SNL Building Constructions Pty Ltd

Geotechnical and Phase 1 Site Contamination Assessment

Proposed Development, Dudley Road and Kopa Street

Whitebridge

Report No. RGS00603.1-AB 28 August 2013

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Manning-Great Lakes

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28 August 2013

SNL Building Constructions Pty Ltd
22 Pendlebury Road
CARDIFF NSW 2285

Attention: Mr Wade Morris

Dear Wade

RE: Proposed Development, Dudley Road and Kopa Street, Whitebridge
Geotechnical and Phase 1 Site Contamination Assessment

Regional Geotechnical Solutions are pleased to provide this report providing a Geotechnical and Phase 1 Contamination Assessment for the proposed development at Whitebridge.

If you require any further information regarding the report please do not hesitate to contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

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1 INTRODUCTION

At the request of SNL Building Constructions Pty Ltd (SNL), Regional Geotechnical Solutions (RGS) has undertaken a geotechnical and contamination assessment for a proposed development located between Dudley Road and Kopa Street, Whitebridge. The development is to comprise generally one to two storey medium density residential buildings, some with partial basement parking or lightweight partial third stories, as well as associated access roads and parking and some other possible mixed use development. The site is currently vacant. The purpose of the investigation, which was commissioned by Wade Morris of SNL was to provide the following:

- Geotechnical investigations for assessment of foundation conditions, site classification, assessment of suitable footing types and bearing capacity;
- Subgrade conditions for pavement design;
- Assessment of slope stability;
- General geotechnical conditions for earthworks, nature of site materials, opportunities for re-use, fill construction procedures;
- Phase 1 site contamination assessment;
- Preliminary assessment of Mine Subsidence related issues beneath the site.

2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 Site Description

The site is identified as 142 Dudley Road and 2-4 Kopa Street Whitebridge. It is situated on the northeastern side of Dudley Road and extends through to Kopa Street, comprising the following lots:

- Lots 1,2 and 3 DP 436503
- Lots 1,2 and 3 DP349377
- Lot 4 DP 663765
- Lots 2 and 3DP 26039

The site is roughly rectangular in shape, occupying an area of approximately 220m by 150m. An aerial view, reproduced from the project brief, is presented below.

Aerial image (Source: SIX Viewer)

Regionally the site is situated within an area of gently to moderately undulating topography. From the north-western corner of the site the surface slopes generally towards the northeast at grades of 5˚ to 8˚.

The site has mostly been cleared of trees apart from the north-western corner which has a stand of large tress. The majority of the site is vacant and grassed. Two residential lots that contain existing weatherboard residences located at the northwestern corner of the site will be incorporated into the development. No other buildings occupied the site at the time of the investigation. An unsealed car parking area was present in the south-western corner of the site, and a concrete footpath crosses the north western corner of the site. In the vicinity of the car park area, the site appears to have been filled. The estimated extent of the filling is shown on Figure 1.

At the time of the investigation two wet areas were noted at the site, in the following locations:

- Adjacent and downslope of the commercial building in the south-western corner of the site; and
- Adjacent and downslope of the residential building on the northern boundary of the site.

These are shown on Figure 1.The wet areas are expected to be the result of seepage runoff from the respective properties.

3 SCOPE OF GEOTECHNICAL INVESTIGATION

3.1 Field Work

The field work was carried out on 16 July 2013 and comprised:

- A walk over assessment of the site which involved mapping surface features, surface slope angles, drainage lines, wet and boggy ground conditions and other site features considered of relevance as outlined above;
- Excavation of twelve (12) test pits to depths varying from 0.8m to2.1m using a 3.5 tonne tracked excavator.

Figure 1 shows the investigation locations. Engineering logs are presented in Appendix A.

3.2 Geotechnical Laboratory Testing

Samples collected during the field work were sent to an independent NATA registered laboratory for testing. Laboratory testing included:

- Three (3) California Bearing Ratio (CBR) tests for pavement design; and
- Four (4) shrink swell tests for the assessment of clay reactivity and assessment of site classification.

The results of the laboratory testing are summarised in Table 1. Laboratory test result sheets are presented in Appendix B.

Table 1: Results of CBR Testing

Sample Location	Sample Depth (m)	Field Moisture Content (%)	Optimum Moisture Content (%)	Maximum Dry Density (t/m³)	CBR
TP2	0.2 to 0.5	28.3	27.0	1.47	4.5
TP4	0.2 to 0.7	26.0	24.3	1.53	6.0
TP9	0.7 to 0.8	20.5	18.7	1.70	4.5

The results of the laboratory testing indicate the field moisture content of the site soils were wet of optimum at the time of the investigation.

Table 2: Results of Shrink Swell Testing

Sample Location	Sample Depth (m)	Field Moisture Content (%)	Shrink Swell Index % (I_{ss})
TP1	0.1 to 0.5	36.7	4.1
TP3	0.3 to 0.6	24.6	1.6
TP7	0.2 to 0.5	30.5	2.9
TP10	0.25 to 0.5	22.5	2.6

The results of the shrink swell testing indicate the clay soils are generally highly reactive with change in moisture content.

4 SUBSURFACE CONDITIONS

The 1:100,000 scale Newcastle Coal Field Regional Geology map indicates the site is underlain by the Adamstown Subgroup of the Newcastle Coal Measures comprising Conglomerate, Sandstone, Siltstone Coal and Tuff rock types.

The general subsurface conditions encountered at the site have been summarised as follows:

- Topsoil: Clay and Silt, dark brown, low to medium plasticity, root affected to 0.2m; overlying
- Residual Soil: Clay and Gravelly Clay, medium to high plasticity pale brown, brown, yellow and grey mottled, stiff to very stiff consistency, varying between 0.15m and 0.8m below ground level; overlying
- Extremely Weathered Bedrock (Comprising Conglomerate, Siltstone and Sandstone): Materials excavate as Gravelly Clay, Clay, Clayey Sand and Sand, fines are of medium to high plasticity, pale grey, yellow, orange and dark red mottled to beyond the depth of investigation.

Apart from the generalised subsurface conditions mentioned above, the following subsurface materials were also encountered:

- **Localised Thick Layer of Topsoil -** In location TP3, a localised thickened layer of topsoil was observed to a depth of 0.55m,
- **Localised Thick Layer of Colluvium -** In location TP8 and TP9, a localised layer of colluvium was observed to a depth of 0.55m. The colluvium comprised Clayey Sand, Sandy Clay and Clay, low to medium plasticity, pale grey, dark grey and brown, firm to very stiff in consistency,
- **Localised Thick Layer of Fill -** In location TP6, TP11 and TP12 a localised layer of fill was observed to a depth of 0.8m. The fill comprised Gravelly Clay and Clay, pale brown,

brown and black, fine to medium gravel with a some rafts of concrete up to 0.6m in size. The fill is likely to be associated with fill placed as part of the car parking area.

- **Localised Areas of Firm Clay Soils –** In TP9 the test pit encountered stiff and firm clay soils to 2m depth.

Further details of the materials encountered in the test pits are provided in the Engineering Logs presented in Appendix A.

No groundwater was observed in any of the test pits during excavation, but surface seepage was observed originating from commercial and residential buildings adjacent to the site. It should be noted that no long term monitoring of groundwater was carried out and groundwater levels may fluctuate as a consequence of different climatic conditions.

5 SLOPE STABILITY ASSESSMENT

5.1 Methodology

It is not technically feasible to assess the stability of a particular site in absolute terms such as stable or unstable. However, the degree of risk of slope movement can be assessed by the recognition of surface features supplemented by limited information on the regional and local subsurface ground conditions and with the benefit of experience gained in similar geological environments.

The risks associated with slope instability at this site have been assessed using the methodology presented in the Australian Geomechanics Society's 2007 document "*Practice Notes for Landslide Risk Management",* (AGS2007).

The risk assessment process involves identification of a potential slope instability hazard or event, and an estimation of the likelihood of the event, and potential consequences should the event occur.

The terms used in the risk assessment process are defined below:

Hazard:	A condition with the potential for causing an undesirable consequence.
Likelihood:	The probability, expressed qualitatively, that the hazardous event will occur.
Consequence:	Outcome arising from a hazard, expressed as loss or damage.
Risk:	A term combining the probability and severity or consequence of any event causing adverse effects to property or the environment.

5.2 Site Observations

The risk of slope instability for the proposed development has been based on the site observations noted during the walk over assessment and the subsurface conditions encountered during the investigation. The site walkover undertaken during this assessment

included, but was not limited to, observations for old slip scarps, bent or hooked trees, areas of hummocky ground, areas of steepened hill slopes and the like.

The principle site features to note included:

- Surface slopes across the site range from 5˚ to 8˚. There is an increase in slope angle through the midslope of the site and a flattening towards the crest and basal areas of the slopes;
- Slope geometry across the various portions of land is generally uniform;
- No obvious evidence of overall instability was observed on the site (i.e. no headscarp areas, lobes of debris or hooked and bent tree trunks were observed).

5.3 Hazard Identification

The following hazards that could potentially impact on this site are as follows:

H1: Potential translational or rotational sliding in natural slopes which are typically less than 10°. Such failures would require long term (say thousands of years) deterioration of the slope and subsurface profile to generate conditions that would be likely to cause failure, followed by an extreme wet weather event (say 1 in 1,000 year average return interval). The failures would occur on a small scale and as such would affect only a small proportion of the site (less than say 10%). On this basis the estimated annual probability of any part of the site being affected by instability of this nature is of the order of 1×10^{-7}, or 1 in 10,000,000 years. Using the terminology presented by AGS2007, this would be termed a **Barely Credible** event. Should such a failure impact on the proposed development, it would be expected to cause localised damage to some part of the structure, requiring some minor reinstatement works. Using the terminology presented by AGS2007, this would be termed a **Minor** consequence;

H2: Rotational failure or toppling of steep, unsupported or poorly supported cuts or fill batters. Such failures can occur in adverse weather (say 1 in 10 year event) if cut and fill batters are left unprotected. This would be termed a **Likely** event. If supported by retaining walls and the other recommendations included in this report are adopted, the likelihood of failure would be reduced to **Unlikely.** These failures would affect only a small proportion of the development and require small scale, localised repairs, which would be deemed a **Minor** consequence.

The matrix below evaluates the hazards outlined above and their likelihood of occurring, based on the proposed development of the site (assuming only minor changes to slope conditions by cut and fill earthworks) including implementation of the recommendations within this report.

Table 3: Slope Stability Hazard and Risk Matrix

Hazard	Consequence		Likelihood		Assessed Risk
	Extent of damage/ repair	AGS 2007 descriptor	Approx annual probability	AGS 2007 descriptor	
H1	Limited damage, some remediation needed	Minor	10^{-7}	Barely Credible	Very Low
H2	Limited damage, some remediation needed	Minor	10^{-2}* 10^{-4}**	Likely* Unlikely**	Moderate* Low**

Note: * *If cuts/fills left unsupported*

** *If recommendations of this report adopted*

On the basis of these site features, the site proposed to be developed for residential landuse are assessed to have an overall Low to Very Low Risk of slope instability in accordance with the AGS 2007 classification system, provided good hillside construction practice and the recommendations contained in this report are adopted.

It would be normal practice in the Lake Macquarie area for residential development to proceed with this risk level classification. Development should be carried out in accordance with good hillside practice as set out in the attached (AGS 2007 excerpts) attached in Appendix C, and the specific geotechnical recommendations defined in this report.

6 PRELIMINARY MINE SUBSIDENCE ASSESSMENT

The Mine Subsidence Board (MSB) was consulted in relation to the site being affected by mining. The results of the assessment indicated that the site is located in an area of potential mine subsidence.

Based on the records held by the MSB, the site is located above three different levels of mine workings including workings in the Victoria Tunnel, the Dudley and the Borehole Seams. The shallowest workings are those of the Victoria Tunnel seam a depth of approximately 120m. Recommendations by the MSB are:

- The site is considered suitable for development of two storey residential structures founded on footings designed in accordance to the Australian Standards.

- The plans for the subdivision will require approval from the MSB prior to DA approval and construction.

Further consultation with the MSB regarding lightweight partial three storey development of the nature proposed for this project. MSB indicated this would be acceptable provided the length of slabs containing adjacent town-house/dwellings is limited.

7 FOUNDATIONS

7.1 Site Classification

For site classification purposes, the subject site has been split into two different areas being:

- Areas not affected by fill placement and abnormal moisture conditions; and
- Areas affected by deep fill or topsoil and areas affected by abnormal moisture conditions.

Areas Not Affected by Fill Placement and Abnormal Moisture Conditions

This includes the majority of the site including the following test pit locations (TP2, TP4, TP5, TP7, TP8, TP9 and TP10. Provided all structural elements are founded within the natural residual or colluvial soils below all topsoil and fill materials, the footings may be designed assuming a Class M Classification with predicted near surface movements (y_s) of between 20mm and 40mm.

Areas Affected by Fill Placement and Abnormal Moisture Conditions:

This generally includes the portions of the site including:

- The area affected by deep fill near and in the car park at the southern end of the site TP6, TP11 and TP12);
- Areas affected by wet ground – abnormal conditions (areas in the vicinity of TP1 and TP4);
- Areas with deep topsoil (area in the vicinity of TP4); and
- Areas affected by abnormal moisture conditions – desiccated soils from tree growth (north eastern corner of site)

The locations affected by the above conditions include (TP1, TP3, TP4, TP6, TP10, TP11 and TP12). Due to these areas being affected by the presence of deep fill, deep topsoil and abnormal moisture conditions, the sites are classified as Class P in accordance with Clause 2.1.3 and 2.5.3 of AS2870-2011.

The sites may be reclassified once the deep fill and topsoil materials are removed, trees are removed and the drainage conditions improved in the locations where wet and ponding

groundwater conditions were observed. Provided sufficient time is allowed for the moisture profiles to re-equilibrate following the removal of the fill, trees and installation of effective drainage, the affected areas may be reclassified as class M.

It is understood regrade will involve only minor cut and fill. It is recommended that the lots be reclassified by a geotechnical practitioner familiar with the site following earthworks to assess changes to site classification from the removal of fill or other site earthworks.

7.2 Foundation Parameters

Structures can be supported on shallow footings founded within the natural clay soils or extremely weathered bedrock or piled footings founded within the extremely weathered bedrock. All structural elements should be founded on materials of similar stiffness to reduce the risk of differential settlements and damage to structures.

7.2.1 Shallow Footings

High level footings may comprise pad and/or strip footings or slab on ground construction founded through the fill, topsoil and any wet/soft colluvium materials into the stiff clay soils or extremely weathered bedrock. An allowable bearing pressure of 100kPa may be adopted for footings founded in the natural clay soils and extremely weathered bedrock of stiff consistency or greater.

Where lower bearing pressures are appropriate, such as for buildings supported by a slab on ground foundations, the footings may be founded in the lower strength colluvium. Where footings are founded in the firm clay soils, an allowable bearing pressure of 50kPa may be adopted for the firm clay soils with undrained shear strengths of 35kPa or greater.

7.2.2 Piled Footings

Should pad, strip or slab on ground construction not be feasible due to inadequate bearing capacity or serviceability issues, piled foundations may be suitable. Piles founded within the stiff residual clay soils or better can be designed based on an ultimate bearing capacity of 700kPa. A geotechnical reduction factor (Φ_g) of 0.5 should be applied to the ultimate values indicated when considering the ultimate strength limit state.

For the assessment of serviceability for the piles founded as described above, an elastic modulus of 50MPa may be adopted.

8 EARTHWORKS

8.1 Site Trafficability During Construction

The presence of high plasticity clay soils across the site means that the site trafficability will be poor where water has been ponding (seepage areas) or when wet weather periods prevail once stripping is undertaken.

Site trafficability is also expected to be poor where firm clay soils are encountered across the site (location of TP9), and in the localised wet areas shown on Figure 1. Construction in these areas is likely to require placement of a working platform of select fill material or similar.

8.2 Reuse of Materials

Natural *in situ* soils won from excavations, and the existing fill material near the southern end of the site will be suitable for reuse as general fill to regrade building lots and road embankments formations. It is not envisaged that the site won materials will be suitable for select fill or pavement materials. At the time of the investigation the test results indicated the site soils to be slightly wet of optimum moisture some moisture conditioning is likely to be required if reused as engineered fill.

8.3 Subgrade Preparation, Fill Placement and Compaction Control

The following general comments and recommendations are provided for site preparation beneath structures and pavements:

- All topsoil material should be stripped and stockpiled for re-use as landscaping materials only;
- Following excavation to design level, exposed materials should be proof rolled to identify any wet, excessively deflecting or deleterious material. Any such areas should be over-excavated and backfilled with approved granular fill..
- Approved fill beneath roads should be placed in layers not exceeding 300mm loose thickness and be compacted to a minimum dry density ratio of 95% Standard Compaction. Clay fill should be placed and maintained at 60% to 90% of Standard OMC.
- The top 300mm of natural subgrade or subgrade fill below pavements should be compacted to a minimum dry density ratio of 100% Standard Compaction.
- All pavement materials should be placed and maintained at 60% to 90% of Standard OMC.
- Approved fill beneath structures should be placed in layers not exceeding 300mm loose thickness and be compacted to a minimum dry density ratio of 95% Standard Compaction. Clay fill should be placed and maintained at between ±2% of Standard OMC. All filling beneath structures should be carried out under Level 1 construction monitoring and testing as defined in AS3798-1996.
- Earthworks should be carried out in accordance with the recommendations outlined in AS3798-1996, 'Guidelines for Earthworks for Commercial and Residential Developments'.

9 PAVEMENT DESIGN

9.1 Subgrade

Based on the results of the laboratory testing, the high plasticity clay soils have CBR values ranging between 4.5 and 6. Based on experience with similar materials, it is recommend that a CBR value of 4.5 be adopted for pavement design purposes.

Due to the expected length of road required for the development, it is likely that some variability in the subgrade conditions will occur during construction. Therefore we recommend that a geotechnical practitioner familiar with the site assess the exposed subgrade to verify the subgrade parameters adopted for design are appropriate over the full length of the pavement.

9.2 Pavement Thickness Design

Options are provided in Appendix D for the following types of pavement that could be adopted for the site:

- Flexible granular
- Rigid Concrete
- Segmental Paver

In terms of design traffic, the proposed access road will be required to service approximately 60 dwellings. Access will be predominantly by light vehicles, however, construction traffic, some delivery vehicles, and a weekly garbage truck will need to be taken into account. There will be no buses accessing the road.

Based on the above and in accordance with LMCC design guidelines, the road has been deemed similar to a Local Road – Access Place, for which a traffic loading of $4x10^5$ESA can be adopted for a 30 year design life for flexible pavement design. The LMCC design guide indicates that for rigid concrete pavements and segmental pavements, pavement design should adopt a 40 year and 25 year design life respectively. Traffic loadings for these options have therefore been adjusted accordingly in the attached design sheets.

9.3 Drainage

The provision of adequate drainage will be critical to pavement performance. Subsoil drains extending 300mm below subgrade level should be placed along the high side of all roads orientated across slope, and on both sides of all roads orientated down slope.

Where pavements cross the wet areas shown on Figure 1, the exposed surface should be viewed on stripping to assess the need for a localised drainage blanket beneath the pavement.

10 PHASE 1 SITE CONTAMINATION ASSESSMENT

10.1 History of Land Usage

The site was formerly a designated reserve for future road easement associated with a potential Charlestown bypass route. The proposed road was not constructed, and as such the site has remained vacant for several decades.

There is no evidence of significant development having taken place on the site itself. Surrounding land use includes commercial development on the southern boundary, and a former railway line along the eastern boundary. The remainder of the site is surrounded by residential development or undeveloped land.

Mine workings underlie the site, but the surface facilities were located well away from the site.

No other land uses were known to have occurred on the site.

10.2 NSW EPA Notices

A review of the NSW EPA website database revealed that no notices have been issued for the site under the *Environmentally Hazardous Chemicals Act (1985*) or the *Contaminated Land Management Act (1997)*.

10.3 Areas of Environmental Concern

There is no visible evidence of contamination on the surface of the site in the form of significant staining or spillage resulting from the use of petroleum at the site, and no visible evidence of contamination on site emanating from surrounding land use.

On the basis of the site history and the site observations, Areas of Environmental Concern on the site were identified as outlined in Table 4.

Table 4: Areas of Environmental Concern and samples obtained

AREA OF CONCERN	POSSIBLE MODE OF CONTAMINATION
Areas adjacent to the former railway line	Deposited ash waste, coal waste, spraying of herbicides
Areas adjacent to commercial development	Localised spills or leaks of oils and greases from facilities or from car park runoff
Areas containing uncontrolled fill	Fill of unknown origin may contain contaminated soils or wastes from unknown sources

10.4 Field Work

During the site investigation, samples were obtained from the above listed areas of concern. Samples were obtained at selected intervals or in representative materials throughout the profile. The samples were placed in laboratory supplied glass jars and placed on ice to preserve volatile compounds.

10.5 Chemicals of Concern and Analysis Suite

As the investigation was targeting contamination associated with fill from an unknown source, and runoff or contamination from varied surrounding activities, the following chemicals of concern were adopted as the target analysis suite for this assessment:

- Total Recoverable Hydrocarbons (TRH) – from fuels and oils;
- Polycyclic Aromatic Hydrocarbons (PAH) – from oils, greases, ash, tar or bitumen products;
- Benzene, Toluene, Ethyl-Benzene, Xylene (BTEX) – From fuels, solvents; and
- Heavy metals, from industrial waste deposition;
- Asbestos – from demolition of former site structures or from dumping of fill from unknown sources
- Pesticides – from past spraying of the site or adjacent sites

10.6 Guidelines and Acceptance Criteria

To assess the results of the laboratory testing, the following industry accepted guidelines were referred to:

- NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme;
- NSW EPA (1994), Guidelines for Assessing Service Station Sites; and

The NSW DEC (2006) *Guidelines for the NSW Site Auditor Scheme* present health based soil investigation levels for different land uses including industrial/commercial, residential, and recreational. The guidelines reference the National Environmental Health Forum (NEHF) investigation levels to derive guideline levels for protection of human health for these different land uses.

As the site is proposed for residential usage the guidelines for "Residential with gardens and accessible soil" use are considered appropriate for this assessment from a human health protection perspective.

NSW DEC (2006) does not provide levels for volatile petroleum hydrocarbon compounds (TRH and BTEX). The *Guidelines for Assessing Service Station Sites* (NSW EPA, 1994) provide threshold levels for sensitive land use for these compounds. The NSW DECCW has advised that these guidelines should also be used for less sensitive land uses and therefore these guidelines were adopted for this assessment.

Based on the above discussion of industry accepted guidelines, the guidelines presented in Column 1 of Appendix II of the NSW Site Auditor Scheme guidelines were adopted for this assessment.

10.7 Quality Control

10.7.1 Sampling Procedures

Samples were obtained using industry accepted protocols for sample treatment, preservation, and equipment decontamination. The following quality control practices were employed in the field:

- To avoid cross contamination between locations all soil sampling equipment was decontaminated between each sample location using Decon90 and a final rinse prior to sampling;
- Soils were placed in laboratory-supplied glass jars and were placed on ice while on site and retained on ice throughout the field work and transit to the laboratory;
-
- All samples were submitted to NATA accredited laboratories under chain of custody conditions.

10.7.2 Duplicate Samples

One duplicate sample was taken and submitted to the laboratory for analysis. Comparisons of the results of testing on primary and duplicate samples are presented in Table5.

Table 5: Comparison of Primary and Duplicate Soil Samples (mg/kg)

Analyte	Primary TP4A 0 – 0.1	Duplicate TP4B 0 – 0.1
TRH: C6-C9	<10	<10
TRH: C10-C36	<50	<50
PAH	<LOR	<LOR
Benzene	<0.2	<0.2
Toluene	<0.5	<0.5
Ethyl-benzene	<0.5	<0.5
Xylene	<0.5	<0.5

Analyte	Primary TP4A 0 – 0.1	Duplicate TP4B 0 – 0.1
Pesticides (OCP and OPP)	<LOR	<LOR
Arsenic	10	8
Cadmium	<1	<1
Chromium	9	8
Copper	14	12
Lead	84	50
Nickel	<2	<2
Zinc	318	284
Mercury	<0.1	<0.1
Asbestos	None	None

Note: LOR = Limit of reporting

The results show good correlation between testing on primary and duplicate samples.

10.7.3 Laboratory QC Testing

In addition to the field quality control procedures, the laboratory, ALS Environmental, undertook internal quality control testing including surrogates, blanks, and laboratory duplicate samples. The results are presented with the laboratory test results in Appendix E.

All laboratory quality control data is within acceptable limits for the tests carried out.

10.7.4 Conclusions Regarding Quality Control

The field and laboratory quality control data is considered to be within acceptable limits and therefore, on the basis of the results of the field and laboratory quality control procedures and testing, the data is considered to reasonably represent the concentrations of contaminants in the soils and groundwater at the sample locations at the time of sampling and the results can be adopted for this assessment.

10.8 Test Results

The results of the laboratory analyses are presented in Appendix E. The following points are noted:

- Concentrations of heavy metals were below the adopted soil investigation guidelines in all samples tested;
- Concentrations of PAH, TPH, OC/OP pesticides and BTEX compounds were below detectable limits and therefore well below soil investigation guidelines in all samples tested;
- No asbestos was detected in any of the samples analysed.

10.9 Conclusion

The investigation targeted areas of concern that were deemed to have the potential to cause site contamination, including fill from unknown sources, and runoff from areas off-site. Samples were obtained in accordance with industry protocols and submitted to NATA accredited laboratories where they were analysed for a broad suite of contaminants.

The analysis results revealed no contaminant concentrations exceeding the adopted guideline criteria in any of the samples tested. On this basis the site is considered appropriate for the proposed development.

11 SUMMARY

The majority of the site at its current ground levels has a Class M site classification with some areas assessed to have Class P classifications.

The site is located in a proclaimed mine subsidence area. The MSB has indicated that the shallowest mine workings are those of the Victoria Tunnel Seam at approximately 120m depth. Therefore the site is considered suitable for development, provided the structures comply with Mine Subsidence Board requirements regarding length and height limits to proposed structures.

A Phase 1 assessment of site contamination has been undertaken and no evidence of contamination resulting from past usage of the site or surrounding land was indicated.

Based on the surface and subsurface conditions encountered during the investigation, the site is considered suitable for the proposed residential development.

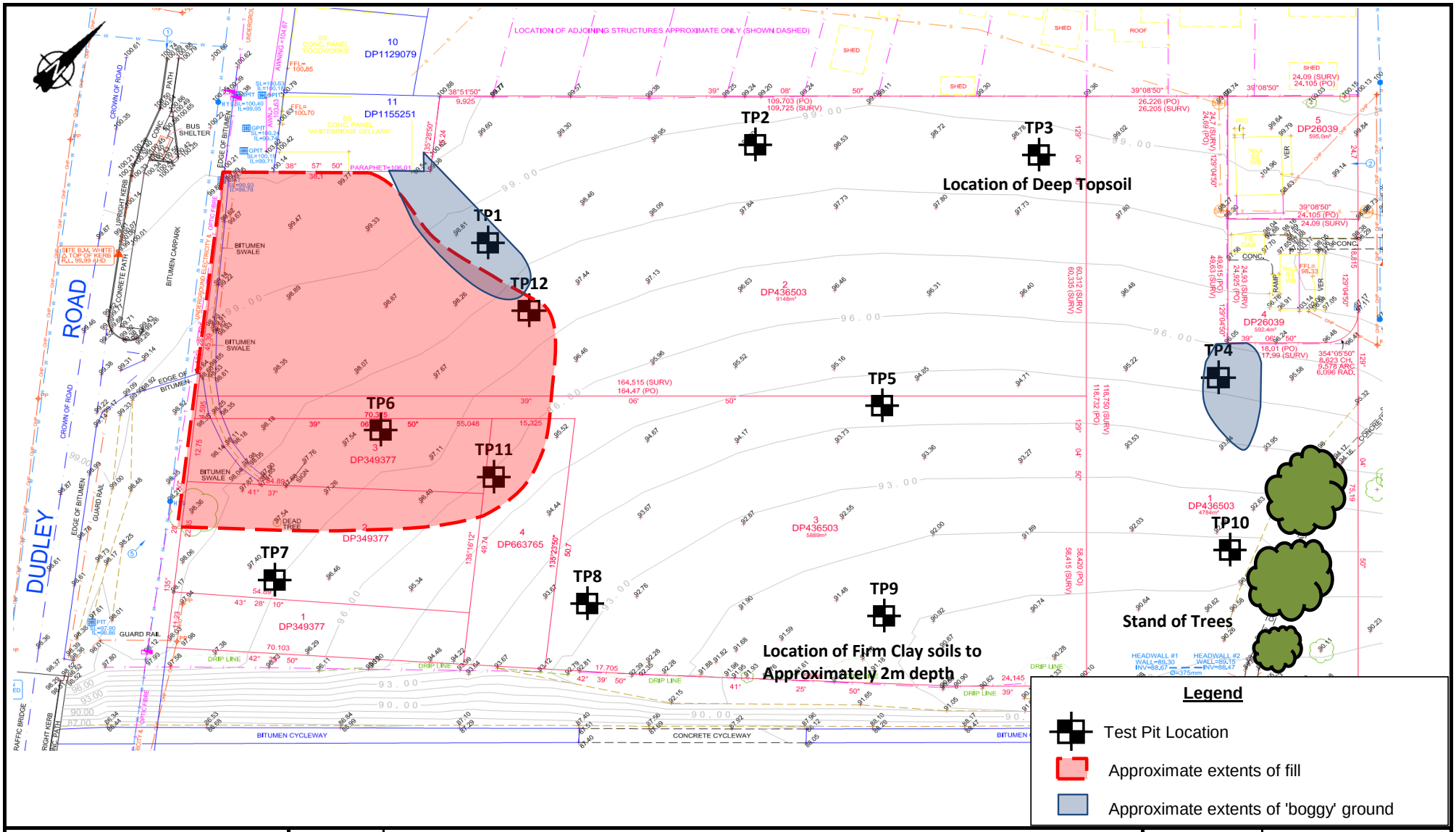
For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Steven Morton

Principal

Figure



REGIONAL GEOTECHNICAL SOLUTIONS	Client	SNL Building Consturctions Pty Ltd	Job No. RGS00603.1
	Project:	Proposed Residential Development Dudley Road, Whitebridge	Drawn By: Simon Keen Date: 17-Jul-13
	Title:	Test Pit Location Plan	Drawing No. **Figure 1**

Appendix A

Engineering Logs

ENGINEERING LOG - TEST PIT

REGIONAL GEOTECHNICAL SOLUTIONS

CLIENT: SNL Building Construction Pty Ltd
PROJECT NAME: Proposed Residential Development
LOCATION: Dudley Road Whitebridge - Refer to figure 1

TEST PIT NO: TP1
PAGE: 1 OF 1
JOB NO: RGS00603.1
LOGGED BY: SK
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
TEST PIT LENGTH: 2.2 m **WIDTH:** 0.5 m
SURFACE RL: 98.5 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket 300 Rock Tooth Bucket	(None encountered)	0.10m					0.10m TOPSOIL: Silty CLAY, low to medium plasticity, dark brown, traces of fine to medium grained sand					TOPSOIL
							CLAY: high plasticity, pale brown mottled brown, fine rootlets	$M > w_P$	St - VSt	HP	=190	RESIDUAL SOIL
		U50				CH				HP	=180	
										HP	=220	
		0.50m	98.0	0.5			0.50m			HP	=300	EXTREMELY WEATHERED SILTSTONE
							Silty CLAY: low plasticity, pale grey mottled dark red and orange		VSt			
			97.5	1.0			some relic fabric			HP	=450	
						CL		$M < w_P$		HP	=250	
										HP	=400	
			97.0	1.5					VSt - H			
							1.90m					
			96.5	2.0			Hole Terminated at 1.90 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

REGIONAL GEOTECHNICAL SOLUTIONS

CLIENT: SNL Building Construction Pty Ltd
PROJECT NAME: Proposed Residential Development
LOCATION: Dudley Road Whitebridge - Refer to figure 1

TEST PIT NO: TP2
PAGE: 1 OF 1
JOB NO: RGS00603.1
LOGGED BY: SK
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m
SURFACE RL: 98.7 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)						TOPSOIL: Silty CLAY, low plasticity, dark brown, traces of fine to coarse grained sand	M > w_P				TOPSOIL
							0.15m					
		0.20m	98.5				Gravelly CLAY: medium to high plasticity, pale grey mottled yellow-brown, fine to medium grained, subangular to subrounded gravel, relic fabric			HP	=300	EXTREMELY WEATHERED CONGLOMERATE
										HP	=350	
		BS										
		0.50m		0.5					VSt	HP	=300	
			98.0			CH		M ~ w_P		HP	=350	
										HP	=450	
				1.0			becoming pale grey mottled yellow-brown and red		VSt - H	HP	=390	
			97.5									
							1.30m					
							Clayey Gravelly SAND: fine to coarse grained, pale grey mottled yellow-orange and red, fine to medium grained subangular gravel, low to medium plasticity fines					
				1.5								
			97.0			SC		M	MD - D			
				2.0								
							2.10m					
							Hole Terminated at 2.10 m					
			96.5									

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

REGIONAL GEOTECHNICAL SOLUTIONS

CLIENT: SNL Building Construction Pty Ltd
PROJECT NAME: Proposed Residential Development
LOCATION: Dudley Road Whitebridge - Refer to figure 1

TEST PIT NO: TP3
PAGE: 1 OF 1
JOB NO: RGS00603.1
LOGGED BY: SK
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m
SURFACE RL: 98.6 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket 300mm Rock Tooth Bucket	(None encountered)	0.10m E 0.20m 0.30m U50 0.60m	98.5 98.0 97.5 97.0 96.5	0.5 1.0 1.5 2.0		CH CL SC	TOPSOIL: Silty CLAY, low to medium plasticity, dark brown to brown traces of fine to coarse grained sand and fine grained gravel 0.55m CLAY: medium plasticity, pale yellow-brown 0.70m Sandy CLAY: medium plasticity, pale yellow to pale grey mottled orange-red, fine to medium grained sand 1.10m Silty Clayey SAND: fine to medium grained, pale grey with indistinct dark red mottle, relic fabric 1.30m SAND: fine to medium grained, pale grey with indistinct dark red mottle with a trace to some Clayey Silt varying percentage of Clayey Silt from 1.7m 2.10m Hole Terminated at 2.10 m	M > w_P M	 VSt D	HP HP	=350 =330	TOPSOIL RESIDUAL SOIL EXTREMELY WEATHERED SANDSTONE

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP4

CLIENT: SNL Building Construction Pty Ltd
PAGE: 1 OF 1

PROJECT NAME: Proposed Residential Development
JOB NO: RGS00603.1

LOGGED BY: SK

LOCATION: Dudley Road Whitebridge - Refer to figure 1
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
SURFACE RL: 95.4 m

TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)	E 0.21m					TOPSOIL: Silty CLAY, low plasticity, dark brown, traces of fine to coarse grained sand					TOPSOIL
							0.20m					
			95.0			CH	CLAY: medium to high plasticity, pale yellow to pale brown, trace to some fine to coarse grained sand	$M > W_P$				RESIDUAL SOIL
		BS		0.5			0.50m		VSt	HP	=290	
		0.70m				CL	Sandy CLAY: medium to high plasticity, pale yellow to pale brown orange and pale grey, fine to medium grained Sand					
							0.80m					
			94.5	1.0		SP	SAND: fine to medium grained, pale grey mottled orange, intermixed, Clayey SAND, medium to high plasticity, relic fabric	M	D			EXTREMELY WEATHERED SANDSTONE
300mm Tooth Bucket			94.0	1.5			some highly weathered material from 1.4m		VD			
							1.70m					
			93.5	2.0			Hole Terminated at 1.70 m					
			93.0									

RG LIB 1.02.GLB Log RG NON-CORED BOREHOLE - TEST PIT RGS00603.1 GINT.GPJ <<DrawingFile>> 18/07/2013 13:28 8.30.003 Datgel Lab and In Situ Tool

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP5

CLIENT: SNL Building Construction Pty Ltd
PAGE: 1 OF 1

PROJECT NAME: Proposed Residential Development
JOB NO: RGS00603.1

LOGGED BY: SK

LOCATION: Dudley Road Whitebridge - Refer to figure 1
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
SURFACE RL: 94.2 m

TEST PIT LENGTH: 2.6 m **WIDTH:** 0.5 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
45	(None encountered)		94.0	0.0			TOPSOIL: Clayey SAND, fine to medium grained, dark brown, low plasticity fines	M				TOPSOIL
							0.20m					
						CH	CLAY: medium to high plasticity, pale brown and pale grey mottled yellow brown with a traces to some fine to coarse grained sand and fine grained subangular gravel			HP	=300	RESIDUAL SOIL
										HP	=350	
				0.5								
										HP	=400	
			93.5				0.70m	M > w_P	VSt	HP	=300	
						CH	Sandy CLAY: medium to high plasticity, pale grey to pale brown mottled red and orange, fine to coarse grained sand, traces of fine to medium grained subangular to subrounded gravel					EXTREMELY WEATHERED SANDSTONE
				1.0								
			93.0				1.20m					
							Clayey SAND: fine to medium grained, pale grey mottled yellow and pale red, medium plasticity fines, traces of fine to medium grained subangular gravel	M	D			
				1.5								
							1.60m					
			92.5				Hole Terminated at 1.60 m					
				2.0								
			92.0									

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP6

CLIENT: SNL Building Construction Pty Ltd
PAGE: 1 OF 1

PROJECT NAME: Proposed Residential Development
JOB NO: RGS00603.1

LOGGED BY: SK

LOCATION: Dudley Road Whitebridge - Refer to figure 1
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
SURFACE RL: 97.3 m

TEST PIT LENGTH: 2.7 m **WIDTH:** 0.5 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)	0.60m E 0.70m	97.0	0			FILL: Gravelly CLAY, medium to high plasticity, brown, fine to medium grained gravel	M > w_P				FILL
				0.40m			FILL: Silty CLAY, medium plasticity, black, intermixed white clay and lenses of orange sandy gravelly clay, fine to medium grained subangular to subrounded gravel, fine to coarse grained sand					
			96.5	0.5								
				0.80m			TOPSOIL: Clayey SILT, low plasticity, dark brown, traces to some fine to medium grained sand					TOPSOIL
				0.95m								
				1.0			Silty CLAY: medium plasticity, yellow-brown mottled pale grey			HP	=350	RESIDUAL SOIL
			96.0			CL		M > w_P	VSt	HP	=300	
				1.5								
				1.50m			Silty CLAY: low to medium plasticity, pale grey mottled yellow orange and red, relic fabric			HP	=450	EXTREMELY WEATHERED MUDSTONE
			95.5			CL			VSt - H	HP	=300	
				1.90m			Hole Terminated at 1.90 m					
				2.0								
			95.0									

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

REGIONAL GEOTECHNICAL SOLUTIONS

CLIENT: SNL Building Construction Pty Ltd
PROJECT NAME: Proposed Residential Development
LOCATION: Dudley Road Whitebridge - Refer to figure 1

TEST PIT NO: TP7
PAGE: 1 OF 1
JOB NO: RGS00603.1
LOGGED BY: SK
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
TEST PIT LENGTH: 2.5 m **WIDTH:** 0.5 m
SURFACE RL: 97.0 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)	0.20m					TOPSOIL: Clayey SIlty SAND, fine to coarse grained, dark brown, low plasticity fines	M				TOPSOIL
							0.20m					
		U50					CLAY: medium to high plasticity, yellow-brown, with a trace of some fine to medium grained Sand			HP	=250	RESIDUAL SOIL
		0.50m	96.5	0.5		CH		M > w_P	VSt	HP	=350	
							0.70m					
							Clayey SAND: fine to medium grained, pale grey mottled yellow orange and red, medium plasticity fines					EXTREMELY WEATHERED SANDSTONE
			96.0	1.0		SC		M	MD - D			
							1.30m					
							Sandy CLAY: medium plasticity, pale grey mottled red, fine to medium grained sand, traces of fine to medium grained highly weathered gravel	M < w_P	VSt - H			EXTREMELY WEATHERED MUDSTONE, INTERMIXED WITH EXTREMELY WEATHERED SANDSTONE
			95.5	1.5			1.50m					
							Hole Terminated at 1.50 m					
			95.0	2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP8

CLIENT: SNL Building Construction Pty Ltd

PAGE: 1 OF 1

PROJECT NAME: Proposed Residential Development

JOB NO: RGS00603.1

LOGGED BY: SK

LOCATION: Dudley Road Whitebridge - Refer to figure 1

DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)

SURFACE RL: 93.1 m

TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m

DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)		93.0				TOPSOIL: Clayey SILT, low plasticity, dark grey to dark brown, some fine to medium grained sand	M > w_P				TOPSOIL
							0.20m					
							Clayey SAND/Sandy CLAY: fine to medium grained, low plasticity, grey-brown	M / M > w_P				COLLUVIAL SOIL
				0.5						HP	=300	
							0.50m			HP	=320	
						CH	CLAY: high plasticity, pale brown mottled orange and pale grey	M > w_P				RESIDUAL SOIL
			92.5				0.60m					
							CLAY: medium to high plasticity, pale grey mottled orange and red trace to some fine to coarse grained sand		St - VSt			EXTREMELY WEATHERED MUDSTONE
						CH		M ~ w_P				
				1.0								
			92.0									
							1.20m					
Bucket							Sandy CLAY: medium to high plasticity, fine to coarse grained sand, trace to some fine to highly weathered gravel					EXTREMELY WEATHERED SANDSTONE
Rock Tooth						CH						
				1.5			1.50m					
300mm			91.5				Hole Terminated at 1.50 m					
				2.0								
			91.0									

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

REGIONAL GEOTECHNICAL SOLUTIONS

CLIENT: SNL Building Construction Pty Ltd
PROJECT NAME: Proposed Residential Development
LOCATION: Dudley Road Whitebridge - Refer to figure 1

TEST PIT NO: TP9
PAGE: 1 OF 1
JOB NO: RGS00603.1
LOGGED BY: SK
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m
SURFACE RL: 91.2 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)						TOPSOIL: Clayey SILT, low plasticity, pale grey					TOPSOIL
							0.10m					
		0.20m	91.0				Sandy Silty CLAY: low to medium plasticity, pale grey mottled dark grey, fine to medium grained sand					COLLUVIAL SOIL
		E 0.30m				CL			F	HP	=70	
										HP	=100	
				0.5			0.50m					
							Sandy CLAY: medium to high plasticity,k grey mottled yellow-brown, fine to coarse grained sand, traces of fine to medium grained subangular gravel			HP	=180	RESIDUAL SOIL
		0.70m	90.5						St - VSt	HP	=290	
		BS 0.80m								HP	=70	
				1.0				M ~ w_P		HP	=100	
			90.0									
						CH			F			
				1.5						HP	=70	
			89.5							HP	=90	
				2.0						HP	=150	
									St	HP	=160	
			89.0				2.30m					
							Hole Terminated at 2.30 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP10

CLIENT: SNL Building Construction Pty Ltd
PAGE: 1 OF 1

PROJECT NAME: Proposed Residential Development
JOB NO: RGS00603.1

LOGGED BY: SK

LOCATION: Dudley Road Whitebridge - Refer to figure 1
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
SURFACE RL: 91.9 m

TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket 300mm Rock Tooth Bucket	(None encountered)	0.25m					TOPSOIL: Sandy Silty CLAY, low plasticity, dark brown, fine to medium grained sand					TOPSOIL
		U 0.50m	91.5	0.5		CH	0.25m CLAY: high plasticity, yellow-brown mottled grey, trace to some fine to coarse grained sand and fine to medium grained subangular gravel relic fabric from 0.65m	M > w_P	VSt - H	HP HP	=290 =450	RESIDUAL SOIL
			91.0	1.0		CL	0.80m Sandy Gravelly CLAY: low to medium plasticity, pale grey mottled dark red and orange-yellow, fine to medium grained highly weathered gravel, fine to coarse grained sand	M < w_P	H	HP HP	=400 =490	EXTREMELY WEATHERED MUDSTONE
			90.5				1.40m Hole Terminated at 1.40 m					
				1.5								
			90.0	2.0								
			89.5									

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

REGIONAL GEOTECHNICAL SOLUTIONS

CLIENT: SNL Building Construction Pty Ltd
PROJECT NAME: Proposed Residential Development
LOCATION: Dudley Road Whitebridge - Refer to figure 1

TEST PIT NO: TP11
PAGE: 1 OF 1
JOB NO: RGS00603.1
LOGGED BY: SK
DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)
TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m
SURFACE RL: 95.8 m
DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)	0.20m E 0.30m	95.5	0.5			FILL: CLAY, medium plasticity, pale brown and brown with some fine to coarse grained sand and fine to coarse grained gravel, traces of concrete to greater than 500mm in size and boulders to 600mm in size 0.50m	$M > w_P$				FILL
							TOPSOIL: Silty CLAY, low to medium plasticity, dark brown 0.70m					TOPSOIL
			95.0				CLAY: high plasticity, yellow-brown 0.80m		VSt			RESIDUAL SOIL
				1.0			Hole Terminated at 0.80 m					
			94.5	1.5								
			94.0	2.0								
			93.5									

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP12

CLIENT: SNL Building Construction Pty Ltd

PAGE: 1 OF 1

PROJECT NAME: Proposed Residential Development

JOB NO: RGS00603.1

LOGGED BY: SK

LOCATION: Dudley Road Whitebridge - Refer to figure 1

DATE: 16/7/13

EQUIPMENT TYPE: NAGNO NS 35.3 (3.5 Tonne Excavator)

SURFACE RL: 97.6 m

TEST PIT LENGTH: 2.3 m **WIDTH:** 0.5 m

DATUM: AHD (Adopted From Survey)

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
450mm Mud Bucket	(None encountered)	E 0.10m	97.5				FILL: Gravelly CLAY, medium plasticity, brown, fine to coarse grained gravel, trace of cobbles 0.10m	M > w_P				FILL
							CLAY: high plasticity, yellow-brown 0.20m		VSt			RESIDUAL SOIL
							Hole Terminated at 0.20 m					
			97.0	0.5								
			96.5	1.0								
			96.0	1.5								
			95.5	2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density		
V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition	
D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

Appendix B

Geotechnical Laboratory Results

Qualtest
LABORATORY (NSW) PTY LTD
8 Ironbark Close, Warabrook
NSW, Australia 2304
Ph: (02) 4968 4468
Fax: (02) 4960 9775
ABN: 98 153 268 896

Client : Regional Geotechnical Solutions Pty Ltd

44 Bent Street
Wingham NSW 2429

Project : Proposed Residential Development
Dudley Street, Whitebridge

Report No : 13/00069/07
Issue No : 1

Page No : 1
Lab Ref No : 00787

Date : 26/07/2013

Shrink Swell Index Report

Sampling Procedure	AS1289.1.3.1 Clause 3.1.3.1
Test Procedure	AS1289.7.1.1

Sample Identification

Test No & Description	TP1 (0.1-0.5m)
Sample No	00787-GR-07
Sample Visual Description	(CH) CLAY, High plasticity, dark brown
Date Sampled	16/07/2013
Date Tested	19/07/2013

Swell Data

Initial Moisture Content	(%)	42.6
Final Moisture Content	(%)	44.2
Swell	(%)	-0.1

Shrinkage Data

Initial Wet Density	(t/m^3)	1.83
Moisture Content	(%)	36.7
Estimate of Significant Inert Inclusions	(%)	5
Extent of Crumbling		Nil
Extent of Cracking		Nil
Shrinkage	(%)	7.4

Shrink Swell Data

Shrink Swell Index - I_{ss}	(%)	**4.1**

Remarks:

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025

NATA accredited laboratory number 18686

Authorised Signatory:

Alan Cullen
Principal Geotechnician

8 Ironbark Close Warabrook NSW 2304
T: 02 4968 4468
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ABN: 98 153 268 896

MATERIAL TEST REPORT

Report Number: 13/00069/06
Issue Number: 1

This report replaces all previous issues

Accredited for compliance with ISO/IEC 17025.

Client:	Regional Geotechnical Solutions Pty Ltd 44 Bent Street Wingham NSW 2429
Principal:	SNL Building Constructions P/L
Project Number:	12/00069
Project:	Proposed Residential Development
Location:	Dudley Street, Whitebridge
TRN:	-

Approved Signatory:	Glen Richardson
Title:	Senior Geotechnician
Date of Issue:	26/07/2013
NATA Accredited Laboratory Number:	18686

Sample Details	
Client Reference / Description:	TP2 (0.2-0.5m)
Laboratory Reference:	00787
Sample Number:	00787-GR-06
Sampling Method:	Submitted by Client
Date Sampled:	16/07/2013
Date Submitted:	16/07/2013
Sample Location:	TP2 (0.2-0.5m)
Specification:	-
Source:	Onsite
Material:	Existing Ground

CALIFORNIA BEARING RATIO

AS1289.6.1.1

			Limits
CBR at 5.0mm	%	**4.5**	
Maximum Dry Density	t/m³	1.47	
Optimum Moisture Content	%	27.0	
Dry Density before Soaking	t/m³	1.47	
Density Ratio before Soaking	%	100	
Moisture Content before Soaking	%	27.2	
Moisture Ratio before Soaking	%	101	
Dry Density after Soaking	t/m³	1.49	
Swell	%	0.6	
Moisture Content of Top 30mm	%	30.5	
Moisture Content of Remaining Depth	%	27.4	
Compactive Effort		Standard	
Surcharge Mass	kg	4.5	
Period of Soaking	Days	4	
Oversize Material		Excluded	
Oversize Material	%	0	
Field Moisture Content	%	28.3	
Date Tested		23/07/2013	

Comments:

Qualtest
LABORATORY (NSW) PTY LTD
8 Ironbark Close, Warabrook
NSW, Australia 2304
Ph: (02) 4968 4468
Fax: (02) 4960 9775
ABN: 98 153 268 896

Client : Regional Geotechnical Solutions Pty Ltd

44 Bent Street
Wingham NSW 2429

Project : Proposed Residential Development
Dudley Street, Whitebridge

Report No : 13/00069/05
Issue No : 1

Page No : 1
Lab Ref No : 00787

Date : 26/07/2013

Shrink Swell Index Report

Sampling Procedure	AS1289.1.3.1 Clause 3.1.3.1
Test Procedure	AS1289.7.1.1

Sample Identification

Test No & Description	TP3 (0.3-0.6m)
Sample No	00787-GR-05
Sample Visual Description	(CH) Sandy CLAY, High plasticity, pale yellow brown
Date Sampled	16/07/2013
Date Tested	19/07/2013

Swell Data

Initial Moisture Content	(%)	22.4
Final Moisture Content	(%)	24.8
Swell	(%)	-0.5

Shrinkage Data

Initial Wet Density	(t/m^3)	1.977
Moisture Content	(%)	24.6
Estimate of Significant Inert Inclusions	(%)	5
Extent of Crumbling		Nil
Extent of Cracking		Nil
Shrinkage	(%)	2.9

Shrink Swell Data

Shrink Swell Index - I_{ss}	(%)	**1.6**

Remarks:

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025

NATA accredited laboratory number 18686

Authorised Signatory:

Alan Cullen
Principal Geotechnician

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MATERIAL TEST REPORT

Report Number: 13/00069/04
Issue Number: 1
This report replaces all previous issues

Client: Regional Geotechnical Solutions Pty Ltd
44 Bent Street
Wingham NSW 2429
Principal: SNL Building Constructions P/L
Project Number: 12/00069
Project: Proposed Residential Development
Location: Dudley Street, Whitebridge
TRN: -

Accredited for compliance with ISO/IEC 17025.

Approved Signatory: Glen Richardson
Title: Senior Geotechnician
Date of Issue: 26/07/2013
NATA Accredited Laboratory Number: 18686

Sample Details	
Client Reference / Description:	TP4 (0.2-0.7m)
Laboratory Reference:	00787
Sample Number:	00787-GR-04
Sampling Method:	Submitted by Client
Date Sampled:	16/07/2013
Date Submitted:	16/07/2013
Sample Location:	TP4 (0.2-0.7m)
Specification:	-
Source:	Onsite
Material:	Existing Ground

CALIFORNIA BEARING RATIO

AS1289.6.1.1

			Limits
CBR at 5.0mm	%	**6**	
Maximum Dry Density	t/m³	1.53	
Optimum Moisture Content	%	24.3	
Dry Density before Soaking	t/m³	1.52	
Density Ratio before Soaking	%	100	
Moisture Content before Soaking	%	24.7	
Moisture Ratio before Soaking	%	102	
Dry Density after Soaking	t/m³	1.54	
Swell	%	0.9	
Moisture Content of Top 30mm	%	29.3	
Moisture Content of Remaining Depth	%	25.8	
Compactive Effort		Standard	
Surcharge Mass	kg	4.5	
Period of Soaking	Days	4	
Oversize Material		Excluded	
Oversize Material	%	0	
Field Moisture Content	%	26.0	
Date Tested		23/07/2013	

Comments:

Qualtest
LABORATORY (NSW) PTY LTD
8 Ironbark Close, Warabrook
NSW, Australia 2304
Ph: (02) 4968 4468
Fax: (02) 4960 9775
ABN: 98 153 268 896

Client : Regional Geotechnical Solutions Pty Ltd

44 Bent Street
Wingham NSW 2429

Project : Proposed Residential Development
Dudley Street, Whitebridge

Report No : 13/00069/03
Issue No : 1

Page No : 1
Lab Ref No : 00787

Date : 26/07/2013

Shrink Swell Index Report

Sampling Procedure	AS1289.1.3.1 Clause 3.1.3.1
Test Procedure	AS1289.7.1.1

Sample Identification

Test No & Description	TP7 (0.2-0.5m)
Sample No	00787-GR-03
Sample Visual Description	(CH) CLAY, High plasticity, pale brown
Date Sampled	16/07/2013
Date Tested	19/07/2013

Swell Data

Initial Moisture Content	(%)	30.7
Final Moisture Content	(%)	34.4
Swell	(%)	0.3

Shrinkage Data

Initial Wet Density	(t/m^3)	1.869
Moisture Content	(%)	30.5
Estimate of Significant Inert Inclusions	(%)	5
Extent of Crumbling		Nil
Extent of Cracking		Nil
Shrinkage	(%)	4.9

Shrink Swell Data

Shrink Swell Index - I_{ss}	(%)	**2.9**

Remarks:

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025

NATA accredited laboratory number 18686

Authorised Signatory:

Alan Cullen
Principal Geotechnician

Qualtest LABORATORY (NSW) PTY LTD

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MATERIAL TEST REPORT

Report Number: 13/00069/02
Issue Number: 1
This report replaces all previous issues

Client: Regional Geotechnical Solutions Pty Ltd
44 Bent Street
Wingham NSW 2429
Principal: SNL Building Constructions P/L
Project Number: 12/00069
Project: Proposed Residential Development
Location: Dudley Street, Whitebridge
TRN: -

NATA WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

Approved Signatory: Glen Richardson
Title: Senior Geotechnician
Date of Issue: 26/07/2013
NATA Accredited Laboratory Number: 18686

Sample Details	
Client Reference / Description:	TP9 (0.7-0.8m)
Laboratory Reference:	00787
Sample Number:	00787-GR-02
Sampling Method:	Submitted by Client
Date Sampled:	16/07/2013
Date Submitted:	16/07/2013
Sample Location:	TP9 (0.7-0.8m)
Specification:	-
Source:	Onsite
Material:	Existing Ground

CALIFORNIA BEARING RATIO

AS1289.6.1.1

			Limits
CBR at 5.0mm	%	**4.5**	
Maximum Dry Density	t/m³	1.70	
Optimum Moisture Content	%	18.7	
Dry Density before Soaking	t/m³	1.69	
Density Ratio before Soaking	%	100	
Moisture Content before Soaking	%	19.0	
Moisture Ratio before Soaking	%	101	
Dry Density after Soaking	t/m³	1.71	
Swell	%	0.6	
Moisture Content of Top 30mm	%	20.5	
Moisture Content of Remaining Depth	%	19.6	
Compactive Effort		Standard	
Surcharge Mass	kg	4.5	
Period of Soaking	Days	4	
Oversize Material		Excluded	
Oversize Material	%	0	
Field Moisture Content	%	20.5	
Date Tested		23/07/2013	

Comments:

Qualtest
LABORATORY (NSW) PTY LTD
8 Ironbark Close, Warabrook
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ABN: 98 153 268 896

Client : Regional Geotechnical Solutions Pty Ltd

44 Bent Street
Wingham NSW 2429

Project : Proposed Residential Development
Dudley Street, Whitebridge

Report No : 13/00069/01
Issue No : 1

Page No : 1
Lab Ref No : 00787

Date : 26/07/2013

Shrink Swell Index Report

Sampling Procedure	AS1289.1.3.1 Clause 3.1.3.1
Test Procedure	AS1289.7.1.1

Sample Identification

Test No & Description	TP10 (0.25-0.5m)
Sample No	00787-GR-01
Sample Visual Description	(CH) CLAY, High plasticity, brown
Date Sampled	16/07/2013
Date Tested	19/07/2013

Swell Data

Initial Moisture Content	(%)	18.1
Final Moisture Content	(%)	22.2
Swell	(%)	0.1

Shrinkage Data

Initial Wet Density	(t/m^3)	1.868
Moisture Content	(%)	22.5
Estimate of Significant Inert Inclusions	(%)	5
Extent of Crumbling		Nil
Extent of Cracking		Nil
Shrinkage	(%)	4.2

Shrink Swell Data

Shrink Swell Index - I_{ss}	(%)	**2.6**

Remarks:

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025

NATA accredited laboratory number 18686

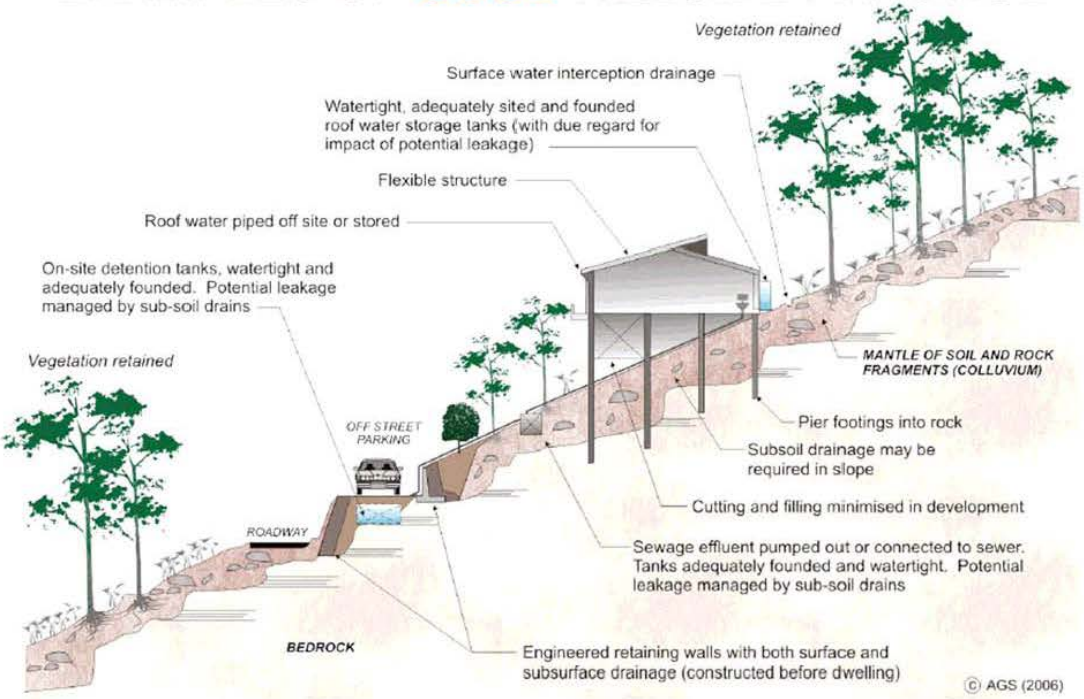
Authorised Signatory:

Alan Cullen
Principal Geotechnician

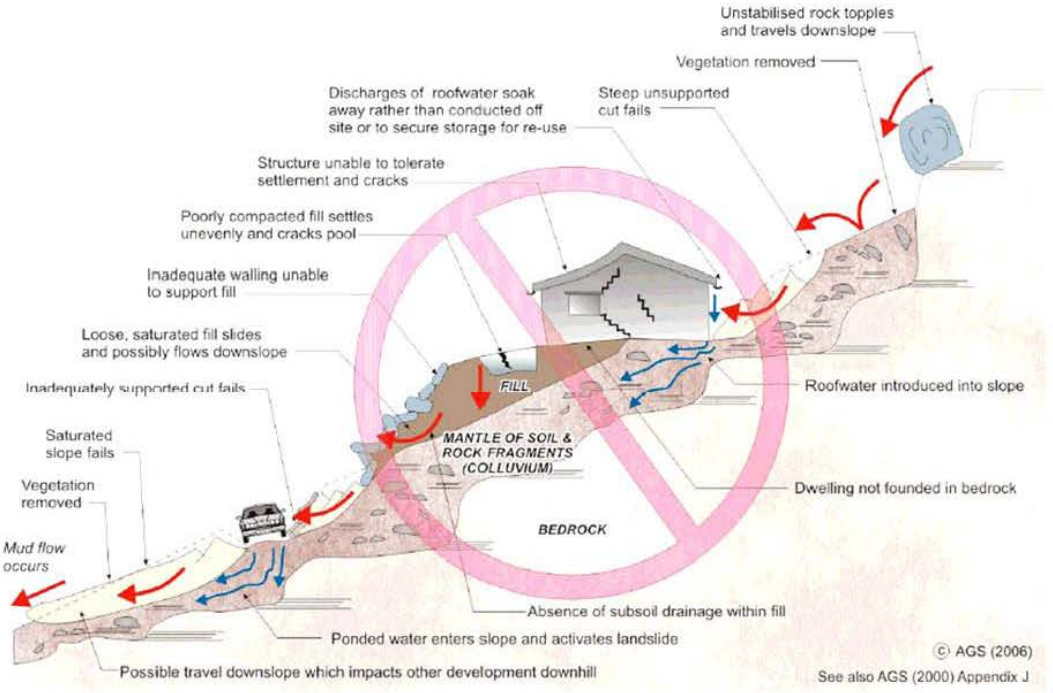
Appendix C

Examples of Good Hillside Practice

EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE



Appendix D

Pavement Thickness Designs

SEGMENTAL PAVEMENT THICKNESS DESIGN

CLIENT: SNL Constructions **Job No.:** RGS00603.1

PROJECT: Proposed Residential Development

LOCATION: Dudley Road/Kopa Street Whitebridge **Date:** 28-Aug-13

REGIONAL GEOTECHNICAL SOLUTIONS

ROAD NAME:	**Internal Road**	**Refer to drawing:**	
Chainage Interval (m):	Full Length	**Road classification ref:**	APRG Report 21
Road Classification:	Minor with two lane traffic	**Design Traffic:**	4 x 10^4 CVAG

Subgrade Conditions

Expected subgrade:	High Plasticity Clay		
Adopted Subgrade CBR value:	4.5	Required subgrade compaction:	100%
Construction method:	Excavate to design subgrade level. Proof roll to highlight soft or excessively deflecting materials. Replace as required with approved select fill. Place and compact pavement layers as specified.		

Pavement Design

Recommended Pavement Layer Thickness:		**Recommended Material requirements**	**Required Compaction**
Wearing course thickness (mm):	85	60mm block paver placed in herringbone pattern on 25mm bedding sand	
Base thickness (mm):	150	DGB20 or equivalent	98% Modified Compaction
Sub-base thickness (mm):	100	DGS40 or equivalent	95% Modified Compaction
Select thickness (mm):	As required based on proof roll	Existing pavement gravels, or imported material with CBR≥10%, PI<15%, max particle size 100mm	100% Standard Compaction
Total thickness (mm):	335		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS00603.1-AB for recommendations regarding drainage.

RIGID PAVEMENT THICKNESS DESIGN

CLIENT: SNL Constructions **Job No.:** RGS00603.1

PROJECT: Proposed Residential Development

LOCATION: Dudley Road/Kopa Street Whitebridge **Date:** 28-Aug-13

REGIONAL GEOTECHNICAL SOLUTIONS

ROAD NAME:	**Internal Road**	**Refer to drawing:**	
Chainage Interval (m):	Full Length	**Road classification ref:**	APRG Report 21
Road Classification:	Minor with two lane traffic	**Design Traffic:**	4 x 10^4 CVAG

Subgrade Conditions

Expected subgrade:	High Plasticity Clay		
Adopted Subgrade CBR value:	4.5	Required subgrade compaction:	100%
Construction method:	Excavate to design subgrade level. Proof roll to highlight soft or excessively deflecting materials. Replace as required with approved select fill. Place and compact pavement layers as specified.		

Pavement Design

Recommended Pavement Layer Thickness:		**Recommended Material requirements**	**Required Compaction**
Wearing course thickness (mm):	-		
Concrete base thickness (mm):	150	DGB20 or equivalent	98% Modified Compaction
Sub-base thickness (mm):	100	Bound sub-base - DGS or DGB with 3% stabilment	95% Modified Compaction
Select thickness (mm):	As required based on proof roll	Existing pavement gravels, or imported material with CBR≥10%, PI<15%, max particle size 100mm	100% Standard Compaction
Total thickness (mm):	250		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS00603.1-AB for recommendations regarding drainage.

FLEXIBLE PAVEMENT THICKNESS DESIGN

CLIENT: SNL Constructions **Job No.:** RGS00603.1

PROJECT: Proposed Residential Development

LOCATION: Dudley Road/Kopa Street Whitebridge **Date:** 28-Aug-13

REGIONAL GEOTECHNICAL SOLUTIONS

ROAD NAME:	**Internal Road**	**Refer to drawing:**	
Chainage Interval (m):	Full Length	**Road classification ref:**	N/A
Road Classification:	Local	**Design Traffic:**	7 x 10^4 ESA

Subgrade Conditions

Expected subgrade:	High plasticity Clay		
Adopted Subgrade CBR value:	4.5	Required subgrade compaction:	100%
Construction method:	Excavate to design subgrade level. Proof roll to highlight soft or excessively deflecting materials. Replace as required with approved select fill. Place and compact pavement layers as specified.		

Pavement Design

Recommended Pavement Layer Thickness:		**Recommended Material requirements**	**Required Compaction**
Wearing course thickness (mm):	25	As per LMCC requirements	
Base thickness (mm):	100	DGB20 or equivalent	98% Modified Compaction
Sub-base thickness (mm):	200	DGS40 or equivalent	95% Modified Compaction
Select thickness (mm):	As required based on proof roll	Existing pavement gravels, or imported material with CBR≥10%, PI<15%, max particle size 100mm	100% Standard Compaction
Total thickness (mm):	300		

Definitions:

Design traffic loading:	The anticipated number of equivalent standard axles (ESA), as defined by AUSTROADS, in the design lane during the design life of the pavement.
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent

Note: Pavement designs assume appropriate drainage is installed and maintained. Refer to Regional Geotechnical Solutions Report No. RGS00603.1-AB for recommendations regarding drainage.

Appendix E

Environmental Laboratory Results

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1315917**	Page	: 1 of 6
Client	: REGIONAL GEOTECHNICAL SOLUTION	Laboratory	: Environmental Division Sydney
Contact	: SIMON KEEN	Contact	: Client Services
Address	: 44 BENT STREET WINGHAM NSW, AUSTRALIA 2429	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: simon.k@regionalgeotech.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 6553 5641	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 6031 PROPOSED RESIDENTIAL DEVELOPMENT	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: DUDLEY ST, WHITEBRIDGE		
C-O-C number	: ----	Date Samples Received	: 16-JUL-2013
Sampler	: ----	Issue Date	: 26-JUL-2013
Order number	: ----		
		No. of samples received	: 8
Quote number	: SY/460/13	No. of samples analysed	: 8

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (2013). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**----**	----	----	**17-JUL-2013**	30-JUL-2013	✓
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1	**16-JUL-2013**	**---**	12-JAN-2014	----	**26-JUL-2013**	22-JAN-2014	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	12-JAN-2014	✓	**18-JUL-2013**	12-JAN-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	13-AUG-2013	✓	**18-JUL-2013**	13-AUG-2013	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**18-JUL-2013**	26-AUG-2013	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**18-JUL-2013**	26-AUG-2013	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**18-JUL-2013**	26-AUG-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Soil Glass Jar - Unpreserved (EP071)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**17-JUL-2013**	26-AUG-2013	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**17-JUL-2013**	26-AUG-2013	✓
EP080: BTEX							
Soil Glass Jar - Unpreserved (EP080)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**17-JUL-2013**	30-JUL-2013	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**17-JUL-2013**	30-JUL-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Soil Glass Jar - Unpreserved (EP080)							
TP12 0-0.1, TP11 0.2-0.3, TP6 0.6-0.7, TP4A 0-0.1, TP4B 0-0.1, TP9 0.2-0.3, TP3 0.1-0.2, TP1 0-0.1	**16-JUL-2013**	**17-JUL-2013**	30-JUL-2013	✓	**17-JUL-2013**	30-JUL-2013	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Moisture Content	EA055-103	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	2	16	**12.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	2	12	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	2	12	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in bulk solids	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)

Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES1315917**	Page	: 1 of 13
Client	: **REGIONAL GEOTECHNICAL SOLUTION**	Laboratory	: Environmental Division Sydney
Contact	: SIMON KEEN	Contact	: Client Services
Address	: 44 BENT STREET WINGHAM NSW, AUSTRALIA 2429	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: simon.k@regionalgeotech.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 6553 5641	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 6031 PROPOSED RESIDENTIAL DEVELOPMENT	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: DUDLEY ST, WHITEBRIDGE		
C-O-C number	: ----	Date Samples Received	: 16-JUL-2013
Sampler	: ----	Issue Date	: 26-JUL-2013
Order number	: ----		
		No. of samples received	: 8
Quote number	: SY/460/13	No. of samples analysed	: 8

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alex Rossi	Organic Chemist	Sydney Organics
		Sydney Organics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos
Pabi Subba	Senior Organic Chemist	Sydney Organics
		Sydney Organics
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 2969758)									
ES1315901-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	0.0	No Limit
ES1315969-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	36.5	33.5	8.7	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 2970848)									
ES1315895-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	27	31	12.8	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	14	13	8.1	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	8	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	13	14	9.7	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	24	24	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	69	67	2.8	0% - 50%
ES1315895-031	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	17	18.9	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	10	10	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	7	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	8	8	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	22	19	12.2	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	26	24	7.2	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2970849)									
ES1315895-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1315895-031	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2969644)									
ES1315917-001	TP12 0-0.1	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1315917-008	TP1 0-0.1	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2969643)									
ES1315917-001	TP12 0-0.1	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2969643) - continued									
ES1315917-001	TP12 0-0.1	EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1315917-008	TP1 0-0.1	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2969643)									
ES1315917-001	TP12 0-0.1	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2969643) - continued									
ES1315917-001	TP12 0-0.1	EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1315917-008	TP1 0-0.1	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2969652)									
ES1315917-001	TP12 0-0.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.5	0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.5	0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2969652) - continued									
ES1315917-001	TP12 0-0.1	EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.0	1.0	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (WHO)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES1315917-008	TP1 0-0.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.6	0.6	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.6	0.6	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.2	1.2	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (WHO)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2969645)									
ES1315917-001	TP12 0-0.1	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1316075-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2969651)									
ES1315917-001	TP12 0-0.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1315917-008	TP1 0-0.1	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2969645)									
ES1315917-001	TP12 0-0.1	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1316075-001	Anonymous	EP080: C6 - C10 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2969651)									
ES1315917-001	TP12 0-0.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1315917-008	TP1 0-0.1	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 2969645)									
ES1315917-001	TP12 0-0.1	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES1316075-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2970848)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	103	87	129
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	95.6	80	122
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	105	71	133
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	107	86	128
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	99.9	81	123
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	106	84	130
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	108	81	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2970849)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	72.6	66	112
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2969644)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	92.0	57.4	117
EP068A: Organochlorine Pesticides (OC) (QCLot: 2969643)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	102	60.8	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	94.2	59.4	115
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	100	59.8	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	96.1	59.8	118
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.4	65.8	114
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	94.0	65.6	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.1	67	113
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	92.3	65.6	113
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	60.7	113
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	108	65.8	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	57.3	120
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.5	67.4	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.2	67.5	114
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.4	63	121
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	102	66.1	117
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	65.3	116
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	101	57.3	115
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.6	63.6	119
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	99.8	58.4	127
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	93.9	63.6	117
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	97.6	50.4	132
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2969643)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2969643) - continued								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	100	25.5	124
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	86.3	10.1	159
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	77.0	2.88	149
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	95.6	48.6	126
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	99.5	64.9	111
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	94.1	65.1	111
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	88.5	61.4	113
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	89.6	60.4	127
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	87.0	64.7	110
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	64.2	111
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	95.8	60	116
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	96.1	64.8	111
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	89.1	64.3	114
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.0	45.5	128
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	95.4	65.4	111
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	62	116
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	96.3	59.5	119
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	64.9	29.8	137
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2969652)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	4 mg/kg	108	81.9	113
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	4 mg/kg	110	79.6	113
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4 mg/kg	107	81.5	112
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	4 mg/kg	102	79.9	112
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	4 mg/kg	98.0	79.4	114
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	4 mg/kg	98.9	81.1	112
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	4 mg/kg	97.7	78.8	113
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	4 mg/kg	105	78.9	113
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	4 mg/kg	101	77.2	112
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	4 mg/kg	111	79.8	114
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	4 mg/kg	94.4	71.8	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	4 mg/kg	110	74.2	117
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	4 mg/kg	110	76.4	113
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	4 mg/kg	86.2	71	113
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	4 mg/kg	86.9	71.7	113
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	4 mg/kg	82.3	72.4	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969645)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	73.8	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969651)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	102	59	131

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969651) - continued								
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	103	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	91.5	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2969645)								
EP080: C6 - C10 Fraction	----	10	mg/kg	<10	31 mg/kg	77.2	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2969651)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	97.6	59	131
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	102	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	73.8	63	131
EP080: BTEXN (QCLot: 2969645)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	73.3	62	120
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	72.2	62	128
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	75.6	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	75.1	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	75.8	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	69.6	62	138

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 2970848)							
ES1315895-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	94.9	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.5	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	106	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	104	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	100	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.7	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	99.5	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2970849)							
ES1315895-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	80.8	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2969644)							
ES1315917-001	TP12 0-0.1	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.0	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2969643)							

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 2969643) - continued							
ES1315917-001	TP12 0-0.1	EP068: gamma-BHC	58-89-9	0.5 mg/kg	95.9	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	91.3	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	91.8	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	84.4	70	130
		EP068: Endrin	72-20-8	2 mg/kg	89.9	70	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	90.1	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2969643)							
ES1315917-001	TP12 0-0.1	EP068: Diazinon	333-41-5	0.5 mg/kg	106	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	79.7	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	89.3	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	77.5	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	74.2	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2969652)							
ES1315917-001	TP12 0-0.1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	98.2	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	106	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969645)							
ES1315917-001	TP12 0-0.1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	89.8	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969651)							
ES1315917-001	TP12 0-0.1	EP071: C10 - C14 Fraction	----	640 mg/kg	92.7	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	108	53	131
		EP071: C29 - C36 Fraction	----	2860 mg/kg	81.6	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2969645)							
ES1315917-001	TP12 0-0.1	EP080: C6 - C10 Fraction	----	37.5 mg/kg	94.2	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2969651)							
ES1315917-001	TP12 0-0.1	EP071: >C10 - C16 Fraction	----	850 mg/kg	119	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	98.5	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	65.8	52	132
EP080: BTEXN (QCLot: 2969645)							
ES1315917-001	TP12 0-0.1	EP080: Benzene	71-43-2	2.5 mg/kg	72.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	77.9	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	80.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	86.7	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	81.4	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	76.6	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP068A: Organochlorine Pesticides (OC) (QCLot: 2969643)										
ES1315917-001	TP12 0-0.1	EP068: gamma-BHC	58-89-9	0.5 mg/kg	95.9	----	70	130	----	----
		EP068: Heptachlor	76-44-8	0.5 mg/kg	91.3	----	70	130	----	----
		EP068: Aldrin	309-00-2	0.5 mg/kg	91.8	----	70	130	----	----
		EP068: Dieldrin	60-57-1	0.5 mg/kg	84.4	----	70	130	----	----
		EP068: Endrin	72-20-8	2 mg/kg	89.9	----	70	130	----	----
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	90.1	----	70	130	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2969643)										
ES1315917-001	TP12 0-0.1	EP068: Diazinon	333-41-5	0.5 mg/kg	106	----	70	130	----	----
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	79.7	----	70	130	----	----
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	89.3	----	70	130	----	----
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	77.5	----	70	130	----	----
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	74.2	----	70	130	----	----
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2969644)										
ES1315917-001	TP12 0-0.1	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.0	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969645)										
ES1315917-001	TP12 0-0.1	EP080: C6 - C9 Fraction	----	32.5 mg/kg	89.8	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2969645)										
ES1315917-001	TP12 0-0.1	EP080: C6 - C10 Fraction	----	37.5 mg/kg	94.2	----	70	130	----	----
EP080: BTEXN (QCLot: 2969645)										
ES1315917-001	TP12 0-0.1	EP080: Benzene	71-43-2	2.5 mg/kg	72.7	----	70	130	----	----
		EP080: Toluene	108-88-3	2.5 mg/kg	77.9	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	80.8	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	86.7	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	81.4	----	70	130	----	----
		EP080: Naphthalene	91-20-3	2.5 mg/kg	76.6	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2969651)										
ES1315917-001	TP12 0-0.1	EP071: C10 - C14 Fraction	----	640 mg/kg	92.7	----	73	137	----	----
		EP071: C15 - C28 Fraction	----	3140 mg/kg	108	----	53	131	----	----
		EP071: C29 - C36 Fraction	----	2860 mg/kg	81.6	----	52	132	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2969651)										
ES1315917-001	TP12 0-0.1	EP071: >C10 - C16 Fraction	----	850 mg/kg	119	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	98.5	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	65.8	----	52	132	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2969652)										
ES1315917-001	TP12 0-0.1									

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2969652) - continued										
ES1315917-001	TP12 0-0.1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	98.2	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	106	----	70	130	----	----
EG005T: Total Metals by ICP-AES (QCLot: 2970848)										
ES1315895-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	94.9	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.5	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	106	----	70	130	----	----
		EG005T: Copper	7440-50-8	250 mg/kg	104	----	70	130	----	----
		EG005T: Lead	7439-92-1	250 mg/kg	100	----	70	130	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	97.7	----	70	130	----	----
		EG005T: Zinc	7440-66-6	250 mg/kg	99.5	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2970849)										
ES1315895-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	80.8	----	70	130	----	----

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1315917**	Page	: 1 of 11
Client	: **REGIONAL GEOTECHNICAL SOLUTION**	Laboratory	: Environmental Division Sydney
Contact	: SIMON KEEN	Contact	: Client Services
Address	: 44 BENT STREET WINGHAM NSW, AUSTRALIA 2429	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: simon.k@regionalgeotech.com.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 6553 5641	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: 6031 PROPOSED RESIDENTIAL DEVELOPMENT	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 16-JUL-2013
Sampler	: ----	Issue Date	: 26-JUL-2013
Site	: DUDLEY ST, WHITEBRIDGE		
		No. of samples received	: 8
Quote number	: SY/460/13	No. of samples analysed	: 8

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EA200 Legend**
- **EA200 'Am' Amosite (brown asbestos)**
- **EA200 'Ch' Chrysotile (white asbestos)**
- **EA200 'Cr' Crocidolite (blue asbestos)**
- **EA200 'Trace' - Asbestos fibres detected at levels below 0.1g/kg. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres**
- **EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.**
- **EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.**
- **EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.**

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Alex Rossi	Organic Chemist	Sydney Organics
		Sydney Organics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos
Pabi Subba	Senior Organic Chemist	Sydney Organics
		Sydney Organics
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP12 0-0.1	TP11 0.2-0.3	TP6 0.6-0.7	TP4A 0-0.1	TP4B 0-0.1
				Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]
Compound	CAS Number	LOR	Unit		ES1315917-001	ES1315917-002	ES1315917-003	ES1315917-004	ES1315917-005
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		18.9	18.8	28.5	36.9	38.6
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	No
Asbestos Type	1332-21-4	0.1	--		-	-	-	-	-
Sample weight (dry)	----	0.01	g		51.0	37.1	46.8	26.2	36.3
APPROVED IDENTIFIER:	----	-	--		C.OWLER	C.OWLER	C.OWLER	C.OWLER	C.OWLER
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		9	8	<5	10	8
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		15	15	64	9	8
Copper	7440-50-8	5	mg/kg		10	8	60	14	12
Lead	7439-92-1	5	mg/kg		31	46	81	84	50
Nickel	7440-02-0	2	mg/kg		<2	3	<2	<2	<2
Zinc	7440-66-6	5	mg/kg		193	134	43	318	284
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP12 0-0.1	TP11 0.2-0.3	TP6 0.6-0.7	TP4A 0-0.1	TP4B 0-0.1
				Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]
Compound	CAS Number	LOR	Unit		ES1315917-001	ES1315917-002	ES1315917-003	ES1315917-004	ES1315917-005
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP12 0-0.1	TP11 0.2-0.3	TP6 0.6-0.7	TP4A 0-0.1	TP4B 0-0.1
			Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]
Compound	CAS Number	LOR	Unit	ES1315917-001	ES1315917-002	ES1315917-003	ES1315917-004	ES1315917-005
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**0.5**	**0.8**	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	**0.5**	**0.8**	<0.5	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	**0.7**	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	**0.5**	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**1.0**	**2.8**	<0.5	<0.5	<0.5
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	mg/kg	<0.5	**0.6**	<0.5	<0.5	<0.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP12 0-0.1	TP11 0.2-0.3	TP6 0.6-0.7	TP4A 0-0.1	TP4B 0-0.1
			Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]
Compound	CAS Number	LOR	Unit	ES1315917-001	ES1315917-002	ES1315917-003	ES1315917-004	ES1315917-005
EP080: BTEXN								
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	71.0	72.0	73.0	72.0	68.0
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	98.6	96.0	86.0	83.1	84.2
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	83.8	85.4	100	99.3	102
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	86.8	108	86.4	104	102
2-Chlorophenol-D4	93951-73-6	0.1	%	88.9	95.0	92.5	94.0	94.4
2.4.6-Tribromophenol	118-79-6	0.1	%	83.1	98.7	94.0	94.5	97.6
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	79.2	102	96.6	99.1	97.6
Anthracene-d10	1719-06-8	0.1	%	78.4	92.5	89.2	89.2	91.4
4-Terphenyl-d14	1718-51-0	0.1	%	70.6	84.5	74.2	83.0	81.2
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	98.5	103	97.2	106	101
Toluene-D8	2037-26-5	0.1	%	117	107	108	109	104
4-Bromofluorobenzene	460-00-4	0.1	%	116	106	103	108	92.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP9 0.2-0.3	TP3 0.1-0.2	TP1 0-0.1	----	----
			Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	----	----
Compound	CAS Number	LOR	Unit	ES1315917-006	ES1315917-007	ES1315917-008	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	14.9	32.5	43.5	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	15	6	----	----
Cadmium	7440-43-9	1	mg/kg	<1	2	<1	----	----
Chromium	7440-47-3	2	mg/kg	<2	20	10	----	----
Copper	7440-50-8	5	mg/kg	<5	51	18	----	----
Lead	7439-92-1	5	mg/kg	8	151	94	----	----
Nickel	7440-02-0	2	mg/kg	<2	14	3	----	----
Zinc	7440-66-6	5	mg/kg	32	406	341	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP9 0.2-0.3	TP3 0.1-0.2	TP1 0-0.1	----	----
			Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	----	----
Compound	CAS Number	LOR	Unit	ES1315917-006	ES1315917-007	ES1315917-008	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	**0.6**	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	**0.6**	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP9 0.2-0.3	TP3 0.1-0.2	TP1 0-0.1	----	----
			Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	----	----
Compound	CAS Number	LOR	Unit	ES1315917-006	ES1315917-007	ES1315917-008	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	1.2	----	----
^ Benzo(a)pyrene TEQ (WHO)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	10	mg/kg	<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	----	10	mg/kg	<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
EP080: BTEX								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
EP080: BTEXN								
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----
EP066S: PCB Surrogate								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP9 0.2-0.3	TP3 0.1-0.2	TP1 0-0.1	----	----
			Client sampling date / time	[16-JUL-2013]	[16-JUL-2013]	[16-JUL-2013]	----	----
Compound	CAS Number	LOR	Unit	ES1315917-006	ES1315917-007	ES1315917-008	----	----
EP066S: PCB Surrogate - Continued								
Decachlorobiphenyl	2051-24-3	0.1	%	73.0	74.0	74.0	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	81.5	99.2	91.5	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	93.8	109	92.1	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	97.4	106	116	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	92.0	92.2	92.4	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%	94.0	99.6	94.9	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	97.2	103	95.7	----	----
Anthracene-d10	1719-06-8	0.1	%	89.6	90.9	91.4	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	83.0	83.5	83.1	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	102	98.0	104	----	----
Toluene-D8	2037-26-5	0.1	%	113	100	106	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	103	98.8	106	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	TP12 0-0.1 - [16-JUL-2013]	Mid brown clay soil with grey and dark red rocks plus a trace of vegetation.
EA200: Description	TP11 0.2-0.3 - [16-JUL-2013]	Mid brown clay soil with grey and orange rocks plus a trace of vegetation.
EA200: Description	TP6 0.6-0.7 - [16-JUL-2013]	Dark brown clay soil with grey rocks plus a trace of vegetation.
EA200: Description	TP4A 0-0.1 - [16-JUL-2013]	Dark brown clay soil with red rocks plus a trace of vegetation.
EA200: Description	TP4B 0-0.1 - [16-JUL-2013]	Mid brown clay soil with plenty of vegetation.

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	29.4	145
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	145
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	32	142
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	127
2-Chlorophenol-D4	93951-73-6	64	126
2.4.6-Tribromophenol	118-79-6	36	136
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	64	130
Anthracene-d10	1719-06-8	69	135
4-Terphenyl-d14	1718-51-0	64	136
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72.8	133.2
Toluene-D8	2037-26-5	73.9	132.1
4-Bromofluorobenzene	460-00-4	71.6	130.0