarse, angular, mottled grey and orange, high plasticity fines, trace gravel, moist, dense, XW DOLERITE. Σ Ω 2.5 2.60m DOLERITE, brown and orange with black staining, intact rock typically medium strength, highly weathered, fractured, rock cobbles recovered within a clayey sand matrix. WEATHERED ROCK 0.09 3.0 7/2 3.10m EXCAVATION TP-EQ03 TERMINATED AT 3.30 m 3.30: Near refusal on HW Target depth 0.4.0 4.5 O 5.0 5.5 PHOTOGRAPHS NOTES YES C NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M W - Moist 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations **SMEC** & basis of descriptions.

20/03/2017 17:52 8.2.900

20-3-2017.GPJ

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS

WITH FENCE TOOL

1 LIB 08

AGS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ04 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767751.000, N: 5998234.000 (55 MGA94) SURFACE ELEVATION: 67.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components GROUND WAT SYMBOL STRUCTURE & Other Observations 97.0 10.0 FILL CH GRAVELLY CLAY, high plasticity, mottled brown, red-brown and orange, gravel is fine to coarse, with sand, trace cobbles, moist MC<PL, stiff, FILL. ŏ M (<PL) 0.5 OH CLAY, high plasticity, black, with some gravel, moist MC<PL, very stiff, ٧St o 1.0 GNE 1.10m EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled grey and red, trace gravel (fine to medium grained), moist MC~PL, stiff, XW DOLERITE. M (c PL) 1.5 ಭ 1.60m CH SANDY CLAY, medium plasticity, mottled grey and orange, sand is fine to coarse, moist MC~PL, stiff, XW DOLERITE. 0.2.0 WEATHERED ROCK DOLERITE, brown and orange with black staining, intact rock medium to high strength, highly weathered, fractured, rock cobbles recovered within a clayey sand matrix. 7/ 2.00: Minor SHALE (grey with orange staining, medium to high strength, moderately weathered) EXCAVATION TP-EQ04 TERMINATED AT 2.30 m observed. 2.5 2.30: Near refusal on HW Dolerite 0. 3.0 3.5 0.4.0 4.5 0.5.0 75.0 5.5 PHOTOGRAPHS NOTES × σ̈YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak - Medium Dense - Dense - Very Dense SUPPORT MD water inflow R-Remouded (uncorrected kPa Timbering D VD Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations **SMEC** & basis of descriptions.

SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ

18-06-2014.GLB Log

WITH FENCE TOOL

1 LIB 08

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ05 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION : E: 767814.000, N: 5998282.000 (55 MGA94) SURFACE ELEVATION: 51.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components GROUND WAT LEVELS SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL 16 EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled red-brown and orange, moist MC~PL, stiff to very stiff, XW DOLERITE 0.5 St to VSt) M GNE SC CLAYEY SAND, fine to coarse, angular, mottled yellow and orange, high plasticity fines, with gravel, moist, dense, XW DOLERITE. Σ DOLERITE, brown and orange with black staining, intact rock high to very high strength, highly weathered, fractured, rock cobbles recovered within a clayey sand matrix. WEATHERED ROCK ~ 1.5 1.60: Near refusal on HW EXCAVATION TP-EQ05 TERMINATED AT 1.60 m Target depth 0. 2.0 2.5 0. 3.0 4.5 0. 5.0 9. 5.5 PHOTOGRAPHS NOTES X4 AES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:52 8.2.900

WITH FENCE TOOL

1 LIB 08

AGS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ06 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767617.000, N: 5998450.000 (55 MGA94) SURFACE ELEVATION: 65.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.50 m WIDE DRILLING MATERIAL 100 HAND 200 SPENETRO-300 © METER ELEVATION (RL) DEPTH (m) GROUND WATER LEVELS GRAPHIC LOG CLASSIFICATION MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL <u>w</u> WEATHERED ROCK DOLERITE, brown and orange with black staining, intact rock high to very high strength, highly weathered, fractured, rock cobbles recovered within a clayey sand matrix. 77 GNE 0.5 0.1.0 0.70 1.20: Near refusal on HW Dolerite EXCAVATION TP-EQ06 TERMINATED AT 1.20 m Target depth 1.5 0.2.0 2.5 0.8 3.5 4.5 o 5.0 5.5 PHOTOGRAPHS NOTES ∑ [®]YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:52 8.2.900

WITH FENCE TOOL

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ07 : Eurobodalla Shire Council CLIENT FEATURE FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767781.000, N: 5998450.000 (55 MGA94) SURFACE ELEVATION: 47.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 4.00 m LONG 2.00 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT MATERIAL DESCRIPTION Soil Type, Plasticity or Particle Characteristic, Colour, Secondary and Minor Components GROUND WAT SYMBOL STRUCTURE & Other Observations TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM CL GRAVELLY CLAY, medium plasticity, brown, gravel is fine to coarse, angular, with cobbles, moist MC<PL. 0.50m 0.5 RESIDUAL SOIL CH CLAY, high plasticity, red-brown, trace gravel (fine to coarse), moist MC~PL, very stiff. ΛŞţ M (c PL) 1.00m EXTREMELY WEATHERED ROCK 46.0 CH CLAY, high plasticity, mottled red-brown and orange, trace gravel (fine to coarse), moist MC~PL, stiff. ŏ SC CLAYEY SAND, fine to coarse, angular, mottled yellow and orange, high plasticity fines, with gravel, trace cobbles, moist, dense, XW DOLERITE. 1.5 1.70: Increasing cobbles Ω 2.50m 2.5 0. 3.0 WEATHERED ROCK DOLERITE, brown and orange, intact rock high to very high strength, highly weathered, fractured, rock cobbles recovered within a clayey sand matrix 3.00: Increased resistance EXCAVATION TP-EQ07 TERMINATED AT 3.20 m 3.20: Near refusal on HW Target depth 3.5 4.5 0.5 5.5 PHOTOGRAPHS NOTES ∑ ₄AES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak - Medium Dense - Dense - Very Dense SUPPORT MD water inflow R-Remouded (uncorrected kPa Timbering D VD Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations **SMEC** & basis of descriptions.

20/03/2017 17:52 8.2.900

20-3-2017.GPJ

SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS

18-06-2014.GLB Log

WITH FENCE TOOL

1 LIB 08

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ08 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767699.000, N: 5998497.000 (55 MGA94) SURFACE ELEVATION: 48.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.60 m LONG 2.10 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT GROUND WATI MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM COBBLES within sandy gravel matrix, grey-brown, dry Ω .50m 0.5 EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled brown, grey and orange, with some gravel (fine to coarse), trace cobbles, moist MC \sim PL, very stiff, XW DOLERITE GNE M (c PL) ٧St 0.74 1.20m WEATHERED ROCK SHALE, grey with orange and red, intact rock high to very high strength, fractured 1.5 EXCAVATION TP-EQ08 TERMINATED AT 1.60 m Refusal 0.94 2.5 0.5 3.0 4.5 ္ 5.0 တ္ 5.5 PHOTOGRAPHS NOTES X 4 YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:52 8.2.900

WITH FENCE TOOL

1 LIB 08

4GS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ09 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767733.000, N: 5998665.000 (55 MGA94) SURFACE ELEVATION: 34.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.00 m LONG 2.00 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components CLASSIFICATI GROUND WAT SYMBOL STRUCTURE & Other Observations 6. 0.0 . TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM COBBLES within sandy gravel matrix, grey-brown, dry. Δ 0.40m EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled brown, orange and grey, trace gravel (fine to coarse), moist MC~PL, very stiff, XW DOLERITE. 0.5 0.1.0 ٧St 1.5 (c PL) 2.5 CH SANDY CLAY, medium plasticity, mottled brown, orange and grey, sand is fine to coarse, moist MC~PL, XW DOLERITE. 0.8 0.3.0 WEATHERED ROCK DOLERITE, grey and brown, intact rock high to very high strength, moderately weathered, fractured. _ EXCAVATION TP-EQ09 TERMINATED AT 3.40 m Target depth 4.5 O 5.0 5.5 PHOTOGRAPHS NOTES ∑ [®]YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations **SMEC** & basis of descriptions.

20/03/2017 17:52 8.2.900

20-3-2017.GPJ

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS

WITH FENCE TOOL

1 LIB 08

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ10 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767783.000, N: 5998689.000 (55 MGA94) SURFACE ELEVATION: 33.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.00 m LONG 2.20 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST GRAPHIC LOG CLASSIFICATION PENETRATION SUPPORT GROUND WATI MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL 0.15m ALLUVIUM/COLLUVIUM COBBLES within sandy gravel matrix, grey-brown, dry. Ω 0.30m RESIDUAL SOIL CH CLAY, high plasticity, red-brown, trace sand and gravel, moist MC<PL, M (<PL) 0.5 ٧St GNE 0.80m CL SANDY CLAY, low plasticity, mottled brown, orange and grey, sand is fine to coarse, trace gravel, moist MC~PL, stiff to very stiff, XW DOLERITE. EXTREMELY WEATHERED ROCK 35.0 35.0 ζţ M (c PL) 1.40m DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured. WEATHERED ROCK 1.5 _ EXCAVATION TP-EQ10 TERMINATED AT 1.60 m Target depth 0. 2.0 E 2.5 o. 3.0 3.5 0.4.0 4.5 o 5.0 5.5 PHOTOGRAPHS NOTES ∑ ^NYES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

18-06-2014.GLB Log

WITH FENCE TOOL

1 LIB 08

AGS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ11 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767711.000, N: 5998734.000 (55 MGA94) SURFACE ELEVATION: 29.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.30 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) GRAPHIC LOG MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST CLASSIFICATION PENETRATION SUPPORT GROUND WATI MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL 0.20m EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled brown, orange and grey, trace sand and gravel, moist MC~PL, very stiff, XW DOLERITE. 0.5 GNE M (c PL) ٧St 0.10 1.30m WEATHERED ROCK DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured. ightharpoonupEXCAVATION TP-EQ11 TERMINATED AT 1.50 m Target depth 0.20 2.5 0.8 0.93 3.5 0.4.0 4.5 0. 5.0 5.5 PHOTOGRAPHS NOTES ∑ ÑYES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

WITH FENCE TOOL

1 LIB 08

4GS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ12 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767667.000, N: 5998800.000 (55 MGA94) SURFACE ELEVATION: 23.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 4.00 m LONG 2.40 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT GROUND WATI MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM GRAVELS and COBBLES within sandy clay matrix, dry. Ω 0.50m 0.5 RESIDUAL SOIL CH CLAY, high plasticity, mottled brown, orange and grey, trace sand, moist MC~PL, very stiff. GNE M (c PL) 0.10 VSt 1.50m 1.5 DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured. WEATHERED ROCK 7,1 1.70: Near refusal on HW Dolerite EXCAVATION TP-EQ12 TERMINATED AT 1.70 m Target depth 0.20 2.5 0.8 3.5 4.5 o 5.0 ∞ 5.5 PHOTOGRAPHS NOTES YES E NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

WITH FENCE TOOL

1 LIB 08

4GS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ13 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767656.000, N: 5998839.000 (55 MGA94) SURFACE ELEVATION: 17.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.00 m LONG 2.00 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT GROUND WATE LEVELS MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM COBBLES within sandy gravel matrix, grey-brown, dry Ω 0.50m GNE 0.5 WEATHERED ROCK RHYOLITE, mottled grey, white and orange, intact rock high to very high strength strength, highly weathered, fractured, recovered as gravel and cobbles within a sandy clay matrix. 0.1.0 1.20m 1.20: Near refusal on HW Rhyolite EXCAVATION TP-EQ13 TERMINATED AT 1.20 m Target depth 1.5 0.2.0 2.5 o 3.0 3.5 4.5 0.5.0 2 5.5 PHOTOGRAPHS NOTES YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

WITH FENCE TOOL

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ14 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767762.000, N: 5998860.000 (55 MGA94) SURFACE ELEVATION: 29.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.00 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-300 © METER ELEVATION (RL) DEPTH (m) GROUND WATER LEVELS MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST CLASSIFICATION PENETRATION GRAPHIC LOG SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM COBBLES within sandy gravel matrix, grey-brown, dry. Ω GNE 0.5 DOLERITE, brown and orange with black staining, intact rock typically medium to high strength, highly weathered, fractured, recovered as gravels and cobbles in a clayey sand matrix. WEATHERED ROCK 7/ 0.1.0 1.20: Near refusal on HW Dolerite EXCAVATION TP-EQ14 TERMINATED AT 1.20 m Target depth 1.5 0.20 2.5 0.8 0.93 3.5 0.4.0 4.5 0. 5.0 5.5 PHOTOGRAPHS NOTES ∑ ÑYES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

WITH FENCE TOOL

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ15 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767869.000, N: 5998799.000 (55 MGA94) SURFACE ELEVATION: 29.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.50 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) GRAPHIC LOG MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST CLASSIFICATION PENETRATION SUPPORT GROUND WATE LEVELS MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL RESIDUAL SOIL CH CLAY, high plasticity, red-brown, trace fine to medium sand, moist MC<PL, very stiff. M (<PL) 0.5 0.75m EXTREMELY WEATHERED ROCK CL CLAY, medium plasticity, mottled red and orange, with some fine to medium grained sand, moist MC~PL, very stiff, XW DOLERITE. 0.10 1.5 2.5 GNE 3.0 3.0 4.5 0.5.0 5.0 EXCAVATION TP-EQ15 TERMINATED AT 5.40 m Machine Limit 5.5 IIIPHOTOGRAPHS NOTES ∑ ÑYES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

18-06-2014.GLB Log

T00L

WITH FENCE

1 LIB 08

4GS 3

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ16 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767861.000, N: 5998698.000 (55 MGA94) SURFACE ELEVATION: 36.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 4.00 m LONG 2.80 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-- 300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG CLASSIFICATIO SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components GROUND WAT SYMBOL STRUCTURE & Other Observations TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM GRAVELS and COBBLES within sandy clay matrix, dry. Δ 0.40m RESIDUAL SOIL CH CLAY, high plasticity, red-brown, trace fine to medium grained sand, moist MC~PL, very stiff. 0.5 ΛSt GNE 0.80m EXTREMELY WEATHERED ROCK CL SANDY CLAY, medium plasticity, mottled brown, orange and grey, sand is fine to medium grained, trace fine to coarse gravel, moist M~PL, stiff, XW DOLERITE. M (c PL) 35.0 ij 1.50m 1.5 WEATHERED ROCK DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured. 1 1.80: Near refusal on HW Dolerite EXCAVATION TP-EQ16 TERMINATED AT 1.80 m Target depth % 0. 2.0 2.5 0.83.0 3.5 0.4.0 4.5 O. 5.0 5.5 PHOTOGRAPHS NOTES YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, - Medium Dense - Dense - Very Dense SUPPORT MD water inflow R-Remouded (uncorrected kPa Timbering D VD Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations **SMEC** & basis of descriptions.

20/03/2017 17:53

SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <-DrawingFile>>

18-06-2014.GLB Log

WITH FENCE TOOL

1 LIB 08

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ17 : Eurobodalla Shire Council CLIENT FEATURE FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION : E: 767897.000, N: 5998668.000 (55 MGA94) SURFACE ELEVATION: 32.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 4.00 m LONG 2.40 m WIDE DRILLING MATERIAL 200 A PENETRO-300 & METER ELEVATION (RL) DEPTH (m) MOISTURE CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST PENETRATION GRAPHIC LOG SUPPORT MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components CLASSIFICATI GROUND WAT SYMBOL STRUCTURE & Other Observations 0.0 TOPSOIL TOPSOIL ALLUVIUM/COLLUVIUM GW SANDY GRAVEL, fine to coarse, brown, sand is fine to coarse grained, with some fines, dry, COLLUVIUM. Δ CH CLAY, high plasticity, mottled dark brown, red and orange, with fine to coarse grained sand, moist MC<PL, very stiff. RESIDUAL SOIL 0.5 M (<PL) ΛŞţ 1.10m EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled brown, red and orange, with fine to coarse grained sand, moist MC<PL, very stiff, XW Dolerite. 1.5 1.70m CL SANDY CLAY, medium plasticity, mottled brown, red and orange, sand is fine to coarse grained, moist M~PL, XW DOLERITE. 1.70: Increasing sand content with depth GNE 2.5 3 0.8 79.0 3.60m WEATHERED ROCK DOLERITE, brown and orange with black staining, intact rock typically high strength, highly weathered, fractured. ` _ 4.00: Near refusal on HW Dolerite 28.0 EXCAVATION TP-EQ17 TERMINATED AT 4.00 m 4.5 0.5.0 18-06-2014.GLB Log 5.5 WITH FENCE TOOL PHOTOGRAPHS NOTES ∑ [®]YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M W - Moist 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations **SMEC** & basis of descriptions.

20-3-2017.GPJ

QUARRY

SMEC EXCAVATION

1 LIB 08

EXCAVATION - GEOLOGICAL LOG PIT NO: TP-EQ18 CLIENT FEATURE : Eurobodalla Shire Council FILE / JOB NO : 30012127 PROJECT : Eurobodalla Southern Storage SHEET: 1 OF 1 Eurobodalla Quarry Potential Earthfill Borrow POSITION: E: 767726.000, N: 5998496.000 (55 MGA94) SURFACE ELEVATION: 52.000 (AHD) EQUIPMENT TYPE: 16t Excavator METHOD: Test Pit DATE EXCAVATED: 19/1/17 LOGGED BY: CP CHECKED BY: RW EXCAVATION DIMENSIONS: 3.80 m LONG 2.50 m WIDE DRILLING MATERIAL - 100 - 200 APENETRO-300 © METER ELEVATION (RL) DEPTH (m) MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY SAMPLES & FIELD TEST CLASSIFICATION PENETRATION GRAPHIC LOG SUPPORT GROUND WATE LEVELS MATERIAL DESCRIPTION
Soil Type, Plasticity or Particle Characteristic, Colour,
Secondary and Minor Components SYMBOL STRUCTURE & Other Observations 0.0 0.0 TOPSOIL TOPSOIL 16 0.30m EXTREMELY WEATHERED ROCK CH CLAY, high plasticity, mottled brown, orange and grey, trace gravel (fine to coarse), moist MC~PL, very stiff, XW DOLERITE. 7 0.5 GNE M (c PL) VSt 1.10: Colour changes to mottled grey and orange 1.30: Some low to medium strength rock appearing 1.50m 1.5 WEATHERED ROCK DOLERITE, grey and brown, intact rock typically high strength, highly \weathered, fractured. EXCAVATION TP-EQ18 TERMINATED AT 1.60 m 0.2.0 2.5 0.6 3.0 3.5 4.5 0.5.0 4 5.5 PHOTOGRAPHS NOTES YES NO CLASSIFICATION SYMBOLS & CONSISTENCY/ PENETRATION SAMPLES & FIELD TESTS METHOD RELATIVE DENSITY SOIL DESCRIPTION ₽шцт₹ - Very Soft - Soft - Firm Based on Unified VS U50 - Undisturbed Sample Natural Exposure No Resistance Classification System 50 mm diameter Existing Excavation Disturbed Sample BH Backhoe Bucket St VSt - Stiff MOISTURE - Very Stiff - Hard - Very Loose В **Bulk Disturbed Sample** Bulldozer Blade H VL MC Moisture Content Ripper WATER D - Dry Hand Penetrometer (UCS kPa) M - Moist W - Wet 10 Oct., 73 Water Level on Date shown - Loose VS Vane Shear; P-Peak, MD D VD - Medium Dense - Dense - Very Dense SUPPORT water inflow R-Remouded (uncorrected kPa Timbering Plate Bearing Test water outflow See Explanatory Notes for **SMEC AUSTRALIA** details of abbreviations SMEC & basis of descriptions.

18-06-2014.GLB Log SMEC EXCAVATION EUROBODALLA QUARRY INVESTIGATIONS - 20-3-2017.GPJ <<DrawingFile>> 20/03/2017 17:53 8.2.900

WITH FENCE TOOL

1 LIB 08

4GS 3



APPENDIX B. LABORTORY TESTING

Appendix	Laboratory Test
B1	Particle Size Distribution
B2	Atterberg Limits and Emerson Class
В3	Standard Compaction
B4	Triaxial Tests
B5	Permeability Tests

Technical Note: ESS-TN- 01



B1 – Particle Size Distribution

Technical Note: ESS-TN- 01



Job No CIVIL GEOTECHNICAL SERVICES Report No 17102/R001 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by ANR Client 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

TP-EQ01 0.3 - 1.2m Sample Identification Sample No 17102001

Sample Description

gravelly CLAY, high plasticity, brown, fine to coarse gravel, trace of fine to coarse sand

Assumed soil particle density 2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion	Mechanical	Loss in pretreatment	0%
Hydrometer type	g/l	Variation to method	-

		•																				
Particle	Percent		ASS	SIEVE (m	m)		10	~		_	10 0											
Size	Passing						0.075	0 150	3	300	0.425	3	1.18	2.36	4.75	<u></u> ν	2 2	0.	5.5	37.5	2 0	Ö
(mm)		100					0	9	<u> </u>	9	0 0	<u> </u>	_	6	4. (<u>ه</u> ه	, ,	<u>~</u>	~	ကြ	۱ کر	: ★
100.0	100	700					廿			_	1				1				*	\mathbb{T}	#	
75.0	100						廿				\pm				\pm					_	壯	L
53.0	100	90					+		\vdash	\pm	\pm		_	-	\pm	1	K		+	\pm	\pm	L
37.5	100						H				+				\pm	*			-	-	₩	F
26.5	98	00					Ŧ				-				\boldsymbol{x}	-	\Box		7	-	#	F
19.0	97	80					Ŧ			-	-		-		-	-		_	-	7	#	F
13.2	93						77				1				\perp	-					#	1
9.5	90	70					#			*	*				#	#			#	#	#	1
6.7	86				***************************************		1	_			+				#					_	#	‡
4.75	83	'ng				X	$\stackrel{K}{\sqcup}$			_	+				_				_	_	#	t
2.36	78	iss 60				X	廿			\pm	\pm				\pm				\pm	+	#	t
1.18	75	Percent Passing 0 09			/ ^^		廿				1				1					_	壯	
0.600	72	Ti 50			<u> </u>		$\pm \pm$				_					+	\vdash			+	<u> </u>	Ł
0.425	71	o s					+										-				+	-
0.300	71	ď	×				H		H						-	H	\vdash				₩	F
0.150	69	40					H		F							-	\Box			-	\mp	-
0.075	66						ŦŦ				-				7	-			7	-	\mp	F
0.064	65	00	******		• • • • • • • • • • • • • • • • • • • •	***************************************	H				-				7					-	#	_
0.046	63	30					Ħ		\vdash	-	+				-	-			#	+	#	F
0.033	61						#			_	+				+	-			-	_	#	1
0.023	59	20					#			_	#				#				_		#	F
0.016	58						#				#				#					-	#	_
0.012	58						Ħ				+				#					_	#	t
0.0085	56	10					Ħ			=	\pm			#==	#	#=			#	+	#	t
0.0060	53						Ħ			_	\perp				\pm				\pm	1	壯	L
0.0043	49	0					+				+				+	-	\vdash			-	#	F
0.0040	49	U	>	fine	medium	coarse		fine	T	med	lium	coa	rse	fine	-	m	ediu	_m	CO	arse	T	ES
0.0031	47		CLAY	\vdash	iirie				COA	-	,,,,,					- 50		4	COBBLES			
0.0022	45				SILT					SA	ND					GRA	AVE	L				S
			0.0	002		0.0	060			-1- (٠ <u>-</u> -	(mm)	2.	0							60.0)

				raiti	cie siże (min)		
Gravel		Sand		Silt		Cobbles	0.0%
coarse	3.2%	coarse	5.2%	coarse	5.6%	Gravel	22.5%
medium	11.8%	medium	2.8%	medium	5.2%	Sand	13.5%
fine	7.5%	fine	5.5%	fine	7.0%	Silt	17.8%
Total	22.5%	Total	13.5%	Total	17.8%	Clay	46.2%
						Total	100.0%





17102



Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R002 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by ANR Client 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 02/03/17 Location EUROBODALLA QUARRY Checked by PJF

TP-EQ03 2.6 - 3.1m Sample Identification Sample No 17102002

Sample Description

clayey GRAVEL, fine to coarse, brown, fines of medium plasticity, with fine to coarse sand

Assumed soil particle density 2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion	Mechanical	Loss in pretreatment	0%
Hydrometer type	g/l	Variation to method	-

Particle	Percent	Ī	AS S	SIEVE (mi	n)				_											
Size	Passing						0.075	0.150	900	0.425	200	1.18	2.36	22	6.7	13.2	0	26.5	0	75.0
(mm)		100					<u>0</u>	0.		60	0	1.	2.	4.	9 0	13	19	37	53	75
100.0	100	100					+									-			-	\prod
75.0	97						H		-						-	H	-		-	И
53.0	89	90					Ŧ	-	-	\mp	-	-	+	-	-	H	7	-	\exists	H
37.5	76						1			-				_	-				1	H
26.5	67				***************************************		H			-			-		-				7	Ħ
19.0	62	80					#	_	_	#		-	#	-	-	\vdash	1	_	/	Ħ
13.2	59						#							_				17		Ħ
9.5	56	70					#			#			#	‡-	#==		-	#	1	Ħ
6.7	52						+			_				_	#			*		#
4.75	49	ing					#			_			#		#		\star	4		Ħ
2.36	44	iss 60					\bot							_		1	4			Ħ
1.18	39	P.								_				_	1/2					Ħ
0.600	35	e 50					士			_			++		*				-	H
0.425	33	Percent Passing				•				\pm				1						Ħ
0.300	31	ų.					士		-	_		-	\mathbb{X}	_	<u> </u>		1			Н
0.150	26	40					++-					\star'	++						-+	\pm
0.075	23						+			-	\mathbf{k}^{\prime}		-		-	\Box		-	-	\mathbf{H}
0.064	22	30					H			X						H	-	-	\Box	H
0.047	20	30					H	-	\mathbb{Z}	=		-	-	-	H-	H	\exists	-	\exists	H
0.034	19						1	\rightarrow		-				-	-	H	-			H
0.024	17	20				×	7	_	_	-			-		-	H	7	+	=	Ħ
0.017	16				*	X	1			-				-	-					H
0.013	14	40			XX		#		-	-			-	-	#		7	-	\dashv	H
0.0089	13	10	×	×-×			Ħ	_		#		-	#	#	#	H	#	_		Ħ
0.0064	13						#		-	-			#		#		#		1	Ħ
0.0045	11	0					<u> </u>		#	+	+		##	_	-		#		+	Ħ
0.0032	10		CLAY	fine	medium	coarse	,	fine	me	dium	coa	arse	fii	ne	me	ediun	n	coai	se	CORRIES
0.0023	10		CL	SILT					٠,	AND			1		GR/	11/5	, —			ا ھ
0.0013	8						<i>ڪ</i>	עווי					GRA	1 V 🗀				7		

		0.002	•	0.060	2.	Λ	00.0
					icle Size (mm)	0	
Gravel		Sand		Silt		Cobbles	6.1%
coarse	30.8%	coarse	8.2%	coarse	4.9%	Gravel	50.8%
medium	11.8%	medium	7.0%	medium	3.7%	Sand	22.2%
fine	8.2%	fine	7.0%	fine	3.0%	Silt	11.6%
Total	50.8%	Total	22.2%	Total	11.6%	Clay	9.3%
						Total	100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R003 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ04 1.6 - 2.0m Sample No 17102003

Sample Description

clayey GRAVEL, fine to coarse, brown, fines of medium plasticity, with fine to coarse sand

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

Particle Size	Percent Passing		AS	SIEVE (m	m)		0.075	0 150	3	300	0.425	200	1.18		2.36	22	6.7		13.2	7.	5	0.	0
(mm)		100					0	o c	5	0;	<u>0</u>	<u>.</u>	1.		22.	4	9	9. 4	2 6	26	37	53	75
100.0	100	100					-											-				\bigwedge	Ŧ
75.0	100								-		-					-	-	-	-		-	Ħ	#
53.0	100	90					Ħ		H	_	+	_	_			7	#	#	1			\Box	Ŧ
37.5	89										#				-	#	#	+	-		1	#	#
26.5	81						T				#					#	#	+	#		/	#	#
19.0	78	80					H			_	+	_	_			_	#	‡	13			#	#
13.2	75						Ħ			_						#	#	17	\star			#	#
9.5	71	70								_	#		_			_	#	\star	<u> </u>			#	廿
6.7	66	,,,					H			_	+		_			_	\bigvee	+	-			+	廿
4.75	62	ng									\pm	_			_	\downarrow	1	1				\pm	廿
2.36	55	Percent Passing					H			_	\pm		_			4	\pm	\pm	\vdash			\pm	廿
1.18	44	Pa									1				\checkmark	_	1	1	_			\pm	\pm
0.600	35	tues 50												7			+	+				-	
0.425	32	erc		***********			-				-			7		-	-	-				-	-
0.300	29	٩					H				-	-	*				-	-	-			7	Ŧ
0.150	25	40					H					Ε,	7				#-	F			=	7	Ŧ
0.075	22						H					X				_	-	7	-			7	H
0.070	22			*************	***************************************		H				X					-	-	-	-			7	-
0.050	21	30					Η			*	4	-			-	#	#	1	-		=	7	Ŧ
0.036	19						Ę				7					_	#	1	-			7	#
0.025	19	20				V X	抖			_	#	_	_			#	#	+	1			7	#
0.018	17				XXX		Ħ				1					#	#	+	1			#	#
0.013	17		\/	XXX	*		Ħ			_	#	-	_		-	#	#	#	1			#	#
0.0092	16	10	×				Ħ		H	=	#	=	_		-	#	#	1	<u> </u>			#	#
0.0066	15						Ħ			_	#					_	#	#	_			#	Ħ
0.0047	14	0					世		H		+	-				-	#-	+-		Ы		+	井
0.0033	13		<u>}</u>	fine	medium	coarse		fine		med	lium	6	oars	e	fir	ne	n	nedi	um	6	oars	se	COBBLES
0.0024	12		CLAY			1	+											417		_) BB
0.0014	11				SILT					SA	ND						GR	AV	<u> </u>				8

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 21.4% 16.9% 2.6% Gravel 47.9% coarse coarse coarse medium 13.8% medium 8.8% medium 3.5% Sand 31.8% fine 12.7% fine 6.1% fine 2.9% Silt 9.0% Total 47.9% Total 31.8% Total 9.0% Clay 11.3% Total 100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R004 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ03 0.25 - 2.2m Sample No 17102004

Sample Description

CLAY, medium plasticity, brown, with fine to coarse sand, trace of fine to medium gravel

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

Particle Size (mm)	Percent Passing		AS S	SIEVE (m	m)		0.075	0.150	0	0.425	.600	1.18	2.36	75	2 /	. 6	3.2	19.0	26.5	37.5	53.0	
100.0	100	100			ı	T	$\overline{}$	- 	$\overline{}$		-		1 1		1 (J. 3		$\stackrel{\sim}{\mapsto}$	*	*	补	⇌
75.0							1								*						#	=
75.0 53.0	100						#	_					*		\mp				_	-	#	1
53.0 37.5	100 100	90					#	_	_		\star		#		\Box				_	-	#	F
							#						#		\pm				_	+	#	t
26.5	100	80						X	1				#		\sharp				_	+	#	L
19.0	100			~~~~			X	_							$^{\pm}$					_	#	1
13.2	100												\pm		\pm		_			1	壯	
9.5	99	70				/-		+					+		╁┼	-			-+	-+-	#	+
6.7	98					/	-				-		\blacksquare		H					-	Ŧ	F
4.75	97	Percent Passing 00 09				X	H						\blacksquare		\Box					-	#	F
2.36	94	isse 60					1	7	-		_		-		\Box	-			_	+	#	F
1.18	91	# P			, , , , , , , , , , , , , , , , , , ,		1						-#		\mp				_	1	#	1
0.600	88	e 50			×		#	_			-				#				-		#	二
0.425	87	er.			<u> </u>		#						#		\pm					_	#	1
0.300	86						廿				-		#		\pm					+	#	1
0.150	82	40					 	<u>}</u> -			+-		-++		H	1			-+-	+	壯	<u>+</u> -
0.075	78			× · · · · ·			++						\pm		\pm		_		-		#	\vdash
0.063	76	30	X	***************************************			+-								+					-	${\mathbb H}$	-
0.046	73	30					H	-	-	FF	F		\mp		H	\vdash	\exists	-	\mp	-	₩	F
0.033	68						\Box								Ŧ					_	#	-
0.023	63	20					-	7	-	=	_		+		\Box				7	+	#	F
0.017	55						1						-		\Box					-	#	1
0.012	52						#	_	+		_		#		#				_	#	#	1
0.0088	49	10					#	#	#	#	#		#		\sharp				#	#	#	#
0.0062	46						#		-				#		#					#	#	1
0.0045	42	0					++-		+		-		-++		#			-	_	+-	#	上
0.0032	38	ľ	7.	fine	medium	coarse	fi	ne	me	dium		coarse		fine		me	diur	n	со	arse		COBBLES
0.0023	37		CLAY				 	_					+		ᆜ	204	\/_				+)BB
0.0013	33				SILT				Si	AND					(3RA	νE	L				<u>೮</u>

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 4.9% 0.0% 16.1% Gravel 6.9% coarse coarse coarse medium 2.4% medium 4.5% medium 13.5% Sand 17.7% 9.6% fine 4.5% fine 8.3% fine Silt 39.2% Total 6.9% Total 17.7% Total 39.2% Clay 36.2% 100.0% Total







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R005 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by ANR Client 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

TP-EQ07 0.5 - 1.0m Sample Identification Sample No 17102005

Sample Description

silty SAND, fine to coarse, brown, fines of high liquid limit, with fine to coarse gravel

Assumed soil particle density 2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion	Mechanical	Loss in pretreatment	0%
Hydrometer type	g/l	Variation to method	-

,	* .	9																				_
Particle	Percent	1	ASS	SIEVE (m	ım)																	
Size	Passing						0.075	750	3	300	0.425		1.18	2.36	22	6.7		19.0	10	37.5	53.0	0
(mm)		100					ō	Ċ	<u>.</u>	0	0.0	S .	7.	2.	4	9 0	9. 4	79	26	37	53	75
100.0	100	700							-					+			+-		-		\star	$\widehat{+}$
75.0	100						H		H		-			H		-	F	-	H	$\overline{\downarrow}$	4	-
53.0	97	90					H		H	-	+	-	-	H	-	#	F		P	7	\dashv	Ŧ
37.5	92						\Box			_	-			-				X		-	#	7
26.5	91						T		\Box		_			#	*	*	1			_	#	7
19.0	90	80					H			_	+			$ \mathbf{x} $		#	‡		H	#	#	#
13.2	86						††				#		/	1		#	#			_	#	#
9.5	85	70					##				#	17	*	#		#	‡			#	#	_
6.7	84	, ,					Ħ				+	*		#	_	#	1	1		_	#	+
4.75	82	ng					#				X		-	#			1			_	士	_
2.36	79	iss 60					Ц		Ш,	1						#	t		H	#	#	1
1.18	72	Pa					$\pm i$		\mathcal{A}		1					#	±			_	\pm	_
0.600	67	Ti 50				•••••	± 1	/	ʱ					壯		Ш-	±	-				\pm
0.425	64	Percent Passing 00 09					k				_						L			_	\pm	_
0.300	61	٩					X		\Box					-	-	-	-		Н	-	\mp	Ŧ
0.150	54	40				/	H							 -		#-	F		H		\mp	Ŧ
0.075	47						H		H					#		-	7			7	\mp	Ŧ
0.066	44	00		***************************************	***************************************	/	H				1			-	-	-	Ŧ				\mp	7
0.048	40	30				<i>X</i>	H		1	_	-			#	-	#	1		H	+	\dashv	7
0.035	35				X		Ħ		\Box		7			1	_	-	1				#	_
0.025	30	20			X		T		Ħ	7	#		+	#	_	#	+		П	7	#	7
0.018	26			X	*		Ħ				#			#	_	#	1			_	#	_
0.013	22		*	***************************************			± 1			_	#			#	_	#	#			#	#	#
0.0093	19	10					Ħ		Ħ	_	#		-	#	=	#	#		H	#	#	#
0.0066	17						\sharp			_	\pm			#	_	#	1			#	#	#
0.0047	16	0					廿							#	-	#	+		Н	_	+	\pm
0.0033	15	Ĭ	>	fine	medium	coarse		fine		mer	dium	coa	rse	f	ine	m	edit	ım	6	oars	e	ES.
0.0024	14		CLAY	,,,,,,	l	1 300.00	+	mic				1									\dashv	COBBLES
0.0014	12				SILT		L			SA	ND					GR.	AVI	=L				8
			0.0	002		0.0	060	F	arti	cle	Size	(mm)	2.	0							60.	.0

				raiti	icie Size (IIIIII)		
Gravel		Sand		Silt		Cobbles	0.9%
coarse	9.1%	coarse	10.0%	coarse	14.1%	Gravel	22.1%
medium	6.6%	medium	10.2%	medium	10.2%	Sand	35.7%
fine	6.4%	fine	15.5%	fine	3.7%	Silt	28.0%
Total	22.1%	Total	35.7%	Total	28.0%	Clay	13.3%
						Total	100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R006 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by ANR Client 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

TP-EQ12 0.5 - 1.5m Sample Identification Sample No 17102006

Sample Description

CLAY, high plasticity, brown, trace of fine to coarse sand and fine to coarse gravel

Assumed soil particle density 2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type g/l Variation to method

Particle																						
	Percent		ASS	SIEVE (m	m)																	
Size	Passing						0.075	0 150	3	90	0.425	2	1.18	2.36	2	► 10	, ~	0	ري ا	ro c	, c	ڊ
(mm)		100					0.0	,	s	0	0.0	S ·	7.	2.	4	6.7	73	19.0	26	37.5	25	5
100.0	100	100					\exists														\mathbb{Z}	
75.0	100						H		=	-	-			1	7	1			*	*	1	_
53.0	97	90					Ŧ		\Box	7	\mp			 	\star	*	Ħ	7	#	-	#	F
37.5	96						\pm			_	-				4	#		_	1	1	#	
26.5	95						Ħ				#		\angle	1	#	#			-	-	#	_
19.0	95	80					Ħ			_			-	#	#	#			#	#	#	F
13.2	94									*				1	_	#			+	+	#	-
9.5	93	70					×				#				#	#		_		+	#	_
6.7	92	1				X					+			<u> </u>	_	#			+	+	#	1
4.75	90	ng								_					\pm					1	壯	
2.36	86	iss 60					H			\pm	\pm				\pm				\pm	\pm	Ш	L
1.18	82	Pa					H			_	1				_	1			\pm	_	壯	
0.600	79	tu 50			X		$\pm i$		-	-+	<u></u>			Н		Н	-			+	╫	L
0.425	78	Percent Passing			<i></i>										_					_		
0.300	76	ď		\sim							-			-		-	-			-	\vdash	
0.150	74	40		××			\pm									-		∦	-+-	+	+	-
0.075	72		\times				H				-			-		-	\Box		-	-	F	-
0.065	72	30					H		H		-				7	-			-	-	F	_
0.047	69	30					H		H	-	+			-	\mp	-	\vdash	-	-	-	F	-
0.034	66						7				7				7	-			7	-	#	_
0.024	63	20					H		H	_	+		-	-	7	#	П		+	+	H	F
0.017	58						H				-			 	#	#		7	-	7	#	_
0.012	53						\Box			_	#			#	#	#			-	-	#	_
0.0089	50	10					H			7	+		-	#	#	#-		#	+	+	#	F
0.0063	46						H				#			1	#	#			-	+	#	_
0.0045	45	0					世		H		+			 - - - - - - - - - 	+	-			+	+-	벆	Ė
0.0032	41		₽	fine	medium	coarse		fine		med	dium	coa	rse	fir	ne	m	ediu	m	CO	arse	1	COBBLES
0.0023	39		CF.	7						24	ND					GR/	11/5	 ;			$\exists \ \ \exists$	OBB
0.0013	35		0.002 0.06				\perp			SA	עויו					GRA	11/				50.0	_

				Part	icle Size (mm)		
Gravel		Sand		Silt		Cobbles	1.1%
coarse	3.8%	coarse	6.0%	coarse	10.3%	Gravel	13.9%
medium	4.1%	medium	3.8%	medium	14.8%	Sand	14.0%
fine	6.0%	fine	4.2%	fine	7.4%	Silt	32.5%
Total	13.9%	Total	14.0%	Total	32.5%	Clay	38.5%
						Total	100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R007 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ11 0.2 - 1.3m Sample No 17102007

Sample Description

CLAY, high plasticity, brown, trace of fine to coarse sand

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

Particle Size	Percent Passing		AS	SIEVE (m	m)		0.075	0 150	3	300	0.425	000	1.18	2.36	75	6.7	5	13.2	0.6	26.5	37.5	0.5	
(mm)		100					0	_	· ·	-	900	5	_	<u>رة</u>	4	9	6 →	*	~	Ž	m ι	ر ب ر	` *
100.0	100						Ħ						-	*		\exists				1	+	#	1
75.0	100						廿			*	*	*		\pm		#	1		1	\pm	\pm	#	t
53.0	100	90				- J	*		Ì	_	\perp		_	\pm		\pm	+	\pm	1	\pm	\pm	$^{+}$	±
37.5	100					× ``	+										+	+	+		+-	₩	+-
26.5	100	00					Ŧ				7					-	7	_	7	-	-	#	F
19.0	100	80			X		Ŧ				-			-		-	7	-	-	-	+	#	F
13.2	100						#				1			#		-	#	_	1	-	1	#	F
9.5	100	70					#				_			#		#	#	#	1	+	#	#	1
6.7	99			<u> </u>			廿				_					-#	_		1	-	+	#	1
4.75	99	ng	×				\pm			_	_			#		#	#	_	1	_	1	#	士
2.36	97	188 60					H				\perp			#		#	1	\pm	1	\pm	\pm	#	上
1.18	96	Pa															1	_	1	_	\pm	#	L
0.600	95	tu 95 50					++							-++-			-	-	-		-	#	-
0.425	94	Percent Passing 0 09					H		-		-					\dashv	7		7	-	Ŧ	Ŧ	F
0.300	93	٩					H				-					7	7	-	7	-	-	Ŧ	F
0.150	92	40					H		-					-11-		-#	7	7	7		+	#-	-
0.075	91						#				1			#		#	#	7	1	1	+	#	1
0.057	89						Ħ				#			#		_	7	_	7	+	1	#	1
0.042	88	30					Ħ		_		#	-		#		#	#	#	#	#	+	#	1
0.030	86						茸				#			-			1		#	_	-	#	+
0.021	85	20					1				_			#		#	_	_		+	+	#	上
0.015	84						\pm				_			-		#	1				+	\pm	1
0.010	81						H				_			#		1	_	+	1	+	+	#	1
0.0077	79	10					H				+			\pm	}	#	-	+	\pm	\pm	+-	#	£
0.0077	75 75			***************************************			H							+				-	-		-	Ŧ	F
0.0033	73	_					H				+			-		#	7	7	7		-	Ŧ	F
0.0039	73 70	0	_	_			Ė		T					Τ	fino	Ť	me	diane	Ţ		2500	Τ	Si
	-		CLAY	fine	medium	coarse	$oxed{oxed}$	fine		med	dium	CO	arse	\perp	fine		iriec	dium		CO	arse	_	COBBLES
0.0020 0.0012	67 64		"		SILT					SA	ND					G	RAI	VEL	-				S
0.0012	U 4	J	0.0	002		0.0	60			,	Size	,	, 2	2.0								60.0	

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 0.0% 2.5% 4.5% Gravel coarse coarse coarse 2.9% medium 0.8% medium 2.0% medium 9.1% Sand 7.6% fine 2.1% fine 3.1% fine 8.8% Silt 22.4% Total 2.9% Total 7.6% Total 22.4% Clay 67.1% Total 100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R008 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ18 0.3 - 1.5m Sample No 17102008

Sample Description

CLAY, high plasticity, brown, with fine to coarse gravel, trace of fine to coarse sand

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion	Mechanical	Loss in pretreatment	0%
Hydrometer type	g/l	Variation to method	-

Particle Size	Percent Passing		AS S	SIEVE (m	m)		75	5	3	00	25	3 ,	∞	မှ	2			0 0	, ıc	2 40	0	0
(mm)							0.075	0 150	5	0.3	0.425		1.18	2.36	7.4	6.7	9.5	13.2	5 6	37.	53.	75.
100.0	100	100																		- *	4	1
75.0	100						Ħ				1			#		#	1		Z		_	
53.0	100	90					Ħ			_	+		-	#		#	1	ᆂ	-		_	
37.5	98						Ħ				#				\rightarrow	*		+			#	
26.5	96						Ħ			*	*		*	\prod	_	#	+	_			#	
19.0	95	80					넗				\pm		-	#		#	#	+			#	\pm
13.2	92						K				+					#	+	+			+	
9.5	90	70				/	4				+					#	+	+	-		_	
6.7	88	, ,	~~~~			*	Ħ				+			+	_	#	+	-			+	
4.75	87	ng		~~~~			H				1						1	_			_	
2.36	85	Percent Passing				/	Н			\pm	\pm			\perp		#	\pm	\pm	L		\pm	\perp
1.18	84	Pa				<i>/</i>	Ħ				1						1	_	L		1	
0.600	84	# 50			/		H							壯			\pm	+	1	-	-+	
0.425	83	erc S					H				\pm						1	_			\pm	
0.300	83	σ					+i				-			-			-	-	-	-	+	-
0.150	82	40			<i>-</i> }		H							- 11			\pm		-		+	
0.075	78				<i></i>		\vdash				-			+		-	+	-	-		-	-
0.061	75	30			*		H				-			H			Ŧ	-			-	
0.046	67	30		7			Н			-	-			H		Ŧ	Ŧ	F	F		\mp	H
0.033	62						H				-			-			Ŧ	-	-		7	
0.023	57	20					H			_	-		-	\blacksquare	_	\mp	Ŧ	-	-		7	Ŧ
0.017	51			X			H				7						-	-	_	-	7	
0.012	47	10	/				H				-			-	-		7	-	-		7	-
0.0089	38	10	*				H			-	+			-		\mp	7	+	F		7	H
0.0064	34		*********		***************************************		H				-			#		#	7	-	-		-	1
0.0046	28	0					p		1		1			11		#	1				Ť	<u></u>
0.0033	21		CLAY	fine	medium	coarse		fine		medi	um	coa	rse	t	ine	r	nedi	um	0	coars	se	COBBLES
0.0024	18		7		0 // T	1	t			SAN	VD.					GF	ZΔV	FI.				OBE
0.0014	10		0.002 0.060 3.0 GRAVEL 8											Ь—								

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 5.2% 1.5% 19.3% Gravel 14.9% coarse coarse coarse medium 7.1% medium 1.5% medium 22.1% Sand 11.1% fine 2.6% fine 8.1% fine 17.4% Silt 58.8% Total 14.9% Total 11.1% Total 58.8% Clay 15.2% Total 100.0%







Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R009 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by ANR Client 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

TP-EQ07 1.0 - 2.5m Sample Identification Sample No 17102009

Sample Description

silty CLAY, high plasticity, brown, with fine to coarse gravel, trace of fine to coarse sand

Assumed soil particle density 2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion	Mechanical	Loss in pretreatment	0%
Hydrometer type	g/l	Variation to method	-

.,																						_
Particle	Percent		ASS	SIEVE (m	m)					_		_										
Size	Passing						0.075	0 150		300	0.425		1.18	2.36	75	6.7	ς ς	19.0	5.5	37.5	53.0	0.0
(mm)		100					0	0	<u>. </u>	0	0 0	<u> </u>	-	2.	4.	9 0	<u>ب</u> بر	3 6	2	8	2	"
100.0	100	700					\pm			_	\perp				_	#	\pm				A	f
75.0	100						\pm		_	-	+			 	\dashv	+	土		Н	X	+	\pm
53.0	100	90					H		\pm	\pm	+			H	\dashv	+	\perp		P	\exists	+	\pm
37.5	95										+			H-		#	\mathcal{V}	*	Н	-	\dashv	Ŧ
26.5	91	00					H			-	+			H	*	*	F	-	П		\exists	7
19.0	89	80					Ŧ		-	-	-		*	*		-	Ŧ		П	-	\dashv	\mp
13.2	87			***************************************			7			-*	*			-	-	-	+	-	П	-	7	7
9.5	84	70					7			7	-‡-		 	#-	‡	#	‡	-	H	-	#	7
6.7	82						*;				+				_	#	#	_		_	#	#
4.75	81	ing				X	#			#	#			#	_	#	#			_	#	#
2.36	79	issi 60				×	Ħ		_	#	\pm		<u> </u>	#		#	#		H	#	#	
1.18	78	A.			X		Ħ				#				_	#	土				\pm	
0.600	76	ii 50			<u></u>		Ħ			-	+			士	-	#	士	-	H	\pm	-	\pm
0.425	76	Percent Passing 00 09			/		Ħ				\pm			\perp			上			_	\pm	
0.300	75	щ					H			_	1		<u> </u>	1	_	#	土	-			\pm	\pm
0.150	73	40		<u> </u>			+							-11		-1	+		-		\dashv	-
0.075	71		×				\pm			-				-		-	\pm	-		-	\dashv	\pm
0.060	68	30		**********			H				-			H		-	Ŧ	-	Н		\mp	-
0.044	66	30					H		-	-	-			\vdash		#	F	-	П	-	\exists	Ŧ
0.031	63				•••••	***************************************	H				7			-	-	-	Ŧ		П		7	7
0.022	59	20					H		7	7	+			\mathbf{H}	7	#	F	<u> </u>	H	7	7	Ŧ
0.016	57						#		_	7	1			#	_	#	#		Ħ	_	#	7
0.012	54						#		_	#	#			#	_	#	#	_	H	_	#	#
0.0084	50	10					#		#	#	\pm		#	#	#	#	#		H	#	#	#
0.0060	47						Ħ		_	#	#			#	_	#	#	<u></u>	H	#	#	#
0.0043	46	0					廿		+	-	+			#		#	土		口	_	士	士
0.0031	42	Ŭ	<u>}</u>	fine	medium	coarse		fine	,	mea	lium	coa	rse	fi	ine	m	nediu	ım	c	oars	e	ES
0.0022	40		CLAY		<u> </u>	1	+										414		Щ		\dashv	COBBLES
0.0013	38				SILT					SA	ND					GR.	AVE	=L				<u>8</u>
	-		0.0	002		0.0	060	P	artic	cle S	Size	(mm)	2.	0							60	.0

				Part	icie Size (mm)		
Gravel		Sand		Silt		Cobbles	0.0%
coarse	10.6%	coarse	2.6%	coarse	8.9%	Gravel	21.0%
medium	7.6%	medium	2.3%	medium	11.4%	Sand	11.4%
fine	2.8%	fine	6.5%	fine	7.3%	Silt	27.6%
Total	21.0%	Total	11.4%	Total	27.6%	Clay	40.0%
						Total	100.0%







Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R010 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ10 0.8 - 1.4m Sample No 17102010

Sample Description

silty / clayey GRAVEL, fine to coarse, brown, fines of high plasticity, with fine to coarse sand

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

Particle Size	Percent Passing		ASS	SIEVE (m	m)		5	S	2	0	ro c	2	m			_			_				_
(mm)	r assirig						0.075	750		0.30	0.425	20	1.18	2.36	, i	4. 0 7. 1	9.5	13.2	19.0	26.5	37.5	53.0	75.0
100.0	100	100														1					X	ŤĮ.	*
75.0	100						\pm													1,	4	\pm	+
53.0	100	90					世				\pm					†				X	+	#	+
37.5	98	00							\Box		1					†		\star		4	_	$^{+}$	\pm
26.5	91						H				\pm					$^{+}$	Ż		-	\pm	+	#	+
19.0	87	80					H			_	\pm	_		\pm			\checkmark			\pm	+	#	\pm
13.2	87						H				+					И	-					#	-
9.5	84	70							 		<u></u>					*				\pm	1	\pm	+
6.7	78	70					Н		-		-				-/	\vdash				\pm		#	+
4.75	72	ρι									_				+	\vdash	-	_	_	-	_	\pm	\pm
2.36	60	Percent Passing 00 09					Н		H	-	+		-	1		H		-	-	+	+	#	\pm
1.18	53	Pa							-				1	4		H					-	#	-
0.600	49	sent 50					H		H		-		*			H	-			-	-	Ŧ	Ŧ
0.425	47	ο 50 10					H		-		\downarrow					H	-			-	-	#	+
0.300	45	٩							П	*	-					H	-			-	7	Ŧ	F
0.150	41	40					H	>	*							77	-			-	7	#	7
0.075	37						3				-					H	-			-		#	7
0.068	35	00		***********	***************************************	X					-					Ħ					-	#	-
0.050	33	30				X	Η		H	_	+		+-	7		Ħ		_	-	\mp	+	#	+
0.035	29				X		H		H		#			-		#				-	-	#	7
0.025	28	20		-	××		T		Ħ	_	#		_			Ħ				7	7	#	#
0.018	26			\times			Ħ				#									1	#	#	+
0.013	22						Ħ		Ħ	_	#		#	#		\ddagger				#	#	#	#
0.0093	22	10					H		Ħ	=	#	<u> </u>	#	\pm		#				#	#	#	#
0.0066	21						Ħ		Ħ		#			#		#				#	+	#	#
0.0047	20	0					口		Ħ		+			Щ		††			-	+	+-	#	土
0.0033	18		γ	fine	medium	coarse		fine		med	lium	со	arse		fine		me	diur	n	со	arse		COBBLES
0.0023	17		CLAY	-		1	+			٥,٨	MD			+			201	VE				\dashv)BB
0.0014	15		0.002 0.060 2.0 60.0										ŏ										

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 12.2% 10.0% 5.7% Gravel 41.3% coarse coarse coarse medium 11.5% medium 6.2% medium 6.2% Sand 26.5% 10.3% fine 17.6% fine fine 3.9% Silt 15.8% Total 41.3% Total 26.5% Total 15.8% Clay 16.4% Total 100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R011 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ16 0.4 - 0.8m Sample No 17102011

Sample Description

silty CLAY, high plasticity, brown, with fine to coarse sand

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

		•																				_
Particle	Percent		ASS	SIEVE (m	m)		10	~		O 10	0											
Size	Passing						0.075	0.150		0.300 0.425	900	1.18	6	2.36	5 1	. 6	3.2	9.0	6.5	37.5	9.0	
(mm)		100					0	0		0.0	0	-		· ·	4. 0	0.0	\ \(\frac{1}{2}\)	~	2	χ χ	1 0	: ★
100.0	100						廿			1				*	*						#	t
75.0	100						廿				\star	*			\pm				\pm		#	\pm
53.0	100	90					╁	_	+	**	\pm		\dashv	_	\pm	\vdash		1	\pm	\pm	$^{+}$	\pm
37.5	100						1			+-+					+					-	#	+
26.5	100	00					X			-					\mp				7	-	Ŧ	F
19.0	100	80				X	Ĥ			1	_				\mp	-	-	-	7	-	#	F
13.2	100					X	#			1					\downarrow	-			#	-	#	F
9.5	100	70				/	#			1	_				#	-			#	#	#	‡
6.7	99				X		廿			1					#				_	_	#	1
4.75	98	ng			/		廿				_				\pm				_	+	#	1
2.36	97	iss 60			*		廿				_				\pm				\pm	+	#	t
1.18	95	Percent Passing 00 09			/		士			11					\pm	-			\pm		\pm	\pm
0.600	93	tu 50			/		H			$\pm\pm$				 	+		-		-+		╁	
0.425	92	o s					+			-					+-						+	+
0.300	90	٩		×			H			1-7					Ŧ	-			-	-	₩	F
0.150	88	40		X			H			 -					7				7	7	#	F
0.075	84		X				H			-					7				7	-	#	F
0.061	82				***************************************	•••••	1			1					\mp				_	-	#	F
0.044	78	30					H			1	-		_		\mp	-			#	+	#	F
0.032	74						#			##					#				#	-	#	#
0.023	70	20					#			#	_		_		\pm				#	_	#	丰
0.016	67						廿			1					$^{\pm}$				_	+	#	+
0.012	63						井			##	#				$^{\perp}$				#	_	#	+
0.0085	60	10					廿			##	+				\pm			1	#	+	#	t
0.0061	52						廿				_					_			1	_	\pm	t
0.0044	50	0					+			$\pm \pm$	-				+	-		-	-	-	#	+
0.0031	45		>	fine	medium	coarse		fine		edium	, Τ	coarse		fine		me	diui	"	co	arse	T	ES
0.0031	41		CLAY	iirie	meaium	coarse	<u> </u>	iirie				Joanse	\perp	,,,,,						J, 00	4	COBBLES
0.0022	37				SILT				S	AND	1				(GRA	VE	L				S
			0.0	002		0.0	60	D	orticl	≏ Size	- /n	nm)	2.0								60.0)

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 0.0% 3.6% 12.4% Gravel coarse coarse coarse 3.9% medium 1.2% medium 3.7% medium 17.4% Sand 14.6% fine 2.7% fine 7.3% fine 11.7% Silt 41.5% Total 3.9% Total 14.6% Total 41.5% Clay 40.0% Total 100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R012 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by ANR Client 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

TP-EQ15 0.75 - 5.4m Sample Identification Sample No 17102012

Sample Description

SILT, high liquid limit, brown, trace of fine to coarse sand

Assumed soil particle density 2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type g/l Variation to method

Particle	Percent		AS	SIEVE (m	m)		10	_	,) IO (_									
Size	Passing						0.075	0.150	Š	0.300	70	1.18	2.36	75	0 6	3.2	9.0	5.5	37.5	0.0
(mm)		100					0	0.		900	<u>s</u>	-	2	4. 0	o o	; ``	~	× 5	y k	ί ~` (
100.0	100	700					廿					*		Î						
75.0	100						\pm		-	-	*		<u> </u>	\pm				_	1	
53.0	100	90						_*	\pm			+-	 - - - - - - - -	\pm		\vdash	-	\pm	+	\coprod
37.5	100						A							\mp	-	H			-	-
26.5	100	00				/	H							7		H	-		-	
19.0	100	80					H							\mp	-	\vdash	-		-	-
13.2	100					X	#							\mp			-			
9.5	100	70				X	#							#	-		-#	-	1	
6.7	100						二							#			-#			
4.75	100	'ng			<u></u>		\perp					-		\pm				_	1	
2.36	99	Percent Passing			<u> </u>		廿		_					\pm			_	\pm		
1.18	97	Pa			*									\pm						
0.600	94	71 50 50			<i></i>		$\pm\pm$							+-	+				-	
0.425	93	o sero			*		+							-		-				
0.300	93	Ф.		X			H							\mp	-	H			-	H
0.150	90	40		-				F		F-									+	
0.075	88			<i>J</i>			1							\mp	-		7		-	
0.060	85	00	×		•••••	***************************************	7							\mp						
0.044	79	30					H		-				 	\mp	-	H	-	-	-	
0.032	76						1					-		7	-				-	
0.022	71	20					1	_				-		\pm			#	_	1	
0.016	65					***************************************	#							+	-				-	
0.012	61						廿							#			#	_	+	
0.0085	56	10					廿		=	1		+		\pm		口	#	#		##
0.0062	48						1												1	
0.0044	44	0					+							+	-	Н	-	-	+	++
0.0032	39		>	fine	medium	coarse		fine	me	edium	coa	rse	fine		me	ediur	,	coa	arse	ES
0.0023	34		CLAY	iiie	medium	Coarse	"	11 IC			1000	.50	10							COBBLES
0.0023	32				SILT				S	4 <i>ND</i>				(GRA	\VE	L			8
	-		0.0	002		0.0	60	Do	rtiala	Cizo	(mm)	2.	0						6	0.0

		0.002		0.060	2.	0	60.0
				Part	icle Size (mm)		
Gravel		Sand		Silt		Cobbles	0.0%
coarse	0.0%	coarse	4.2%	coarse	16.2%	Gravel	1.4%
medium	0.1%	medium	3.1%	medium	21.5%	Sand	13.2%
fine	1.3%	fine	5.9%	fine	14.0%	Silt	51.7%
Total	1.4%	Total	13.2%	Total	51.7%	Clay	33.7%
						Total	100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R013 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ16 0.8 - 1.5m Sample No 17102013

Sample Description

sandy CLAY / sandy SILT, high plasticity, brown, fine to coarse sand

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

Particle	Percent	1	AS S	SIEVE (mi	n)					_												
Size	Passing						0.075	7	8	300	0.425	3	1.18	2.36	22	6.7	2	13.2	28.0	37.5	0	75.0
(mm)		100					0	ò	s [.]	0.	9.0	š	7.	ζ.	4.	9	6	73	817	37	53	75
100.0	100	100		***********			H							*	7	T	7	1	1	\Box	\uparrow	1
75.0	100						H				-	/	*	-		-	7		-		7	-
53.0	100	90					H		Ħ	-	7	/	-	#		#	7	+	-	\Box	\dashv	H
37.5	100						7		1		1/			#		-	7		1		-	
26.5	100						Ħ		\Box		*			#		#	1		1		#	
19.0	100	80					Ħ		1	_*			-	#		#	#	#	#		#	#
13.2	100				•••••		Ħ		\Box	/				#		#	#		-		#	
9.5	100	70					Ħ		1/1	_	_			#		#	#		#		#	
6.7	100						Ħ				_					#	+	_	+		#	
4.75	99	ng					Ħ	1			+			#		#	#	_	1		_	
2.36	99	Percent Passing 00 09					×			_				\perp		#	#	#	#		\Rightarrow	
1.18	96	Pe					X		\Box		1					#	1		1		\Rightarrow	
0.600	88	Ti 93 50					仕		<u>†</u>					#		-#	+		+	\pm	-+	
0.425	84	o Serce					H				1			\perp			1	_	1		\pm	
0.300	79	ų.				<u> </u>	H		$\pm \pm$		-			+		-#	+	-	1	-	\pm	
0.150	69	40				<i>X</i>	${}^{+}$		}- -					++-					-		-+	
0.075	59				>	{	\mathbb{H}		+		-			+		+	\pm	-	+	\vdash	-	-
0.069	56	30					Н		H		-			H		-	7	-	-		\exists	
0.050	50	30			X		H		H	-	-			${\mathbb H}$		\mp	-	\mp	F	\vdash	\exists	H
0.036	46						H		\Box		7			-		7	7		-		7	
0.025	40	20	×				H		H	_	-		-	+		\blacksquare	7	+	-	\Box	\exists	F
0.018	36				•		H		H		7			-			7		-		-	
0.013	34	40					H		\Box		-			#		#	7	-	-	\Box	7	1
0.0093	32	10					H		Ħ	_	+		-	#	_	#	7	#	+	\Box	7	#
0.0066	29						Ħ		#		-			#		#	#	-	#		#	1
0.0047	26	0					Ħ		†		-			#		#	-+		#	-	_	<u> </u>
0.0034	22		γ	fine	medium	coarse		fine		med	lium	coa	rse	t	ine		med	lium		coar	se	COBBLES
0.0024	21		CLAY				+			SA	ND						- Δ1	/EL				BBC
0.0014	19				SILT		L			ЗА	עוו					GI	M	/ L'L				ರ

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 0.0% 9.8% 13.4% Gravel 2.1% coarse coarse coarse medium 0.3% medium 15.0% medium 9.2% Sand 47.1% fine 1.8% fine 22.3% fine 8.1% Silt 30.7% Total 2.1% Total 47.1% Total 30.7% Clay 20.1% Total 100.0%







Job No

17102

CIVIL GEOTECHNICAL SERVICES Report No 17102/R014 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by Client ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02/03/17 Location **EUROBODALLA QUARRY** Checked by PJF

Sample Identification TP-EQ17 1.7 - 3.6m Sample No 17102014

Sample Description

silty CLAY, medium plasticity, brown, with fine to coarse sand and fine to medium gravel

2.65 g/cm³ Assumed soil particle density

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersion Mechanical Loss in pretreatment 0% Hydrometer type Variation to method g/l

Particle	Percent	1	Δς	SIEVE (m	ım)															
Size	Passing		73	OIL VL (III	,,,,		75	20		25	3	œ	9	2		~	0	y v	0	0
(mm)							0.075	0.150		0.300	<u>ة</u> 5	1.18	2.36	4.7	6.7	3. 5.	19.0	26.5	53.0	75
100.0	100	100														 	7	$\overrightarrow{}$		Ħ
75.0	100						#						#	_	12					Ħ
53.0	100	90					#			#			#	_	*	\Box		_		Ħ
37.5	100						#			##			#	X	1		#			Ħ
26.5	100						廿			##			$\parallel /$	4	-					Ħ
19.0	100	80					#					١.,	*		#=		_	+		Ħ
13.2	98						#					\checkmark		_	-	\Box				Ħ
9.5	95	70								 	\angle	-		_	#=		#		\exists	Ħ
6.7	92	, ,					#				*			_	-					Ħ
4.75	87	ng					#		1	$*$ \perp			#	_						Ħ
2.36	81	Percent Passing 09					H	<u>\</u>	1				#	_	#	\Box		_		Ħ
1.18	74	Pe						\leq						#						Ħ
0.600	69	e 9 50					X			 			++	_	+		-			H
0.425	66	Serc 2				/							1	\pm						Ħ
0.300	64	ш.				X.	士						#	_						H
0.150	58	40				×	士	}					++		 					H
0.075	53				X		+			-				-	-	-	-			\forall
0.061	50	30					+									-				-
0.045	46	30					H			+			H	\pm	-	\vdash	$-\mathbf{I}$	-	-	H
0.032	43						+			-				-	-				\vdash	$\overline{+}$
0.023	39	20	×				H		+	H		+	#	-	#	H	7	+	H	H
0.016	37						H							-	-		7		H	H
0.012	35	10					1							-	-	H	-		H	H
0.0087	31	10					H		-	##		-	#	-	-	F	7	-	H	H
0.0062	29						H							-		H	-		H	H
0.0044	26	0					7						71		1		1			Ц
0.0032	24		CLAY	fine	medium	coarse		fine	m	edium	coa	arse	fir	ne	me	ediur	n	coai	rse	COBBI ES
0.0023	22		CL.		0".7	1	+			AND			1		GR4	1VF) ag
0.0013	21				SILT		SAND G					GRAVEL			Ľč					

Particle Size (mm) Gravel Sand Silt Cobbles 0.0% 0.0% 10.2% 11.9% Gravel coarse coarse coarse 21.0% medium 9.8% medium 8.3% medium 9.2% Sand 29.1% 10.6% fine 11.2% fine fine 6.9% Silt 28.0% Total 21.0% Total 29.1% Total 28.0% Clay 21.9% Total 100.0%







AS 1289.3.6.1

CIVIL GEOTECHNICAL SERVICES

6 - 8 Rose Avenue, Croydon 3136

Job No 17102 Report No 17102/R015

Date of Issue 04/04/17

Sample Ider	ntification	Springwater Quarry Sample 1	Sample No	17102015
Location	EUROBOD	ALLA QUARRY	Checked by	PJF
Project	30012127	EUROBODALLA SOUTHERN STORAGE	Date tested	02/03/17
Client	SMEC AUS	STRALIA LIMITED (MELBOURNE)	Tested by	CC

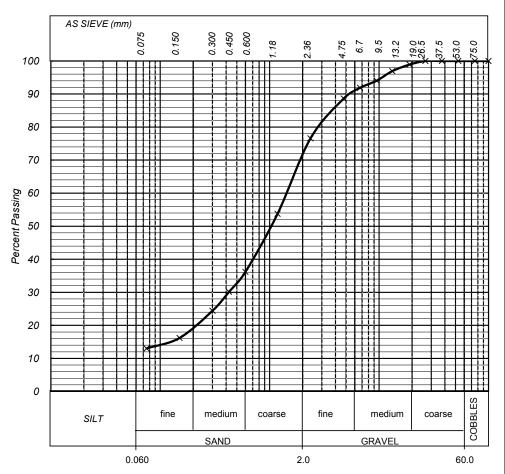
By Client Sampled by Client Sampling method 2017 Sampling date

Sample Description

silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel

Particle Size Distribution

Particle	Percent
Size	Passing
(mm)	
100.0	100
75.0	100
53.0	100
37.5	100
26.5	100
19.0	99
13.2	97
9.5	94
6.7	92
4.75	89
2.36	77
1.18	54
0.600	36
0.425	30
0.300	24
0.150	16
0.075	13



Particle Size (mm)

Gravel		Sand		Cobbles	0.0%	
coarse	0.9%	coarse	34.9%	Gravel	28.8%	
medium	8.2%	medium	16.6%	Sand	58.2%	
fine	19.7%	fine	6.7%	Fines	13.0%	
Total	28.8%	Total	58.2%	Total	100.0%	







Job No

17102

AS 1289.3.6.1

CIVIL GEOTECHNICAL SERVICES Report No 17102/R016 6 - 8 Rose Avenue, Croydon 3136 Date of Issue 04/04/17

Client	SMEC AU	STRALIA LIMITED (MELBOURNE)	Tested by	CC
Project	30012127	EUROBODALLA SOUTHERN STORAGE	Date tested	02/03/17
Location	EUROBO	DALLA QUARRY	Checked by	PJF
Sample Ide	entification	Springwater Quarry Sample 2	Sample No	17102016

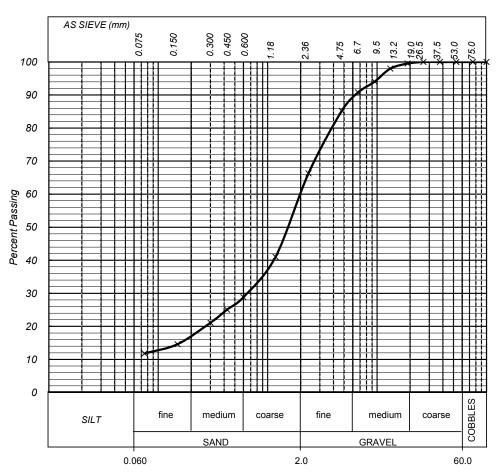
Sampled by Sampling method By Client Client 2017 Sampling date

Sample Description

silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel

Particle Size Distribution

Particle	Percent
Size	Passing
(mm)	
100.0	100
75.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	98
9.5	94
6.7	91
4.75	85
2.36	66
1.18	41
0.600	29
0.425	25
0.300	21
0.150	15
0.075	12



Particle Size (mm)

Gravel		Sand		Cobbles	0.0%	
coarse	0.4%	coarse	31.4%	Gravel	39.7%	
medium	10.6%	medium	11.5%	Sand	48.5%	
fine	28.7%	fine	5.6%	Fines	11.8%	
Total	39.7%	Total	48.5%	Total	100.0%	







AS 1289.3.6.1

CIVIL GEOTECHNICAL SERVICES

6 - 8 Rose Avenue, Croydon 3136

Job No 17102 Report No 17102/R017

Date of Issue 04/04/17

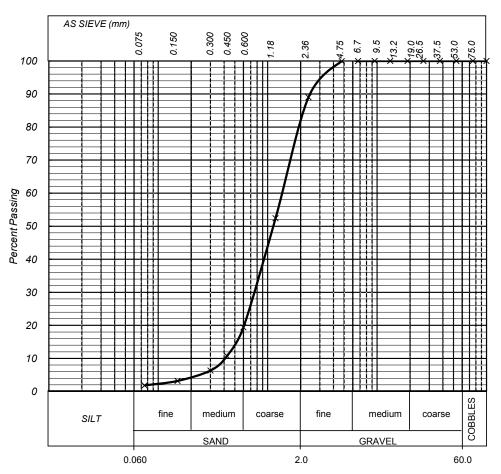
Client	SMEC AUS	STRALIA LIMITED (MELBOURNE)	Tested by	CC
Project	30012127	EUROBODALLA SOUTHERN STORAGE	Date tested	02/03/17
Location	EUROBOD	ALLA QUARRY	Checked by	PJF
Sample Iden		Cadgee Quarry By Client	Sample No Sampled by	17102017 Client
Camping me	511100	By Short	Sampling date	2017

Sample Description

gravelly SAND, fine to coarse, brown, fine gravel

Particle Size Distribution

Particle	Percent
Size	Passing
(mm)	
100.0	100
75.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	89
1.18	52
0.600	19
0.425	11
0.300	6
0.150	3
0.075	2



Particle Size (mm)

Gravel		Sand		Cobbles	0.0%	
coarse	0.0%	coarse	60.9%	Gravel	19.7%	
medium	0.0%	medium	14.9%	Sand	78.5%	
fine	19.7%	fine	2.7%	Fines	1.8%	
Total	19.7%	Total	78.5%	Total	100.0%	





Approved Signatory : Peter Fry



CIVIL GEOTECHNICAL SERVICES

6 - 8 Rose Avenue, Croydon 3136

Report No

Report No 17102/R025

Date of Issue 28/06/17

17102

ANR

A362 V1.15 MAR 1

Job No

Checked by

ClientSMEC AUSTRALIA LIMITED (MELBOURNE)Tested byANRProject30012127 EUROBODALLA SOUTHERN STORAGEDate tested25/05/17

Sample Identification TP-EQ07 0.5 - 2.5m Sample No 17102018

Sample Description

Location

CLAY, high plasticity, brown, with fine to coarse sand, trace of fine to medium gravel.

Assumed soil particle density 2.65 g/cm³

EUROBODALLA QUARRY

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

Method of dispersionMechanicalLoss in pretreatment0%Hydrometer typeg/lVariation to method-

		1																			
Particle	Percent		AS	SIEVE (m	m)		ın			C 1	0 0										
Size	Passing						0.075	7.60	3	0.300	4. g	ζ,		2.36	1.3	9.7	13.2	9.0	26.5	3.0	75.0
(mm)		100					9		<u> </u>	0	2	,	_	7	4 0	0 0	_	~	% °	× ×	
100.0	100						Ħ			1	-				\pm		\prec^*		_		廿
75.0	100						Ħ			1	1				*	*	\pm				廿
53.0	100	90					Ħ			+	+-		\geq	*	\pm	\pm	\pm	#	+-		士
37.5	100						\pm						·		\pm	1	+		+-	-	廿
26.5	100	80					± 1			\star	*	`			+	1-				-	H
19.0	100	80					H	->		+	-				-	+				-	F
13.2	98						1	·		-					\exists	-	7			-	H
9.5	97	70					X		-	-					7	-		-			F
6.7	95					X				-					77	1	7	-		1	Ħ
4.75	94	Percent Passing 09 09				-	\Box			1	-			4	\Box		7	1	-		H
2.36	91	isse 60				/	Ħ			#					#		\dashv	-	#		
1.18	87	t Pe				×	\pm			+	1					#		#	+		H
0.600	84	le 50					\pm			_					\pm	\pm	\Rightarrow	#			廿
0.425	83	erc					\Box			_	_				\pm		#		_		廿
0.300	82			/	X										\perp		\pm				\pm
0.150	78	40					H		-	+	+			 	士	\pm		_	+-		士
0.075	74			×X			$\pm i$				+				\pm	+	-	-	+-		H
0.064	71	30	×				-				~~~~										+
0.047	67	30													-		-				+
0.034	62						H			-	-				\Box	-		-		\exists	H
0.024	57	20					H			7	-				\mp	-	7	7		-	H
0.017	53						\Box			-	-				\Box	1	7	-	-	7	H
0.013	50						\Box			#	-				\mp	1	-	#	+	1	#
0.0090	47	10					Ħ			#				#	\Box		#	#	#	1	Ħ
0.0064	44						\pm			-	1				+	#	#	#	+		#
0.0037	38	0	~~~~				+1		-		+				+	†		-			士
0.0033	36	Ü	4	fine	medium	coarse		fine	Ι,	nediu	ım	coars	se	fine		me	ediun	n	coai	se	COBBLES
0.0023	35		CLAY		l	I	+									201					BB
0.0013	33				SILT					SAN	עו					GRA	\VE	L			8
	•		0.0	002		0.0	060				: <i>:</i>	(mm)	2.0)						60	0.0

Particle Size (mm) Cobbles Gravel Sand Silt 0.0% 0.0% 5.9% 15.0% Gravel coarse coarse coarse 10.0% medium 5.5% medium 4.5% medium 11.2% Sand 20.3% 4.5% 9.9% 9.1% Silt 35.3% fine fine fine Total 10.0% Total 20.3% Total 35.3% Clay 34.4% Total 100.0%



Alan Fobert

Accreditation No 9909

The results of the tests, calibrations



Client

Project

PARTICLE SIZE DISTRIBUTION

CIVIL GEOTECHNICAL SERVICES

6 - 8 Rose Avenue, Croydon 3136

Job No 17102 Report No Date of Issue

17102/R026

28/06/17

Tested by Date tested

ANR 25/05/17

Location **EUROBODALLA QUARRY** Checked by

ANR

Sample Identification

TP-EQ10 0.3 - 1.4m

SMEC AUSTRALIA LIMITED (MELBOURNE)

Sample No

17102019

Sample Description

CLAY, high plasticity, brown, with fine to coarse gravel, with fine to coarse sand.

30012127 EUROBODALLA SOUTHERN STORAGE

Assumed soil particle density

2.65 g/cm³

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

0% Method of dispersion Mechanical Loss in pretreatment Hydrometer type Variation to method q/l

		-																			
Particle	Percent		AS	SIEVE (m	m)																
Size	Passing						0.075	0 150	3	300	0.425	3 9	1.18	2.36	12	<u> </u>	2.2	0.	5.5	53.0	0.0
(mm)		100					0.	0	<u>.</u>	0.	0.0	· ,	7.	2.	4.	9 0	73	19	26	λ 5.	12
100.0	100	100					+			-	-				+	-	*	\Rightarrow	7	7-1	\mp
75.0	100						Ŧ			-	-		-		Ŧ		H	-		\Box	Ŧ
53.0	100	90					11			7	-				+	X	-	-#		\Box	Ŧ
37.5	100						#			_	-				\bigvee	#	H	-			#
26.5	100						#			-	-		-	/	4	1	1	-		\Box	#
19.0	99	80					#			_	-		‡		#	-		#		\Box	#
13.2	98						11			-	-			*	+	#				11	#
9.5	95	70					11						\star		+	1	-			1	廿
6.7	91	'0					\pm				\star				+	#	士	1		± 1	廿
4.75	85	ng					\pm		1	1	1			<u> </u>	+	1		1		± 1	廿
2.36	76	Percent Passing 09 09					+	/			+-				+	-		-	+-	+	$\pm \pm$
1.18	72	Pa					XX								+					\Box	$\pm \pm$
0.600	69	50 ceut				/	1			-	-				+	-	H			H	H
0.425	67	erc 90					H		H	-	-		ļ		Ŧ	Η-	H		-	\vdash	Ŧ
0.300	66	ď			X		-			-	-				-	-				\square	Ŧ
0.150	61	40			-X		Ħ			-	-		 		Ŧ	-	H	-#		\Box	#
0.075	57				×		#			_					-	#	1	-		\Box	#
0.065	55						#			-					+	1-	1				#
0.048	50	30		×			#								#	ļ	1				#
0.034	48						#			#	+		†		+	#				\Box	#
0.024	46	20					11			_	+		 		+	#		_#		口	#
0.017	45						\pm						<u> </u>		1	#	\Box	#		\Box	井
0.012	43						廿				_		<u> </u>		1		\Box			\pm	廿
0.0089	40	10					#			+	+		<u> </u>	 	+	片	口	#	=	$\pm \pm$	井
0.0064	37						\pm			1	+		<u> </u>		-	1		+			廿
0.0037	33	0					+								+-	 	\vdash			1-	+
0.0032	32		>	fine	medium	m coarse fine medium coarse				rea	fine		me	diur	n	coa	ırse	ES			
0.0023	30		CLAY	IIIIE	Imediani	500136	ļ					10							COBBLES		
0.0023	27				SILT		SAND GRAVEL								8						
	0.002 0.060 2.0 60.0 Particle Size (mm)									0.0											

Particle Size (mm) Cobbles Gravel Sand Silt 0.0% 1.0% 6.5% 8.1% Gravel coarse coarse coarse 24.7% medium 10.2% medium 5.5% medium 9.3% Sand 21.4% 13.5% 9.4% 7.1% Silt 24.5% fine fine fine Total 24.7% Total 21.4% Total 24.5% Clay 29.4% Total 100.0%



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025. Accreditation No 9909

Approved Signatory : Andrew Roberts

A362 V1.15 MAR 1



Client

Project

Location

PARTICLE SIZE DISTRIBUTION

CIVIL GEOTECHNICAL SERVICES

6 - 8 Rose Avenue, Croydon 3136

Job No 17102 Report No 17102/R027

Date of Issue 28/06/17

Tested by **ANR** Date tested 25/05/17

Checked by ANR

Sample Identification TP-EQ16 0.4 - 1.5m Sample No 17102020

Sample Description

CLAY, high plasticity, brown, with fine to coarse sand, trace of fine to medium gravel.

Assumed soil particle density 2.65 g/cm³

EUROBODALLA QUARRY

AS 1289.3.6.1 and 3.6.3 - Particle Size Distribution - Sieve and Hydrometer

SMEC AUSTRALIA LIMITED (MELBOURNE)

30012127 EUROBODALLA SOUTHERN STORAGE

0% Method of dispersion Mechanical Loss in pretreatment Hydrometer type Variation to method q/l

Particle Size (mm)	Percent Passing		AS S	SIEVE (m	m)		0.075	0.150		0.300	009.0	1.18	98 0	8 1	7.73	0.7	13.2	19.0	5.93	37.5	53.0	75.0
100.0	100	100					$\ddot{\Box}$						Ť		Y.	*	*		×	*	<u>新</u>	Ť
75.0	100						H			-		*	7		7	-	-				#	F
53.0	100	90					H			-					H	-	4			7	\mp	F
37.5	100	90					H			\checkmark	\Box				\exists	F	\exists	4		-	#	F
26.5	100						F		X	-					H	-	\Box			7	#	F
19.0	100	80					H			-	-				7	-	H		-	7	#	F
13.2	99						*			-					\Box	1				_	#	Ŧ
9.5	99		~~~~				Ų.		-	-					#	1	1			#	#	#
6.7	99	70					#		#	+					\Box	1	\Box		_	#	#	#
4.75	98	g					#			1					\Box	1		_		1	#	#
2.36	96 97	Percent Passing 09 09				<u> </u>	井			+					\ddagger	\vdash	H	_	_	#	#	+
2.36 1.18	97 95	s _a c				×	廿								\pm				_	\pm	#	±
0.600	95 91	nt I					土								\pm	\vdash			_	\pm	#	\pm
		ည် 50			x		╁╁╴			+			-+		\pm	+-	-	}	-	-+-	#	Ł
0.425	89	Pe			/		++			-					+	 	-				+	+
0.300	87	40		/	×		H								H	Ι					#	F
0.150	82	40					H			-					\Box	-	-			7	#	F
0.075	76						#			-					\Box	1			_	#	#	#
0.066	72	30		*************			#			1					\ddagger	<u> </u>			_	_	#	#
0.048	67						\pm			-					\Box	1	\Box			_	#	#
0.034	63						士								\pm				\pm	\pm	#	\pm
0.024	58	20					╁╁╴			+-	-				\pm	+			_	+	#	+
0.017	56									-					+	┼				-	╫	+
0.013	51	40					H			-					H	<u></u>	\neg		-	-	#	F
0.0090	48	10					H			-					\Box	-	-	_		7	#	F
0.0065	44						H		-	-					\Box	1	7			7	#	F
0.0038	36	0					T								1	†				-	#	Ţ
0.0033	34		CLAY	fine medium coarse fine medium coarse					n coarse fine i		medium c			cc	arse	,	COBBLES					
0.0023	32		CL	SUT SAND					+			20/	11/5					3BB				
0.0014	30		SILT SAND						\perp	GRAVEL						\perp	<u>ŏ</u>					

Particle Size (mm) Silt Cobbles

Gravel Sand 0.0% 0.0% coarse 5.2% 11.9% coarse coarse Gravel 3.3% medium 1.5% medium 7.4% medium 14.4% Sand 27.8% 1.8% 15.2% 10.9% Silt 37.2% fine fine fine Total 3.3% Total 27.8% Total 37.2% Clay 31.7% Total 100.0%



and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025.

The results of the tests, calibrations

Accreditation No 9909

Approved Signatory : Andrew Roberts

A362 V1.15 MAR 1



B2 – Atterberg Limits and Emerson Class

Technical Note: ESS-TN- 01



TEST RESULTS

AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1 & 3.8.1

CIVIL GEOTECHNICAL SERVICES

Job No 17102 Report No 17102/R018

6 - 8 Rose Avenue, Croydon 3136

Client SMEC AUSTRALIA LIMITED (MELBOURNE)

Date of Issue 04/04/17
Tested by SK

Project 30012127 EUROBODALLA SOUTHERN STORAGE
Location EUROBODALLA QUARRY

Date tested 06/03/17 Checked by PJF

		%	%	%	%	%		
Sample Identification	Soil Description	Field Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage	% Passing 75µm sieve	Emerson Class No*
17102001 TP-EQ01 0.3 - 1.2m	gravelly CLAY, high plasticity, brown, fine to coarse gravel, trace of fine to coarse sand	28.0	82	31	51	18.0	66	3
17102002 TP-EQ03 2.6 - 3.1m	clayey GRAVEL, fine to coarse, brown, fines of medium plasticity, with fine to coarse sand	19.0	46	22	24	12.0	23	2
17102003 TP-EQ04 1.6 - 2.0m	clayey GRAVEL, fine to coarse, brown, fines of medium plasticity, with fine to coarse sand	17.7	44	22	22	11.0	22	3
17102004 TP-EQ03 0.25 - 2.2m	CLAY, medium plasticity, brown, with fine to coarse sand, trace of fine to medium gravel	24.3	47	21	26	12.5	78	3
17102005 TP-EQ07 0.5 - 1.0m	silty SAND, fine to coarse, brown, fines of high liquid limit, with fine to coarse gravel	31.5	52	34	18	11.5	47	3
17102006 TP-EQ12 0.5 - 1.5m	CLAY, high plasticity, brown, trace of fine to coarse sand and fine to coarse gravel	18.6	51	21	30	13.5	72	2
17102007 TP-EQ11 0.2 - 1.3m	CLAY, high plasticity, brown, trace of fine to coarse sand	35.9	91	35	56	22.5	91	5
17102008 TP-EQ18 0.3 - 1.5m	CLAY, high plasticity, brown, with fine to coarse gravel, trace of fine to coarse sand	19.5	55	24	31	14.0	78	5
17102009 TP-EQ07	silty CLAY, high plasticity, brown, with fine to coarse	31.8	74	32	42	18.5	71	5

Notes

1.0 - 2.5m

AS 1289.3.1.2,3.2.1,3.4.1 Method of drying: Oven dried AS 1289.3.8.1* Water used: Distilled water Dry/Wet sieve: Dry Temperature: 20.5 - 20.8 °C

Curing time: >24hrs Date sampled: 2017





gravel, trace of fine to coarse sand



TEST RESULTS

AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1 & 3.8.1

CIVIL GEOTECHNICAL SERVICES

17102 Job No Report No 17102/R019

6 - 8 Rose Avenue, Croydon 3136

Date of Issue 04/04/17 SK

> 06/03/17 PJF

Client	SMEC AUSTRALIA LIMITED (MELBOURNE)	Tested by
Project	30012127 EUROBODALLA SOUTHERN STORAGE	Date tested
Location	FURORODALI A OLIARRY	Checked by

Sample Identification Soil Description Soil Description Soil Description Identification Soil Description Identification Identification Soil Description Identification Id		1	%	%	%	%	%	, ,	i
TP-EQ10 0.8 - 1.4m 17102011 TP-EQ16 0.4 - 0.8m 17102012 TP-EQ15 0.75 - 5.4m 17102013 TP-EQ16 0.8 - 1.5m 17102014 TP-EQ17 1.7 - 3.6m 17102015 Springwater Quarry Sample 1 17102016 Springwater Quarry Sample 2 17102017 silty CLAY, high plasticity, brown, with fine to coarse, brown, fines of high plasticity, with fine to coarse, brown, fines of low plasticity, brown, fine to coarse gravel 52 17102011 17102012 TP-EQ15 0.75 - 5.4m 31.9 69 44.4 66 44.4 66 32.9 53 32.9 53 53 54 66 67 68 69 49 40 40 40 40 40 40 40 40 4		Soil Description	Field Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage	% Passing 75µm sieve	Emerson Class No*
TP-EQ16 0.4 - 0.8m 17102012 TP-EQ15 0.75 - 5.4m SILT, high liquid limit, brown, trace of fine to coarse sand 0.8 - 1.5m sandy CLAY / sandy SILT, high plasticity, brown, fine to coarse sand 17102014 TP-EQ17 1.7 - 3.6m silty CLAY, medium plasticity, brown, with fine to coarse sand 17102015 Springwater Quarry Sample 1 17102016 Springwater Quarry Sample 2 17102017 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102017 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102017	TP-EQ10		20.1	52	28	24	11.5	37	3
TP-EQ15 0.75 - 5.4m SILT, high liquid limit, brown, trace of fine to coarse sand 17102013 TP-EQ16 0.8 - 1.5m sandy CLAY / sandy SILT, high plasticity, brown, fine to coarse sand 17102014 TP-EQ17 1.7 - 3.6m silty CLAY, medium plasticity, brown, with fine to coarse sand and fine to medium gravel 17102015 Springwater Quarry Sample 1 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102016 Springwater Quarry Sample 2 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102017	TP-EQ16	silty CLAY, high plasticity, brown, with fine to coarse sand	31.9	69	31	38	16.5	84	5
TP-EQ16 0.8 - 1.5m sandy CLAY / sandy SILT, high plasticity, brown, fine to coarse sand 17102014 TP-EQ17 1.7 - 3.6m silty CLAY, medium plasticity, brown, with fine to coarse sand sand and fine to medium gravel 17102015 Springwater Quarry Sample 1 17102016 Springwater Quarry Sample 2 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102017 53 24.6 49 5.5 - with fine to coarse gravel 6.4 - 17102017	TP-EQ15	SILT, high liquid limit, brown, trace of fine to coarse sand	44.4	66	35	31	16.0	88	5
TP-EQ17 1.7 - 3.6m silty CLAY, medium plasticity, brown, with fine to coarse sand and fine to medium gravel 17102015 Springwater Quarry Sample 1 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102016 Springwater Quarry Sample 2 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102017 24.6 49 5.5 - 6.4 - With fine to coarse gravel	TP-EQ16		32.9	53	29	24	13.5	59	3
Springwater Quarry Sample 1 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102016 Springwater Quarry Sample 2 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 17102017	TP-EQ17		24.6	49	27	22	12.0	53	5
Springwater Quarry Sample 2 silty SAND, fine to coarse, brown, fines of low plasticity, with fine to coarse gravel 6.4	ringwater Quarry		5.5	-	-	-	-	13	-
	ringwater Quarry		6.4	-	-	-	-	12	-
Gadges adaily gratery of the telescope, stems, and gratery	17102017 Cadgee Quarry	gravelly SAND, fine to coarse, brown, fine gravel	2.8	-	-	-	-	2	-

AS 1289.3.1.2,3.2.1,3.4.1 Method of drying: Oven dried AS 1289.3.8.1* Water used: Dry/Wet sieve: Dry

>24hrs

20.5 - 20.7 °C Temperature: Date sampled: 2017





Curing time:



TEST RESULTS

AS 1289.2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1, 3.6.1 & 3.8.1

CIVIL GEOTECHNICAL SERVICES

6 - 8 Rose Avenue, Croydon 3136

Job No 17102

Report No 17102/R035 Date of Issue 29/06/17

SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by SK Client Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 31/5-4/6/17

Location EUROB	ODALLA QUARRY			Ch	ecked	l by	ANR	
		%	%	%	%	%		
Sample Identification	Soil Description	Field Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Linear Shrinkage	% Passing 75µm sieve	Emerson Class No*
17102018 TP-EQ07 0.5 - 2.5m	CLAY, high plasticity, brown, with fine to coarse sand, trace of fine to medium gravel.	32.1	65	30	35	15.5	74	5
17102019 TP-EQ10 0.3 - 1.4m	CLAY, high plasticity, brown, with fine to coarse gravel, with fine to coarse sand.	25.4	61	28	33	12.5	57	3
17102020 TP-EQ16 0.4 - 1.5m	CLAY, high plasticity, brown, with fine to coarse sand, trace of fine to medium gravel.	32.3	66	29	37	15.0	76	5
Notes AS 1289.3.1.2,3.2.1,3.4.	1 Method of drying: Oven dried AS 1289.3. Dry/Wet sieve: Dry Curing time: >24hrs		used: erature:		Distille	d water 20.5		

2017

Curing time: >24hrs Date sampled:



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025. Accreditation No 9909

Approved Signatory : Andrew Roberts



B3 – Standard Compaction

Technical Note: ESS-TN- 01



STANDARD COMPACTION

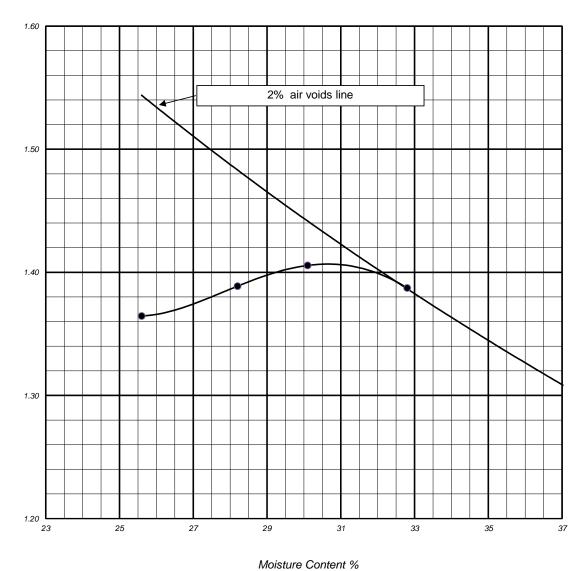
AS 1289.5.1.1

		Job No	17102				
CIVIL GEOTECHNICAL SERVICES		Report No	17102/R020				
6 - 8 Rose Avenue, Croydon, Vic 3136		Date of Issue	28/06/17				
Client SMEC AUSTRALIA LIMITED (MELBOURNE)		Tested by	GW				
Project 30012127 EUROBODALLA SOUTHERN STOR	Date tested	25/05/17					
Location EUROBODALLA QUARRY		Checked by	PJF				
Sample Identification TP-EQ01 0.3 - 1.2m		Sample No	17102001				
Sample Description		Sampled by	Client				
gravelly CLAY, high plasticity, brown, fine to coarse gravel, to	race of fine	Sampling date	2017				
to coarse sand							
Oversize material retained on 19.0mm sieve = 2 %	Mould Type		А				
Maximum Dry Density 1.41 t/m³	Optimum Moisture Content		30.5 %				

DRY DENSITY - MOISTURE CONTENT PLOT

Calculated apparent particle density =

2.64 t/m³



NATA

ACCRECITED FOR
TECHNICAL
COMPETENCE

Dry Density Vm³

Ala For

AS512-R7-OCT 09



STANDARD COMPACTION

AS 1289.5.1.1

	Job No	17102
CIVIL GEOTECHNICAL SERVICES	Report No	17102/R023
6 - 8 Rose Avenue, Croydon, Vic 3136	Date of Issue	28/06/17
Client SMEC ALISTRALIA LIMITED (MELPOLIDNE)	Tootod by	CW

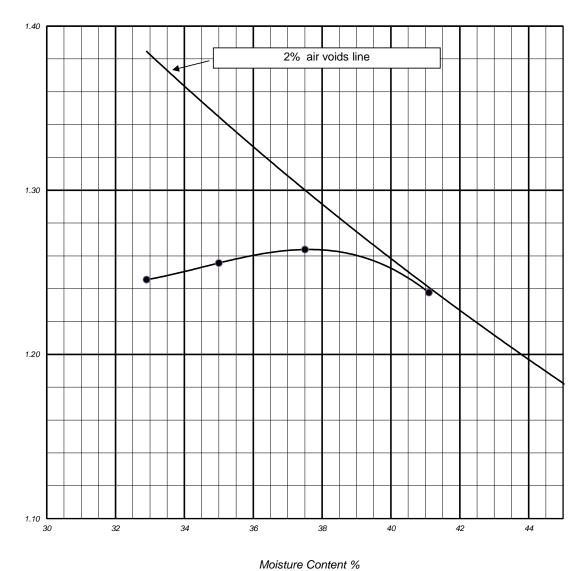
Client	SMEC AUSTRALIA LIMITED (MELBOURNE)	Tested by	GW
Project	30012127 EUROBODALLA SOUTHERN STORAGE	Date tested	25/05/17
Location	EUROBODALLA QUARRY	Checked by	PJF
Sample Id	entification TP-EQ15 0.75 - 5.4m	Sample No	17102012
- · · · · ·			
Sample De		Sampled by	Client

Oversize material retained on 19.0)mm sieve = 0 %	Mould Type	Α
Maximum Dry Density	1.26 <i>t/m³</i>	Optimum Moisture Content	37.5 %

DRY DENSITY - MOISTURE CONTENT PLOT

Calculated apparent particle density =

2.64 t/m³



moiotaro con



Dry Density 1/m3

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

Accreditation No 9909

Ala Fobert

Approved Signatory : Andrew Roberts

AS512-R7-OCT 09



STANDARD COMPACTION

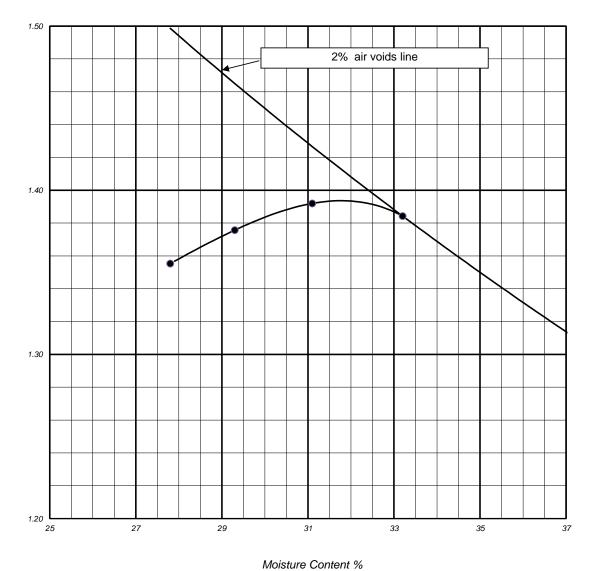
AS 1289.5.1.1

		Job No	17102
CIVIL GEOTECHNICAL SERVICES		Report No	17102/R028
6 - 8 Rose Avenue, Croydon, Vic 3136		Date of Issue	28/06/17
Client SMEC AUSTRALIA LIMITED (MELBOURNE)		Tested by	GW
Project 30012127 EUROBODALLA SOUTHERN STOR	AGE	Date tested	25/05/17
Location EUROBODALLA QUARRY		Checked by	ANR
Sample Identification TP-EQ07 0.5 - 2.5m		Sample No	17102018
Sample Description		Sampled by	Client
CLAY, high plasticity, brown, with fine to coarse sand, trace of	of fine	Sampling date	2017
to medium gravel.			
Oversize material retained on 19.0mm sieve = 0 %	Mould Type		А
Maximum Dry Density 1.39 t/m³	Optimum Moisture Content		32.0 %

DRY DENSITY - MOISTURE CONTENT PLOT

Calculated apparent particle density =

2.66 t/m³



NATA

ACCREDITED FOR
TECHNICAL
COMPETENCE

Dry Density 1/m3

Alan Zobas

Approved Signatory : Andrew Roberts

AS512-R7-OC



STANDARD COMPACTION

AS 1289.5.1.1

	Job No	17102
CIVIL GEOTECHNICAL SERVICES	Report No	17102/R029
6 - 8 Rose Avenue, Crovdon, Vic 3136	Date of Issue	28/06/17

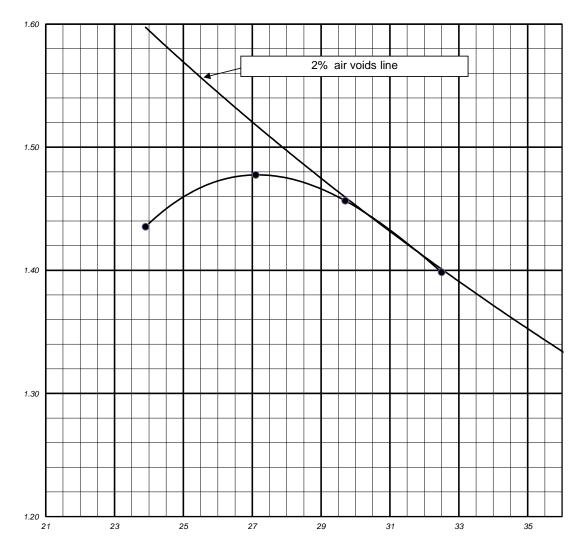
Client	SMEC AUSTRALIA LIMITED (MELBOURNE)	Tested by	GW
Project	30012127 EUROBODALLA SOUTHERN STORAGE	Date tested	25/05/17
Location	EUROBODALLA QUARRY	Checked by	PJF
Sample Id	entification TP-EQ10 0.3 - 1.4m	Sample No	17102019
Sample D	escription	Sampled by	Client
01 437 11	h plasticity, brown, with fine to coarse gravel, with fine to coarse sand.	Sampling date	2017

Oversize material retained on 19.0mm sieve = 1 %Mould TypeAMaximum Dry Density 1.48 t/m^3 Optimum Moisture Content27.0 %

DRY DENSITY - MOISTURE CONTENT PLOT

Calculated apparent particle density =

2.67 t/m³



Moisture Content %

NATA
ACCRECITED FOR
TECHNICAL

Dry Density 1/m3

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

Ala Fobert

Approved Signatory : Andrew Roberts

Δ\$512-R7-OCT 00



Maximum Dry Density

STANDARD COMPACTION

AS 1289.5.1.1

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R030 6 - 8 Rose Avenue, Croydon, Vic 3136 Date of Issue 28/06/17 Client SMEC AUSTRALIA LIMITED (MELBOURNE) Tested by GW 30012127 EUROBODALLA SOUTHERN STORAGE Project Date tested 25/05/17 Location **EUROBODALLA QUARRY** Checked by PJF Sample Identification TP-EQ16 0.4 - 1.5m Sample No 17102020 Sample Description Sampled by Client CLAY, high plasticity, brown, with fine to coarse sand, trace of fine 2017 Sampling date to medium gravel. Mould Type Oversize material retained on 19.0mm sieve = 0 % Α

DRY DENSITY - MOISTURE CONTENT PLOT

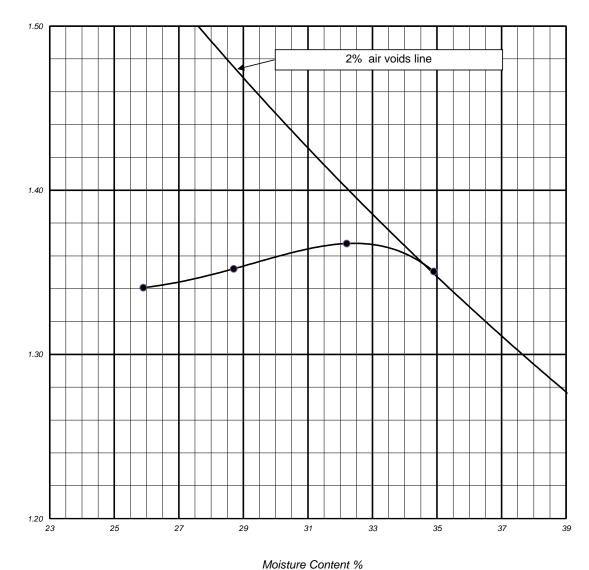
Optimum Moisture Content

Calculated apparent particle density =

1.37 t/m³

2.65 t/m³

32.5





Dry Density 1/m3

Ala Lober

AS512-R7-OCT 09



B4 – Triaxial Tests

Technical Note: ESS-TN- 01



AS 1289.6.4.2

	A5 1209.0.4.2	۷.		
CIVIL GEOTECHNICAL SERV - 8 Rose Avenue, Croydon 313	6		Job No Report No Issue date	17102 17102/R021 29/06/17
Project 30012127	TRALIA LIMITED (MELBOURNE) EUROBODALLA SOUTHERN STORA ALLA QUARRY	AGE	Tested by Date tested Checked by	ANR 02-26/06/17 ANR
Sample No Sample location	17102001 TP-EQ01 0.3 - 1.2m		Sampled by Sampling date	Client 2017
Type of sample Type of test Drainage conditions Failure criteria	R100 Compressive strength of a saturate compression with measurement of Top, bottom and side Principle Stress Ratio	· ·		
Test Details				
	Stage No	1	2	3
Initial cell pressure	kPa	700	900	900
Back pressure	kPa	500	500	100
Effective axial stress at fa		219	440	786
Effective lateral stress at		92	206	409
Effective pore pressure a		109	194	391
Deviator stress at failure	kPa	128	234	377
Strain at failure	%	2.92	6.27	10.09
Degree of saturation befo	ore test (B)		0.99	
Rate of strain	mm/min		0.013	
Sample Details				
Initial sample length	mm		200.2	
Initial sample diameter	mm		99.6	
Initial dry density	t/m³		1.37	
Initial moisture content	%		31.3	
Moisture content after tes	st			
Moisture Content	%		32.0	
Test Results				
EFFECTIVE COHESION	kPa		20	
EFFECTIVE ANGLE OF FF	RICTION 0		17	
Sample Description	gravelly CLAY, high plasticity, brow Specimen remoulded to 97.1% Sta		-	
Mode of Failure	Plastic barrelling			



Alan Fobert



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R021 6 - 8 Rose Avenue, Croydon 3136 Issue date 29/06/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02-26/06/17 Location **EUROBODALLA QUARRY** Checked by ANR Sample location TP-EQ01 0.3 - 1.2m Sample No 17102001 SHEAR STRESS - NORMAL STRESS PLOT 800 700 600 500 Shear stress (kPa) 400 300 200 100 0 100 200 300 400 500 600 700 800 Normal Stress (kPa) Test results EFFECTIVE COHESION 20 kPa 17 ° EFFECTIVE ANGLE OF FRICTION



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025 Accreditation No 9909

Ada Pobert



AS 1289.6.4.2

ent oject cation		SM 300 EU	121	127	Е	UR	OB	OE	DAL	_L/									٩G	E					Da	te i		y tea I by			AN 02- AN	-26	/06/	′17
mple l	oca	tion				T	P-E	ΞQ	01	0	.3 -	- 1.	.2r	n											Sai	тр	le i	No			17′	102	2001	1
														р	ı' -	q'	PL	.07	Γ															
900 T				_									_		_						_			_	_					_				7
-					П		Ħ	1															П							1	T		1	1
-					\Box		\Box	1					1		ļ				Ħ				Ħ		t					#	+		+	1
800 -							\pm						+		t				\vdash				Ħ		$^{+}$					\pm			\pm	1
-					Н								\pm		t		+						Н							\pm	\pm			_
700					Н		Н					+	+		-		+		\vdash		+		Н		+		H		+	+	+		+	-
700							\blacksquare						1		F		4		F		-		Н		-					+				-
-							H						1		F				F		1		Н							1				1
600							Н					1			Ļ								П							1				1
-							Н								t								Ш							1			1	1
-													+																	\pm	\pm		\pm	_
500							H						+		l				H				Н							†				1
-							\Box						+				+				+		Н											_
400					\Box		Н	+					+		+				$\frac{1}{1}$		+		Н		+		Н		+	+	+	\Box	+	1
400													+						H				Н											7
-			H		Н		Н						1		ı				H		1		H		F				H	1	+	Н		1
300				+	H		H	1				1	#	+	ŧ		1		F		#	+	H	+	+	H	H	+	\parallel	#	+		+	1
				#			H	1					#		ļ		1		F		#		H	#	+					1	1	\vdash	+	1
				\pm	H		\Box						1						L		1			1			H	+	+	1			\downarrow	1
200 -				\pm	\forall	\downarrow	\Box	1				\downarrow	\pm	$^{+}$	†		+		t		\pm	+	H	1	1		\exists	\dagger	\Box	\pm		\Box	\pm	1
	\perp			\pm		\pm	\forall		\pm	L		\pm	\pm	\pm	Ł		\perp	\pm			\pm	\pm	\exists	\pm	$ begin{array}{c} & & \\$			\pm	\exists	\pm	\pm		\pm	1
100		H	H	F	$oxed{H}$		$oxed{\Box}$	Ŧ				$\overline{\ }$	+	7	f	H	Ŧ	$-\Gamma$	F	H	Ŧ	+	H	Ŧ	F	H	H		$ \sqrt{} $	\mp		$oxed{\Box}$	Ŧ	-
100 -			H	\mp		\downarrow	H	+	1				$ \sqrt{} $		F		-		H		+		Н	+					\Box	A	+	Н	+	-
-		\downarrow	+	+	1			1				1	1	\downarrow	ļ		1		F		#	-	H	1	ļ	H		+	\parallel					1
0			Ц			\downarrow	$\downarrow \downarrow$							1	\downarrow						1		Ħ	1		Ė	Ш			1				1
C)		10	0		2	200			3	00			4	100			5	00			6	00			70	00			800	0		g	900



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

Accreditation No 9909

Ada Fobert



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R021 6 - 8 Rose Avenue, Croydon 3136 Issue date 29/06/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 02-26/06/17 Location **EUROBODALLA QUARRY** Checked by ANR Sample location TP-EQ01 0.3 - 1.2m Sample No 17102001 STRESS - STRAIN PLOT 400 300 Deviator Stress (kPa) 200 100 0 10 12 14 Strain (%) **EFFECTIVE PORE PRESSURE - STRAIN PLOT** 500 Effective Pore Pressure (KPa) 000 001 2 4 6 10 12 14 Strain (%) A642 V1.7 MAR 13 PAGE 4 OF The results of the tests, calibrations



and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025 Accreditation No 9909

Alon Fobert



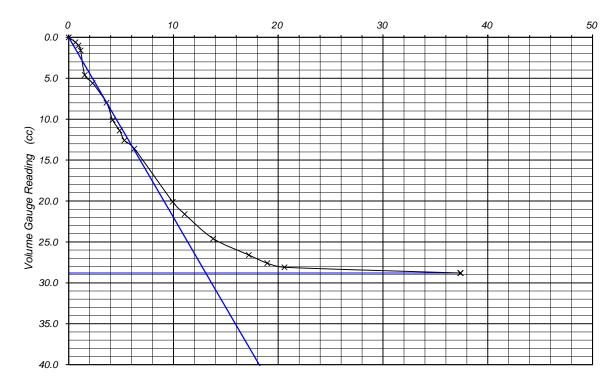
AS 1289.6.4.2

	Job No	17102
CIVIL GEOTECHNICAL SERVICES	Report No	17102/R021
6 - 8 Rose Avenue, Croydon 3136	Issue date	29/06/17

ClientSMEC AUSTRALIA LIMITED (MELBOURNE)Tested byANRProject30012127 EUROBODALLA SOUTHERN STORAGEDate tested02-26/06/17LocationEUROBODALLA QUARRYChecked byANR

Sample location TP-EQ01 0.3 - 1.2m Sample No 17102001

CONSOLIDATION TEST



Squareroot of Time (mins)

Stage No	1	
Effective cell pressure	200	kPa
Consolidation 100% (t 100)	171.4	mins
Coefficient of consolidation (c v)	1.0	M²∕year



Alan Pobe

A642 V1.7 MAR 13 PAGE 5 OF 5



AS 1289.6.4.2

	CES RALIA LIMITED (MELBOURNE) UROBODALLA SOUTHERN STOF	RAGE	Job No Report No Issue date Tested by Date tested	17102 17102/R024 13/07/17 ANR 23/6-9/6/17
Location EUROBODAL	LA QUARRY		Checked by	ANR
Sample No Sample location	17102012 TP-EQ15 0.75 - 5.4m		Sampled by Sampling date	Client 2017
Type of sample Type of test Drainage conditions Failure criteria	R100 Compressive strength of a satural compression with measurement Top, bottom and side Principle Stress Ratio	=		
Test Details				
	Stage No	1	2	3
Initial cell pressure	kPa	700	900	900
Back pressure	kPa	500	500	100
Effective axial stress at fail	ure kPa	229	497	976
Effective lateral stress at fa	ilure kPa	75	177	380
Effective pore pressure at t	ailure kPa	125	223	420
Deviator stress at failure	kPa	154	320	596
Strain at failure	%	6.28	10.16	14.15
Degree of saturation before	e test (B)		1.00	
Rate of strain	mm/min		0.040	
-				
Sample Details				
Initial sample length	mm		199.8	
Initial sample diameter	mm		99.5	
Initial dry density	t/m³		1.22	
Initial moisture content	%		38.1	
Moisture content after test				
Moisture Content	%		37.6	
Test Results				
EFFECTIVE COHESION	kPa		13	
EFFECTIVE ANGLE OF FRIC	CTION 0		25	
Sample Description	SILT, high liquid limit, brown, trac Specimen remoulded to 96.4% S See test report no 17102/R023 fo	Standard Compact	ive effort at 0.5%	wet of OMC.
Mode of Failure	Plastic barrelling			



Approved Signatory: Andrew Roberts

A642 V1.7 MAR 13 PAGE 1 OF 5



AS 1289.6.4.2

ent oject cation		300	121	27	Εl	JRO	во		ΓED .LA : Y							AGE	=			L	este Date Chec	tes	ste	d		AN 23 AN	/6-9	9/6/	17
mple lo	cat	ion				TP	-EQ	15	0.7	5 - 5	5.4	m								S	Sam	ple	No)		17	102	2012	2
							Sł	HEA	ıR S	STR	ES	ss -	· N(ЭR	'MA	L S	STR	ES.	S P	PLO	Т								
1000 -		H	H								Ŧ																		
900 -																													
800 -											+																		
700 -																													
700											$\frac{1}{1}$																		
600																													
500																													•
400 -																													
300 -																													
550											+												<u> </u>						
200 -											1		/	+											<u> </u>				
100 -											/			+															
0 -			100			200	\	30	00		400			500			600		70	00		80	00		90	00		10	00
				-		t re:	sult	s			٨	lorn	nal S	Stre	ess	(kF	Pa)												
									IESI	ON									13	3 <i>k</i>	Pa								



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

Accreditation No 9909

Ada Potert



AS 1289.6.4.2

Rose Avend Rose Avend Client Project ocation	ue, Croydo SMEC 30012	SERVICES on 3136 AUSTRALIA 127 EUROB BODALLA Q	BODALLA S			E	Job No Report No Issue date Tested by Date tested Checked by	17102 17102/R024 13/07/17 ANR 23/6-9/6/17 ANR
Sample loca			EQ15 0.75	- 5.4m			Sample No	17102012
/							, , , , , , , , , , , , , , , , , , ,	
				p' - 0	g' PLOT			
1000								
	+++							
900								
800	+++							
700	+++							
	+++							
600								
500	+++							
400								
700	+++							
300								
H	+++			+++		\Box	$++N++\square$	
200	\Box							
				 				
100	+++							
o 崖	100) 200	300	400	500	600	700 800	900 1000



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

Accreditation No 9909

Ada Fobert



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R024 6 - 8 Rose Avenue, Croydon 3136 Issue date 13/07/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 23/6-9/6/17 Location **EUROBODALLA QUARRY** Checked by **ANR** Sample location TP-EQ15 0.75 - 5.4m Sample No 17102012 STRESS - STRAIN PLOT 600 550 500 450 400 350 Deviator Stress 300 250 200 150 100 50 0 0 10 12 14 16 Strain (%) **EFFECTIVE PORE PRESSURE - STRAIN PLOT** 500 450 90 Aressure (kPa) 350 250 250 250 Pore I 200 Effective F 50 2 10 12 14 Strain (%) A642 V1.7 MAR 13 PAGE 4 OI The results of the tests, calibrations



and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025. Accreditation No 9909

Alan Fobert

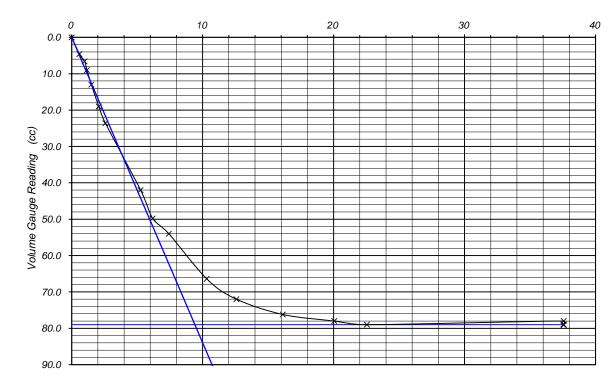


AS 1289.6.4.2

		Job No	17102
CIVIL GEOTEC	HNICAL SERVICES	Report No	17102/R024
6 - 8 Rose Aver	nue, Croydon 3136	Issue date	13/07/17
Client	SMEC AUSTRALIA LIMITED (MELBOURNE)	Tested by	ANR
Project	30012127 EUROBODALLA SOUTHERN STORAGE	Date tested	23/6-9/6/17
Location	EUROBODALLA QUARRY	Checked by	ANR
	_	•	•

 Sample location
 TP-EQ15
 0.75 - 5.4m
 Sample No
 17102012

CONSOLIDATION TEST



Squareroot of Time (mins)

Stage No	1	
Effective cell pressure	200	kPa
Consolidation 100% (t 100)	88.4	mins
Coefficient of consolidation (c v)	1.9	M² / year



Alan Fobert



AS 1289.6.4.2

	CES RALIA LIMITED (MELBOURNE) UROBODALLA SOUTHERN STOR	RAGE	Job No Report No Issue date Tested by Date tested	17102 17102/R031 29/06/17 ANR 14-26/06/17
Location EUROBODAL	LA QUARRY		Checked by	ANR
Sample No Sample location	17102018 TP-EQ07 0.5 - 2.5m		Sampled by Sampling date	Client 2017
Type of sample Type of test Drainage conditions Failure criteria	R100 Compressive strength of a satural compression with measurement of Top, bottom and side Principle Stress Ratio	-		
Test Details				
	Stage No	1	2	3
Initial cell pressure	kPa	700	900	900
Back pressure	kPa	500	500	100
Effective axial stress at fail	lure kPa	221	466	969
Effective lateral stress at fa	ailure kPa	76	166	382
Effective pore pressure at	failure kPa	124	234	419
Deviator stress at failure	kPa	146	300	587
Strain at failure	%	3.80	7.61	11.53
Degree of saturation before	e test (B)		0.97	
Rate of strain	mm/min		0.013	
				<u> </u>
Sample Details				
Initial sample length	mm		200.0	
Initial sample diameter	mm		99.6	
Initial dry density	t/m³		1.35	
Initial moisture content	%		33.0	
Moisture content after test				
Moisture Content	%		32.8	
Test Results		•		
EFFECTIVE COHESION	kPa		10	
EFFECTIVE ANGLE OF FRIC	CTION 0		25	
Sample Description	CLAY, high plasticity, brown, with Specimen remoulded to 96.8% S			
Mode of Failure	Plastic barrelling			



Approved Signatory: Andrew Roberts

A642 V1.7 MAR 13 PAGE 1 OF 5

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025
Accreditation No 9909



AS 1289.6.4.2

ient oject cation	SMI 300 EUF	1212	27	EU	ROE	300	DAL	LA							AG	E				D	este ate hec	tes	ste	d		AN 14 AN	-26	6/06	6/17
ample loc	ation				TP-	EQ	07	0.5	- 2	.5n	n									S	amį	ole	No)		17	102	201	8
						SH	IEA	ıR S	STF	RES	SS	- /\	IOF	RMA	A <i>L</i>	ST	RE	ESS	S PI	_07	Γ								
¹⁰⁰⁰ T		П			П								П			П	_		П			П		П]
		Ш	Ш	Н	Ш								Н					Н	Ш								Н		
900													Ш														Н		
													Н			\parallel						Н		Н			Н		
				Н		\pm							\pm			\forall			\pm				\pm	H		\pm	Н		
800						H				Н			H			+			\pm					H			Н		
				\vdash		\blacksquare							+					\vdash						\blacksquare			\Box		
700													\blacksquare																
700 F													Н														Н		
				H		\blacksquare	\blacksquare		+	Н	-		\mathbb{H}			\blacksquare		H	+			H	+	H	\blacksquare	-	Н		
600				Н									\blacksquare			\blacksquare						\blacksquare		Н	\blacksquare		Н		
				H		\blacksquare							\forall			\blacksquare		H	+			\blacksquare		\forall	+	+	\blacksquare		
500		+	\vdash										H														H		
500		+	+	H	\blacksquare	H	+			H	Ŧ		H		1			H	\blacksquare			\blacksquare		H	+				}
3				H		H				Н	H		H			Н		H	H			Н		H		7			
400		+		H		H	\blacksquare		+	H	+		\forall		-	\blacksquare	+	H	\forall				-	1	\mp	+	\blacksquare	+	
				H									H						H		7						H		
		+	H	H	\blacksquare	H			H	H			H			\blacksquare		1	1			H		H	+		Н		
300		+	+	H		H	\blacksquare			H	+		H			7	-	Ħ		+	$\overline{}$	\blacksquare		H	\blacksquare		H		
F	++	+	\forall	H	H	\dashv	\blacksquare		\vdash	H	+		#	4	+	\dashv	\mp	H	\forall	+		Ħ	\uparrow	K	+	+	H	+	
200	++	+	\dashv	H	\forall	\dashv	\dashv			\dashv	7	1	#	\blacksquare	+	\dashv	+	H	\dashv	+	+	\dashv	+	H	X	\mp	H	+	
F	\Box	+	H	H	H	H		4		H	/		\Box		+	\blacksquare	+	H	\blacksquare	+		H	+	H	\blacksquare	X	H		
400		+	+	Ħ					\uparrow	\searrow	4		\parallel		1	\parallel	+	H	\parallel			\parallel	+	H	+	+	\forall		
100		+			4	\parallel				1/		\forall	\parallel		1	\parallel	+	Ħ	\parallel			\parallel	+		+	+	\forall		
		1		1	\mathbf{X}					/		\setminus	Ħ					H						Ħ			П	\downarrow	
0 E		\Box		Ш	11	Ш	Ц			Ц			Ц		1	Ц		Ц	Ц			Ц		Ш	Ц		Ш	1	
0		100)	2	200		30	00		40			50			60			70	0		80	0		90	00		10	000
			T	est	res	ults	3			1	Nor	mal	Str	ess	(k	Pa))												



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

Accreditation No 9909

Alan Fobert



AS 1289.6.4.2

IL GEOTE Rose Aver	nue,	Cro	ydc	n 3	313	6																					R Is	ep su	No ort e d	t N dat	te		1 2	71 29/	02 06/	2/R		31
Client Project Location	3	00	EC 12 ² ROI	127	7	Εl	JR	OI	BC	D	ΑL	L	<i>y</i> ((M SO	1E)U	LE Th	BO HE	UI RI	RN N S	IE) ST) OI	RA	G	E			D	ate	tec e te ck	est	ec		1	4- 4N	26	/06	6/1	7
Sample loc	atio	on					Т	P-	E	Q0	7	0	.5	- 2	2.5	īm											S	an	npl	e I	Vo		1	71	02	201	18	
																	p	' -	q'	P	LC	ΣT	-															
1000	+				=	=	Ŧ				1	+		F						T							+			-	Ŧ		—	Ŧ	-			
900						+	‡ ‡																				+							<u>+</u>				
800						<u>+</u>	‡ ‡																															
700					_	<u>+</u>	+																											<u>+</u>				
600						<u>+</u>	+																															
500																																						Į
400																																		<u>_</u>				
300					 	<u>+</u>	+																			_	1							<u>+</u>				
200					\exists	\pm	\pm				$\frac{1}{1}$		Ŧ						\neq	1	1													_				



100

0 | 0

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

Accreditation No 9909

100

200

300

Alan Fobert

400

500

p (kPa)

700

800

900

1000



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R031 6 - 8 Rose Avenue, Croydon 3136 Issue date 29/06/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 14-26/06/17 Location **EUROBODALLA QUARRY** Checked by ANR Sample location TP-EQ07 0.5 - 2.5m Sample No 17102018 STRESS - STRAIN PLOT 700 600 500 Deviator Stress (kPa) 400 300 200 100 0 6 10 Strain (%) **EFFECTIVE PORE PRESSURE - STRAIN PLOT** 500 Effective Pore Pressure (KPa) 000 001 2 6 10 12 Strain (%) A642 V1.7 MAR 13 PAGE 4 OF The results of the tests, calibrations



and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025 Accreditation No 9909

Ada Pobert



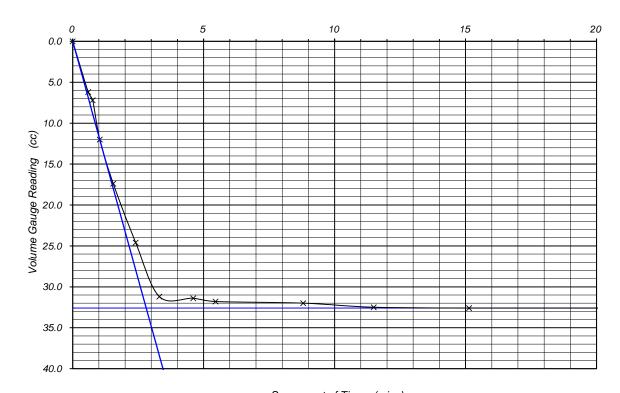
AS 1289.6.4.2

	Job No	17102
CIVIL GEOTECHNICAL SERVICES	Report No	17102/R031
6 - 8 Rose Avenue, Croydon 3136	Issue date	29/06/17

ClientSMEC AUSTRALIA LIMITED (MELBOURNE)Tested byANRProject30012127 EUROBODALLA SOUTHERN STORAGEDate tested14-26/06/17LocationEUROBODALLA QUARRYChecked byANR

Sample location TP-EQ07 0.5 - 2.5m Sample No 17102018

CONSOLIDATION TEST



Squareroot of Time (mins)

Stage No	1	
Effective cell pressure	200	kPa
Consolidation 100% (t 100)	7.9	mins
Coefficient of consolidation (c v)	20.9	M²/year



Alan Fobert



AS 1289.6.4.2

CIVIL GEOTECHNICAL SERVIG 6 - 8 Rose Avenue, Croydon 3136 Client SMEC AUSTI	CES RALIA LIMITED (MELBOURNE)		Job No Report No Issue date Tested by	17102 17102/R032 07/11/17
	UROBODALLA SOUTHERN STOF	RAGE	Date tested Checked by	23/06-7/07/17 ANR
Sample No Sample location	17102019 TP-EQ10 0.3 - 1.4m		Sampled by Sampling date	Client 2017
Type of sample Type of test Drainage conditions Failure criteria	R100 Compressive strength of a satural compression with measurement of Top, bottom and side Principle Stress Ratio	•		
Test Details				
	Stage No	1	2	3
Initial cell pressure	kPa	700	900	900
Back pressure	kPa	500	500	100
Effective axial stress at fail	lure kPa	217	481	1081
Effective lateral stress at fa		76	184	463
Effective pore pressure at	failure kPa	124	216	338
Deviator stress at failure	kPa	141	297	619
Strain at failure	%	2.87	6.73	10.78
Degree of saturation before	e test (B)		0.97	
Rate of strain	mm/min		0.040	
Sample Details				
Initial sample length	mm		200.0	
Initial sample diameter	mm		99.6	
Initial dry density	t/m³		1.43	
Initial moisture content	%		28.8	
Moisture content after test				
Moisture Content	%		29.4	
Test Results				
EFFECTIVE COHESION	kPa		14	
EFFECTIVE ANGLE OF FRIC	CTION 0		23	
Sample Description	CLAY, high plasticity, brown, with Specimen remoulded to 96.7% S See Report no 17102/R029 for C	tandard Compact	ive Effort at 1.6%	
Mode of Failure	Plastic barrelling			



Ala Pobert

A642 V1.7 MAR 13 PAGE 1 OF 5



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R032 6 - 8 Rose Avenue, Croydon 3136 Issue date 07/11/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 23/06-7/07/17 Location EUROBODALLA QUARRY Checked by ANR Sample location TP-EQ10 0.3 - 1.4m Sample No 17102019 SHEAR STRESS - NORMAL STRESS PLOT 1200 1000 800 Shear stress (kPa) 600 400 200 200 400 600 800 1000 1200 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 *kPa* 23 ° EFFECTIVE ANGLE OF FRICTION



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025. Accreditation No 9909

Ada Pobert

A642 V1.7 MAR 13



AS 1289.6.4.2

Rose Aver ient oject ocation	SN 300	IEC / 0121 ROE	4US 27	TR <i>A</i> EUI	ROE	ODA	۱LL						RAC	ЭE				Issu Test Date Che	ed l	by sted		۱A	//11/ NR 8/06- NR		7/17
ample loc	ation				TP-E	Q10	0 0	.3 -	1.4	m								San	ple	No		17	'102	019	
										p'	- q'	PL	ЭТ												
1200												<u> </u>				<u> </u>				1					1
												-				-									
1000								Н				+				+									
1000																									
								Н				-				+									
800																									
								Н				+				+									
600																									
600																									
								Н				-				_									
								Н																	
400																									
								Н				+				+		-							
															_	$ \checkmark $									
												1						\							
200 —		+					+		\rightarrow	4	+	+			+	+	+	+	Н		+		+		
						K												\Box							
	+		_				1					+				+	1	4	\vdash				+		
		1	\setminus				+					+				+	+								
0 			20	20			1	00				500				800				10	<u> </u>			12	1 200



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

Accreditation No 9909

Ada Fobert

A642 V1.7 MAR 13 PAGE 3 OF 5



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R032 6 - 8 Rose Avenue, Croydon 3136 Issue date 07/11/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 23/06-7/07/17 Location **EUROBODALLA QUARRY** Checked by ANR Sample location TP-EQ10 0.3 - 1.4m Sample No 17102019 STRESS - STRAIN PLOT 700 600 500 Deviator Stress (kPa) 400 300 200 100 0 10 12 Strain (%) **EFFECTIVE PORE PRESSURE - STRAIN PLOT** 400 350 Effective Pore Pressure (kPa) 001 002 002 008 50 2 10 Strain (%) A642 V1.7 MAR 13 PAGE 4 OI



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025
Accreditation No 9909

Ada Lobert



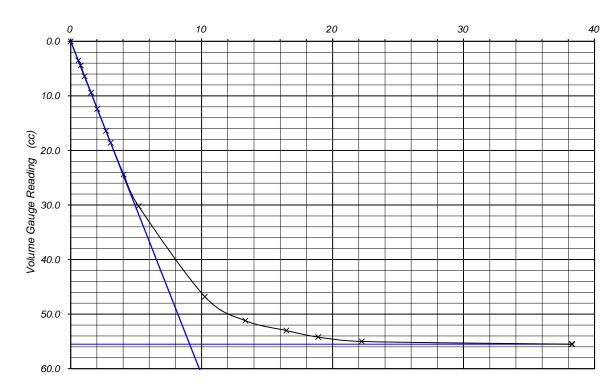
AS 1289.6.4.2

6 - 8 Rose Avenue, Croydon 3136	Issue date	07/11/17
CIVIL GEOTECHNICAL SERVICES	Report No	17102/R032
	Job No	17102

ClientSMEC AUSTRALIA LIMITED (MELBOURNE)Tested byANRProject30012127 EUROBODALLA SOUTHERN STORAGEDate tested23/06-7/07/17LocationEUROBODALLA QUARRYChecked byANR

Sample location TP-EQ10 0.3 - 1.4m Sample No 17102019

CONSOLIDATION TEST



Squareroot of Time (mins)

Stage No	1	
Effective cell pressure	200	kPa
Consolidation 100% (t 100)	82.5	mins
Coefficient of consolidation (c v)	2.0	M² / year



Ala Pobart



AS 1289.6.4.2

	7.6 (200.0)	_						
IVIL GEOTECHNICAL SERV - 8 Rose Avenue, Croydon 3130			Job No Report No Issue date	17102 17102/R033 11/07/17				
Client SMEC AUS Project 30012127	TRALIA LIMITED (MELBOURNE) EUROBODALLA SOUTHERN STOR/ ALLA QUARRY	AGE	Tested by Date tested Checked by	ANR 28/06-10/07/17 ANR				
Sample No Sample location	17102020 TP-EQ16 0.4 - 1.5m		Sampled by Sampling date	Client 2017				
Type of sample Type of test Drainage conditions Failure criteria	R63 Compressive strength of a saturat compression with measurement of Top, bottom and side Principle Stress Ratio	=						
Test Details								
	Stage No	1	2	3				
Initial cell pressure	kPa	700	900	900				
Back pressure	kPa	500	500	100				
Effective axial stress at fa	ailure kPa	239	538	1236				
Effective lateral stress at	failure kPa	86	219	520				
Effective pore pressure a	t failure kPa	114	181	280				
Deviator stress at failure	kPa	153	319	716				
Strain at failure	%	4.07	7.83	13.18				
Degree of saturation before	ore test (B)		0.97					
Rate of strain	mm/min		0.025					
Sample Details								
Initial sample length	mm		126.8					
Initial sample diameter	mm		63.2					
Initial dry density	t/m³		1.33					
Initial moisture content	%	32.7						
			-					
Moisture content after tes	st							
Moisture Content	%		31.2					
Test Results								
EFFECTIVE COHESION	kPa		14					
EFFECTIVE ANGLE OF FR	EICTION 0		23					
Sample Description	CLAY, high plasticity, brown, with Specimen remoulded to 97.3% Sta See Report no 17102/R030 for Co	andard Compact	tive Effort at 0.3%					
Mode of Failure	Plastic barrelling							



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

Accreditation No 9909

Approved Signatory : Andrew Roberts

A642 V1.7 MAR 13 PAGE 1 OF 5



AS 1289.6.4.2

E	127 E	UROE	BODA	LLA			OURI ERN		RAC	ЭE				Da	ate	tesi	y ted			06-1	0/07/1
EURO	BODA																by		AN		
ation		TP-	EQ16	0.4	4 - 1.	5m								Sá	amp	le l	Vo		17	1020)20
			SHE	AR .	STR	ES.	S - N	ORN	1AL	ST	RE	SS	: PL	.07	_						
		1 1				_															_
					+			+	+												
						I						I									
					+			\mathbb{H}	+												
						+		++	+			+									
						\perp		П				1									
					+			++	+												
	++					+			+			+									
	++					+			+			+									_
						+		H				+								Н	
	+					+		++	+	\vdash	+	+									4
						+		++	+			+							+		
																7					
						+		++	+		+	+									_
						+		++	+		\rightarrow	+									
													\uparrow		\Box						
						+									\rightarrow	\downarrow					
					+	1	$\forall \vdash$									_	\forall				
						\mathbb{Z}											\perp				
				\rightarrow	$\downarrow \downarrow$	$/\!$												$\setminus oldsymbol{\perp}$			
	+	H			$+ \forall$													+			
17																					
	200		40	00		ϵ	600		8	00			10	000			12	00			1400
	Te	st res	ults			N	ormal	Stres	s (A	kPa))										
		Te EF	200 Test res EFFECTIVE	200 40 Test results EFFECTIVE CO	200 400 Test results EFFECTIVE COHES	Zoo 400 Test results EFFECTIVE COHESION	200 400 6 Test results EFFECTIVE COHESION	200 400 600 Normal Test results	200 400 600 Normal Stres Test results EFFECTIVE COHESION	200 400 600 8 Normal Stress (I	200 400 600 800 Normal Stress (kPa) Test results EFFECTIVE COHESION	200 400 600 800 Normal Stress (kPa) Test results EFFECTIVE COHESION	200 400 600 800 Normal Stress (kPa) Test results EFFECTIVE COHESION	200 400 600 800 10 Normal Stress (kPa) Test results EFFECTIVE COHESION 14	200 400 600 800 1000 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kF	Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kPa	200 400 600 800 1000 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kPa	200 400 600 800 1000 12 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kPa	200 400 600 800 1000 1200 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kPa	200 400 600 800 1000 1200 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kPa	200 400 600 800 1000 1200 Normal Stress (kPa) Test results EFFECTIVE COHESION 14 kPa



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

Accreditation No 9909

Ada Pobert

A642 V1.7 MAR 13 PAGE 2 OF 5



AS 1289.6.4.2

Rose Avenue, Croydon 3136 Client SMEC AUSTRALIA LIMITED (MELBOURNE) Project 30012127 EUROBODALLA SOUTHERN STORAGE Location EUROBODALLA QUARRY								Issue date Tested by Date tested Checked by			d	11/07/17 ANR 28/06-10/07/17 ANR						
Sample loc		TP-EQ16 0.4 - 1.5m											Sample No		1	17102020		
						p	' - q'	PLO	Τ									
1400																		
1200 -																		
1000																		
800				+														Ħ



200

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

Accreditation No 9909

400

200

Approved Signatory : Andrew Roberts

600

800

p (kPa)

1000

1200

A642 V1.7 MAR 13 PAGE 3 OF 5

1400



AS 1289.6.4.2

Job No 17102 CIVIL GEOTECHNICAL SERVICES Report No 17102/R033 6 - 8 Rose Avenue, Croydon 3136 Issue date 11/07/17 SMEC AUSTRALIA LIMITED (MELBOURNE) Client Tested by ANR Project 30012127 EUROBODALLA SOUTHERN STORAGE Date tested 28/06-10/07/17 Location **EUROBODALLA QUARRY** Checked by **ANR** Sample location TP-EQ16 0.4 - 1.5m Sample No 17102020 STRESS - STRAIN PLOT 800 700 600 Deviator Stress (kPa) 500 400 300 200 100 0 10 16 Strain (%) **EFFECTIVE PORE PRESSURE - STRAIN PLOT** 300 250 Effective Pore Pressure (kPa) 50 0 2 6 10 12 14 Strain (%)



The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards. Accredited for compliance to ISO/IEC 17025
Accreditation No 9909

Alan Fobert

A642 V1.7 MAR 13 PAGE 4 OI



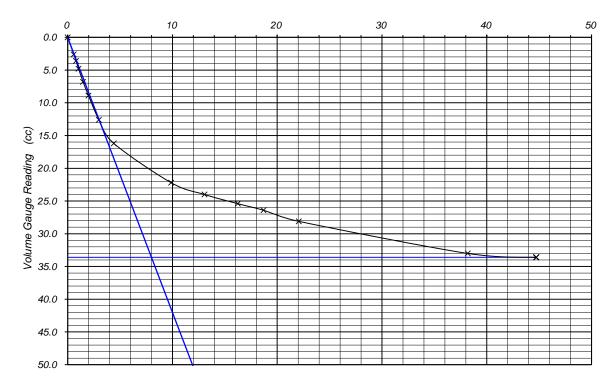
AS 1289.6.4.2

		Job No	17102
CIVIL GEOTECH	INICAL SERVICES	Report No	17102/R033
6 - 8 Rose Aven	ue, Croydon 3136	Issue date	11/07/17
Client	SMEC AUSTRALIA LIMITED (MELBOURNE)	Tested by	ANR

ClientSMEC AUSTRALIA LIMITED (MELBOURNE)Tested byANRProject30012127 EUROBODALLA SOUTHERN STORAGEDate tested28/06-10/07/17LocationEUROBODALLA QUARRYChecked byANR

Sample location TP-EQ16 0.4 - 1.5m Sample No 17102020

CONSOLIDATION TEST



Squareroot of Time (mins)

Stage No	1	
Effective cell pressure	200	kPa
Consolidation 100% (t 100)	64.0	mins
Coefficient of consolidation (c v)	1.0	M²∕year



Ala Lobert



B5 – Permeability Tests

Technical Note: ESS-TN- 01



CONSTANT HEAD PERMEABILITY TEST

AS 1289.6.7.3

		Job No	17102			
CIVIL GEOTECHNICAL SERVICES		Report No	17102/R022			
6 - 8 Rose Avenue, Croydon 3136		Date of Issue	29/06/17			
Client SMEC AUSTRALIA LIMITED (MELBOURI	.NE)	Tested by	ANR			
Project 30012127 EUROBODALLA SOUTHERN	STORAGE	Date tested	16-23/06/17			
Location EUROBODALLA QUARRY		Checked by	ANR			
Sample No		171020	001			
Sample identification		TP-EQ01 0.3				
· 						
Date sampled		2017				
Sampled by		Clien				
Sampling method		By Clie				
Sample type		Bulk Distu	urbed			
Sample Preparation						
Oversize material retained on 19mm sieve	%	2				
Percent of material discarded		2				
Compaction details 1						
AS1289 5.1.1 Standard Compaction see Report No		17102/R	₹020 <u> </u>			
Maximum Dry Density	t/m³	1.41				
Optimum Moisture Content	%	30.5				
Oversize material retained on 19.0mm sieve	%	2				
Compaction details 2						
Target laboratory density ratio	%	97				
Method of compaction		Compaction	on by			
		tamping in eq	ual layers			
No of layers		3				
Length of specimen	mm	100.0				
Diameter of specimen	mm	99.6				
Length to diameter ratio		1: 1.0	0			
Specimen details before test						
Dry density	t/m³	1.37	,			
Moisture content	%	31.8				
Laboratory moisture ratio	%	104				
Laboratory density ratio	%	97				
Specimen details after test						
Moisture content	%	34.6	i			
Mean effective stress	kPa	100				
Permeant used		Distilled v	water			
PERMEABILITY (k)	m/sec	4 x 10	-11			
Sample description						
		gravelly CLAY, high plas	-			
		coarse gravel, trace of	fine to coarse sand			



Ada Pobert

Approved Signatory : Andrew Roberts

A673R V1 6 MAR 13



CONSTANT HEAD PERMEABILITY TEST

AS 1289.6.7.3

		Job No	17102			
CIVIL GEOTECHNICAL SERVICES	Report No	17102/R034				
- 8 Rose Avenue, Croydon 3136		Date of Issue	11/07/17			
Client SMEC AUSTRALIA LIMITED (MELBOUR	RNE)	Tested by	ANR			
Project 30012127 EUROBODALLA SOUTHERN	N STORAGE	Date tested	23-30/06/17			
Location EUROBODALLA QUARRY		Checked by	ANR			
Sample No	$\overline{}$	17102018				
Sample identification		TP-EQ07 0.				
Date sampled		2017	7			
Sampled by		Clien				
Sampling method		By Clie	ent			
Sample type		Bulk Dist	urbed			
Sample Preparation						
Oversize material retained on 10mm sieve	%	0				
Percent of material discarded		0				
Compaction details 1						
AS1289 5.1.1 Standard Compaction see Report No)	17102/R	₹028			
Maximum Dry Density	t/m³	1.39	,			
Optimum Moisture Content	%	32.0)			
Oversize material retained on 19.0mm sieve	%	0				
Compaction details 2						
Target laboratory density ratio	%	97				
Method of compaction		Compacti	ion by			
·		tamping in eq	-			
No of layers		3				
Length of specimen	mm	99.9)			
Diameter of specimen	mm	99.6	j			
Length to diameter ratio		1: 1.	.0			
Specimen details before test						
Dry density	t/m³	1.34	4			
Moisture content	%	32.7	7			
Laboratory moisture ratio	%	103	<i>5</i>			
Laboratory density ratio	%	97				
Specimen details after test	_	_	_			
opcomion actano arter test						

%

kPa

m/sec

NATA
ACCREDITED FOR
TECHNICAL

Moisture content

Mean effective stress

Permeant used

Sample description

PERMEABILITY (k)

Ala Potert

A673R V1 6 MAR 13

40.1

100

Distilled water

2 x 10⁻¹¹

CLAY, high plasticity, brown, with fine to coarse sand, trace of fine to medium gravel.