

\\C:\mywork\Projects\2016\20160518_482-488_The Esplanade, Warners Bay\DESIGN DRAWINGS\CURRENT DWG\DA_Civil_20160518_DA2.02_A.dwg

3/15/17

DO NOT SCALE DRAWINGS. VERIFY ALL DIMENSIONS ON SITE.

REVISION DESCRIPTION DATE VERSION

A ISSUE FOR REVIEW 31/03/17

B ISSUE FOR DA 11/04/17

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FOR REVIEW

RGH CONSULTING GROUP
Multi-discipline Engineering

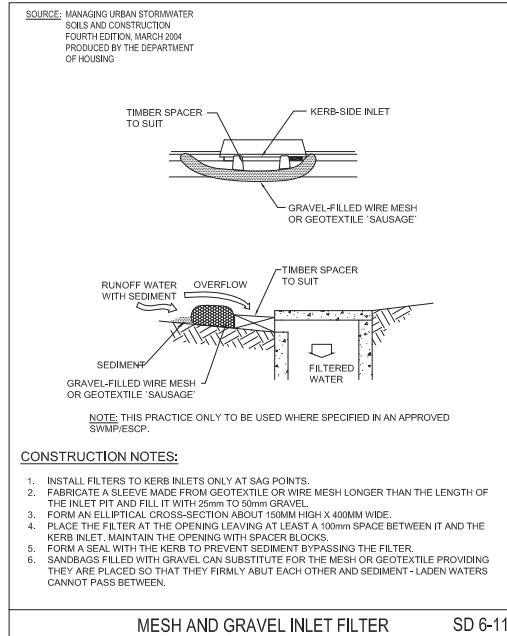
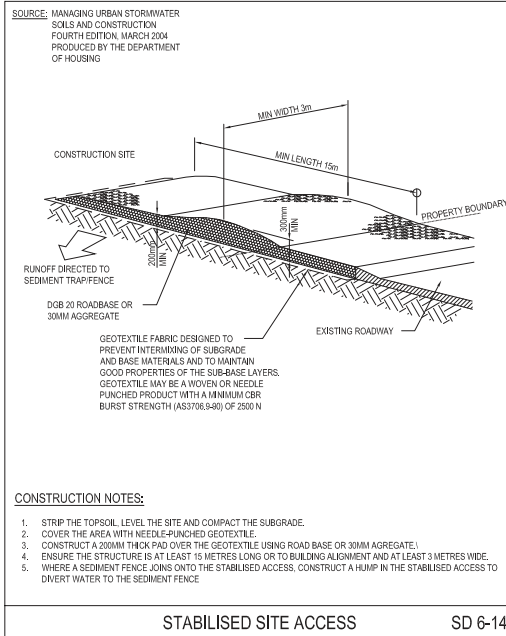
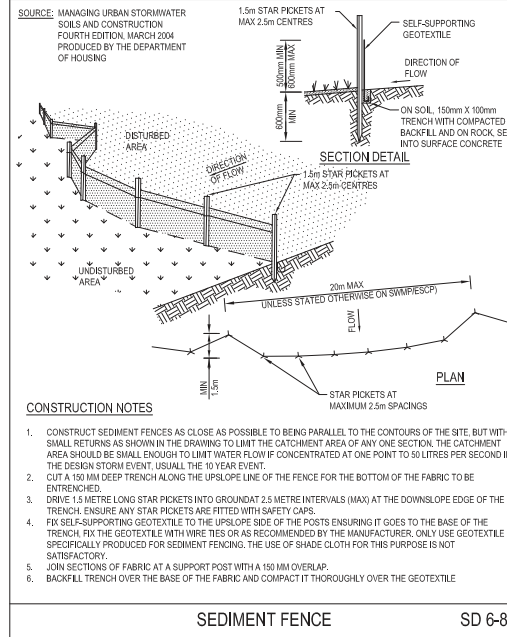
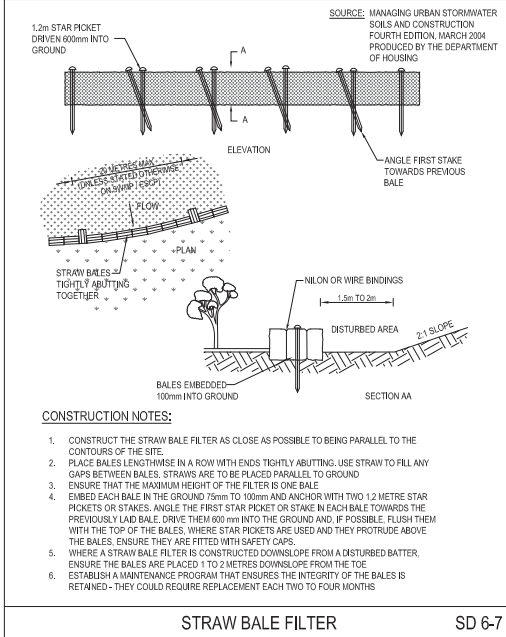
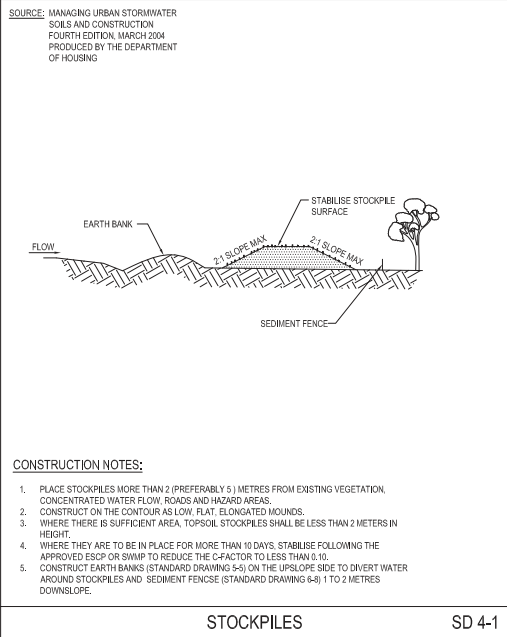
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Central Coast Office: Unit 1, 3 Teesdale Close, Tuggerah NSW 2259
Ph 02 4351 9022
Newcastle Office: Shop 113, The Junction Village Centre, North Street, The Junction NSW 2291
Ph 02 4982 4414

SURVEY BY CADMAN CONSULTANTS
REFERENCE 8395
DATED 15/02/2009
DATUM AHD

CLIENT BLOC
ADDRESS 482-488 THE ESPLANADE WARNERS BAY
PROJECT PROPOSED MULTI UNIT DEVELOPMENT

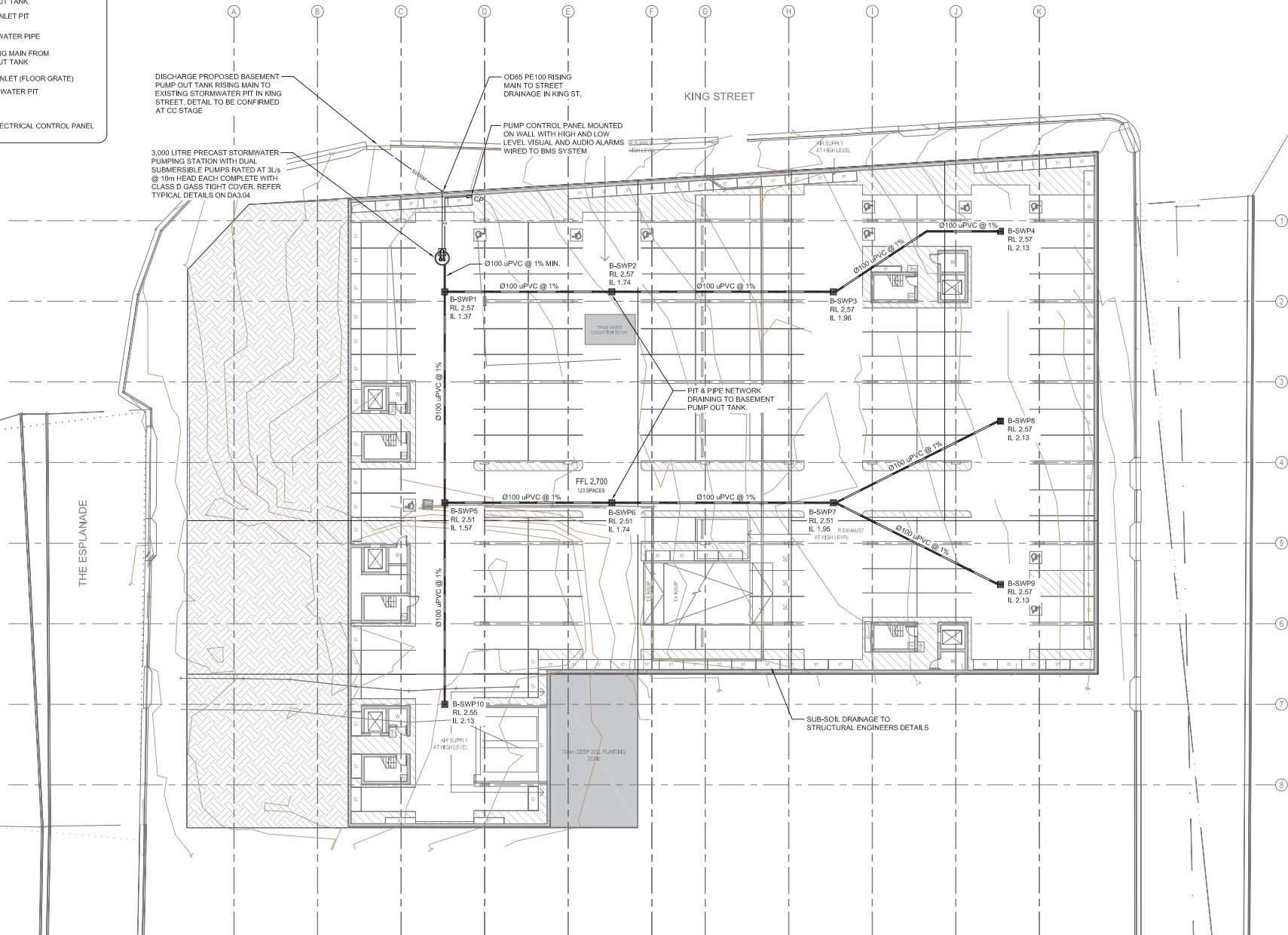
DRAWING TITLE
CONCEPT SEDIMENT AND EROSION CONTROL DETAILS
ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830

SCALE N.T.S. INT. SHEET
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DESIGNED BW
CHECKED BW
DATE MARCH 2017
FOR NUMBER 20160518
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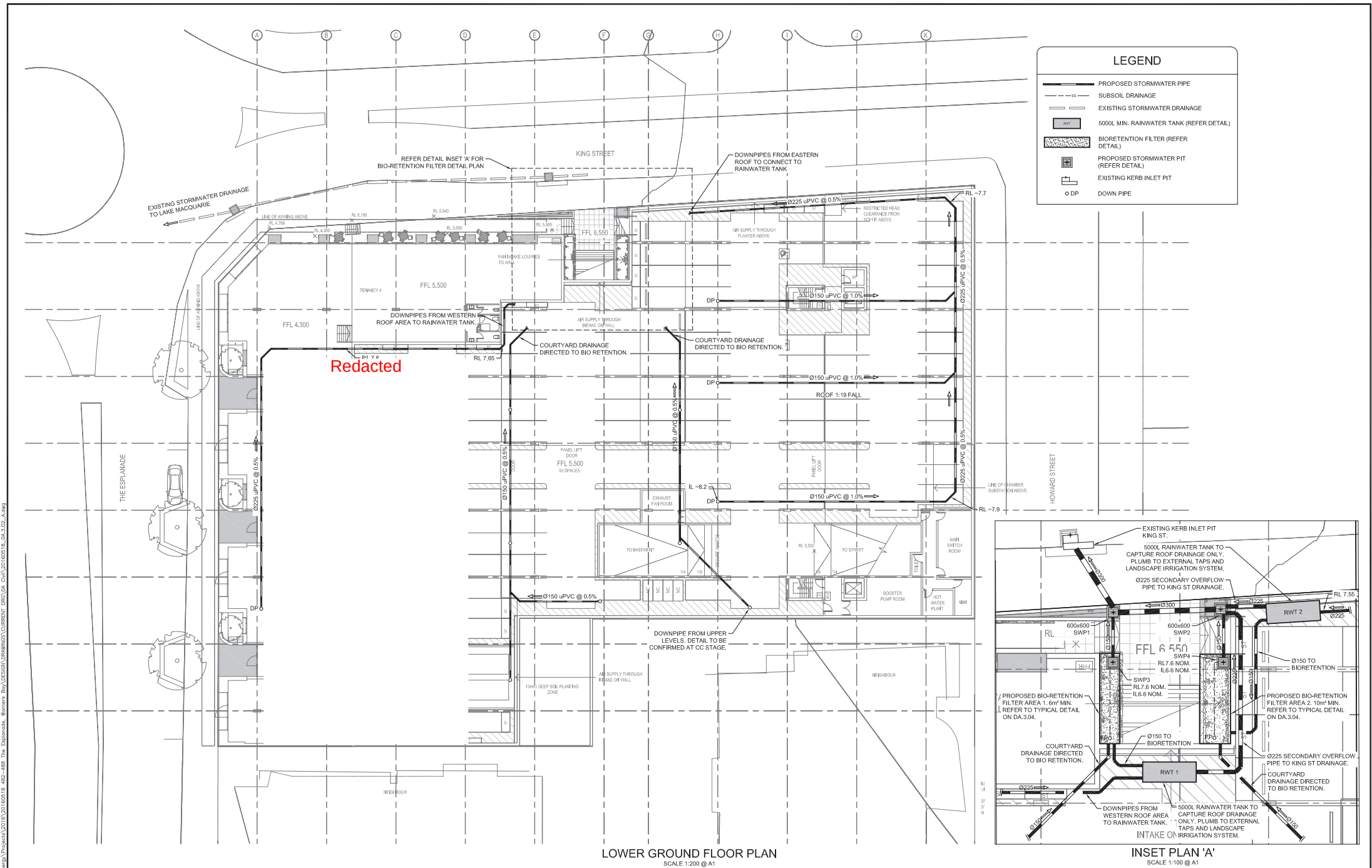


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REVISION	DESCRIPTION	DATE
A	ISSUE FOR REVIEW	31/03/17
B	ISSUE FOR DA	11/04/17

VERSION	FOR REVIEW
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12	16
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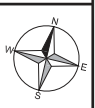
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Ph 02 4351 9022
Newcastle Office: Shop 113, The Junction Village Centre, North Street, The Junction NSW 2291
Ph 02 4982 4414

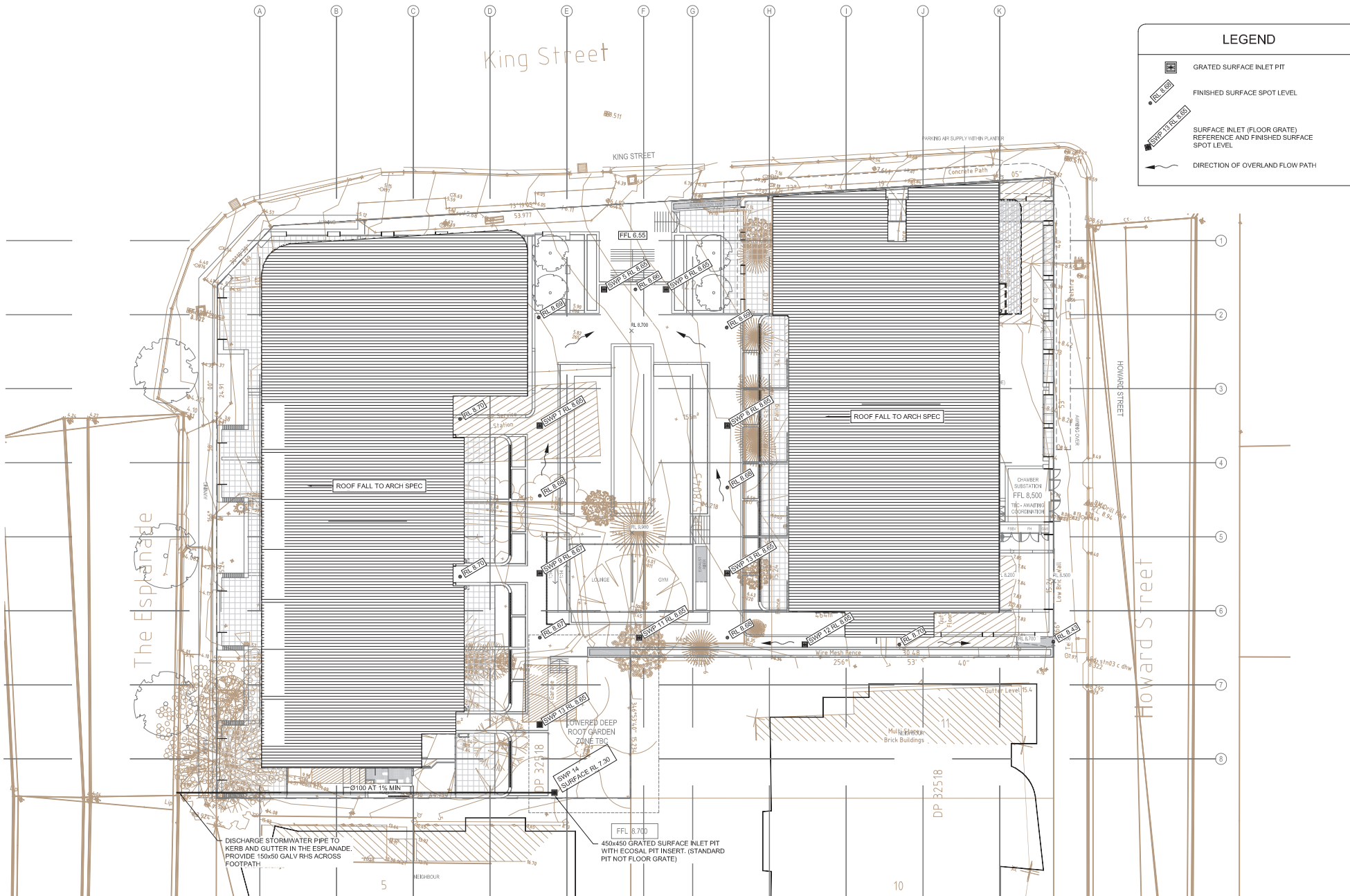
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REFERENCE: 8395
DATED: 15/02/2009
DATUM: AHD

CLIENT: BLOC
ADDRESS: 482-488 THE ESPLANADE WARNERS BAY
PROJECT: PROPOSED MULTI UNIT DEVELOPMENT

DRAWING TITLE: CONCEPT LOWER GROUND FLOOR DRAINAGE PLAN
ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830

SCALE	1:200	INT.	SHEET
DAWN	AFUG		DA.3.02
DESIGNED	BW		
CHECKED	BW		
DATE	MARCH 2017	REV	B
FOR NUMBER	20160518		





UPPER GROUND FLOOR PLAN
SCALE 1:200 @ A1

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REVISION	DESCRIPTION	DATE	VERSION
A	ISSUE FOR REVIEW	31/03/17	
B	ISSUE FOR DA	11/04/17	

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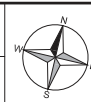
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Newcastle Office: Shop 113, The Junction Village Centre, North Street, The Junction NSW 2291
Ph 02 4982 4414

SURVEY BY: CADMAN CONSULTANTS
REFERENCE: 8395
DATED: 15/02/2009
DATUM: AHD

CLIENT: BLOC
ADDRESS: 482-488 THE ESPLANADE WARNERS BAY
PROJECT: PROPOSED MULTI UNIT DEVELOPMENT

DRAWING TITLE: CONCEPT UPPER GROUND FLOOR DRAINAGE PLAN
ANTHONY JOHN GRIFFITHS
MIE AUST CPENG 2342830

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DESIGNED	BW		
CHECKED	BW		
DATE	MARCH 2017	REV	B
JOB NUMBER	20160518		



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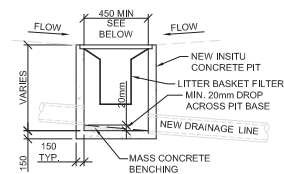
RAINWATER RE-USE TANK DETAIL
N.T.S.

TYPICAL SUBMERSIBLE PUMP
CHAMBER & VALVE PIT DETAIL.
NOT TO SCALE

PITS: EQUAL TO C.I & D. PRECAST HOLDING TANK
MODEL SPW-3 OR FIBRE GLASS PACKAGE UNIT SIMILAR
TO THOSE MANUFACTURED BY HUNTER PUMPS.

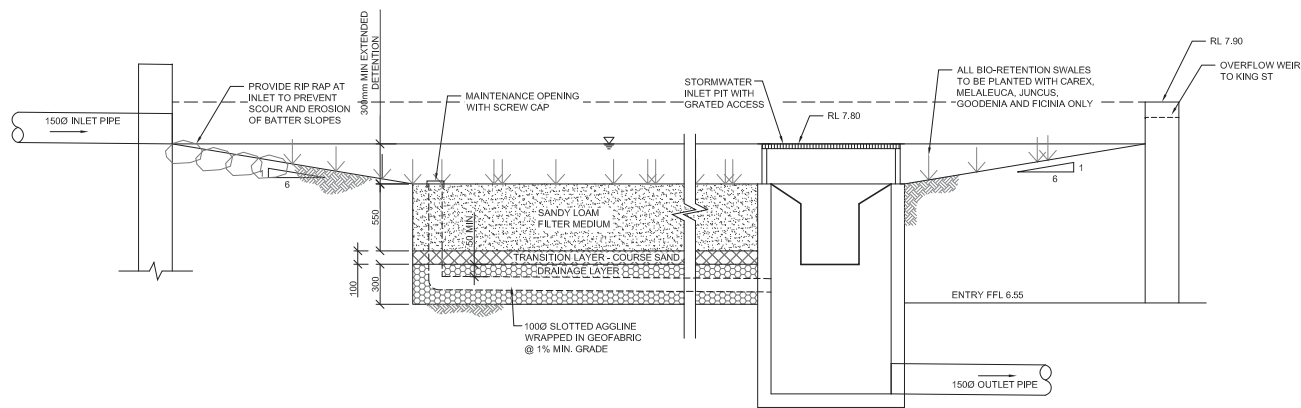
PUMPS: EQUAL TO DUAL MACERATOR TYPE RATED AT 3.0l/s @ 10m HEAD.

CONTROL PANEL: TO BE LOCATED ADJACENT WET WELL
INSIDE BASEMENT. PROVIDE EXTERNAL ALARM LIGHT &
BELL.



TYPICAL GRATED SURFACE INLET PIT
WITH 'ECOSOL LITTER BASKET' DETAIL
N.T.S.

450 X 450 PLAN INTERNAL PIT DIMENSIONS FOR PITS LESS THAN 600 DEEP
600 X 600 PLAN INTERNAL PIT DIMENSIONS FOR PITS LESS THAN 900 DEEP
600 X 900 PLAN INTERNAL PIT DIMENSIONS FOR PITS 900 TO 1200 DEEP
900 X 900 PLAN INTERNAL PIT DIMENSIONS FOR PITS GREATER THAN 1200 DEEP



TYPICAL SECTION THROUGH BIO-RETENTION FILTER
SCALE NTS

BIO-RETENTION FILTER MATERIAL SCHEDULE			
LAYER	SOIL TYPE	PARTICLE SIZE (mm)	SATURATED HYDRAULIC CONDUCTIVITY (mm/hr)
FILTER MEDIA	SANDY LOAM	0.5	180
TRANSITION LAYER	COARSE SAND	1	3600
DRAINAGE LAYER	GRAVEL	2	36000

FILTER AREAS	
BIO RETENTION ZONE No.	AREA (m ²)
1	6
2	10

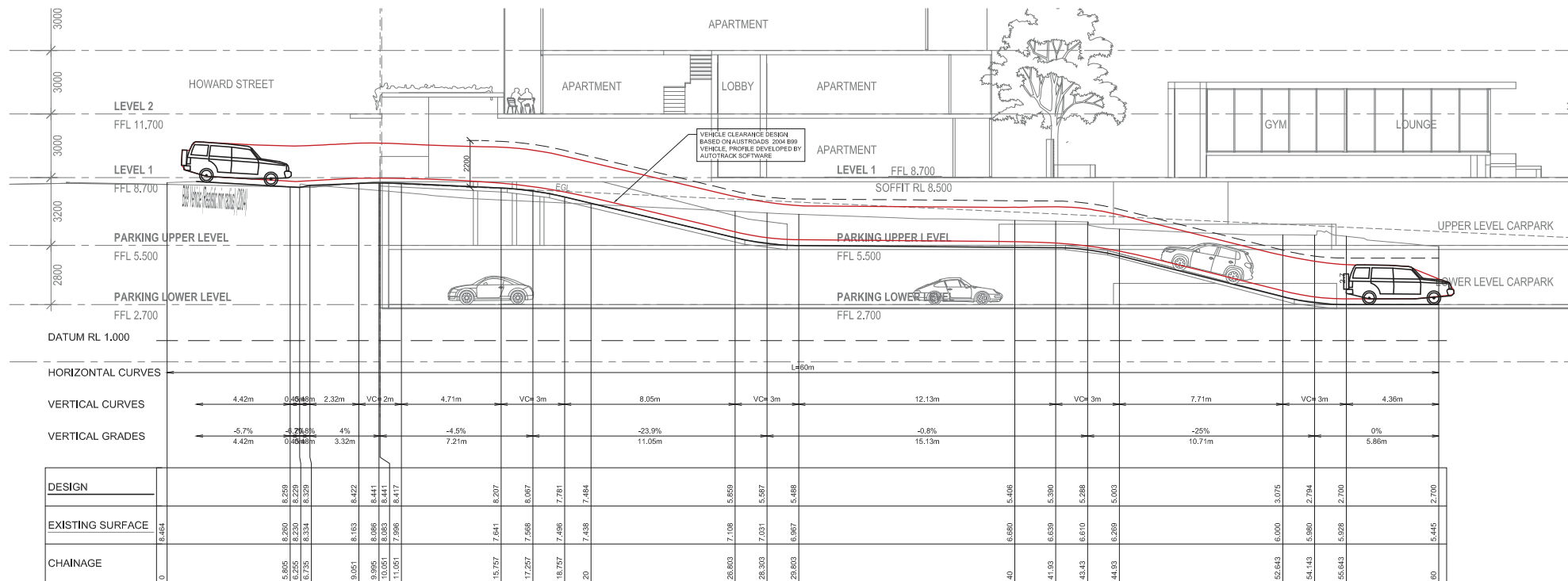
PIPE SIZES		
BIO RETENTION ZONE No.	INLET (mm)	OUTLET (mm)
1 (WESTERN)	2 x 150Ø	150Ø
2 (EASTERN)	2 x 150Ø	150Ø

BIO-RETENION FILTER NOTES

1. FILTERS, SWALES AND BASINS TO BE CONSTRUCTED IN LOCATIONS AS LOCATED UPON THE DRAWINGS AND IN ACCORDANCE WITH THE DETAILS WITHIN THE DRAWING SET.
2. FILTER MEDIA AS SPECIFIED IS TO BE IN ACCORDANCE WITH THE FOLLOWING TABLE:

FILTER MEDIA TYPE	MEDIUM PARTICLE SIZE (mm)	MAX SATURATED HYDRAULIC CONDUCTIVITY (mm/hr)
GRAVEL	2	3600
COARSE SAND	0.85	3600
SAND	0.425	360
SANDY LOAM	0.75	180
3. CONTRACTOR IS TO PROVIDE RELEVANT TESTING CERTIFICATION FROM A MEDIA SUPPLIER SHOWING CONFORMANCE WITH THE ABOVE TABLE WITH RESPECT TO PARTICLE SIZE.
4. SUBSOIL DRAINS ARE TO BE INSTALLED UPON A 100mm LAYER OF THE FILTER MEDIA, WITHIN 300mm OF THE FILTER PIT EXCAVATION PERIMETER, AND AT A MAXIMUM 5 METRE GRID THROUGHOUT THE FILTER AREA.
5. FILTERS OF LESS THAN OR EQUAL TO 2m width, I.E. FILTER TRENCHES MAY HAVE A SINGLE SUBSOIL DRAIN LOCATED CENTRALLY TO THE FILTER TRENCH AND IS TO EXTEND FOR THE FULL EXTENT OF THE FILTER TRENCH.
6. OUTLET LINES FROM FILTER AREAS ARE TO BE CONNECTED IMMEDIATELY TO FITTINGS TO SUIT THE OUTLET LINE DIAMETER AND PIPE MATERIAL. THE OUTLET LINE IS TO FALL AT A SUFFICIENTLY STEEP GRADIENT TO POINT OF OUTLET AS SHOWN ON THE DRAWINGS.
7. THE CERTIFYING ENGINEER IS TO INSPECT AND VERIFY THE FILTER EXCAVATION PIT DIMENSIONS AND CONFIRM ADEQUACY PRIOR TO PLACEMENT OF FILTER MEDIA.
8. PLANTINGS UPON FILTER AREAS ARE TO BE AS SPECIFIED ON THE DRAWINGS AND SHOULD BE OF A GRASS OR SHRUB TYPE OF GROWTH HABIT, GOOD ROOT SYSTEM, UNLESS NOTED OTHERWISE, AND AT A DENSITY AS SPECIFIED ON THE DRAWINGS OR IF NOT NOTED AS SPECIFIED BY A QUALIFIED LANDSCAPE/HORTICULTURE CONSULTANT.

FILTER MEDIA TYPE	MEDIAN PARTICLE SIZE (mm)	MAX SATURATED HYDRAULIC CONDUCTIVITY (mm)
GRAVEL	2	36000
COARSE SAND	1	3600
SAND	0.7	360
SANDY LOAM	0.45	180



D Driveway Cline - LONGITUDINAL SECTION

A1 HORZ SCALE 1:100
A1 VERT SCALE 1:100

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REVISION	DESCRIPTION	DATE	VERSION	FOR REVIEW		 RGH CONSULTING GROUP Multi-discipline Engineering	Postal Address: PO Box 3197, Tuggerah NSW 2259 Central Coast Office: Unit 1, 3 Teaster Close, Tuggerah NSW 2259 Ph 02 4351 9022 Newcastle Office: Shop 113, The Junction Village Centre, North Street, The Junction NSW 2291 Ph 02 4982 4414	SURVEY BY CADMAN CONSULTANTS REFERENCE 8395 DATED 15/02/2009 DATUM AHD	CLIENT BLOC 482-488 THE ESPLANADE WARNERS BAY PROPOSED MULTI UNIT DEVELOPMENT	DRAWING TITLE CONCEPT DRIVEWAY LONG SECTIONS ANTHONY JOHN GRIFFITHS MIE AUST CPENG 2342830	SCALE N.T.S. DRAWN AFJG DESIGNED BW CHECKED BW DATE MARCH 2017 FOR NUMBER 20160518	SHEET C4.01 REV B	
A	ISSUE FOR REVIEW	31/03/17	1										
B	ISSUE FOR DA	11/04/17	2										
SCALE 100 50 0 100 200 300 400 500 SCALE OF MILLIMETRES (1:5 AT A1 SHEET BEFORE REDUCTION)													

A1

10 – GEOTECHNICAL REPORT



AWT Consulting Engineers Pty Ltd

ABN 35 093 828 794

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North Sydney NSW 2060
P: (02) 9922 2466
F: (02) 9922 3705
adam@awtce.net.au

GPO Box 436
Gungahlin ACT 2912
P: (02) 6257 2614
F: (02) 6257 1723
alan@awtce.net.au

CERTIFICATE OF STRUCTURAL SUFFICIENCY – DESIGN

Address: 12-16 King St

Suburb: Warners bay

Lessee or Permit Holder's Name: BLOC (ACT) Pty Ltd

Contact: Peter Bowyer(BLOC)

Peter.bowyer@bloc.com.au

AWT Job No: 169224

Title: The Lakehouse Apartments Warner Bay

Description of Building Work:

New Work x

Additions

Alterations

Other

I certify that:

1. I have checked the proposed structural design computations for the building named above and/or the following components and of their supporting elements
Foundations
2. In checking the structural design, I have paid attention to the integrity of the building under normal conditions relevant for this type of structure. The strength requirements and serviceability requirements of the building and its structural elements comply with the Building Code of Australia and all relevant SAA Codes (including AS 1170 Part 4 Earthquake Code).
3. The foundations have been designed in accordance with Coffey Geosciences Report NL6000/1 May 2005

Declaration

I am a professional engineer as defined in Part A1 Clause A1.1 of the Building Code of Australia.

This "Structural Engineers Certificate" is issued pursuant to Section 47 of the ACT Building Act 2004

Signature

Date: 06/04/17

Engineer: Alan Tingcombe

Qualifications: BE(Hons) F.I.E. Aust

Address: 2 Brindabella Cct, Canberra Airport ACT 2609

Telephone: (02) 6257 2614

Fax: (02) 6257 1723

Email: alan@awtce.net.au

NLE000/1
25 May, 2005

Howard King Pty Ltd

RE: PROPOSED APARTMENTS
482 THE ESPLANADE, WARNERS BAY
DRAWING REVIEW

This letter serves to confirm our acceptance of your commission to provide geotechnical services for the above project. The work has been carried out in accordance with our Terms of Agreement for Professional Services, a copy of which is attached.

The DRAWING REVIEW is provided on the basis that those Terms of Agreement are acceptable and form the basis of our commission.

Invoices are payable on receipt of the DRAWING REVIEW.

The drawing review has been carried out in accordance with the requirements of Lake Macquarie City Council. The review included the slope stability aspects of the proposed development as shown on the drawings and does not include a review of the design of the foundations or structural aspects of the building and retaining walls. The review assumes that the details of surface levels, cuts, fills and retaining walls as shown on the drawings are accurate. Excavations for construction of retaining walls results in a temporary reduction in the stability of the adjacent area particularly during wet weather until the wall is complete. This increased risk can be managed or reduced by appropriate construction planning possibly using temporary support, staged excavation and control of drainage. This review does not include review or design of such construction details.

If you have any questions regarding this matter please contact the undersigned.

For and on behalf of
COFFEY GEOSCIENCES PTY LTD


ARTHUR LOVE

ATTACHMENTS:

Terms of Agreement for Professional Services
Reviewed Drawings

Coffey 

COEVE DESIGN
PROPOSED MIXED USE DEVELOPMENT
KING STREET, HOWARD STREET AND THE ESPLANADE, WARNERS
BAY
PRELIMINARY GEOTECHNICAL ASSESSMENT

N09303401-AB
20 December 2004



NC9303/D1-A6 DDM
20 December 2004

Coeve Design
PO Box 1107
NEWCASTLE NSW 2300

Attention: Charles De Bono

Dear Sir

RE: PROPOSED MIXED USE DEVELOPMENT
KING STREET, HOWARD STREET AND THE ESPLANADE, WARNERS BAY
PRELIMINARY GEOTECHNICAL ASSESSMENT

Please find enclosed a report describing the preliminary geotechnical investigation carried out on the above site.

The purpose of the investigation was to provide preliminary geotechnical information for the design and construction of the proposed unit development. Guidance on the uses and limitations of this report is presented in the attached document, 'Important Information about your Coffey Report', in conjunction with which this report should be read.

If you have any questions please do not hesitate to contact Drew Morgan or the undersigned.

For and on behalf of
COFFEY GEOSCIENCES PTY LTD


ARTHUR LOVE

Distribution:	Original	Held by Coffey Geosciences Pty Ltd
	1 Copy	Coffey Geosciences Pty Ltd Library
	3 Copies	Coeve Design

Coffey 

N09303/01-AB
20 December 2004

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Important Information About Your Coffey Report

APPENDICES

- A Results of Field Investigations
- B Laboratory Results

DRAWINGS

- N09303/01-1 Borehole Location and Site Plan

1. INTRODUCTION

This report presents the results of a geotechnical investigation carried out by Colley Geosciences Pty Ltd (Colley) for Coeve Design, for the proposed unit development to be located at the corner of King and Howard Street, Warners Bay.

The work was commissioned by Kim Nash, of Bay Building Investments in a facsimile dated 15 November 2004. Purchase Order No 00011366. No plans of the proposed development were available at the time of this assessment.

The details of the proposed development were not provided at the time of this investigation, however, discussions with the client indicated that it is likely to comprise a multi level unit complex, with commercial and residential space and excavation for basement car parking.

The purpose of the work was to gain a brief profile of the subsurface conditions across the site and provide preliminary recommendations on the following scope of works:

- Site preparation;
- Excavation conditions;
- Alternative footing types and founding levels, including recommendations as to allowable bearing pressure and probable settlements;
- Soil and groundwater aggressivity to buried structural elements;

2. FIELD WORK

Field work was carried out on 24, 25 November 2004 and consisted of the drilling, logging and sampling of two boreholes using a truck mounted drill rig equipped with continuous spiral flights augers and core barrel for coring rock. Borehole BH1 was drilled using a concrete coring diatube for the pavement material and a combination of solid flight auger drilled, rock rolling and NM/C diamond coring techniques, to a depth of 4.68m. Borehole BH2, was drilled using solid flight auger methods to depths of 3.24m. Both of the boreholes were cored to additional final depth of 10m. Standard penetration tests were carried out at 1.5m intervals and corresponding samples taken for further testing. Point load index tests were also undertaken on core recovered from the investigation with results shown on accompanying logs.

The boreholes were drilled in the fulltime presence of a Geotechnical Engineer from Colley who located the boreholes, took samples and produced engineering logs of the soil and rock profiles. The logs are presented in Appendix A, together with explanation sheets defining the terms and symbols used in their preparation.

Groundwater levels and inflows observed in the boreholes were recorded at times and under the conditions stated on the engineering logs. Standpipe piezometers were installed in both boreholes to monitor ground water level during the investigation.

The borehole locations are shown on Drawing N09303/01-1. They were obtained by measuring distances relative to surface features shown on the drawing provided.

3. LABORATORY WORK

Soil samples obtained from the SPT tests were submitted to a specialist chemical laboratory to be tested for aggressivity to buried structural elements. The result of which are presented in Appendix B and Discussed in Section 5.5.

Cored rock samples obtained during the field investigation were returned to our Newcastle Laboratory where point load index (RTA T223) testing was undertaken. These laboratory test results are presented on the field logs, in Appendix A. Photographs of rock core are included in the report.

4. SITE CONDITIONS

4.1 Surface Conditions

The site is located in Warners Bay and is bound by The Esplanade to the west, King Street to the north and Howard Street to the east. The site is identified as Lot 1 in DP90877, Lot 122 in DP578045 and Lot 1, 2 and 3 in DP155951.

It is situated in an area of gently undulating topography, within close proximity to the Lake Macquarie coastline. The site is located on the western foot slopes of a gently sloping hill, with Lake Macquarie situated approximately 100m to the west of the site. The site occupies approximately 3800 square metres in area and slopes mildly from east to west.

Lot 1, 2 and 3 in DP155951 are currently occupied by single storey weathered board of brick residences, with a garage at the rear of each lot, as shown on Drawing N09303/01-1. There was no obvious evidence of damage to these structures at the time of the field work. Vegetation on these lots comprised mainly of short grass cover and some small shrubs and trees up to 4m in height were also present on these lots.

Drainage over these lots is judged to be via some infiltration into the soil and primarily via surface runoff, following the natural contours of the site.

Lot 1 in DP90877 and Lot 122 in DP578045 were occupied by a BP service station, that was still in operation, at the time of the field work. The majority of this site is covered by concrete pavements, with the exception of some gardens beds around the boundaries of the site. Short grass up to 0.2m in height and some shrubs and trees up to 6m in height were present in the gardens beds. Two brick buildings were present on the site associated with the sites operations as a services station. There was no obvious evidence of damage to these buildings at the time of the field work.

Drainage is judged to occur via surface runoff over this site into an onsite, stormwater drainage system, which is assumed to discharge to the street stormwater drainage system.

Fill was present on the site of the BP service station the full extent of this fill was not determined during this investigation. Underground Storage Tanks (UST's) were still present on this site at the time of the field work.

4.2 Subsurface Conditions

Based on the 1:100,000 Newcastle Coalfield Regional Geology Map, the site is judged to be underlain by the Permian aged Bostaroo Subgroup of the Newcastle Coal Measures, comprising conglomerate, sandstone, siltstone, coal and turf and soils derived by these rocks.

The typical subsurface conditions encountered during the field investigation may be summarised as follows:

TABLE 1 - SUMMARY OF BOREHOLE DATA (Depth in Metres)

UNIT	DESCRIPTION	BOREHOLE LOCATION	
		BH1	BH2
1	FILL. Gravely Clayey SAND fine to medium grained, grey, gravel fine to coarse grained, clay low to medium plasticity, some slag and pieces of concrete	D0 - 2.9	-

UNIT	DESCRIPTION	BOREHOLE LOCATION	
		BH1	BH2
2	TOPSOIL: Sandy CLAY, medium to high plasticity, dark grey to brown, sand fine to coarse grained, trace of silt	-	0.0 - 0.7
3	RESIDUAL SOIL: CLAY, medium to high plasticity, red and pale brown mottled pale grey.	-	0.7 - 2.3
4	WEATHERED ROCK 1: extremely weathered to highly weathered sandstone fine to medium grained, pale grey / white with some orange bands.	2.5 - 4.8	2.3 - 3.25
5	WEATHERED ROCK 2: Highly to moderately weathered sandstone, fine to medium grained, white with orange / brown bands	4.8 - 6.7	3.25 - 6.85
6	WEATHERED ROCK 2: highly weathered claystone / siltstone, pale grey / grey, brown / grey with some highly weathered to moderately weathered coal seams, black. Very low to medium strength.	6.7 - 10.15	6.85 - 10.0

The lateral extent of Unit 1 was unable to be determined during this preliminary assessment, due to the limited amount of boreholes. However it is possible that the majority of the existing BP service station site is underlain by fill, surrounding several UST's. This assessment has also assumed that the fill on the site possibly extends beyond the site boundaries due to the numerous services present around the boundary of the site.

The results of the water level monitoring of the wells installed by Coffey on 24 and 25 November 2004 is summarised in Table 2.

TABLE 2 - GROUNDWATER MONITORING RECORDS

BOREHOLE	SURFACE RL (m) AHD	BOREHOLE DEPTH (m)	DATE MEASURED / GROUNDWATER LEVEL RL (m) AHD	
			25-11-04	2-12-04
BH1	4.5	10.19	3.0	2.8
BH2	8.3	10.0	5.2	5.05

5. DISCUSSION AND PRELIMINARY RECOMMENDATIONS

5.1 Site Preparation and Excavation Conditions

Although no plans of the proposed redevelopment of the site were available at the time of the report, it is assumed that all existing structures on the site and the UST's would be removed prior to construction and that bulk excavation would be undertaken. The proposed construction areas should be stripped to remove all vegetation, topsoil, root affected or other potentially deleterious material. Stripping is generally expected to be required to depths of about 0.7m in Lot 1, 2 and 3 in DP155951. The majority of Lot 1 in DP90877 and Lot 122 in DP578045 is covered with concrete pavements, which is underlain by fill surrounding the underground storage tanks. These areas of concentrated fill should also be over excavated onto the natural profile. It is possible that some remediation on the site of the service station may be undertaken before development, although this has not been addressed as part of this development.

In terms of rippability, excavation of site materials can generally be divided into:

- Fill containing slag and concrete (Unit 1). The excavatability of this material will be dependant on the amount of concrete and slag present in this layer. The use of a large excavator equipped with hydraulic rock breakers may be required;
- Clayey Soils (Unit 2 and 3). It is anticipated that these materials could be excavated by a conventional bulldozer blade or excavator;
- Weathered Rock (Unit 4). It is anticipated that these materials could be excavated by a conventional bulldozer blade or excavator;
- Weathered Rock (Unit 5 and 6). Rippability is dependent on rock strength, degree of weathering and number of defects within the rock mass. It is assessed that generally the Unit 3 and Unit 4 weathered rock encountered in the boreholes will be rippable. However, if some excavatability problems occur in the higher strength Unit 4 weathered rock then the use of hydraulic rock breakers may be required;

Table 3 provides an indication of the assessed excavatability of each geotechnical unit.

TABLE 3 – SUMMARY OF INDICATIVE EXCAVATABILITY OF GEOTECHNICAL UNITS

GEOTECHNICAL UNIT	LIKELY TO BE EXCAVATABLE USING
UNIT 1	Large excavator equipped with sharp-toothed bucket and/or rock breaker. (Possibly a large bulldozer (Caterpillar D9 or equivalent) equipped with ripping tyres.
UNIT 2 and 3	Conventional bulldozer blade or excavator bucket.
UNIT 4	Conventional bulldozer blade or excavator bucket.
UNIT 5	Conventional bulldozer (Caterpillar D8 or equivalent) equipped with ripping tyres. Large excavator equipped with sharp-toothed bucket and/or rock breaker.
UNIT 6	Large bulldozer (Caterpillar D9 or equivalent) equipped with ripping tyres. Large excavator equipped with ripping tyre or rock-breaker

The required depth of excavation for the proposed development was not available at the time of this assessment. However based on the findings of the investigation this depth of earthworks is likely to penetrate the water table. The soils are of low permeability, with the exception of the Unit 1 fill material and therefore the water inflows that occur are likely to be confined to preferential drainage paths within the profile.

Due to the elevated water table is anticipated that dewatering during excavation and construction will be required. Coffey's experience on sites with similar subsurface profiled has shown that this is often achievable using a sump and pump system in the base of the excavation.

The options for disposal of the water from dewatering has not been assessed as part of this investigation and may require assessment during detailed site investigations, including possible contamination from the existing service station.

Due to the presence of stiff to hard residual clays and weathered rock within the soil profile, localised slumping of walls isn't expected to occur, provided that temporary excavations are battered no greater than 1H:1V and protected against erosion.

Following bulk excavation, it is recommended that all exposed subgrade (beneath the floor slab) be immediately covered with a layer of blinding concrete, or a working platform of gravel or similar approved material to reduce risk of degradation or softening due to exposure.

It is understood that it was proposed to use a sheet piled wall option for temporary support during construction. This method may encounter difficulties due to the presence of Unit 1 fill material that contained slag and concrete, which was encountered in BH1, at the western end of the existing service station. It is possible that this material is more extensive in the western portion of the site. Options for excavation supports are present in Section 5.4.

5.2 Stability Parameters for Earthworks and Retention of Permanent Excavations

Table 4 provides recommended parameters for design of retaining measures and earthworks within each of the inferred geotechnical units.

TABLE 4 – RECOMMENDED PARAMETERS FOR RETAINING MEASURES AND STABILITY OF EARTHWORKS BY INFERRED GEOTECHNICAL UNIT

GEOTECHNICAL UNIT	ACTIVE EARTH PRESSURE (K_a)	PASSIVE EARTH PRESSURE (K_p)	MAXIMUM SLOPE OF EXCAVATED UNSUPPORTED BATTER	
			Temporary Excavations ¹	Permanent Excavations
UNIT 1	0.4	2.5	1V:1H	1V:2H
UNIT 2	0.4	2.5	1V:1H	1V:2H
UNIT 3	0.35	2.8	1V:1H	1V:2H
UNIT 4	0.3	3.4	1V:1H	1V:2H
UNIT 5	0.2	4.8	1V:0.5H	1V:1.5H
UNIT 6	0.35	2.8	1V:0.5H	1V:1.5H
NOTE:				
¹ Subject to inspection during excavation check for water inflow, adversely orientated defects or other conditions that could affect stability of the slope				

5.3 Foundations

5.3.1 Shallow Foundations

Following bulk excavation, the material to be exposed over the majority of the building footprint will comprise very low to low strength rock at a depth of 5m or low to medium strength rock at a depth of 6m.

Shallow footings (eg: strip, pad footings or raft slabs) may be founded on the UNIT 2, UNIT 3 or UNIT 4 materials. It is recommended that foundations be proportioned for the maximum allowable (serviceability) end bearing pressures outlined in Table 5.

TABLE 5 – ALLOWABLE (SERVICEABILITY) BEARING PRESSURES BY INFERRED GEOTECHNICAL UNIT

GEOTECHNICAL UNIT	MAXIMUM ALLOWABLE BEARING PRESSURE (kPa)	MAXIMUM ALLOWABLE SHAFT ADHESION (kPa)
Engineered Fill Platforms	150	-
UNIT 1	-	-
UNIT 2	-	-
UNIT 3	200	25
UNIT 4	600	60
UNIT 5 and 6	1000	125

The footing should be trimmed and cleaned prior to pouring to remove any loosened or softened material. The exposed clays are likely to fret and soften on exposure and therefore, concrete should be poured within 24 hours of footing excavation, or else a blinding layer of concrete used to protect the base. Should softening of the exposed soils occur, the affected material should be over excavated and backfilled to design footing level by a layer of mass concrete.

5.3.2 Piled Foundations

5.3.2.1 Bored Piles

Bored piles are a feasible option for support of the proposed structure. Bored piles should be proportioned for the following parameters:

TABLE 6 – RECOMMENDED DESIGN PARAMETERS FOR BORED PILES

FOUNDING MATERIAL	UNIT 3	UNIT 4, 5 and 6
Ultimate End Bearing Pressure	600kPa	3 MPa
Serviceability	200kPa	1.0MPa
Ultimate Shaft Adhesion	50kPa	150 kPa
Elastic Modulus	20MPa	300 MPa

For calculation of geotechnical design capacity, the above ultimate values should be factored down using a geotechnical strength reduction factors of $\phi_g = 0.5$

The above parameters assume the sides and base of the pier are clean and rough. It will be necessary to clean the sides of open bored piers to remove the layer of softened, smeared, or remoulded material which forms on the walls of the pile. Construction of open bored piles will require drilling below water table level and it is likely that water inflows will occur into the holes. This may make cleaning of the base and sides difficult and may cause some collapse. The use of casing should be considered. Tremie methods may be required to pour concrete below the water table. Concrete should be poured as soon as possible after drilling and not more than 24 hours after exposure.

5.3.2.2 Raft Foundation with Bored Piles

Raft foundations must be supported on natural ground and may be used in conjunction with bored piles adopting the pile design parameters discussed above. The raft foundation may be founded on the residual clay with an allowable bearing pressure of 150kPa.

5.4 Excavation Supports

In order to construct the anticipated basement level, excavation may be required adjacent to property boundaries. As a result of these cuts possibly being in close proximity to the boundaries, supports will be required during excavation. Options for support of the excavation include:

- Contiguous bored piles;
- Bored soldier piles with infill panels.
- Braced excavation involving prior construction of ground floor levels.

Contiguous bored piles or bored soldier piles can be designed as free standing cantilevered piles, or could be supported by tie-back anchors. Piles designed to be free standing would be about 0.6m diameter reinforced concrete piles. Embedment depths would be roughly equivalent to the height of the free length of the pile supporting the excavation. Piles constructed in this manner should be braced by the proposed structure.

As an alternative to cantilevered piles, the bored piles could be supported by temporary or permanent anchors installed below adjacent properties. Permission from property owners would be required for this option. Anchors for support of the piles can be designed with an allowable shaft friction of 50kPa in clays. Anchors should be installed once excavation reaches a point 1m below the level of the anchor and should be fully installed and tensioned prior to excavation proceeding further. Tension should be applied to anchors upon installation. Piles anchored in this manner would require sufficient socket below the excavation floor level to provide appropriate kick out resistance. Sockets of the order of 2m would be anticipated.

If bored soldier piles are to be used, they should be installed at 2m to 3m centres around the perimeter of the proposed excavation. Excavation should then be undertaken in 2m to 3m depth intervals. The face of each exposed panel should be trimmed to the required final alignment and geotextile wrapped drainage layer such as Nyllex 'Strip-drain' or similar should be pinned to the surface. The drainage layer should extend the full depth of the excavation and should be placed so as to provide adequate lateral coverage across each panel. The drainage layer should be connected into a perimeter drain provided at the toe of the final excavation and should be connected to the site stormwater system to provide long term drainage behind excavation walls.

Following placement of the drainage layer, mesh should be pinned to the wall of the excavation and tied into the adjacent bored piles by means of a series of studs inserted into the pile. Shotcrete should then be sprayed over the mesh, to a minimum thickness of 100mm. Spacers should be provided to ensure that the mesh is located centrally within the shotcrete layer.

An alternative to the above options would be to excavate to a temporary batter of 1H:1V and construct the ground floor level prior to final excavation by boring piers through to the design foundation level and then placing the floor slabs. The structure should be designed to brace the excavation for this option. Subsequent excavation of subfloor levels could then be undertaken, with the pre-installed superstructure bracing the excavation. The face of the excavation could be trimmed to required alignment and either treated by shotcreting as described above, or construction of cast in situ or pre-cast reinforced concrete retaining wall panels. All retaining options will require provision of adequate drainage behind the walls as previously discussed. The following parameters are provided for retaining wall design:

Unit Weight, γ	=	19kN/m ³
Friction Angle, ϕ'	=	25°

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8

Cohesion, C' (excavation)	=	0kPa
Cohesion, C' (below excavation)	=	20kPa
At rest earth pressure coefficient, K ₀	=	0.5
Active earth pressure coefficient, K _a	=	0.33
Passive earth pressure coefficient, K _p	=	3.9
Passive coefficient, clay soil, K _{pc}	=	5.5

Passive pressure behind the retaining walls can be calculated by the following formula:

$$P_p = \frac{1}{2} K_{p0} \gamma H^2 + K_{pc} c H$$

5.5 Aggressivity to Buried Structural Elements

Then results of the aggressivity testing are presented in Appendix B and are summarised below

Borehole 1 (BH1) 3.0 – 3.4

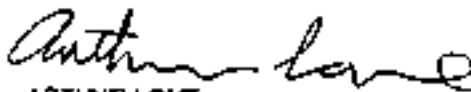
Classified as non-aggressive towards concrete and steel piles.

Borehole 2 (BH2) 1.05 – 1.50

Classified as mildly aggressive towards concrete piles in any material above groundwater. Would be classified as moderately aggressive towards concrete piles if below groundwater. Similarly BH5 would be classified as non-aggressive towards steel piles above groundwater but mildly aggressive in clay or soil below groundwater

For and on behalf of

COFFEY GEOSCIENCES PTY LTD


ARTHUR LOVE

Information

Important Information about your Coffey Report



As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

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APPENDIX A

Results of Field Investigations

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Soil Description

Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms, soil includes every type of unconsolidated or partially consolidated inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil.

Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (USC) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.00 mm to 6 mm
Sand	coarse	600 µm to 2.08 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry	Looks and feels dry. Cohesive and cemented soils are hard, brittle or powdery. Unconsolidated granular soils rattle freely through the tines.
Moist	Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	< 2	A finger can be pushed well into the soil with little effort.
Soft	2 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	> 200	The surface of the soil can be marked only with the thumbnail.
Flowable	-	Clumps or powders when exposed by thumb.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very Loose	Less than 10
Loose	10 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence not detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils < 5% Fine grained soils < 15%
With some	Presence easily detected by feel or eye, soil properties little difference to general properties of primary component.	Coarse grained soils 5 - 12% Fine grained soils 15 - 30%

SOIL STRUCTURE

ZONING	CEMENTING
Layers	Continuous across exposure or sample
Lenses	Discontinuous layers of lenticular shape.
Pockets	Irregular inclusions of different material.
	Weakly cemented
	Moderately cemented

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes/transported downslope by gravity.
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in open basins, bays, beaches and estuaries.

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Explanation Sheet (2 of 2) - Soil Description

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (excluding particles larger than 60 mm and basing fractions on estimated mass)				USC	PRIMARY NAME	
COARSE GRAINED SOILS More than 50% of material less than 60 mm is larger than 0.075 mm	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (less than 5% fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	GW	GRAVEL	
		GRAVELS WITH FINES (Appreciable amount of fines)	Predominantly one size or a range of sizes with more intermediate sizes missing	GP	GRAVEL	
		NON-PLASTIC FINES (for identification procedures see ML below)	GM	SILTY GRAVEL		
			GC	CLAYEY GRAVEL		
	SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (less than 5% fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes missing	SW	SAND	
		SANDS WITH FINES (Appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing	SP	SAND	
		NON-PLASTIC FINES (for identification procedures see ML below)	SM	SILTY SAND		
			SC	CLAYEY SAND		
	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm					
	FINE GRAINED SOILS More than 50% of material less than 60 mm is smaller than 0.075 mm	SILTS & CLAYS (Liquid limit less than 50)	DRY STRENGTH	DILATANCY	TOUGHNESS	
None to low			Quick to slow	None	ML	SILT
Medium to High			None	Medium	CL	CLAY
SILTS & CLAYS (Liquid limit greater than 50)		Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		Low to medium	Slow to very slow	Low to medium	MH	SILT
		High	None	High	CH	CLAY
		Medium to high	None	Low to medium	OH	ORGANIC CLAY
		HIGHLY ORGANIC SOILS			PT	PEAT

• Low plasticity - Liquid limit W_L less than 35% • Medium plasticity - W_L between 35% and 50%

* Low plasticity - Liquid limit W_L less than 35% * Medium plasticity - W_L between 35% and 50%

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub-parallel to layering (see bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub-parallel to layering. May be open or closed. The term 'joint' may be used for irregular joints <0.2mm large.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lensoidal or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very late) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Subsidiary cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter.	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Shim or well like body of soil substance or mass with roughly planar to irregular, near parallel boundaries which cuts through a soil mass. Formed by filling of open joints.	

Rock Description

Explanation Sheet (1 of 2)

Coffey

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which can or be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogeneous material may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are: Coarse grained: Mainly 0.5mm to 2mm Medium grained: Mainly 0.2mm to 0.5mm Fine grained: Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering or penetrative fabric (eg. bedding, cleavage etc.) are: Massive: No layering or penetrative fabric. Indistinct: Layering or fabric just visible. Little effect on properties. Distinct: Layering or fabric is easily visible. Rock breaks more easily parallel to layering or fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition	Term	Abbreviation	Point Load Index, P_{50} (N/25)	Field Guide
Residual Soil	RS	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly reorganised.	Very Low	VL	Less than 1	Material crumbles under firm blows with sharp end of pick. Can be peeled with a knife. Pieces up to 30mm thick can be broken by finger pressure.
Extremely Weathered Material	XM	Material is weathered to such an extent that it has soil properties, ie. it either disintegrates or can be removed in water. Original rock fabric is visible.	Low	L	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm blows of a pick/poin; has a dull sound under hammer. Pieces or cores 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be usable and break during handling.
Highly Weathered Rock	HM	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching. To the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.	Medium	M	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
Moderately Weathered Rock	MM	The whole of the rock substance is discoloured, usually by iron staining or bleaching. To the extent that the colour of the fresh rock is no longer recognisable.	High	H	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow. Rock rings under hammer.
Slightly Weathered Rock	SM	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by iron) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.	Very High	VH	3 to 10	Hard specimen breaks after more than one blow of a pick; rock rings under hammer.
Fresh Rock	FR	Rock substance unaffected by weathering.	Extremely High	EH	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Weathering:

- AS1726 suggests the term 'Discontinuity Weathered' (DW) to cover the range of substance weathering conditions between XM and SM. For projects where it is not practical to distinguish between HM and MM or it is judged that there is no advantage in making such a distinction, DW may be used with the definition given in AS1726.
- Where physical and chemical properties were measured by the project and Equis associated with igneous rocks, the term 'altered' may be substituted to 'weathering' to give the abbreviations XA, HA, MA, SA and DA.

Notes on Rock Substance Strength:

- In anisotropic rocks the field guide to strength applies to the strongest perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the plane of anisotropy.
- The term 'minimum low' is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide chart makes it clear that materials in that strength range are soils in engineering terms.
- The unconfined compressive strength for isotropic rocks (and some rock types which behave isotropically) is typically 10 to 25 times the point load index (PLI). The value may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

Explanation Sheet (2 of 2) - Rock Description



Coffey
COMMON DEFECTS IN ROCK MASSES

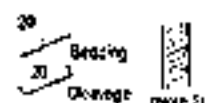
Term **Definition**

Parting A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg. bedding) or a planar anisotropy in the rock substance (eg. cleavage). May be open or closed.

Diagram

Map Symbol

Graphic Log (Note 1)

**DEFECT SHAPE TERMS**

Planar The defect does not vary in orientation.

Curved The defect has a gradual change in orientation.

Undulating The defect has a wavy surface.

Stepped The defect has one or more well defined steps.

Irregular The defect has many sharp changes of orientation.

Note: The assessment of defect shape is partly influenced by the scale of the observation.

Joint A surface or crack across which the rock has little or no tensile strength but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.

**ROUGHNESS TERMS**

Slickensided Grooved or striated surface usually polished.

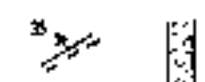
Polished Shiny smooth surface.

Smooth Smooth to touch. Few or no surface irregularities.

Rough Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.

Very Rough Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than, very coarse sand paper.

Sheared Zone (Note 3) Zone of rock substance with roughly parallel, near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.



Sheared Surface (Note 3) A near planar, curved or undulating surface which is usually smooth, polished or slickensided.



Crushed Seam (Note 3) Seam with roughly parallel, almost planar boundaries, composed of disoriented, usually irregular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.

**COATING TERMS**

Clear No visible coating.

Stained No visible coating but surfaces are discoloured.

Veneer A visible coating of soil or mineral, too thin to measure; may be patchy.

Coating A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg. infilled seam). Thicker rock strength material is usually described as a vein.

Infilled Seam Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or pore. Infilled seams less than 1mm thick may be described as veneer or coating on joint surface.



Extremely Weathered Seam Seam of soil substance, often with gradational boundaries. Formed by weathering of the rock substance in place.

**BLOCK SHAPE TERMS**

Blocky Approximately equidimensional.

Tabular Thickness much less than length or width.

Columnar Height much greater than cross section.

Notes on Defects:

1. Usually borehole logs show the true dip of defects and local orientations and sections are apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are usually in geological terms.

Borehole No **BH 1****Engineering Log - Borehole**

Sheet 1 of 3

Office Job No. **N09303/01**Client: **COEVE DESIGN**Date started: **24.11.2004**Principal: **BAY BUILDING INVESTMENTS**Data completed: **24.11.2004**Project: **CORNER KING AND HOWARD STREETS, WARNERS BAY**Logged by: **SJK**Borehole Location: **REFER TO DRAWING N09303/01-1**Checked by: **Coffey**

drill model and mounting		Truck Mounted	Logging	steps: 100'	R.L. Surface: 4.5
hole diameter:		100 mm	Nothing	bearing	datum: AHD
drilling information			material substance		
method	penetration	notes samples, 100mm, etc	depth meters	material description symbol	material classification
ADT	ADT		1	CONCRETE: gray.	C
ADT	ADT		2	FILL: Gravely Clayey SAND: fine to medium grained, gray, gravel fine to coarse grained, clay low to medium plasticity	M
ADT	ADT		3	Clayey SAND: fine to medium grained, gray and pale gray, clay medium to high plasticity, hydrocarbon areas.	
ADT	ADT		4		
ADT	ADT		5		
ADT	ADT		6		
ADT	ADT		7		
ADT	ADT		8		
ADT	ADT		9		
ADT	ADT		10		
ADT	ADT		11		
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ADT	ADT		96		
ADT	ADT		97		
ADT	ADT		98		
ADT	ADT		99		
ADT	ADT		100		

Engineering Log - Borehole

Client: COEVE DESIGN

Principal: BAY BUILDING INVESTMENTS

Project: CORNER KING AND HOWARD STREETS, WARNERS BAY

Borehole Location: REFER TO DRAWING N09303/01-1

Borehole No. BH 1

Sheet 1 of 3

Office Job No.: N09303/01

Date started: 24.11.2004

Date completed: 24.11.2004

Logged by: SJK

Checked by: Coffey 

drill model and mounting		Truck Mounted		Easting		slope: 40°		R.L. Surface: 4.5			
hole diameter:		100 mm		Northing		bearing:		dip: 40°			
drilling information				material substance							
method	penetration	notes samples, tests, etc	PL	depth meters	diagram log	classification symbol	material	structure condition	consistency/ density notes	potholes bearing IDPa	structure and additional observations
AD-01				4		SC	CONCRETE: grey.				CONCRETE
ADT				1			FILL: Gravely Clayey SAND, fine to medium grained, grey, gravel fine to coarse grained clay low to medium plasticity				FILL (imported)
				2							100mm of concrete
				3			Clayey SAND: fine to medium grained, grey and pale grey, clay medium to high plasticity, hydrocarbon odour				EXTREMELY WEATHERED SANDSTONE
				6							
				1							
				2							
				3							
				4							
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				98							
				99							
				100							

Borehole No **BH 1**

Sheet 3 of 3

Office Job No. **N09303/01**Date started **24.11.2004**Date completed **24.11.2004**Logged by **SJK**Checked by: **Engineering Log - Cored Borehole**Client **COVE DESIGN**Principal **BAY BUILDING INVESTMENTS**Project **CORNER KING AND HOWARD STREETS, WARNERS BAY**Borehole Location: **REFER TO DRAWING N09303/01-1**

drill method & mounting				Tach Mounted		Easting:		slope:		R.L. Surface		±5	
hole diameter				100 mm		Drilling fluid:		Mud		Holding:		blowing:	
drilling information				material substance				rock mass defects					
method	depth	water	depth	material	estimated	is to	defect	defect description					
depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	
depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	depth	
1	1	1	1	orange and dark brown sands, mainly layered with lenses of brownish yellow clay - pale grey to pale yellow	1	1	1	1	1	1	1	1	
2	2	2	2	COAL: black, some extremely weathered brown bands	2	2	2	2	2	2	2	2	
3	3	3	3	SILTSTONE: grey with dark grey bands	3	3	3	3	3	3	3	3	
4	4	4	4	CLAYSTONE: pale grey to pale green, some black mottling	4	4	4	4	4	4	4	4	
5	5	5	5	COAL: black	5	5	5	5	5	5	5	5	
6	6	6	6	SILTSTONE: grey, dark grey	6	6	6	6	6	6	6	6	
7	7	7	7	CLAYSTONE: pale grey to pale green, some black mottling	7	7	7	7	7	7	7	7	
8	8	8	8	CLAYSTONE: pale grey to pale green, some black mottling	8	8	8	8	8	8	8	8	
9	9	9	9	CLAYSTONE: pale grey to pale green, some black mottling	9	9	9	9	9	9	9	9	
10	10	10	10	CLAYSTONE: pale grey to pale green, some black mottling	10	10	10	10	10	10	10	10	
11	11	11	11	CLAYSTONE: pale grey to pale green, some black mottling	11	11	11	11	11	11	11	11	
12	12	12	12	CLAYSTONE: pale grey to pale green, some black mottling	12	12	12	12	12	12	12	12	
13	13	13	13	CLAYSTONE: pale grey to pale green, some black mottling	13	13	13	13	13	13	13	13	
14	14	14	14	CLAYSTONE: pale grey to pale green, some black mottling	14	14	14	14	14	14	14	14	
15	15	15	15	CLAYSTONE: pale grey to pale green, some black mottling	15	15	15	15	15	15	15	15	
16	16	16	16	CLAYSTONE: pale grey to pale green, some black mottling	16	16	16	16	16	16	16	16	
17	17	17	17	CLAYSTONE: pale grey to pale green, some black mottling	17	17	17	17	17	17	17	17	
18	18	18	18	CLAYSTONE: pale grey to pale green, some black mottling	18	18	18	18	18	18	18	18	
19	19	19	19	CLAYSTONE: pale grey to pale green, some black mottling	19	19	19	19	19	19	19	19	
20	20	20	20	CLAYSTONE: pale grey to pale green, some black mottling	20	20	20	20	20	20	20	20	
21	21	21	21	CLAYSTONE: pale grey to pale green, some black mottling	21	21	21	21	21	21	21	21	
22	22	22	22	CLAYSTONE: pale grey to pale green, some black mottling	22	22	22	22	22	22	22	22	
23	23	23	23	CLAYSTONE: pale grey to pale green, some black mottling	23	23	23	23	23	23	23	23	
24	24	24	24	CLAYSTONE: pale grey to pale green, some black mottling	24	24	24	24	24	24	24	24	
25	25	25	25	CLAYSTONE: pale grey to pale green, some black mottling	25	25	25	25	25	25	25	25	
26	26	26	26	CLAYSTONE: pale grey to pale green, some black mottling	26	26	26	26	26	26	26	26	
27	27	27	27	CLAYSTONE: pale grey to pale green, some black mottling	27	27	27	27	27	27	27	27	
28	28	28	28	CLAYSTONE: pale grey to pale green, some black mottling	28	28	28	28	28	28	28	28	
29	29	29	29	CLAYSTONE: pale grey to pale green, some black mottling	29	29	29	29	29	29	29	29	
30	30	30	30	CLAYSTONE: pale grey to pale green, some black mottling	30	30	30	30	30	30	30	30	
31	31	31	31	CLAYSTONE: pale grey to pale green, some black mottling	31	31	31	31	31	31	31	31	
32	32	32	32	CLAYSTONE: pale grey to pale green, some black mottling	32	32	32	32	32	32	32	32	
33	33	33	33	CLAYSTONE: pale grey to pale green, some black mottling	33	33	33	33	33	33	33	33	
34	34	34	34	CLAYSTONE: pale grey to pale green, some black mottling	34	34	34	34	34	34	34	34	
35	35	35	35	CLAYSTONE: pale grey to pale green, some black mottling	35	35	35	35	35	35	35	35	
36	36	36	36	CLAYSTONE: pale grey to pale green, some black mottling	36	36	36	36	36	36	36	36	
37	37	37	37	CLAYSTONE: pale grey to pale green, some black mottling	37	37	37	37	37	37	37	37	
38	38	38	38	CLAYSTONE: pale grey to pale green, some black mottling	38	38	38	38	38	38	38	38	
39	39	39	39	CLAYSTONE: pale grey to pale green, some black mottling	39	39	39	39	39	39	39	39	
40	40	40	40	CLAYSTONE: pale grey to pale green, some black mottling	40	40	40	40	40	40	40	40	
41	41	41	41	CLAYSTONE: pale grey to pale green, some black mottling	41	41	41	41	41	41	41	41	
42	42	42	42	CLAYSTONE: pale grey to pale green, some black mottling	42	42	42	42	42	42	42	42	
43	43	43	43	CLAYSTONE: pale grey to pale green, some black mottling	43	43	43	43	43	43	43	43	
44	44	44	44	CLAYSTONE: pale grey to pale green, some black mottling	44	44	44	44	44	44	44	44	
45	45	45	45	CLAYSTONE: pale grey to pale green, some black mottling	45	45	45	45	45	45	45	45	
46	46	46	46	CLAYSTONE: pale grey to pale green, some black mottling	46	46	46	46	46	46	46	46	
47	47	47	47	CLAYSTONE: pale grey to pale green, some black mottling	47	47	47	47	47	47	47	47	
48	48	48	48	CLAYSTONE: pale grey to pale green, some black mottling	48	48	48	48	48	48	48	48	
49	49	49	49	CLAYSTONE: pale grey to pale green, some black mottling	49	49	49	49	49	49	49	49	
50	50	50	50	CLAYSTONE: pale grey to pale green, some black mottling	50	50	50	50	50	50	50	50	
51	51	51	51	CLAYSTONE: pale grey to pale green, some black mottling	51	51	51	51	51	51	51	51	
52	52	52	52	CLAYSTONE: pale grey to pale green, some black mottling	52	52	52	52	52	52	52	52	
53	53	53	53	CLAYSTONE: pale grey to pale green, some black mottling	53	53	53	53	53	53	53	53	
54	54	54	54	CLAYSTONE: pale grey to pale green, some black mottling	54	54	54	54	54	54	54	54	
55	55	55	55	CLAYSTONE: pale grey to pale green, some black mottling	55	55	55	55	55	55	55	55	
56	56	56	56	CLAYSTONE: pale grey to pale green, some black mottling	56	56	56	56	56	56	56	56	
57	57	57	57	CLAYSTONE: pale grey to pale green, some black mottling	57	57	57	57	57	57	57	57	
58	58	58	58	CLAYSTONE: pale grey to pale green, some black mottling	58	58	58	58	58	58	58	58	
59	59	59	59	CLAYSTONE: pale grey to pale green, some black mottling	59	59	59	59	59	59	59	59	
60	60	60	60	CLAYSTONE: pale grey to pale green, some black mottling	60	60	60	60	60	60	60	60	
61	61	61	61	CLAYSTONE: pale grey to pale green, some black mottling	61	61	61	61	61	61	61	61	
62	62	62	62	CLAYSTONE: pale grey to pale green, some black mottling	62	62	62	62	62	62	62	62	
63	63	63	63	CLAYSTONE: pale grey to pale green, some black mottling	63	63	63	63	63	63	63	63	
64	64	64	64	CLAYSTONE: pale grey to pale green, some black mottling	64	64	64	64	64	64	64	64	
65	65	65	65	CLAYSTONE: pale grey to pale green, some black mottling	65	65	65	65	65	65	65	65	
66	66	66	66	CLAYSTONE: pale grey to pale green, some black mottling	66	66	66	66	66	66	66	66	
67	67	67	67	CLAYSTONE: pale grey to pale green, some black mottling	67	67	67	67	67	67	67	67	
68	68	68	68	CLAYSTONE: pale grey to pale green, some black mottling	68	68	68	68	68	68	68	68	
69	69	69	69	CLAYSTONE: pale grey to pale green, some black mottling	69	69	69	69	69	69	69	69	
70	70	70	70	CLAYSTONE: pale grey to pale green, some black mottling	70	70	70	70	70	70	70	70	
71	71	71	71	CLAYSTONE: pale grey to pale green, some black mottling	71	71	71	71	71	71	71	71	
72	72	72	72	CLAYSTONE: pale grey to pale green, some black mottling	72	72	72	72	72	72	72	72	
73	73	73	73	CLAYSTONE: pale grey to pale green, some black mottling	73	73	73	73	73	73	73	73	
74	74	74	74	CLAYSTONE: pale grey to pale green, some black mottling	74	74	74	74	74	74	74	74	
75	75	75	75	CLAYSTONE: pale grey to pale green, some black mottling	75	75	75	75	75	75	75	75	
76	76	76	76	CLAYSTONE: pale grey to pale green, some black mottling	76	76	76	76	76	76	76	76	
77	77	77	77	CLAYSTONE: pale grey to pale green, some black mottling	77	77	77	77	77	77	77	77	
78	78	78	78	CLAYSTONE: pale grey to pale green, some black mottling	78	78	78	78	78	78	78	78	
79	79	79	79	CLAYSTONE: pale grey to pale green, some black mottling	79	79	79	79	79	79	79	79	
80	80	80	80	CLAYSTONE: pale grey to pale green, some black mottling	80	80	80	80	80	80	80	80	
81	81	81	81	CLAYSTONE: pale grey to pale green, some black mottling	81	81	81	81	81	81	81	81	
82	82	82	82	CLAYSTONE: pale grey to pale green, some black mottling	82	82	82	82	82	82	82	82	
83	83	83	83	CLAYSTONE: pale grey to pale green, some black mottling	83	83	83	83	83	83	83	83	
84	84	84	84	CLAYSTONE: pale grey to pale green, some black mottling	84	84	84	84	84	84	84	84	
85	85	85	85	CLAYSTONE: pale grey to pale green, some black mottling	85	85	85	85	85	85	85	85	
86	86	86	86	CLAYSTONE: pale grey to pale green, some black mottling	86	86	86	86	86	86	86	86	
87	87	87	87	CLAYSTONE: pale grey to pale green, some black mottling	87	87	87	87	87	87	87	87	
88	88	88	88	CLAYSTONE: pale grey to pale green, some black mottling	88	88	88	88	88	88	88	88	
89	89	89	89	CLAYSTONE: pale grey to pale green, some black mottling	89	89	89	89	89	89	89	89	
90	90	90	90	CLAYSTONE: pale grey to pale green, some black mottling	90	90	90	90	90	90	90	90	
91	91	91	91	CLAYSTONE: pale grey to pale green, some black mottling	91	91	91	91	91	91	91	91	
92	92	92	92	CLAYSTONE: pale grey to pale green, some black mottling	92	92	92	92	92				

N09903/01
 COEVE DESIGN
 PROPOSED MIXED USE DEVELOPMENT
 CORNER OF KING AND HOWARD STREETS, WARNERS BAY
 BOREHOLE: BH1 4.68m TO 10.19m



Coffey Geosciences Pty Ltd ACH 056 305 515

Geotechnical | Resources | Environmental | Technical | Project Management

Drawn	DDM	COEVE DESIGN	Borehole/s:
Approved		PROPOSED MIXED USE DEVELOPMENT	BH1
Date	14-Dec-04	CORE PHOTOGRAPHS	Document:
Scale	AS SHOWN	BH2	N09303/01-AB

Borehole No. **BH 2**

Sheet 1 of 3

Office Job No. **N09303/01**Date started: **25.11.2004**Date completed: **25.11.2004**Logged by: **SJK**Checked by: **Engineering Log - Borehole**Client: **COEVE DESIGN**Principal: **BAY BUILDING INVESTMENTS**Project: **CORNER KING AND HOWARD STREETS, WARNERS BAY**Borehole Location: **REFER TO DRAWING N09303/01-1****Coffey**

drilling information		material substance		structure and additional observations	
method	penetration	depth	material	classification	structure and additional observations
ADV	1.0	0	TOPSOIL: Silty CLAY, medium to high plasticity, pale grey to brown and pale brown, sand fine to coarse grained. trace silt.	3-4	TOPSOIL
		1	CLAY: medium to high plasticity, red and pale brown mottled pale grey, mottling decreasing with depth.	5-6	RESIDUAL SOIL
	SPT 2.5.6 MPa	7	Grading into Extremely Weathered Sandstone		
		2	Colour pale grey		
	SPT 4.14.8 MPa	5	CLAY: fine to medium grained, orange and pale grey to white	7	EXTREMELY WEATHERED SANDSTONE
		3	SANDSTONE: fine to medium grained, white with orange bands		HIGHLY WEATHERED SANDSTONE
		4	Borehole BH 2 continued as open hole		
		5			
		6			
		7			
		8			

Borehole N09303/01 COFFEY/2011/12/24

Borehole N09303/01 COFFEY/2011/12/24

Engineering Log - Cored Borehole

Cart **COEVE DESIGN**

Principal: **BAY BUILDING INVESTMENTS**

Project: CORNER KING AND HOWARD STREETS, WARNERS BAY

Boys' Life Location: **REFER TO DRAWING A09303/01-1**

drill model & mounting				drill		slope:		R.L. Surface		S.A.	
hole diameter				100 mm		Drilling fluid:		Water		Mortaring:	
bearing										day/m:	
drilling information				material substance				rock mass defects			
method	core bit	water	R.L.	depth	graphic log	material	weathering	strength	100 MPa	defect spacing	defect description
NMTC				0		CLAYSTONE: white with grey bands, finely bedded. (continued)	WV		11.10.23		CS, U, PL, SO, SN
				1		Colour pale brown to pale grey.	WV				PT, U, UN, SO, SN
				2			WV				PT, U, UN, SO, SN
				3			WV				PT, U, UN, SO, SN
				4		Colour dark grey with some brown, pale grey and black seams, numerous coal seams.	WV				PT, U, UN, SO, SN
				5			WV				CS, U, UN, SO, SN
				6			WV				PT, U, PL, SO, SN
				7			WV				PT, U, PL, SO, SN
				8			WV				CS, U, PL, SO, SN
				9			WV				
				10		BM 2 terminated at 10m	WV				
				11			WV				
				12			WV				
				13			WV				
				14			WV				
				15			WV				
				16			WV				

N09903/01
 COVE DESIGN
 PROPOSED MIXED USE DEVELOPMENT
 CORNER OF KING AND HOWARD STREETS, WARNERS BAY
 BOREHOLE: BH2 3.24M TO 10.0M



Coffey Geosciences Pty Ltd ACN 090 336 516

Geotechnical | Resources | Environmental | Technical | Project Management

Drawn	DDM	COVE DESIGN	Borehole/s:
Approved		PROPOSED MIXED USE DEVELOPMENT	BH2
Date	14-Dec-04	CORE PHOTOGRAPHS	Document:
Scale	AS SHOWN	BH1	N09303/01-AB

N09303/01-AB
20 December 2004

APPENDIX B

Laboratory Results

Coffey 



CERTIFICATE OF ANALYSIS

Client : COFFEY GEOSCIENCES PTY LTD		Laboratory : ALS Environmental Brisbane		Page : 1 of 3
Contact : MR DREW MORGAN		Contact : Michael Henry		
Address : 13 MANGROVE ROAD SANDGATE NSW AUSTRALIA 2304		Address : 32 Shand Street Blenheim QLD Australia 4053		Work order : EBD407957
Project : NEM13M11		Quote number : EBD0000011		
Order number : 4242				
C.O.C number : 21766				
Site : NF 16455				
E-mail : drew_morgan@coffey.com.au		E-mail : Michael.Henry@alsenviro.com		
Telephone : 02 4957 9277		Telephone : 01-7-32437222		
Facsimile : 02 4987 5402		Facsimile : 01-7-32437259		
			No. of samples Received : 2	
			Analytical : 2	

This final report was issued on Friday, December 17, 2004 for the ALS work order reference EBD407957 and supersedes any previous reports with this reference. Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

- This report contains the following information:
- Analytical results for samples submitted
 - Surrogate control limits

ALS - QUALITY, SERVICE and TECHNOLOGY provided GLOBALLY



NATA accredited Laboratory - #75

The Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its scope of accreditation. This document shall not be reproduced except in full.

This document has been digitally signed by those names that appear on this report and are the authorised signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signature :
Kim McCann
Shawn Grubb

Department

Inorganics - NATA 818 (Brisbane)
Inorganics - NATA 818 (Brisbane)



ALX Environmental

Client: COFFEY GEOSCIENCES PTY LTD

Project: NS30301

Work Order:

EB0401803

Page Number: 2 of 3

Print Date:

21 Dec 2004

When moisture determination has been performed, results are reported on a dry weight basis. When a reporting basis that results higher than the LDR, this may be due to primary sample extraction solution and/or insufficient sample amount for analysis. Surrogate Recovery Limits are stated and based on USEPA Surrogate or ALX QN1010100 in the absence of specified USEPA method(s). Abbreviations: G.S. number - Chemical Analysis Service number; LDR - Limit of Reporting; R indicates a failed LDR. * Indicates failed Surrogate Recoveries. When detected and/or limited and/or failed, these have been assumed by the laboratory for process purposes.

Analytical Results

Client Sample ID		Sample Matrix Type / Description		Sample Date / Time		Laboratory Sample ID	
Analysis	QAS number	LOA	Unit	LOA	Unit	LOA	Unit
EA002: pH (Soils)	12109-02-5	0.1	pH Unit	0.2	0.8	0.2	0.8
EA003: Moisture Content			%	20.4	24.9		
EA004: Moisture Content (moist @ 103°C)			%	20.4	24.9		
EA005: Boron (B) Supplied by NCPAES	12109-02-5	10	mg/kg	300	130		
EA006: Chloride	12109-02-5	10	mg/kg	10	20		



Client : COMSEC GEDSCIENCES PTY LTD
Project : N930001

Work Order : E80403957
ALS Order Reference : E820030011

Page Number : 3 of 3
Issue Date : 17 Dec 2004

ALS Confidential

Surrogate Control Limits

This analytical procedures used by ALS Environmental are based on established internationally recognized procedures such as those published by the US EPA, APHA, AS and NELAP. The house procedures are employed in the absence of documented standards or by client request. The following report provides total descriptions of the analytical procedures employed for results reported herein. Refer to the methods which ALS methods are based are provided in parenthesis.

- No surrogate present on this report.

ALS Environmental**QUALITY CONTROL REPORT**

Client	: GORBY GEOSCIENCES PTY LTD		Laboratory	: ALS Environmental Brisbane	Page	: 1 of 4
Contact	: MR DREW MORGAN		Contact	: Michael Henry	Work order	: EB0407957
Address	: 13 MARGROVE ROAD SAMINGATE NSW AUSTRALIA 2304		Address	: 32 Strand Surfer Station QLD Australia 4053		
Project	: M92030701		Quote number	: EB20000011	Date received	: 3 Dec 2004
Order number	: 4242		E-mail	: drew_morgan@geology.com.au	Date issued	: 17 Dec 2004
C-O-C number	: 27768		Telephone	: 02 4967 6377	No. of samples Retained	: 2
Site	: NE 18465		Facsimile	: 02 4967 6402	Analyzed	: 2

This final report was issued on Friday, December 17, 2004 for the ALS work order reference EB0407957 and supersedes any previous reports with this reference. Results apply to the samples as submitted. All pages of this report have been checked and approved for release.

This report contains the following information:

- Laboratory Duplicates (DUP): Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Samples (LCS): Recovery and Acceptance Limits
- Matrix Spikes (MS): Recovery and Acceptance Limits

ALS - QUALITY SERVICE and TECHNOLOGY provided GLOBALLY

NATA Accredited Laboratory - 825

This Laboratory is accredited by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with the scope of accreditation. This document shall not be reproduced except in full.

This document has been digitally signed by those named and appears on this report and are the authorized signatories. Digital signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signature
Xun McCabe
Sharon Crabbe

Department

Inorganics - NATA 818 (Brisbane)
Inorganics - NATA 818 (Brisbane)



ALS Environmental

Client : COFFEY GEOSOURCES PTY LTD
 Project : M330301
 Work Order : EN0407562
 ALB Quota Reference : EB20070011
 Page Number : 2 of 4
 Issue Date : 17 Oct 2014

Quality Control Report - Laboratory Duplicates (DUP)

This quality control form Laboratory Duplicates refers to an inter-laboratory split sample randomly selected from one sample batch. Laboratory duplicates provide information on method precision and sample heterogeneity. Appropriate Client Sample IDs refer to samples which are not specifically over the QC process but formed part of the QC process. For Abbreviations: LOR = Limit of Reporting, RPD = Relative Percent Difference. Individual split QC. This normalised ranges for the RPD of Laboratory Duplicates (relative percent difference) are specified in ALS Method QM1-Env03 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, 4% - 50%. Result > 20 times LOR, 0% - 20%.

Media Type: SOL

Laboratory Sample ID		Client Sample ID	Sample Name	LOE	Original Result	Duplicate Result	RPD
EA002: pH (1.5)							
EA002: pH (5.0h) - (QC Lot: 27385)					pH Unit	pH Unit	%
EB0407562-001		BH1 3.0-3.4	pH Value	0.1 pH Unit	8.3	9.2	0.0
EA005: 103: Methane Content							
EA005: Moisture Content - (QC Lot: 26568)					%	%	%
EA005: Moisture Content - (QC Lot: 26568)					20.2	21.2	4.8
EA005: Sulphate at 504 2: Soluble					mg/g	mg/g	%
EA005: Sulphate at 504 2: Soluble by (CPAES - (QC Lot: 27385))					500	510	0.0
EB0407562-001		BH1 3.0-3.4	Sulphate at 504 2:	10 mg/kg			
EA005: Chloride - Soluble					mg/kg	mg/kg	%
EA005: Chloride - (QC Lot: 27385)					20	20	0.0
EB0407562-002		BH2 1.05-1.50	Chloride	10 mg/kg			



Client: CONVEY GEOSCIENCES PTY LTD

Project: W000001

Work Order:

ALS Order Reference:

E80407557

E820000011

Page Number: 1 of 8

Issue Date: 17 Dec 2004

ALS Environmental

Quality Control Report - Method Blank (MB) and Laboratory Control Samples (LCS)

The quality control term Method Blank refers to an empty test matrix to which all reagents are added in the same volume or proportions as used in standard sample preparation. The purpose of this QC type is to monitor potential laboratory contamination. The quality control term Laboratory Control Samples (LCS) refers to a known, homogeneous test matrix spiked with target analytes or certified reference material. The purpose of this QC type is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of actual laboratory data. Abbreviations: LOR = Limit of Reporting.

- Indicates Failed QC

Matrix Type: SOL

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

Analyte name	LOR	Method blank result	Actual Recovery		Recovery Limit	
			Static concentration	Static Recovery	Dynamic Recovery Limit	Recovery Limit
ED0443: Sulphate as SO ₄ 2- Soluble				LOR		N/A
ED0408: Barium Sulphate as SO ₄ 2- (QC Lot: 27 MB)				%	%	%
Sulphate as SO ₄ 2-	10 mg/kg	mg/g = 10	mg/g			
ED0445: Chloride as Chloride				%	%	%
ED0445: Chloride (QC Lot: 27 MB)	10 mg/kg	mg/g = 10	mg/g			
Chloride			1000	99.7	70	150



Client : COFFEY GEOSCIENTIFIC PTY LTD
 Project : 4030001
 Work Order : E80407967
 ALS Order Reference : E82003001
 Page Number : 4 of 4
 Issue Date : 17 Dec 2004
 ALS Environmental

Quality Control Report - Matrix Spikes (MS)

This quality control term Matrix Spike (MS) refers to an in-laboratory split sample spiked with a representative set of target analytes. The purpose of this QC type is to monitor potential matrix effects on analyte recoveries. Spike Recovery Limits are set laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference. - Anonymous - Client Sample ID refers to samples which are not specifically part of this work order but formed part of the QC process for. Abbreviations: LOR = Limit of Reporting, RPD = Relative Percent Difference.

* Indicates Failed QC

Matrix Type: SOW

Analyte Name	Laboratory Sample ID	Client Sample ID	LOR	Spike Concentration	Actual Result			Recovery Limit		
					Conc'n Result	MS	%	Low	High	MS
ED0455: Chloride - Soluble										
ED0455: Chloride - (OC Int: 27366)										
ED0455: Chloride	E80407967.001	Mat 0.0-0.4	10 mg/kg	mg/kg	10	105	%	N	h	130

Matrix Spike (MS) Report

Chain of Custody

No: 27768

Laboratory Quotation / Order No: 4242

Job No: N9303/01

Sheet 1 of 1

Dispatch to:
(Address &
Phone No.)

ALS

Attestation:

Sample Receipt

Redeveloped by:

T. Kelly

Katie Kelly - ALS Newcastle

Signed by:

Shannon Kelly

Project Manager:
(Report results to)

Drew Morgan

Consigning Officer:

Newcastle

Date Dispatched:

1/12/04

Coastline Service:

N/A

Consignment Note No:

Redeveloped by:

T. Kelly

Katie Kelly - ALS Newcastle

Date:

1/12/04

Time:

4pm

Received by:

Drew Morgan

Date:

1/12/04

Time:

4:10

Comments:

① Soil

② "

Batch No. ☐ ORG

NE 16406

Batched Date: 2/12

☒ Soil ☐ Ambient☐ Water ☒ Chilled☐ Other ☒ Fertiliser☐ Substantive Work☐ Bottle Return☐ Imm, Anal, Activated

2x Plastic

Bag - soil

Sample Matrix

Container Type
and Preservative

Plastic Bag

Sample No.

BH1 3.0-3.4

BH2 1.05-1.50

Date Sampled

24.11.04

Metals

MAHS + BTEX

TPH

PAHs

Analyses Required

Sketch 7

Sample
Condition
on ReceiptAddressed to
ALS and NewcastleALS Environmental
Brisbane
Work Order
EB0407957

Telephone: 61-7-52437222

Special Laboratory Instructions:

A Plastic return Sample to Coffey Geosciences
13 Mangrove Road
Snodgrass 2304

Deletion Labels

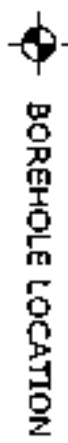
Copies: WHITE: Right on receipt. YELLOW: If dispatched to International Lab. Use to sign on receipt and fax back to Coffey. BLUE: To be returned with result.

JOB NUMBER MUST BE
REFERENCED ON ALL
SUBSEQUENT PAGES

10-1-15506



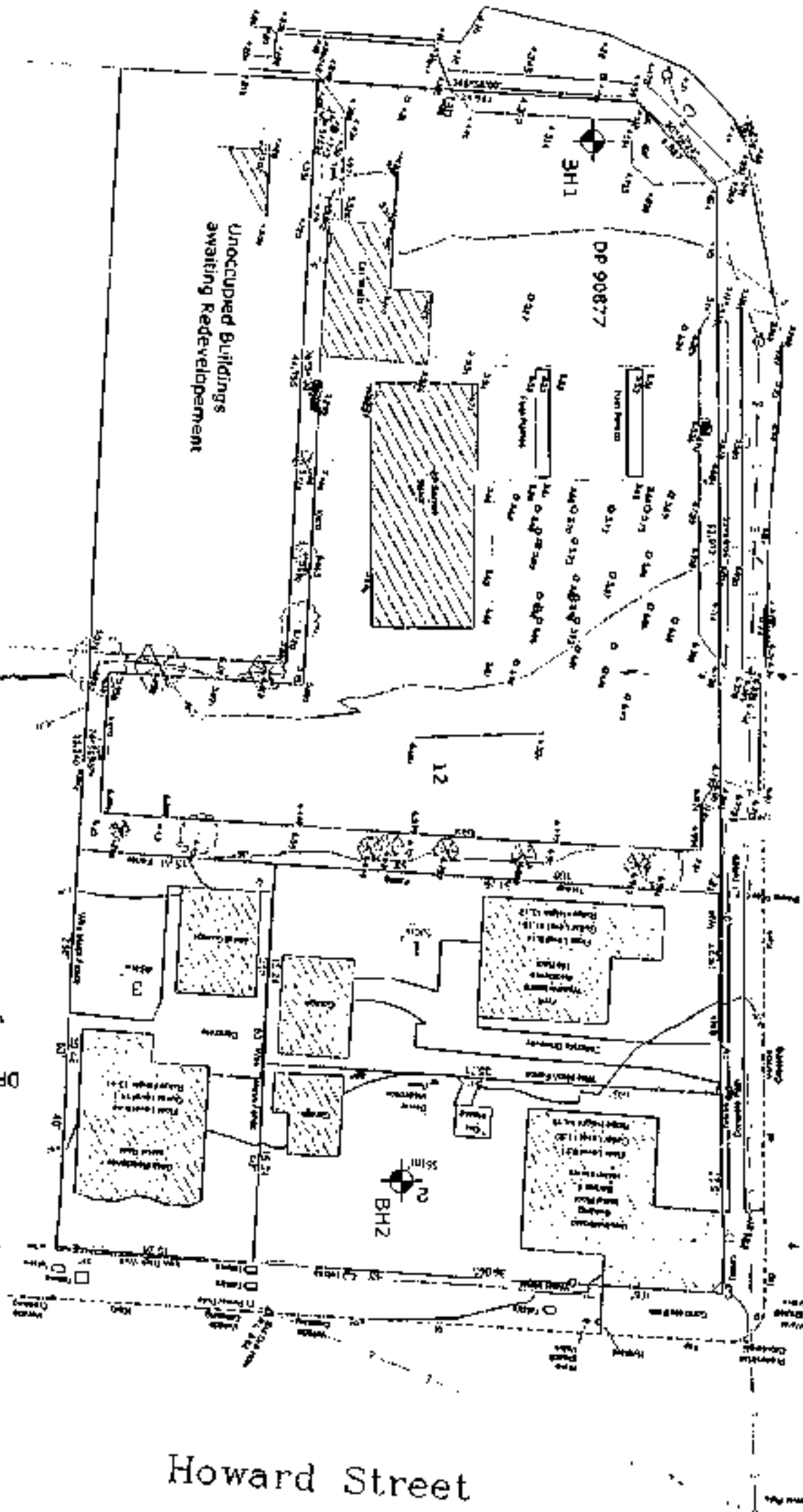
LEGEND



The Esplanade

King Street

Howard Street



Coffey Geosciences Pty Ltd

Geotechnical Resources | Environmental | Technical | Project Management

COEVE DESIGN

PROPOSED MIXED USE DEVELOPMENT
GEOTECHNICAL ASSESSMENT
SITE PLAN

Drawing No

N09303/01-1

Job No N09303/01-AB

Author

Drawn

Approved

Date

Check

DDM / DMW

Date

Scale

1:400 (A3)

Revision

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11 – ENVIRONMENTAL SITE ASSESSMENT

7th September 2015

Yahav Property Investments Pty Ltd
c/PKF Newcastle
755 Hunter St
NEWCASTLE NSW 2300

Waste Classification for Lot 1 DP90877, BP Service Station, 482 The Esplanade, Warners Bay, NSW

To Whom It May Concern,

Aurora Environmental Consulting Pty Ltd (Aurora) was engaged by Yahav Property Investments to provide a waste classification for off-site disposal of material from the abovementioned site. Details of the source site, material characterisation and waste classification are provided below. The Limitations included in **Attachment 1** apply to the advice provided herein.

1. Source Site Details

Lot/DP	Lot 1 DP90877
Address	482 The Esplanade, Warners Bay, NSW, 2282
Local Government Authority	Lake Macquarie City Council
Description of Source Site/Area	Surface material on site to a depth of 4.5m below ground surface in the anticipated excavation areas as shaded orange in Figure 1 in Attachment 3 . Areas outside of the shaded zone have been validated as Excavated Natural Material (ENM) in accordance with the NSW EPA ENM Order (2014) under separate reporting cover.

2. Material Characterisation

Material identification	Silty Clay and Sandy Gravel Fill, soft to stiff, dark brown Silty Clay and Clayey Sandy Silt Natural Soils, soft to stiff, grey/brown/red, moderate plasticity and homogenous structure, and natural yellow sandstone.
Area	Approximately 800m ²
Estimated volume (m ³)	Approximately 2000m ³ (in-situ)
Characterisation Samples	SB1 (0.8-1.0m), SB1 (2.3-2.5m), SB1 (3.8-4.0m), SB2 (0.8-1.0m), SB2 (2.3-2.5m), SB2 (3.8-4.0m), SB3 (0.8-1.0m), SB3 (2.3-2.5m), SB3 (3.8-4.0m), SB7(0.5-1.0m), SB7 (2.5-3.0m), SB7 (3.5-4.0m). Sample Locations are shown in Attachment 3 .
QA/QC Samples	QS4. This was collected from sample SB3 (2.3-2.5m)
TCLP Samples	N/A
Sampling Date(s)	30 th July 2015
Laboratory	Australian Laboratory Services (ALS)
Contaminants of Concern	Total Petroleum Hydrocarbons (TPHs), benzene, toluene, ethylbenzene, xylene (BTEx), Naphthalene, Lead (Pb)
Laboratory Report Attached?	Yes – Attachment 2
Additional Data Sources?	N/A
Additional Data Attached?	N/A
All laboratory methods NATA certified?	Yes
Material description	Material in the vicinity of proposed excavation areas included heterogenous, sandy gravel fill, dark grey silty clays, brown/grey/red clayey silts and sandstone
Visible Asbestos Containing Material (ACM)?	No visible asbestos containing material was identified during the waste classification.
Visible Putrescible Material	None observed
Is the material covered by a General Immobilisation Approval?	No

3. Waste Classification

Waste Classification	GENERAL SOLID WASTE
Does 'Special Waste' apply?	No
Is the material classified as 'Hazardous Waste'?	No
General/Specific Immobilisation Approval No.	N/A
Classification Comments	The classification applies to all the material identified and described herein as a whole, and only the material identified and described herein. Should subsurface conditions differ from the material described in this document, or excavation works extend beyond the extent shown in the figure in Attachment 3 , the waste classification may require revision.
Disposal Comments	Waste must be transported by an appropriately licensed transporter and disposed to a facility that is licensed to receive that class of waste

Should you have any queries or require further clarification, please feel free to contact the undersigned on 0438233779 or by email tim@auroraenvironmentalconsulting.com.au

Yours sincerely:



Tim Brown

Director

Aurora Environmental Consulting Pty Ltd

Attachments:

1. Limitations
2. Laboratory Analysis Report and COCs
3. Site Layout

1 The estimated volume of waste is an indicative estimate only based on site dimensions and investigation depot. For material characterised in-situ, a bulking factor may be applied.

2 Material observations including those relating to visible ACM and putrescible materials were made prior to material leaving the source site.

3 Wastes that are not generally classified as putrescible include: soils, timber, garden trimmings, agricultural, forestry and crop materials, and natural fibrous organic and vegetative materials, as per NSW DECCW (2009) Waste Classification Guidelines, Part 1: Classifying Waste.

4 Waste classification in accordance with NSW DECCW (2009) Waste Classification Guidelines, Part 1: Classifying Waste.

5 Disposal Facility or Facilities must be appropriately licensed under Schedule 1, Section 39; "Waste Disposal (Application to Land)", of The Protection of the Environment Operations (POEO) Act 1997. Disposal of 'Asbestos Waste', as defined under the Act and associated Waste Guidelines, is required to be managed in accordance with Section 42 of The Protection of the Environment Operations (Waste) Regulation 2005 in terms of loading, transport, unloading and disposal. The POEO Act 1997 states that if waste is transported to a facility not lawfully authorised as a waste facility for that waste, the owner, transporter and receiver of the waste are each guilty of an offence. The owner of waste includes, in relation to waste that has been transported, the person who was the owner of the waste immediately before it was transported.

Attachment 1 – Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. The report has been prepared specifically for the client for the purposes of the commission, including use by the Site Auditor acting as an agent of the client in this respect. No warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this report by any third party.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose. This report should not be amended in any way without prior approval by Aurora, or reproduced other than in full including all attachments as originally provided to the client by Aurora.

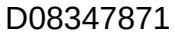
Limited sampling and laboratory analyses were undertaken as part of the investigations reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the stockpile or subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site or material investigated, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, Aurora reserves the right to review the report in the context of the additional information.

Lot 1 DP90877 - Waste Classification L01

Attachment 2 – Laboratory Analysis Report and COCs



General Comments

D08347871



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) K* Å-
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Analytical Results

, \$/L>"0#4d : SOIL (>"0#4d SOIL)		, /Ä&##+"01/Ä! +""#&+4+##Ä0&														
		, (Ä+9.0:& ;		678	5/Ä#		hKIL\$3LJ!*Äi		hKIL\$3LJ!*Äi		hKIL\$3LJ!*Äi		hKIL\$3LJ!*Äi			
							ES1527269-001		ES1527269-002		ES1527269-003		ES1527269-004			
, \$01\$;!*							7%,\$30		7%,\$30		7%,\$30		7%,\$30		7%,\$30	
EA055: Moisture Content																
jÄ Moisture Content (dried @ 103°C)		LLLL *		k	18.5		25.4		22.7		15.9		23.0			
EG005T: Total Metals by ICP-AES																
Lead		-RKNLNJL*		Ä	8(aP(		6		cÄ		14		8			
EP080/071: Total Petroleum Hydrocarbons																
C6 - C9 Fraction		LLLL *		j	8(aP(		c*!		c*!		c*!		c*!		c*!	
C10 - C14 Fraction		LLLL		Ä!	8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
C15 - C28 Fraction		LLLL		*!!	8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
C29 - C36 Fraction		LLLL		*!!	8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ C10 - C36 Fraction (sum)		LLLL		Ä!	8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions																
C6 - C10 Fraction		2GI2*!		*!	8(aP(		c*!		c*!		c*!		c*!		c*!	
jÄ C6 - C10 Fraction minus BTEX (F1)		2GI2*!LA"6F		*!	8(aP(		c*!		c*!		c*!		c*!		c*!	
>C10 - C16 Fraction		m2*!l2*G		Ä!	8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
>C16 - C34 Fraction		LLLL		*!!	8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
>C34 - C40 Fraction		LLLL		*!!	8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ >C10 - C40 Fraction (sum)		LLLL		Ä!	8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
jÄ >C10 - C16 Fraction minus Naphthalene (F2)		LLLL		Ä!	8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080: BTEXN																
Benzene		-*LRKLJ		! J	8(aP(		cl J		cl J		cl J		cl J		cl J	
Toluene		*!MLMMLK		! Ä	8(aP(		cl Ä		cl Ä		cl Ä		cl Ä		cl Ä	
Ethylbenzene		*!ILR*LR		! Ä	8(aP(		cl Ä		cl Ä		cl Ä		cl Ä		cl Ä	
meta- & para-Xylene		*!MLKMLKÄ*(GLRJLK		! Ä	8(aP(		cl Ä		cl Ä		cl Ä		cl Ä		cl Ä	
ortho-Xylene		NÄLR-LG		! Ä	8(aP(		cl Ä		cl Ä		cl Ä		cl Ä		cl Ä	
jÄ Sum of BTEX		LLLL		! J	8(aP(		cl J		cl J		cl J		cl J		cl J	
jÄ Total Xylenes		*KKILJIL-		! Ä	8(aP(		cl Ä		cl Ä		cl Ä		cl Ä		cl Ä	
Naphthalene		N*!JILK		*	8(aP(		c*		c*		c*		c*		c*	
EP080S: TPH(V)/BTEX Surrogates																
1,2-Dichloroethane-D4		*-!GILI-L!		! J	k		92.8		93.7		101		94.4			
Toluene-D8		JIK-LJGLÄ		! J	k		112		117		122		113			
4-Bromofluorobenzene		RGIL!ILR		! J	k		120		122		124		118			



& (%
C-#PAB#-%#
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R*Ä-
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) E!7B?EÄ6D`@?BD>6D"E.Ä2BD;!."@D^
) A&ACE?D67;AAEW

Analytical Results

\$/L>^0#4d : SOIL (>0#4d SOIL)		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&		,/Ä&##+^01/Ä! +^*#&+4+^#Ä0&	
,\$01\$,:!* (\$01\$,:!*<															



& (%
C-#PAB#-%#
234%50
&#+V%=0
) Ä* Ä-
) 6*ÄJ-JGN
) E!7B?EÄ6D`@?BD>6D"E.Ä2BD;!."@D^
) A&ACE?D67;AAEW

Analytical Results

;\$/L>0#4d : SOIL (>0#4d SOIL)		,Ä&#+"01/Ä! +""#&+4+Ä0&		SB4 2.3-2.5		SB4 3.8-4.0		SB5 0.4-1.0		SB5 2.5-3.0		SB6 0.6-0.8			
,Ä+9.0:& ; 678		5/Ä#		ES1527269-011		ES1527269-012		ES1527269-013		ES1527269-014		ES1527269-015			
				7%,\$30		7%,\$30		7%,\$30		7%,\$30		7%,\$30			
EA055: Moisture Content															
jÄ Moisture Content (dried @ 103°C)		LLLL *		k		24.2		24.4		19.5		22.7		16.9	
EG005T: Total Metals by ICP-AES															
Lead		-RKNLNJL*		Ä		7		9		49		7		10	
EP080/071: Total Petroleum Hydrocarbons															
C6 - C9 Fraction		LLLL *		8(aP(		c*!		c*!		27		c*!		c*!	
C10 - C14 Fraction		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
C15 - C28 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
C29 - C36 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ C10 - C36 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions															
C6 - C10 Fraction		2GI2*!		8(aP(		c*!		c*!		36		c*!		c*!	
jÄ C6 - C10 Fraction minus BTEX (F1)		2GI2*!LA*6F		*!		8(aP(		c*!		35		c*!		c*!	
>C10 - C16 Fraction		m2*!l2*G		Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!	
>C16 - C34 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
>C34 - C40 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ >C10 - C40 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
jÄ >C10 - C16 Fraction minus Naphthalene (F2)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080: BTEXN															
Benzene		-*LRKLJ		! J		8(aP(		cl J		cl J		cl J		cl J	
Toluene		*!MLMMLK		! Ä		8(aP(		cl Ä		cl Ä		cl Ä		cl Ä	
Ethylbenzene		*!ILR*LR		! Ä		8(aP(		cl Ä		cl Ä		cl Ä		cl Ä	
meta- & para-Xylene		*!MLKMLKÄ*IGLRJLK		! Ä		8(aP(		cl Ä		1.0		cl Ä		cl Ä	
ortho-Xylene		NÄLR-LG		! Ä		8(aP(		cl Ä		cl Ä		cl Ä		cl Ä	
jÄ Sum of BTEX		LLLL		! J		8(aP(		cl J		1.0		cl J		cl J	
jÄ Total Xylenes		*KKILJIL-		! Ä		8(aP(		cl Ä		1.0		cl Ä		cl Ä	
Naphthalene		N*!JILK		*		8(aP(		c*		c*		c*		c*	
EP080S: TPH(V)/BTEX Surrogates															
1,2-Dichloroethane-D4		*-!GILI-LI		! J		k		86.4		84.9		92.9		87.8	
Toluene-D8		JIK-LJGLÄ		! J		k		112		103		112		106	
4-Bromofluorobenzene		RGIL!ILR		! J		k		114		105		111		112	

- GA, A-
- 6,*AJ-JGN
- EI?B?EĀ6
- A&ĀCE?D6

```
;/L>'0#4d: SOIL  
(>'0#4d SOIL)
```

;\$/L>^0#4d : SOIL (>^0#4d SOIL)		./Ä&#++^01/8+23																			
,.\$01\$/!* ./Ä&#++^01/Ä+^*#&+4+^#Ä0& ,./Ä+9.0.& 9		678		5/Ä#		ES1527269-016 ??%.\$30		ES1527269-017 ??%.\$30		SB7 2.5-3.0 ??%.\$30		SB7 3.5-4.0 ??%.\$30		ES1527269-020 ??%.\$30							
EA055: Moisture Content																					
jÄ Moisture Content (dried @ 103°C)																					
EG005T: Total Metals by ICP-AES																					
Lead																					
EP080/074: Total Petroleum Hydrocarbons																					
C6 - C9 Fraction																					
C10 - C14 Fraction																					
C15 - C28 Fraction																					
C29 - C36 Fraction																					
jÄ C10 - C36 Fraction (sum)																					
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions																					
C6 - C10 Fraction																					
jÄ C6 - C10 Fraction minus BTEX (F1)																					
>C10 - C16 Fraction																					
>C16 - C34 Fraction																					
>C34 - C40 Fraction																					
jÄ >C10 - C40 Fraction (sum)																					
jÄ >C10 - C16 Fraction minus Naphthalene (F2)																					
EP080: BTEXN																					
Benzene																					
Toluene																					
Ethylbenzene																					
meta- & para-Xylene																					
ortho-Xylene																					
jÄ Sum of BTEX																					
jÄ Total Xylenes																					
Naphthalene																					
EP080S: TPH(V)/BTEX Surrogates																					
1,2-Dichloroethane-D4																					
Toluene-D8																					
4-Bromofluorobenzene																					

-) -Ä-Ä-
-) 6:ÄJ-JGN
-) E!/?EÄ6D'.@?BD>6D"E.Ä2BD;!."@D^
-) A&ÄCE?D6?;ÄAEW

Analytical Results

;\$/L>"0#4d : SOIL (>"0#4d SOIL)												./Ä&#+""01/&+23											
./Ä&#+""01/Ä! +""#&+4+#Ä0&												hKIL\$3LJ!*Ä!											
,.(Ä+9:0.& % 678												5/Ä#											
,\$01\$;!*												ES1527269-021											
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Environmental

QUALITY CONTROL REPORT

Work Order	: ES1527269	
5 673	*Ä+"	
5.73Ä>3	1Ä2.(Ä3.(4	
F==(?!)	5.73Ä>3	
	F==(?!)	
8N:Ä6	8N:Ä6	
" "PR.7"	" "PR.7"	
ÄÄ>16:6 "	ÄÄ>16:6 "	
* (Z)">3	V5#1"9"	
C(="(7)"2"(	Ä3"#<Ä.P "#@>">"69"=	
5NCN5#7)"2"(	Ä3*#F7Ä 4161#5..."7">="	
<Ä.P "(	A11)"#Ä3"	
<63"	E.%#/#Ä.P "#(">"69"=	
V)3"7)"2"(	E.%#/#Ä.P "#Ä7Ä 41"=	

'R61#("P.(3#1)P"("I"="!#Ä74#P"("96.)#("P.(3WIX#163R#3R61#("I"9%#@")! 31#ÄPP 4#3.#3R"#Ä.P "WIX#Ä1#1)2:633"=%##

'R61#V)Ä 634#5.73(. #@"P.(3#>.73Ä671#3R"#I. j67+#671(.Ä36.7,

- 1Ä2 (Ä3.(4#;)P 6>Ä3"#W.J"X#@"P"Ä6" Ä369"#(">"73Ä+"#61/"7>"#W@":XÄ7=FF>"P3Ä7>"#16.63!
- ?"3R.=#B Ä7Q#W7BX#Ä7=#1Ä2.(Ä3.(4#5.73(. #<P6Q "#W15<X#@P934#Ä7=#F>"P3Ä7>"#16.63!
- ?Ä3(6_#<P6Q"#W7<X#@P934#Ä7=#F>"P3Ä7>"#16.63!



WORLD RECOGNISED
ACCREDITATION

ÄÄ !"#\$\$%Ä&'

EF'F#F>>("=63"=#

1Ä2 (Ä3.(4#OK\$

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>.:P 6Ä7>"#j63R#

A<CbA85#-M&K\$% ,Ä26#<)22Ä

*RÄ ÄQ#Ä73RÄQ"1.7"

<Ä7Z"IR76#V.36

<R.2R7Ä#5RÄ7=(Ä

>.:P 6Ä7>"#j63R#P(.>"=)("I#IP">6/6"=#67#K-#5Ä@#*Ä(3#--%
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 , K# / #0
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 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEc
 , B*#DF@E8@<#BF[

General Comments

'R"# Å7 Å 436>Å¶.>")="(#
="9".P"#=#P(>")("Å("#:P 4"=#67#3R"#Å2I"7>"#/#=>)."73"=# 13Å7=Å(=I#.(#24#> 6"73#("Y)"13%
DR"("#.#.6I3)("#="3"("67Å36.7#RÅ#2""7#P"(/("=#("I) 3I#Å("P" P.(3"=#.7#Å#=(4#I"6+R3#2ÅI6I%
DR"("#Å#("P.(3"=# "I#3RÅ7#WVeX#("I) 3#6I#R6+R" (#3RÅ7#3R6#Å@#2X#="Y"#3.#P(6.Å(4#Å.P "# _3(Å>3b=6+"I3Å3"#=6)36I#Å7H)/6>6"73#Å.P "#/(#Å7 Å 4I6I%#DR"("3R"#I C@#.#Å#¶Iß3#=6I/("I#(/.#I3Å7=Å(=#I C@#3R6#.#Å4#2" #=")3.#R6+
h"4# , F 7.74.:)#¶#@"/"(/#3.#Å.P "#I#R6>R#Å(" #7 3#I#P">6I6>Å 4#PÅ(3#3R6I#I[Q#(="(#2)3#I.("="#PÅ(3#.#3R"#V5#P((>"I# 3
5F<#E).2" (##5F<#(" +6I3(4#7).2" (#I.:#=Å3Å2ÅI"#.Å673Å67"=#24#5R".6>Å #F2I3(Å>3I#<"(96>"%#R"#5R".6>Å #F2I3(Å>3I#<"(96>"#6986.7#/#3R"#F.:"(6>Å7#5R".6>Å #<>6"34%#
1C@#I#16.63#.#I#("P.(367+#
@*##@." Å369"#"(">"73Å+."#6I/"7>"
g###A7=6>Å3"i#I#Å6 "=#V5

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5 6"73
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, L#/#0
, 8<.$KMKH0
, FJ@C@F#8eA@CE?8EF1#5CE~J'AeC
, B*DF@E8@<#BF[

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Laboratory Duplicate (DUP) Report

2N2?Ä3(6: SOIL Laboratory Duplicate (DUP) Report

Laboratory sample ID		Client sample ID	Method: <Compound		Laboratory Duplicate (DUP) Report				
EA055: Moisture Content (QC Lot: 170482)			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
8<-\$KMKHON&-K F7.74.:)#			8F&\$S\$N-&L.#?>.6(3)('H5.73'73#W=(6"= #T#-&Lk5X	NNNN	-	i	H%H	O%L	KK%&
8<-\$KMKHON&K\$ F7.74.:)#			8F&\$S\$N-&L.#?>.6(3)('H5.73'73#W=(6"= #T#-&Lk5X	NNNN	-	i	-0%H	K-%&	H%OM
EA055: Moisture Content (QC Lot: 170483)									
8<-\$KMKHON&0 <BL#L%ONS&#&			8F&\$S\$N-&L.#?>.6(3)('H5.73'73#W=(6"= #T#-&Lk5X	NNNN	-	i	K&%S	K&%H	8%0SH
8<-\$KMKHON&K& V<L#			8F&\$S\$N-&L.#?>.6(3)('H5.73'73#W=(6"= #T#-&Lk5X	NNNN	-	i	KM%\$	KS%O	-&%S
EG005T: Total Metals by ICP-AES (QC Lot: 171857)									
8<-\$KMKHON&-& <BS&%SN&%H#			8c&\$S\$.#1"Ä=	MSLONOKN-	\$	:bQ+	-0	-M	-&%H
8<-\$KMKK\$N&\$& F7.74.:)#			8c&\$S\$.#1"Ä=	MSLONOKN-	\$	:bQ+	S0	LK	L0%O
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 169984)									
8<-\$KMKHON&-& <B-#&%ON-%&#			8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&	e-&	8%&&
8<-\$KMKHON&-- <BS#K%LNK%\$#			8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&	e-&	8%&&
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 169991)									
8<-\$KMKMSN&-& F7.74.:)#			8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&	e-&	8%&&
8<-\$KMK\$ON&-& F7.74.:)#			8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&	e-&	8%&&
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170059)									
8<-\$KMKHON&-& <B-#&%ON-%&#			8*M-.#5-\$#N#5KO#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&&	e-&&	8%&&
			8*M-.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&&	e-&&	8%&&
			8*M-.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:bQ+	e\$&	e\$&	8%&&
8<-\$KMKHON&-- <BS#K%LNK%\$#			8*M-.#5-\$#N#5KO#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&&	e-&&	8%&&
			8*M-.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&&	e-&&	8%&&
			8*M-.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:bQ+	e\$&	e\$&	8%&&
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170100)									
8<-\$KMKHON&K- F7.74.:)#			8*M-.#5-\$#N#5KO#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&&	e-&&	8%&&
			8*M-.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&&	e-&&	8%&&
			8*M-.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:bQ+	e\$&	e\$&	8%&&
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170122)									
8<-\$KMKH-N&S- F7.74.:)#			8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&	e-&	8%&&
8<-\$KMKO0N&&S F7.74.:)#			8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:bQ+	e-&	e-&	8%&&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 169984)									
8<-\$KMKHON&-& <B-#&%ON-%&#			8*8O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:bQ+	e-&	e-&	8%&&
8<-\$KMKHON&-- <BS#K%LNK%\$#			8*8O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:bQ+	e-&	e-&	8%&&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 169991)									
8<-\$KMKMSN&-& F7.74.:)#			8*8O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:bQ+	e-&	e-&	8%&&
8<-\$KMK\$ON&-& F7.74.:)#			8*8O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:bQ+	e-&	e-&	8%&&

- $+\tilde{\lambda}^{n+}$
- $S\#/\#0$
- $8<-\$KMKH0$
- $D.(Q\#C(=")$
- $FJ@C@F\#8Ea@CE?8EF1\#5CE<J^{\wedge}AEc$
- $5\ 6^{\wedge}73$
- $B^{\wedge}DF@E8@<\#BF[$
- $*(Z^{n+}>3$

Laboratory sample ID			Client sample ID	Method:Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
<2N?Ä3(6: SOIL												
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170059)												
8-<\$KMKHON&&-		<B-#&%ON-%&#	8*&M-,#j5-H#N#5LS#Ä(Ä>36.7	NNNN -&&	:+bQ+	e-&&	e-&&	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5LS#N#5S&#Ä(Ä>36.7	NNNN -&&	:+bQ+	e-&&	e-&&	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5-&#N#5-H#Ä(Ä>36.7	j5-&i5-H \$&	: +bQ+	e\$&	e\$&	e\$&	e\$&	&%&&	E #16:63	
			8*&M-,#j5-H#N#5LS#Ä(Ä>36.7	NNNN -&&	:+bQ+	e-&&	e-&&	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5LS#N#5S&#Ä(Ä>36.7	NNNN -&&	:+bQ+	e-&&	e-&&	e-&&	e-&&	&%&&	E #16:63	
8-<\$KMKHON&--		<BS#K%LNK%\$#	8*&M-,#j5-&#N#5-H#Ä(Ä>36.7	j5-&i5-H \$&	: +bQ+	e\$&	e\$&	e\$&	e\$&	&%&&	E #16:63	
			EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170100)									
			8*&M-,#j5-H#N#5LS#Ä(Ä>36.7	NNNN -&&	:+bQ+	e-&&	e-&&	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5LS#N#5S&#Ä(Ä>36.7	NNNN -&&	:+bQ+	e-&&	e-&&	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5-&#N#5-H#Ä(Ä>36.7	j5-&i5-H \$&	: +bQ+	e\$&	e\$&	e\$&	e\$&	&%&&	E #16:63	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170122)												
8-<\$KMKH-N&S-		F7.74.:)#	8*&O&,#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	:+bQ+	e-&	e-&	e-&	&%&&	E #16:63	
			8*&O&,#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	:+bQ+	e-&	e-&	e-&	&%&&	E #16:63	
			EP080: BTEXN (QC Lot: 169984)									
			8*&O&,#B"7"7"	M-NSLNK &%K	:+bQ+	e&%K	e&%K	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
8-<\$KMKHON&&-		<B-#&%ON-%&#	8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	: +bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			-&HNSKNL									
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#.)7"	-&ONOO NL &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#EÄPR3RÄ "7"	0-NK&NL -	:+bQ+	e-	e-	e-	e-	&%&&	E #16:63	
8-<\$KMKHON&--		<BS#K%LNK%\$#	8*&O&,#B"7"7"	M-NSLNK &%K	:+bQ+	e&%K	e&%K	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	: +bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			-&HNSKNL									
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
8-<\$KMKHON&-		<BS#K%LNK%\$#	8*&O&,#.)7"	-&ONOO NL &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#EÄPR3RÄ "7"	0-NK&NL -	:+bQ+	e-	e-	e-	e-	&%&&	E #16:63	
			EP080: BTEXN (QC Lot: 169991)									
			8*&O&,#B"7"7"	M-NSLNK &%K	:+bQ+	e&%K	e&%K	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
8-<\$KMKHON&&-		<BS#K%LNK%\$#	8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	: +bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			-&HNSKNL									
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#.)7"	-&ONOO NL &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#EÄPR3RÄ "7"	0-NK&NL -	:+bQ+	e-	e-	e-	e-	&%&&	E #16:63	
EP080: BTEXN (QC Lot: 169991)												
8-<\$KMKHON&&-		F7.74.:)#	8*&O&,#B"7"7"	M-NSLNK &%K	:+bQ+	e&%K	e&%K	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	: +bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			-&HNSKNL									
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
8-<\$KMKHON&&-		F7.74.:)#	8*&O&,#B"7"7"	M-NSLNK &%K	:+bQ+	e&%K	e&%K	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	: +bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	
			-&HNSKNL									
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	:+bQ+	e&%\$	e&%\$	e&%\$	e&%\$	&%&&	E #16:63	



Å+
D,(Q#C(=(
5 6"73
*(Z">3
 , \$#/ #0
 , 8<-\$KMKH0
 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEc
 , B*#DF@E8@<#BF[

<2N?Ã3(6: 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: BTEXN (QC Lot: 169991) - continued									
8<-\$KMK\$0N&&-	F7.74:.)#	8*8O&.#(3R.NG4 "7"	0\$NSMNH	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#.)7"	-&ONOOHL	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#EÃPR3RÃ "7"	0-NK&NL	-	:+bQ+	e-	e-	8%&&	E #16:63
EP080: BTEXN (QC Lot: 170122)									
8<-\$KMKH+N&S-	F7.74:.)#	8*8O&.#B"7"7"	M-NSLNK	8%K	:+bQ+	e&%K	e&%K	8%&&	E #16:63
		8*8O&.#83R4 2"7"7"	-&&NS-NS	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#:"3ÃN#m#PÃ(ÃNG4 "7"	-&ONLONL#	8%\$	: +bQ+	e&%\$	e&%\$	8%&&	E #16:63
8<-\$KMK00N&&S	F7.74:.)#	8*8O&.#(3R.NG4 "7"	0\$NSMNH	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#.)7"	-&ONOOHL	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#EÃPR3RÃ "7"	0-NK&NL	-	:+bQ+	e-	e-	8%&&	E #16:63
		8*8O&.#B"7"7"	M-NSLNK	8%K	:+bQ+	e&%K	e&%K	8%&&	E #16:63
		8*8O&.#83R4 2"7"7"	-&&NS-NS	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#:"3ÃN#m#PÃ(ÃNG4 "7"	-&ONLONL#	8%\$	: +bQ+	e&%\$	e&%\$	8%&&	E #16:63
			-&HNSKNL						
8<-\$KMKH+N&S-	F7.74:.)#	8*8O&.#(3R.NG4 "7"	0\$NSMNH	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#.)7"	-&ONOOHL	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#EÃPR3RÃ "7"	0-NK&NL	-	:+bQ+	e-	e-	8%&&	E #16:63



A+
; H# / #0
; 8<-\$KMKH0
D,(Q#C/="(
; FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEC
5 6"73
*(Z">3
; B*#DF@E8@<#BFI

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

'R*# Y)Ä 634# 73(. # 3"(. # ?"3R.==# 1Ä2.(Ä3.(4#B Ä7Q#"/" (# 3.#Ä7#Ä7Ä 43#"(" #. Ä3(6_#3# J#6>R#Ä #/"Ä+73# Ä(" #Ä==="#67#6R"#Ä: "#9.):"# . (#P(.P.(36.7#Ä#))"-# 67#3Ä7=Ä(=#Ä.P"# P("PÄ(Ä36.%#R"# P)(P.I"# .# 3R6I#5# PÄ(Ä:~3"(. # 0# 3.# : .763.(#P.3"736Ä #Ä2.(Ä3.(4#>73Ä.67Ä36.7%#R"# Y)Ä 634# 73(. # 3"(. # 1Ä2.(Ä3.(4# 5.73(. # <Ä.P"# W15<X#"/"I(# 3.#Ä# >/'(36/6"= #'/'/">"# : Ä3"(6Ä #/Ä#Ä#Q7J7# 673"(/" ">"# (/""# : Ä3(6_#6Q"=#63R#3Ä(+3# Ä7Ä 43"1%#R"#P)(P.I"#.#3R6I#V5#PÄ(Ä:~3"(. #0#3.#.763.(#:"3#P(" >616.7#Ä7=Ä>>)(Ä>4#67="P"7="73#.#/Ä.P"#Ä3(6_ %#Ä7Ä8>8@#16.63I#Ä("#2ÄI"=#.7#13Ä36I36>Ä #9Ä)Ä36.7#.#/P(.>#I15<%

<J2N?Ä3(6:_SOIL

Method: Compound				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 171857)									
8c&\$\$.#1"Ä=	MSLON0KN	\$	: +bQ+	e\$	S&#+bQ+	0S%-	OH	-KS	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169984)									
8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	KH#:#+bQ+	0K%&	HO	-KO	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169991)									
8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	KH#:#+bQ+	0&%\$	HO	-KO	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)									
8*8M,-.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:+bQ+	e\$&	K&&#:#+bQ+	-&0	M-	L-	
8*8M,-.#5-\$#N#5KO#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	K\$&#:#+bQ+	-H	MS	-LO	
8*8M,-.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	K&&#:#+bQ+	-&0	HS	-KO	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170100)									
8*8M,-.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:+bQ+	e\$&	K&&#:#+bQ+	---	M-	L-	
8*8M,-.#5-\$#N#5KO#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	K\$&#:#+bQ+	-\$	MS	-LO	
8*8M,-.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	K&&#:#+bQ+	-&L	HS	-KO	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170122)									
8*8O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	KH#:#+bQ+	MH%&	HO	-KO	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169984)									
8*8O&.#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	:+bQ+	e-&	L-#:#+bQ+	0K%S	HO	-KO	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169991)									
8*8O&.#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	:+bQ+	e-&	L-#:#+bQ+	0&%L	HO	-KO	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170059)									
8*8M,-.#j5-&#N#5-H#Ä(Ä>36.7	j5-&I5-H	\$&	:+bQ+	e\$&	K\$&#:#+bQ+	-&\$	M&	L-&	
8*8M,-.#j5-H#N#5LS#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	L\$&#:#+bQ+	-M	MS	-LO	
8*8M,-.#j5LS#N#5S&#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	K&&#:#+bQ+	-&-	HL	-L-	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170100)									
8*8M,-.#j5-&#N#5-H#Ä(Ä>36.7	j5-&I5-H	\$&	:+bQ+	e\$&	K\$&#:#+bQ+	00%S	M&	L-&	
8*8M,-.#j5-H#N#5LS#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	L\$&#:#+bQ+	-K&	MS	-LO	
8*8M,-.#j5LS#N#5S&#Ä(Ä>36.7	NNNN	-&&	:+bQ+	e-&&	K&&#:#+bQ+	-&S	HL	-L-	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170122)									
8*8O&.#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	:+bQ+	e-&	L-#:#+bQ+	ML%L	HO	-KO	
EP080: BTEXN (QCLot: 169984)									
8*8O&.#B"7"7"	M-NSLNK	&%K	: +bQ+	e&%K	-#:#+bQ+	MK%\$	HK	-H	
8*8O&.#83R4 2"7"7"	-&&NS-NS	&%\$	:+bQ+	e&%\$	-#:#+bQ+	QM%M	\$O	-O	



Å+
D,(Q#C(=(
5 6"73
*(Z">3
 , M# / #0
 , 8<-\$KMKH0
 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEC
 , B*#DF@E8@<#BF[

Method: Compound					Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
EP080: BTEXN (QCLot: 169984) - continued					Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
CAS Number	LOR	Unit					LCS	Low	High	
8*O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	&%\$	: +bQ+	-&ONLONL#	-&HNSKNL	e&%\$	K#:+bQ+	0M%O	H&	-K&	
8*O&.#EÄPR3RÄ "7"	-	: +bQ+	0-NK&NL		e-	#:+bQ+	0-%K	HK	-LO	
8*O&.#:(3R.NG4 "7"	&%\$	: +bQ+	0\$NSMNH		e&%\$	#:+bQ+	0M%M	H&	-K&	
8*O&.#.)"7"	&%\$	:bQ+	-&ONOOOL		e&%\$	#:+bQ+	0L%O	HK	-KO	
EP080: BTEXN (QCLot: 169991)										
8*O&.#B"7 "7"	&%K	: +bQ+	M-NSLNK		e&%K	#:+bQ+	0-%O	HK	-H	
8*O&.#83R4 2"7 "7"	&%\$	:bQ+	-&NS-NS		e&%\$	#:+bQ+	0\$%&	\$O	-O	
8*O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	&%\$	: +bQ+	-&ONLONL#	-&HNSKNL	e&%\$	K#:+bQ+	0S%\$	H&	-K&	
8*O&.#EÄPR3RÄ "7"	-	: +bQ+	0-NK&NL		e-	#:+bQ+	OK%&	HK	-LO	
8*O&.#:(3R.NG4 "7"	&%\$	: +bQ+	0\$NSMNH		e&%\$	#:+bQ+	0M%L	H&	-K&	
8*O&.#.)"7"	&%\$	:bQ+	-&ONOOOL		e&%\$	#:+bQ+	0M%K	HK	-KO	
EP080: BTEXN (QCLot: 170122)										
8*O&.#B"7 "7"	&%K	: +bQ+	M-NSLNK		e&%K	#:+bQ+	M0%-	HK	-H	
8*O&.#83R4 2"7 "7"	&%\$	:bQ+	-&NS-NS		e&%\$	#:+bQ+	HM%K	\$O	-O	
8*O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	&%\$	: +bQ+	-&ONLONL#	-&HNSKNL	e&%\$	K#:+bQ+	HO%H	H&	-K&	
8*O&.#EÄPR3RÄ "7"	-	: +bQ+	0-NK&NL		e-	#:+bQ+	MS%M	HK	-LO	
8*O&.#:(3R.NG4 "7"	&%\$	: +bQ+	0\$NSMNH		e&%\$	#:+bQ+	HO%H	H&	-K&	
8*O&.#.)"7"	&%\$	:bQ+	-&ONOOOL		e&%\$	#:+bQ+	OO%0	HK	-KO	
Matrix Spike (MS) Report										
Laboratory sample ID		Client sample ID		CAS Number		Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)		
EG005T: Total Metals by ICP-AES (QCLot: 171857)		Method: Compound				MS	Low	High		
8<-\$KMKH0N&&-<B-#&%ON-%&#		8c&&\$:#1"Ä=		MSLON0KN-		K\$&#:+bQ+	-&S	M&	-L&	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169984)										
8<-\$KMKH0N&&-<B-#&%ON-%&#		8*O&.#5H#N#50#Ä(Ä>36.7		NNNN		LK%\$#:+bQ+	-K-	M&	-L&	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169991)										
8<-\$KMK\$0N&&-F7.74:.)#		8*O&.#5H#N#50#Ä(Ä>36.7		NNNN		LK%\$#:+bQ+	---	M&	-L&	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)										
8<-\$KMKH0N&&-<B-#&%ON-%&#		8*O&.#5-&#N#5-S#Ä(Ä>36.7		NNNN		\$KL#:+bQ+	0L%0	ML	-LM	

Matrix Spike (MS) Report

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- Q#/#0
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- 5 6'73
- *.(Z"->3
- B*#DF@E8@<#BF[

				Matrix Spike (MS) Report			
Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)
						MS	Low High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059) - continued							
8<-\$KMKH0N&&-<B-#8%ON-%&#			8*&M-,#5-\$#N#5KO#Å(Å>36.7	NNNN	KL-O#:#bQ+	-&-	\$L -L-
			8*&M-,#5K0#N#5LH#Å(Å>36.7	NNNN	-M-S#:#bQ+	-K&	\$K -LK
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170100)							
8<-\$KMKHON&K-F7.74:.)#			8*&M-,#5-&#N#5-S#Å(Å>36.7	NNNN	\$KL#:#bQ+	OH%&H	ML -LM
			8*&M-,#5-\$#N#5KO#Å(Å>36.7	NNNN	KL-O#:#bQ+	-&K	\$L -L-
			8*&M-,#5K0#N#5LH#Å(Å>36.7	NNNN	-M-S#:#bQ+	-K&	\$K -LK
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170122)							
8<-\$KMKH-N&S-F7.74:.)#			8*&O&,#5H#N#50#Å(Å>36.7	NNNN	LK%\$#:#bQ+	-&K	M& -L&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169984)							
8<-\$KMKH0N&&-<B-#8%ON-%&#			8*&O&,#5H#N#5-&#Å(Å>36.7	5Hl5-&	LM%\$#:#bQ+	-K&	M& -L&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169991)							
8<-\$KMK\$ON&&-F7.74:.)#			8*&O&,#5H#N#5-&#Å(Å>36.7	5Hl5-&	LM%\$#:#bQ+	-&O	M& -L&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170059)							
8<-\$KMKH0N&&-<B-#8%ON-%&#			8*&M-,#j5-&#N#5-H#Å(Å>36.7	j5-&l5-H	OH&#:#bQ+	OH%&K	ML -LM
			8*&M-,#j5-H#N#5LS#Å(Å>36.7	NNNN	LKKL#:#bQ+	-H	\$L -L-
			8*&M-,#j5LS#N#5S&#Å(Å>36.7	NNNN	-&SO#:#bQ+	-&	\$K -LK
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170100)							
8<-\$KMKHON&K-F7.74:.)#			8*&M-,#j5-&#N#5-H#Å(Å>36.7	j5-&l5-H	OH&#:#bQ+	-&&	ML -LM
			8*&M-,#j5-H#N#5LS#Å(Å>36.7	NNNN	LKKL#:#bQ+	-O	\$L -L-
			8*&M-,#j5LS#N#5S&#Å(Å>36.7	NNNN	-&SO#:#bQ+	-&0	\$K -LK
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170122)							
8<-\$KMKH-N&S-F7.74:.)#			8*&O&,#5H#N#5-&#Å(Å>36.7	5Hl5-&	LM%\$#:#bQ+	-&-	M& -L&
EP080: BTEXN (QCLot: 169984)							
8<-\$KMKH0N&&-<B-#8%ON-%&#			8*&O&,#B"7"7"	M-NSLNK	K%\$#:#bQ+	O0%K	M& -L&
			8*&O&,#83R4 2"7"7"	-&&NS-NS	K%\$#:#bQ+	-&K	M& -L&
			8*&O&,#"3ÄN#m#PÄ(ÄNG4"7"	-&ONLONL#&-HNSKNL	K%\$#:#bQ+	-M	M& -L&
			8*&O&,#EÄPR3RÄ"7"	O-NK&NL	K%\$#:#bQ+	OS%K	M& -L&
			8*&O&,#(3R.NG4"7"	O\$NSMNH	K%\$#:#bQ+	-&-	M& -L&
			8*&O&,#.)7"	-&ONOO NL	K%\$#:#bQ+	-K	M& -L&
EP080: BTEXN (QCLot: 169991)							
8<-\$KMK\$ON&&-F7.74:.)#			8*&O&,#B"7"7"	M-NSLNK	K%\$#:#bQ+	OK%O	M& -L&
			8*&O&,#83R4 2"7"7"	-&&NS-NS	K%\$#:#bQ+	OK%L	M& -L&
			8*&O&,#"3ÄN#m#PÄ(ÄNG4"7"	-&ONLONL#&-HNSKNL	K%\$#:#bQ+	0-%S	M& -L&
			8*&O&,#EÄPR3RÄ"7"	O-NK&NL	K%\$#:#bQ+	OH%K	M& -L&



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5 6"73 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEc
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		Matrix Spike (MS) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080: BTEXN (QCLot: 169991) - continued							
8-<\$KMK\$0N&&-	F7.74:.)#	8*&O&.#(3R.NG4 "7"	0\$NSMNH	K%\$#:+bQ+	0-%K	M&	- L&
		8*&O&.#.)7"	-&ONOO NL	K%\$#:+bQ+	0L%K	M&	- L&
EP080: BTEXN (QCLot: 170122)							
8-<\$KMKH-N&S-	F7.74:.)#	8*&O&.#B"7"7"	M-NSLNK	K%\$#:+bQ+	00%0	M&	- L&
		8*&O&.#83R4 2"7"7"	-&&NS-NS	K%\$#:+bQ+	00%-	M&	- L&
		8*&O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL#	K%\$#:+bQ+	00%-	M&	- L&
			-&HNSKNL				
		8*&O&.#EÄPR3RÄ "7"	0-NK&NL	K%\$#:+bQ+	00%L	M&	- L&
		8*&O&.#(3R.NG4 "7"	0\$NSMNH	K%\$#:+bQ+	-&-	M&	- L&
		8*&O&.#.)7"	-&ONOO NL	K%\$#:+bQ+	0L%&	M&	- L&

QA/QC Compliance Assessment for DQO Reporting

Work Order	: ES1527269	"#\$!	%&()***
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/!2-#:-	%<Ä=;'><?@A	Ä!0!BC(2!	%DE&FGFHHJH'***
"Ä(K!:-	%@"@L<A3<8'>LM	6#-!8#5B0!7<!;!14!9	%NOFP 0FGO&*
81-J	%@"@L<A3<8'>LM	=77 !6#-!	%O*FL \$FGO&*
8#5B0!Ä	%Ä=;'><?@A	A(Q()!7#5B0!7'Ä!;!14!9	%GJ
?Ä9!Ä'2 5,Ä	%FFFF	A(Q()!7#5B0!7#2#0.7!9	%GJ

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

>Ä!1!)5!-C(9!7 55#Ä!17#29Ä!)Ä!2:!!7#Ä!#!#07!(BÄ(4!9!9!-(!#771 7'-!2'-Ä#;!#;10!1-Q

Summary of Outliers

Outliers : Quality Control Samples

ÄC!7!Ä!B(Ä-'C!\$C0!\$C-7(!-0!Ä!7!0#\$!\$9!12'-C!R #0!1-!/BÄ!0<!B(Ä-Q

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.



"#S!
@('ÄU"²Ä9/Ä
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%>"@L<A3<8>LM

Analysis Holding Time Compliance

ÄC17'ÄB(Ä- 7 55Ä1Z17' 1Ä#:-1(2' 1' BÄ1BÄ#-1(2#29' #2#0.717'-517' #29' :(5B#Ä17' 1#C' 11-C' L+8' Ä1:(5512919' Q0912\$-1517' SÄ1)Ä:12\$' W83"L' 8@' HUE" L" L" L" L8' #29' A3":T' ,#719' (2' -C' 7#5B01' :(2 -#12Ä' BÄ(41919Q'6#-17'Ä1B(Ä-19'Ä1Ä1712-)1Ä7-'9#-11(1)1Ä#:-1(2(Ä#2#0.717'#29BÄ1:0 91'7, 71' 12-910 -1(27#29Ä1Ä 27Q'L017-2\$(1'Ä#C17S1)#2.T'17BÄ(41919C1Ä112Q
_(0912\$-151')Ä' 0#C#-1' 51-C(97' SQ3Q Ä+"T' 4#Ä' #::(Ä912\$' -(' -C') #2#0.-17' Ä1B(Ä-19Q" L77177512-' :(5B#Ä17' -C' 01#C' 9#-1' 11-C' -C' 7C(Ä-17'-#2#0.-1' Q0912\$-151')Ä' -C' 1' 14#012-' 7(10'51- C(9Q'ÄC17')Ä'1% (Ä\$#21:7' &19# 7"51Ä: Ä'GH'9# 7'a(-C1Ä'51:#07'&HO'9# 7Q"L'Ä1(Ä919' , Ä#C'9(172(' \$ #Ä#2-11#',Ä#C'1(Ä#002(2F4(0#-101'B#Ä#51-1 Ä7Q
_(0912\$-1517')Ä' VOC in soils 4#Ä' #::(Ä912\$' -(' #2#0.-17' (1' 12-Ä17-Q' X12.0/CQ(Ä191' #29' 8.-Ä121' C(0912\$-151' 1' 9# 7b' (-C1Ä7' &J'9# 7 Q' L' Ä1(Ä919' ,Ä#C' 9(17' 2(-' \$ #Ä#2-11' # ,Ä#C')Ä' #00X?1' #2#0.-17' #29' 7C(09'141Ä1)119'12-#71-C1'Ä1B(Ä-19'Ä1#C'17#)#071'B(71- 141' (ÄX12.0/CQ(Ä191#29'8.-Ä121'Ä1'2(-'U1' #2#0.-17(1'12-Ä 17-Ä:(2:Ä2Q

#-Ä11: **SOIL** 34#0 #1(2% c_ (0912\$-151'Ä1#C'b' ✓c@1-C12'C(0912\$-151Q'

Method		Sample Date		%&(')\$*Ä+,-/('\$*Ä		Date analysed		ÄÄ '##\$#	
Container / 41\$Ä+5 6/1+728#9				Date extracted		21.+3'(+&(')\$*Ä		%011 '\$*Ä	
EA055: Moisture Content									
Soil Glass Jar - Unpreserved (EA055-103)									
8>&'GQNFQG*^A		30-Jul-2015		----		FFFF		FFFF	
8>&'GQNFQG*^A									
8>&'NQHFJQO^A									
8>&'NQHFJQO^A									
8>'GQNFQG*^A									
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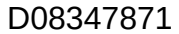


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%>"@L<A3<8>LM

#-Ä1: SOIL 34#0 # 1(2%*c_ (0912\$-15t'Ä#C'b' ✓'c@1-C12C(0912\$-15tQ'

Method	Sample Date	Date extracted	%&(')\$*Ä+ +/(/ (\$*Ä	%011 '\$*Ä	Date analysed	ÄÄ '##\$#	%011 '\$*Ä
Container / 4(\$Ä+5 6/L+728#9							
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
8>&'GQNFQG*^	30-Jul-2015	31-Jul-2015	&NFL\$FGO&*	✓	03-Aug-2015	OVF8BFGO&*	✓
8>G'OQHF&QO^							
8>&'NQHFJQO^							
8>G'GQNFQG*^							
8>N'OQHF&QO^							
8>N'GQNFQG*^							
8>J'OQJFOQE^							
8>J'NQHFJQO^							
8>*GQ*FNQO^							
8>E'GQHFNQO^							
8>'OQ*F&QO^							
8>'NQ*FJQO^							
R8J							
EP080S: TPH(V)/BTEX Surrogates							
Soil Glass Jar - Unpreserved (EP080)							
8>&'GQNFQG*^	30-Jul-2015	31-Jul-2015	&NFL\$FGO&*	✓	03-Aug-2015	&NFL\$FGO&*	✓
8>G'OQHF&QO^							
8>&'NQHFJQO^							
8>G'GQNFQG*^							
8>N'OQHF&QO^							
8>N'GQNFQG*^							
8>J'OQJFOQE^							
8>J'NQHFJQO^							
8>*GQ*FNQO^							
8>E'GQHFNQO^							
8>'OQ*F&QO^							
8>'NQ*FJQO^							
Ä<="g"=d3^							
Ä8/							
Soil Glass Jar - Unpreserved (EP080)							
R8J	30-Jul-2015	31-Jul-2015	&NFL\$FGO&*	✓	31-Jul-2015	&NFL\$FGO&*	✓

D08347871



Quality Control Parameter Frequency Compliance

#Ä¶: SOIL

[illegible]

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%388*GIGEV
%LW<?<1'3AX=<?A,3AÄL~/7A8W+Ä=AY
%>~@L<A3<8'>LM

```

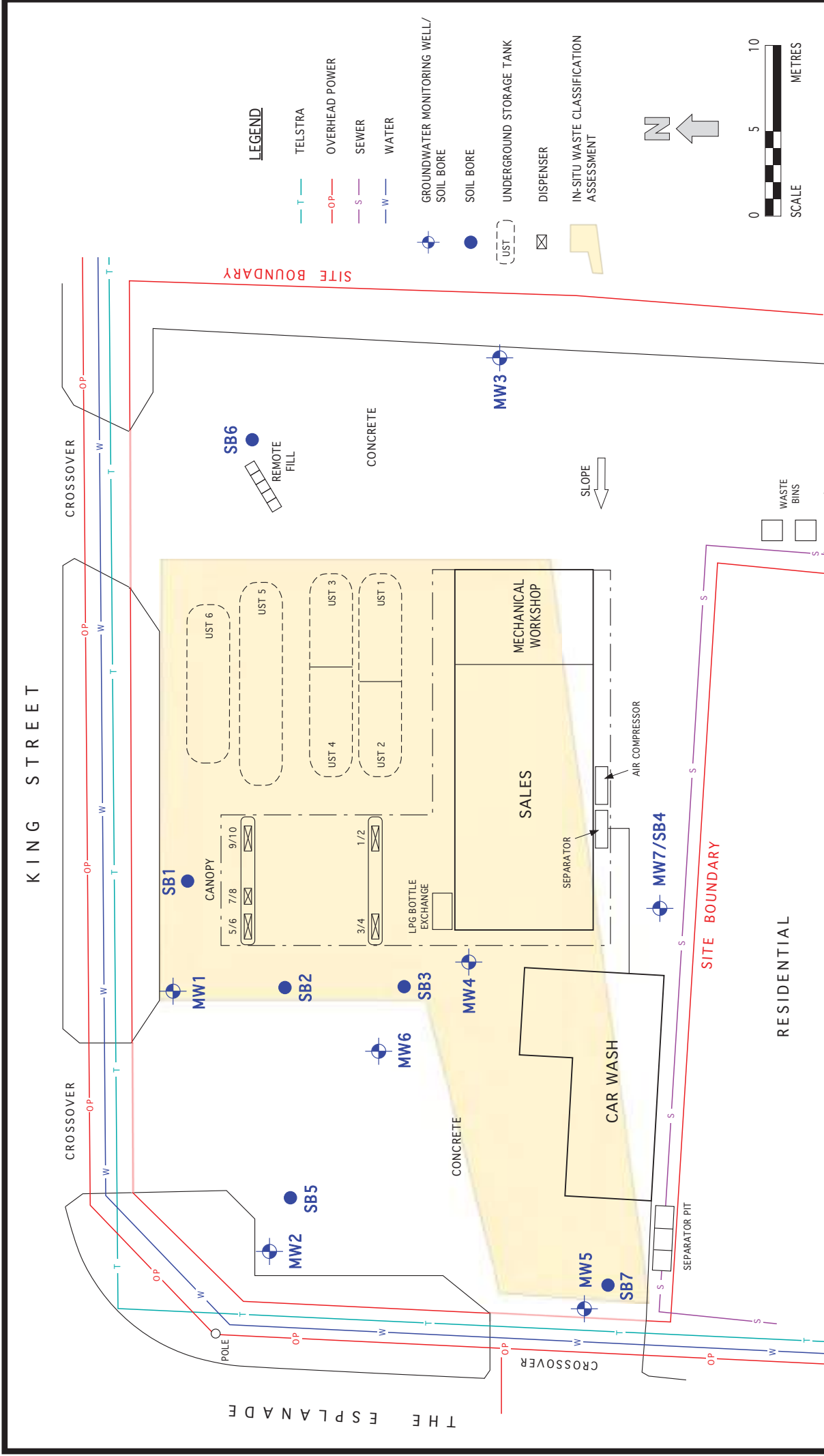
Brief Method Summaries

[illegible]

ÄÄ"'"\$!>?'@#	>'@+2#)(\$'Ä#	>/\$&	>'?@	3LO**F&ON	8?+=	=2FC(71Q"l\$Ä#4151-Ä11:BÄ(19Ä11#719(2111\$C-0(77(4Ä#&G'C(Ä9Ä12\$B1Ä1(9#&ONF&O*9\$Ä1!7/Q"ÄC1751-C(9171:(5B01#2-11-C'A3";SGO&NT8'C19 01>SNT81-1(21Q&#29#Ä#01&S&J9#C(0912\$-151TQ
Ä(40#11#071'1="FL38	3YOOÄ	8?+=				=2C(71%<1)Ä12191-1'L_N&GOB'W83"L18@'HJEF'E&OQ";1#07#Ä191-Ä51219)00(112\$#2#BBÄ(BÄ1#1#1991\$17-1(21-1C17(10Q'ÄC1="L381-C2111(217177#5B01712#B0#75#15112\$#C#Ä#-1Ä17-17B1-Ä51#719(2151#07BÄ1712-Q=21271-117#-7101-191#41012\$-C7#Ä1(5B#Ä19#\$1271-C(71()5#-Ä115#-C1917-#29#Ä97Q'ÄC1751-C(9171:(5B01#2-11-C'A3";SGO&NT8C19 01>SNT
Ä<1'F81514(0#-101'eÄ#:-1(2	3"OI&	8?+=				SW83"L18@'HJEF'HO&*LT18#5B0111-Ä#:-7#Ä11#2#0.71911#B100#Ä.Y1/e=6#29#2-11)19#\$#1271-#0U#217-#29#Ä97(41Ä-C1'Ä#2\$1'1/O'F'JOQ
Ä<1'X(0#-10171>Ä3f	3"OHO	8?+=				SW83"L18@'HJEF'HGEO>T31-Ä#:-7#Ä11#2#0.71911#Ä1#29#ÄÄ#B^1#B100#Ä.Y118Q'R#2-11)#-1(21711:(5B#Ä17(2#\$#1271-#2171#017C1911B(121-#01,Ä#1(21Ä1Q
-1/1'\$ÄÄ>?'@#	>'?@	>/\$&	>'?@			>'?@+2#)(\$'Ä#
!-C#2(01131-Ä#:-1(21)8(1071)(Ä"Ä\$!#29#ÄÄ#B	g?<Y&E	8?+=				SW83"L18@'HJEF'F*ONOLT*\$1)7(019177C#U1211-C17ÄÄ(\$#11#2#05+51-C#2(0BÄ1(Ä1-#2#0.71711#Ä\$!#29#ÄÄ#B'F"Y118Q
Ä5,01Ä31-Ä#:-1(21)8(0197	?<Y&1	8?+=				=2FC(71111C#211#01\$11#1(21S-5,01ÄTQ&O\$1)7#5B01^A#G81#2917ÄÄ(\$#11#Ä111-Ä#-19111-CNO5+&#&61111-1(211129(41Ä1291-5,01Q'ÄC17(041211791#2191#91C.9Ä#19#291(212-Ä#19'S11d6T1-C19171Ä194(051)Ä#2#0.717Q

Lot 1 DP90877 - Waste Classification L01

Attachment 3 – Site Layout



BP SERVICE STATION WARNERS BAY
In-Situ Waste Classification Assessment

SITE PLAN

CHECKED:

APPROVED:

CLIENT: YAHAY PROPERTY INVESTMENTS

LOCATION: 482 THE ESPLANADE, WARNERS BAY, NSW

DESIGNED: TB

DATE: 8.9.2015

PROJECT NO.: P15071

DRAWN: RC

REV. NO: A

FIGURE: 1

DISPENSERS	
1/2	ULT/PULP/E10
3/4	PULP/ULP/E10
5/6	ULT/PULP/E10
7/8	ADF
9/10	PULP/ULP/E10

STORAGE TANKS	
UST 1	26.6kL ULP91
UST 2	20.2kL ULT98
UST 3	20.0kL PULP
UST 4	27.2kL not in use
UST 5	45.0kL E10
UST 6	33.0kL ADF



Groundwater Monitoring Event (GME) Report May 2015

BP Warners Bay Service Station
482 The Esplanade
Warners Bay, NSW, 2282



Produced For:

Nine One One Convenience Pty Ltd

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May 2015

Nine One One Convenience Pty Ltd

Groundwater Monitoring Event (GME) Report – May 2015

BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW

Groundwater Monitoring Event (GME) Report May 2015

**BP Warners Bay Service Station
482 The Esplanade,
Warners Bay, NSW, 2282**

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Report Issued: May 2015

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Nine One One Convenience Pty Ltd*Groundwater Monitoring Event (GME) Report – May 2015**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW***TABLE OF CONTENTS**

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Nine One One Convenience Pty Ltd*Groundwater Monitoring Event (GME) Report – May 2015**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW*

EXECUTIVE SUMMARY

Aurora Environmental Consulting Pty Ltd (Aurora) was commissioned by Mr Basil Chakos of Nine One One Convenience Pty Ltd to undertake a Groundwater Monitoring Event (GME) at the BP service station facility located at 482 The Esplanade, Warners Bay, NSW (the Site).

The assessment is intended to provide an environmental condition report of the site, with this report documenting the findings of the monitoring event conducted on 18th May 2015.

The objectives of this GME were to collect, analyse, and report on the extent of hydrocarbon impacted groundwater at the site in accordance with the reporting requirements and recommendations of the NSW EPA's Underground Petroleum Storage System (UPSS) Regulations 2008.

The outcomes of the assessment were:

- The site is used as a retail store and fuel facility, and contains a UPSS comprising four underground storage tanks with six (6) storage compartments, and five (5) dispensing pumps;
- Groundwater was encountered below the site at between 0.9m and 2.1m BGL. The direction of groundwater movement below the site is towards the west, following the decrease in natural surface elevations towards Warners Bay, a distance of 100m from the site;
- A total of six (6) on-site groundwater monitoring wells exist at the site. On-site wells provide adequate site coverage for UPSS compliance purposes.
- Phase Separated Hydrocarbon (PSH) was not identified in any on-site monitoring well; and
- Concentrations of petroleum hydrocarbon compounds in groundwater samples collected from on-site monitoring wells MW1 to MW6 were below the adopted site assessment criteria, with the exception of the Naphthalene concentration in monitoring well MW4 which exceeded the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water.

In summary, the extent of petroleum hydrocarbon impact to groundwater appears to be generally contained to within the boundaries of the site. The Naphthalene impact in MW4 is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6. As such, the risk of harm to any potential aquatic ecosystem with the site in its current state is considered low. The extent of naphthalene impact to groundwater laterally to the south has not been confirmed, however is unlikely to extend beyond the current site boundary.

On the basis of this investigation, the environmental condition of the groundwater does not preclude the suitability of the site for ongoing service station use. More detailed environmental assessment would be required to confirm the site's suitability for ongoing residential or commercial land use.

Nine One One Convenience Pty Ltd*Groundwater Monitoring Event (GME) Report – May 2015**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW*

1. INTRODUCTION

Aurora Environmental Consulting Pty Ltd (Aurora) was commissioned by Mr Basil Chakos of Nine One One Convenience Pty Ltd to undertake a Groundwater Monitoring Event (GME) at the BP Warners Bay service station facility located at 482 The Esplanade, Warners Bay, NSW (the Site). The location of the Site is depicted in **Figure 1**, Site Location Plan which is attached in **Appendix A**.

The assessment is intended to provide an environmental condition report of the site.

1.1 Background

Groundwater monitoring wells within the site were initially installed at the site during previous ownership of the site by BP Australia Pty Ltd (BP) in 2003. Monitoring well locations within the site provide adequate coverage of the UPSS network. A total of six (6) on-site monitoring wells were sampled as part of this GME.

1.2 Objectives

The objectives of this GME were to:

- Collect, analyse, and report on the extent of hydrocarbon impacted groundwater at the site in accordance with the reporting requirements and recommendations of the NSW EPA;
- Confirm the extent and distribution of petroleum hydrocarbon impacted groundwater;
- Provide Nine One One Convenience Pty Ltd with an updated GME report documenting the contamination status of the site.

1.3 Scope of Work

The following scope of work was undertaken by Aurora for the GME:

- Gauge and sample all six (6) existing on-site monitoring wells;
- Collection of groundwater samples via well-dedicated disposable bailers from wells;
- Laboratory analysis of groundwater samples for the following potential contaminants:
 - Total petroleum hydrocarbons (TPH); and
 - Benzene, toluene, ethylbenzene, xylenes, and naphthalene (BTEXN).
- Preparation of a GME report.

Nine One One Convenience Pty Ltd*Groundwater Monitoring Event (GME) Report – May 2015**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW***2. SITE IDENTIFICATION****2.1 Site Use**

The Site is located at 482 The Esplanade, Warners Bay, NSW, approximately 105km north of Sydney on the north-eastern shores of Lake Macquarie, NSW. The Site location is illustrated in **Figure 1**, Site Location Plan. The site is currently in used as a petroleum service station, and is located within the Lake Macquarie City Council LGA and previously zoned Urban Centre 3(1) in accordance with the Lake Macquarie City Council LEP (2004), with the current zoning in accordance with the 2014 LEP listed as “Deferred Matter”. For the purposes of this assessment, the site has been assessed as residential land use.

The monitoring wells are located in the western portion of the site, downgradient of the Underground Petroleum Storage System (UPSS). These areas are shown on the site plan provided in **Figure 2** of **Appendix A**.

2.2 Physiography

The surface of the site is relatively flat, displaying a slight slope towards the west. Regionally, the surrounding topography also displays a moderate slope to the west. The elevation of the site is approximately 11mAHN.

2.3 Surrounding Land Use

The area surrounding the Site is generally residential / commercial property. The surrounding land use is summarised in **Table 1** below.

Table 1: Surrounding Land Use

Direction	Description
North	King St, then commercial property.
East	Residential property.
South	Residential property.
West	The Esplanade, then shoreline of Lake Macquarie

2.4 Regional Geology and Hydrogeology

A review of the Newcastle and Coal Measures 1:100,000 Geological Sheet produced by the NSW Geological Survey indicates the site is intersected by the contact between the Quaternary alluvium of North Creek and the Boolaroo Subgroup.

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A boresearch of the NSW Natural Resources Groundwater Interactive Map hosted by the NSW Office of Water was conducted with a search radius of 1 km around the site. There were no registered groundwater bores located within a 1km radius of the site.

Groundwater below the site occurs within the Quaternary Alluvium and the residual sandstone of the Boolaroo Subgroup forming a semi confined aquifer overlain by silty clay alluvial sediments. Further information relating to the physical properties of the groundwater at the site is provided in **Section 4.2**.

2.5 Nearby Surface Waters and Site Drainage

Surface drainage from the site is predominantly collected in on-site and boundary stormwater drains, and discharged off-site via the stormwater drainage network below The Esplanade and King Street. Lake Macquarie is the closest environmentally sensitive surface water body to the site, located 75m to the west.

2.6 Site History

Site history for the site was documented in the ESA conducted for the site by Environmental Resources Management Pty Ltd (ERM) in 2003 for BP Australia Pty Ltd. The ERM 2003 report identifies that a portion of the site (Lots 1 and 2) was purchased in 1958 by BP Australia for fuel retail purposes, with Lot 3 purchased in 1974. The site was sold to Nine One One Convenience Pty Ltd in 2003. Prior to 1958, the site does not appear to have been used for activities of a potentially contaminating nature.

2.7 Previous Investigations

The ERM (2003) ESA was sourced as the only previous environmental investigation report for the site.

Environmental Site Assessment (ESA) for BP Warners Bay Service Station, The Esplanade, Warners Bay, NSW (October 2003)

Environmental Resources Management Australia Pty Limited (ERM) was commissioned by BP Australia Pty Ltd (BP) to conduct drilling and monitoring well installation, at the BP Warners Bay Service Station in 2003.

The objective of the assessment was to determine whether the current and/or historical use of the site for fuel retail purposes, had resulted in hydrocarbon or lead impact to the soils and/or groundwater at the site. In addition, the investigation was to determine the vertical and lateral extent of impact to the soils and/or seepage water, both on and downgradient of the site. In order to achieve the above objectives, the assessment was conducted in two stages. BP's intention was to divest the site in the later part of the year, with the site to continue operation as a service station facility.

The results of the assessment works defined the lateral and vertical extent of hydrocarbon impact to the soils and groundwater below the site, and indicated that impact above the site assessment criteria, downgradient of the main source area extended to the western boundary. Given that hydrocarbon impacted soils and

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groundwater above the site assessment criteria were detected at the site's western boundary, and not in any off site boreholes/monitoring wells, the extent of hydrocarbon impact to the soils and groundwater, was likely to be confined to within the boundaries of the site and possibly for a short distance below The Esplanade.

Hydrocarbon impacted soils above the site assessment criteria were generally confined to below concrete surfaced areas in the south western portion of the site. ERM therefore considered that the exposure risk to human health associated with the soil impact is likely to be minimal, with the site in its current configuration.

2.8 Site Features

At the time of the GME, the site contained an operational service station facility including:

- A sales building and mechanical workshop in the central portion of the Site;
- A canopy in the central portion of the site, below which comprised five (5) fuel dispensing pumps;
- Two (2) split compartmentalised single-walled fibreglass underground storage tanks (USTs) and two (2) single unit single-walled fibreglass USTs. UST details are provided in **Table 2** below;
- A car wash located in the south-western portion of the site; and
- Ingress and egress is provided via two driveways on the site's northern boundary with King St, and an exit driveway on The Esplanade.

The site is surfaced throughout with concrete. Minor hydrocarbon staining on the concrete surface was evident in the areas surrounding the refuelling dispensers and remote fill points. A detailed site layout plan showing the locations of the site's features is presented in **Figure 2, Site Plan**, which is located in **Appendix A**.

2.9 Petroleum Storage

The storage of petroleum products is outlined in **Table 2** below.

Table 2: Petroleum Storage Information

Tank Number	Product	Material	Year of Install	Capacity (kL)
UST 1	ULP 91	Fibreglass	1996	24.6
UST 2	ULT 98	Fibreglass	1996	20.2
UST 3	PULP 95	Fibreglass	1996	20.0
UST 4	Not In Use	Fibreglass	1996	27.2
UST 5	E10 ULP	Fibreglass	1996	45.0
UST 6	ADF	Fibreglass	1996	33.0

Nine One One Convenience Pty Ltd*Groundwater Monitoring Event (GME) Report – May 2015**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW***3. FIELD ACTIVITIES****3.1 Summary of Field Activities**

GME activities are summarised in the following table.

Table 3: Summary of Field Activities

Activity	Details
Date of Field Activities	18 th May 2015
Groundwater Gauging	Gauging of all wells (MW1 – MW6) was conducted on the 18 th May 2015. Gauging was conducted using an oil/water interface probe to establish depth to groundwater, total well depth, and to check for the presence of LNAPL. Groundwater gauging results are summarised in Section 3.2 below.
Groundwater Sampling	Sampling of all wells MW1 to MW6 was conducted on 18 th May 2015. Each groundwater monitoring well was purged using a well-dedicated disposable bailer, with between 10L and 15L of water being removed from each well. Groundwater samples were collected in laboratory supplied containers specific to the parameters being analysed. All groundwater samples were analysed for TPH, BTEXN compounds. Groundwater results summary tables are attached as Appendix B .
Sample Preservation	Groundwater samples stored on ice whilst on-site and in transit to the NATA accredited laboratory. Samples were transported using chain-of-custody protocols. Groundwater laboratory reports are attached as Appendix C .
Decontamination Procedures	The interface probe and water quality meter were decontaminated between uses at each well with a Decon 90 solution, then rinsed with potable water. Disposable nitrile gloves were changed between handling of each groundwater sample. Well-dedicated bailers were used for sampling each well, to prevent cross contamination.

3.2 Localised Hydrogeology

Groundwater was encountered between the alluvium and underlying sandstone. Depth to groundwater ranged between 0.88m BTOC (Below Top of Casing) in monitoring well MW2, to 2.06m BTOC in monitoring well MW3. Phase Separated Hydrocarbon (PSH) was not identified in any monitoring well.

The direction of groundwater movement across the site was calculated from surveyed relative levels to determine the corrected groundwater elevations in each well. The groundwater gradient was determined to be 0.014 m/m or 0.78 degrees towards the west, following a decrease in natural surface elevations towards Warners Bay. The groundwater contour plan for the site is provided as **Figure 3** in **Appendix A**.

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4. ASSESSMENT CRITERIA

To assess the relative level and significance of any detected contaminants, reference is made to established environment and/or human health threshold level or criterion. These criteria are dependant mainly on the proposed use of the site and associated environmental and human health risk, either on or off-site, in both the long and short term. More stringent levels apply to sensitive land uses and chemicals with higher toxicity.

Based on the current zoning of the site, the surrounding land use, the potential future beneficial use of the site and groundwater beneath it and identified potential receptors at and in the vicinity of the site, the following investigation levels are considered relevant for the GME.

As the GME was undertaken as a component of the NSW (2008) POEO UPSS Regulation, the groundwater analytical data has been compared to the:

- NSW DECC (2009) – Department of Environment and Climate Change, Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 Column 2, trigger values for fresh water.

Furthermore, to evaluate groundwater conditions at the site, analyte concentrations have been compared to relevant groundwater guidelines. For this site, there are no potable water users in the vicinity of the site, the groundwater results have therefore been compared to the ecological risk based criteria for fresh water developed in the following guidelines:

- NEPM (1999: amendment 2013) – National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), Groundwater Investigation Levels (GILs), Schedule B(1), Table 1(C). GILs for Fresh Waters and Marine Waters are based on trigger values for slightly-moderately disturbed ecosystems obtained from the National Water Quality Management Strategy (NWQMS), Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), October 2000); and
- NEPM (1999: amendment 2013) – National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), Health Screening Levels (HSLs) for Petroleum Hydrocarbons in Soil and Groundwater. The guidelines provide Tier 1 groundwater HSLs for vapour intrusion of petroleum hydrocarbons, and have been developed for the protection of site users from vapours released from the impacted groundwater. The HSLs take into consideration the potential land use receptors (residential or commercial/industrial); the depth of groundwater intersection (2m to <4m, 4m to <8m); and the dominant soil type (sand, silt or clay) overlying the groundwater intersection depth.

The HSLs are not clean-up levels but are used to trigger additional assessment (Tier 2 or Tier 3) or for development of appropriate risk management options.

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5. GROUNDWATER ANALYTICAL RESULTS SUMMARY

Groundwater analytical results are summarised in **Table 4** contained in **Appendix B**. Complete copies of the NATA endorsed analytical reports, with analytical methods and analytical results, and accompanying chain-of-custody documentation, are provided in **Appendix C**.

5.1 TPH (C₆-C₉)

TPH (C₆-C₉) compound concentrations in groundwater samples collected from each of the sampled monitoring wells ranged between below laboratory detection limits in MW2 and MW3, up to 2,290 ug/L in MW4..

5.2 TPH (C₁₀-C₃₆)

TPH (C₁₀-C₃₆) compound concentrations in groundwater samples collected from each of the sampled monitoring wells ranged between below laboratory detection limits in several wells, up to 7,600ug/L in MW4.

5.3 TRH

Total Recoverable Hydrocarbon concentrations were either below laboratory detection limits (MW2 and MW3), or below the NEPM (2013) site assessment criteria (MW1, MW4, MW5 and MW6) for all sampled monitoring wells. Monitoring well MW4 recorded elevated TRH concentrations however concentrations were below the NEPM (2013) health screening levels (HSLs) for soil vapour intrusion when compared to residential land use criteria for Silt based soils.

5.4 Benzene

Benzene concentrations in each of the sampled monitoring wells were below the NEPM (2013) health screening levels (HSLs) for soil vapour intrusion compared to residential land use criteria for Silt based soils.

5.5 BTEXN

Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN) compounds in groundwater collected from each of the sampled monitoring wells were below the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water, with the exception of the concentration of Naphthalene detected in MW4 (427 ug/L) which exceeded the threshold level of 16 ug/L.

Given the location of the observed impact to groundwater is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6, the risk of harm to any potential aquatic ecosystem with the site in its current state is considered low. The extent of naphthalene impact to groundwater laterally to the south has not been confirmed, however is unlikely to extend beyond the current site boundary.

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6. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Groundwater samples were collected in the field by Aurora personnel, placed on ice, and transferred to the analytical laboratory using appropriate sample preservation methods and chain-of-custody documentation.

The National Association of Testing Authorities (NATA) certifies both laboratories for the analytical testing employed. As part of their internal QA/QC, these laboratories conduct regular audits on their analyses through the use of reagent blanks, analysis of surrogate spikes, repeat duplicates and verification of recoveries.

Copies of the final NATA endorsed laboratory reports, including internal QA/QC results and chain-of-custody documentation are attached as **Appendix C**.

Overall, the QA/QC assessment found that:

- The internal duplicates were within the acceptable relative percentage difference range (0% to 30-50%RPD);
- Trip Blank sample returned an acceptable concentration of contaminant (Below laboratory detection limits), indicating the field samples were not externally contaminated during the sampling event;
- Matrix and surrogate spike recoveries were within the acceptable range (70-130%) for the majority of samples submitted; and
- Samples were received by the laboratory in good order, appropriately chilled and analysed within appropriate sample holding times.

Based on a review of the results for the QA/QC program adopted, the overall data quality is acceptable.

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7. CONCLUSIONS

Based on the results of the May 2015 Groundwater Monitoring Event (GME) at the BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW, the following can be concluded:

- The site is used as a retail store and fuel facility, and contains a UPSS comprising four underground storage tanks with six (6) storage compartments, and five (5) dispensing pumps;
- Groundwater was encountered below the site at between 0.9m and 2.1m BGL. The direction of groundwater movement below the site is towards the west, following the decrease in natural surface elevations towards Warners Bay, a distance of 100m from the site;
- A total of six (6) on-site groundwater monitoring wells exist at the site. On-site wells provide adequate site coverage for UPSS compliance purposes.
- Phase Separated Hydrocarbon (PSH) was not identified in any on-site monitoring well; and
- Concentrations of petroleum hydrocarbon compounds in groundwater samples collected from on-site monitoring wells MW1 to MW6 were below the adopted site assessment criteria, with the exception of the Naphthalene concentration in monitoring well MW4 which exceeded the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water.

In summary, the extent of petroleum hydrocarbon impact to groundwater appears to be generally contained to within the boundaries of the site. The Naphthalene impact in MW4 is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6. As such, the risk of harm to any potential aquatic ecosystem with the site in its current state is considered low. The extent of naphthalene impact to groundwater laterally to the south has not been confirmed, however is unlikely to extend beyond the current site boundary.

On the basis of this investigation, the environmental condition of the groundwater does not preclude the suitability of the site for ongoing service station use. More detailed environmental assessment would be required to confirm the site's suitability for ongoing residential or commercial land use.

Nine One One Convenience Pty Ltd*Groundwater Monitoring Event (GME) Report – May 2015**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW*

8. LIMITATIONS OF REPORT

The findings of this report are based on site conditions that existed at the time this Groundwater Monitoring Event (GME) was conducted. The report was prepared in accordance with accepted environmental practices used by environmental professionals working within this area. Conclusions are made from a limited number of observation points assuming that the soil, groundwater, geological and chemical conditions are representative across the site. No other warranties are made or intended.

This report has been prepared exclusively for use by Nine One One Convenience Pty Ltd for the May 2015 Groundwater Monitoring Event (GME) of the BP Service Station, 482 The Esplanade, Warners Bay, NSW. This report cannot be reproduced without the written authorisation of Aurora Environmental Consulting Pty Ltd and then can only be reproduced in its entirety.

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Groundwater Monitoring Event (GME) Report – May 2015

BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW

9. REFERENCES

Australian and New Zealand Environment and Conservation Council & National Health and Medical Research Council (ANZECC & NHMRC), *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*, January 1992.

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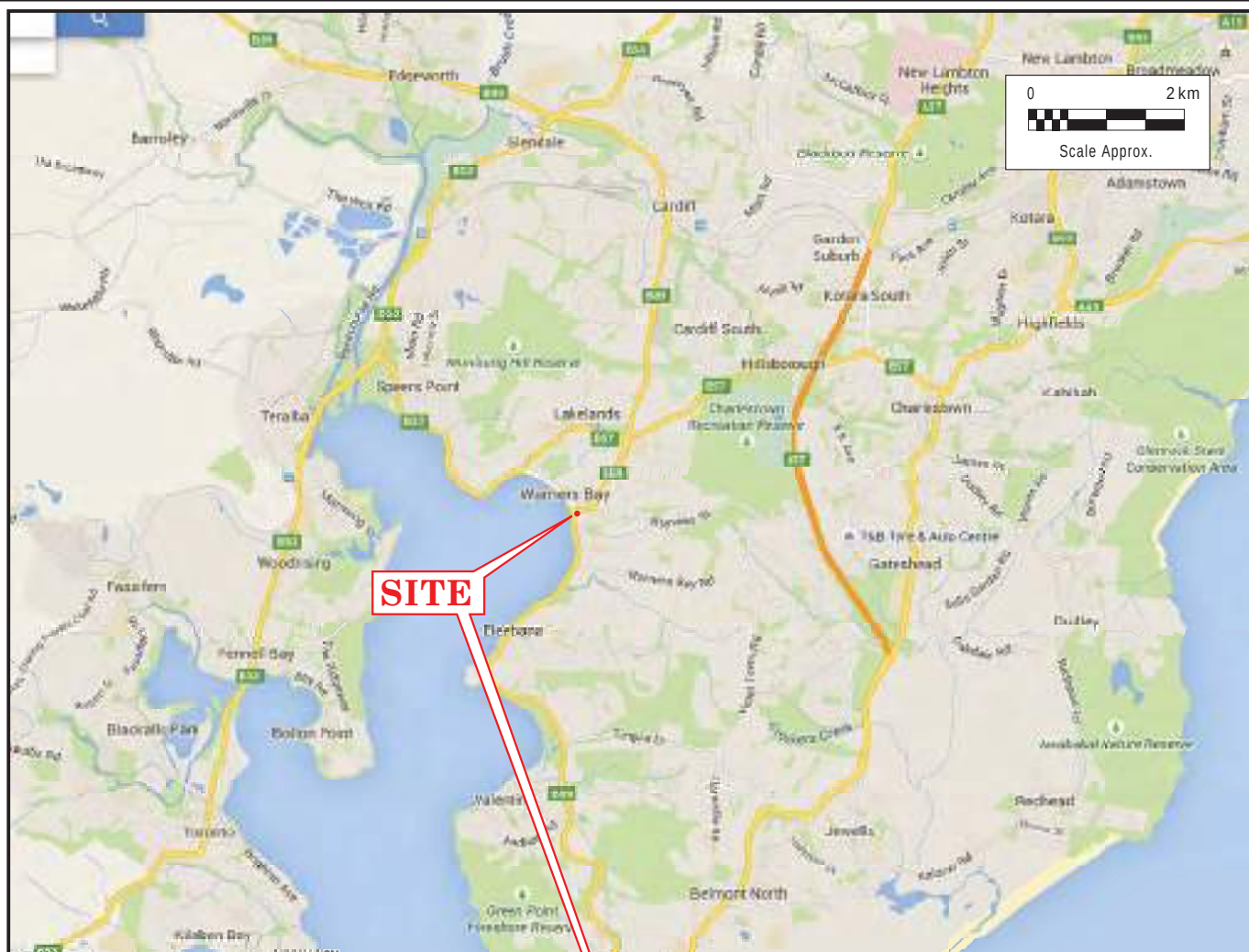
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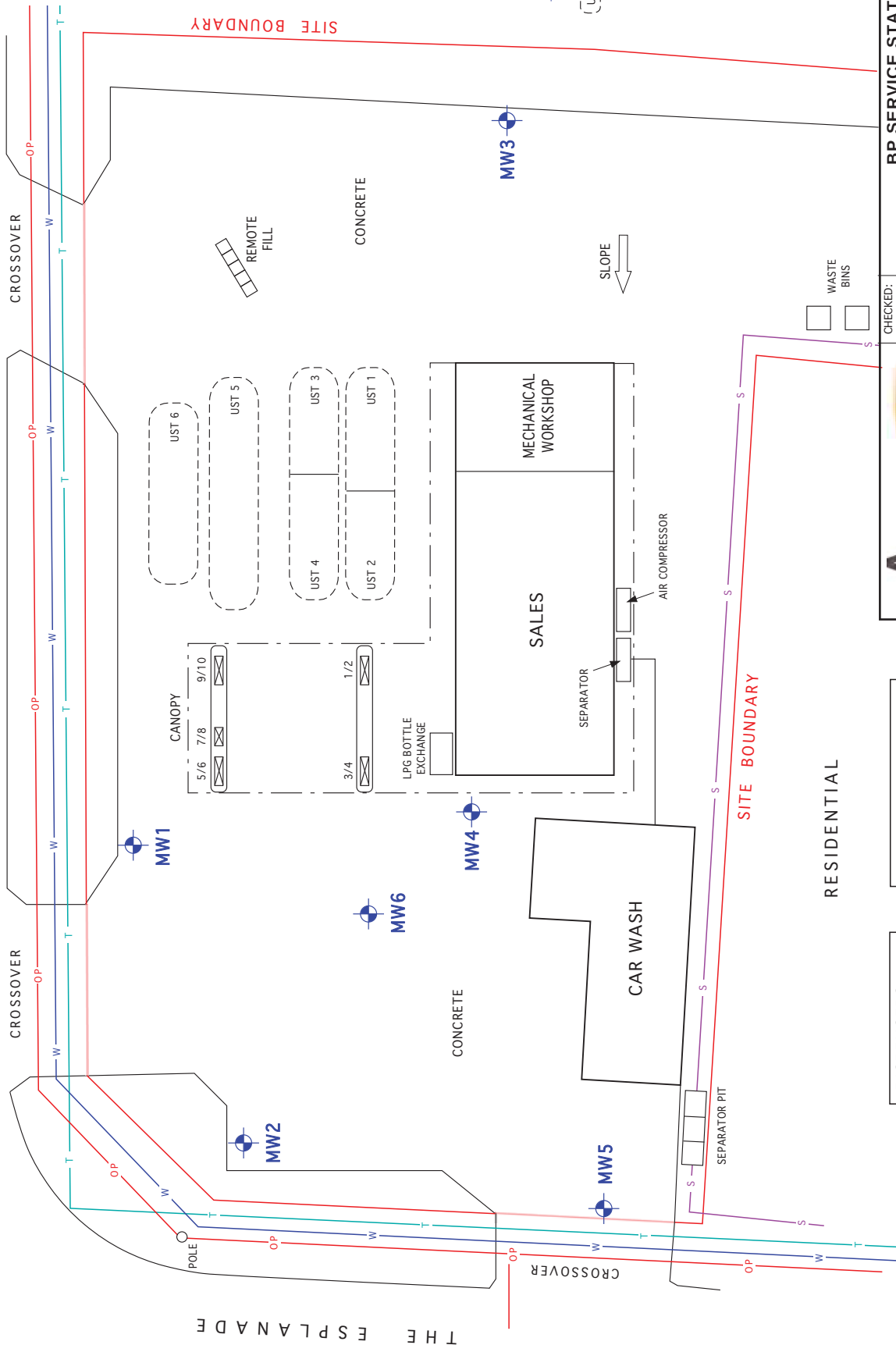
Appendix A

Figures



MAP DATA REPRODUCED WITH THE PERMISSION OF GOOGLE MAPS (2015)

 Aurora ENVIRONMENTAL CONSULTING PO Box 165 Newcastle NSW 2300 M: +61 438 233 779 E: tim@auroraenvironmentalconsulting.com.au	CHECKED:	BP SERVICE STATION WARNERS BAY Environmental Site Assessment SITE LOCATION PLAN			
	APPROVED:	CLIENT:	LOCATION:		
		NINE ONE ONE CONVENIENCE PTY LTD		482 THE ESPLANADE, WARNERS BAY, NSW	
		DESIGNED: TB	DATE: 18.5.2015	PROJECT NO.: P15038	FIGURE: 1
		DRAWN: RC	REV. NO: A		



DISPENSERS	
1/2	ULT/PULP/E10
3/4	PULP/ULP/E10
5/6	ULT/PULP/E10
7/8	ADF
9/10	PULP/ULP/E10

STORAGE TANKS	
UST 1	26.6kL ULP91
UST 2	20.2kL ULT98
UST 3	20.0kL PULP
UST 4	27.2kL not in use
UST 5	45.0kL E10
UST 6	33.0kL ADF

Aurora
ENVIRONMENTAL CONSULTING

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M: +61 438 233 779
E: tim@auroraenvironmentalconsulting.com.au

CHECKED:

APPROVED:

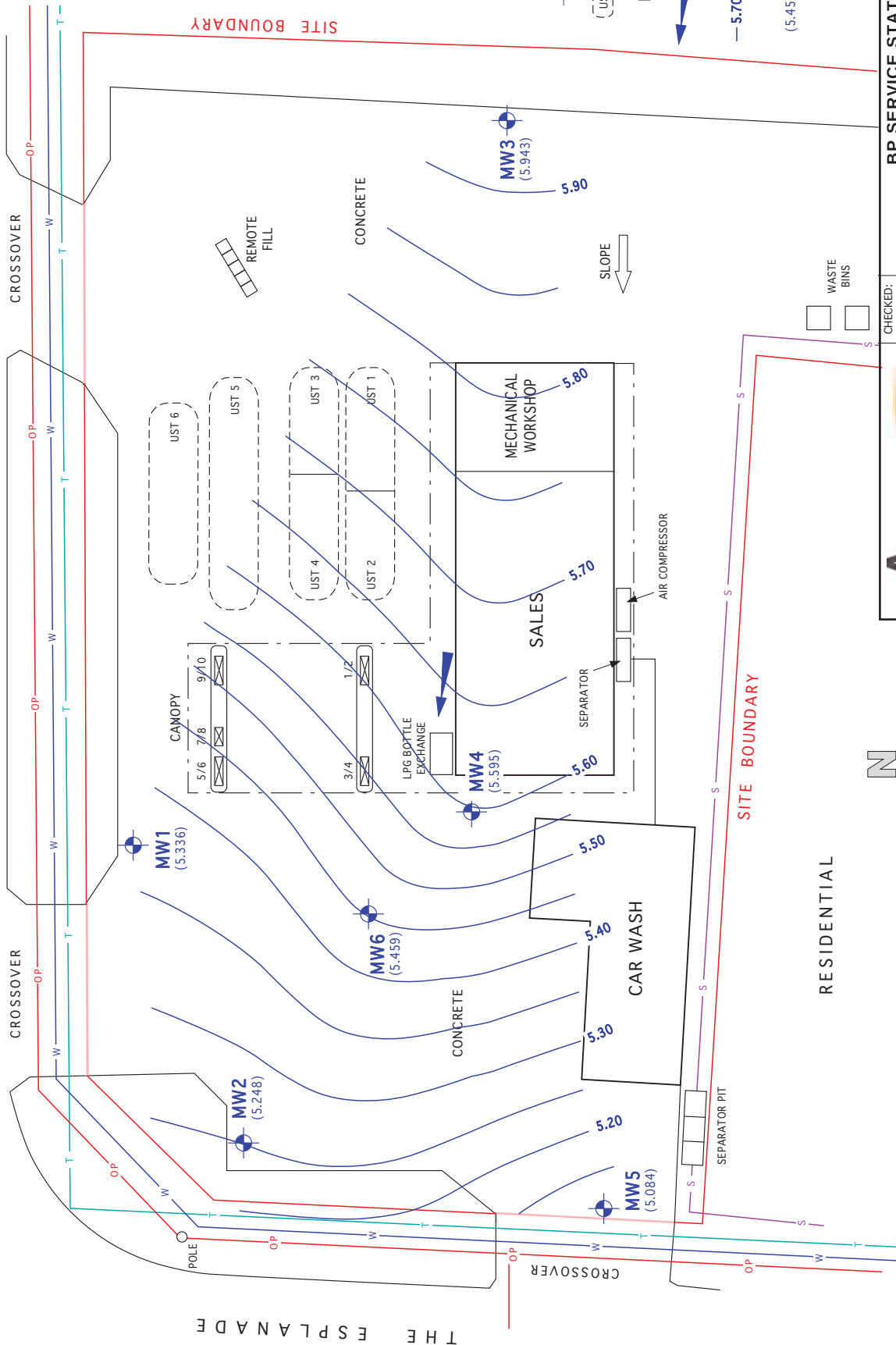
CLIENT:		LOCATION:	
NINE ONE ONE CONVENIENCE PTY LTD		482 THE ESPLANADE, WARNERS BAY, NSW	
DESIGNED:	TB	DATE:	18.5.2015
DRAWN:	RC	REV. NO:	A
		PROJECT NO.:	P15038
		FIGURE:	2

BP SERVICE STATION WARNERS BAY
Environmental Site Assessment

SITE PLAN

CLIENT:		LOCATION:	
NINE ONE ONE CONVENIENCE PTY LTD		482 THE ESPLANADE, WARNERS BAY, NSW	
DESIGNED:	TB	DATE:	18.5.2015
DRAWN:	RC	REV. NO:	A
		PROJECT NO.:	P15038
		FIGURE:	2

KING STREET



CHECKED: APPROVED:

CLIENT: NINE ONE CONVENIENCE PTY LTD

LOCATION: 482 THE ESPLANADE, WARNERS BAY, NSW

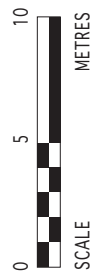
DESIGNED: TB DATE: 18.5.2015 PROJECT NO.: PT5038

DRAWN: RC REV. NO: A

FIGURE: 3

BP SERVICE STATION WARNERS BAY
Environmental Site Assessment

GROUNDWATER ELEVATION CONTOURS



Nine One One Convenience Pty Ltd

Groundwater Monitoring Event (GME) Report – May 2015

BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW

Appendix B

Groundwater Results Summary Tables

TABLE 4
Groundwater Analytical Summary
TPH, TRH, BTEXN
BP Warners Bay Service Station
482 The Esplanade, Warners Bay, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Land Use at Well Location	Soil Profile Conditions		Total Petroleum Hydrocarbons (TPH)					Total Recoverable Hydrocarbons (TRH)					Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene (BTEXN)								
			Depth Water Encountered (mBGS)	Major Soil Texture above Water	HSL Texture Category	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₁₈	C ₁₉ -C ₂₈	Total TPH C ₁₀ -C ₂₈ ^A	C ₆ -C ₁₀	F1 (C ₆ -C ₁₀ - BTEX)	>C ₁₀ -C ₁₅	F2 (>C ₁₀ -C ₁₅ - N)	>C ₁₅ -C ₃₀	Total TRH C ₆ -C ₃₀ ^A	Benzene	Toluene	Ethylbenzene	m & p Xylenes	o-Xylenes	Total BTEX ^A	Naphthalene
MW1	18-May-15	A & B: Low to High Density Residential	1.5	Silty Clay	Silt	50	100	100	nd	200	50	140	130	nd	nd	140	nd	nd	2	nd	nd	2	12
MW2	18-May-15	A & B: Low to High Density Residential	0.9	Silty Clay	Silt	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW3	18-May-15	A & B: Low to High Density Residential	2.1	Silty Clay	Silt	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW4	18-May-15	A & B: Low to High Density Residential	1.2	Silty Clay	Silt	2,290	4,620	990	1,990	7,600	2,630	2,400	4,940	4,510	1,960	8,690	206	5	nd	22	nd	233	427
MW5	18-May-15	A & B: Low to High Density Residential	0.9	Silty Clay	Silt	170	nd	nd	nd	nd	170	170	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW6	18-May-15	A & B: Low to High Density Residential	1.5	Silty Clay	Silt	40	nd	nd	nd	nd	50	50	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QW1	18-May-15	A & B: Low to High Density Residential	1.5	Silty Clay	Silt	50	nd	nd	nd	nd	50	50	nd	nd	nd	nd	nd	nd	2	nd	nd	2	12
TRIP BLANK	18-May-15					nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

NEPM (1999:amendment 2013) Groundwater Investigation Levels																						
Fresh Water																						
DECC (2009) Duty to Report																						
Fresh Water																						
NEPM (1999:amendment 2013) Groundwater HSLs for Vapour Intrusion																						
HSL A & HSL B	A & B: Low to High Density Residential	2 to <4m																				
		4 to <8m																				
		8m+																				
		Solubility Limit																				
			20	50	100	50	50	20	20	100	NA	100	100	100	1	2	2	2	2	1	5	
Laboratory Methodology			EP080/071										EP080/071								EP080	

Notes:

- Sample ID: MW-# denotes a water sample obtained from a monitoring well. All Units = µg/L;
- "nd" denotes concentrations not detected above the laboratory Limit of Reporting (LOR);
- F1 (C₆-C₁₀ - BTEX) fraction is determined by subtracting the total BTEX value from the C₆-C₁₀ fraction result as reported by the laboratory;
- F₂ (C₁₀-C₁₈ - N) fraction is determined by subtracting the naphthalene value from the >C₁₀-C₁₈ fraction result;
- "—" denotes that sample was requested but results not undertaken;
- "n/a" denotes that data is not available;
- "Σ" denotes that the total is the sum of individual results;
- "NA" denotes Not Applicable;
- "H" denotes the laboratory LOR concentration for the analysis. If this is greater than the standard LOR at the bottom of the table, the particular sample required dilution due to the presence of high level contaminants/or the LOR was raised due to ambient background levels in the laboratory and the LOR values have been adjusted accordingly;
- "C" indicates the values have been calculated using a hardness of 30 mg/L of CaCO₃. Refer to ANZECC & ARMCANZ (2000) for further guidance on recalculating for site specific hardness;
- NEPM (1999/amendment 2013) Groundwater Investigation Levels (GILs) are obtained from the National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), Schedule B(1) Table 1A(4); GILs for Fresh Waters and Marine Waters are based on trigger values for slightly/moderately disturbed ecosystems obtained from the National Water Quality Management Strategy (NWQMS), Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), October 2000). GILs for Drinking Water are based on the health values of the National Water Quality Management Strategy (NWQMS), Australian Drinking Water Guidelines (National Health and Medical Research Council (NHMRC) and National Resource Management Ministerial Council (NRMMC), 2011);
- ANZECC & ARMCANZ (2000) Stock Watering denotes investigation levels for Livestock Drinking Water Quality;
- NHMRC (2008) Recreation Water denotes investigation levels for managing risk in Recreational Water, based on Drinking Water investigation levels multiplied by 10, as recommended in Section 9.3.2 of the guideline;
- "H" denotes that guideline is for p-xylenes only;
- "Σ" denotes guideline being based on waters being visually free of oil and grease;
- NEPM (1999/amendment 2013) Health Screening Levels (HSLs) for Vapour Intrusion are obtained from the National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), Schedule B(1) Table 1A(4);
- "NL" denotes not limiting. The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. If the derived groundwater HSL exceeds the solubility limit, a soil-vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as "NL";
- Land-use setting includes: HSL A - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry)); also includes childcare centres, preschools and primary schools; HSL B - Residential with minimal opportunities for soil access: includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments; HSL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is low and where a site-specific assessment may be more appropriate; and, HSL D - Commercial/Industrial, includes premises such as shops, offices, factories and industrial sites

Nine One One Convenience Pty Ltd

Groundwater Monitoring Event (GME) Report – May 2015

BP Warners Bay Service Station, 482 The Esplanade, Warners Bay, NSW

Appendix C

Groundwater Laboratory Analytical Reports

Work Order
: ES1522095

Work Order : ES1522095) AURORA ENVIRONMENTAL CONSULTING
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Analytical Results

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EP080/071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction											
C10 - C14 Fraction											
C15 - C28 Fraction											
C29 - C36 Fraction											
jÄ C10 - C36 Fraction (sum)											
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction											
jÄ C6 - C10 Fraction minus BTEX (F1)											
>C10 - C16 Fraction											
>C16 - C34 Fraction											
>C34 - C40 Fraction											
jÄ >C10 - C40 Fraction (sum)											
jÄ >C10 - C16 Fraction minus Naphthalene (F2)											
EP080: BTEXN											
Benzene											
Toluene											
Ethylbenzene											
meta- & para-Xylene											
ortho-Xylene											
jÄ Total Xylenes											
jÄ Sum of BTEX											
Naphthalene											
EP080S: TPH(V)/BTEX Surrogates											
1,2-Dichloroethane-D4											
Toluene-D8											
4-Bromofluorobenzene											



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Laboratory Duplicate (DUP) Report

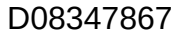
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Laboratory sample ID				Client sample ID		Method:Compound		Laboratory Duplicate (DUP) Report				
Laboratory sample ID		Client sample ID		Method:Compound		CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 102364)												
7,\$/JJ&O/M&&J		>CJ#		7* &N8, #4G#M#4O#Ã(Ã=25-6		MMMM J&	J&	j+0	dJ&	dJ&	8%&&	D-#05952
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 102364)												
7,\$/JJ&O/M&&J		>CJ#		7* &N8, #4G#M#4\$&#Ã(Ã=25-6		4Gk4\$&	J&	j+0	dJ&	dJ&	8%&&	D-#05952
EP080: BTEXN (QC Lot: 102364)												
7,\$/JJ&O/M&&J		>CJ#		7* &N8, #A^6 "6"		L\$MSKMJ \$	\$	j+0	d\$	d\$	8%&&	D-#05952
				7* &N8, #72R3 1^6 "6"		\$&&M\$MS	J	j+0	dJ	dJ	8%&&	D-#05952
				7* &N8, #9"2ÃM##PÃ(ÃMF3 "6"		\$&NMKNMK#	J	j+0	dJ	dJ	8%&&	D-#05952
						\$&GMSJMK						
				7* &N8, #- (2R-MF3 "6"		O/SLMG	J	j+0	dJ	dJ	8%&&	D-#05952
				7* &N8, #- "6"		\$&NMNNMK	J	j+0	dJ	dJ	8%&&	D-#05952
				7* &N8, #DÃPR2RÃ "6"		O\$MJ&MK	/	j+0	d/	d/	8%&&	D-#05952



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Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
				EP080: BTEXN (QCLot: 102364) - continued			
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		7*&N&,#-)"6"	\$&NMNNMK	J/#j+`0	O&%\$	L&	\$K&



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Outliers : Quality Control Samples

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

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

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**



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Outliers : Frequency of Quality Control Samples

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Analysis Holding Time Compliance

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1(0912\$ -151')Ä' 0#C#-1' 51-C(97' QOQD Ä+R' 4#Ä: #::(Ä912\$ -(' -C' #2#0.-17' ÄB(Ä-19O" L77177512-' : (5B#Ä17' -C' 01#C' 9#-1' '1-C' -C' 7C(Ä-17- #2#0.-1')Ä' -C' 1[14#012- 7(10'51- C(9O'ÄC17!' #Ä1% (Äs#21:7' &*9# 7a51Ä: Ä'GH'9# 7b(-C'Ä51:#07&HN'9#7O"L'Ä1:(Ä919' Ä#C'9(17'2(-\$ #Ä#2-11#Ä#C') (Ä#002(2F4(0#-101'B#Ä#51-! Ä7O
1(0912\$ -1517')Ä' VOC in soils' 4#Ä: #::(Ä912\$ -(' #2#0.-17' (') 12-Ä17-O' V12.0/CQ(Ä191' #29' 8.-Ä121' C(0912\$-151' 7' 1' 9#7c' (-C1Ä7' &*9#7 O' L' Ä1:(Ä919' Ä#C' 9(17' 2(- \$ #Ä#2-1! # ' Ä#C')Ä' #00V?1' #2#0.-17' #29' 7C(09;141Ä1)119'12-#71'-C1'ÄB(Ä-19' Ä#C'17#)#071'B(71- 141' (ÄV12.0/CQ(Ä191' #29'8.-Ä121' #Ä1'2(-S1: #2#0.-17')12-Ä 17-_(2:Ä2O

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EP080/071 : Total Petroleum Hydrocarbons					
Amber Glass Bottle - Unpreserved (EP071)					
:@&a :@a :@Za :@Ja P@&a	18-May-2015	18-May-2015	GJF:# FGN&J	19-May-2015	GIF12FGN&J
:@Ga :@*a :@Ea Ä<=">+LAe					
EP080/071: Total Petroleum Hydrocarbons					
Amber VOC Vial - Sulfuric Acid (EP080)					
:@&a :@a :@Za :@Ja P@&a	18-May-2015	18-May-2015	N&Ff 2FGN&J	18-May-2015	N&Ff 2FGN&J
:@Ga :@*a :@Ea Ä<=">+LAe					

```
%Z\)*
@/ÄS?Ä9Ä
%388JGGNTJ
0/012-
Ä/K(-
%L<Ä3<8>LM
%ÄU?<L'3ÄV=<?A,3ÄÄL+'7A8U+Ä=ÄW
```

Quality Control Parameter Frequency Compliance

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C:"\AC1\00('1\$Å1B(Ä-7 5\$Å1717-C1)Ä[12:(')0#(Ä#Ä.'P' 7#5B07'2#0.719'-1-C12-C1#2#0.-1#0'0(-Q7R12'C1:C-C17'5-197#5B01Q7R'#7Q'ÄRBÄ(17719O'L-#0 Ä#-'17C(09:'\$Ä# -JÄ-C#2(Ä'l[#0-(

#Å1X WATER

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	>.'?#@	:4	:<1I I	Actual	Expected	%0 I1	\$*Ä		
+.#.(Ä#.(Ä.'6 B01 #.-I7/Q6U)"R									
Ä<1F8I5I4(0#-10I7)Ä#.-1(2		N	T	0.00	10.00	✗		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
Ä<1V(0#-10I7_>Ä3g		&	T	11.11	10.00	✓		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
+.#.(Ä#-(Ä./I(2-Ä0#5B0I7'Q+8R									
Ä<1F8I5I4(0#-10I7)Ä#.-1(2		&	T	11.11	5.00	✓		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
Ä<1V(0#-10I7_>Ä3g		&	T	11.11	5.00	✓		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
!-C(9>0#2S7'Q>R									
Ä<1F8I5I4(0#-10I7)Ä#.-1(2		&	T	11.11	5.00	✓		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
Ä<1V(0#-10I7_>Ä3g		&	T	11.11	5.00	✓		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
#-Ä1X8B1SI7Q.8R									
Ä<1F8I5I4(0#-10I7)Ä#.-1(2		N	T	0.00	5.00	✗		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	
Ä<1V(0#-10I7_>Ä3g		&	T	11.11	5.00	✓		A3'';GN&Z''8:C19 0I">QZR#29I L+8P/8ZÄÄI 1ÄI5I2-	



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"Ä(K):-
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%38&JGGNTJ
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Brief Method Summaries

ÄC!#2#0.-1.#0*BÄ(:9 Ä!7' 7!9'.!-C!3241Ä(2512-#06141171(2'C# 4!1!29!4!0(B!9)Ä(5!7-#.#017C!9!12-Ä2#-1(2#00.Ä!:((\$2!1'9'B Ä(:9 Ä!7'7'.C#7'-C(7!B.#017C!9'.!-C!U8'3"LaL"LaL8#29'A 3":O=2'C(7!
9!4!0(B!9'BÄ(:9 Ä!7"Ä!"!5B0(19!12-C!#.#7!2:'!()9(5!2-!9' 7-#29#Ä97'(Ä'.!0112-Ä! 17-O'ÄC!)00('12\$Ä*B(Ä-BÄ(4!9!7'Ä!1!9!7:Ä!B-1(27')-C!#2#0.-1.#0BÄ(:9 Ä!7!5B0(!9!Ä!7 0-7Ä!B(Ä-!9!12-C!
/Ä-1)!#!')L2#0.7!17O'8(Ä:17)Ä(5'C1:C'L+8'5!-C(97'C#4!;! 129!4!0(B!9#Ä!BÄ(4!9!9"1-C12-C!;!C(96!7:Ä!B-1(27O

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Ä<!\V(0#-10!7_>Ä3g	3"NHN	@LÄ3<	U83"L'8@'H'E'F'HGEN>"@#-!Ä'7#5B0!7#Ä!9!1Ä!-0.'B Ä\$!9'BÄ1(Ä'#2#0.7!7'.!#B100#Ä.'W!_8#29' [#2-1)!#-1(2'17'.!:(5B#Ä17(2#\$#127-#2!7-#.#017C!9'JB(12-!#01,Ä#-1(2': Ä4!O!L0-Ä2#-14!0.a#7#5B0!17' ! 101,Ä#-!9!12#C!#97B#-!4!#0#29#B(Ä-1(2')-C!C!#97B#! '9!-!Ä5!2!9'.!W!;8#2#0.7!17O'ÄC17'5!-C(9!7' :(5B01#2-!1-C-C!P/Ä! 1Ä!5!2-7')A3";QGN&ZR'8:C!9 0!>QZR



7th September 2015

Yahav Property Investments
c/ PKF Newcastle
755 Hunter St
NEWCASTLE NSW 2300

Attn: To Whom It May Concern

**RE: Excavated Natural Material (ENM) Classification Assessment of Soil for
Proposed Warners Bay Development Site**

1 Introduction

Aurora Environmental Consulting Pty Ltd (Aurora) has completed an in-situ Excavated Natural Material (ENM) soil classification assessment on a 5,101 m² parcel of land in Warners Bay, NSW, which is the subject of a proposed development by Yahav Property Investments. The locality plan of the area is shown in **Figure 1** attached.

The site is comprised by the following allotments bounded by The Esplanade, King Street and Howard Street in Warners Bay, NSW and as shown in **Figure 2** attached:

- Lot 1 DP 90877 (482 The Esplanade)
- Lot 122 DP 578045 (16 King St)
- Lot 3 DP 32518 (486 The Esplanade)
- Lot 4 DP 32518 (488 The Esplanade)
- Lot 1 DP 155951 (14 King St)
- Lot 2 DP 155951 (12 King St)
- Lot 3 DP 155951 (1 Howard St)

The operational service station area and car wash facility (located partially within Lot 1 DP 90877) was excluded from the ENM assessment due to the presence of underground petroleum infrastructure, and the identification of concentrations of petroleum hydrocarbons in soil above the ENM exemption criteria. **Figure 2** identifies the approximate area excluded from the assessment. This area is subject to a separate in-situ waste classification assessment and report.

The purpose of the investigation was to adequately classify the in-situ soil material across the site (with the exception of the operational service station area and car wash area) in order to facilitate off-site use as excavated natural material (ENM).

The results for sampling and analysis of the soil have been compared against the New South Wales Environmental Protection Authority (NSW EPA) *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014*, The Excavated Natural Material Order 2014.

Supporting documentation including site plans (**Figures 1 and 2**) showing the site location and the area where the soil samples were collected, results summary tables (**Table T1 to Table T5**), and Laboratory Reports (**Attachment A**).

2 Scope of Works

In accordance with the sampling requirements detailed in Table 2 of the NSW EPA's ENM Order (2014), and based on an in-situ assessment area of 5,000m², a total of 13 systematic sampling points across the site were proposed for investigation.

Based on information provided by Yahav Property Investments regarding the maximum extent of excavations anticipated for the proposed development, the assessment required the in-situ sampling to between 3m and 6m below ground level across the site. As such, in-situ sampling was conducted in accordance with Table 3 of the ENM Order (2014), based on a depth of 3m below ground level in the western portion of the site, grading to 4.5m in the central portion of the site, and up to 6m below ground level in the eastern portion of the site.

As such, between 29th and 30th July 2015, a total of 42 discrete ENM samples were collected from the 13 systematic sampling points across the site, in accordance with the in-situ sampling requirements of the ENM Order (2014). Samples were collected using a Geoprobe drilling rig equipped with push tube capability. Due to the sample volume required for the ENM analysis, samples were collected in approximately 1m lengths, ensuring compliance with the ENM Order (2014) sampling requirements for in-situ assessment. All samples were inspected both visually and field screened for the presence of Volatile Organic Compounds (VOCs) utilising a Photo-Ionisation Detector (PID) or via olfactory sensing.

All soil samples were collected in the field by a qualified environmental engineer using an excavator to access all areas of the stockpile. The samples were immediately placed on ice and transferred to the laboratory with relevant Chain of Custody (CoC) documentation.

3 Assessment Criteria

Laboratory analytical results were compared against the Maximum Average and the Absolute Maximum Concentrations for Characterisation found in Table 4 of the NSW EPA Excavated Natural Material (ENM) Order (2014) as shown in **Table T1 to T5**.

4 Sample Analysis

A total of forty two (42) discrete soil samples and two (2) field duplicates were collected for the in-situ soil classification assessment and were submitted to Australian Laboratory Services (ALS) of Smithfield, New South Wales. The laboratory results and comparison with the criteria specified in Table 4 of the ENM Order (2014) are summarised in **Table T1 to Table T5** attached. The laboratory reports are attached (**Attachment B**)

All samples were submitted for the soil classification assessment were analysed for the following Contaminants of Concern (COC):

- Total Petroleum Hydrocarbons (TPH), Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethyl-benzene, Xylenes, collectively known as BTEX;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Metals (including As, Cd, Cu Cr, Pb, Zn, Hg, Ni);
- pH;
- Electrical Conductivity; and
- Foreign Materials Testing (FMT) *

*Samples were analysed for Foreign Materials Testing (FMT) in accordance with RTA276 requirements, including testing for the presence of rubber, plastic, cloth, paper, bitumen, paint and wood.

In accordance with the ENM Order (2014), samples with a pH below 5.0 were tested for potential acid sulfate soils (PASS). The testing method for PASS is referred to as SPOCAS (Suspended Peroxide Oxidation Combined Acidity and Sulfur) which is a measure of existing soil acidity and potential soil acidity to determine the soil's acid sulfate soil potential.

5 Analytical Results

5.1 Field Analysis Results

The stratigraphy encountered during drilling is summarised below and detailed in the borehole logs, which are presented in **Attachment A**.

The geology encountered in the boreholes drilled across the site comprised of alluvial sediments from North Creek and Lake Macquarie and residual soils of the Boolaroo Subgroup. The soils comprised dark grey and black sandy clay alluvium to varying depths of approximately 1.0 m below ground level. This is underlain by orange brown sandy clays grading to clayey sand residual soils of the Boolaroo Subgroup to the maximum depth of drilling at 6.0m. The alluvial clay sequence thickens towards the west in the boreholes closest to Lake Macquarie. Each sample collected was tested for the presence of volatile organic compounds (VOCs) using a hand held gas meter. All samples recorded VOC concentrations less than 1ppm (parts per million).

5.2 Laboratory Analysis Results

The laboratory analysis results of forty-two (42) discrete samples from boreholes ENM1 to ENM13 are summarized in the following section below:

- Concentrations of TPH, and BTEX compounds were below the laboratory detection limits in all samples.
- Concentrations of PAH compounds were below the laboratory detection limits in all samples;
- Concentrations of metals were detected below the NSW EPA ENM Order (2014) Maximum Average and Absolute Maximum concentrations in all samples;
- Foreign Materials were not detected in any of the samples analysed; and

- Laboratory pH ranged from 4.6 to 8.5 and had an average of 6.1. The pH values meet the NSW EPA ENM Order (2014) Maximum Average and Absolute values.

5.3 SPOCAS Assessment

Four samples returned pH concentrations below 5.0 and as such were submitted for SPOCAS analysis in accordance with the NSW EPA ENM Order (2014). An additional two samples were submitted for SPOCAS analysis for site coverage purposes.

A review of the results provided for the six samples submitted for SPOCAS analysis indicates that the **material is not consistent with actual or potential acid sulfate soils**.

A review of the KCl extractible sulphur indicates all concentrations are below the most conservative action criteria as per the Acid Sulfate Soils Manual (1998) and all the peroxide oxidisable sulfate (or Spos%) results occur in the range of <0.02 % to 0.023 %, all of which are less than the most conservative action criteria threshold of 0.03 %. This indicates that oxidation of the soils does not result in the production of sulfuric acid and so the soils are not classed as Acid Sulfate Soil.

It should be noted that whilst the SPOCAS results identified that the titratable sulfidic acidity and net acidity exceeded the assessment criteria in selected samples, these results are an indirect test that comprises the addition of a basic solution of known concentration to the soil sample solution whilst measuring the change in pH. The amount of basic solution that is required to raise the pH to a value of pH 5.5 is then called the 'Acidity' value. As such if the soils are acidic for any reason (not necessarily acid sulfate), you get a positive result. The total sulfidic acidity (TSA) value is calculated by TPA minus TAA, assuming all acid produced during oxidation is the result of sulfate release, but this is often not the case, resulting in false positives for Acid Sulfate Soils.

5.3 Results Summary Tables

The summary tables (**Table T1** to **Table T5**) attached to this report provide a summary of all laboratory results collected from the site, and indicate that all laboratory results meet the NSW EPA ENM Order (2014) criteria. The laboratory data is provided in **Attachment B**.

6 QA/QC Results

To ensure that the data reported during the investigation fulfilled the overall project objectives and specific qualitative and quantitative Data Quality Objectives (DQOs), the following Data Quality Indicators (DQIs) were adopted for the collection and analysis of soil samples during the investigation:

- Use of appropriate field and analytical sampling methodology;
- Preservation of samples upon collection and during transport to the laboratory meet applicable standards and guidelines;
- Sample holding times meet applicable standards and guidelines;
- Testing was carried out by a laboratory accredited by NATA, using methods approved by NATA (or the USEPA);

- Laboratory Limits of Reporting (LOR) or Estimated Quantitation Limits (EQL) meet applicable standards and guidelines;
- Frequency of collection of field and laboratory quality control samples meet applicable standards and guidelines;
- Results of the field quality control samples meet applicable standards and guidelines (i.e. duplicate samples);
- Results of the laboratory quality control samples meet applicable standards and guidelines (i.e. method blanks, laboratory control samples, duplicates, matrix spike, and surrogate recoveries); and
- Occurrence of apparent inconsistencies between laboratory data results as compared to field observations and measurements.

A Quality Assurance/ Quality Control (QA/QC) Program was implemented to assess the quality and reliability of the data collected and used in this investigation.

Primary or parent samples and intra-laboratory duplicates were submitted to Australian Laboratory Services (ALS) of Smithfield, New South Wales. The QA/QC program for analytical data is summarised in **Table T5**.

ALS's analytical methods for the tests requested are certified by the NATA. The analytical testing laboratories utilised during the investigation were also required to adhere to accepted analytical methodologies and conduct regular quality control checks on their analysis. Aurora requires these laboratories to regularly provide results of method or reagent blanks, control standards, duplicates, and surrogate recoveries. These procedures and results are documented in the laboratory reports in **Attachment B**.

The overall quality of the data is considered suitable for the purposes of this investigation.

7 Conclusions

The samples collected indicated concentrations of contaminants and physical attributes were within the Maximum Average and Absolute Maximum Concentrations listed in Table 4 of the New South Wales Environmental Protection Authority (NSW EPA) *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014*, The Excavated Natural Material Order 2014.

In summary, the in-situ sampling of soil across the 5,101m² site has confirmed that the soils meet the requirements of the NSW EPA ENM Order (2014) facilitating off-site disposal as **Excavated Natural Material**, noting that the assessment excludes that area comprising service station operations as indicated in **Figure 2**. A separate in-situ waste classification assessment and report has been prepared for the area comprising service station operations.

8 Limitations

The findings of this report are based on site conditions which existed on the 29th and 30th July 2015. The report was prepared in accordance with accepted environmental practices used by environmental professionals working within this area. Conclusions have been made from a limited number of observation points assuming that the chemical conditions are representative across the assessed area. No other warranties are made or intended.

This report has been prepared by Aurora Environmental Consulting (Aurora) as part of the ENM Classification Report performed on the subject sites described as Lots 1 and 2 DP90877, Lots 3 and 4 DP32518, Lot 122 DP578045, and Lots 1-3 DP155951. This report cannot be reproduced without the written authorisation of Aurora Environmental Consulting Pty Ltd and then be can only reproduced in its entirety.

Yours sincerely,

Aurora Environmental Consulting Pty Ltd



Tim Brown (B.E. Env)
Director

ATTACHMENTS

Figure 1 – Site Layout

Figure 2 – Site Plan showing ENM Sampling Locations

Table T1 – Soil Analytical Summary – TRH, TPH, BTEXN

Table T2 – Soil Analytical Summary – PAHs

Table T3 – Soil Analytical Summary – Heavy Metals

Table T4 – Soil Analytical Summary - pH, Electrical Conductivity, Sulfur Trail and Foreign Materials

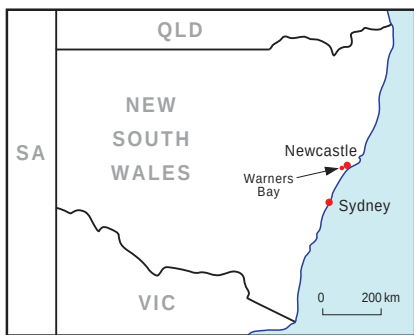
Table T5 – Soil Analytical Summary – Potential Acid Sulfate Soils

Table T6 – Soil QAQC Summary

Attachment A – Drilling Borelogs

Attachment B – Laboratory Reports

FIGURES



MAP DATA REPRODUCED WITH THE PERMISSION OF GOOGLE MAPS (2015)

Aurora
ENVIRONMENTAL CONSULTING

PO Box 165 Newcastle NSW 2300
M: +61 438 233 779
E: tim@auroraenvironmentalconsulting.com.au

CHECKED:

APPROVED:

Warners Bay Excavated Natural Material Classification Assessment SITE LOCATION PLAN

CLIENT:

YAHAV PROPERTY INVESTMENTS

LOCATION:

Cnr. KING ST & THE ESPLANADE,
WARNERS BAY, NSW

DESIGNED:

TB

DATE:

8.8.2015

PROJECT NO.:

P15080

DRAWN:

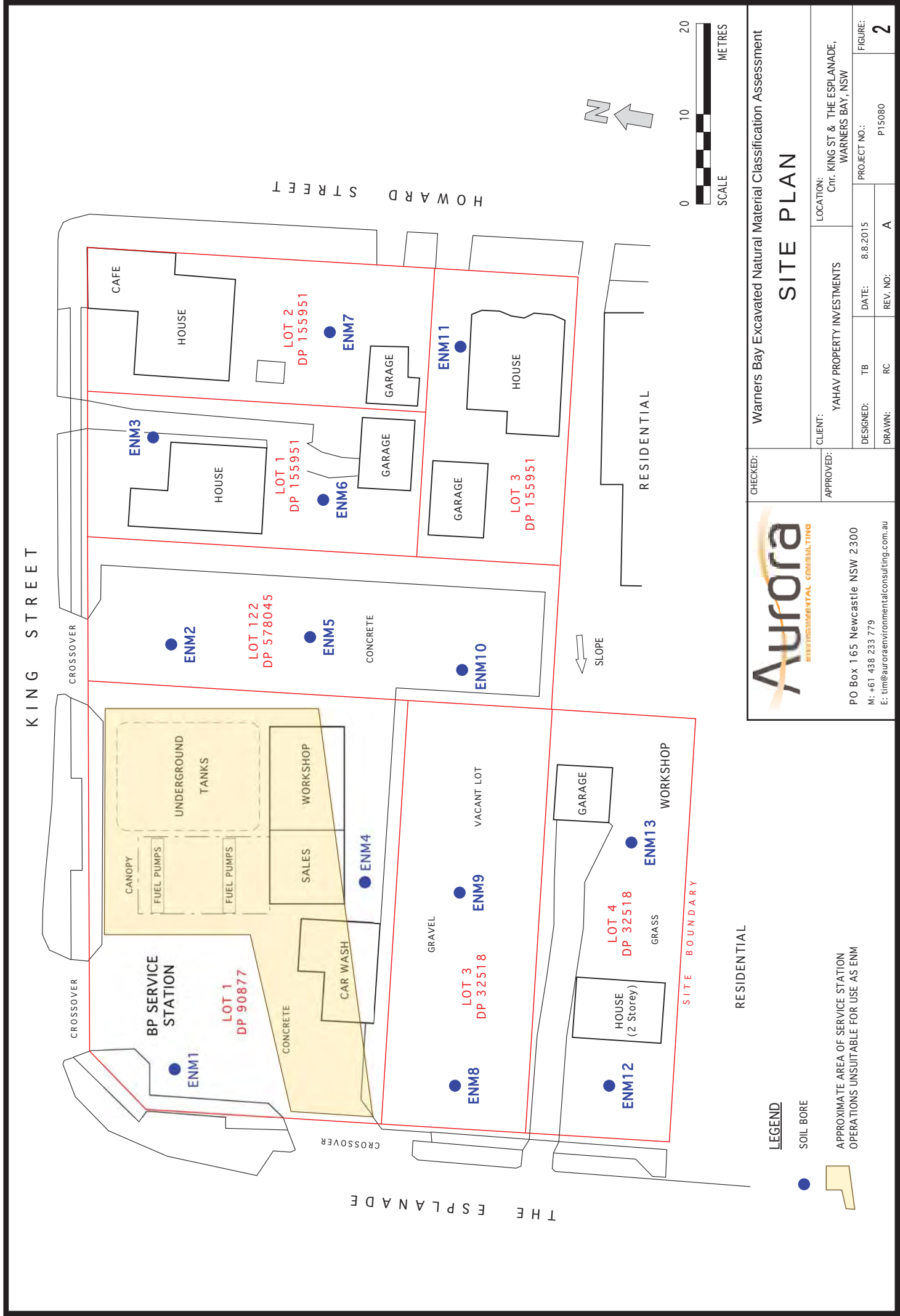
RC

REV. NO:

A

FIGURE:

1



TABLES



TABLE T1
Soil Analytical Summary - TPH, TRH & BTEXN
EXCAVATED NATURAL MATERIAL (ENM) ASSESSMENT
WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Total Petroleum Hydrocarbons (TPH)				Total Recoverable Hydrocarbons (TRH)				Benzene, Toluene, Ethylbenzene & Xylenes (BTEXN)										
		C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	Total TPH C ₁₀ -C ₃₆ [^]	C ₆ -C ₁₀	C ₆ -C ₁₀ (P1)	C ₁₀ -C ₁₆	C ₁₆ -C ₃₄	C ₃₄ -C ₄₀	Total TRH C ₆ -C ₄₀ [^]	Benzene	Toluene	Ethylbenzene	m & p Xylenes	o-Xylenes	Total BTEX [^]	Naphthalene	
ENM1 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM1 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM2 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM2 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM2 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 2.0-3.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 4.5-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM9 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM9 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM9 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 2.5-3.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM12 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM12 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM12 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QS1	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	QS2	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Column 2 - Maximum Average Concentration										250																			
Column 3 - Absolute Maximum Concentration										500																			
LOR																													
Laboratory Methodology										EP880071										EP880071									
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										50										50									
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Table T2
Soil Analytical Summary - PAH Compounds
EXCAVATED NATURAL MATERIAL (ENM) ASSESSMENT
WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Polycyclic Aromatic Hydrocarbons (PAH)												Total PAH				
		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)-anthracene	Chrysene	Benzo(b) fluoranthene	Benzo (k) fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(ah)-anthracene	Benzo(ghi)-perylene	Total PAH
ENM1 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM1 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM2 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM2 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM2 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 2.0-3.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 4.5-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 0.4-1.4m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM7 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM9 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM9 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM9 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 2.5-3.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM10 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 3.5-4.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM11 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM12 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM12 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM12 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 0.0-1.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 1.0-2.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QS1	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QS2	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd



Table T2
Soil Analytical Summary - PAH Compounds
EXCAVATED NATURAL MATERIAL (ENM) ASSESSMENT
WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Polycyclic Aromatic Hydrocarbons (PAH)												Total PAH			
		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)-anthracene	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene		Benzo(a)pyrene	Indeno(1,2,3-cd)-pyrene	Dibenz(ah)-anthracene
Sample Mean		-	-	-	-	0.27	-	0.41	0.44	0.29	0.56	0.34	-	0.33	-	-	0.32
Sample Standard Deviation		-	-	-	-	0.09	-	0.35	0.42	0.11	0.21	0.21	-	0.17	-	-	0.16
95% Confidence Level		-	-	-	-	0.06	-	0.23	0.28	0.07	0.14	0.14	-	0.11	-	-	0.11
95% UCL of Mean		-	-	-	-	0.33	-	0.64	0.71	0.36	0.70	0.48	-	0.44	-	-	0.42
NSW EPA (2014) The Excavation of Natural Material Order																	
Column 2 - Maximum Average Concentration		-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	20
Column 3 - Absolute Maximum Concentration		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	40
LOR		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Laboratory Methodology		EP075(SM)B															

Notes:

- Sample ID: SB#/#.#.#.# denotes a soil sample taken at a specific depth (m) and Q# denotes a quality assurance sample;
- All Units = mg/kg
- "nd" denotes concentrations not detected above the laboratory Limit of Reporting (LOR);
- "-" denotes that analysis was not requested;
- "n" denotes that no relevant criteria are available;
- "n/c" denotes that the total is the sum of individual results;
- 95% UCL of mean denotes 95% Upper Confidence Level of mean;
- Sample mean, standard deviation and 95%UCL of mean do not include the quality assurance samples;
- NSW EPA (2008) denotes the New South Wales (NSW) Environment Protection Authority (EPA) Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A. The excavated natural material exemption 2008; and
- Shading denotes concentrations exceeds the relevant guideline.



Table T3

Soil Analytical Summary

Metals

EXCAVATED NATURAL MATERIAL (ENM) ASSESSMENT

WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Arsenic (As)	Cadmium (Cd)	Total Chromium (Cr)	Copper (Cu)	Lead (Pb)	Nickel (Ni)	Zinc (Zn)	Mercury (Hg)
ENM1 0.4-1.4m	30-Jul-15	nd	nd	3	nd	8	nd	nd	nd
ENM1 2.0-3.0m	30-Jul-15	nd	nd	9	nd	7	nd	nd	nd
ENM2 0.4-1.4m	30-Jul-15	nd	nd	7	nd	8	nd	nd	nd
ENM2 2.0-3.0m	30-Jul-15	nd	nd	2	nd	nd	nd	nd	nd
ENM2 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 0.0-1.0m	29-Jul-15	nd	nd	2	nd	20	nd	18	nd
ENM3 2.0-3.5m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM3 4.5-6.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 0.4-1.4m	30-Jul-15	nd	nd	2	nd	6	nd	6	nd
ENM4 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM4 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 0.4-1.4m	30-Jul-15	nd	nd	6	nd	5	nd	nd	nd
ENM5 2.0-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM5 3.5-4.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 0.0-1.0m	29-Jul-15	5	0.4	4	13	43	nd	142	nd
ENM6 2.0-3.0m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
ENM6 3.5-4.5m	29-Jul-15	nd	nd	4	nd	nd	nd	nd	nd
ENM6 5.0-6.0m	29-Jul-15	nd	nd	nd	nd	6	nd	nd	nd
ENM7 0.0-1.0m	29-Jul-15	nd	nd	4	6	32	nd	33	nd
ENM7 2.0-3.0m	29-Jul-15	nd	nd	7	nd	8	nd	nd	nd
ENM7 3.5-4.5m	29-Jul-15	nd	nd	4	nd	nd	nd	nd	nd
ENM7 5.0-6.0m	29-Jul-15	8	nd	5	nd	5	nd	nd	nd
ENM8 0.0-1.0m	29-Jul-15	6	nd	8	nd	19	nd	29	nd
ENM8 1.0-2.0m	29-Jul-15	nd	nd	6	nd	7	nd	nd	nd
ENM8 2.0-3.0m	29-Jul-15	nd	nd	16	nd	7	3	nd	nd
ENM9 0.0-1.0m	29-Jul-15	6	nd	11	nd	7	2	15	nd
ENM9 1.0-2.0m	29-Jul-15	17	nd	13	nd	6	nd	nd	nd
ENM9 2.0-3.0m	29-Jul-15	nd	nd	8	nd	nd	nd	nd	nd
ENM10 0.0-1.0m	29-Jul-15	6	nd	18	nd	11	nd	nd	nd
ENM10 1.0-2.0m	29-Jul-15	7	nd	17	nd	8	nd	nd	nd
ENM10 2.5-3.5m	29-Jul-15	nd	nd	11	nd	6	nd	nd	nd
ENM10 3.5-4.5m	29-Jul-15	nd	nd	8	nd	7	nd	nd	nd
ENM11 0.0-1.0m	29-Jul-15	10	nd	22	nd	32	nd	10	nd
ENM11 2.0-3.0m	29-Jul-15	7	nd	4	nd	17	nd	nd	nd
ENM11 3.5-4.5m	29-Jul-15	nd	nd	3	nd	nd	nd	nd	nd
ENM11 5.0-6.0m	29-Jul-15	11	nd	nd	nd	7	nd	nd	nd
ENM12 0.0-1.0m	29-Jul-15	nd	nd	4	nd	8	nd	nd	nd
ENM12 1.0-2.0m	29-Jul-15	nd	nd	5	nd	6	nd	nd	nd
ENM12 2.0-3.0m	29-Jul-15	nd	nd	3	nd	nd	nd	nd	nd
ENM13 0.0-1.0m	29-Jul-15	nd	nd	4	nd	18	nd	73	nd
ENM13 1.0-2.0m	29-Jul-15	nd	nd	7	nd	6	nd	nd	nd
ENM13 2.0-3.0m	29-Jul-15	6	nd	7	nd	nd	nd	nd	nd
QS1	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd
QS2	29-Jul-15								

Sample Mean	8	-	7	10	12	3	41	-
Sample Standard Deviation	4	-	5	2	10	1	25	-
95% Confidence Level	2	-	3	1	6	0	15	-
95% UCL of Mean	10	-	11	11	18	3	55	-

NSW EPA (2014) The Excavation of Natural Material Order

Column 2 - Maximum Average Concentration	20	0.5	75	100	50	30	150	0.5
Column 3 - Absolute Maximum Concentration	40	1	150	200	100	60	300	1

LOR	5	1	2	5	5	2	5	0.1
Laboratory Methodology	EG005T							EG035T

Notes:

- Sample ID: SB###.##.## denotes a soil sample taken a specific depth (m) and Q# denotes a quality assurance sample;
- All Units = mg/kg, unless otherwise noted, e.g. pH, Electrical Conductivity (
- "nd" denotes concentrations not detected above the laboratory Limit of Reporting (LOR);
- " - " denotes that analysis was not requested;
- " - " denotes that no relevant criteria are available;
- "A" denotes that the total is the sum of individual results;
- 95% UCL of mean denotes 95% Upper Confidence Level of mean;
- Sample mean, standard deviation and 95%UCL of mean do not include the quality assurance samples;
- Criteria for chromium is relevant for hexavalent chromium only;
- Criteria for mercury is for inorganic mercury;
- NSW EPA (2012) denotes the New South Wales (NSW) Environment Protection Authority (EPA) Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A: The excavated natural material exemption 2012; and
- Shading denotes concentrations exceeds the relevant guideline.



Table T4

Soil Analytical Summary
pH, Electrical Conductivity, Sulfur Trail, Foreign Materials
EXCAVATED NATURAL MATERIAL (ENM) ASSESSMENT
WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	pH	Electrical Conductivity	Sulfur Trail (%Spos)	Foreign Materials						
					Rubber	Plastic	Bitumen	Paint	Paper	Cloth	Wood
ENM1 0.4-1.4m	30-Jul-15	7	22	0.02	nd	nd	nd	nd	nd	nd	nd
ENM1 2.0-3.0m	30-Jul-15	6.6	13	-	nd	nd	nd	nd	nd	nd	nd
ENM2 0.4-1.4m	30-Jul-15	7.5	23	-	nd	nd	nd	nd	nd	nd	nd
ENM2 2.0-3.0m	30-Jul-15	5.3	42	-	nd	nd	nd	nd	nd	nd	nd
ENM2 3.5-4.5m	30-Jul-15	5.3	37	-	nd	nd	nd	nd	nd	nd	nd
ENM3 0.0-1.0m	29-Jul-15	7	12	-	nd	nd	nd	nd	nd	nd	nd
ENM3 2.0-3.5m	29-Jul-15	6.8	52	-	nd	nd	nd	nd	nd	nd	nd
ENM3 4.5-6.0m	29-Jul-15	6.8	11	-	nd	nd	nd	nd	nd	nd	nd
ENM4 0.4-1.4m	30-Jul-15	8.0	49	-	nd	nd	nd	nd	nd	nd	nd
ENM4 2.0-3.0m	30-Jul-15	5.1	96	-	nd	nd	nd	nd	nd	nd	nd
ENM4 3.5-4.5m	30-Jul-15	7.5	66	-	nd	nd	nd	nd	nd	nd	nd
ENM5 0.4-1.4m	30-Jul-15	5.5	76	-	nd	nd	nd	nd	nd	nd	nd
ENM5 2.0-3.0m	30-Jul-15	5.2	80	-	nd	nd	nd	nd	nd	nd	nd
ENM5 3.5-4.5m	30-Jul-15	5.6	40	-	nd	nd	nd	nd	nd	nd	nd
ENM6 0.0-1.0m	29-Jul-15	6.8	31	-	nd	nd	nd	nd	nd	nd	nd
ENM6 2.0-3.0m	29-Jul-15	5.5	25	-	nd	nd	nd	nd	nd	nd	nd
ENM6 3.5-4.5m	29-Jul-15	5.1	36	-	nd	nd	nd	nd	nd	nd	nd
ENM6 5.0-6.0m	29-Jul-15	6.0	21	-	nd	nd	nd	nd	nd	nd	nd
ENM7 0.0-1.0m	29-Jul-15	6.9	18	-	nd	nd	nd	nd	nd	nd	nd
ENM7 2.0-3.0m	29-Jul-15	5.1	88	-	nd	nd	nd	nd	nd	nd	nd
ENM7 3.5-4.5m	29-Jul-15	5.6	32	-	nd	nd	nd	nd	nd	nd	nd
ENM7 5.0-6.0m	29-Jul-15	5.8	26	-	nd	nd	nd	nd	nd	nd	nd
ENM8 0.0-1.0m	29-Jul-15	7.6	78	-	nd	nd	nd	nd	nd	nd	nd
ENM8 1.0-2.0m	29-Jul-15	5.5	53	nd	nd	nd	nd	nd	nd	nd	nd
ENM8 2.0-3.0m	29-Jul-15	6.1	36	-	nd	nd	nd	nd	nd	nd	nd
ENM9 0.0-1.0m	29-Jul-15	8.5	102	-	nd	nd	nd	nd	nd	nd	nd
ENM9 1.0-2.0m	29-Jul-15	5.2	76	-	nd	nd	nd	nd	nd	nd	nd
ENM9 2.0-3.0m	29-Jul-15	5.5	48	-	nd	nd	nd	nd	nd	nd	nd
ENM10 0.0-1.0m	29-Jul-15	6.8	74	-	nd	nd	nd	nd	nd	nd	nd
ENM10 1.0-2.0m	29-Jul-15	4.6	399	0.02	nd	nd	nd	nd	nd	nd	nd
ENM10 2.5-3.5m	29-Jul-15	5.2	62	-	nd	nd	nd	nd	nd	nd	nd
ENM10 3.5-4.5m	29-Jul-15	5.3	47	-	nd	nd	nd	nd	nd	nd	nd
ENM11 0.0-1.0m	29-Jul-15	6.7	15	-	nd	nd	nd	nd	nd	nd	nd
ENM11 2.0-3.0m	29-Jul-15	5.8	38	-	nd	nd	nd	nd	nd	nd	nd
ENM11 3.5-4.5m	29-Jul-15	5.8	43	-	nd	nd	nd	nd	nd	nd	nd
ENM11 5.0-6.0m	29-Jul-15	6.1	28	-	nd	nd	nd	nd	nd	nd	nd
ENM12 0.0-1.0m	29-Jul-15	7.3	9	-	nd	nd	nd	nd	nd	nd	nd
ENM12 1.0-2.0m	29-Jul-15	5.4	47	-	nd	nd	nd	nd	nd	nd	nd
ENM12 2.0-3.0m	29-Jul-15	4.9	37	nd	nd	nd	nd	nd	nd	nd	nd
ENM13 0.0-1.0m	29-Jul-15	7.2	16	-	nd	nd	nd	nd	nd	nd	nd
ENM13 1.0-2.0m	29-Jul-15	4.7	169	0.023	nd	nd	nd	nd	nd	nd	nd
ENM13 2.0-3.0m	29-Jul-15	4.9	109	nd	nd	nd	nd	nd	nd	nd	nd
LOR		0.1	1	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Units		pH Units	uS/cm	%S	%	%	%	%	%	%	%
Laboratory Method		EA002	EA010	EA029	EA155						
Sample Mean		6.1	57	na	na	na	na	na	na	na	0.03
Sample Standard Deviation		1	63	na	na	na	na	na	na	na	0.01
95% Confidence Level		0.6	23	na	na	na	na	na	na	na	0.01
95% UCL of Mean		6.7	79	na	na	na	na	na	na	na	0.04

NSW EPA (2014) Excavated Natural Material Order

Column 2 Maximum Average Concentration	5 - 9	1500		0.05%
Column 3 Absolute Maximum Concentration	4.5 - 10	3000	0.03*	0.10%

Notes:

- ND = not detected above the laboratory Limit of Reporting;
- ^ = the Total is cumulative, derived from the sum of each constituents Limit Of Reporting;
- N/A = criteria not specified;

Bold type denotes concentrations in excess of the relevant criteria.

- LOR = Laboratory Limit of Reporting

"na" denotes that the sample was not analysed for this chemical

NSW EPA (2012) denotes the New South Wales (NSW) Environment Protection Authority (EPA) Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A: The excavated natural material exemption 2012.



Table T5
Soil QA/QC Summary
TPH, TRH, BTEXN & Total PAH
EXCAVATED NATURAL MATERIAL (ENM) ASSESSMENT
WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Total Petroleum Hydrocarbons (TPH)				Total Recoverable Hydrocarbons (TRH)				Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene (BTEXN)					
		C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	C ₆ -C ₁₀	C ₆ -C ₃₀ (F1)	C ₁₀ -C ₁₆	C ₁₆ -C ₃₄	C ₃₄ -C ₄₀	Benzene	Toluene	Ethyl-Benzene	Xylenes	Naphthalene
Duplicate/Triplicate Sample															
ENM 8.0-1m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QSI		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
RPD % (SP1 and QS1)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ENM11 0-1m	29-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QS2		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
RPD % (SP13 and QS2)		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
+ 30 - 50% (Analytical Concentration >5 LOR)															
LOR		10	50	100	100	10	10	50	100	100	0.2	0.5	0.5	0.5	1
Laboratory Methodology		EP080/071				EP080/071				EP080					

- Notes:
- Sample ID: SB#/#.## denotes a soil sample taken a specific depth (m) and Q# denotes a quality assurance sample;
 - All Units = mg/kg;
 - "nd" denotes concentrations not detected above the Laboratory Limit of Reporting (LOR);
 - "n" denotes that analysis was not requested;
 - "w" denotes that the total is the sum of individual results;
 - RPD = relative percent difference of duplicate sample results;
 - Concentrations in **red** are half the LOR for purposes of calculating RPD where the laboratory results returned nd for either the parent or the duplicate sample, but a detectable concentration was reported for the other sample; and
 - Shading denotes an unacceptable RPD (>5xLOR).

ATTACHMENT A

DRILLING BORELOGS

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM1

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay

Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW

Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 30/07/2015

Borehole depth: 3.0m

Contractor: Terratest

Date hole completed: 30/07/2015

R.L casing:

Driller: JC

Logged by: T Brown

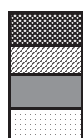
R.L surface:

Drill rig: Geoprobe

Datum:

Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E		    	CONCRETE	#	0	ENM1 0.4-1.4m	No Odour
				FILL: GRAVELEY SAND: brown, moist, dense				
2.0				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	No Odour	
3.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0	No Odour	
				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet, dense	#	0	ENM 1 2.0-3.0m	No Odour
4.0	Borehole Terminated at 3.0m depth							
5.0								
6.0								

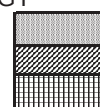


Cement/Grout
Backfill/Cuttings
Bentonite
Sand/Filter Pack



Asphalt/Concrete
Sand
Silt

GEOLOGY



Clay
Rock
Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM2

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 122 DP578045 (16 King St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced:	30/07/2015	Borehole depth:	4.5m	Contractor:	Terratest
Date hole completed:	30/07/2015	R.L casing:		Driller:	JC
Logged by:	T Brown	R.L surface:		Drill rig:	Geoprobe
		Datum:		Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			CONCRETE	#	0	ENM 2 0.4 - 1.4m	No Odour
				FILL: GRAVELEY SAND: brown, moist, dense				
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm				
				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency				
2.0								
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	0	ENM 2 2.0-3.0m	No Odour
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	ENM 2 3.5-4.5m	No Odour
5.0				Borehole Terminated at 4.5m depth				
6.0								

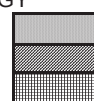


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM3

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP155951 (14 King St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015	Borehole depth: 6.0m	Contractor: Terratest
Date hole completed: 29/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	ENM 3 0 - 1m	No Odour
				RESIDUAL: SILTY SANDY CLAY: moderate plasticity, fine to medium sand, well graded, light and dark brown bands, moist, firm consistency				
2.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	0	ENM 3 2.0-3.5m	No Odour
3.0					#	0		No Odour
4.0				RESIDUAL: SAND: low plasticity, fine grained, yellow, wet, less dense	#	0		No Odour
5.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	ENM 3 4.5-6.0m	No Odour
6.0					#	0		No Odour

Borehole Terminated at 6.0m depth

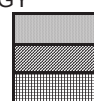


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM4

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 2 DP90877 (484 The Esplanade) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced:	30/07/2015	Borehole depth: 4.5m	Contractor:	Terratest
Date hole completed:	30/07/2015	R.L casing:	Driller:	JC
Logged by: T Brown		R.L surface:	Drill rig:	Geoprobe
		Datum:	Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			CONCRETE				
				FILL: GRAVELEY SAND: brown, moist, dense	#	0	ENM 4 0.4 - 1.4m	No Odour
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm	#	0		No Odour
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0	ENM 4 2.0-3.0m	No Odour
				RESIDUAL: SANDY GRAVELEY CLAY: moderate plasticity, fine to medium gravels, well graded, light and dark brown bands, very moist, firm consistency	#	0		No Odour
3.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0		No Odour
4.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3.5m, dense				
				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	ENM 4 3.5-4.5m	No Odour
					#	0		
5.0	Borehole Terminated at 4.5m depth							
6.0								

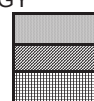


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM5

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 122 DP578045 (16 King St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced:	30/07/2015	Borehole depth:	4.5m	Contractor:	Terratest
Date hole completed:	30/07/2015	R.L casing:		Driller:	JC
Logged by:	T Brown	R.L surface:		Drill rig:	Geoprobe
		Datum:		Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments	
1.0	P U S H T U B E			CONCRETE		0	ENM 5 0.4 - 1.4m	No Odour	
				FILL: GRAVELEY SAND: brown, moist, dense					
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm					
				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#				
2.0									
3.0									
4.0									
5.0	Borehole Terminated at 4.5m depth								
6.0									

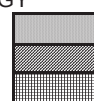


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM6

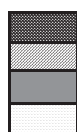
Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP155951 (14 King St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced:	29/07/2015	Borehole depth: 6.0m	Contractor:	Terratest
Date hole completed:	29/07/2015	R.L casing:	Driller:	JC
Logged by: T Brown		R.L surface:	Drill rig:	Geoprobe
		Datum:	Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency RESIDUAL: SILTY SANDY CLAY: moderate plasticity, fine to medium sand, well graded, light and dark brown bands, moist, firm consistency	#	0	ENM 3 0 - 1m	No Odour
2.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, dense	#	0		No Odour
3.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, wet, dense	#	0	ENM 3 2.0-3.5m	No Odour
4.0					#	0		No Odour
5.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, white, dry, hard	#	0	ENM 3 4.5-6.0m	No Odour
6.0					#	0		No Odour

Borehole Terminated at 6.0m depth

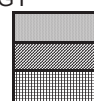


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM7

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 2 DP155951 (12 King St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015	Borehole depth: 6.0m	Contractor: Terratest
Date hole completed: 29/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency RESIDUAL: SILTY SANDY CLAY: moderate plasticity, fine to medium sand, well graded, light and dark brown bands, moist, firm consistency	#	0	ENM 7 0 - 1m	No Odour
2.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	0		No Odour
3.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, wet, dense	#	0	ENM 7 2.0-3.0m	No Odour
4.0					#	0	ENM 7 3.5-4.5m	No Odour
5.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, white, dry, hard	#	0		No Odour
6.0					#	0	ENM7 5.0-6.0m	No Odour

Borehole Terminated at 6.0m depth

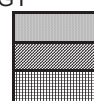


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM8

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 3 DP32518 (486 The Esplanade) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015	Borehole depth: 3.0m	Contractor: Terratest
Date hole completed: 29/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	ENM8 0-1m	No Odour
				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency				
2.0				RESIDUAL: SANDY GRAVELEY CLAY: moderate plasticity, fine to medium gravels, well graded, light and dark brown bands, very moist to wet, firm consistency				
3.0					#	0	ENM8 2-3m	No Odour
4.0	Borehole Terminated at 3.0m depth							
5.0								
6.0								



Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM9

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 3 DP32518 (486 The Esplanade) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015 Borehole depth: 3.0m Contractor: **Terratest**
 Date hole completed: 29/07/2015 R.L casing: Driller: **JC**
 Logged by: T Brown R.L surface: Drill rig: **Geoprobe**
 Datum: Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			FILL: GRAVELEY SAND: brown, moist, dense	#	0	ENM 9 0-1m	No Odour
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency				
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0	ENM9 1-2m	No Odour
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet, dense	#	0	ENM9 2-3m	No Odour
4.0	Borehole Terminated at 3.0m depth							
5.0								
6.0								



Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM10

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 122 DP578045 (16 King St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015	Borehole depth: 4.5m	Contractor: Terratest
Date hole completed: 29/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			FILL: GRAVELEY SAND: brown, moist, dense	#	0	ENM 10 0-1m	No Odour
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency				
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency				
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet, dense				
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	ENM10 3.5-4.5m	No Odour
5.0	Borehole Terminated at 4.5m depth							
6.0								

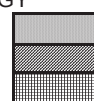


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM11

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 3 DP155951 (1 Howard St) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015	Borehole depth: 6.0m	Contractor: Terratest
Date hole completed: 29/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	ENM 11 0 - 1m	No Odour
2.0				RESIDUAL: SILTY SANDY CLAY: moderate plasticity, fine to medium sand, well graded, light and dark brown bands, moist, firm consistency	#	0		
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	0	ENM 11 2.0-3.0m	No Odour
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, wet, dense	#	0		
5.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, white, dry, hard	#	0	ENM 11 3.5-4.5m	No Odour
6.0					#	0	ENM 11 5.0-6.0m	No Odour

Borehole Terminated at 6.0m depth

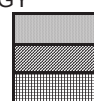


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: ENM12

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 4 DP32518 (488 The Esplanade) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced: 29/07/2015	Borehole depth: 3.0m	Contractor: Terratest
Date hole completed: 29/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	ENM12 0-1m	No Odour
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0	ENM12 1-2m	No Odour
3.0				RESIDUAL: SANDY GRAVELEY CLAY: moderate plasticity, fine to medium gravels, well graded, light and dark brown bands, very moist to wet, firm consistency	#	0	ENM12 2-3m	No Odour
Borehole Terminated at 3.0m depth								
4.0								
5.0								
6.0								

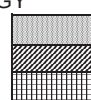


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



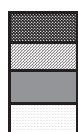
BOREHOLE LOG: ENM13

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 4 DP32518 (488 The Esplanade) Warners Bay, NSW
 Job Description: Excavated Natural Material (ENM) Classification

Date hole commenced:	29/07/2015	Borehole depth:	3.0m	Contractor:	Terratest
Date hole completed:	29/07/2015	R.L casing:		Driller:	JC
Logged by:	T Brown	R.L surface:		Drill rig:	Geoprobe
		Datum:		Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	ENM13 0-1m	No Odour
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency				
3.0				RESIDUAL: SANDY GRAVELEY CLAY: moderate plasticity, fine to medium gravels, well graded, light and dark brown bands, very moist to wet, firm consistency	#	0	ENM13 1-2m	No Odour
					#	0	ENM13 2-3m	No Odour
4.0	Borehole Terminated at 3.0m depth							
5.0								
6.0								

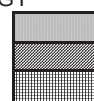


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

ATTACHMENT B

LABORATORY REPORTS

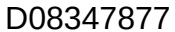


Environmental

CERTIFICATE OF ANALYSIS

Work Order	: ES1527261		
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4+62#2	) >?Ä@A>ÄB?CDE	/#0+1#2+13	) 76851+69&62#\$Ä:585%5+6Ä:3<6&3
F<<1&%%	) 'CÄBCGÄ*HI	4+62#2	)
	E7D4F;@/7ÄE:DJFK;@?F/AFÄL-!!	F<<1&%%	) LMMNLÄ.ÄD++<O#1PÄ?+#+<Ä:952Q,5&\$<ÄE;DÄFR%21#\$5#ÄL*HS
7N9#5\$	) 259T#R1+1#&6851+69&62#\$=+6%R\$256(=+9 #R	7N9#5\$	)
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'1+V&=2	) DF?E7?,ÄBFWÄ7E>	X4Ä&8&\$	) E7>ÄL!*-ÄÄ;=Q&<R\$&ÄBY-ZÄ6<ÄF//ÄX4;-Ä1[R51&9&62
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;52&	) DF?E7?,ÄBFWÄ7E>		
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[illegible]



General Comments

D08347877



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(>#215dSOIL)
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,\$01\$!:*										,Ä+9:0;& 9 ; 678 5/Ä#										K-INIR\$NLI[*]I										K-INIR\$NLI[*]I										K-INIR\$NLI[*]I										k-INIR\$NLI[*]I										k-INIR\$NLI[*]I																			
																				ES1527261-001										ES1527261-002										ES1527261-003										ES1527261-004										ES1527261-005																			
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EA002 : pH (Soils)																																																																															
pH Value										NNNN ! *										OaÄK652										7.0										6.6										7.5										5.3										5.3									
EA010: Conductivity																																																																															
Electrical Conductivity @ 25°C										NNNN *										m,b=9										22										13										23										42										37									
EA029-A: pH Measurements																																																																															
pH KCl (23A)										NNNN ! *										OaÄK652										5.6																																																	
pH OX (23B)										NNNN ! *										OaÄK652										4.7																																																	
EA029-B: Acidity Trail																																																																															
Titratable Actual Acidity (23F)										NNNN L										9+-\$&ÄaUÄbÄ2										10																																																	
Titratable Peroxide Acidity (23G)										NNNN L										9+-\$&ÄaUÄbÄ2										10																																																	
Titratable Sulfidic Acidity (23H)										NNNN L										9+-\$&ÄaUÄbÄ2										cL																																																	
sulfidic - Titratable Actual Acidity (s-23F)										NNNN ! IL										nÄO3152&Ä;										c! IL!																																																	
sulfidic - Titratable Peroxide Acidity (s-23G)										NNNN ! IL										nÄO3152&Ä;										c! IL!																																																	
sulfidic - Titratable Sulfidic Acidity (s-23H)										NNNN ! IL										nÄO3152&Ä;										c! IL!																																																	
EA029-C: Sulfur Trail																																																																															
KCl Extractable Sulfur (23Cø)										NNNN ! IL										nÄ;										c! IL!																																																	
Peroxide Sulfur (23De)										NNNN ! IL										nÄ;										0.020																																																	
Peroxide Oxidisable Sufur (23E)										NNNN ! IL										nÄ;										0.020																																																	
acidity - Peroxide Oxidisable Sulfur (a-23E)										NNNN *!										9+-\$&ÄaUÄbÄ2										13																																																	
EA029-D: Calcium Values																																																																															
KCl Extractable Calcium (23Vh)										NNNN ! IL										nÄ4#										0.191																																																	
Peroxide Calcium (23Wh)										NNNN ! IL										nÄ4#										0.192																																																	
Acid Reacted Calcium (23X)										NNNN ! IL										nÄ4#										c! IL!																																																	
acidity - Acid Reacted Calcium (a-23X)										NNNN *!										9+-\$&ÄaUÄbÄ2										c*!																																																	
sulfidic - Acid Reacted Calcium (s-23X)										NNNN ! IL										nÄ;										c! IL!																																																	
EA029-E: Magnesium Values																																																																															
KCl Extractable Magnesium (23Sm)										NNNN ! IL										nÄ>(										0.036																																																	
Peroxide Magnesium (23Trm)										NNNN ! IL										nÄ>(										0.039																																																	
Acid Reacted Magnesium (23U)										NNNN ! IL										nÄ>(										c! IL!																																																	
Acidity - Acid Reacted Magnesium (a-23U)										NNNN *!										9+-\$&ÄaUÄbÄ2										c*!																																																	
sulfidic - Acid Reacted Magnesium (s-23U)										NNNN ! IL										nÄ;										c! IL!																																																	
EA029-H: Acid Base Accounting																																																																															



'#(&
D+1PAC1<&1
4\$5&62
'1+V&=2
) I Å, Å..
) 7:ILMLH*
) FK?C?FÅ7E_A?CE>7E@F/Å4CE:K/@AE^
) DF?E7?ÅBFWÅ7E>

Analytical Results

:RON>#215SOIL (>#215dSOIL)		,/Ä&#+"01/&+23		ENM1 0.4-1.4M		ENM1 2.0-3.0M		ENM2 0.4-1.4		ENM2 2.0-3.0		ENM2 3.5-4.5	
				k-INR\$NLI*		k-INR\$NLI*		k-INR\$NLI*		k-INR\$NLI*			
,\$01\$;!*		,/Ä&#+"01/Ä +*#&+4+#Ä0&		ES1527261-001		ES1527261-002		ES1527261-003		ES1527261-004		ES1527261-005	
		,(Ä+9.0;& 9 678 5/Ä#		?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2	
EA029-H: Acid Base Accounting - Continued													
ANC Fineness Factor				NNNN !		N		1.5					
Net Acidity (sulfur units)				NNNN ! L		nÄ;		0.04					
Net Acidity (acidity units)				NNNN *		9+\$&ÄaUÄbÄ2		23					
Liming Rate				NNNN *		P(Ä4#4C-b2		2					
EA055: Moisture Content													
oÄMoisture Content (dried @ 103°C)				NNNN *		n		13.2		16.8		19.6	
EA155: Foreign Material - Type III													
Rubber				NNNN !		n		cl !				cl !	
Plastic				NNNN !		n		cl !				cl !	
Bitumen				NNNN !		n		cl !				cl !	
Paint				NNNN !		n		cl !				cl !	
Paper				NNNN !		n		cl !				cl !	
Cloth				NNNN !		n		cl !				cl !	
Wood				NNNN !		n		cl !				cl !	
EG005T: Total Metals by ICP-AES													
Arsenic				MSSIN-ÄNL		I		9(bP(		cl		cl	
Cadmium				MSSINS-N		! S		9(bP(		cl S		cl S	
Chromium				MSSINSMN-		L		9(bP(		3		7	
Copper				MSSINIINÄ		I		9(bP(		cl		cl	
Lead				MS-.N.LN*		I		9(bP(		8		7	
Nickel				MSSINILN		L		9(bP(		cL		cL	
Zinc				MSSINHINH		I		9(bP(		cl		cl	
EG035T: Total Recoverable Mercury by FIMS													
Mercury				MS-.N.MNH		! *		9(bP(		cl *		cl *	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons													
Naphthalene				*NLIN-		!		9(bP(		cl !		cl !	
Acenaphthylene				LÄN.HNÄ		!		9(bP(		cl !		cl !	
Acenaphthene				Ä-N-LN.		!		9(bP(		cl !		cl !	
Fluorene				ÄHNM-NM		!		9(bP(		cl !		cl !	
Phenanthrene				ÄINI*NÄ		!		9(bP(		cl !		cl !	
Anthracene				*LIN*LNM		!		9(bP(		cl !		cl !	
Fluoranthene				LIHNSSN		!		9(bP(		cl !		cl !	
Pyrene				*L.NIIN		!		9(bP(		cl !		cl !	
Benz(a)anthracene				IHNIIN-		!		9(bP(		cl !		cl !	



'#(&
D+1P&C1<&1
4\$5&62
'1+V&=2
) H* A..
) 7*ILMLH*
) FK?C?F&7E_A?CE>7E@F/Â4CE;K/@AE^
) DF?E?;ÂBFWÂE>

Analytical Results

:RON>#215&SOIL (>#215dSOIL)		,/Ä&##+""01/&+23		ENM1 0.4-1.4M		ENM1 2.0-3.0M		ENM2 0.4-1.4		ENM2 2.0-3.0		ENM2 3.5-4.5	
, \$01\$.!*		, /Ä&##+""01/Ä! +""#&+4+Ä0&		k-INIR\$NLI!*II		k-INIR\$NLI!*II		k-INIR\$NLI!*II		k-INIR\$NLI!*II		k-INIR\$NLI!*II	
, (Ä+9.0;& 9 678 5/Ä#				ES1527261-001		ES1527261-002		ES1527261-003		ES1527261-004		ES1527261-005	
				?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued													
Chrysene	L*ÄNI*N.	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(b+)fluoranthene	LIIN..NLÄI.IINÄLN-	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(k)fluoranthene	LIMNIÄN.	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(a)pyrene	IIN-LNÄ	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Indeno(1,2,3.cd)pyrene	*-N-.NI	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Dibenz(a,h)anthracene	I-NMIN-	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(g,h,i)perylene	*.NLSNL	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
oASum of polycyclic aromatic hydrocarbons	NNNN II		9(bP(	cl I		cl I		cl I		cl I		cl I	
oABenzo(a)pyrene TEQ (zero)	NNNN II		9(bP(	cl I		cl I		cl I		cl I		cl I	
oABenzo(a)pyrene TEQ (half LOR)	NNNN II		9(bP(	0.6		0.6		0.6		0.6		0.6	
oABenzo(a)pyrene TEQ (LOR)	NNNN II		9(bP(	1.2		1.2		1.2		1.2		1.2	
EP080/071: Total Petroleum Hydrocarbons													
C6 - C9 Fraction	NNNN *I		9(bP(	----		----		----		----		----	
C10 - C14 Fraction	NNNN II		9(bP(	cl I		cl I		cl I		cl I		cl I	
C15 - C28 Fraction	NNNN *II		9(bP(	C*I		C*I		C*I		C*I		C*I	
C29 - C36 Fraction	NNNN *II		9(bP(	C*I		C*I		C*I		C*I		C*I	
oAC10 - C36 Fraction (sum)	NNNN II		9(bP(	cl I		cl I		cl I		cl I		cl I	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction	4Hp4*I	*I	9(bP(	----		----		----		----		----	
oAC6 - C10 Fraction minus BTEX (F1)	4Hp4*INB@7G	*I	9(bP(	----		----		----		----		----	
>C10 - C16 Fraction	q4*1p4*H	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
>C16 - C34 Fraction	NNNN *II		9(bP(	C*I		C*I		C*I		C*I		C*I	
>C34 - C40 Fraction	NNNN *II		9(bP(	C*I		C*I		C*I		C*I		C*I	
oÄ>C10 - C40 Fraction (sum)	NNNN II		9(bP(	cl I		cl I		cl I		cl I		cl I	
oÄ>C10 - C16 Fraction minus Naphthalene (F2)	NNNN II		9(bP(	----		----		----		----		----	
EP080: BTEXN													
Benzene	M*NS-NL	II L	9(bP(	cl L		cl L		cl L		cl L		cl L	
Toluene	*IÄNÄÄN-	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
Ethylbenzene	*IIINS*NS	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
meta- & para-Xylene	*IÄN-ÄN-Ä*IHNSLN-	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
ortho-Xylene	.INSMNH	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
oATotal Xylenes	*-..INLINM	II	9(bP(	cl I		cl I		cl I		cl I		cl I	
oASum of BTEX	NNNN II L		9(bP(	cl L		cl L		cl L		cl L		cl L	



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) M* Ä..
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215<SOIL (>#215<SOIL)		./Ä&#+"01/&+23		ENM1 0.4-1.4M	ENM1 2.0-3.0M	ENM2 0.4-1.4	ENM2 2.0-3.0	ENM2 3.5-4.5
, \$01\$.!*		./Ä&#+"01/Ä! +**#&+4+##Ä0&		k-INR\$NLI*II	k-INR\$NLI*II	k-INR\$NLI*II	k-INR\$NLI*II	k-INR\$NLI*II
		, (Ä+9.0;& 9 678 5/Ä#		ES1527261-001 ?&%R\$2	ES1527261-002 ?&%R\$2	ES1527261-003 ?&%R\$2	ES1527261-004 ?&%R\$2	ES1527261-005 ?&%R\$2
EP080: BTEXN - Continued								
Naphthalene		*NLIN-	*	9(bP(	-----	-----	-----	-----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6		*-L MNÄÄN-	! !	n	104	103	97.2	96.2
2-Chlorophenol-D4		-.I*NM-NH	! !	n	99.5	94.9	96.7	92.7
2,4,6-Tribromophenol		**ÄNM.NH	! !	n	95.4	91.6	90.8	91.3
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl		-L*NHINÄ	! !	n	98.4	96.0	94.9	95.5
Anthracene-d10		*M*.NIHNÄ	! !	n	101	99.6	102	98.7
4-Terphenyl-d14		*M*ÄNI*N!	! !	n	102	97.3	99.3	99.0
EP080S: TPH(V)/BTX Surrogates								
1,2-Dichloroethane-D4		*MIHINIMNI	! L	n	109	90.7	117	132
Toluene-D8		LI-MNLHNI	! L	n	114	90.7	78.1	89.1
4-Bromofluorobenzene		SHINIINS	! L	n	124	90.9	82.5	93.6

#(8
D+1PÄC1<81
45\$862
'1+V8=2
) ÄÄ-Ä-
) 7;*1MLH*
) FK?C?FÄ7E A?CE>7E@FÄ4CE;K1@AE^
) DF?E7?ÄBFWÄ7E>

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;R0N>#215dSOIL
(>#215dSOIL)
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;RON>#215cSOIL (>#215dSOIL)										./Ä&#+""01/&+23									
,\$01\$!*										,/Ä&#+""01/Ä! +**#&+4+#Ä0&									
										,(Ä+9.0.& 9		678 5/Ä#		ENM3 0-1M		ENM3 2.0-3.5		ENM3 4.5-6.0	
												kL.NIR\$N\$L!*		kL.NIR\$N\$L!*		kL.NIR\$N\$L!*		k-INIR\$N\$L!*	
										ES1527261-006		ES1527261-007		ES1527261-008		ES1527261-009		ES1527261-010	
										%&%R\$2		%&%R\$2		%&%R\$2		%&%R\$2		%&%R\$2	
EA002 : pH (Soils)																			
pH Value				NNNN ! *				OaÄK652		7.0		6.8		8.0		5.1			
EA010: Conductivity																			
Electrical Conductivity @ 25°C				NNNN *				m,b=9		12		52		49		96			
EA029-A: pH Measurements																			
pH KCl (23A)				NNNN ! *				OaÄK652											
pH OX (23B)				NNNN ! *				OaÄK652											
EA029-B: Acidity Trail																			
Titratable Actual Acidity (23F)				NNNN L				9+-\$&AaUÄbÄ2											
Titratable Peroxide Acidity (23G)				NNNN L				9+-\$&AaUÄbÄ2											
Titratable Sulfidic Acidity (23H)				NNNN L				9+-\$&AaUÄbÄ2											
sulfidic - Titratable Actual Acidity (s-23F)				NNNN ! IL				nÄO3152&Ä;											
sulfidic - Titratable Peroxide Acidity (s-23G)				NNNN ! IL				nÄO3152&Ä;											
sulfidic - Titratable Sulfidic Acidity (s-23H)				NNNN ! IL				nÄO3152&Ä;											
EA029-C: Sulfur Trail																			
KCl Extractable Sulfur (23Cø)				NNNN ! IL				nÄ;											
Peroxide Sulfur (23De)				NNNN ! IL				nÄ;											
Peroxide Oxidisable Sulfur (23E)				NNNN ! IL				nÄ;											
acidity - Peroxide Oxidisable Sulfur (a-23E)				NNNN *				9+-\$&AaUÄbÄ2											
EA029-D: Calcium Values																			
KCl Extractable Calcium (23Vh)				NNNN ! IL				nÄ4#											
Peroxide Calcium (23Wh)				NNNN ! IL				nÄ4#											
Acid Reacted Calcium (23X)				NNNN ! IL				nÄ4#											
acidity - Acid Reacted Calcium (a-23X)				NNNN *				9+-\$&AaUÄbÄ2											
sulfidic - Acid Reacted Calcium (s-23X)				NNNN ! IL				nÄ;											
EA029-E: Magnesium Values																			
KCl Extractable Magnesium (23Sm)				NNNN ! IL				nÄ>(											
Peroxide Magnesium (23Trn)				NNNN ! IL				nÄ>(											
Acid Reacted Magnesium (23U)				NNNN ! IL				nÄ>(											
Acidity - Acid Reacted Magnesium (a-23U)				NNNN *				9+-\$&AaUÄbÄ2											
sulfidic - Acid Reacted Magnesium (s-23U)				NNNN ! IL				nÄ;											
EA029-H: Acid Base Accounting																			

#&
 D+1PÄC1<&1
 4\$5&62
 '1+V&-2
) .Ä-
) 7;*LMH*
) FK?C?FÄ7E A?CE>7E@FÄ4CE;K;@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

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;R0N>#215dSOIL
(>#215dSOIL)
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;RON>#215cSOIL (>#215dSOIL)	/Ä&#+"01/Ä/ +**&+4+#Ä0& ,(Ä+9.0.& 9 678 5/Ä#										ENM3 0-1M	ENM3 2.0-3.5	ENM3 4.5-6.0	ENM4 0.4-1.0	ENM4 2.0-3.0	
	,\$01\$/!* (>#215dSOIL)											KL.NIR\$NL[*]I	KL.NIR\$NL[*]I	KL.NIR\$NL[*]I	k-INIR\$NL[*]I	k-INIR\$NL[*]I
											ES1527261-006	ES1527261-007	ES1527261-008	ES1527261-009	ES1527261-010	
											?&%R\$2	?&%R\$2	?&%R\$2	?&%R\$2	?&%R\$2	
EA029-H: Acid Base Accounting - Continued																
ANC Fineness Factor																
NNNN ! I N																
Net Acidity (sulfur units)																
NNNN ! IL nÄ;																
Net Acidity (acidity units)																
NNNN *I 9+&ÄaUÄbÄ2																
Liming Rate																
NNNN * P(A4#4C-b2																
EA055: Moisture Content																
oAMoisture Content (dried @ 103°C)																
NNNN * n																
17.9 29.1 10.9 7.7 21.6																
EA155: Foreign Material - Type III																
Rubber																
NNNN ! II																
Plastic																
NNNN ! II																
Bitumen																
NNNN ! II																
Paint																
NNNN ! II																
Paper																
NNNN ! II																
Cloth																
NNNN ! II																
Wood																
NNNN ! II																
EG005T: Total Metals by ICP-AES																
Arsenic																
MSSIN-ÄNL I 9(bP(																
Cadmium																
MSSINS-N I S 9(bP(																
Chromium																
MSSINSMN- L 9(bP(																
Copper																
MSSINIINÄ I 9(bP(																
Lead																
MS-.N.LN* I 9(bP(																
Nickel																
MSSINILNI L 9(bP(																
Zinc																
MSSINH-HH I 9(bP(																
EG035T: Total Recoverable Mercury by FIMS																
Mercury																
MS-.N.MNH i * 9(bP(																
cl * cl * cl * cl *																
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																
Naphthalene																
.NLI- I I 9(bP(																
Acenaphthylene																
LÄN.HNÄ I I 9(bP(																
Acenaphthene																
Ä-N-LN. I I 9(bP(																
Fluorene																
ÄHNM-NM I I 9(bP(																
Phenanthrene																
ÄNI*NÄ I I 9(bP(																
Anthracene																
*LIN*LM I I 9(bP(																
Fluoranthene																
LIHSSNI I I 9(bP(																
Pyrene																
*L.NIINI I I 9(bP(																
Benz(a)anthracene																
IHNIIN- I I 9(bP(																



'#(&
D+1P&C1<&1
4\$5&62
'1+V&=2
) *! Å. Å.-
) 7:*!LMHLH*
) FK?C?F&7E_A?CE>7E@F/Å4CE;K/@AE^
) DF?E7?ÅBFWÅ7E>

Analytical Results

;RON>#215SOIL (>#215dSOIL)		/Ä&#+"01/&+23		ENM3 0-1M		ENM3 2.0-3.5		ENM3 4.5-6.0		ENM4 0.4-1.0		ENM4 2.0-3.0	
,Ä&#+"01/Ä! +*#&+4+*Ä0&		,Ä&#+"01/Ä! +*#&+4+*Ä0&		KL.NIR\$NLI*!		KL.NIR\$NLI*!		KL.NIR\$NLI*!		K-INIR\$NLI*!		K-INIR\$NLI*!	
,Ä&#+"01/Ä! +*#&+4+*Ä0&		,Ä&#+"01/Ä! +*#&+4+*Ä0&		ES1527261-006		ES1527261-007		ES1527261-008		ES1527261-009		ES1527261-010	
,Ä&#+"01/Ä! +*#&+4+*Ä0&		,Ä&#+"01/Ä! +*#&+4+*Ä0&		7&R\$2		7&R\$2		7&R\$2		7&R\$2		7&R\$2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued													
Chrysene	L*ÄN!N.	!	9(bP(	cl		cl		cl		cl		cl	
Benzo(b+)fluoranthene	LIIN..NLÄ!INÄLN-	!	9(bP(	cl		cl		cl		cl		cl	
Benzo(k)fluoranthene	LIMNIÄN.	!	9(bP(	cl		cl		cl		cl		cl	
Benzo(a)pyrene	IIN-LNÄ	!	9(bP(	cl		cl		cl		cl		cl	
Indeno(1,2,3.cd)pyrene	*-N-.NI	!	9(bP(	cl		cl		cl		cl		cl	
Dibenz(a,h)anthracene	I-NMIN-	!	9(bP(	cl		cl		cl		cl		cl	
Benzo(g,h,i)perylene	*.NLSNL	!	9(bP(	cl		cl		cl		cl		cl	
oÄSum of polycyclic aromatic hydrocarbons	NNNN !		9(bP(	cl		cl		cl		cl		cl	
oÄBenzo(a)pyrene TEQ (zero)	NNNN !		9(bP(	cl		cl		cl		cl		cl	
oÄBenzo(a)pyrene TEQ (half LOR)	NNNN !		9(bP(	0.6		0.6		0.6		0.6		0.6	
oÄBenzo(a)pyrene TEQ (LOR)	NNNN !		9(bP(	1.2		1.2		1.2		1.2		1.2	
EP080/071: Total Petroleum Hydrocarbons													
C6 - C9 Fraction	NNNN *!		9(bP(	----		----		----		----		----	
C10 - C14 Fraction	NNNN !		9(bP(	cl		cl		cl		cl		cl	
C15 - C28 Fraction	NNNN *!		9(bP(	C*!		C*!		C*!		C*!		C*!	
C29 - C36 Fraction	NNNN *!		9(bP(	C*!		C*!		C*!		C*!		C*!	
oÄC10 - C36 Fraction (sum)	NNNN !		9(bP(	cl		cl		cl		cl		cl	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction	4Hp4*!	*!	9(bP(	----		----		----		----		----	
oÄC6 - C10 Fraction minus BTEX (F1)	4Hp4*!NB@7G	*!	9(bP(	----		----		----		----		----	
>C10 - C16 Fraction	q4*!p4*H	!	9(bP(	cl		cl		cl		cl		cl	
>C16 - C34 Fraction	NNNN *!		9(bP(	C*!		C*!		C*!		C*!		C*!	
>C34 - C40 Fraction	NNNN *!		9(bP(	C*!		C*!		C*!		C*!		C*!	
oÄ>C10 - C40 Fraction (sum)	NNNN !		9(bP(	cl		cl		cl		cl		cl	
oÄ>C10 - C16 Fraction minus Naphthalene (F2)	NNNN !		9(bP(	----		----		----		----		----	
EP080: BTEXN													
Benzene	M*NS-NL	!L	9(bP(	cl		cl		cl		cl		cl	
Toluene	*!ÄNÄÄN-	!	9(bP(	cl		cl		cl		cl		cl	
Ethylbenzene	*!INS*NS	!	9(bP(	cl		cl		cl		cl		cl	
meta- & para-Xylene	*!ÄN-ÄN-Ä*!HNSLN-	!	9(bP(	cl		cl		cl		cl		cl	
ortho-Xylene	.INSMNH	!	9(bP(	cl		cl		cl		cl		cl	
oÄTotal Xylenes	*-NINLNM	!	9(bP(	cl		cl		cl		cl		cl	
oÄSum of BTEX	NNNN !L		9(bP(	cl		cl		cl		cl		cl	



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) ** Ä,Ä-
) 7:*ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE;K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215dSOIL (>#215dSOIL)		/Ä&##+""01/&+23		ENM3 0-1M		ENM3 2.0-3.5		ENM3 4.5-6.0		ENM4 0.4-1.0		ENM4 2.0-3.0	
		,Ä&##+""01/Ä! +""#&+4+##Ä0&		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II		K-INIR\$NLI*II		K-INIR\$NLI*II	
,S01\$;!*		,(Ä+9.0;& 9 678 5/Ä#		ES1527261-006		ES1527261-007		ES1527261-008		ES1527261-009		ES1527261-010	
				7&R\$2		7&R\$2		7&R\$2		7&R\$2		7&R\$2	
EP080: BTEXN - Continued													
Naphthalene		.NLI-N		*		9(bP(		-----		-----		-----	
EP075(SIM)S: Phenolic Compound Surrogates													
Phenol-d6		*-L MNÄÄN-		! !		n		102		100		102	
2-Chlorophenol-D4		-I*NM-NH		! !		n		93.5		98.2		97.2	
2,4,6-Tribromophenol		**ÄNM.NH		! !		n		85.9		93.2		91.8	
EP075(SIM)T: PAH Surrogates													
2-Fluorobiphenyl		-L*NHINÄ		! !		n		94.6		98.7		98.3	
Anthracene-d10		*M* NIHNÄ		! !		n		96.9		102		102	
4-Terphenyl-d14		*M*ÄNI*N!		! !		n		97.2		101		100	
EP080S: TPH(V)/BTEX Surrogates													
1,2-Dichloroethane-D4		*MIHINIMN!		! L		n		111		106		104	
Toluene-D8		LI-MNLHNI		! L		n		87.7		93.4		93.3	
4-Bromofluorobenzene		SHINIINS		! L		n		101		104		103	

D08347877

#(&
 D+1PÄC1<&1
 4\$5&62
 '1+V&=2
) *- Ä- Ä-
) 7;*!LMH*
) FK?C?FÄ7E A?CE>7E@FÄ4CE;K!@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

```
;R0N>#215dSOIL
(>#215dSOIL)
```

[illegible]



'#(&
D+1PAC1<&1
4\$5&62
'1+V&=2
) *S^,A-
) 7:*ILMLH*
) FK?C?FÂ7E_A?CE>7E@F/Â4CE;K/@AE^
) DF?E7?ÂBFWÂ7E>

Analytical Results

,Ä&##+*01/&+23													
,Ä&##+*01/Ä! +**#&+4+Ä0&													
,Ä+9.0;& ; 678 5/Ä#													
,Ä&##+*01/&+23													
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) *! Ä,Ä-
) 7:*!LMILH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE;K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215cSOIL (>#215dSOIL)		./Ä&##+""01/&+23		ENM4 3.5-4.5		ENM5 0.4-1.4		ENM5 2.0-3.0		ENM5 3.5-4.5		ENM6 0-1.0M	
,S01\$;!*		./Ä&##+""01/Ä! +""#&+4+##Ä0&		K-INIR\$NLI!*II		K-INIR\$NLI!*II		K-INIR\$NLI!*II		K-INIR\$NLI!*II		KLINIR\$NLI!*II	
		,(Ä+9.0;& 9 678 5/Ä#		ES1527261-011 ?&%R\$2		ES1527261-012 ?&%R\$2		ES1527261-013 ?&%R\$2		ES1527261-014 ?&%R\$2		ES1527261-015 ?&%R\$2	
EP080: BTEXN - Continued													
Naphthalene		.NLIN-		*		9(bP(		*****		*****		*****	
EP075(SIM)S: Phenolic Compound Surrogates													
Phenol-d6		*-*LMNÄÄN-		! !		n		103		95.6		96.1 98.7	
2-Chlorophenol-D4		-.*NM-NH		! !		n		100.0		94.0		92.4 95.9	
2,4,6-Tribromophenol		**ÄNM.NH		! !		n		82.4		75.3		77.5 89.0	
EP075(SIM)T: PAH Surrogates													
2-Fluorobiphenyl		-L*NHINÄ		! !		n		96.7		91.9		93.2 95.4	
Anthracene-d10		*M* .NIHNÄ		! !		n		99.2		93.7		95.9 96.4	
4-Terphenyl-d14		*M*ÄNI*N!		! !		n		98.4		92.2		93.1 95.9	
EP080S: TPH(V)/BTX Surrogates													
1,2-Dichloroethane-D4		*MIHINIMNI!		! L		n		103		94.2		103 114	
Toluene-D8		LI-MNLHNI		! L		n		94.9		83.7		89.0 98.3	
4-Bromofluorobenzene		SHINIINS		! L		n		107		90.6		99.2 107	

#&
D+1PÄC1<81
4\$5&62
'1+V8=2
) *HÄ- Ä-
) 7:'1MLH*
) FK?C?FÄ7E_A?CE>7E@FÄ4CE;K!@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

R0N>#215:SOIL (>#215:SOIL)										./Ä—01/Ä! +*"#&+4+#+Ä0&										ENM6 2-3M										ENM6 5-6M										ENM7 0-1M										ENM7 2-3M																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				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D+1PÄC1<&1
4\$5&62
'1+V&=2
) *MÄ-Ä-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215cSOIL (>#215dSOIL)		,Ä‑01/Ä‑+‑0‑+23											
,Ä‑0‑Ä&#x2													



'#(&
D+1P&C1<&1
4\$5&62
'1+V&=2
) *ÄÄ.Ä.-
) 7:*ILMLH*
) FK?C?FÄ7E_A7CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215cSOIL (>#215dSOIL)		,/Ä&#/+""01/&+23		ENM6 2-3M	ENM6 3.5-4.5	ENM6 5-6M	ENM7 0-1M	ENM7 2-3M
, \$01\$;!*		,/Ä&#/+""01/Ä/ +""#&+4+Ä0&		KL.NIR\$NLI!*II ES1527261-016 ?&%R\$2	KL.NIR\$NLI!*II ES1527261-017 ?&%R\$2	KL.NIR\$NLI!*II ES1527261-018 ?&%R\$2	KL.NIR\$NLI!*II ES1527261-019 ?&%R\$2	KL.NIR\$NLI!*II ES1527261-020 ?&%R\$2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Chrysene	L*ÄNI*N.	II	9(bP(	cl I	cl I	cl I	cl I	cl I
Benzo(b+)fluoranthene	LIIN..NLÄIINÄLN-	II	9(bP(	cl I	cl I	cl I	cl I	cl I
Benzo(k)fluoranthene	LIMNIÄN.	II	9(bP(	cl I	cl I	cl I	cl I	cl I
Benzo(a)pyrene	IIN-LNÄ	II	9(bP(	cl I	cl I	cl I	cl I	cl I
Indeno(1,2,3.cd)pyrene	*.-N.-NI	II	9(bP(	cl I	cl I	cl I	cl I	cl I
Dibenz(a,h)anthracene	I-NMIN-	II	9(bP(	cl I	cl I	cl I	cl I	cl I
Benzo(g,h,i)perylene	*.NLSNL	II	9(bP(	cl I	cl I	cl I	cl I	cl I
oÄSum of polycyclic aromatic hydrocarbons			NNNN	II	cl I	cl I	cl I	cl I
oÄBenzo(a)pyrene TEQ (zero)			NNNN	II	cl I	cl I	cl I	cl I
oÄBenzo(a)pyrene TEQ (half LOR)			NNNN	II	0.6	0.6	0.6	0.6
oÄBenzo(a)pyrene TEQ (LOR)			NNNN	II	1.2	1.2	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction			NNNN	*I	9(bP(	----	----	----
C10 - C14 Fraction			NNNN	II	9(bP(	cl I	cl I	cl I
C15 - C28 Fraction			NNNN	*II	9(bP(	c*I I	c*I I	c*I I
C29 - C36 Fraction			NNNN	*II	9(bP(	c*I I	c*I I	c*I I
oÄC10 - C36 Fraction (sum)			NNNN	II	9(bP(	cl I	cl I	cl I
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction			4Hp4*I	*I	9(bP(	----	----	----
oÄC6 - C10 Fraction minus BTEX (F1)			4Hp4*INB@7G	*I	9(bP(	----	----	----
>C10 - C16 Fraction			q4*I p4*H	II	9(bP(	cl I	cl I	cl I
>C16 - C34 Fraction			NNNN	*II	9(bP(	c*I I	c*I I	c*I I
>C34 - C40 Fraction			NNNN	*II	9(bP(	c*I I	c*I I	c*I I
oÄ>C10 - C40 Fraction (sum)			NNNN	II	9(bP(	cl I	cl I	cl I
oÄ>C10 - C16 Fraction minus Naphthalene (F2)			NNNN	II	9(bP(	----	----	----
EP080: BTEXN								
Benzene			M*NS-NL	I L	9(bP(	cl L	cl L	cl L
Toluene			*IÄNÄÄN-	I I	9(bP(	cl I	cl I	cl I
Ethylbenzene			*IIINS*NS	I I	9(bP(	cl I	cl I	cl I
meta- & para-Xylene			*IÄN-ÄN-Ä*IHNSLN-	I I	9(bP(	cl I	cl I	cl I
ortho-Xylene			.INSMNH	I I	9(bP(	cl I	cl I	cl I
oÄTotal Xylenes			*-..INLINM	I I	9(bP(	cl I	cl I	cl I
oÄSum of BTEX			NNNN	I L	9(bP(	cl L	cl L	cl L



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) * . Ä. Ä.-
) 7:*ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215cSOIL (>#215dSOIL)		,Ä&#+"01/&+23									
,\$01\$.!*		,Ä&#+"01/Ä! +**#&+4+Ä0&		KL.NIR\$NLI!*II		KL.NIR\$NLI!*II		KL.NIR\$NLI!*II		KL.NIR\$NLI!*II	
		,(Ä+9.0;& 9 678 5/Ä#		ES1527261-016		ES1527261-017		ES1527261-018		ES1527261-019	
				7&R\$2		7&R\$2		7&R\$2		7&R\$2	
EP080: BTEXN - Continued											
Naphthalene		.*NLIN-		*		9(bP(		-----		-----	
EP075(SIM)S: Phenolic Compound Surrogates											
Phenol-d6		*-*LMNÄÄN-		!		n		104		99.1	
2-Chlorophenol-D4		-.. *NM-NH		!		n		103		96.0	
2,4,6-Tribromophenol		**ÄNM.NH		!		n		85.0		76.4	
EP075(SIM)T: PAH Surrogates											
2-Fluorobiphenyl		-L*NHINÄ		!		n		101		98.2	
Anthracene-d10		*M*.NIHNÄ		!		n		103		99.6	
4-Terphenyl-d14		*M*ÄNI*N!		!		n		102		97.9	
EP080S: TPH(V)/BTEX Surrogates											
1,2-Dichloroethane-D4		*MIHINIMNI!		!L		n		108		103	
Toluene-D8		LI-MNLHNI		!L		n		79.8		88.5	
4-Bromofluorobenzene		SHINIINS		!L		n		93.4		101	
										93.8	
										97.4	
										85.4	
										88.8	



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;RON>#215dSOIL  
(>#215dSOIL)
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;RON>#215;SOIL (>#215dSOIL)																./Ä&#x+''01/Ä! +**#&+4+#Ä0&															
,\$01\$/!* ,(Ä+9:0:& 9		678		5/Ä#		KL.NIR\$NLI!*II		ENM7 3.5-4.5M		ENM7 5-6M		ENM8 0-1M		ENM8 1-2M		ENM8 2-3M															
						ES1527261-021		?&%R\$2		ES1527261-022		?&%R\$2		ES1527261-023		?&%R\$2		ES1527261-024		ES1527261-025		?&%R\$2									
EA002 : pH (Soils)																															
pH Value		NNNN ! *		OaÄK652		5.6		5.8		7.6		5.5		6.1																	
EA010: Conductivity																															
Electrical Conductivity @ 25°C		NNNN *		m;b=9		32		26		78		53		36																	
EA029-A: pH Measurements																															
pH KCl (23A)		NNNN ! *		OaÄK652								4.7																			
pH OX (23B)		NNNN ! *		OaÄK652								4.1																			
EA029-B: Acidity Trail																															
Titratable Actual Acidity (23F)		NNNN L		9+-\$&ÄaUÄbÄ2								22																			
Titratable Peroxide Acidity (23G)		NNNN L		9+-\$&ÄaUÄbÄ2								45																			
Titratable Sulfidic Acidity (23H)		NNNN L		9+-\$&ÄaUÄbÄ2								23																			
sulfidic - Titratable Actual Acidity (s-23F)		NNNN ! IL		nÄO3152&Ä;								0.036																			
sulfidic - Titratable Peroxide Acidity (s-23G)		NNNN ! IL		nÄO3152&Ä;								0.072																			
sulfidic - Titratable Sulfidic Acidity (s-23H)		NNNN ! IL		nÄO3152&Ä;								0.036																			
EA029-C: Sulfur Trail																															
KCl Extractable Sulfur (23Cø)		NNNN ! IL		nÄ;								cl !L!																			
Peroxide Sulfur (23De)		NNNN ! IL		nÄ;								cl !L!																			
Peroxide Oxidisable Sulfur (23E)		NNNN ! IL		nÄ;								cl !L!																			
acidity - Peroxide Oxidisable Sulfur (a-23E)		NNNN *I		9+-\$&ÄaUÄbÄ2								c*!																			
EA029-D: Calcium Values																															
KCl Extractable Calcium (23Vh)		NNNN ! IL		nÄ4#								cl !L!																			
Peroxide Calcium (23Wh)		NNNN ! IL		nÄ4#								cl !L!																			
Acid Reacted Calcium (23X)		NNNN ! IL		nÄ4#								cl !L!																			
acidity - Acid Reacted Calcium (a-23X)		NNNN *I		9+-\$&ÄaUÄbÄ2								c*!																			
sulfidic - Acid Reacted Calcium (s-23X)		NNNN ! IL		nÄ;								cl !L!																			
EA029-E: Magnesium Values																															
KCl Extractable Magnesium (23Sm)		NNNN ! IL		nÄ>(								0.039																			
Peroxide Magnesium (23Trm)		NNNN ! IL		nÄ>(								0.039																			
Acid Reacted Magnesium (23U)		NNNN ! IL		nÄ>(								cl !L!																			
Acidity - Acid Reacted Magnesium (a-23U)		NNNN *I		9+-\$&ÄaUÄbÄ2								c*!																			
sulfidic - Acid Reacted Magnesium (s-23U)		NNNN ! IL		nÄ;								cl !L!																			
EA029-H: Acid Base Accounting																															

EA029-H: Acid Base Accounting



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) L * Ä.Ä.-
) 7:*ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215SOIL (>#215SOIL)		,Ä&#+"01/&+23		ENM7 3.5-4.5M		ENM7 5-6M		ENM8 0-1M		ENM8 1-2M		ENM8 2-3M	
, \$01\$:!* , (Ä+9.0:& ; 678 5/Ä#		,Ä&#+"01/Ä! +**#&+4+#Ä0&		KL.NIR\$NLI* ES1527261-021		KL.NIR\$NLI* ES1527261-022		KL.NIR\$NLI* ES1527261-023		KL.NIR\$NLI* ES1527261-024		KL.NIR\$NLI* ES1527261-025	
				7&%R\$2		7&%R\$2		7&%R\$2		7&%R\$2		7&%R\$2	
EA029-H: Acid Base Accounting - Continued													
ANC Fineness Factor		NNNN !		N						1.5			
Net Acidity (sulfur units)		NNNN ! L		nÄ;						0.04			
Net Acidity (acidity units)		NNNN *		9+\$&ÄaUÄbÄ2						22			
Liming Rate		NNNN *		P(Ä4#4C-b2						2			
EA055: Moisture Content													
oÄMoisture Content (dried @ 103°C)		NNNN *		n		28.8		19.6		14.9		11.4	
EA155: Foreign Material - Type III													
Rubber		NNNN !		n		cl !		cl !		cl !		cl !	
Plastic		NNNN !		n		cl !		cl !		cl !		cl !	
Bitumen		NNNN !		n		cl !		cl !		cl !		cl !	
Paint		NNNN !		n		cl !		cl !		cl !		cl !	
Paper		NNNN !		n		cl !		cl !		cl !		cl !	
Cloth		NNNN !		n		cl !		cl !		cl !		cl !	
Wood		NNNN !		n		cl !		cl !		cl !		cl !	
EG005T: Total Metals by ICP-AES													
Arsenic		MSSIN-ÄNL		I		9(bP(		8		6		cl	
Cadmium		MSSINS-N		! S		9(bP(		cl S		cl S		cl S	
Chromium		MSSINSMN-		L		9(bP(		4		5		6	
Copper		MSSINIINÄ		I		9(bP(		cl		cl		cl	
Lead		MS-.NLN*		I		9(bP(		cl		5		7	
Nickel		MSSINILNI		L		9(bP(		cl		cl		3	
Zinc		MSSINHNNH		I		9(bP(		cl		29		cl	
EG035T: Total Recoverable Mercury by FIMS													
Mercury		MS-.N.MNH		! *		9(bP(		cl *		cl *		cl *	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons													
Naphthalene		*NLIN-		!		9(bP(		cl		cl		cl	
Acenaphthylene		LÄ.N.HNÄ		!		9(bP(		cl		cl		cl	
Acenaphthene		Ä-N-LN.		!		9(bP(		cl		cl		cl	
Fluorene		ÄHNM-NM		!		9(bP(		cl		cl		cl	
Phenanthrene		ÄINI*NÄ		!		9(bP(		cl		cl		cl	
Anthracene		*LIN*LNM		!		9(bP(		cl		cl		cl	
Fluoranthene		LIHNSSNI		!		9(bP(		cl		cl		cl	
Pyrene		*L.NIINI		!		9(bP(		cl		cl		cl	
Benz(a)anthracene		IHNIIN-		!		9(bP(		cl		cl		cl	

) LLÄ-Ä-
) 7*!LMH*
) FK?C?FÄ7E A?CE>7E@FÄ4CE;K!@AE^
) DF?E7?;ÄBFWÄ7E>

Analytical Results

:RON>#215:SOIL (>#215:SOIL)				./Ä&#++"/01/8+23				ENM7 3.5-4.5M				ENM7 5-6M				ENM8 0-1M				ENM8 1-2M				ENM8 2-3M			
, \$01\$;!*				./Ä&#++"/01/Ä + **#&+4+##Ä0&				KL.NIR\$N\$L!*II				KL.NIR\$N\$L!*II				KL.NIR\$N\$L!*II				KL.NIR\$N\$L!*II							
				, (Ä+9:0,& 9 678 5/Ä#				ES1527261-021				ES1527261-022				ES1527261-023				ES1527261-024				ES1527261-025			
				?&%R\$2				?&%R\$2				?&%R\$2				?&%R\$2				?&%R\$2							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued																											
Chrysene				L*ÄNI*N. I I				9(bP(				cI I				cI I				cI I							
Benzo(b+)fluoranthene				LIIN.NLÄLIINÄLN- I I				9(bP(				cI I				cI I				cI I							
Benzo(k)fluoranthene				LIMNIÄN. I I				9(bP(				cI I				cI I				cI I							
Benzo(a)pyrene				IIN-LNÄ I I				9(bP(				cI I				cI I				cI I							
Indeno(1.2.3.cd)pyrene				*-N.-NI I I				9(bP(				cI I				cI I				cI I							
Dibenz(a,h)anthracene				I-NMIN- I I				9(bP(				cI I				cI I				cI I							
Benzo(g,h,i)perylene				*.*NLSNL I I				9(bP(				cI I				cI I				cI I							
oASum of polycyclic aromatic hydrocarbons				NNNN I I				9(bP(				cI I				cI I				cI I							
oABenzo(a)pyrene TEQ (zero)				NNNN I I				9(bP(				cI I				cI I				cI I							
oABenzo(a)pyrene TEQ (half LOR)				NNNN I I				9(bP(				0.6				0.6				0.6							
oABenzo(a)pyrene TEQ (LOR)				NNNN I I				9(bP(				1.2				1.2				1.2							
EP080/074: Total Petroleum Hydrocarbons																											
C6 - C9 Fraction				NNNN *I				9(bP(				****				****				****							
C10 - C14 Fraction				NNNN I I				9(bP(				cI I				cI I				cI I							
C15 - C28 Fraction				NNNN *I I				9(bP(				c*I I				c*I I				c*I I							
C29 - C36 Fraction				NNNN *I I				9(bP(				c*I I				c*I I				c*I I							
oAC10 - C36 Fraction (sum)				NNNN I I				9(bP(				cI I				cI I				cI I							
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions																											
C6 - C10 Fraction				4Hp4*I *I				9(bP(				****				****				****							
oAC6 - C10 Fraction minus BTEX (F1)				4Hp4*INB@7G *I				9(bP(				****				****				****							
>C10 - C16 Fraction				q4*Ip4*H I I				9(bP(				cI I				cI I				cI I							
>C16 - C34 Fraction				NNNN *I I				9(bP(				c*I I				c*I I				c*I I							
>C34 - C40 Fraction				NNNN *I I				9(bP(				c*I I				c*I I				c*I I							
oÄ>C10 - C40 Fraction (sum)				NNNN I I				9(bP(				cI I				cI I				cI I							
oÄ>C10 - C16 Fraction minus Naphthalene (F2)				NNNN I I				9(bP(				****				****				****							
EP080: BTEXN																											
Benzene				M*NS-NL I L				9(bP(				cI L				cI L				cI L							
Toluene				*IÄNÄÄN- I I				9(bP(				cI I				cI I				cI I							
Ethylbenzene				*IINS*NS I I				9(bP(				cI I				cI I				cI I							
meta- & para-Xylene				*IÄN-ÄN-Ä*IHNSLN- I I				9(bP(				cI I				cI I				cI I							
ortho-Xylene				.INSMNH I I				9(bP(				cI I				cI I				cI I							
oÄTotal Xylenes				*..INLINM I I				9(bP(				cI I				cI I				cI I							
oÄSum of BTEX				NNNN I L				9(bP(				cI L				cI L				cI L							



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) L-Ä-Ä-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215dSOIL (>#215dSOIL)		,/Ä&#+"01/&+23		ENM7 3.5-4.5M		ENM7 5-6M		ENM8 0-1M		ENM8 1-2M		ENM8 2-3M	
, \$01\$.!*		,/Ä&#+"01/Ä! +**&+4+##Ä0&		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II	
		,(Ä+9.0;& 9 678 5/Ä#		ES1527261-021		ES1527261-022		ES1527261-023		ES1527261-024		ES1527261-025	
				7&%R\$2		7&%R\$2		7&%R\$2		7&%R\$2		7&%R\$2	
EP080: BTEXN - Continued													
Naphthalene		. *NLIN-		9(bP(		-----		-----		-----		-----	
EP075(SIM)S: Phenolic Compound Surrogates													
Phenol-d6		*.-*LMNÄÄN-		!!		n		111		98.3		100	
2-Chlorophenol-D4		.-.I*NM-NH		!!		n		94.3		97.7		96.0	
2,4,6-Tribromophenol		**ÄNM.NH		!!		n		92.2		78.0		79.6	
EP075(SIM)T: PAH Surrogates													
2-Fluorobiphenyl		-L*NHINÄ		!!		n		102		100		99.9	
Anthracene-d10		*M* NIHNÄ		!!		n		109		114		118	
4-Terphenyl-d14		*M*ÄNI*N!		!!		n		109		105		102	
EP080S: TPH(V)/BTEX Surrogates													
1,2-Dichloroethane-D4		*MIHINIMNI!		! L		n		82.7		81.8		89.3	
Toluene-D8		LI-MNLHNI		! L		n		106		102		101	
4-Bromofluorobenzene		SHI!NI!S		! L		n		109		103		103	



```
;R0N>#215dSOIL
(>#215dSOIL)
```

[illegible]

EA029-H: Acid Base Accounting



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) LI Ä.Ä.-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215dSOIL (>#215dSOIL)		,Ä&#++"/01/&+23									
, \$01\$.!*		,Ä&#++"/01/Ä! +""#&+4+#Ä0&		5/Ä#		678		Ä&#++"/01/Ä! +""#&+4+#Ä0&			
EA029-H: Acid Base Accounting - Continued											
ANC Fineness Factor		NNNN ! !		N							
Net Acidity (sulfur units)		NNNN ! !L		nÄ;							
Net Acidity (acidity units)		NNNN *!		9+\$&ÄaUÄbÄ2							
Liming Rate		NNNN *		P(Ä4#4C-b2							
EA055: Moisture Content											
oÄMoisture Content (dried @ 103°C)		NNNN *		n		16.6		22.9		24.7	
EA155: Foreign Material - Type III											
Rubber		NNNN ! !		n		cl !l		cl !l		cl !l	
Plastic		NNNN ! !		n		cl !l		cl !l		cl !l	
Bitumen		NNNN ! !		n		cl !l		cl !l		cl !l	
Paint		NNNN ! !		n		cl !l		cl !l		cl !l	
Paper		NNNN ! !		n		cl !l		cl !l		cl !l	
Cloth		NNNN ! !		n		cl !l		cl !l		cl !l	
Wood		NNNN ! !		n		cl !l		cl !l		cl !l	
EG005T: Total Metals by ICP-AES											
Arsenic		MSSIN-ÄNL		I		9(bP(		17		6	
Cadmium		MSSINS-N		! S		9(bP(		cl S		cl S	
Chromium		MSSINSMN-		L		9(bP(		13		8	
Copper		MSSINIINÄ		I		9(bP(		cl		cl	
Lead		MS-.NLN*		I		9(bP(		6		cl	
Nickel		MSSINILN!		L		9(bP(		cl		cl	
Zinc		MSSINHINH		I		9(bP(		cl		cl	
EG035T: Total Recoverable Mercury by FIMS											
Mercury		MS-.N.MNH		! *		9(bP(		cl *		cl *	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons											
Naphthalene		*NLIN-		! !		9(bP(		cl !		cl !	
Acenaphthylene		LÄN.HNÄ		! !		9(bP(		cl !		cl !	
Acenaphthene		Ä-N-LN.		! !		9(bP(		cl !		cl !	
Fluorene		ÄHNM-NM		! !		9(bP(		cl !		cl !	
Phenanthrene		ÄINI*NÄ		! !		9(bP(		cl !		cl !	
Anthracene		*LIN*LNM		! !		9(bP(		cl !		cl !	
Fluoranthene		LIHNSSN!		! !		9(bP(		cl !		cl !	
Pyrene		*L.NIIN!		! !		9(bP(		cl !		cl !	
Benz(a)anthracene		IHNIIN-		! !		9(bP(		cl !		cl !	

) LHÄ. Ä.
) 7*!LMH*
) FK?C?FÄ7E A?CE>7E@FÄ4CE;K!@AE^
) DF?E7?;ÄBFWÄ7E>

Analytical Results

;RON>#215;SOIL (>#215;SOIL)		/Ä&#+"01/Ä +**#&+4+##Ä0&		ENM9 0-1M		ENM9 1-2M		ENM9 2-3M		ENM10 0-1M		ENM10 1-2M	
, \$01\$;!*		, (Ä+9:0,& 9 678 5/Ä#		KL.NIR\$N\$L!*		KL.NIR\$N\$L!*		KL.NIR\$N\$L!*		KL.NIR\$N\$L!*		KL.NIR\$N\$L!*	
				ES1527261-026		ES1527261-027		ES1527261-028		ES1527261-029		ES1527261-030	
				?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued													
Chrysene		L*ÄN!*N.		9(bP)		c		c		c		c	
Benzo(b+)fluoranthene		L I N.N Ä I N Ä N-		9(bP)		c		c		c		c	
Benzo(k)fluoranthene		L I N N Ä N.		9(bP)		c		c		c		c	
Benzo(a)pyrene		I I N-L N Ä		9(bP)		c		c		c		c	
Indeno(1,2,3-cd)pyrene		*-N-.N		9(bP)		c		c		c		c	
Dibenz(a,h)anthracene		I-N N I N-		9(bP)		c		c		c		c	
Benzo(g,h,i)perylene		*.*N S N L		9(bP)		c		c		c		c	
oASum of polycyclic aromatic hydrocarbons		N N N N		9(bP)		c		c		c		c	
oABenzo(a)pyrene TEQ (zero)		N N N N		9(bP)		c		c		c		c	
oABenzo(a)pyrene TEQ (half LOR)		N N N N		9(bP)		0.6		0.6		0.6		0.6	
oABenzo(a)pyrene TEQ (LOR)		N N N N		9(bP)		1.2		1.2		1.2		1.2	
EP080/074: Total Petroleum Hydrocarbons													
C6 - C9 Fraction		N N N N *		9(bP)		----		----		----		----	
C10 - C14 Fraction		N N N N		9(bP)		c		c		c		c	
C15 - C28 Fraction		N N N N *		9(bP)		c*		c*		c*		c*	
C29 - C36 Fraction		N N N N *		9(bP)		c*		c*		c*		c*	
oAC10 - C36 Fraction (sum)		N N N N		9(bP)		c		c		c		c	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction		4Hp4*		9(bP)		----		----		----		----	
oAC6 - C10 Fraction minus BTEX (F1)		4Hp4* NB@7G		9(bP)		----		----		----		----	
>C10 - C16 Fraction		q4* p4*H		9(bP)		c		c		c		c	
>C16 - C34 Fraction		N N N N *		9(bP)		c*		c*		c*		c*	
>C34 - C40 Fraction		N N N N *		9(bP)		c*		c*		c*		c*	
oÄ>C10 - C40 Fraction (sum)		N N N N		9(bP)		c		c		c		c	
oÄ>C10 - C16 Fraction minus Naphthalene (F2)		N N N N		9(bP)		----		----		----		----	
EP080: BTEXN													
Benzene		M*NS-N L		9(bP)		c		c		c		c	
Toluene		* ÄN Ä N-		9(bP)		c		c		c		c	
Ethylbenzene		* NS*NS		9(bP)		c		c		c		c	
meta- & para-Xylene		* ÄN-ÄN-Ä* HNS N-		9(bP)		c		c		c		c	
ortho-Xylene		.INS MN H		9(bP)		c		c		c		c	
oÄTotal Xylenes		*.. N N N N		9(bP)		c		c		c		c	
oÄSum of BTEX		N N N N		9(bP)		c		c		c		c	



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) LMÄ.Ä.-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE;K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215dSOIL (>#215dSOIL)		,Ä&##+""01/&+23															
, \$01\$.!*		,Ä&##+""01/Ä! +*##&+4+##Ä0&															
		, (Ä+9.0;& 9 678 5/Ä#															
		ES1527261-026															
		ES1527261-027															
		ES1527261-028															
		ES1527261-029															
		ES1527261-030															
		?&%R\$2															
		?&%R\$2															
		?&%R\$2															
		?&%R\$2															
		?&%R\$2															
		?&%R\$2															
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, \$01\$;!*										, (Ä+9.0.& 9 678 5/Ä#										KL.NIR\$N\$L!*II									
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EA029-H: Acid Base Accounting - Continued																													
ANC Fineness Factor										NNNN !I N										NNNN									
Net Acidity (sulfur units)										NNNN !IL nÄ;										NNNN									
Net Acidity (acidity units)										NNNN *I 9+&ÄaUÄbÄ2										NNNN									
Liming Rate										NNNN * P(Ä4#4C-b2										NNNN									
EA055: Moisture Content																													
oÄMoisture Content (dried @ 103°C)										NNNN * n										23.0 26.4 22.0 29.2 31.2									
EA155: Foreign Material - Type III																													
Rubber										NNNN !II										cl II									
Plastic										NNNN !II										cl II									
Bitumen										NNNN !II										cl II									
Paint										NNNN !II										cl II									
Paper										NNNN !II										cl II									
Cloth										NNNN !II										cl II									
Wood										NNNN !II										cl II									
EG005T: Total Metals by ICP-AES																													
Arsenic										MSSIN-ÄNL I 9(bP(										cl									
Cadmium										MSSINS-N I S 9(bP(										cl S									
Chromium										MSSINSMN- L 9(bP(										11 8 22 4 3									
Copper										MSSINIINÄ I 9(bP(										cl									
Lead										MS-.N.LN* I 9(bP(										6 7 32 17									
Nickel										MSSINIILNI L 9(bP(										cl									
Zinc										MSSINHHNH I 9(bP(										cl 10									
EG035T: Total Recoverable Mercury by FIMS																													
Mercury										MS-.N.MNH I * 9(bP(										cl * cl * cl *									
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																													
Naphthalene										.NLIN- I I 9(bP(										cl I									
Acenaphthylene										LÄN.HNÄ I I 9(bP(										cl I									
Acenaphthene										Ä-N-LN- I I 9(bP(										cl I									
Fluorene										ÄHNM-NM I I 9(bP(										cl I									
Phenanthrene										ÄNI*NÄ I I 9(bP(										cl I									
Anthracene										*LIN*LNMI I I 9(bP(										cl I									
Fluoranthene										LIHNSSNI I I 9(bP(										cl I									
Pyrene										*L.NIINI I I 9(bP(										cl I									
Benz(a)anthracene										IHNIIN- I I 9(bP(										cl I									



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) DF?E7?ÅBFWÂ7E>

Analytical Results

:RON>#215&SOIL (>#215dSOIL)		,Ä&##+*01/Ä! +**#&+4+Ä0&#		ENM10 2.5-3.5		ENM10 3.5-4.5		ENM11 0-1M		ENM11 2-3M		ENM11 3.5-4.5	
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EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued													
Chrysene	L*ÄNI*N.	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(b+)fluoranthene	LIIN..NLÄLIINÄLN-	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(k)fluoranthene	LIMNIÄN.	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(a)pyrene	IIN-LNÄ	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Indeno(1,2,3.cd)pyrene	*-N-.NI	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Dibenz(a,h)anthracene	I-NMIN-	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Benzo(g,h,i)perylene	*.NLSNL	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
oÄSum of polycyclic aromatic hydrocarbons	NNNN ! I		9(bP(	cl I		cl I		cl I		cl I		cl I	
oÄBenzo(a)pyrene TEQ (zero)	NNNN ! I		9(bP(	cl I		cl I		cl I		cl I		cl I	
oÄBenzo(a)pyrene TEQ (half LOR)	NNNN ! I		9(bP(	0.6		0.6		0.6		0.6		0.6	
oÄBenzo(a)pyrene TEQ (LOR)	NNNN ! I		9(bP(	1.2		1.2		1.2		1.2		1.2	
EP080/071: Total Petroleum Hydrocarbons													
C6 - C9 Fraction	NNNN *I		9(bP(	----		----		----		----		----	
C10 - C14 Fraction	NNNN !I		9(bP(	clI		clI		clI		clI		clI	
C15 - C28 Fraction	NNNN *!I		9(bP(	C*I!		C*I!		C*I!		C*I!		C*I!	
C29 - C36 Fraction	NNNN *!I		9(bP(	C*I!		C*I!		C*I!		C*I!		C*I!	
oÄC10 - C36 Fraction (sum)	NNNN !I		9(bP(	clI		clI		clI		clI		clI	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction	4Hp4*I	*I	9(bP(	----		----		----		----		----	
oÄC6 - C10 Fraction minus BTEX (F1)	4Hp4*INB@7G	*I	9(bP(	----		----		----		----		----	
>C10 - C16 Fraction	q4*Ip4*H	!I	9(bP(	clI		clI		clI		clI		clI	
>C16 - C34 Fraction	NNNN *!I		9(bP(	C*I!		C*I!		C*I!		C*I!		C*I!	
>C34 - C40 Fraction	NNNN *!I		9(bP(	C*I!		C*I!		C*I!		C*I!		C*I!	
oÄ>C10 - C40 Fraction (sum)	NNNN !I		9(bP(	clI		clI		clI		clI		clI	
oÄ>C10 - C16 Fraction minus Naphthalene (F2)	NNNN !I		9(bP(	----		----		----		----		----	
EP080: BTEXN													
Benzene	M*NS-NL	! L	9(bP(	cl L		cl L		cl L		cl L		cl L	
Toluene	*IÄNÄÄN-	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
Ethylbenzene	*!INS*NS	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
meta- & para-Xylene	*IÄN-ÄN-Ä*IHNSLN-	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
ortho-Xylene	.INSMNH	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
oÄTotal Xylenes	*-..INLINM	! I	9(bP(	cl I		cl I		cl I		cl I		cl I	
oÄSum of BTEX	NNNN ! L		9(bP(	cl L		cl L		cl L		cl L		cl L	



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) * Ä,Ä-
) 7:*ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215dSOIL (>#215dSOIL)		,/Ä&##+""01/&+23		ENM10 2.5-3.5		ENM10 3.5-4.5		ENM11 0-1M		ENM11 2-3M		ENM11 3.5-4.5	
, \$01\$.!* (Ä+9.0;& 9 678 5/Ä#		,/Ä&##+""01/Ä! +""#&+4+##Ä0&		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II	
				ES1527261-031 7&%R\$2		ES1527261-032 7&%R\$2		ES1527261-033 7&%R\$2		ES1527261-034 7&%R\$2		ES1527261-035 7&%R\$2	
EP080: BTEXN - Continued													
Naphthalene		.*NLIN-		*		9(bP(		-----		-----		-----	
EP075(SIM)S: Phenolic Compound Surrogates													
Phenol-d6		*.*LMNÄÄN-		II		n		102		99.3		99.5 105 105	
2-Chlorophenol-D4		.-.I*NM-NH		II		n		91.6		99.8		87.3 96.0 98.8	
2,4,6-Tribromophenol		**ÄNM.NH		II		n		71.4		69.0		72.0 75.8 71.0	
EP075(SIM)T: PAH Surrogates													
2-Fluorobiphenyl		-L*NHNÄ		II		n		102		103		100 102 101	
Anthracene-d10		*M*.NIHNÄ		II		n		115		123		115 122 115	
4-Terphenyl-d14		*M*ÄNI*N!		II		n		103		102		100 104 100	
EP080S: TPH(V)/BTEX Surrogates													
1,2-Dichloroethane-D4		*MIHINIMNI		!L		n		89.4		88.8		87.9 76.4 85.6	
Toluene-D8		LI-MNLHNI		!L		n		102		104		98.2 96.9 112	
4-Bromofluorobenzene		SHI!NI!S		!L		n		101		104		97.0 95.7 111	

#&
D+1PAC1<81
4\$5&62
+1+V8=-2
) -L.Ã.Ã.
) 7;*1MLH*
) FK?C?FÃ7E A?CE>7E@FÃ4CE;K!@AE^
) DF?E7?;ÄBFWÃ7E>

Analytical Results

	/Ä&#+""01/Ä! +**#&+4+#Å0&	ENM11 5-6M	ENM12 0-1M	ENM12 1-2M	ENM12 2-3M	ENM13 0-1M
, \$01\$;!*	/Ä&#+""01/Ä! +**#&+4+#Å0& ,(Ä+9;0;& ; 678 NNÑÑ ! *	KL_NIR\$N\$L!"II ES1527261-036 ?&%R\$2	KL_NIR\$N\$L!"II ES1527261-037 ?&%R\$2	KL_NIR\$N\$L!"II ES1527261-038 ?&%R\$2	KL_NIR\$N\$L!"II ES1527261-039 ?&%R\$2	kL_NIR\$N\$L!"II ES1527261-040 ?&%R\$2
EA002 : pH (Soils)						
pH Value	NNÑÑ ! *	OaÅK652	6.1	7.3	5.4	4.9
EA010: Conductivity						
Electrical Conductivity @ 25°C	NNÑÑ *	m;b=9	28	9	47	37
EA029-A: pH Measurements						
pH KCl (23A)	NNÑÑ ! *	OaÅK652				4.5
pH OX (23B)	NNÑÑ ! *	OaÅK652				4.1
EA029-B: Acidity Trail						
Titratable Actual Acidity (23F)	NNÑÑ L	9+-\$&ÅaUÄbÄ2				33
Titratable Peroxide Acidity (23G)	NNÑÑ L	9+-\$&ÅaUÄbÄ2				50
Titratable Sulfidic Acidity (23H)	NNÑÑ L	9+-\$&ÅaUÄbÄ2				16
sulfidic - Titratable Actual Acidity (s-23F)	NNÑÑ ! IL	nÄO3152&Ä;				0.053
sulfidic - Titratable Peroxide Acidity (s-23G)	NNÑÑ ! IL	nÄO3152&Ä;				0.080
sulfidic - Titratable Sulfidic Acidity (s-23H)	NNÑÑ ! IL	nÄO3152&Ä;				0.026
EA029-C: Sulfur Trail						
KCI Extractable Sulfur (23Ce)	NNÑÑ ! IL	nÄ;				cl lL!
Peroxide Sulfur (23De)	NNÑÑ ! IL	nÄ;				cl lL!
Peroxide Oxidisable Sulfur (23E)	NNÑÑ ! IL	nÄ;				cl lL!
acidity - Peroxide Oxidisable Sulfur (a-23E)	NNÑÑ *I	9+-\$&ÅaUÄbÄ2				c*I
EA029-D: Calcium Values						
KCI Extractable Calcium (23Vh)	NNÑÑ ! IL	nÄ4#				cl lL!
Peroxide Calcium (23Wh)	NNÑÑ ! IL	nÄ4#				cl lL!
Acid Reacted Calcium (23X)	NNÑÑ ! IL	nÄ4#				cl lL!
acidity - Acid Reacted Calcium (a-23X)	NNÑÑ *I	9+-\$&ÅaUÄbÄ2				c*I
sulfidic - Acid Reacted Calcium (s-23X)	NNÑÑ ! IL	nÄ;				cl lL!
EA029-E: Magnesium Values						
KCI Extractable Magnesium (23Sm)	NNÑÑ ! IL	nÄ>(				cl lL!
Peroxide Magnesium (23Tm)	NNÑÑ ! IL	nÄ>(				cl lL!
Acid Reacted Magnesium (23U)	NNÑÑ ! IL	nÄ>(				cl lL!
Acidity - Acid Reacted Magnesium (a-23U)	NNÑÑ *I	9+-\$&ÅaUÄbÄ2				c*I
sulfidic - Acid Reacted Magnesium (s-23U)	NNÑÑ ! IL	nÄ;				cl lL!
EA029-H: Acid Base Accounting						

#&
D+1PAC1<81
4\$5&62
+1+V8=-2
) -- Å- Å-
) 7;*LMlH*
) FK?C?FÅ7E A?CE>7E@FÅ4CE;K!@AE^
) DF?E7?ÅBFWÅ7E>

Analytical Results

```
;R0N>#215dSOIL
(>#215dSOIL)
```

:R0N>#215:SOIL (>#215:SOIL)										,Ä&##+""01/&+23										ENM11 5-6M		ENM12 0-1M		ENM12 1-2M		ENM12 2-3M		ENM13 0-1M	
,\$01\$;!* ,Ä+9:0;& 9 678 5/Ä#										,Ä&##+""01/Ä! +""#&+4+##Ä0&										KL.NIR\$NLI"*II		KL.NIR\$NLI"*II		KL.NIR\$NLI"*II		KL.NIR\$NLI"*II			
																				ES1527261-036		ES1527261-037		ES1527261-038		ES1527261-039			
																				?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2			
EA029-H: Acid Base Accounting - Continued																													
ANC Fineness Factor										NNNN ! I										N						1.5			
Net Acidity (sulfur units)										NNNN ! IL										nÄ;						0.05			
Net Acidity (acidity units)										NNNN *I										9+-\$ÄaUÄbÄ2						33			
Liming Rate										NNNN *										P(Ä4#C-b2						2			
EA055: Moisture Content																													
oÄMoisture Content (dried @ 103°C)										NNNN *										n		15.1		12.8		14.4		14.4	
EA155: Foreign Material - Type III																													
Rubber										NNNN ! II										n				c! II		c! II		c! II	
Plastic										NNNN ! II										n				c! II		c! II		c! II	
Bitumen										NNNN ! II										n				c! II		c! II		c! II	
Paint										NNNN ! I										n				c! II		c! II		c! II	
Paper										NNNN ! II										n				c! II		c! II		c! II	
Cloth										NNNN ! II										n				c! II		c! II		c! II	
Wood										NNNN ! II										n				c! II		c! II		c! II	
EG005T: Total Metals by ICP-AES																													
Arsenic										MSSIN-ÄNL I										9(bP(		11		cI		cI		cI	
Cadmium										MSSINS-N. I S										9(bP(		cI S		cI S		cI S		cI S	
Chromium										MSSINSMN- L										9(bP(		dL		4		cI		3	
Copper										MSSINIINÄ I										9(bP(		cI		cI		cI		cI	
Lead										MS-.NLN* I										9(bP(		7		8		cI		cI	
Nickel										MSSINILNI L										9(bP(		dL		cL		cL		cL	
Zinc										MSSINH-HNH I										9(bP(		cI		cI		cI		cI	
EG035T: Total Recoverable Mercury by FIMS																													
Mercury										MS-.NMNH I *										9(bP(		cI *		cI *		cI *		cI *	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons																													
Naphthalene										.*NLIN- I I										9(bP(		cI I		cI I		cI I		cI I	
Acenaphthylene										LIÄN-HNÄ I I										9(bP(		cI I		cI I		cI I		cI I	
Acenaphthene										Ä-N-LN. I I										9(bP(		cI I		cI I		cI I		cI I	
Fluorene										ÄHNM-NM I I										9(bP(		cI I		cI I		cI I		cI I	
Phenanthrene										ÄINI*NÄ I I										9(bP(		cI I		cI I		cI I		cI I	
Anthracene										*LIN*LNM I I										9(bP(		cI I		cI I		cI I		cI I	
Fluoranthene										LIHNSSNI I I										9(bP(		cI I		cI I		cI I		cI I	
Pyrene										*L.NIINI I I										9(bP(		cI I		cI I		cI I		cI I	
Benz(a)anthracene										IHNIIN- I I										9(bP(		cI I		cI I		cI I		cI I	



'#(&
D+1P&C1<&1
4\$5&62
'1+V&=2
) -S^A^A-
) 7^*ILMLH^*
) FK?C?F&7E_A?CE>7E@F/Â4CE;K/@AE^
) DF?E7?ÂBFWÂ7E>

Analytical Results

;RON>#215:SOIL (>#215dSOIL)		/Ä&##+""01/&+23		ENM11 5-6M		ENM12 0-1M		ENM12 1-2M		ENM12 2-3M		ENM13 0-1M	
,Ä&##+""01/Ä! +""#&+4+Ä0&		5/Ä#		KL.NIR\$NL!"I		KL.NIR\$NL!"I		KL.NIR\$NL!"I		KL.NIR\$NL!"I		KL.NIR\$NL!"I	
,Ä+9.0;& 678				ES 1527261-036		ES 1527261-037		ES 1527261-038		ES 1527261-039		ES 1527261-040	
				?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2		?&%R\$2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued													
Chrysene	L*ÄNI*N.	I!	9(bP(	c!		c!		c!		c!		c!	
Benzo(b+j)fluoranthene	LIIN..NLÄ!IINÄLN-	I!	9(bP(	c!		c!		c!		c!		c!	
Benzo(k)fluoranthene	LIMNIÄN.	I!	9(bP(	c!		c!		c!		c!		c!	
Benzo(a)pyrene	IIN-LNÄ	I!	9(bP(	c!		c!		c!		c!		c!	
Indeno(1,2,3.cd)pyrene	*..N..NI	I!	9(bP(	c!		c!		c!		c!		c!	
Dibenz(a,h)anthracene	I-NMIN-	I!	9(bP(	c!		c!		c!		c!		c!	
Benzo(g,h,i)perylene	*..NLSNL	I!	9(bP(	c!		c!		c!		c!		c!	
oÄSum of polycyclic aromatic hydrocarbons													
oÄBenzo(a)pyrene TEQ (zero)	NNNN !!		9(bP(	c!		c!		c!		c!		c!	
oÄBenzo(a)pyrene TEQ (half LOR)	NNNN !!		9(bP(	c!		c!		c!		c!		c!	
oÄBenzo(a)pyrene TEQ (LOR)	NNNN !!		9(bP(	0.6		0.6		0.6		0.6		0.6	
	NNNN !!		9(bP(	1.2		1.2		1.2		1.2		1.2	
EP080/074: Total Petroleum Hydrocarbons													
C6 - C9 Fraction													
C10 - C14 Fraction	NNNN *!		9(bP(	----		----		----		----		----	
C15 - C28 Fraction	NNNN !!		9(bP(	c!		c!		c!		c!		c!	
C29 - C36 Fraction	NNNN *!!		9(bP(	c*!		c*!		c*!		c*!		c*!	
oÄC10 - C36 Fraction (sum)	NNNN !!		9(bP(	c!		c!		c!		c!		c!	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction	4Hp4*!	*!	9(bP(	----		----		----		----		----	
oÄC6 - C10 Fraction minus BTEX (F1)	4Hp4*INB@7G	*!	9(bP(	----		----		----		----		----	
>C10 - C16 Fraction	q4*!p4*H	!!	9(bP(	c!		c!		c!		c!		c!	
>C16 - C34 Fraction	NNNN *!!		9(bP(	c*!		c*!		c*!		c*!		c*!	
>C34 - C40 Fraction	NNNN *!!		9(bP(	c*!		c*!		c*!		c*!		c*!	
oÄ>C10 - C40 Fraction (sum)	NNNN !!		9(bP(	c!		c!		c!		c!		c!	
oÄ>C10 - C16 Fraction minus Naphthalene (F2)	NNNN !!		9(bP(	----		----		----		----		----	
EP080: BTEXN													
Benzene	M*NS-NL	! L	9(bP(	c! L		c! L		c! L		c! L		c! L	
Toluene	*!ÄNÄÄN-	! I	9(bP(	c!		c!		c!		c!		c!	
Ethylbenzene	*!!NS*NS	! I	9(bP(	c!		c!		c!		c!		c!	
meta- & para-Xylene	*!ÄN-ÄN-Ä*!HNSLN-	! I	9(bP(	c!		c!		c!		c!		c!	
ortho-Xylene	.INSMNH	! I	9(bP(	c!		c!		c!		c!		c!	
oÄTotal Xylenes	*..INLINM	! I	9(bP(	c!		c!		c!		c!		c!	
oÄSum of BTEX	NNNN ! L		9(bP(	c! L		c! L		c! L		c! L		c! L	



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) -I Ä,Ä-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE;K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215cSOIL (>#215dSOIL)		./Ä&#+"01/&+23		ENM11 5-6M	ENM12 0-1M	ENM12 1-2M	ENM12 2-3M	ENM13 0-1M
, \$01\$.!*		./Ä&#+"01/Ä! +**&+4+Ä0&		KL.NIR\$NLI*II	KL.NIR\$NLI*II	KL.NIR\$NLI*II	KL.NIR\$NLI*II	KL.NIR\$NLI*II
				ES1527261-036 ?&%R\$2	ES1527261-037 ?&%R\$2	ES1527261-038 ?&%R\$2	ES1527261-039 ?&%R\$2	ES1527261-040 ?&%R\$2
EP080: BTEXN - Continued								
Naphthalene	.NLIN-	*	9(bP(	-----	-----	-----	-----	-----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	*-L MNÄÄN-	! !	n	105	98.6	97.0	96.8	99.5
2-Chlorophenol-D4	-.! NM-NH	! !	n	103	86.9	95.6	101	96.5
2,4,6-Tribromophenol	**ÄNM.NH	! !	n	77.1	71.6	69.0	64.9	74.0
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	-L*NHINÄ	! !	n	101	101	98.5	101	99.2
Anthracene-d10	*M*.NIHNÄ	! !	n	106	112	120	118	121
4-Terphenyl-d14	*M*ÄNI*N!	! !	n	105	100	97.9	101	103
EP080S: TPH(V)/BTX Surrogates								
1,2-Dichloroethane-D4	*MIHINIMNI	! L	n	102	75.0	76.6	76.2	77.0
Toluene-D8	LI-MNLHNI	! L	n	121	105	101	101	100
4-Bromofluorobenzene	SHINIINS	! L	n	126	107	101	100	97.2



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;R0N>#215dSOIL
(>#215dSOIL)
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;RON>#215<SOIL (>#215<dSOIL)						
./Ä&#x001f+""01/ÄI +""#&x0004+#Ä0&						
,Ä	& ; 678 5/Ä# ES1527261-041 ?&%R\$2						
,Ä	!*						
EA002 : pH (Soils)						
pH Value NNNN I * OaÄK652 4.7 4.9						
EA010: Conductivity						
Electrical Conductivity @ 25°C NNNN * m;b=9 169 109						
EA029-A: pH Measurements						
pH KCl (23A) NNNN I * OaÄK652						
pH OX (23B) NNNN I * OaÄK652						
EA029-B: Acidity Trail						
Titratable Actual Acidity (23F) NNNN L 9+-\$&ÄaUÄbÄ2						
Titratable Peroxide Acidity (23G) NNNN L 9+-\$&ÄaUÄbÄ2						
Titratable Sulfidic Acidity (23H) NNNN L 9+-\$&ÄaUÄbÄ2						
sulfidic - Titratable Actual Acidity (s-23F) NNNN ! IL nÄO3152&Ä;						
sulfidic - Titratable Peroxide Acidity (s-23G) NNNN ! IL nÄO3152&Ä;						
sulfidic - Titratable Sulfidic Acidity (s-23H) NNNN ! IL nÄO3152&Ä;						
EA029-C: Sulfur Trail						
KCl Extractable Sulfur (23Cø) NNNN ! IL nÄ;						
Peroxide Sulfur (23De) NNNN ! IL nÄ;						
Peroxide Oxidisable Sufur (23E) NNNN ! IL nÄ;						
acidity - Peroxide Oxidisable Sulfur (a-23E) NNNN *I 9+-\$&ÄaUÄbÄ2						
EA029-D: Calcium Values						
KCl Extractable Calcium (23Vh) NNNN ! IL nÄ4#						
Peroxide Calcium (23Wh) NNNN ! IL nÄ4#						
Acid Reacted Calcium (23X) NNNN ! IL nÄ4#						
acidity - Acid Reacted Calcium (a-23X) NNNN *I 9+-\$&ÄaUÄbÄ2						
sulfidic - Acid Reacted Calcium (s-23X) NNNN ! IL nÄ;						
EA029-E: Magnesium Values						
KCl Extractable Magnesium (23Sm) NNNN ! IL nÄ>(						
Peroxide Magnesium (23Trn) NNNN ! IL nÄ>(						
Acid Reacted Magnesium (23U) NNNN ! IL nÄ>(						
Acidity - Acid Reacted Magnesium (a-23U) NNNN *I 9+-\$&ÄaUÄbÄ2						
sulfidic - Acid Reacted Magnesium (s-23U) NNNN ! IL nÄ;						
EA029-H: Acid Base Accounting						

EA029-H: Acid Base Accounting



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) -MÄ-Ä-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215SOIL (>#215dSOIL)		/Ä&#+"01/&+23		ENM13 1-2M		ENM13 2-3M		QS1		QS2		NNNN	
,S01\$.!* ,(Ä+9:0:& 9 678 5/Ä#		,Ä&#+"01/Ä! +**#&+4+#Ä0&		KL.NIR\$NL!"		KL.NIR\$NL!"		KL.NIR\$NL!"		KL.NIR\$NL!"		NNNN	
		ES1527261-041 ?&%R\$2		ES1527261-042 ?&%R\$2		ES1527261-043 ?&%R\$2		ES1527261-044 ?&%R\$2					
EA029-H: Acid Base Accounting - Continued													
ANC Fineness Factor													
Net Acidity (sulfur units)		NNNN !		N									
Net Acidity (acidity units)		NNNN ! L		nÄ;									
Liming Rate		NNNN *!		9+\$&ÄaUÄbÄ2									
		NNNN *		P(Ä4#4C-b2									
EA055: Moisture Content													
oÄMoisture Content (dried @ 103°C)		NNNN *		n		14.8		8.2		9.5		16.2	
EA155: Foreign Material - Type III													
Rubber		NNNN !		n		cl							
Plastic		NNNN !		n		cl							
Bitumen		NNNN !		n		cl							
Paint		NNNN !		n		cl							
Paper		NNNN !		n		cl							
Cloth		NNNN !		n		cl							
Wood		NNNN !		n		cl							
EG005T: Total Metals by ICP-AES													
Arsenic		MSSIN-ÄNL		I		9(bP(		cl		6			
Cadmium		MSSINS-N		! S		9(bP(		cl S					
Chromium		MSSINSMN-		L		9(bP(		7					
Copper		MSSINIÄ		I		9(bP(		cl					
Lead		MS-.NLN*		I		9(bP(		6					
Nickel		MSSINILN!		L		9(bP(		cl					
Zinc		MSSINH-HH		I		9(bP(		cl					
EG035T: Total Recoverable Mercury by FIMS													
Mercury		MS-.N.MNH		! *		9(bP(		cl *					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons													
Naphthalene		.NLIN-		!		9(bP(		cl					
Acenaphthylene		LÄN.HNÄ		!		9(bP(		cl					
Acenaphthene		Ä-N-LN.		!		9(bP(		cl					
Fluorene		ÄHNM-NM		!		9(bP(		cl					
Phenanthrene		ÄINI*NÄ		!		9(bP(		cl					
Anthracene		*LIN*LNM		!		9(bP(		cl					
Fluoranthene		LIHNSSN!		!		9(bP(		cl					
Pyrene		*L.NIINI!		!		9(bP(		cl					
Benz(a)anthracene		IHNIIN-		!		9(bP(		cl					



'#(&
D+1P&C1<&1
4\$5&62
'1+V&=2
) -ÄÄÄ-
) 7:ILMLH+
) FK?C?FÄ7E_A7CE>7E@F/Ä4CE:K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215SOIL (>#215SOIL)		,Ä&##+""01/&+23							
		,Ä&##+""01/Ä! +""#&+4+Ä0&		KL.NIR\$NLI*II		KL.NIR\$NLI*II		KL.NIR\$NLI*II	
,S01\$;!*		,(A+9.0:& 9 678 5/Ä#		ES1527261-041 ?&%R\$2		ES1527261-042 ?&%R\$2		ES1527261-044 ?&%R\$2	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Chrysene	L*ÄNI*N.	! I	9(bP(	cl I		cl I			
Benzo(b+)fluoranthene	LIIN..NLÄLIINÄLN-	! I	9(bP(	cl I		cl I			
Benzo(k)fluoranthene	LIMNIÄN.	! I	9(bP(	cl I		cl I			
Benzo(a)pyrene	IIN-LNÄ	! I	9(bP(	cl I		cl I			
Indeno(1,2,3.cd)pyrene	*.-N.-NI	! I	9(bP(	cl I		cl I			
Dibenz(a,h)anthracene	I-NIMIN-	! I	9(bP(	cl I		cl I			
Benzo(g,h,i)perylene	*.NLSNL	! I	9(bP(	cl I		cl I			
oASum of polycyclic aromatic hydrocarbons	NNNN ! I		9(bP(	cl I		cl I			
oABenzo(a)pyrene TEQ (zero)	NNNN ! I		9(bP(	cl I		cl I			
oABenzo(a)pyrene TEQ (half LOR)	NNNN ! I		9(bP(	0.6		0.6			
oABenzo(a)pyrene TEQ (LOR)	NNNN ! I		9(bP(	1.2		1.2			
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	NNNN *I		9(bP(	----		----		C*I	
C10 - C14 Fraction	NNNN !I		9(bP(	cl I		cl I		cl I	
C15 - C28 Fraction	NNNN *II		9(bP(	C*II		C*II		C*II	
C29 - C36 Fraction	NNNN *II		9(bP(	C*II		C*II		C*II	
oAC10 - C36 Fraction (sum)	NNNN !I		9(bP(	cl I		cl I		cl I	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	4Hp4*I	*I	9(bP(	----		----		C*I	
oAC6 - C10 Fraction minus BTEX (F1)	4Hp4*INB@7G	*I	9(bP(	----		----		C*I	
>C10 - C16 Fraction	q4*Ip4*H	!I	9(bP(	cl I		cl I		cl I	
>C16 - C34 Fraction	NNNN *II		9(bP(	C*II		C*II		C*II	
>C34 - C40 Fraction	NNNN *II		9(bP(	C*II		C*II		C*II	
oA>C10 - C40 Fraction (sum)	NNNN !I		9(bP(	cl I		cl I		cl I	
oA>C10 - C16 Fraction minus Naphthalene (F2)	NNNN !I		9(bP(	----		----		cl I	
EP080: BTEXN									
Benzene	M*NS-NL	! L	9(bP(	cl L		cl L		cl L	
Toluene	*IÄNÄÄN-	! I	9(bP(	cl I		cl I		cl I	
Ethylbenzene	*IINS*NS	! I	9(bP(	cl I		cl I		cl I	
meta- & para-Xylene	*IÄN-ÄN-Ä*IHNSLN-	! I	9(bP(	cl I		cl I		cl I	
ortho-Xylene	.INSMNH	! I	9(bP(	cl I		cl I		cl I	
oATotal Xylenes	*--INLINM	! I	9(bP(	cl I		cl I		cl I	
oASum of BTEX	NNNN ! L		9(bP(	cl L		cl L		cl L	



'#(&
D+1PÄC1<&1
4\$5&62
'1+V&=2
) -, Ä, Ä-
) 7:ILMLH*
) FK?C?FÄ7E_A?CE>7E@F/Ä4CE;K/@AE^
) DF?E7?ÄBFWÄ7E>

Analytical Results

;RON>#215SOIL (>#215dSOIL)		,/Ä&##+""01/&+23									
,\$01\$;!*	,/Ä&##+""01/Ä! +*#&+4+Ä0& ,/Ä+9.0;& 9 678 5/Ä#	ENM13 1-2M		ENM13 2-3M		QS1		QS2			
		KL.NIR\$NLI!*II		KL.NIR\$NLI!*II		KL.NIR\$NLI!*II		KL.NIR\$NLI!*II		NNNN	
		ES1527261-041		ES1527261-042		ES1527261-043		ES1527261-044		NNNNNNNN	
		7&%R\$2		7&%R\$2		7&%R\$2		7&%R\$2		7&%R\$2	
EP080: BTEXN - Continued											
Naphthalene		*NLIN-	*	9(bP(	-----	-----	C*	C*	-----		
EP075(SIM)S: Phenolic Compound Surrogates											
Phenol-d6		*-L MNÄÄN-	!!	n	94.0	81.0	-----	-----	-----		
2-Chlorophenol-D4		-.I*NM-NH	!!	n	82.4	86.6	-----	-----	-----		
2,4,6-Tribromophenol		**ÄNM.NH	!!	n	89.8	93.1	-----	-----	-----		
EP075(SIM)T: PAH Surrogates											
2-Fluorobiphenyl		-L*NHINÄ	!!	n	91.5	91.6	-----	-----	-----		
Anthracene-d10		*M*.NIHNÄ	!!	n	89.2	90.2	-----	-----	-----		
4-Terphenyl-d14		*M*ÄNI*N!	!!	n	91.9	92.0	-----	-----	-----		
EP080S: TPH(V)/BTX Surrogates											
1,2-Dichloroethane-D4		*MIHINIMN!	! L	n	98.9	101	96.2	96.2	93.9		
Toluene-D8		LI-MNLHN!	! L	n	119	118	114	114	114		
4-Bromofluorobenzene		SHINIINS	! L	n	98.7	98.9	94.3	94.3	91.1		



Environmental

QUALITY CONTROL REPORT

Work Order : ES1527261

2 3'40		'Ä"	) * #, # \$
2+40Ä,0		-Ä,+Ä0+1	) 5463/+47"40Ä #8363;3+4#91;4"1
D:;"/!		2+40Ä,0	)
		D:;"/!	) JLLMJ\$N#B++:OÄ/P#=-+Ä:#9730Q,3" :#C9B#DR10/Ä 3Ä#J"FS
5M7Ä3		5M7Ä3	)
>" "OQ+4"		>" "OQ+4"	) UF*MJMJ\$,\$S#\$GGG
ÄÄ;1373 "		ÄÄ;1373 "	) UF*MJMJ\$,\$S#\$G&&
'/Z":0		V2#-"6"	) C5<#J&*K##9;Q":R "#@WKX#Ä4:#D-9#V29K#/"YR3/"7"40
ÄÄ;1373 "		8Ä0"#9Ä7O "#=#;"36"	) K&MIR MJ&*G
'/Z":0		8Ä0"#D4Ä 113#2+77"4,";	) K*MIR MJ&*G
ÄÄ;1373 "		?!IR"#8Ä0"	) *KMDR(MJ&*G
ÄÄ;1373 "		C+%#+, #Ä7O "#/#;"36"	) SS
ÄÄ;1373 "		C+%#+, #Ä7O "#ÄÄ 1!":	) SS

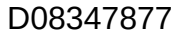
>Q3#/"O+/0#IRO"/!":#Ä41#O/"63+R!/"O+/0WIX#30Q#0Q3##%#R 0!#ÄOO 1#0+#0Q"#Ä7O "WIX#Ä!#R.7300":%##

>Q3#VVRÄ 301#2+40/+ #="O+/0#;+40Ä34!#0Q"#, + +]34(34,+17A03+4)

• -Ä,+Ä0+/1#8RO 3;Ä0"#W8IX#="O+Ä" Ä036"#/;"40Ä("#83,"/4;"#W=8X#Ä4:#D;"O0Ä4;"#-3730!

• <"0Q+ #@ Ä4P#W<@X#Ä4:#Ä,+Ä0+/1#2+40/+ #903P"#W-29#F#6F#Ä4:#D;"O0Ä4;"#-3730!

• <Ä0/3_#903P"#W<9X#=#Ä4#6F/1#Ä4:#D;"O0Ä4;"#-3730!



General Comments

BQ"/7#7+30R"/#:"0"/734Å03+4QÅQÅH:"4#0"/,+7"H#iR 0#ÅÅ"0#4#Å#:/1#W3Q0#Å31%

2D#CR7. "/# /+7#ÄöÄ.Ä"7#7340Ä34".#.#12Q73Ä.#D.10Ä.01#9"/63. "%>Q"#2Q73Ä.#D.10Ä.01#9"/63. "#31#36313+4#.# #Q#Q#D7"/3/Ä#2Q73Ä.#9+;3"01%"#

g###?4:3;Ä0"i#;Ä3":#V2



1) %&*Ä#Ä\$!+ "#& \$%-

91.4"1#24+/(Å43!

91.4"1#24+/(Ä43.1

C"·Ä"IO "#M#24+//Ä"43·I

91.1"1#21+//Ä13.1

Q1. A "1#A//Ä13.1

01:4"1#A/(Ä13:1

$\frac{1}{2} \log \left(\frac{1 + \sqrt{1 - 4\alpha}}{1 - \sqrt{1 - 4\alpha}} \right)$

② 3: A4 #D, 3: #3X
③ 4" 1/2 4 - 1/8" 4 3/4"

) K#.#\$
) 59'GJJF*
) DI=A=D#5C'?=AC<5C>D#2AC9I->?Ca
) BD=C5=9#@D[#5C<
)

Laboratory Duplicate (DUP) Report

[illegible]

9R.M<Ä0/3 SOIL

99R.M<A0/3_ SOIL	Laboratory Duplicate (DUP) Report									
	Laboratory sample ID	Client sample ID	Method:-Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA002 : pH (Solis) (QC Lot: 170614)										
59*GJLJF*M&*	50<*&#%SM*%S<#	5D&&J#O#c#Ä R"	MMMM &*	Oc#430	L%&	L%&	L%&	L%&	&%&&	&#M#J&i
59*GJLJF*M&*	50<S#K%GMS%G#	5D&&J#O#c#Ä R"	MMMM &*	Oc#430	L%G	L%G	L%J	L%J	K%GK	&#M#J&i
EA002 : pH (Solis) (QC Lot: 170616)										
59*GJLJF*M&J*	50<L#K%GMS%G<#	5D&&J#O#c#Ä R"	MMMM &*	Oc#430	G%F	G%\$	G%\$	G%\$	S%LG	&#M#J&i
59*GJLJF*M&K*	50<*&#J%GMK%G#	5D&&J#O#c#Ä R"	MMMM &*	Oc#430	G%J	G%*	G%*	G%*	&%&&	&#M#J&i
EA002 : pH (Solis) (QC Lot: 170618)										
59*GJLJF*M&S*	50<*&#M#J<#	5D&&J#O#c#Ä R"	MMMM &*	Oc#430	S%L	S%L	S%L	S%L	&%&&	&#M#J&i
EA010: Conductivity (QC Lot: 170615)										
59*GJLJF*M&*	50<*&#%SM*%S<#	5D&*&#5""0/3,Ä #2+4;R;036301#T#JGk2	MMMM *	I 9e;7	JJ	JJ	JJ	JJ	&%&&	&#M#J&i
59*GJLJF*M&*	50<S#K%GMS%G#	5D&*&#5""0/3,Ä #2+4;R;036301#T#JGk2	MMMM *	I 9e;7	FF	FF	GN	GN	**%*	&#M#J&i
EA010: Conductivity (QC Lot: 170617)										
59*GJLJF*M&J*	50<L#K%GMS%G<#	5D&*&#5""0/3,Ä #2+4;R;036301#T#JGk2	MMMM *	I 9e;7	KJ	KJ	KJ	KJ	&%&&	&#M#J&i
59*GJLJF*M&K*	50<*&#J%GMK%G#	5D&*&#5""0/3,Ä #2+4;R;036301#T#JGk2	MMMM *	I 9e;7	FJ	FJ	FK	FK	J%JS	&#M#J&i
EA010: Conductivity (QC Lot: 170619)										
59*GJLJF*M&S*	50<*&#M#J<#	5D&*&#5""0/3,Ä #2+4;R;036301#T#JGk2	MMMM *	I 9e;7	*FN	*GJ	*GJ	*GJ	*%&,\$	&#M#J&i
EA029-A: pH Measurements (QC Lot: 178486)										
5@*GJGJ\$GM&*	D4+417+R#	5D&JN#O#c#2 #WJKDX	MMMM &*	Oc#430	S%K	S%J	S%J	S%J	J%KG	&#M#J&i
		5D&JN#O#c#AE#WJK@X	MMMM &*	Oc#430	S%J	S%J	S%J	S%J	&%&&	&#M#J&i
EA029-B: Acidity Trail (QC Lot: 178486)										
5@*GJGJ\$GM&*	D4+417+R#	5D&JN#R_3,3;#M#>30/Ä0Ä. "#D;0RÄ #D;3:301#WIMJKAx	MMMM &%&J	i#O1/30"#9	&%&\$S	&%*N*	&%*N*	&%*N*	K%LS	C+>3730
		5D&JN#R_3,3;#M#>30/Ä0Ä. "#"/+ _3:"#D;3:301#WIMJKAx	MMMM &%&J	i#O1/30"#9	&%J&G	&%J**	&%J**	&%J**	K%*J	&#M#G&i
		5D&JN#R_3,3;#M#>30/Ä0Ä. "#9R_3,3;#D;3:301#WIMJKAx	MMMM &%&J	i#O1/30"#9	&%&J*	&%&J&	&%&J&	&%&J&	&%&&	C+>3730
		5D&JN#>30/Ä0Ä. "#D;0RÄ #D;3:301#WJKAx	MMMM J	7 + "#cU#e#0	**S	*N	*N	*N	K%LS	&#M#J&i
		5D&JN#>30/Ä0Ä. "#"/+ _3:"#D;3:301#WJKAx	MMMM J	7 + "#cU#e#0	*J\$	*KJ	*KJ	*KJ	K%*J	&#M#J&i
		5D&JN#>30/Ä0Ä. "#9R_3,3;#D;3:301#WJKAx	MMMM J	7 + "#cU#e#0	*K	*K	*K	*K	&%&&	C+>3730
EA029-C: Sulfur Trail (QC Lot: 178486)										
5@*GJGJ\$GM&*	D4+417+R#	5D&JN#h2 #5_0Ä;0Ä. "#9R_R#WJK2"x	MMMM &%&J	i#9	&%&JG	&%&JS	&%&JS	&%&JS	G%JS	C+>3730
		5D&JN#"/+ _3:"#A_3:3/Ä. "#9R_R#WJK5X	MMMM &%&J	i#9	d&%&J&	d&%&J&	d&%&J&	d&%&J&	&%&&	C+>3730
		5D&JN#"/+ _3:"#9R_R#WJK8"x	MMMM &%&J	i#9	&%&K&	&%&JS	&%&JS	&%&JS	G%\$\$	C+>3730
		5D&JN#Ä;3:301#M"/+ _3:"#A_3:3/Ä. "#9R_R#WIMJKAx	MMMM *&	7+ "#cU#e#0	d' &	d' &	d' &	d' &	&%&&	C+>3730
EA029-D: Calcium Values (QC Lot: 178486)										

EA029-D: Calcium Values (QC Lot: 178486)



'Å(") S#,#\$
B+/P#A/!"/) 59"GJLJF*
2 3'40) DI=A=D#5C'?=AC<5C>D-#2AC9I->?Ca
'/+Z";0) BD=C5=9#@D]#5C<

Laboratory sample ID		Client sample ID	Method:Compound		Laboratory Duplicate (DUP) Report				
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA029-D: Calcium Values (QC Lot: 178486) - continued									
5@*GJGJ\$GM&*	D4+417+R#	5D&JN#D;3:#="Å,0":#2Å,3R7#WJKE	MMMM &%&J		#2Å	d&%&J&	d&%&J&	&%&&	C+#-3730
		5D&JN#h2 #5_0/Å,0Å, "h2Å,3R7#WJK'QX	MMMM &%&J		#2Å	&%*&&	&%*&F	F%K*	C+#-3730
		5D&JN#"/+ 3:"#2Å,3R7#WJKBQX	MMMM &%&J		#2Å	&%*&J	&%**&	L%S&	C+#-3730
		5D&JN#IR, 3:3:#M#D;3:#="Å,0":#2Å,3R7#WIMJKE	MMMM &%&J		#9	d&%&J&	d&%&J&	&%&&	C+#-3730
		5D&JN#Å,3:301#M#D;3:#="Å,0":#2Å,3R7#WÅMJKE	MMMM *&	7+ "h#cU#e#0	d*&	d*&	&%&&	C+#-3730	
EA029-E: Magnesium Values (QC Lot: 178486)									
5@*GJGJ\$GM&*	D4+417+R#	5D&JN#D;3:#="Å,0":#<Å(4"i3R7#WJKE	MMMM &%&J		#<(	d&%&J&	d&%&J&	&%&&	C+#-3730
		5D&JN#h2 #5_0/Å,0Å, "h<Å(4"i3R7#WJK97X	MMMM &%&J		#<(	&%&K&	&%&K*	&%&&	C+#-3730
		5D&JN#"/+ 3:"#<Å(4"i3R7#WJK>7X	MMMM &%&J		#<(	&%&KJ	&%&K*	&%&&	C+#-3730
		5D&JN#IR, 3:3:#M#D;3:#="Å,0":#<Å(4"i3R7#WIMJKE	MMMM &%&J		#9	d&%&J&	d&%&J&	&%&&	C+#-3730
		5D&JN#D;3:301#M#D;3:#="Å,0":#<Å(4"i3R7#WÅMJKE	MMMM *&	7+ "h#cU#e#0	d*&	d*&	&%&&	C+#-3730	
EA029-H: Acid Base Accounting (QC Lot: 178486)									
5@*GJGJ\$GM&*	D4+417+R#	5D&JN#D;3:#="Å,0":#<Å(4"i3R7#WJKE	MMMM &%G		M	*%G	*%G	&%&&	C+#-3730
		5D&JN#C"0#D;3:301#WIR, R]#R430IX	MMMM &%&J		#9	&%*N	&%J&	&%&&	&#M#G&i
		5D&JN#-3734(=#=Å0"	MMMM *		P#2Å2AKe0	N	N	&%&&	C+#-3730
		5D&JN#C"0#D;3:301#WÅ,3:301#R430IX	MMMM *&	7+ "h#cU#e#0	**N	* JG	S%\$G	&#M#G&i	
EA055: Moisture Content (QC Lot: 172092)									
59*GJLJ\$JM&JJ	D4+417+R#	5D&GGM* &K]#<+310R/"#2+40"40#W/3":#T#*&Kk2X	MMMM *		i	*\$%L	*\$%L	&%&&	&#M#G&i
		5D&GGM* &K]#<+310R/"#2+40"40#W/3":#T#*&Kk2X	MMMM *		i	*N%*	*N%&	&%LS*	&#M#G&i
EA055: Moisture Content (QC Lot: 172093)									
59*GJLJF*M&*S	5C<G#K%GMS%G#	5D&GGM* &K]#<+310R/"#2+40"40#W/3":#T#*&Kk2X	MMMM *		i	JG%&	JG%K	* %J&	&#M#J&i
		5D&GGM* &K]#<+310R/"#2+40"40#W/3":#T#*&Kk2X	MMMM *		i	\$%F	*&%G	* N%N	&#M#G&i
EA055: Moisture Content (QC Lot: 172094)									
59*GJLJF*M&KS	5C<***#JMK<#	5D&GGM* &K]#<+310R/"#2+40"40#W/3":#T#*&Kk2X	MMMM *		i	JN%J	JN%S	&%GSJ	&#M#J&i
		5D&GGM* &K]#<+310R/"#2+40"40#W/3":#T#*&Kk2X	MMMM *		i	*G%K	*G%*	*%K*	&#M#G&i
EG005T: Total Metals by ICP-AES (QC Lot: 177506)									
59*GJLJF*M&*	5C<#&%SM%\$S<#	5a&&G>M<B]#2Å:73R7	LSS&MSKMN	&%S	7(eP(	d&%S	d&%S	&%&&	C+#-3730
		5a&&G>M<B]#2Q/+73R7	LSS&MSLMK	J	7(eP(	K	J	&%&&	C+#-3730
		5a&&G>M<B]#C3;P"	LSS&M&JM&	J	7(eP(	dJ	dJ	&%&&	C+#-3730
		5a&&G>M<B]#D/!"43;	LSS&MK\$MJ	G	7(eP(	dG	dG	&%&&	C+#-3730
		5a&&G>M<B]#2+OO"/	LSS&MG&M\$	G	7(eP(	dG	dG	&%&&	C+#-3730
59*GJLJF\$SM&*	D4+417+R#	5a&&G>M<B]#- "Å:	LSKNMNJM*	G	7(eP(	\$	G	KK%F	C+#-3730
		5a&&G>M<B]#m34;	LSS&MFFMF	G	7(eP(	dG	dG	&%&&	C+#-3730
EG005T: Total Metals by ICP-AES (QC Lot: 177508)									
59*GJLJF*M&J*	5C<L#K%GMS%G<#	5a&&G>M<B]#2Å:73R7	LSS&MSKMN	&%S	7(eP(	d&%S	d&%S	&%&&	C+#-3730
		5a&&G>M<B]#2Q/+73R7	LSS&MSLMK	J	7(eP(	S	S	&%&&	C+#-3730
		5a&&G>M<B]#C3;P"	LSS&M&JM&	J	7(eP(	dJ	dJ	&%&&	C+#-3730



'Å(') G#, #S\$
B+/P#A/!/') 59"GJLJF*
2 3"40) DI=A=D#5C'?=AC<5C>D-#2AC9I->?Ca
'/Z"0) BD=C5=9#&@D/#5C<

Laboratory sample ID		Client sample ID	Method:Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 177508) - continued										
59*GJLJF*M&J*		5C<L#K%GMS%G<#	5a&&G>M<B#D/I"43;	LSS&MK\$MJ	G	7(eP(	dG	dG	8%&&	C+#-3730
			5a&&G>M<B#2+OO"/	LSS&MG&M\$	G	7(eP(	dG	dG	8%&&	C+#-3730
			5a&&G>M<B#J-"Å:	LSKNMNJM*	G	7(eP(	dG	dG	8%&&	C+#-3730
			5a&&G>M<B#m34;	LSS&MFFMF	G	7(eP(	dG	dG	8%&&	C+#-3730
EG005T: Total Metals by ICP-AES (QC Lot: 177510)										
59*GJLJF*M&K*		5C<*&#J%GMK%G#	5a&&G>M<B#2Å:73R7	LSS&MSKMN	8%S	7(eP(	d&%S	d&%S	8%&&	C+#-3730
			5a&&G>M<B#2Q/+73R7	LSS&MSLMK	J	7(eP(	**	* &	8%&&	C+#-3730
			5a&&G>M<B#C3;P"	LSS&M&JM&	J	7(eP(	dJ	dJ	8%&&	C+#-3730
			5a&&G>M<B#D/I"43;	LSS&MK\$MJ	G	7(eP(	dG	dG	8%&&	C+#-3730
			5a&&G>M<B#2+OO"/	LSS&MG&M\$	G	7(eP(	dG	dG	8%&&	C+#-3730
			5a&&G>M<B#J-"Å:	LSKNMNJM*	G	7(eP(	F	\$	KNV%&	C+#-3730
			5a&&G>M<B#m34;	LSS&MFFMF	G	7(eP(	dG	dG	8%&&	C+#-3730
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 177507)										
59*GJLJF*M&S**		5C<S#K%GMS%G#	5a&KG>M<B#<"/;R/1	LSKNMNLMF	8%*	7(eP(	d&%*	d&%*	8%&&	C+#-3730
59*GJLJF*M&S*		5C<S#&%SM*%S<#	5a&KG>M<B#<"/;R/1	LSKNMNLMF	8%*	7(eP(	d&%*	d&%*	8%&&	C+#-3730
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 177509)										
59*GJLJF*M&J*		5C<L#K%GMS%G<#	5a&KG>M<B#<"/;R/1	LSKNMNLMF	8%*	7(eP(	d&%*	d&%*	8%&&	C+#-3730
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 177511)										
59*GJLJF*M&S*		5C<*K#*MJ<#	5a&KG>M<B#<"/;R/1	LSKNMNLMF	8%*	7(eP(	d&%*	d&%*	8%&&	C+#-3730
59*GJLJF*M&K*		5C<*&#J%GMK%G#	5a&KG>M<B#<"/;R/1	LSKNMNLMF	8%*	7(eP(	d&%*	d&%*	8%&&	C+#-3730
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 170055)										
59*GJLJF*M&S*		5C<*#&%SM*%S<#	5*LGW9?<X#D:*4ÅOQ0Q"4"	\$KMKJMN	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#D:*4ÅOQ0Q1 "4"	J&\$MNF\$	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#D40Q/Å:"4"	*J&M*JML	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#&@"4bWÅXÅ40Q/Å:"4"	GFMGGMK	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#&@"4b+WÅXO1/"4"	G&MKJM\$	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#&@"4b+WÅXO1/"4"#>5V#Wb"/+X	MMMM	&%G	7 (eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#&@"4b+W.UZX, R+/Å40Q"4"	J&GMNMMJ#	&%G	7 (eP(	d&%G	d&%G	8%&&	C+#-3730
				J&GMSJMK						
			5*LGW9?<X#&@"4b+W/Q%3XO"1 "4"	*N*MJSMJ	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#&@"4b+WPX, R+/Å40Q"4"	J&LM&\$MN	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#2Q/1"4"	J*\$M&*MN	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#83:"4bWÅ%QXÅ40Q/Å:"4"	GKML&MK	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#Å R+/Å40Q"4"	J&FMSSM&	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#Å R+/4"	\$FMLKML	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#?4:"4+W*%J%K%.:XO1/"4"	*NKMKNMG	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
			5*LGW9?<X#CÅOQ0QÅ "4"	N*MJ&MK	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730
5*LGW9?<X#Q"4Å40Q/"4"	\$GM&*M\$	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730			
5*LGW9?<X#)1/"4"	*JNM&M&	8%G	7(eP(	d&%G	d&%G	8%&&	C+#-3730			



'Å"
B+/P#A/!'
2 3"40
'/+Z"0
) F#.#\$
) 59"GJLJF*
) DI=A=D#5C'?=AQ<5C>D-#2AC9I->?Ca
) BD=C5=9#&@D#5C<

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: 170055) - continued									
59"GJLJF'M&*	5C<#&%SM'%S<#	5&LGW9?<X#D;"4ÅOQ0Q"4" Q1:/+./+4!	MMMM	&%G	7 (eP)	d&%G	d&%G	&%&&	C+#-3730
59"GJLJF'M&*	5C<S#K%GMS%G#	5&LGW9?<X#D;"4ÅOQ0Q"4" 5&LGW9?<X#D;"4ÅOQ0Q1 "4" 5&LGW9?<X#D40Q/Å;"4" 5&LGW9?<X#D;"4bWÅXÅ40Q/Å;"4" 5&LGW9?<X#D;"4b+WÅXO1/"4" 5&LGW9?<X#D;"4b+WÅXO1/"4"-5V#Wb"/+X 5&LGW9?<X#D;"4b+W.UZX, R+/Å40Q"4"	\$KMKJMN J&\$MNFWS *J&M"JML GFMGGMK G&MKJMS MMMM J&GMNNMJ# J&GMSJMK	&%G &%G &%G &%G &%G &%G &%G	7 (eP) 7 (eP) 7 (eP) 7 (eP) 7 (eP) 7 (eP) 7 (eP)	d&%G d&%G d&%G d&%G d&%G d&%G d&%G	d&%G d&%G d&%G d&%G d&%G d&%G d&%G	&%&& &%&& &%&& &%&& &%&& &%&& &%&&	C+#-3730 C+#-3730 C+#-3730 C+#-3730 C+#-3730 C+#-3730 C+#-3730
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 170061)									
59"GJLJF'M&J*	5C<L#K%GMS%G<#	5&LGW9?<X#D;"4ÅOQ0Q"4" 5&LGW9?<X#D;"4ÅOQ0Q1 "4" 5&LGW9?<X#D40Q/Å;"4" 5&LGW9?<X#D;"4bWÅXÅ40Q/Å;"4" 5&LGW9?<X#D;"4b+WÅXO1/"4" 5&LGW9?<X#D;"4b+WÅXO1/"4"-5V#Wb"/+X 5&LGW9?<X#D;"4b+W.UZX, R+/Å40Q"4"	\$KMKJMN J&\$MNFWS *J&M"JML GFMGGMK G&MKJMS MMMM J&GMNNMJ# J&GMSJMK	&%G &%G &%G &%G &%G &%G &%G	7 (eP) 7 (eP) 7 (eP) 7 (eP) 7 (eP) 7 (eP) 7 (eP)	d&%G d&%G d&%G d&%G d&%G d&%G d&%G	d&%G d&%G d&%G d&%G d&%G d&%G d&%G	&%&& &%&& &%&& &%&& &%&& &%&& &%&&	C+#-3730 C+#-3730 C+#-3730 C+#-3730 C+#-3730 C+#-3730 C+#-3730



'Å(") L#.#,\$\$
B+/P#A/!"/) 59"GJLJF*
2 3"40) DI=A=D#5C"?=AQ<5C>D-#2AC9I->?Ca
'/z"0) BD=C8=9#@[D]#5C<

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: 170061) - continued													
59*GJLJF*M&J*		5C<L#K%GMS%G<#	5&LGW9?<X#R7#+, #O+ 1;1; 3;#Ä/+7Ä03;#	*JNM&&M& &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			Q1:/+;Ä./+4!	MMMM &#G	&#G	7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4ÄOQ0Q"4"	\$KMKJMN &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4ÄOQ0Q1 "4"	J&\$MNFWS &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
59*GJLJF*M&K*		5C<*8#J%GMK%G#	5&LGW9?<X#D40Q/Ä;"4"	*J&M* JML &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4bWÄXÄ40Q/Ä;"4"	GFMGGMK &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4b+WÄXO1/"4"	G&MKJMS &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4b+WÄXO1/"4"#+5V#Wb"/+X	MMMM &#G	&#G	7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4b+W.UZX, R+/Ä40Q"4"	J&GMNNMJ# &#G	&#G	7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
				J&GMSJMK									
			5&LGW9?<X#D;"4b+W(%Q%3XO"/1 "4"	*N*MJSMJ &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D;"4b+W.PX, R+/Ä40Q"4"	J&LM&\$MN &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#D2Q/1"4"	J*\$M&*MN &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#83;"4bWÄ%QXÄ40Q/Ä;"4"	GKML&MK &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
59*GJLJF*M&K*		5C<L#K%GMS%G<#	5&LGW9?<X#Ä R+/Ä40Q"4"	J&FMSSM& &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#Ä R+"/4"	\$FMLKML &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#?4;"4+W*%J%K%.;XO1"/4"	*NKMKNMG &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#CÄOQ0QÄ "4"	N*MJ&MK &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#Q"4Ä40Q"4"	\$GM&*MS &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#R7#+, #O+ 1;1; 3;#Ä/+7Ä03;#	*JNM&&M& &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			Q1:/+;Ä./+4!	MMMM &#G	&#G	7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
			EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 170145)										
			5B*G****8M&8*	D4+417+R#	5&LGW9?<X#D;"4ÄOQ0Q"4"	5&LGW9?<X#D;"4ÄOQ0Q1 "4"	J&\$MNFWS &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730
						5&LGW9?<X#D40Q/Ä;"4"	*J&M* JML &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730
5&LGW9?<X#D;"4bWÄXÄ40Q/Ä;"4"	GFMGGMK &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+WÄXO1/"4"	G&MKJMS &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+WÄXO1/"4"#+5V#Wb"/+X	MMMM &#G	&#G				7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+W.UZX, R+/Ä40Q"4"	J&GMNNMJ# &#G	&#G				7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
	J&GMSJMK												
5&LGW9?<X#D;"4b+W(%Q%3XO"/1 "4"	*N*MJSMJ &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+W.PX, R+/Ä40Q"4"	J&LM&\$MN &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D2Q/1"4"	J*\$M&*MN &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
59*GJLJF*M&J*	5C<L#K%GMS%G<#	5&LGW9?<X#83;"4bWÄ%QXÄ40Q/Ä;"4"	5&LGW9?<X#Ä R+/Ä40Q"4"	J&FMSSM& &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#Ä R+"/4"	\$FMLKML &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#?4;"4+W*%J%K%.;XO1"/4"	*NKMKNMG &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#CÄOQ0QÄ "4"	N*MJ&MK &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#Q"4Ä40Q"4"	\$GM&*MS &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			5&LGW9?<X#R7#+, #O+ 1;1; 3;#Ä/+7Ä03;#	*JNM&&M& &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730			
			Q1:/+;Ä./+4!	MMMM &#G	&#G	7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
			EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 170145)										
			5B*G****8M&8*	D4+417+R#	5&LGW9?<X#D;"4ÄOQ0Q"4"	5&LGW9?<X#D;"4ÄOQ0Q1 "4"	J&\$MNFWS &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730
						5&LGW9?<X#D40Q/Ä;"4"	*J&M* JML &#G	&#G	7(eP(	d&%G	d&%G	&%&&	C+#-3730
5&LGW9?<X#D;"4bWÄXÄ40Q/Ä;"4"	GFMGGMK &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+WÄXO1/"4"	G&MKJMS &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+WÄXO1/"4"#+5V#Wb"/+X	MMMM &#G	&#G				7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+W.UZX, R+/Ä40Q"4"	J&GMNNMJ# &#G	&#G				7 (eP(	d&%G	d&%G	&%&&	C+#-3730			
	J&GMSJMK												
5&LGW9?<X#D;"4b+W(%Q%3XO"/1 "4"	*N*MJSMJ &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D;"4b+W.PX, R+/Ä40Q"4"	J&LM&\$MN &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			
5&LGW9?<X#D2Q/1"4"	J*\$M&*MN &#G	&#G				7(eP(	d&%G	d&%G	&%&&	C+#-3730			

-) \$#=\$#
-) 59*GJLJF*
-) DI=A=D#5C'?=AC<5C>D#2AC9I->?Ca
-) BD=C5=9#@DI#5C<

9R.M<Ä0/3_ SOIL										
Laboratory sample ID	Client sample ID	Method:Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Laboratory Duplicate (DUP) Report	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 170145) - continued										
5B*G****&M&&*	D4+417+R#	5&L GW97<X#Q'4Ä40Q"4"	\$GM&*M\$	8%G	7(eP(	d8%G	d8%G	8%&&	d8%G	C+#-3730
		5&L GW97<X#1"4"	*JNM&&M&	8%G	7(eP(	d8%G	d8%G	8%&&	d8%G	C+#-3730
		5&L GW97<X#9R7#+,#O+ 1;1; 3;#Ä/+7Ä03# Q1'/+;Ä;.+41	MMMM &G		7 (eP(	d8%G	d8%G	8%&&	d8%G	C+#-3730
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 169974)										
59*G.JLJF*M&&*		5C<*&%SM*%S<#		MMMM *&	7(eP(	d*&		d*&	8%&&&	C+#-3730
59*G.JLJF*M&*		5C<S#K%GMS%G#		MMMM *&	7(eP(	d*&		d*&	8%&&&	C+#-3730
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 169980)										
59*G.JLJF*M&J*		5C<L#K%GMS%G<#		MMMM *&	7(eP(	d*&		d*&	8%&&&	C+#-3730
59*G.JLJF*M&K*		5C<*&#1%GMK%G#		MMMM *&	7(eP(	d*&		d*&	8%&&&	C+#-3730
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170056)										
59*G.JLJF*M&&*		5C<*&%SM*%S<#		MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM G&	7(eP(	dG&		dG&	8%&&&	C+#-3730
		5C<S#K%GMS%G#		MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
		5&L *)#2*&#M#2*S#Ä/Ä;03+4		MMMM G&	7(eP(	dG&		dG&	8%&&&	C+#-3730
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170060)										
59*G.JLJF*M&J*		5C<L#K%GMS%G<#		MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM G&	7(eP(	dG&		dG&	8%&&&	C+#-3730
59*G.JLJF*M&K*		5C<*&#1%GMK%G#		MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM *&&	7(eP(	d*&&		d*&&	8%&&&	C+#-3730
				MMMM G&	7(eP(	dG&		dG&	8%&&&	C+#-3730
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170122)										
59*G.JLJF*M&S*		5C<*K%MJ<#		MMMM *&	7(eP(	d*&		d*&	8%&&&	C+#-3730
59*G.JLJNM&&S		D4+417+R#		MMMM *&	7(eP(	d*&		d*&	8%&&&	C+#-3730
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170144)										
5B*G****&M&&*	D4+417+R#	5&L *)#2*G#M#2J\$#Ä/Ä;03+4	MMMM *&&		7(eP(	*S&		*L&	*\$%G	C+#-3730
		5&L *)#2JN#M#2KF#Ä/Ä;03+4	MMMM *&&		7(eP(	JF&		JJ&	*N%L	C+#-3730
		5&L *)#2*&#M#2*S#Ä/Ä;03+4	MMMM G&		7(eP(	dG&		dG&	8%&&&	C+#-3730
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 169974)										
59*G.JLJF*M&&*		5C<*&%SM*%S<#		2Fn2*&	7(eP(	d*&		d*&	8%&&&	C+#-3730
59*G.JLJF*M&*		5C<S#K%GMS%G#		2Fn2*&	7(eP(	d*&		d*&	8%&&&	C+#-3730
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 169980)										
59*G.JLJF*M&J*		5C<L#K%GMS%G<#		2Fn2*&	7(eP(	d*&		d*&	8%&&&	C+#-3730
59*G.JLJF*M&K*		5C<*&#1%GMK%G#		2Fn2*&	7(eP(	d*&		d*&	8%&&&	C+#-3730
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170056)										



'Å(") N#, #S\$
B+/P#A/!/") 59"GJLJF*
2 3"40) DI=A=D#5C'?=AQ<5C>D-#2AC9I->?Ca
'/z"0) BD=C5=9#&@D[#5C<

Laboratory sample ID		Client sample ID	Method:Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			
							Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170056) - continued										
59*GJLJF*M&&*		5C<*&#&%SM*%S<#	5&L*)#2*F#M#2KS#A/Ä:03+4	MMMM *8&		7(eP(	d*&&	d*&&	8%&&	C+#-3730
			5&L*)#2KS#M#2S&#A/Ä:03+4	MMMM *8&	7(eP(	d*&&	d*&&	8%&&	C+#-3730	
			5&L*)#2*&#M#2*F#Ä/Ä:03+4	G&	7 (eP(	dG&	dG&	8%&&	C+#-3730	
			5&L*)#2*F#M#2KS#Ä/Ä:03+4	MMMM *8&	7(eP(	d*&&	d*&&	8%&&	C+#-3730	
			5&L*)#2KS#M#2S&#Ä/Ä:03+4	MMMM *8&	7(eP(	d*&&	d*&&	8%&&	C+#-3730	
59*GJLJF*M&**		5C<S#K%GMS%G#	5&L*)#2*&#M#2*F#Ä/Ä:03+4	G&		7 (eP(	dG&	dG&	8%&&	C+#-3730
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170060)										
59*GJLJF*M&J*		5C<L#K%GMS%G<#	5&L*)#2*F#M#2KS#A/Ä:03+4	MMMM *8&		7(eP(	d*&&	d*&&	8%&&	C+#-3730
			5&L*)#2KS#M#2S&#Ä/Ä:03+4	MMMM *8&	7(eP(	d*&&	d*&&	8%&&	C+#-3730	
			5&L*)#2*&#M#2*F#Ä/Ä:03+4	G&	7 (eP(	dG&	dG&	8%&&	C+#-3730	
59*GJLJF*M&K*		5C<*&#J%GMK%G#	5&L*)#2*F#M#2KS#A/Ä:03+4	MMMM *8&		7(eP(	d*&&	d*&&	8%&&	C+#-3730
			5&L*)#2KS#M#2S&#Ä/Ä:03+4	MMMM *8&	7(eP(	d*&&	d*&&	8%&&	C+#-3730	
			5&L*)#2*&#M#2*F#Ä/Ä:03+4	G&	7 (eP(	dG&	dG&	8%&&	C+#-3730	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170122)										
59*GJLJF*M&S*		5C<*K#*MJ<#	5&S&&)#2F#M#2*8#Ä/Ä:03+4	2Fn2*8	*8	7(eP(	d*8	d*8	8%&&	C+#-3730
59*GJLJNM&&S		D4+417+R#	5&S&&)#2F#M#2*8#Ä/Ä:03+4	2Fn2*8	*8	7(eP(	d*8	d*8	8%&&	C+#-3730
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170144)										
5B*G****8M&&*		D4+417+R#	5&L*)#2*F#M#2KS#Ä/Ä:03+4	MMMM *8&		7(eP(	JF&	JF&	8%&&	C+#-3730
			5&L*)#2KS#M#2S&#Ä/Ä:03+4	MMMM *8&	7(eP(	J8&	*\$8	\$%KG	C+#-3730	
			5&L*)#2*&#M#2*F#Ä/Ä:03+4	j2*&n2*F	G&	7 (eP(	dG&	dG&	8%&&	C+#-3730
EP080: BTEXN (QC Lot: 169974)										
59*GJLJF*M&&*		5C<*&8%SM*%S<#	5&S&&)#@"4b"4"	L*MSKMJ	8%J	7(eP(	d8%J	d8%J	8%&&	C+#-3730
			5&S&&)#50Q1 "4b"4"	*8&MS*MS	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730
			5&S&&)#7"0ÄM#o#OÄ/ÄME1 "4"	*8\$MK\$MK# &%G	7 (eP(	d8%G	d8%G	d8%G	8%&&	C+#-3730
				*8FMSJMK						
			5&S&&)#+/0Q+ME1 "4"	NGMSLMF	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730
59*GJLJF*M&**		5C<S#K%GMS%G#	5&S&&)#>+ R"4"	*8\$M\$SMK	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730
			5&S&&)#CÄOQ0QÄ "4"	N*MJ8MK	*	7(eP(	d*	d*	8%&&	C+#-3730
			5&S&&)#@"4b"4"	L*MSKMJ	8%J	7(eP(	d8%J	d8%J	8%&&	C+#-3730
			5&S&&)#50Q1 "4b"4"	*8&MS*MS	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730
			5&S&&)#7"0ÄM#o#OÄ/ÄME1 "4"	*8\$MK\$MK# &%G	7 (eP(	d8%G	d8%G	d8%G	8%&&	C+#-3730
EP080: BTEXN (QC Lot: 169980)										
59*GJLJF*M&J*		5C<L#K%GMS%G<#	5&S&&)#+/0Q+ME1 "4"	NGMSLMF	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730
			5&S&&)#>+ R"4"	*8\$M\$SMK	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730
			5&S&&)#CÄOQ0QÄ "4"	N*MJ8MK	*	7(eP(	d*	d*	8%&&	C+#-3730
EP080: BTEXN (QC Lot: 169980)										
59*GJLJF*M&J*		5C<L#K%GMS%G<#	5&S&&)#@"4b"4"	L*MSKMJ	8%J	7(eP(	d8%J	d8%J	8%&&	C+#-3730
			5&S&&)#50Q1 "4b"4"	*8&MS*MS	8%G	7(eP(	d8%G	d8%G	8%&&	C+#-3730



'Å(") * №#x2116;
B+/P#A/!"/) 59"GJLJF*
2 3"40) DI=A=D#5C'?=AC<5C>D-#2AC9I->?Ca
'/z"0) BD=C5=9#@D]#5C<

Laboratory sample ID		Client sample ID	Method:-Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			
EP080: BTEXN (QC Lot: 169980) - continued							Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
59"GJLJF*M&J*		5C<L#K%GMS%G<#	5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &\$\$'0ÅM#o#OÅÀÅME1 "4"	&%G	7 (eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &FMSJMK						
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	NGMSLMF	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &N\$'0ÅM#o#OÅÀÅME1 "4"	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	N*MJ&MK	*	7(eP(	d*	d*	&%&&&	C+#-3730
59"GJLJF*M&K*		5C<* №J%GMK%G#	5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	L*MSKMJ	&%J	7(eP(	d&%J	d&%J	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
59"GJLJF*M&S*		5C<*K*MJ<#	5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
59"GJLJF*M&S	D4+417+R#		5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730
			5'&\$\$'0ÅM#o#OÅÀÅME1 "4"	* &MS*MS	&%G	7(eP(	d&%G	d&%G	&%&&&	C+#-3730

-) `'Ä"`
-) `B+P#A\."/`
-) `** # # $`
-) `59*GULJF*`
-) `DI=A=D#5C`?=-AC<5G>D#2AC9I!>?Ca`
-) `BD=C5=9#@DI#5C<`
-) `2 3^40`
-) `'/+Z"-0`

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

[illegible]

9R.M<Ä0/3_SOIL

9R.M<Ä0/3_ SOIL				Laboratory Control Spike (LCS) Report						
Method: Compound		CAS Number	LOR	Unit	Method Blank (MB) Report		Spike		Recovery Limits (%)	
					Result	Concentration	LCS	Low	High	
EA010: Conductivity (QCLot: 170615)										
5D&* &#5 " ,0/3;Ä #2+4;R;036301#T#JGk2	MMNM	*		l 9e;7	d*		*S*J#9e;7	NL%&	L&	*K&
EA010: Conductivity (QCLot: 170617)										
5D&* &#5 " ,0/3;Ä #2+4;R;036301#T#JGk2	MMNM	*		l 9e;7	d*		*S*J#9e;7	NF%G	L&	*K&
EA010: Conductivity (QCLot: 170619)										
5D&* &#5 " ,0/3;Ä #2+4;R;036301#T#JGk2	MMNM	*		l 9e;7	d*		*S*J#9e;7	NN%\$	L&	*K&
EA029-A: pH Measurements (QCLot: 178486)										
5D&JN#Oc#h2 #WJKDX	MMNM	&%*		Öc#1430	d&%*		S%N#Oc#1430	*&&	L&	*K&
5D&JN#Oc#AE#WJK@X	MMNM	&%*		Öc#1430	d&%*		S%S#Oc#1430	N&%N	L&	*K&
EA029-B: Acidity Trail (QCLot: 178486)										
5D&JN#R ,3;3;#M#>30/Ä0Ä ,#D;0RÄ #D;3;301#WIMJKAX	MMNM	&%&J		#O1/30"#9	d&%&J&		MMMM	MMMM	MMMM	MMMM
5D&JN#R ,3;3;#M#>30/Ä0Ä ,#" /+ _3;"#D;3;301#WIMJKaX	MMNM	&%&J		#O1/30"#9	d&%&J&		MMMM	MMMM	MMMM	MMMM
5D&JN#R ,3;3;#M#>30/Ä0Ä ,#9R ,3;3;#D;3;301#WIMJKcX	MMNM	&%&J		#O1/30"#9	d&%&J&		MMMM	MMMM	MMMM	MMMM
5D&JN#>30/Ä0Ä ,#D;0RÄ #D;3;301#WJKAX	MMNM	J		7 + "#cU#e#0	dJ		*S%KJ#7+ "#cU#e#0	*&K	L&	*K&
5D&JN#>30/Ä0Ä ,#" /+ _3;"#D;3;301#WJKaX	MMNM	J		7 + "#cU#e#0	dJ		F\$#7+ "#cU#e#0	*&L	L&	*K&
5D&JN#>30/Ä0Ä ,#9R ,3;3;#D;3;301#WJKcX	MMNM	J		7 + "#cU#e#0	dJ		MMMM	MMMM	MMMM	MMMM
EA029-C: Sulfur Trail (QCLot: 178486)										
5D&JN#Ä;3;301#M#" /+ _3;"#A ,3;3Ä ,#9R ,R/#WÄMJK5X	MMNM	*&		7 + "#cU#e#0	d*&		MMMM	MMMM	MMMM	MMMM
5D&JN#h2 #5 ,0Ä;0Ä ,#"9R ,R/#WJK2"X	MMNM	&%&J		#9	d&%&J&		&%&FN#9	NK%G	L&	*K&
5D&JN#" /+ _3;"#A ,3;3Ä ,#9R ,R/#WJK5X	MMNM	&%&J		#9	d&%&J&		MMMM	MMMM	MMMM	MMMM
5D&JN#" /+ _3;"#9R ,R/#WJK8"X	MMNM	&%&J		#9	d&%&J&		&%J&S#9	*&K	L&	*K&
EA029-D: Calcium Values (QCLot: 178486)										
5D&JN#D;3;#="Ä;0" #2Ä ;3R7#WJKEX	MMNM	&%&J		#2Ä	d&%&J&		MMMM	MMMM	MMMM	MMMM
5D&JN#Ä;3;301#M#D;3;#="Ä;0" #2Ä ;3R7#WÄMJKEX	MMNM	*&		7 + "#cU#e#0	d*&		MMMM	MMMM	MMMM	MMMM
5D&JN#h2 #5 ,0Ä;0Ä ,#"2Ä ;3R7#WJK QX	MMNM	&%&J		#2Ä	d&%&J&		&%*JG#2Ä	NL%F	L&	*K&
5D&JN#" /+ _3;"#2Ä ;3R7#WJKBOX	MMNM	&%&J		#2Ä	d&%&J&		&%J\$N#2Ä	*&&	L&	*K&
5D&JN#R ,3;3;#M#D;3;#="Ä;0" #2Ä ;3R7#WIMJKEX	MMNM	&%&J		#9	d&%&J&		MMMM	MMMM	MMMM	MMMM
EA029-E: Magnesium Values (QCLot: 178486)										
5D&JN#D;3;#="Ä;0" #<Ä(4"13R7#WJKIX	MMNM	&%&J		#<(<	d&%&J&		MMMM	MMMM	MMMM	MMMM
5D&JN#D;3;301#M#D;3;#="Ä;0" #<Ä(4"13R7#WÄMJKIX	MMNM	*&		7 + "#cU#e#0	d*&		MMMM	MMMM	MMMM	MMMM
5D&JN#h2 #5 ,0Ä;0Ä ,#"<Ä(4"13R7#WJK97X	MMNM	&%&J		#<(<	d&%&J&		&%J\$G#&#<(<	NS%G	L&	*K&
5D&JN#" /+ _3;"#<Ä(4"13R7#WJK>7X	MMNM	&%&J		#<(<	d&%&J&		&%J\$G#&#<(<	*&*	L&	*K&
5D&JN#R ,3;3;#M#D;3;#="Ä;0" #<Ä(4"13R7#WIMJKIX	MMNM	&%&J		#9	d&%&J&		MMMM	MMMM	MMMM	MMMM
EA029-H: Acid Base Accounting (QCLot: 178486)										



'Ä(') * J #.#\$
B+/P#A/"/) 59"GJLJF*
2 3"40) DI=A=D#5C"?=AC<5C>D-#2AC9I->?Ca
'/Z"0) BD=C5=9#@D#5C<

9R.M<Ä0/3_SOIL				Laboratory Control Spike (LCS) Report								
Method: Compound		CAS Number		LOR	Unit	Method Blank (MB) Report		Spike Concentration	Spike Recovery (%)		Low	High
EA029-H: Acid Base Accounting (QCLot: 178486) - continued												
5D&JN#DC2#A34"4"!#ÄÄ.0+!	MMMM	&%G	M		d&%G	MMMM		MMMM	MMMM	MMMM	MMMM	MMMM
5D&JN#-3734(=#Ä0"	MMMM	*	R#2Ä2AKe0		d*	MMMM		MMMM	MMMM	MMMM	MMMM	MMMM
5D&JN#C"0#D;3:301#WÄ.3:301#R430IX	MMMM	*&	7+ "#cU#e#0		d*&	MMMM		MMMM	MMMM	MMMM	MMMM	MMMM
5D&JN#C"0#D;3:301#WIR_R/#R430IX	MMMM	&%&J	i#9		d&%&J	MMMM		MMMM	MMMM	MMMM	MMMM	MMMM
EG005T: Total Metals by ICP-AES (QCLot: 177506)												
5a&&G>M<B#D/!"43;	LSS&MK\$MJ	G	7 (eP(		dG		J%L#7(eP(	\$N%S	\$S		\$J	
5a&&G>M<B#2Ä.73R7	LSS&MSKMN	&%S	7 (eP(		d&%S		S%FS#7(eP(	\$N%F	\$S		\$J	
5a&&G>M<B#2Q/+73R7	LSS&MSLMK	J	7 (eP(		dJ		MMMM	MMMM	MMMM	MMMM	MMMM	
5a&&G>M<B#2+OO"/	LSS&MG&M\$	G	7 (eP(		dG		KJ#7(eP(	NS%J	N&		*K	
5a&&G>M<B#-":Ä:	LSKNMNJM*	G	7 (eP(		dG		S&#7(eP(	\$N%N	\$K		*JL	
5a&&G>M<B#C3:P"	LSS&M&JM&	J	7 (eP(		dJ		GG#7(eP(	\$J%J	\$*		*JG	
5a&&G>M<B#m34;	LSS&MFFMF	G	7 (eP(		dG		F&%\$#7(eP(	NJ%F	\$G		*KK	
EG005T: Total Metals by ICP-AES (QCLot: 177508)												
5a&&G>M<B#D/!"43;	LSS&MK\$MJ	G	7 (eP(		dG		J%L#7(eP(	NS%*	\$S		\$J	
5a&&G>M<B#2Ä.73R7	LSS&MSKMN	&%S	7 (eP(		d&%S		S%FS#7(eP(	N"%L	\$S		*J	
5a&&G>M<B#2Q/+73R7	LSS&MSLMK	J	7 (eP(		dJ		MMMM	MMMM	MMMM	MMMM	MMMM	
5a&&G>M<B#2+OO"/	LSS&MG&M\$	G	7 (eP(		dG		KJ#7(eP(	NS%J	N&		*K	
5a&&G>M<B#-":Ä:	LSKNMNJM*	G	7 (eP(		dG		S&#7(eP(	\$L%N	\$K		*JL	
5a&&G>M<B#C3:P"	LSS&M&JM&	J	7 (eP(		dJ		GG#7(eP(	\$J%J	\$*		*JG	
5a&&G>M<B#m34;	LSS&MFFMF	G	7 (eP(		dG		F&%\$#7(eP(	NG%&	\$G		*KK	
EG005T: Total Metals by ICP-AES (QCLot: 177510)												
5a&&G>M<B#D/!"43;	LSS&MK\$MJ	G	7 (eP(		dG		J%L#7(eP(	N&%J	\$S		\$J	
5a&&G>M<B#2Ä.73R7	LSS&MSKMN	&%S	7 (eP(		d&%S		S%FS#7(eP(	\$S%\$	\$S		*J	
5a&&G>M<B#2Q/+73R7	LSS&MSLMK	J	7 (eP(		dJ		MMMM	MMMM	MMMM	MMMM	MMMM	
5a&&G>M<B#2+OO"/	LSS&MG&M\$	G	7 (eP(		dG		KJ#7(eP(	NF%K	N&		*K	
5a&&G>M<B#-":Ä:	LSKNMNJM*	G	7 (eP(		dG		S&#7(eP(	NG%J	\$K		*JL	
5a&&G>M<B#C3:P"	LSS&M&JM&	J	7 (eP(		dJ		GG#7(eP(	NS%K	\$*		*JG	
5a&&G>M<B#m34;	LSS&MFFMF	G	7 (eP(		dG		F&%\$#7(eP(	NL%K	\$G		*KK	
EG035T: Total Recoverable Mercury by FIMS (QCLot: 177507)												
5a&KG>M<B#<"/R1	LSKNMNLMF	&%*	7 (eP(		d&%*		J%GL#7(eP(	\$S%N	LF		**J	
EG035T: Total Recoverable Mercury by FIMS (QCLot: 177509)												
5a&KG>M<B#<"/R1	LSKNMNLMF	&%*	7 (eP(		d&%*		J%GL#7(eP(	\$N%&	LF		**J	
EG035T: Total Recoverable Mercury by FIMS (QCLot: 177511)												
5a&KG>M<B#<"/R1	LSKNMNLMF	&%*	7 (eP(		d&%*		J%GL#7(eP(	\$F%&	LF		**J	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170055)												
5&LGW9?<X#D:"4ÄOQ0Q"4"	\$KMKJMN	&%G	7 (eP(		d&%G		F#7(eP(	NS%*	LN		*JK	
5&LGW9?<X#D:"4ÄOQ0Q1"4"	J&\$MNFM\$	&%G	7 (eP(		d&%G		F#7(eP(	NL%F	LL		*JK	
5&LGW9?<X#D40Q/Ä:"4"	*J&M*JML	&%G	7 (eP(		d&%G		F#7(eP(	NG%L	LN		*JK	



'Å(') *K#.#\$
B+/P#A./!) 59"GJLJF*
2 3"40) DI=A=D#5C"?=AC<5C>D-#2AC9I->?Ca
'/Z":0) BD=C5=9#@D[#5C<

9R.M<Å0/3_SOIL				Laboratory Control Spike (LCS) Report					
Method: Compound		CAS Number	LOR	Unit	Method Blank (MB) Report	Spike Concentration	Spike Recovery (%)	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170055) - continued									
5&LGW9?<X#@*4bWÅXÅ40Q/Å,"4"	GFMGGMK	&%G	7 (eP(	d&%G	F#7(eP(	N&%F	LK		*J*
5&LGW9?<X#@*4b+WÅXO1/"4"	G&MKJM\$	&%G	7 (eP(	d&%G	F#7(eP(	NL%\$	LF		*JJ
5&LGW9?<X#@*4b+W.UZX, R+/Å40Q"4"	J&GMNNMJ# J&GMSJMK	&%G	7 (eP(	d&%G	F#7(eP(	\$N%L	L&		**\$
5&LGW9?<X#@*4b+W(%Q%3XO1/"4"	*N*MJSMJ	&%G	7(eP(	d&%G	F#7(eP(	\$N%L	LJ		**S
5&LGW9?<X#@*4b+WPX, R+/Å40Q"4"	J&LM&\$MN	&%G	7(eP(	d&%G	F#7(eP(	NJ%&	LL		*JK
5&LGW9?<X#2Q/1/"4"	J*\$M&*MN	&%G	7(eP(	d&%G	F#7(eP(	N%&	\$*		*JK
5&LGW9?<X#83."4bWÅ%QXÅ40Q/Å,"4"	GKML&MK	&%G	7 (eP(	d&%G	F#7(eP(	N**	LJ		**K
5&LGW9?<X#Å R+/Å40Q"4"	J&FMSSM&	&%G	7(eP(	d&%G	F#7(eP(	NF%G	LN		*JK
5&LGW9?<X#Å R+/"4"	\$FMLKML	&%G	7 (eP(	d&%G	F#7(eP(	NG%K	LL		*JK
5&LGW9?<X#74:"4+W*%J%K%,:XO1/"4"	*NKMKNMG	&%G	7(eP(	d&%G	F#7(eP(	N&%K	L*		**K
5&LGW9?<X#CÅOQOQÅ "4"	N*MJ&MK	&%G	7 (eP(	d&%G	F#7(eP(	N\$%S	\$&		*JS
5&LGW9?<X#Q"4Å40Q/"4"	\$GM&*M\$	&%G	7 (eP(	d&%G	F#7(eP(	NS%\$	LN		*JK
5&LGW9?<X#1/"4"	*JNM&&M&	&%G	7(eP(	d&%G	F#7(eP(	NG%J	LN		*JG
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170061)									
5&LGW9?<X#D:"4ÅOQOQ"4"	\$KMKJMN	&%G	7 (eP(	d&%G	F#7(eP(	*&K	LN		*JK
5&LGW9?<X#D:"4ÅOQOQ1 "4"	J&\$MNFM\$	&%G	7(eP(	d&%G	F#7(eP(	NN%\$	LL		*JK
5&LGW9?<X#D40Q/Å,"4"	*J&M*JML	&%G	7(eP(	d&%G	F#7(eP(	NK%N	LN		*JK
5&LGW9?<X#@*4bWÅXÅ40Q/Å,"4"	GFMGGMK	&%G	7 (eP(	d&%G	F#7(eP(	\$L%F	LK		*J*
5&LGW9?<X#@*4b+WÅXO1/"4"	G&MKJM\$	&%G	7 (eP(	d&%G	F#7(eP(	NL%*	LF		*JJ
5&LGW9?<X#@*4b+W.UZX, R+/Å40Q"4"	J&GMNNMJ# J&GMSJMK	&%G	7 (eP(	d&%G	F#7(eP(	NL%N	L&		**\$
5&LGW9?<X#@*4b+W(%Q%3XO1/"4"	*N*MJSMJ	&%G	7(eP(	d&%G	F#7(eP(	\$N%N	LJ		**S
5&LGW9?<X#@*4b+WPX, R+/Å40Q"4"	J&LM&\$MN	&%G	7(eP(	d&%G	F#7(eP(	N&%J	LL		*JK
5&LGW9?<X#2Q/1/"4"	J*\$M&*MN	&%G	7(eP(	d&%G	F#7(eP(	NL%*	\$*		*JK
5&LGW9?<X#83."4bWÅ%QXÅ40Q/Å,"4"	GKML&MK	&%G	7 (eP(	d&%G	F#7(eP(	NJ%F	LJ		**K
5&LGW9?<X#Å R+/Å40Q"4"	J&FMSSM&	&%G	7(eP(	d&%G	F#7(eP(	NG%K	LN		*JK
5&LGW9?<X#Å R+/"4"	\$FMLKML	&%G	7 (eP(	d&%G	F#7(eP(	NN%S	LL		*JK
5&LGW9?<X#74:"4+W*%J%K%,:XO1/"4"	*NKMKNMG	&%G	7(eP(	d&%G	F#7(eP(	NS%J	L*		**K
5&LGW9?<X#CÅOQOQÅ "4"	N*MJ&MK	&%G	7 (eP(	d&%G	F#7(eP(	*&S	\$&		*JS
5&LGW9?<X#Q"4Å40Q/"4"	\$GM&*M\$	&%G	7 (eP(	d&%G	F#7(eP(	N\$%G	LN		*JK
5&LGW9?<X#1/"4"	*JNM&&M&	&%G	7(eP(	d&%G	F#7(eP(	*&&	LN		*JG
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170145)									
5&LGW9?<X#D:"4ÅOQOQ"4"	\$KMKJMN	&%G	7 (eP(	d&%G	F#7(eP(	NN%&	LN		*JK
5&LGW9?<X#D:"4ÅOQOQ1 "4"	J&\$MNFM\$	&%G	7(eP(	d&%G	F#7(eP(	N%S	LL		*JK
5&LGW9?<X#D40Q/Å,"4"	*J&M*JML	&%G	7(eP(	d&%G	F#7(eP(	NL%S	LN		*JK
5&LGW9?<X#@*4bWÅXÅ40Q/Å,"4"	GFMGGMK	&%G	7 (eP(	d&%G	F#7(eP(	NJ%S	LK		*J*
5&LGW9?<X#@*4b+WÅXO1/"4"	G&MKJM\$	&%G	7 (eP(	d&%G	F#7(eP(	NF%F	LF		*JJ



'Å(') *S#.#\$
B+/P#A/!')) 59"GJLJF*
2 3'40) DI=A=D#5C'?=AC<5C>D-#2AC9I->?Ca
'/zZ":0) BD=C5=9#&@D#5C<

Method: Compound				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike	Spike Recovery (%)	Recovery Limits (%)	
							LCS	Low	High
9R.M<Å0/3 SOIL									
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170145) - continued									
5&L&GW9?<X#&@'4b+W.UZX R+/Å40Q"4"	J&G&MNNM# J&G&M\$JMK	&G	7 (eP(	d&%G		F#7(eP(	\$N%L	L&	**\$
5&L&GW9?<X#&@'4b+W(%Q%3XO"/1 "4"	*N*MJSMJ	&G	7(eP(	d&%G		F#7(eP(	\$N%F	LJ	**S
5&L&GW9?<X#&@'4b+WPX R+/Å40Q"4"	J&LM&\$MN	&G	7(eP(	d&%G		F#7(eP(	NG%N	LL	*JK
5&L&GW9?<X#&2Q/1"4"	J*\$M&\$MN	&G	7(eP(	d&%G		F#7(eP(	NL%\$	\$*	*JK
5&L&GW9?<X#&83."4bWÅ%QXÅ40Q/Å;"4"	GKML&MK	&G	7 (eP(	d&%G		F#7(eP(	NS%N	LJ	**K
5&L&GW9?<X#Å R+/Å40Q"4"	J&FMSSM&	&G	7(eP(	d&%G		F#7(eP(	NK%N	LN	*JK
5&L&GW9?<X#Å R+/4"	\$FMLKML	&G	7 (eP(	d&%G		F#7(eP(	NJ%&	LL	*JK
5&L&GW9?<X#?4:"4+W%J%K%:XO1"4"	*NKMKNM&	&G	7(eP(	d&%G		F#7(eP(	NF%J	L*	**K
5&L&GW9?<X#CÅOQOÅ "4"	N*MJ&MK	&G	7 (eP(	d&%G		F#7(eP(	NG%&	\$&	*JS
5&L&GW9?<X#Q"4Å40Q/"4"	\$GM&\$M\$	&G	7 (eP(	d&%G		F#7(eP(	NG%\$	LN	*JK
5&L&GW9?<X#1"4"	*JNM&\$M&	&G	7(eP(	d&%G		F#7(eP(	NK%\$	LN	*JG
EP080/074: Total Petroleum Hydrocarbons (QCLot: 169974)									
5&S&\$#2F#M#2N#Å/Å;03+4	MMMM	*&	7(eP(	d*&		JF#7(eP(	*&F	F\$	*J\$
EP080/074: Total Petroleum Hydrocarbons (QCLot: 169980)									
5&S&\$#2F#M#2N#Å/Å;03+4	MMMM	*&	7(eP(	d*&		JF#7(eP(	**K	F\$	*J\$
EP080/074: Total Petroleum Hydrocarbons (QCLot: 170056)									
5&L*)#2*&#N#2'S#Å/Å;03+4	MMMM	G&	7(eP(	dG&		J&&#7(eP(	**&	L*	*K*
5&L*)#2*G#M#2J\$#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		JG&#7(eP(	**L	LS	*K\$
5&L*)#2JN#M#2KF#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		J&&#7(eP(	N\$%K	FS	*J\$
EP080/074: Total Petroleum Hydrocarbons (QCLot: 170060)									
5&L*)#2*&#N#2'S#Å/Å;03+4	MMMM	G&	7(eP(	dG&		J&&#7(eP(	*&*	L*	*K*
5&L*)#2*G#M#2J\$#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		JG&#7(eP(	**\$	LS	*K\$
5&L*)#2JN#M#2KF#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		J&&#7(eP(	*&S	FS	*J\$
EP080/074: Total Petroleum Hydrocarbons (QCLot: 170122)									
5&S&\$#2F#M#2N#Å/Å;03+4	MMMM	*&	7(eP(	d*&		JF#7(eP(	LF%&	F\$	*J\$
EP080/074: Total Petroleum Hydrocarbons (QCLot: 170144)									
5&L*)#2*&#N#2'S#Å/Å;03+4	MMMM	G&	7(eP(	dG&		J&&#7(eP(	*&G	L*	*K*
5&L*)#2*G#M#2J\$#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		JG&#7(eP(	**K	LS	*K\$
5&L*)#2JN#M#2KF#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		J&&#7(eP(	**J	FS	*J\$
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169974)									
5&S&\$#2F#M#2*&#Å/Å;03+4	2Fn2*&	*&	7(eP(	d*&		K*#7(eP(	*&S	F\$	*J\$
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169980)									
5&S&\$#2F#M#2*&#Å/Å;03+4	2Fn2*&	*&	7(eP(	d*&		K*#7(eP(	**S	F\$	*J\$
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170056)									
5&L*)#2*&#M#2'F#Å/Å;03+4	j2*&n2'F	G&	7(eP(	dG&		JG&#7(eP(	NN%J	L&	*K&
5&L*)#2'F#M#2K\$#Å/Å;03+4	MMMM	*&&	7(eP(	d*&&		KG&#7(eP(	**S	LS	*K\$



'Å(') *G#.#\$
B+/P#A/!')) 59"GJLJF*
2 3"40) DI=A=D#5C'?=AC<5C>D-#2AC9I->?Ca
'/Z":0) BD=C5=9#&@D[#5C<

Method: Compound				Laboratory Control Spike (LCS) Report					
				Method Blank (MB) Report		Spike Concentration	Spike Recovery (%)		Low
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170056) - continued									
5&L *)#2KS#N#2S&#Å:Å:03+4	MMMM	*&&	7 (eP(	d* &&	J&#7 (eP(	NF%F	FK	*K*	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170060)									
5&L *)#2* &#M#2*F#Å:Å:03+4		G&	7 (eP(	dG&	JG&#7 (eP(	N\$%G	L&	*K&	
5&L *)#2*F#M#2KS#Å:Å:03+4	MMMM	*&&	7 (eP(	d* &&	KG&#7 (eP(	**L	LS	*K\$	
5&L *)#2KS#M#2S&#Å:Å:03+4	MMMM	*&&	7 (eP(	d* &&	J&#7 (eP(	N\$%K	FK	*K*	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170122)									
5&\$& #2F#M#2* &#Å:Å:03+4		*&	7 (eP(	d* &	K*#7 (eP(	LK%K	F\$	*J\$	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170144)									
5&L *)#2* &#M#2*F#Å:Å:03+4		G&	7 (eP(	dG&	JG&#7 (eP(	***	L&	*K&	
5&L *)#2*F#M#2KS#Å:Å:03+4	MMMM	*&&	7 (eP(	d* &&	KG&#7 (eP(	**G	LS	*K\$	
5&L *)#2KS#N#2S&#Å:Å:03+4	MMMM	*&&	7 (eP(	d* &&	J&#7 (eP(	*&J	FK	*K*	
EP080: BTEXN (QCLot: 169974)									
5&\$& #@ "4b"4"	L*MSKMJ	&%J	7 (eP(	d&%J	*#7 (eP(	NF%S	FJ	**F	
5&\$& #50Q1 "4b"4"	*&MS*M\$	&%G	7 (eP(	d&%G	*#7 (eP(	N\$%N	G\$	**\$	
5&\$& #770ÅM#oOÅ/ÅME1 "4"	*&\$MK\$MK#	&%G	7 (eP(	d&%G	J#7 (eP(	NL%S	F&	*J&	
	*&FMSJMK								
5&\$& #CÅOQOQÅ "4"	N*MJ&MK	*	7 (eP(	d*	*#7 (eP(	*&J	FJ	*K\$	
5&\$& #+/OQ+ME1 "4"	NGMSLMF	&%G	7 (eP(	d&%G	*#7 (eP(	NN%J	F&	*J&	
5&\$& #>+ R"4"	*&\$M\$MK	&%G	7 (eP(	d&%G	*#7 (eP(	*&S	FJ	*J\$	
EP080: BTEXN (QCLot: 169980)									
5&\$& #@ "4b"4"	L*MSKMJ	&%J	7 (eP(	d&%J	*#7 (eP(	NN%&	FJ	**F	
5&\$& #50Q1 "4b"4"	*&MS*M\$	&%G	7 (eP(	d&%G	*#7 (eP(	*&N	G\$	**\$	
5&\$& #770ÅM#oOÅ/ÅME1 "4"	*&\$MK\$MK#	&%G	7 (eP(	d&%G	J#7 (eP(	*&\$	F&	*J&	
	*&FMSJMK								
5&\$& #CÅOQOQÅ "4"	N*MJ&MK	*	7 (eP(	d*	*#7 (eP(	NK%*	FJ	*K\$	
5&\$& #+/OQ+ME1 "4"	NGMSLMF	&%G	7 (eP(	d&%G	*#7 (eP(	**J	F&	*J&	
5&\$& #>+ R"4"	*&\$M\$MK	&%G	7 (eP(	d&%G	*#7 (eP(	*&\$	FJ	*J\$	
EP080: BTEXN (QCLot: 170122)									
5&\$& #@ "4b"4"	L*MSKMJ	&%J	7 (eP(	d&%J	*#7 (eP(	LN%*	FJ	**F	
5&\$& #50Q1 "4b"4"	*&MS*M\$	&%G	7 (eP(	d&%G	*#7 (eP(	FL%J	G\$	**\$	
5&\$& #770ÅM#oOÅ/ÅME1 "4"	*&\$MK\$MK#	&%G	7 (eP(	d&%G	J#7 (eP(	F\$%F	F&	*J&	
	*&FMSJMK								
5&\$& #CÅOQOQÅ "4"	N*MJ&MK	*	7 (eP(	d*	*#7 (eP(	LS%L	FJ	*K\$	
5&\$& #+/OQ+ME1 "4"	NGMSLMF	&%G	7 (eP(	d&%G	*#7 (eP(	FN%F	F&	*J&	
5&\$& #>+ R"4"	*&\$M\$MK	&%G	7 (eP(	d&%G	*#7 (eP(	\$S\$%N	FJ	*J\$	



'Å(") *F#.#\$
B+/P#A/!'/) 59"GJLJF*
2 3"40) DI=A=D#5C'?=AC<5C>D-#2AC9I->?Ca
'/Z"0) BD=C5=9#&@D]#5C<
9R.M<Å0/3_SOIL
>Q"#YRÅ.301#40/+ #0"7# <Å0/3_#03P"#W<9X#,"I/# 0+##4# 340/Å.Å.Å0+1/#10 30#Å70 "# IO3P".#130Q##/"O/"i"40Å036"#I"O# +.#0Å/(0#Å4Å 10"i"%#Q"#OR/O+/"# +.#Q03I#V2# OÅÅ7"0"/#3# 0+7# +430+4#0+0403Å #Å0/3_#,"0# +4#
Å4Å 10"#I"+6"/3"i"%#90Å03.#=-,+6"/1#-3730I#Å#O"/# Å.+/Å0-40#ÅÅRÅ 301#A.Z"-036"i"#V8VAIX%#":.Å.#I"+6"/1#Å4("i"#10Å0"##Å3#B".#34#0Q"#6"40#+. #Å7O "#7Å0/3_#340"/,"i"%#
9R.M<Å0/3_SOIL

Matrix Spike (MS) Report						
			Spike	SpikeRecovery(%)	Recovery Limits (%)	
Concentration	MS	Low	High			
CAS Number	Method: *Compound					
EG005T: Total Metals by ICP-AES (QCLot: 177506)						
59*GJLJF*M&&*	5C<*&#&%SM*%S<#	5a&&G>M<B)#D/I"43;	LSS&MK\$MJ	G&#7(eP(	NN%&	L&
		5a&&G>M<B)#2Ä:73R7	LSS&MSKMN	G&#7(eP(	NG%\$	L&
		5a&&G>M<B)#2Q/+73R7	LSS&MSLMK	G&#7(eP(	NS%J	L&
		5a&&G>M<B)#2+OO"/	LSS&MG&M\$	JG&#7(eP(	NS%K	L&
		5a&&G>M<B)#- "Ä:	LSKNMNJM*	JG&#7(eP(	NF%&	L&
		5a&&G>M<B)#C3:P"	LSS&M&JM&	G&#7(eP(	*&N	L&
		5a&&G>M<B)#m34;	LSS&MFFMF	JG&#7(eP(	*&K	L&
EG005T: Total Metals by ICP-AES (QCLot: 177508)						
59*GJLJF*M&J*	5C<L#K%GMS%G<#	5a&&G>M<B)#D/I"43;	LSS&MK\$MJ	G&#7(eP(	*&&	L&
		5a&&G>M<B)#2Ä:73R7	LSS&MSKMN	G&#7(eP(	NK%G	L&
		5a&&G>M<B)#2Q/+73R7	LSS&MSLMK	G&#7(eP(	*&*	L&
		5a&&G>M<B)#2+OO"/	LSS&MG&M\$	JG&#7(eP(	*&*	L&
		5a&&G>M<B)#- "Ä:	LSKNMNJM*	JG&#7(eP(	NS%N	L&
		5a&&G>M<B)#C3:P"	LSS&M&JM&	G&#7(eP(	*&F	L&
		5a&&G>M<B)#m34;	LSS&MFFMF	JG&#7(eP(	*&*	L&
EG005T: Total Metals by ICP-AES (QCLot: 177510)						
59*GJLJF*M&K*	5C<*&#J%GMK%G#	5a&&G>M<B)#D/I"43;	LSS&MK\$MJ	G&#7(eP(	\$F%&	L&
		5a&&G>M<B)#2Ä:73R7	LSS&MSKMN	G&#7(eP(	N*%*	L&
		5a&&G>M<B)#2Q/+73R7	LSS&MSLMK	G&#7(eP(	\$N%K	L&
		5a&&G>M<B)#2+OO"/	LSS&MG&M\$	JG&#7(eP(	NG%J	L&
		5a&&G>M<B)#- "Ä:	LSKNMNJM*	JG&#7(eP(	NJ%S	L&
		5a&&G>M<B)#C3:P"	LSS&M&JM&	G&#7(eP(	\$N%L	L&
		5a&&G>M<B)#m34;	LSS&MFFMF	JG&#7(eP(	\$N%N	L&
EG035T: Total Recoverable Mercury by FIMS (QCLot: 177507)						
59*GJLJF*M&&*	5C<*&#&%SM*%S<#	5a&KG>M<B)#<"/;R/1	LSKNMNLMF	G#7(eP(	\$J%N	L&
EG035T: Total Recoverable Mercury by FIMS (QCLot: 177509)						
59*GJLJF*M&J*	5C<L#K%GMS%G<#	5a&KG>M<B)#<"/;R/1	LSKNMNLMF	G#7(eP(	*&J	L&
EG035T: Total Recoverable Mercury by FIMS (QCLot: 177511)						
59*GJLJF*M&K*	5C<*&#J%GMK%G#	5a&KG>M<B)#<"/;R/1	LSKNMNLMF	G#7(eP(	NK%S	L&
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170055)						
59*GJLJF*M&&*	5C<*&#&%SM*%S<#	5&L&GW9?<X)#D;"4&OQ0Q"4"	\$KMKJMN	*&#7(eP(	NK%\$	L&
		5&L&GW9?<X)#/"1"/4"	*JNM&&M&	*&#7(eP(	NS%\$	L&
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170061)						
59*GJLJF*M&J*	5C<L#K%GMS%G<#	5&L&GW9?<X)#D;"4&OQ0Q"4"	\$KMKJMN	*&#7(eP(	*&G	L&
		5&L&GW9?<X)#/"1"/4"	*JNM&&M&	*&#7(eP(	**F	L&

-) *L #,\$\$
-) 59*GULJF*
-) DI=A=D#5C'?-A<5C<D#2AC9I->?Ca
-) BD=C5=9#@DI#5C<

9R.M<Ä0/3 SOIL

9R.M<Ã0/3_ SOIL									
Laboratory sample ID		Client sample ID	Method: *Compound	CAS Number	Spike		Matrix Spike (MS) Report		
					Concentration	MS	Recovery Limits (%)	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 170145)									
5B*G***M&&*	D4+417+RI#				\$KMKJMN	*&#7(eP(	NK%K	L&	*K&
					*JNM&&M&	*&#7(eP(	N%N	L&	*K&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169974)									
59*GJLJF*M&&*	5C<*&%SM*%S<#		5&\$&#2F#M#2N#Ã/Ã:03+4	MMMM	KJ%G#7(eP(	**G		L&	*K&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169980)									
59*GJLJF*M&J*	5C<L#K%GMS%G<#		5&\$&#2F#M#2N#Ã/Ã:03+4	MMMM	KJ%G#7(eP(	**L		L&	*K&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170056)									
59*GJLJF*M&&*	5C<*&%SM*%S<#				MMMM	GJK#7(eP(	N\$%S	LK	*KL
					MMMM	JK*N#7(eP(	*G	GK	*K*
			5&L*)#2JN#M#2KF#Ã/Ã:03+4	MMMM	*L*S#7(eP(	*JG		GJ	*KJ
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170060)									
59*GJLJF*M&J*	5C<L#K%GMS%G<#				MMMM	GJK#7(eP(	NG%L	LK	*KL
					MMMM	JK*N#7(eP(	*&	GK	*K*
			5&L*)#2JN#M#2KF#Ã/Ã:03+4	MMMM	*L*S#7(eP(	*JJ		GJ	*KJ
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170122)									
59*GJLJF*M&S*	5C<*K#*MJ<#		5&\$&#2F#M#2N#Ã/Ã:03+4	MMMM	KJ%G#7(eP(	*&J		L&	*K&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170144)									
5B*G***M&&*	D4+417+RI#				MMMM	GJK#7(eP(	*&K	LK	*KL
					MMMM	JK*N#7(eP(	*&J	GK	*K*
			5&L*)#2JN#M#2KF#Ã/Ã:03+4	MMMM	*L*S#7(eP(	*JL		GJ	*KJ
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169974)									
59*GJLJF*M&&*	5C<*&%SM*%S<#		5&\$&#2F#M#2*&#Ã/Ã:03+4	2Fn2*&	KL%G#7(eP(	**&		L&	*K&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169980)									
59*GJLJF*M&J*	5C<L#K%GMS%G<#		5&\$&#2F#M#2*&#Ã/Ã:03+4	2Fn2*&	KL%G#7(eP(	**S		L&	*K&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170056)									
59*GJLJF*M&&*	5C<*&%SM*%S<#				j2*&n2*F	\$F&#7(eP(	NL%*	LK	*KL
					MMMM	KJK#7(eP(	*J&	GK	*K*
			5&L*)#2KS#M#2S&#Ã/Ã:03+4	MMMM	*G\$#7(eP(	**F		GJ	*KJ
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170060)									
59*GJLJF*M&J*	5C<L#K%GMS%G<#				j2*&n2*F	\$F&#7(eP(	NG%S	LK	*KL
					MMMM	KJK#7(eP(	**\$	GK	*K*
			5&L*)#2KS#M#2S&#Ã/Ã:03+4	MMMM	*G\$#7(eP(	**F		GJ	*KJ
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170122)									
59*GJLJF*M&S*	5C<*K#*MJ<#		5&\$&#2F#M#2*&#Ã/Ã:03+4	2Fn2*&	KL%G#7(eP(	*&*		L&	*K&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170144)									



'Ä(') *\$#-#\$\$
B+/P#A!"/) 59"GJLJF*
2 3"40) DI=A=D#5C'?=AC<5C>D-#2AC9I!->?Ca
'/Z"0) BD=C5=9#@D[#5C<

			Matrix Spike (MS) Report				
Laboratory sample ID	Client sample ID	Method: *Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170144) - continued							
5B*G***&M&&*	D4+417+R#	5&L*)#2*F#M#2*F#Ä/Ä:03+4	j2*F&n2*F	\$F&#7(eP(	N*%N	LK	*KL
		5&L*)#2*F#M#2KS#Ä/Ä:03+4	MMMM	KJK#7(eP(	*J&	GK	*K*
		5&L*)#2KS#M#2S&#Ä/Ä:03+4	MMMM	*G&#7(eP(	N\$%J	GJ	*KJ
EP080: BTEXN (QCLot: 169974)							
59*GJLJF*M&&*	5C<*#&%SM**S<#	5&\$&)#@ "4b"4"	L*MSKMJ	J%G#7(eP(	\$S%\$	L&	*K&
		5&\$&)#50Q1 "4b"4"	*&MS*MS	J%G#7(eP(	N&%K	L&	*K&
		5&\$&)#7"0ÄM#oOÄ/ÄME1 "4"	*&\$MK\$MK# *&FMSJMK	J%G#7(eP(	\$L%F	L&	*K&
		5&\$&)#CÄOQ0QÄ "4"	N*MJ&MK	J%G#7(eP(	\$K%N	L&	*K&
		5&\$&)#+/0Q+ME1 "4"	NGMSLMF	J%G#7(eP(	N*%J	L&	*K&
5&\$&)#>+ R"4"	*&\$M\$SMK	J%G#7(eP(	\$K%\$	L&	*K&		
EP080: BTEXN (QCLot: 169980)							
59*GJLJF*M&J*	5C<L#K%GMS%G<#	5&\$&)#@ "4b"4"	L*MSKMJ	J%G#7(eP(	\$L%*	L&	*K&
		5&\$&)#50Q1 "4b"4"	*&MS*MS	J%G#7(eP(	NG%N	L&	*K&
		5&\$&)#7"0ÄM#oOÄ/ÄME1 "4"	*&\$MK\$MK# *&FMSJMK	J%G#7(eP(	**J	L&	*K&
		5&\$&)#CÄOQ0QÄ "4"	N*MJ&MK	J%G#7(eP(	\$J%*	L&	*K&
		5&\$&)#+/0Q+ME1 "4"	NGMSLMF	J%G#7(eP(	N\$%S	L&	*K&
5&\$&)#>+ R"4"	*&\$M\$SMK	J%G#7(eP(	*&F	L&	*K&		
EP080: BTEXN (QCLot: 170122)							
59*GJLJF*M&S*	5C<*K#*MJ<#	5&\$&)#@ "4b"4"	L*MSKMJ	J%G#7(eP(	\$N%N	L&	*K&
		5&\$&)#50Q1 "4b"4"	*&MS*MS	J%G#7(eP(	NN%*	L&	*K&
		5&\$&)#7"0ÄM#oOÄ/ÄME1 "4"	*&\$MK\$MK# *&FMSJMK	J%G#7(eP(	NN%*	L&	*K&
		5&\$&)#CÄOQ0QÄ "4"	N*MJ&MK	J%G#7(eP(	\$N%K	L&	*K&
		5&\$&)#+/0Q+ME1 "4"	NGMSLMF	J%G#7(eP(	*&*	L&	*K&
5&\$&)#>+ R"4"	*&\$M\$SMK	J%G#7(eP(	NK%&	L&	*K&		



QA/QC Compliance Assessment for DQO Reporting

Work Order	: ES1527261	"#\$!	%&()'*&
/01!2-	%AURORA ENVIRONMENTAL CONSULTING	+#{Ä#-(Ä.	%3241Ä(25!2-#0'6!4!7!1(2'8.92!.
/!2-#:-	%<Ä=;'><?@A	Ä!0!BC(2!	%DE&FGFHH"*HJJJ
"Ä(K!:-	%@L<A3<8>LM'3A;	6#-!8#5B0!7<!;!1!4!9	%NOFP 0FGO&J
81-J	%@L<A3<8>LM'3A;	=77 !6#-!	%&NFL \$FGO&J
8#5B0!Ä	%Ä=;'><?@A	A(Q()!7#5B0!7Ä!;!1!4!9	%**
?Ä9!Ä'2 5,Ä	%FFF	A(Q()!7#5B0!7#2#0.7!9	%**

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

>Ä!1!)5!-C(9!7 55#Ä!17#29Ä!)Ä!2:!!7#Ä!#!#07!(BÄ(4!9!9!-(!#771 7-!2'-Ä#!#!#;101-Q

Summary of Outliers

Outliers : Quality Control Samples

ÄC!7!Ä!B(Ä-C!\$C0!\$C-7(!-0!Ä!7!0#\$\$9!12-C!R #0!-!/(!Ä!7!0<!B(Ä-Q

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.



"#S!
@('ÄU'²Ä9iÄ
/0112-
"Ä(KI:-
%G()' &
%38&JGIGE&
%LV<?<L'3AW=<?A;3AÄL+'17A8V+Ä=AX
%@<L<A3<8>LM'3A;

Outliers : Analysis Holding Time Compliance

#-Ä1Y SOIL

Method		%&')\$*Ä+ +-(/ '\$*Ä		Days		ÄÄ '##\$#		Days overdue
Container / 0112-'8#5B0I'=6S7T		0 ' +.&') : 1		02 +3*(+.&')\$*Ä		0 ' + Ä '##. 1		
EA002 : pH (Soils)								
Soil Glass Jar - Unpreserved								
3A;N'OF&Z		3A;N'GQOFNQJZ		FFFF		FFFF		2
3A;N''QJFEQOZ		3A;E'OF&QO;Z				ONFL \$FGO&J		
3A;E'GFN;Z		3A;E'NQJF*QJZ						
3A;EJFE;Z		3A;I'OF&Z						
3A;I'GFN;Z		3A;I'NQJF*QJ;Z						
3A;I'JFE;Z		3A;H'OF&Z						
3A;H'8FG;Z		3A;H'GFN;Z						
3A;I'OF&Z		3A;I'FG;Z						
3A;I'GFN;Z		3A;I'GFN;Z						
3A;O'8FG;Z		3A;O'OF&Z						
3A;O'8FG;Z		3A;O'GQJFNQJZ						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
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3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
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3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
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3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z		3A;O'8FG;Z						
3A;O'8FG;Z								

Analysis Holding Time Compliance

AC17'ÄB(Ä- 7 55Ä117' 1Y-Ä#:-1(2' 1' BÄB#Ä#-1(2#29' #2#0.717'-617' #29' :(5B#Ä17' 1#-C' ^1-C' L+8' Ä1:(5512919' Q0912\$-1517' SÄ)Ä:12\$' V83'L' 8@' H*EZ' L' _LZ' L8' #29' A3";T' ,#719' (2' -C' 7#5B0I' :(2 #12Ä' BÄ(41919Q'6#-17'ÄB(Ä-19'ÄBÄ1712-1)Ä7-9#-1()1Y-Ä#:-1(2(Ä2#0.717'#29'ÄÄ 27Q'L'017-2\$(Y'Ä#-C17'S1)#2.T'17BÄ(41919C1Ä12Q
_ (0912\$-151')Ä' 0#-C#-1' 51-C(97' SQQ Ä+"T' 4#Ä' #:::(Ä912\$- '('-C)' #2#0.-17' ÄB(Ä-19Q" L77177512-: (5B#Ä17' -C' 0#-C' 9#-1' ^1-C' -C' 7C(Ä-17-#2#0.-1' C(0912\$-151')Ä' -C' 1' 14#012- 7(1051- C(9Q'ÄC17' #Ä1%:(Ä\$#21:7 &*9#.775Ä;Ä'GH'9#.7'a(-C1Ä51-#07'&HO'9#.7Q"L'Ä1:(Ä919' Ä#-C'9(172(\$ #Ä#2-11#',Ä#-C)(Ä#00'2(2F4(0#-101'B#Ä51-1 Ä7Q
_ (0912\$-1517')Ä' VOC in soils' 4#Ä' #:::(Ä912\$- '(#2#0.-17' () 12-Ä17-Q' W2.0/C0(Ä191' #29' 8-Ä121' Q0912\$-151' 7' 1' 9#7b' (-C1Ä7' &*9#7 Q' L' Ä1:(Ä919' Ä#-C' 9(17' 2(-' \$ #Ä#2-11' #, Ä#-C')Ä' #00W71' #2#0.-17' #29' 7C(091'141Ä1)119'12-'#71-C1'ÄB(Ä-19'Ä#-C'17'#71#071'B(71- 141'ÄW12/C0(Ä191'#298-Ä121'#Ä1'2(-U1.#2#0.-17')12-1Ä 17-1(2:Ä2Q

#-Ä1Y SOIL

Method		Sample Date		%&()'S*Ä+ + / ('S*Ä		ÄÄ '##\$#	
Container / 51\$ Ä+6 711+809#:				Date extracted		Date analysed	
				02 + 3'(+ &()'')\$*Ä		02 + 3'(+ Ä '##\$#	
				%4 12 '\$Ä		%4 12 '\$Ä	
				34#0 #1(2%*c_ (0912\$-151'Ä#-C'b' ✓'c@1-C12C(0912\$-151Q'			



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#:Ä1Y SOIL 34#0 # 1(2%*c_ (0912\$-15I'Ä#:#C'b' ✓c@1-C12C(0912\$-15IQ'

Method		Sample Date	%&'('\$*Ä+, +-(/ '\$*Ä		ÄÄ I#\$#				
Container / 5(S,Ä+6 7/I, +809#:			Date extracted	02 +3*(+,&'('\$*Ä	%4 I2 '\$*Ä	Date analysed	02 +3*(+ Ä I#\$#	%4 I2 '\$*Ä	
EA010: Conductivity									
Soil Glass Jar - Unpreserved (EA010)			29-Jul-2015	31-Jul-2015	OJFL \$FGO&J	✓	03-Aug-2015	GHFL\$FGO&J	✓
3A;N'GOQFNQJZ									
3A;E'OF&QO;Z									
3A;E'NQJF*QJZ									
3A;E'JFE;Z									
3A;I'GFN;Z									
3A;I'JFE;Z									
3A;H'8FG;Z									
3A;I'OF&Z									
3A;I'GFN;Z									
3A;O'OF&Z									
3A;O'GOJFNQJZ									
3A;E'OF&Z									
3A;O'NQJF*QJZ									
3A;E'JFE;Z									
3A;G'8FG;Z									
3A;N'OF&Z									
3A;N'GFN;									
Soil Glass Jar - Unpreserved (EA010)			30-Jul-2015	31-Jul-2015	OEFL\$FGO&J	✓	03-Aug-2015	GHFL\$FGO&J	✓
3A;E'QO*F&Q*;Z									
3A;G'QO*F&Q*Z									
3A;G'NQJF*QJZ									
3A;E'GOQFNQOZ									
3A;J'QO*F&Q*Z									
3A;J'NQJF*QJ									
EA029-D: Calcium Values									
Snap Lock Bag - frozen (EA029)			29-Jul-2015	11-Aug-2015	GHFP 0FGO&E	✓	11-Aug-2015	OJFA(4FGO&J	✓
3A;H'8FG;Z									
Snap Lock Bag - frozen (EA029)			30-Jul-2015	11-Aug-2015	GJFP 0FGO&E	✓	11-Aug-2015	OJFA(4FGO&J	✓
3A;E'QO*F&Q*;									



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#A1Y SOIL

Method		Sample Date	%&(')\$*Ä+,+-(/ (')\$*Ä				
Container / 5(S.\$Ä+6 7(/!+809#:		Date extracted	02.+3*(+.&(')\$*Ä	%/ 2 \$*Ä	Date analysed	02.+3*(+ Ä /#\$#\$	%/ 2 \$*Ä
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)			29-Jul-2015	----	FFFF	FFFF	03-Aug-2015
3A;'N'OF&Z			3A;'&&'NQJF*QJZ 3A;'&&'GFN;Z 3A;'&G'OF&Z 3A;'&G'GFN;Z 3A;'&N'&FG;Z R8&Z		FFFF	&GFL\$FGO&J	✓
3A;'N''QJFEQOZ							
3A;'E'GFN;Z							
3A;'E'NQJF*QJZ							
3A;'E'JFE;Z							
3A;'I'GFN;Z							
3A;'I'JFE;Z							
3A;'H'&FG;Z							
3A;'I'OF&Z							
3A;'I'GFN;Z							
3A;'O'OF&Z							
3A;'O'GFNQJZ							
3A;'&&'OF&Z							
3A;'&'NQJF*QJZ							
3A;'&&'JFE;Z							
3A;'&G&FG;Z							
3A;'N'OF&Z							
3A;'N'GFN;Z							
R8G							
Soil Glass Jar - Unpreserved (EA055-103)			30-Jul-2015	----	FFFF	&NFL\$FGO&J	✓
3A;'&'QO*F&Q*;Z			3A;'&'GQOFNQO;Z 3A;'G'QO*F&Q*Z 3A;'GNQJF*QJZ 3A;'*GQOFNQOZ 3A;'J'OQ*F&Q*Z 3A;'J'NQJF*QJ		FFFF	&NFL\$FGO&J	
3A;'G'QO*F&Q*Z							
3A;'GNQJF*QJZ							
3A;'*GQOFNQOZ							
3A;'J'OQ*F&Q*Z							
3A;'J'NQJF*QJ							

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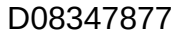
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34#0 # 1(2%*c_ (0912\$-15l'Ä#;C'b' ✓'c@1-C12C(0912\$-15lQ'

Method		Sample Date		%&'('S*Ä+ + (/ ('S*Ä		Date analysed		ÄÄ '##\$#	
Container / 5(S\$Ä+6 7/l.+809#:		Date extracted		02.+3'(+.&'('S*Ä		%4 l2 'S*Ä		02.+3'(+.&'('S*Ä	
EA155: Foreign Material - Type III									
Snap Lock Bag (EA155)		29-Jul-2015		----		FFFF		13-Aug-2015	
3A;.&'GQOFNQO;Z								GJFP#2FGO&E	
3A;.&'OO*F&Q*Z									
3A;.&'NQJF*QJZ									
3A;.&'NQJF*QJZ									
3A;.&'NQJF*QJZ									
3A;.&'NQJF*QJZ									
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#-Å1Y SOIL

Method						
Container / 5(S, Å +6 7/I, +809#:						
Sample Date	%&')\$*Å+ ,+/(/ '\$*Å		Å Å !'#\$%#			
	Date extracted	02.+3*(+. &(')\$*\$Å	%4 !2 '\$*Å	Date analysed	02.+3*(+ Å !'#\$%#	%4 !2 '\$*Å
EG005T: Total Metals by ICP-AES						
Soil Glass Jar - Unpreserved (EG005T-MW)						
3A;N"QJFEQOZ 3A;E'GFN;Z 3A;E'JFE;Z 3A;I'GFN;Z 3A;I'JFE;Z 3A;H'&FG;Z 3A;I'TOF&;Z 3A;I'GFN;Z 3A;&O'&FG;	29-Jul-2015	08-Aug-2015	GJFP#2F GO&E	✓	11-Aug-2015	GJFP#2F GO&E
Soil Glass Jar - Unpreserved (EG005T-MW)						
3A;&O'GQJFNQJZ 3A;&&'OF&;Z 3A;&&'NQJF*QJZ 3A;&'G'OF&;Z 3A;&'G'GFN;Z 3A;&'N'FG;Z	29-Jul-2015	10-Aug-2015	GJFP#2F GO&E	✓	12-Aug-2015	GJFP#2F GO&E
Soil Glass Jar - Unpreserved (EG005T-MW)						
3A;&'OO'*F&*;Z 3A;'GOQ'*F&*Z 3A;'GNQJF*QJZ 3A;*'GOOFNQOZ 3A;'JOQ'*F&*Z 3A;'NQJF*QJ	30-Jul-2015	08-Aug-2015	GEFP#2F GO&E	✓	11-Aug-2015	GEFP#2F GO&E



34#0 # 1/2%":' (0912\$-15!Ä#C'Ä'c@1-C12C0912\$-15!Q

Method						
Container / 5(L, 5L, 6 L, 7L, 809#:		Sample Date	%&'()'S*Ä+, +-(/ ('S*Ä		ÄÄ /"#\$%#	
			Date extracted	02, +3*(+, &'()'S*Ä	%4 /2 \$*Ä	Date analysed
EG035T: Total Recoverable Mercury by FIMS						
Soil Glass Jar - Unpreserved (EG035T-MW)						
3A;N'GQOFNQJZ		29-Jul-2015	08-Aug-2015	GJFP#2FGO&E	✓	11-Aug-2015
3A;E'OF&QO;Z						GJFP#2FGO&E
3A;E'GNF;Z						
3A;E'NQJF*QJZ						
3A;E'JFE;Z						
3A;I'GNF;Z						
3A;I'JFE;Z						
3A;H'OF&Z						
3A;H'FG;Z						
3A;I'OF&Z						
3A;I'GFN;Z						
3A;O'OF&Z						
Soil Glass Jar - Unpreserved (EG035T-MW)						
3A;O'GQJFNQJZ		29-Jul-2015	10-Aug-2015	GJFP#2FGO&E	✓	12-Aug-2015
3A;E'OF&Z						GJFP#2FGO&E
3A;E'NQJF*QJZ						
3A;E'G'OF&Z						
3A;G'GFN;Z						
3A;N'GFN;Z						
Soil Glass Jar - Unpreserved (EG035T-MW)						
3A;E'GQOFNQO;Z		30-Jul-2015	08-Aug-2015	GEFP#2FGO&E	✓	11-Aug-2015
3A;G'GOQFNQOZ						GEFP#2FGO&E
3A;*OQ*F&QOZ						
3A;*GQOFNQOZ						
3A;J'OQ*F&Q*Z						
3A;J'NQJF*QJ						



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#Å1Y SOIL
34#0 #1(2% c' (0912\$-15! Å#C b' ✓c@1-C12C0912\$-15!Q

Method		Sample Date	%&(')\$*Ä+,+(-/(/'\$*Ä				ÄÄ'#\$#\$		
Container / 5(\$.\$Ä+6 7(/!+809#:			Date extracted	02.+3*(+.&(')\$*Ä	%4 /2 \$*Ä	Date analysed	02.+3*(+ Ä'#\$#\$	%4 /2 \$*Ä	
EP080/071: Total Petroleum Hydrocarbons									
Soil Glass Jar - Unpreserved (EP071)			29-Jul-2015	03-Aug-2015	&GFL\$FGO&J	✓	04-Aug-2015	&GF8BFGO&J	✓
3A;.&N'GFN;Z			29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓	05-Aug-2015	O[F8]BFGO&J	✓
R8&Z									
3A;I'JFE;Z									
3A;H'FG&Z									
3A;I'OF&Z									
3A;I'GFN;Z									
3A;.&O'OF&Z									
3A;.&ONQJF*QJZ									
3A;.&O'GF&Z			29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓	10-Aug-2015	O[F8]BFGO&J	✓
3A;.&&'GFN;Z									
3A;.&&'JFE;Z									
3A;.&G'FG&Z									
3A;.&G'GFN;Z									
3A;.&N'OF&;									
3A;N'GQOFNQJZ									
3A;E'OF&QO;Z									
3A;ENQJF*QJZ			29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓	10-Aug-2015	O[F8]BFGO&J	✓
3A;E'JFE;Z									
3A;I'GFN;									
3A;J'GFN;									
Soil Glass Jar - Unpreserved (EP071)			30-Jul-2015	31-Jul-2015	&NFL\$FGO&J	✓	10-Aug-2015	O[F8]BFGO&J	✓
3A;.&'GQO'F&Q*Z			30-Jul-2015	31-Jul-2015	&NFL\$FGO&J	✓	10-Aug-2015	O[F8]BFGO&J	✓
3A;G'GQOFNQOZ									
3A;.*'OQ*F&QOZ									
3A;.*'NQJF*QJZ									
3A;J'GQOFNQOZ									
3A;J'NQJF*QJ									

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#:Ä1Y SOIL 34#0 #_1(2%*c_ (0912\$-15!;Ä#;C'b' ✓'c@1-C12C(0912\$-15!Q'

Method		Sample Date	%&'('\$*Ä+,+/(/ '\$*Ä			ÄÄ !"#S#		
Container / 5(\$.Ä*+6 7/(!.+809#:			Date extracted	02.+3'(+.&'('\$*Ä	%4 12 '\$*Ä	Date analysed	02.+3'(+.&'('\$*Ä	%4 12 '\$*Ä
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))		29-Jul-2015	03-Aug-2015	&GFL\$FGO&J	✓	04-Aug-2015	&GF8BFGO&J	✓
Soil Glass Jar - Unpreserved (EP075(SIM))		29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓	05-Aug-2015	O[F8!BFGO&J	✓
3A;.&N'GFN;								
3A;!JFE;Z								
3A;H'FG;Z								
3A;!OF&Z								
3A;!GFN;Z								
3A;.&O'OF&Z								
3A;.&O'GQJFNQJZ								
3A;.&&'GFN;Z								
3A;.&&'JFE;Z								
3A;.&G'OF&Z								
3A;.&G'GFN;Z								
Soil Glass Jar - Unpreserved (EP075(SIM))		29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓	10-Aug-2015	O[F8!BFGO&J	✓
3A;N'GQOFNQJZ								
3A;N'OF&Z								
3A;N''QJFEQOZ								
3A;E'GFN;Z								
3A;E'JFE;Z								
3A;!OF&Z								
3A;!GFN;								
Soil Glass Jar - Unpreserved (EP075(SIM))		30-Jul-2015	31-Jul-2015	&NFL\$FGO&J	✓	10-Aug-2015	O[F8!BFGO&J	✓
3A;.&'GQOFNQOZ								
3A;.&'OQ*F&Q*Z								
3A;G'GQOFNQOZ								
3A;G'GOQF&Q*Z								
3A;GNQJF*QJZ								
3A;*GQOFNQOZ								
3A;*NQJF*QJZ								
3A;J'GQOFNQOZ								
3A;J'OQ*F&Q*Z								
3A;J'NQJF*QJ								

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#:\u00c41\u00c4 SOIL 34#0 #_1(2%*'c_ (0912\$'-15t'\u00c4#\u00c4C'b' \u2713'c@\u00c41-C12C(0912\$'-15tIQ'

Method		Sample Date	Date extracted		%&')\$*Ä+ +-(/ '\$*Ä	%&')\$*Ä	Date analysed	ÄÄ '\$*#	
Container / 5l\$Ä+6 7l/ +809#:					02.+3'(+.&')\$*Ä			02.+3'(+ Ä '\$*#	%&')\$*Ä
EP080: BTEXN									
Soil Glass Jar - Unpreserved (EP080)		29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓		03-Aug-2015	&GFL\$FGO&J	✓
3A;.&N'GFN;Z									
Soil Glass Jar - Unpreserved (EP080)		29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓		05-Aug-2015	&GFL\$FGO&J	✓
3A;N'OF&Z									
3A;N''QJFEQOZ									
3A;E'GFN;Z									
3A;E'JFE;Z									
3A;I'GFN;Z									
3A;I'JFE;Z									
3A;H'&FG;Z									
3A;I'OF&Z									
3A;I'GFN;Z									
3A;O'&FG;Z									
3A;.&'OF&Z									
3A;.&'NQJF*QJZ									
3A;.&.&'JFE;Z									
3A;.&G'&FG;Z									
3A;.&'OF&Z									
3A;.&.&'NQJF*QJZ									
Soil Glass Jar - Unpreserved (EP080)		30-Jul-2015	31-Jul-2015	&NFL\$FGO&J	✓		05-Aug-2015	&NFL\$FGO&J	✓
3A;.&'OQ*F&Q*Z									
3A;G'OQ*F&Q*Z									
3A;G'NQJF*QJZ									
3A;.''GQOFNQOZ									
3A;J'OQ*F&Q*Z									
3A;J'NQJF*QJ									
EP080/071: Total Petroleum Hydrocarbons									
Soil Glass Jar - Unpreserved (EP080)		29-Jul-2015	31-Jul-2015	&GFL\$FGO&J	✓		03-Aug-2015	&GFL\$FGO&J	✓
R8&Z									
R8G									

Quality Control Parameter Frequency Compliance

#-Å1Y SOIL

R #01-./(2-Ä0#5B0!ÄBI	?	@?1	:5	5*2Ä!	<.!+9>:	Expected	%4.12 \$*Ä
ÄÄ!"\$) !+?.@*!#							:2 !\$^m+.5*(?!+6./)\$S\$) \$*\$Ä
+.#,(Ä#-(Ä`6 B01 #.l7S6V"TT							
30!:-Ä!:#0!/(29 :~14!-.`S&%JT			G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
(;17- Ä!)/(2-!2-		3LOJF&ON	G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
"L_]"C!2(07'S8=;T		3'O!JS8=;T	G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
B_`S&%JT		3LOOG	G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
8 7B!271(2""Ä(NY19!?'Y19#-1(2F(5,12!9!L:~19!-.'#29'		3LOG[	&	J		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
8 OBC#1							
Ä(#0!:'Ä. `Ä.`d=8'S;1.Ä(Ä#4!61\$!7-1(2T		3XONÄF:@	G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä(#0!:'Ä07`,`='L38'S;1.Ä(Ä#4!61\$!7-1(2T		3XOOÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_F'8!5!4(0#-10!dÄ#:-1(2		3'O!l&	G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_W(0#-10!7!>Ä3e		3'OHO	G	Ⓖ		10.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
+.#,(Ä#-(Ä`/2-Ä08#5B0!7'S+/8T							
30!:-Ä!:#0!/(29 :~14!-.`S&%JT		3LO&O	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
"L_]"C!2(07'S8=;T		3'O!JS8=;T	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
8 7B!271(2""Ä(NY19!?'Y19#-1(2F(5,12!9!L:~19!-.'#29'		3LOG[	&	J		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
8 OBC#1							
Ä(#0!:'Ä. `Ä.`d=8'S;1.Ä(Ä#4!61\$!7-1(2T		3XONÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä(#0!:'Ä07`,`='L38'S;1.Ä(Ä#4!61\$!7-1(2T		3XOOÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_F'8!5!4(0#-10!dÄ#:-1(2		3'O!l&	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_W(0#-10!7!>Ä3e		3'OHO	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
-!-C!(9>0#2U7'S;>T							
30!:-Ä!:#0!/(29 :~14!-.`S&%JT		3LO&O	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
"L_]"C!2(07'S8=;T		3'O!JS8=;T	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
8 7B!271(2""Ä(NY19!?'Y19#-1(2F(5,12!9!L:~19!-.'#29'		3LOG[	&	J		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
8 OBC#1							
Ä(#0!:'Ä. `Ä.`d=8'S;1.Ä(Ä#4!61\$!7-1(2T		3XONÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä(#0!:'Ä07`,`='L38'S;1.Ä(Ä#4!61\$!7-1(2T		3XOOÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_F'8!5!4(0#-10!dÄ#:-1(2		3'O!l&	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_W(0#-10!7!>Ä3e		3'OHO	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
#-Ä!Y'B1U!7'S;8T							
"L_]"C!2(07'S8=;T		3'O!JS8=;T	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä(#0!:'Ä. `Ä.`d=8'S;1.Ä(Ä#4!61\$!7-1(2T		3XONÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä(#0!:'Ä07`,`='L38'S;1.Ä(Ä#4!61\$!7-1(2T		3XOOÄF:@	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_F'8!5!4(0#-10!dÄ#:-1(2		3'O!l&	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-
Ä<_W(0#-10!7!>Ä3e		3'OHO	&	Ⓖ		5.00	A3";GO&N"8:C19 0!>SNT#29'L+8'R/8N'Ä!` 1ÄI5!2-



"#\$!
@('ÄU'²Ä9IÄ
0/112-
"Ä(KI:-
%&N()&*
%38&JGIG&
%LV<?<L'3AW=<?A;3AÄL+'17A8V+Ä=AX
%@L<A3<8>LM'3A;

Brief Method Summaries

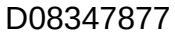
ÄCI#2#0-1.#0BÄ(19 Ä17' 719'-'C1'3241Ä(2512-#0614171(2'C# 41'11291410(B19)Ä(517'-#017C1912-Ä2#-1(2#00'Ä(1\$2119B Ä(19 Ä177' C#7'-C(71B 017C19'-'C1'V83"LZL" _LZL8#29A 3":Q=2'C(71' 91410(B19BÄ(19 Ä17"Ä1"15B0(1912-C1# 712:'(1'9(512-19' 7-#29#Ä97'(Ä'-'0112-Ä1' 17-QÄC1)00(Ä12SÄ1B(Ä-BÄ(41917'Ä11)917'Ä1B-1(27')-C1#2#0-1.#0BÄ(19 Ä17'5B0(19)XÄ17 0-7Ä1B(Ä-19'12-C1' /Ä-1)1:#1')L2#0.7117Q8(Ä:17)Ä(5°C1.CL+8'51-C(97'C#41'! 1291410(B19#Ä1BÄ(41919¹1-C12-C1';C(9617'Ä1B-1(27Q

ÄÄ'1"\$) +? : @*1#	? : @*1	? (\$&	? (\$&	? : @*1+0.#)(\$*\$Ä#
B_ 'S&%JT	3LOOG	8?+=		=2'C(71%<1)Ä12:19'-(L" _L" JOO_DQ"B_ '1791Ä51219(27'10' 7#5B017#)-Ä#&%J7(10)¹#-ÄÄ01#-CQÄC17' 51-C(917';(5B01#2-¹1-C'A3";SGO&NT8:C19 0!>SNT'S;1-C(9&ONT
301:-Ä1.#0/(29 :-141-'S&%JT	3LO&O	8?+=		=2'C(71%<1)Ä12:19'-(L" _L'GJ&OQ"/(29 :-141-'1791-Ä51219' (2'7(10'7#5B017' 712\$#&%J7(10)¹#-ÄÄ01#-CQ' ÄC17'51-C(9'17';(5B01#2-¹1-C'A3";SGO&NT8:C19 0!>SNT'S;1-C(9 &O* T
8 7B1271(2""Ä(Y191' ?Y19#-1(2F(5,1219'L:191-.'#29' 8 0BC#-1	3LOG[	8?+=		=2'C(71%<1)Ä12:19'-(L'CIÄ2'L-#0'GOO*F#7 7B1271(2B1Ä(Y19 1'(Y19#-1(2'51-C(9')00(¹12\$-C1'7 0) Ä-Ä#10f'.' 91-Ä51212\$-C1'01410')&;g/+1Y-Ä#:#,0!7 0) Ä#29-C1'7 0) Ä01410#)-Ä(Y19#-1(2')7(10'7 0BC1917Q"ÄC1' ##:191-.'Ä#10f'17')00(¹19'.'51#7 Ä1512-'(JÄLLZ'Ä"L'#29'A8LQ "+1512\$-#-1'17' #719(2'Ä17 0-7)(Ä'7#5B017'7' 7, 51--19#2912:(ÄB(Ä#-17#51215 57#)1-.'#)-(Ä')&QJQ
;(17- Ä1)/(2-12-	3LOJUF&ON	8?+=		=2FC(71Q"L\$Ä#4151-Ä1:BÄ(19 Ä1' #719(2'¹1\$C-0(77'(41Ä# &GC(Ä9Ä.12\$B1Ä119#-&ONF&OJ91\$Ä17/Q" ÄC17'51-C(9'17';(5B01#2-¹1-C'A3";SGO&NT8:C19 0!>SNT'81:-1(2'IQ& #29'Ä#;0!&'S&*9#.'C(0912\$'-151TQ
d(Ä1'1\$2;#-Ä1#0/(2-12-	3L&JJ	8?+=		d(Ä1'1\$2;#-Ä1#0/(2-12-'S<ÄLÄG1ET
Ä(#0'1;#07'.'='L38'S:1.Ä(¹#41' 61\$17-1(2T	3XOOJÄF:@	8?+=		=2'C(71%<1)Ä12:19'-(V83"L'8@H'E'F'NOJ&'S:1.Ä(¹#Ä1'61\$17-1(2 Tb"L" _L'N&GObV83"L'8@H'E'F'EO&OQ" :1-#07'127(0197'Ä1'91-Ä51219')00(¹12\$#51.Ä(¹#Ä1'91\$17-1(2 QÄC1'='L'38'-1:C21' 1'1(2117'7101:-19 101512-7Q'=(27'Ä1'B#771912-(#C1\$C'4# 55#77'7B1:-Ä(51-ÄZ "C1:C'71B#Ä#-17'-C1#2#0-1-17' #719(2'-C11Ä' 917-12:-5#77')C#Ä\$1'Ä#-1(7BÄ1(Ä-'51#7 Ä1512-' #917'Ä1- 19'2(91'1(2911-1(ÄQÄC17'51-C(917';(5B01#2-¹1-C'A3";SGO&NT8:C19 0!>SNT
Ä(#0':Ä. Ä.'d=:8'S:1.Ä(¹#41' 61\$17-1(2T	3XONJÄF:@	8?+=		=2'C(71%<1)Ä12:19'-(V83"L'8@H'E'F'NOJ&'S:1.Ä(¹#Ä1'61\$17-1(2 Tb'L8'NUJJOZL" _L'N&G'_\$F> Sd0('F12KI:-1(2'S8210GTS(09'W#B(Ä'\$121Ä#-1(2'TLL8T'd=:FLL&#2# -(5#-19')0#510177#-(51-'#;7(ÄB-1(2 -1:C21' IQ':Ä. Ä'127(0197'Ä1'91-Ä51219')00(¹12\$#51.Ä(¹# Ä191\$17-1(2Q'=(21:5Ä. Ä.17Ä19 :19(20121'-(#-(51:'5Ä: Ä'4#B(Ä.'8210G'C1:C'17-C12B Ä\$1912-(#C1# 19' ÄÄ-1'100Q'R #2-1)1 #1(2'17'.'(5B#Ä12\$' #.7(Ä.#2:1#\$#127-#.#01,Ä#-1(2: Ä1QÄC17'51-C(917';(5B01#2-¹1-C'A3";SGO&NT8:C19 0!>SNT
Ä<_ 'F81514(0#-10'dÄ#:-1(2	3°OI&	8?+=		SV83"L'8@H'E'F'HO&JLT'8#5B01'Y-Ä#:-7#Ä1'#2#0.719'.'#B100# Ä.'XJjd=6#29' #2-1)119#\$#127-#0U#21' 7-#29#Ä97(41Ä-C'1'Ä#2\$1'&O'F'/'OQ
"L_"C12(07'S8=:T	3°OJJ 9B=: T	8?+=		SV83"L'8@H'E'F'HGIO>T'3Y-Ä#:-7#Ä1'#2#0.719'.'#B100#Ä.'XJj:8 '128101:-141'=(2':91'S8=:T'#29' ' #2-1)1 #1(2'17'.'(5B#Ä17(2#\$#127-#2'17 #.017C191JB(12-'#01,Ä#-1(2: Ä1QÄC17'51-C(917';(5B01#2-¹1-C' A3";SGO&NT8:C19 0!>SNT'S;1-C(9JOG'#29'JOIT
Ä<_ 'W(0#-1017]>Ä3e	3°OHO	8?+=		SV83"L'8@H'E'F'HGEO>T'3Y-Ä#:-7#Ä1'#2#0.719'.' #Ä1'#2#0.719'.' " Ä\$1'#29'ÄÄ#BZ'#B100#Ä.'XJj:8Q'R #2-1)1 #1(2'17'.' :.(5B#Ä17(2#\$#127-#2'17 #.017C19'JB(12-'#01,Ä#-1(2: Ä1Q
-/(' \$Ä+? : @*1#	? : @*1	? (\$&	? (\$&	? : @*1+0.#)(\$*\$Ä#
6Ä.12\$#-'HJ'91\$Ä17Z' #5\$12\$#29' 0#10012\$S'L88T	3AOGO<	8?+=		=2'C(71
1-C#2(01:3Y-Ä#:-1(2')8(107')Ä" Ä\$1' #29'ÄÄ#B	h ?<x&E	8?+=		SV83"L'8@H'E'F'JONOLTJ\$')7(0191'177C#U12¹1-C'7 ÄÄ(\$#-'1#28O5+51-C#2(0BÄ1(Ä-'(2#2#0.717'.' " Ä\$1' #29'ÄÄ#B'F'XJj:8Q
Ä 5,0Ä3Y-Ä#:-1(2')8(0197	?<x&I	8?+=		=2FC(71Z':1C#21.#0#\$1-#1(2'S- 5,0ÄTQ&O\$')7#5B01Z'A#G8#297' ÄÄ(\$#-1#Ä1'Y-Ä#:-19¹1-C'NO5+&'& 6;JL:1-(2'.'129(41Ä'129- 5,01Q'ÄC1'7(0412-17'91:#2-19Z9 1C.9Ä#-19#29':(2:12-Ä#-19'S.'g6T'-(1-C1' 9171Ä194(0 51')Ä#2#0.717Q

"#S!
@ÄU"Ä9/Ä
/0112-
"Ä(KI:-

%&*()'&*
%38&JGIGE&
%LV<?<L'3AWI=<?A;3AÄL+'?A8V+Ä=AX
 %@L<A3<8>LM'3A;





General Comments

D::A5DIIINAY.&AIDZJ-A-3734(A#%A39A<Z\$2%A4,A#O'#A#0M)3(QJA.'939A'98\$734(A\$9%A'+A+34%A{#3<\$2Z\$2A2Z&AAXI939A(A\$9+A'<#A'+AAFA'A2Z'A'+#A4*4LQ'9A'6666A4;AO'7J



&(%
B*#PAA#:#%#
123%4/
&#V%<I
) JÄ+Ä,
) 5ÄFIMJNÄD7%4;7%4/ÄÄ
) DH>A>DÄ5Ca?>AC=5C"D-Ä1AC:H-"?C^
) BD>C5>Ä@DWÄ5C=

Analytical Results

		/Ä&##+"/01/Ä+23 (=//#3d: SOIL)		ENM1 0.4-1.4M	ENM8 1-2M	ENM12 2-3M	ENM10 2.5-3.5	ENM13 1-2M
		/Ä&##+"/01/Ä! +""#&+4+##Ä0& ,/Ä+9.0;& ; 678 5/Ä#		hÄRLD\$(LI/ÄFi ES1528392-001 >%9\$Z/	hÄRLD\$(LI/ÄFi ES1528392-024 >%9\$Z/	hÄRLD\$(LI/ÄFi ES1528392-039 >%9\$Z/	hÄRLD\$(LI/ÄFi ES1528392-040 >%9\$Z/	hÄRLD\$(LI/ÄFi ES1528392-041 >%9\$Z/
EA029-A: pH Measurements								
pH KCl (23A)		LLLL !Ä	ObÄH43/	5.6	4.7	4.5	4.5	4.4
pH OX (23B)		LLLL !Ä	ObÄH43/	4.7	4.1	4.1	4.0	3.7
EA029-B: Acidity Trail								
Titratable Actual Acidity (23F)		LLLL I	7*2%ÄbTÄÄ/	10	22	33	64	50
Titratable Peroxide Acidity (23G)		LLLL I	7*2%ÄbTÄÄ/	10	45	50	91	68
Titratable Sulfidic Acidity (23H)		LLLL I	7*2%ÄbTÄÄ/	cl	23	16	27	19
sulfidic - Titratable Actual Acidity (s-23F)		LLLL !II	jÄO0#3%Ä:	cl !!!	0.036	0.053	0.103	0.080
sulfidic - Titratable Peroxide Acidity (s-23G)		LLLL !II	jÄO0#3%Ä:	cl !!!	0.072	0.080	0.146	0.110
sulfidic - Titratable Sulfidic Acidity (s-23H)		LLLL !II	jÄO0#3%Ä:	cl !!!	0.036	0.026	0.043	0.030
EA029-C: Sulfur Trail								
KCl Extractable Sulfur (23Ce)		LLLL !II	jÄ:	cl !!!	cl !!!	cl !!!	cl !!!	cl !!!
Peroxide Sulfur (23De)		LLLL !II	jÄ:	0.020	cl !!!	cl !!!	0.020	0.023
Peroxide Oxidisable Sulfur (23E)		LLLL !II	jÄ:	0.020	cl !!!	cl !!!	0.020	0.023
acidity - Peroxide Oxidisable Sulfur (a-23E)		LLLL Ä!	7*2%ÄbTÄÄ/	13	cÄ!	cÄ!	12	14
EA029-D: Calcium Values								
KCl Extractable Calcium (23Vh)		LLLL !II	jÄ1'	0.191	cl !!!	cl !!!	cl !!!	cl !!!
Peroxide Calcium (23Wh)		LLLL !II	jÄ1'	0.192	cl !!!	cl !!!	cl !!!	cl !!!
Acid Reacted Calcium (23X)		LLLL !II	jÄ1'	cl !!!	cl !!!	cl !!!	cl !!!	cl !!!
acidity - Acid Reacted Calcium (a-23X)		LLLL Ä!	7*2%ÄbTÄÄ/	cÄ!	cÄ!	cÄ!	cÄ!	cÄ!
sulfidic - Acid Reacted Calcium (s-23X)		LLLL !II	jÄ:	cl !!!	cl !!!	cl !!!	cl !!!	cl !!!
EA029-E: Magnesium Values								
KCl Extractable Magnesium (23Sm)		LLLL !II	jÄ=(	0.036	0.039	cl !!!	0.032	0.033
Peroxide Magnesium (23Tm)		LLLL !II	jÄ=(	0.039	0.039	cl !!!	0.032	0.034
Acid Reacted Magnesium (23U)		LLLL !II	jÄ=(	cl !!!	cl !!!	cl !!!	cl !!!	cl !!!
Acidity - Acid Reacted Magnesium (a-23U)		LLLL Ä!	7*2%ÄbTÄÄ/	cÄ!	cÄ!	cÄ!	cÄ!	cÄ!
sulfidic - Acid Reacted Magnesium (s-23U)		LLLL !II	jÄ:	cl !!!	cl !!!	cl !!!	cl !!!	cl !!!
EA029-G: Retained Acidity								
HCl Extractable Sulfur (20Be)		LLLL !II	jÄ:	----	----	----	----	cl !!!
Net Acid Soluble Sulfur (20Je)		LLLL !II	jÄ:	----	----	----	----	cl !!!
acidity - Net Acid Soluble Sulfur (a-20J)		LLLL Ä!	7*2%ÄbTÄÄ/	----	----	----	----	cÄ!
sulfidic - Net Acid Soluble Sulfur (s-20J)		LLLL !II	jÄO0#3%Ä:	----	----	----	----	cl !!!



&(!%
B*#PAA#:%#
123%4/
&#V%</
) RÅ+Ä,
) 5:ÄFIMJNÄD7%4;7%4/ÄÄ
) DH>A>DÄ5Ca?>AC=5C"D-Ä1AC:H-"?C^
) BD>C5>:Ä@DWÄ5C=

Analytical Results

:\$.L='#3d : SOIL (='#3d: SOIL)		,Ä&#+"01/&+23		ENM1 0.4-1.4M		ENM8 1-2M		ENM12 2-3M		ENM10 2.5-3.5		ENM13 1-2M	
		,Ä&#+"01/Ä! +**#&+4+#Ä0&		hÄRLD\$(LI)ÄFi		hÄRLD\$(LI)ÄFi		hÄRLD\$(LI)ÄFi		hINL\$2LI)ÄFi		hINL\$2LI)ÄFi	
,\$01\$.!*		,(Ä+9.0;& ; 678 5/Ä#		ES1528392-001		ES1528392-024		ES1528392-039		ES1528392-040		ES1528392-041	
				>%9\$2/		>%9\$2/		>%9\$2/		>%9\$2/		>%9\$2/	
EA029-H: Acid Base Accounting													
ANC Fineness Factor		LLL	! F	L	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)		LLL	! !	jÄ:	0.04	0.04	0.04	0.05	0.05	0.12	0.12	0.10	0.10
Net Acidity (acidity units)		LLL	Ä!	7*2%ÄbTÄ:Ä/	23	22	22	33	33	77	77	64	64
Liming Rate		LLL	Ä	P(Ä11ÄJ'/'	2	2	2	2	2	6	6	5	5



& (%
B*#PAA#:#%#
123%/4/
&#*V%</
) FÅ+Ä,
) 5:ÄFIMJNJIÄD7%4;7%4/ÄÄ
) DH>A>DÄ5Ca?>AC=5C"D-Ä1AC:H-"?C^
) BD>C5>:Ä@DWÄ5C=

Analytical Results

\$.L=/'#3d : SOIL (=/'#3d: SOIL)									
,/Ä&#+"01/Ä/ +*"#&+4+Ä0&				ENM13 2-3M					
,/Ä&#+"01/Ä/ +*"#&+4+Ä0&		,/Ä&#+"01/Ä/ +*"#&+4+Ä0&		hINL\$2LIÄFI		LLLL		LLLL	
,/Ä&#+"01/Ä/ +*"#&+4+Ä0&		,/Ä&#+"01/Ä/ +*"#&+4+Ä0&		ES1528392-042		>%9\$2/		>%9\$2/	
EA029-A: pH Measurements									
pH KCl (23A)		LLLL	! Ä	ObÄH43/	4.5				
pH OX (23B)		LLLL	! Ä	ObÄH43/	4.2				
EA029-B: Acidity Trail									
Titratable Actual Acidity (23F)		LLLL	!	7*2%ÄbTÄ`Ä/	34				
Titratable Peroxide Acidity (23G)		LLLL	!	7*2%ÄbTÄ`Ä/	50				
Titratable Sulfidic Acidity (23H)		LLLL	!	7*2%ÄbTÄ`Ä/	15				
sulfidic - Titratable Actual Acidity (s-23F)		LLLL	! II	jÄO0#3/%Ä:	0.055				
sulfidic - Titratable Peroxide Acidity (s-23G)		LLLL	! II	jÄO0#3/%Ä:	0.080				
sulfidic - Titratable Sulfidic Acidity (s-23H)		LLLL	! II	jÄO0#3/%Ä:	0.024				
EA029-C: Sulfur Trail									
KCl Extractable Sulfur (23Ce)		LLLL	! II	jÄ:	cl III				
Peroxide Sulfur (23De)		LLLL	! II	jÄ:	cl III				
Peroxide Oxidisable Sulfur (23E)		LLLL	! II	jÄ:	cl III				
acidity - Peroxide Oxidisable Sulfur (a-23E)		LLLL	Ä!	7*2%ÄbTÄ`Ä/	cÄ!				
EA029-D: Calcium Values									
KCl Extractable Calcium (23Vh)		LLLL	! II	jÄ1'	cl III				
Peroxide Calcium (23Wh)		LLLL	! II	jÄ1'	cl III				
Acid Reacted Calcium (23X)		LLLL	! II	jÄ1'	cl III				
acidity - Acid Reacted Calcium (a-23X)		LLLL	Ä!	7*2%ÄbTÄ`Ä/	cÄ!				
sulfidic - Acid Reacted Calcium (s-23X)		LLLL	! II	jÄ:	cl III				
EA029-E: Magnesium Values									
KCl Extractable Magnesium (23Sm)		LLLL	! II	jÄ=(	0.024				
Peroxide Magnesium (23Tm)		LLLL	! II	jÄ=(	0.027				
Acid Reacted Magnesium (23U)		LLLL	! II	jÄ=(	cl III				
Acidity - Acid Reacted Magnesium (a-23U)		LLLL	Ä!	7*2%ÄbTÄ`Ä/	cÄ!				
sulfidic - Acid Reacted Magnesium (s-23U)		LLLL	! II	jÄ:	cl III				
EA029-G: Retained Acidity									
HCl Extractable Sulfur (20Be)		LLLL	! II	jÄ:					
Net Acid Soluble Sulfur (20Je)		LLLL	! II	jÄ:					
acidity - Net Acid Soluble Sulfur (a-20J)		LLLL	Ä!	7*2%ÄbTÄ`Ä/					
sulfidic - Net Acid Soluble Sulfur (s-20J)		LLLL	! II	jÄO0#3/%Ä:					



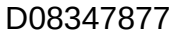
\$.L='#3d : SOIL (='#3d: SOIL)	,\$&#+"01/&+23	ENM13 2-3M	#####	#####	#####
,\$&#+"01/&+23	,\$&#+"01/&+23	hINL\$2LIÄFi	LLLL	LLLL	LLLL
,\$01\$;!*	,\$(A+9.0;& 678 5/Ä#	ES1528392-042	#####	#####	#####
		>=%9\$2/	>=%9\$2/	>=%9\$2/	>=%9\$2/

EA029-H: Acid Base Accounting									
ANC Fineness Factor		LLLL	! F	L	1.5				
Net Acidity (sulfur units)		LLLL	! !	jÄ:	0.06				
Net Acidity (acidity units)		LLLL	Ä!	7*2%ÄbTÄ`Ä/	34				
Liming Rate		LLLL	Ä	P(Ä!1AJ`/	2				

D08347877



RIGHT SOLUTIONS | RIGHT PARTNER



General Comments

D08347877



Å+

C-(Q#B(<("

4 5"62

*(-Z"=2

, L.#

, 7.\$HKNL0K#E9"6<9"62#\$

, EJB?E#7Db@?BD>7D'E0#4BD;J0@Dc

, CE?D7?#AE#7D>

Laboratory Duplicate (DUP) Report

'R"# Y)Å 523#-62(-# 2"(9# 0Å1-(Å2-(3#-)P 5=Å2"# (" "l# 2# Å# (Å6<-9 3# l" "2="<# 562(Å Å1-(Å2-(3#P 52%Å1-(Å2-(3#<)P 5=Å2-"#R-85<"# 56.-(9Å25-6#H+"+Å(<56+#9"2R-<# P("=5l5-6#Å6<# Å9P"# R"2"(-+"6" 523%Å"# P"(9522"<#(Å6+"# -(-# 2R"#? " Å258"#("=62# :85Å25-6#W7":X#-# 0Å1-(Å2-(3#-)P 5=Å2"# Å"# lP"=5.5"<#6E0# ">"2R-<# VC@M7DaLÅ6<#ÅÅ(" # <"P"6<"62#-6# R"#9Å+652)<"#-# ("l) 2# 56#-9PÅ(5l-6# 2# 2R"#8" # -# ("P-(256+# ?") 2# e# \$&#59"#0B? # # D-#05952+"#?) 2#l "2l"6#\$&Å6<#K&#259"#0B? #M#&#M#H&#1#M#K&#259"#0B? &#M#K&#% ;)1M>Å2(5: SOIL

Laboratory sample ID				Client sample ID		Method:Compound		Laboratory Duplicate (DUP) Report			
Laboratory sample ID	Client sample ID			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
EA029-A: pH Measurements (QC Lot: 184507)											
7,\$HKNLOKM&&\$		7D>\$#&%SM\$%S>#	7E&KO_#P#h4_#WKLEX	MMMM_&%\$	&%\$	Pd#J652	H%G	H%G	&%&&	&#M#H&K&i	
			7E&KO_#P#BF#WKLAX	MMMM_&%\$	&%\$	Pd#J652	S%/	S%/	&%&&	&#M#H&K&i	
EA029-A: pH Measurements (QC Lot: 199379)											
7A\$HK/H&GM&&\$		E6-639-)#	7E&KO_#P#h4_#WKLEX	MMMM_&%\$	&%\$	Pd#J652	/ %\$	/ %K	\$%S&	&#M#H&K&i	
			7E&KO_#P#BF#WKLAX	MMMM_&%\$	&%\$	Pd#J652	/ %N	/ %N	&%&&	&#M#H&K&i	
EA029-B: Acidity Trail (QC Lot: 184507)											
7,\$HKNLOKM&&\$		7D>\$#&%SM\$%S>#	7E&KO_#l).5<5=#M#52(Å2Å1_#E=2)Å_#E=5<523#WIMKLÅX	MMMM_&%&K	&%&K&	i#P3(52"#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#l).5<5=#M#52(Å2Å1_#""(-_5<"#E=5<523#WIMKLcX	MMMM_&%&K	&%&K&	i#P3(52"#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#l).5<5=#M#52(Å2Å1_#;).5<5=#E=5<523#WIMKLdX	MMMM_&%&K	&%&K&	i#P3(52"#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#52(Å2Å1_#E=2)Å_#E=5<523#WKLÅX	MMMM_K	\$&	9-_"#dU#a#2	\$&	\$&	&%&&	D-#05952	
			7E&KO_#52(Å2Å1_#""(-_5<"#E=5<523#WKLcX	MMMM_K	\$&	9-_"#dU#a#2	\$&	\$&	&%&&	D-#05952	
			7E&KO_#52(Å2Å1_#;).5<5=#E=5<523#WKLdX	MMMM_K	eK	9-_"#dU#a#2	eK	eK	&%&&	D-#05952	
EA029-B: Acidity Trail (QC Lot: 199379)											
7A\$HK/H&GM&&\$		E6-639-)#	7E&KO_#l).5<5=#M#52(Å2Å1_#E=2)Å_#E=5<523#WIMKLÅX	MMMM_&%&K	&%&K&	i#P3(52"#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#l).5<5=#M#52(Å2Å1_#""(-_5<"#E=5<523#WIMKLcX	MMMM_&%&K	&%&K&	i#P3(52"#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#l).5<5=#M#52(Å2Å1_#;).5<5=#E=5<523#WIMKLdX	MMMM_&%&K	&%&K&	i#P3(52"#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#52(Å2Å1_#E=2)Å_#E=5<523#WKLÅX	MMMM_K	eK	9-_"#dU#a#2	eK	eK	&%&&	D-#05952	
			7E&KO_#52(Å2Å1_#""(-_5<"#E=5<523#WKLcX	MMMM_K	eK	9-_"#dU#a#2	eK	eK	&%&&	D-#05952	
			7E&KO_#52(Å2Å1_#;).5<5=#E=5<523#WKLdX	MMMM_K	eK	9-_"#dU#a#2	eK	eK	&%&&	D-#05952	
EA029-C: Sulfur Trail (QC Lot: 184507)											
7,\$HKNLOKM&&\$		7D>\$#&%SM\$%S>#	7E&KO_#h4_#7_2(Å=2Å1_#;).(#WKL4"X	MMMM_&%&K	&%&K&	i#;	e&%&K&	e&%&K&	&%&&	D-#05952	
			7E&KO_#""(-_5<"#B_5<5iÅ1_#;).(#WKL7X	MMMM_&%&K	&%&K&	i#;	&%&K&	&%&K&	&%&&	D-#05952	
			7E&KO_#""(-_5<"#;).(#WKL:"X	MMMM_&%&K	&%&K&	i#;	&%&K&	&%&K&	&%&&	D-#05952	
			7E&KO_#Å=5<523#M#""(-_5<"#B_5<5iÅ1_#;).(#WÅMKL7X	MMMM_\$&	\$L	9-_"#dU#a#2	\$L	\$L	&%&&	D-#05952	
EA029-C: Sulfur Trail (QC Lot: 199379)											
7A\$HK/H&GM&&\$		E6-639-)#	7E&KO_#h4_#7_2(Å=2Å1_#;).(#WKL4"X	MMMM_&%&K	&%&LN	i#;	&%&S&	&%&S&	G%\$L	D-#05952	
			7E&KO_#""(-_5<"#B_5<5iÅ1_#;).(#WKL7X	MMMM_&%&K	&%&KN	i#;	&%&KN	&%&KN	&%&&	D-#05952	
			7E&KO_#""(-_5<"#;).(#WKL:"X	MMMM_&%&K	&%&GG	i#;	&%&GO	&%&GO	S%\$G	D-#05952	
			7E&KO_#Å=5<523#M#""(-_5<"#B_5<5iÅ1_#;).(#WÅMKL7X	MMMM_\$&	\$/	9-_"#dU#a#2	\$N	\$N	&%&&	D-#05952	



Ä+
C-(Q#B(<(
4 5"62
*(~Z"=2
, S#.#
, 7,\$HKNL0K#E9"9<9"62#\$
, EJ?B?E#7Db@?BD>7D'E0#4BD;J0@Dc
, CE?D7?#AEI#7D>

Laboratory sample ID			Client sample ID		Method:-Compound			Laboratory Duplicate (DUP) Report																			
EA029-D: Calcium Values (QC Lot: 184507)			7D>-\$#&%SM\$%S>#		CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)																
7;\$HKNLOKM&&\$			7E&KO,#E=5<#?"Ä=2"<#4Ä =5)9#WKLFX	MMMM &%&K	MMMM &%&K	#4Ä	e&%&K&	e&%&K&		&%&&	D-#05952																
												7E&KO,#h4 #7_2(Ä=2Ä1 "44Ä =5)9#WKLbRX	#4Ä	&%\$O\$	&%\$O\$	&%&&	D-#05952										
												7E&KO,#*"(_5<"#44Ä =5)9#WKL CRX						#4Ä	&%\$OK	&%\$OK	&%&&	D-#05952					
												7E&KO,#!)5<5=#MM#E=5<#?"Ä=2"<#4Ä =5)9#WIMKLFX											i#;	e&%&K&	e&%&K&	&%&&	D-#05952
												7E&KO,#Ä=5<523#MM#E=5<#?"Ä=2"<#4Ä =5)9#WÄMKLFX															
EA029-D: Calcium Values (QC Lot: 199379)																											
7A\$HK/H&GM&&\$			7E&KO,#E=5<#?"Ä=2"<#4Ä =5)9#WKLFX	MMMM &%&K	#4Ä	&%\$S\$	&%\$O/	LL%L	D-#05952																		
										7E&KO,#h4 #7_2(Ä=2Ä1 "44Ä =5)9#WKLbRX	#4Ä	&%HH\$	&%HKL	H%KH	&#N#K&i												
										7E&KO,#*"(_5<"#44Ä =5)9#WKL CRX						#4Ä	&%GOK	&%K&	L%ON	&#N#K&i							
										7E&KO,#!)5<5=#MM#E=5<#?"Ä=2"<#4Ä =5)9#WIMKLFX											i#;	&%\$SL	&%\$HN	LL%L	D-#05952		
										7E&KO,#Ä=5<523#MM#E=5<#?"Ä=2"<#4Ä =5)9#WÄMKLFX																9- "HdU#ä#2	/ &
EA029-E: Magnesium Values (QC Lot: 184507)																											
7;\$HKNLOKM&&\$			7E&KO,#E=5<#?"Ä=2"<#>Ä+6"15)9#WKLJX	MMMM &%&K	#>+	e&%&K&	e&%&K&	&%&&	D-#05952																		
										7E&KO,#h4 #7_2(Ä=2Ä1 "44Ä =5)9#WKL'9X	#>+	&%&LG	&%&LG	&%&&	D-#05952												
										7E&KO,#*"(_5<"#>Ä+6"15)9#WKL'9X						#>+	&%&LO	&%&LO	&%&&	D-#05952							
										7E&KO,#!)5<5=#MM#E=5<#?"Ä=2"<#>Ä+6"15)9#WIMKLJX											i#;	e&%&K&	e&%&K&	&%&&	D-#05952		
										7E&KO,#E=5<523#MM#E=5<#?"Ä=2"<#>Ä+6"15)9#WÄMKLJX																9- "HdU#ä#2	e\$&
EA029-E: Magnesium Values (QC Lot: 199379)																											
7A\$HK/H&GM&&\$			7E&KO,#E=5<#?"Ä=2"<#>Ä+6"15)9#WKLJX	MMMM &%&K	#>+	&%&H	&%\$&G	LS%K	D-#05952																		
										7E&KO,#h4 #7_2(Ä=2Ä1 "44Ä =5)9#WKL'9X	#>+	&%L/ &	&%LHL	S%K	&#M#H&i												
										7E&KO,#*"(_5<"#>Ä+6"15)9#WKL'9X						#>+	&%SSH	&%SHO	L%&/	&#M#K&i							
										7E&KO,#!)5<5=#MM#E=5<#?"Ä=2"<#>Ä+6"15)9#WIMKLJX											i#;	&%&OO	&%\$S&	LS%K	D-#05952		
										7E&KO,#E=5<523#MM#E=5<#?"Ä=2"<#>Ä+6"15)9#WÄMKLJX																9- "HdU#ä#2	GK
EA029-H: Acid Base Accounting (QC Lot: 184507)																											
7;\$HKNLOKM&&\$			7E&KO,#ED4#Ä56"6"1I#ÄÄ=2-(	MMMM &%H	M	\$%H	\$%H	&%&&	D-#05952																		
										7E&KO,#D"2#E=5<523#W1))I#)652IX	i#;	&%&S	&%&S	&%&&	D-#05952												
										7E&KO,#05956+#?Ä2"						Q#4Ä4BLa2	K	K	&%&&	D-#05952							
										7E&KO,#D"2#E=5<523#WÄ=5<523#)652IX											9- "HdU#ä#2	KL	KL	&%&&	D-#05952		
EA029-H: Acid Base Accounting (QC Lot: 199379)																											
7A\$HK/H&GM&&\$			7E&KO,#ED4#Ä56"6"1I#ÄÄ=2-(	MMMM &%H	M	\$%H	\$%H	&%&&	D-#05952																		
										7E&KO,#D"2#E=5<523#W1))I#)652IX	i#;	e&%&K	e&%&K	&%&&	D-#05952												
										7E&KO,#05956+#?Ä2"						Q#4Ä4BLa2	e\$	e\$	&%&&	D-#05952							
										7E&KO,#D"2#E=5<523#WÄ=5<523#)652IX											9- "HdU#ä#2	e\$&	e\$&	&%&&	D-#05952		


```
*^A"
C(-Q#B(<("
4 5'62
E?B?E#7Db@?BD>7DE0#4BD;J0@Dc
CE2D7?#AE#7D>
I#. #
7,$HKNLOK#E9"6<9'62#$
E?B?E#7Db@?BD>7DE0#4BD;J0@Dc
CE2D7?#AE#7D>
```

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

[illegible]

;)1M>Ä2(5: SOIL

);1M> Å2(5_ SOIL

Method: Compound	CAS Number		LOR	Unit	Method Blank (MB) Report	Spike Concentration	Laboratory Control Spike (LCS) Report		
							Spike Recovery (%)	Low	High
EA029-A: pH Measurements (QCLot: 184507)									
7E&KO,#P d#H14 #WVKLEX	MMMM	&%\$		Pq#J652	e&%\$	S%O#Pq#J652	\$&&	/&	\$L&
7E&KO,#P d#Bf#wKlAX	MMMM	&%\$		Pq#J652	e&%\$	S%S#Pq#J652	O&%O	/&	\$L&
EA029-A: pH Measurements (QCLot: 199379)									
7E&KO,#P d#H14 #WVKLEX	MMMM	&%\$		Pq#J652	e&%\$	S%O#Pq#J652	ON%&	/&	\$L&
7E&KO,#P d#Bf#wKlAX	MMMM	&%\$		Pq#J652	e&%\$	S%S#Pq#J652	NN%G	/&	\$L&
EA029-B: Acidity Trail (QCLot: 184507)									
7E&KO,#1 .5<5=#M#52(Å2Å1 "#E=2)Å #E=5<523#WIMKLÅX	MMMM	&%&K		i#P3(52"#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#1 .5<5=#M#52(Å2Å1 "#*(- _ 5<"#E=5<523#WIMKLcX	MMMM	&%&K		i#P3(52"#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#1 .5<5=#M#52(Å2Å1 "#:	MMMM	&%&K		i#P3(52"#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#52(Å2Å1 "#E=2)Å #E=5<523#WKLÅX	MMNM	K		9 - "#dU#a#2	eK	\$S%LK#9- "#dU#a#2	\$&L	/&	\$L &
7E&KO,#52(Å2Å1 "#*(- 5<"#E=5<523#WKLcX	MMNM	K		9 - "#dU#a#2	eK	GN#9- "#dU#a#2	\$&/	/&	\$L &
7E&KO,#52(Å2Å1 "#:	MMNM	K		9 - "#dU#a#2	eK	MMMM	MMMM	MMMM	MMMM
EA029-B: Acidity Trail (QCLot: 199379)									
7E&KO,#1 .5<5=#M#52(Å2Å1 "#E=2)Å #E=5<523#WIMKLÅX	MMNM	&%&K		i#P3(52"#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#1 .5<5=#M#52(Å2Å1 "#*(- _ 5<"#E=5<523#WIMKLcX	MMNM	&%&K		i#P3(52"#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#1 .5<5=#M#52(Å2Å1 "#:	MMNM	&%&K		i#P3(52"#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#52(Å2Å1 "#E=2)Å #E=5<523#WKLÅX	MMNM	K		9 - "#dU#a#2	eK	\$S%LK#9- "#dU#a#2	\$&\$	/&	\$L &
7E&KO,#52(Å2Å1 "#*(- 5<"#E=5<523#WKLcX	MMNM	K		9 - "#dU#a#2	eK	GN#9- "#dU#a#2	\$&\$	/&	\$L &
7E&KO,#52(Å2Å1 "#:	MMNM	K		9 - "#dU#a#2	eK	MMMM	MMMM	MMMM	MMMM
EA029-C: Sulfur Trail (QCLot: 184507)									
7E&KO,#Å=5<523#M#"(_ 5<"#B_ 5<5IÅ1 "#:).(#WÅMKL7X	MMMM	\$&		9- "#dU#a#2	e&\$	MMMM	MMMM	MMMM	MMMM
7E&KO,#H4 #7_2(Å=2Å1 "#:).(#WKL4"X	MMMM	&%&K		#;	e&%&K&	&%&GO##;	OL%H	/&	\$L&
7E&KO,#*"(_ 5<"#B_ 5<5IÅ1 "#:).(#WKL7X	MMMM	&%&K		#;	e&%&K&	MMMM	MMMM	MMMM	MMMM
7E&KO,#*"(_ 5<"#:).(#WKL:"X	MMMM	&%&K		#;	e&%&K&	&%K&S##;	\$&L	/&	\$L &
EA029-C: Sulfur Trail (QCLot: 199379)									
7E&KO,#Å=5<523#M#"(_ 5<"#B_ 5<5IÅ1 "#:).(#WÅMKL7X	MMMM	\$&		9- "#dU#a#2	e&\$	MMMM	MMMM	MMMM	MMMM
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	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)				
EA029-D: Calcium Values (QCLot: 184507) - continued								
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7E&KO,#!).5<5=#M#E=5<#?"Å=2"<#4Å =5)9#WIMKL FX	MMMM	8%&K	i#;	e8%&K&	MMMM	MMMM	MMMM	MMMM
EA029-D: Calcium Values (QCLot: 199379)								
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EA029-H: Acid Base Accounting (QCLot: 184507)								
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- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.



QA/QC Compliance Assessment for DQO Reporting

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This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

>Ä11)5l-C(97 55#Ä117#29Ä1)Ä12:l7#Äl'#07(BÄ(41919-('771 7-'12'-Ä#:#,101-.Q

Summary of Outliers

Outliers : Quality Control Samples

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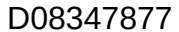
- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

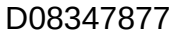
- NO Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

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EA029-F: Excess Acid Neutralising Capacity						
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Snap Lock Bag - frozen (EA029) 3A; &'O'GQJFNQJÄ 3A; &'N'GFN;	29-Jul-2015	02-Sep-2015	GHFP 0FGO&E	02-Sep-2015	O&F6I;FGO&J	✓



Quality Control Parameter Frequency Compliance

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SEE COMMENTS PAGE 107A

Laboratory
 AIDS Spiking
 277 Woodpark Rd
 Greenville, NC 27834
 Contact: Barbara Harce
 Phone: (919) 576-5555 Fax: (919) 576-5555

Jim@auragreen.com
Phone: 0420233779

if the pH falls (less than 4 or greater than 10) the rest of the ~~can~~ testing is to be put on hold.



Telephone +61-2-8784 8585



Environmental Site Assessment Report

BP Warners Bay Service Station
482 The Esplanade
Warners Bay NSW 2282



Produced For:

Yahav Property Investments

Date Issued
August 2015

Yahav Property Investments

Environmental Site Assessment Report

BP Warners Bay Service Station, 482 The Esplanade, Warners Bay NSW 2282

Environmental Site Assessment (ESA) Report

BP Warners Bay Service Station

482 The Esplanade

Warners Bay NSW 2282

Prepared for:

Yahav Property Investment

c/ PKF

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Prepared by:

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AUSTRALIA

Report Issued: August 2015



Fieldwork/Author: _____

Tim Brown

Director B.E. (Env)

Yahav Property Investments*Environmental Site Assessment Report**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay NSW 2282***TABLE OF CONTENTS**

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EXECUTIVE SUMMARY

Aurora Environmental Consulting Pty Ltd (Aurora) was commissioned by Yahav Property Investments to perform an environmental site assessment (ESA) to provide an updated contamination status report for due diligence purposes of the properties described as Lot 1 DP90877 and Lot 122 DP578045, currently in use as a BP branded service station located at 482 The Esplanade, Warners Bay, NSW.

The objective of this assessment was to assess the status of the site with respect to petroleum hydrocarbon contamination potentially associated with current and former operations at the site by drilling, testing, and reporting on the soil and groundwater quality at the site. The assessment targeted areas within the site which were most likely to represent areas of potential hydrocarbon impact based on historical site operations and management practices.

A secondary objective of the works was to install an additional groundwater monitoring well at the site, to provide more substantive coverage of the current underground petroleum storage system (UPSS), in order to delineate previously identified groundwater impacts within the site, and to facilitate more comprehensive compliance with the NSW EPA's Protection of the Environment (UPSS) Operations Regulation (2008).

The outcomes of the assessment were:

- The site is currently owned by Nine One One Convenience Pty Ltd and leased to Darton Warners Bay Pty Ltd who operate the site. The service station is located within a mixed residential and commercial setting in Warners Bay, on the north – eastern shores of Lake Macquarie. The service station site covers an area of approximately 2,200m², and slopes at a low gradient to the west.
- At the time of assessment, the site comprised an underground petroleum storage system (UPSS) including four underground storage tanks (USTs) with six storage compartments, five (5) fuel dispensing pumps and associated pipelines. The UPSS at the site was installed in 1996.
- There were no visible signs of vegetation stress within the site, or in areas located down gradient (north-west) of the site.
- The closest environmentally sensitive receptor to the site is Lake Macquarie, a large saltwater coastal lake, located 100m to the west of the site.
- During the assessment, seven (7) boreholes (SB1 to SB7) were drilled to depths of up to 4.5m BGL and one (1) additional monitoring well installed (to complement the six existing wells) in a location targeted to identify and/or define areas of potential soil and groundwater contamination associated with former service station operations.
- The geology encountered during drilling consisted of gravely sand fill extending from below the concrete slab to approximately 0.4m BGL, underlain by dark grey and black silty clay alluvium to varying depths of between approximately 1.0 m and 3.8m below ground level. This was underlain by

Yahav Property Investments

Environmental Site Assessment Report

BP Warners Bay Service Station, 482 The Esplanade, Warners Bay NSW 2282

orange brown silty clays grading to clayey sand residual soils of the Boolaroo Subgroup to the maximum depth of drilling at 4.5m.

- Groundwater below the site occurs as a semi confined aquifer within the silty clay and clayey sands between 1.5m and 2.2m BGL. The groundwater is flowing in a westerly direction towards Lake Macquarie with a slope of 1.89 degrees, or 0.033m/m.
- Petroleum hydrocarbon impacts to the soils were below the adopted site assessment criteria in all samples submitted for analysis with the exception of boreholes SB3 and SB7 at approximately 2.5m depth which exceeded the NEPM (2013) criteria for based on a residential land use setting for soil vapour intrusion. The criteria was not exceeded based on a commercial land use setting.
- Concentrations of petroleum hydrocarbon compounds in groundwater samples collected from monitoring wells MW1 to MW7 were below the adopted site assessment criteria, with the exception of the Naphthalene concentration in monitoring well MW4 which exceeded the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water.

In summary, the extent of petroleum hydrocarbon impacts to soil appears to be generally contained to within the operational areas of the site, extending towards the south western boundary of the site, in the vicinity of impacted soil bore SB7. Petroleum hydrocarbon impact beyond SB7 has not been delineated, however impact is unlikely to extend beyond the site boundary, based on a residential land-use exposure setting.

The extent of petroleum hydrocarbon impacts to groundwater appears isolated to the area around MW4 in the central portion of the site. Groundwater impact is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6, and to the south by MW7. As such, the risk of harm to any potential aquatic ecosystem with the site in its current state is considered low.

Overall, there was an absence of significant hydrocarbon impacts to soil and groundwater associated with the current and historical service station operations. The identified contamination appears to be securely immobilised within the site, under the building and car wash/ concreted areas, and is unlikely to be currently causing any offsite consequences to the community or environment.

Any potential re-development of the site would require these contaminated areas to be cleaned up, in conjunction with any subsequent excavation or redevelopment of the land. Such remediation works would likely be addressed through the planning and development consent process.

As such the environmental condition of the site is considered unlikely to present a risk of harm to current users of the site in its current state. Remediation works including the excavation of identified petroleum hydrocarbon impacted soils would be conducted during re-development to validate the site for alternative land uses. On the basis of the assessment, Aurora considers the assessment suitable for application as an assessment of current site conditions.

Yahav Property Investments*Environmental Site Assessment Report**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay NSW 2282*

1. INTRODUCTION

Aurora Environmental Consulting Pty Ltd (Aurora) was commissioned by Yahav Property Investments to perform an environmental site assessment (ESA) for due diligence purposes and to provide an updated contamination status report of the properties described as Lot 1 DP90877 and Lot 122 DP578045 currently in use as a BP branded service station located at 482 The Esplanade, Warners Bay, NSW.

1.1 Objectives

The objectives of the ESA were to:

- Assess the status of the site with respect to petroleum hydrocarbon associated contamination potentially associated with historical operations at the site.
- Define the vertical and lateral extent of petroleum hydrocarbon associated impact to the soil and groundwater;
- Identify any other potential sources of petroleum hydrocarbon impact on or in close proximity to the site;
- Assess whether any residual petroleum hydrocarbon impact to soil and groundwater would affect the suitability of the site for continued use as a retail service station facility, or permitted land use under the current zoning; and
- Provide more substantive groundwater monitoring well coverage of the current underground petroleum storage system (UPSS), to facilitate more comprehensive compliance with the NSW EPA's Protection of the Environment (UPSS) Operations Regulation (2008)

1.2 Scope of Work

The following tasks were performed during the ESA by Aurora personnel:

- A review of historical environmental reporting for the site, and an historical survey of the site to identify potential on- and off-site contamination sources;
- Collation of geological and hydrogeological information to identify potential receptors and assist with determining the likely fate and distribution of potential contaminants;
- Preparation of a scaled site map identifying key site features including underground services, storage tanks and other physical structures;
- Conduct a site inspection to validate historical information, identify potential contaminant sources and receptors not previously identified during the historical survey and identify safety issues needing consideration during field activities;

Yahav Property Investments*Environmental Site Assessment Report**BP Warners Bay Service Station, 482 The Esplanade, Warners Bay NSW 2282*

- Obtain the necessary works approvals from landowners / site operators prior to commencement of field activities;
- Develop and implement an appropriate investigation and sampling program in accordance with relevant NSW and Australian guidelines and supported by qualified professional judgement during the historical survey, site inspection and field activities;
- Developed and implemented a quality assurance / quality control program (QA/QC) program throughout all stages of the investigation;
- Establish groundwater flow direction based on a level survey and groundwater monitoring well gauging;
- Undertake screening analysis of soil and groundwater samples in the field using available field instrumentation;
- Analysis of selected soil and groundwater samples for a range of analytes typically associated with petroleum hydrocarbon products; and
- Derived conclusions based on field assessment relating to the source, nature and extent of petroleum hydrocarbon related impact at the site associated with former service station operations, and the suitability of the site for permitted ongoing use under the current zoning.

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2. BACKGROUND INFORMATION

2.1 Site Use

The site is located at 482 The Esplanade, Warners Bay, on the north eastern shores of Lake Macquarie. A site location map is provided as **Figure 1** in **Appendix A**. The site (Lot 1 DP90877 and Lot 122 DP578045) is currently zoned 3(1) Urban Centre in accordance with the Lake Macquarie City Council LEP (2014). The site is owned by Nine One One Convenience Pty Ltd, and operated by Darton Warners Bay Pty Ltd as a BP branded service station.

The site is used as a retail service station facility which stores and distributes petroleum products for retail consumption. The service station covers an area of approximately 2,200m². The entire site is surfaced with concrete, with the exception of some narrow garden beds around the perimeter of the property. Access to the site is from two driveways along King St, and one driveway on The Esplanade.

2.2 Physiography

The surface of the site is relatively flat, displaying a slight slope towards the west. Regionally, the surrounding topography also displays a moderate slope to the west. The elevation of the site is approximately 7mAHD.

The nearest sensitive environmental receptor is Warners Bay, located approximately 100m to the west of the site. Warners Bay forms part of Lake Macquarie, a large coastal saltwater lake.

2.3 Surrounding Land Use

The area surrounding the Site is generally residential / commercial property. The surrounding land use is summarised in **Table 1** below.

Table 1: Surrounding Land Use

Direction	Description
North	King St, then commercial property.
East	Residential property.
South	Residential property.
West	The Esplanade, then shoreline of Lake Macquarie

2.4 Regional Geology and Hydrogeology

Information from the 1:100,000 Newcastle Coalfield Geology Map, indicates that the site is intersected by the contact between the Quaternary alluvium of North Creek and the Boolaroo Subgroup. The alluvium does not

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extend across the whole site and the boundary between the Quaternary Alluvium and the Boolaroo Subgroup is to the south east between boreholes SB4 and SB7. The geological contact between the Quaternary Alluvium and underlying bedrock of the Boolaroo Subgroup was intersected from the surface to 3.8m below ground level (bgl) from east to west across the site. There appears to be a depression in the bedrock surface in the south eastern portion of the site. This is reflected in a thickening wedge of alluvial sediments in the south west of the site, from borehole SB3 to SB7.

A boresearch of the NSW Natural Resources Groundwater Interactive Map hosted by the NSW Office of Water was conducted with a search radius of 1 km around the site. There were no registered groundwater bores located within a 1km radius of the site. Groundwater below the site occurs within the Quaternary Alluvium and the residual sandstone of the Boolaroo Subgroup forming a semi confined aquifer overlain by silty clay alluvial sediments. Further information relating to the physical properties of the groundwater at the site is provided in **Section 4.3**.

2.5 Nearby Surface Waters and Site Drainage

Surface drainage from the site is predominantly collected in on-site and boundary stormwater drains, and discharged off-site via the stormwater drainage network below The Esplanade and King Street. Lake Macquarie is the closest environmentally sensitive surface water body to the site, located 75m to the west.

2.6 Previous Investigations

In addition to the recently completed Aurora Groundwater Monitoring Event (GME) Report (2015), the ERM (2003) ESA and ERM (2004) Remediation Works reports were sourced as the only previous environmental investigation reports for the site.

Environmental Site Assessment (ESA) for BP Warners Bay Service Station, The Esplanade, Warners Bay, NSW (October 2003)

Environmental Resources Management Australia Pty Limited (ERM) was commissioned by BP Australia Pty Ltd (BP) to conduct drilling and monitoring well installation, at the BP Warners Bay Service Station in 2003.

The objective of the assessment was to determine whether the current and/or historical use of the site for fuel retail purposes, had resulted in hydrocarbon or lead impact to the soils and/or groundwater at the site. In addition, the investigation was to determine the vertical and lateral extent of impact to the soils and/or seepage water, both on and downgradient of the site. In order to achieve the above objectives, the assessment was conducted in two stages. BP's intention was to divest the site in the later part of the year, with the site to continue operation as a service station facility.

The results of the assessment works defined the lateral and vertical extent of hydrocarbon impact to the soils and groundwater below the site, and indicated that impact above the site assessment criteria, downgradient of the main source area extended to the western boundary. Given that hydrocarbon impacted soils and

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groundwater above the site assessment criteria were detected at the site's western boundary, and not in any off site boreholes/monitoring wells, the extent of hydrocarbon impact to the soils and groundwater, was likely to be confined to within the boundaries of the site and possibly for a short distance below The Esplanade.

Hydrocarbon impacted soils above the site assessment criteria were generally confined to below concrete surfaced areas in the south western portion of the site. ERM therefore considered that the exposure risk to human health associated with the soil impact is likely to be minimal, with the site in its current configuration.

Remediation Works for BP Warners Bay Service Station, The Esplanade, Warners Bay, NSW (October 2004)

Environmental Resources Management Australia Pty Limited (ERM) was commissioned by BP Australia Pty Limited (BP) to conduct excavation and validation sampling at the BP Warners Bay service station, located at 482 The Esplanade, Warners Bay, NSW. The objective of the remediation works was to identify and excavate the hydrocarbon impacted soil for off-site disposal, including chasing out areas of impacted soils as close to the buildings as practical. The excavation targeted the areas in the south western portion of the site identified during the ERM (2003) ESA resulting from a historical line leak of zoom (premix) fuel below the site.

Approximately 450m³ of hydrocarbon impacted material was removed from the excavation and disposed off-site as Inert Waste. Approximately 416m³ of washed fill sand was imported to the site from Metromix Quarries in Teralba to reinstate the excavation. On the basis of the results for the remediation program, ERM considers that the majority of the hydrocarbon impacted soil identified in the ERM 2003 assessment has been excavated and disposed off-site to landfill. Some impact could not be removed due to the presence of buildings and underground services. However the residual soil impact was below the adopted site assessment criteria for an ongoing service station facility.

Analysis of groundwater samples showed two locations (on site) where concentrations exceeded assessment criteria. No exceedance of the adopted criteria was detected in any of the off-site monitor wells. On the basis of the assessment ERM considered that the site was suitable for continued use as a service station facility and that the site did not represent a significant risk of harm to human health and the environment.

Groundwater Monitoring Event (GME) Report for BP Warners Bay Service Station (May 2015)

Aurora Environmental Consulting Pty Ltd (Aurora) was commissioned by Mr Basil Chakos of Nine One One Convenience Pty Ltd to undertake a Groundwater Monitoring Event (GME) at the BP service station facility located at 482 The Esplanade, Warners Bay, NSW. The assessment was intended to provide an environmental condition report of the site, with this report documenting the findings of the monitoring event conducted on 18th May 2015. The assessment identified that concentrations of petroleum hydrocarbon compounds in groundwater samples collected from on-site monitoring wells MW1 to MW6 were below the adopted site assessment criteria, with the exception of the Naphthalene concentration in monitoring well MW4 which

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exceeded the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water.

The extent of petroleum hydrocarbon impact to groundwater appeared to be generally contained to within the boundaries of the site. The Naphthalene impact in MW4 is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6. As such, the risk of harm to any potential aquatic ecosystem with the site in its current state was considered low.

2.7 Site History

Site history for the site was documented in the ESA conducted for the site by Environmental Resources Management Pty Ltd (ERM) in 2003 for BP Australia Pty Ltd. The ERM 2003 report identifies that a portion of the site (Lots 1 and 2) was purchased in 1958 by BP Australia for fuel retail purposes, with Lot 3 purchased in 1974. The site was sold to Nine One One Convenience Pty Ltd in 2004. Prior to 1958, the site does not appear to have been used for activities of a potentially contaminating nature.

The title information reviewed describes the land as being Lot 1 DP 90877 and Lot 122 DP 578045, in the County of Northumberland, Parish of Kahibah, in the Lake Macquarie Local Government Area (LGA).

The following documents were reviewed by Aurora as part of the historical research into site activities:

- historical title deed documents, provided by advanced legal search;
- LMCC Section 149(2) certificates of environmental planning information;
- NSW EPA register of unhealthy building land; and
- correspondence with current site owners in relation to knowledge of current/previous potentially contaminating activities conducted at the site.

Historical Title Deed Documents

A summary of the site ownership for the Lot 122 DP 578054 follows, which was sourced from Land Title Deed documents:

- 1889 – 1903: John Connal & William Connal;
- 1903 – 1915: William Connal, Marian McDonald & John McDonald;
- 1915 – 1916: Robert Gibbs;
- 1916 – 1942: Arthur Howard;
- 1942 – 1946: Isabella Palmer, Hubert Palmer and James Namus;

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- 1946 – 1948: Walter Phee;
- 1948 – 1948: Public Trustee;
- 1948 – 1972: Isabella Phee;
- 1972 – 1973: Neville Phee & Janice Crittenden;
- 1973 – 1974: Eric Jennison & June Jennison;
- 1974 – 2004: BP Australia Limited
- 2004 – current: Nine One One Convenience Pty Ltd

A summary of the site ownership for the Lot 1 DP 90877 follows, which was Lot 1 and Lot 2 previous to 1958:

Lot 1

- 1889 – 1903: John Connal & William Connal;
- 1903 – 1915: William Connal, Marian McDonald & John McDonald;
- 1915 – 1916: Robert Gibbs;
- 1916 - 1926: Arthur Palmer;
- 1926 – 1947: Elizabeth Feighan;
- 1947 – 1947: Patrick Feighan and Frances Feighan;
- 1947 – 1952: James Feighan;
- 1952 – 1958: Ellen Lowndes;
- 1958 – 2004: BP Australia Limited
- 2004 – current: Nine One One Convenience Pty Ltd

Lot 2

- 1889 – 1903: John Connal & William Connal;
- 1903 – 1915: William Connal, Marian McDonald & John McDonald;
- 1915 – 1916: Robert Gibbs;
- 1916 – 1942: Arthur Palmer;
- 1942 – 1947: Mary Palmer & James Namus;
- 1947 – 1953: Inglis Alexander and Margaret Alexander;
- 1953 – 1958: Ellen Lowndes;
- 1958 – 2004: BP Australia Limited
- 2004 – current: Nine One One Convenience Pty Ltd

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In summary, it appears that prior to BP's occupation of the site since 1958 activities associated of a potentially contaminating nature, with respect to petroleum hydrocarbon impact, are not likely to have been conducted.

Section 149(2) Planning Certificate

The planning certificates for Lot 1 DP 90877 and Lot 122 DP 578045, were prepared by Lake Macquarie City Council under Section 149(2) of the Environmental Planning and Assessment Act 1979. The information supplied in the Section 149 certificates indicate that the sites are not affected by matters that are required to be disclosed under Section 59(2) of the Contaminated Land Management Act 1997.

NSW EPA Register Of Unhealthy Building Land

A search of the NSW EPA records indicated that there are currently no statutory notices issued under the Unhealthy Building Land Act for the site.

NSW EPA Contaminated Sites Register (www.epa.nsw.gov.au/clm/publiclist.htm)

A search of the NSW Environment Protection Authority (EPA) contaminated sites register indicated that the service station site was not listed as notified under Section 60 of the Contaminated Land Management Act (1997) and as such was not under assessment by the NSW EPA as a site requiring further information to determine whether regulation is required.

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3. SITE FEATURES

At the time of the GME, the site contained an operational service station facility including:

- A sales building and mechanical workshop in the central portion of the Site;
- A canopy in the central portion of the site, below which comprised five (5) fuel dispensing pumps;
- Two (2) split compartmentalised single-walled fibreglass underground storage tanks (USTs) and two (2) single unit single-walled fibreglass USTs. UST details are provided in **Table 2** below;
- A car wash located in the south-western portion of the site; and
- Ingress and egress is provided via two driveways on the site's northern boundary with King St, and an exit driveway on The Esplanade.

The site is surfaced throughout with concrete. Minor hydrocarbon staining on the concrete surface was evident in the areas surrounding the refuelling dispensers and remote fill points. A detailed site layout plan showing the locations of the site's features is presented in **Figure 2, Site Plan**, which is located in **Appendix A**.

3.1 Petroleum Storage

The storage of petroleum products is outlined in **Table 2** below.

Table 2: Petroleum Storage Information

Tank Number	Product	Material	Year of Install	Capacity (kL)
UST 1	ULP 91	Fibreglass	1996	24.6
UST 2	ULT 98	Fibreglass	1996	20.2
UST 3	PULP 95	Fibreglass	1996	20.0
UST 4	Not In Use	Fibreglass	1996	27.2
UST 5	E10 ULP	Fibreglass	1996	45.0
UST 6	ADF	Fibreglass	1996	33.0

The USTs were all installed at the site in 1996, during a site upgrade conducted by BP Australia Pty Ltd. The previous underground tanks were located in the location of the existing tanks. It is understood a total of eight underground tanks were removed from the site in 1996 as part of the site upgrade. No further information regarding the environmental condition of the soils or the tank replacement works were available. Underground tank UST #4 formerly contained Zoom 50 (50:1 Petrol/Oil) and was taken out of service in early

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2000s following the leaking fuel line between the tank and the dispensing pump previously located in the north west corner of the site building. The line leak in this location of the site was considered to be the source of the identified soil and groundwater impact in the vicinity of the suite building, car wash and western portions of the site which was subsequently remediated to the extent practicable by BP in 2004.

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4. FIELD ACTIVITIES

4.1 Summary of Field Activities

Field activities are summarised in the following table:

Table 3: Summary of Field Activities

Activity	Details
Date of Field Activities	30 th July 2015 (drilling) 6 th August 2015 (groundwater sampling)
Drilling	All soil boreholes (SB1 – SB7) were advanced to a maximum depth of 4.5m using a combination of solid flight augers and push tubing. Borehole SB4 was converted to monitoring well MW7 at the completion of drilling. Details of the soil bore locations are shown on Figure 2 in Appendix A .
Soil Logging	Soil and rock type classifications and descriptions are based on USCS and AS4482.1-1997. Soil bores were logged by Aurora personnel. The borelogs including monitoring well construction details are attached as Appendix C .
Soil Sampling	Soil samples were collected directly from the solid flight augers or from the push tube sleeves. Soil samples were placed in clean, laboratory-supplied acid washed solvent rinsed glass jars with Teflon lids. Soil results summary tables are attached as Appendix B and the laboratory results are attached as Appendix D .
Soil Sample Screening	Concentrations of volatile organic compounds from collected soil samples were screened using a photo ionisation detector (PID). Volatile organic compounds (VOCs) measured in soil samples using a PID were detected in concentrations ranging from 0ppm in several locations up to 509ppm in SB7 at 2.5 to 3.0m. PID results are presented on the borelogs attached as Appendix C .
Decontamination Procedures	The augers were decontaminated between samples with a phosphate free solution and rinsed with potable water. Disposable gloves were changed between handling of each sample.
Surveying of Wells	Top of casing (TOC) elevations were measured against surveyed height datum levels in metres above AHD (Australian Height Datum) for the purpose of comparing respective standing water levels in each of the available groundwater monitoring wells.
Groundwater Gauging and Sampling	Gauging and sampling of all wells was conducted on the 6 th August 2015. Groundwater results summary tables are attached as Appendix B and the laboratory results are attached as Appendix D .
Sample Preservation	Soil and groundwater samples were stored on ice, in an esky whilst on-site and in transit to the laboratory.

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4.2 Localised Geological Profile

Borehole logs in **Appendix C** have been provided with information relating to the subsurface conditions observed. The soil profile underlying the site and surrounding areas is observed to consist of:

- Silty clay alluvium from below the concrete slab bedding sands to a depth ranging between 1.0m and 3.8m BGL;
- Orange/brown silty and sandy clays from the base of the alluvium to the interface with the underlying residual sandstone of the Boolaroo Subgroup between 1.0m and 4.5m BGL; and
- Residual yellow and white sandstone from the base of the silty/sandy clays to the maximum extent of drilling at 4.5mBGL.

4.3 Localised Hydrogeology

Groundwater below the site occurs within the alluvial clay sediments and the residual sandy soils between approximately 1.5m and 2.2m BGL. Groundwater was present in each of the monitoring wells MW1 to MW7.

Static water levels (SWLs) are calculated by subtracting the depth to groundwater from each of the respective top of casing (TOC) elevations. The SWL and relative elevation of the water in each of the wells is summarised in **Table 4** below.

Table 4: Relative Groundwater Elevation

Location	TOC Elevation (m)	PSH Thickness	Depth to Water (m)	Relative Groundwater Elevation (mAHD)
MW1	6.831	0.0	2.200	4.631
MW2	6.128	0.0	1.538	4.590
MW3	8.000	0.0	2.265	5.735
MW4	6.974	0.0	1.865	5.109
MW5	5.909	0.0	1.951	3.958
MW6	6.792	0.0	2.157	4.635
MW7	6.964	0.0	2.151	4.813

- Measured against an arbitrary level of 8.00m for MW3

- Depth to Water measured from top of well casing (m)

- PSH = Phase Separated Hydrocarbon

The groundwater contours are presented on **Figure 3** in **Appendix A**. The relative elevations of the SWLs infer that groundwater is flowing in a westerly direction towards Lake Macquarie to the west of the site with a slope of 1.89 degrees, or 0.033m/m.

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5. SAMPLING AND ANALYSIS PROGRAM**5.1 Soil**

All primary soil samples were submitted to ALS Environmental Laboratories (ALS) in Smithfield, NSW, Australia.

A total of nineteen (19) primary soil samples and two (2) quality assurance (QAQC) sample were collected by an Aurora environmental engineer and submitted to the laboratory for analysis. The soil samples were submitted to the laboratory using appropriate sample preservation methods and chain-of-custody documentation. Soil samples were analysed for the following:

- Total Petroleum Hydrocarbon fractions (TPH);
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX);
- Naphthalene; and
- Lead (Pb).

ALS is accredited by the National Association of Testing Authorities (NATA) for the analytical testing employed.

Soil bore locations are illustrated in **Figure 2** in **Appendix A**, and the soil analytical results discussed in **Section 7.1**.

5.2 Groundwater

The primary and duplicate groundwater samples collected were submitted to ALS Environmental Laboratories (ALS), in Smithfield, NSW, Australia.

Seven (7) primary samples and one (1) quality assurance (QAQC) sample were collected by Aurora personnel and submitted to the primary laboratory for analysis. The groundwater samples were submitted to the laboratory using appropriate sample preservation methods and chain-of-custody documentation. Groundwater samples were analysed for the following:

- Total Petroleum Hydrocarbon fractions (TPH);
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX); and
- Polycyclic Aromatic Hydrocarbons (PAHs) including Naphthalene.

ALS is accredited by the National Association of Testing Authorities (NATA) for the analytical testing employed.

Groundwater monitoring well locations are illustrated in **Figure 2** in **Appendix A**, and the groundwater analytical results discussed in **Section 7.2**.

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6. ASSESSMENT CRITERIA

To assess the relative level and significance of any detected contaminants, reference is made to an established environment and/or human health threshold level or criterion. These criteria are dependant mainly on the proposed use of the site, and the associated environmental and human health risk, either on or off-site, in both the long and short term. More stringent levels apply to more sensitive land use and to chemicals with higher toxicity.

The primary source of guideline values adopted for this assessment is the National Environment Protection (Assessment of Site Contamination) Measure (NEPM (1999, amended 2013)), specifically those provided in Schedule B1: Guideline on Investigation Levels for Soil and Groundwater. The NEPM (amended 2013) emphasises consideration of the site on a site-specific basis using a risk-based approach. According to the NEPM (amended 2013), human health should be a primary concern when assessing land use and exposure scenarios. Furthermore, the selection of the most appropriate investigation levels (for use in a range of environmental settings and land use scenarios) should also consider factors including the protection of ecosystems, groundwater resources and aesthetics.

Based on the current zoning of the site, the surrounding land use, the potential future beneficial use of the site and groundwater beneath it and identified potential receptors at and in the vicinity of the site, the following investigation levels are considered relevant for this ESA.

6.1 Soil Investigation Levels

Schedule B(1) of the NEPM (amended 2013) provides a range of investigation levels for the protection of human health, referred to as Health Investigation Levels (HILs) and Health Screening Levels (HSLs). HILs have been developed for a broad range of metals and organic substances, however do not include the COPCs potentially present at this site. Adoption of HSLs is considered relevant as the identified COPCs are consistent with those considered in the development of HSLs (petroleum/diesel products).

The following should be noted:

HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physicochemical properties, land-use scenarios and the characteristics of building structures. They apply to different soil types, and depths below surface to >4m;

Values for HSLs are provided for four exposure settings based on land-use:

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-
- HSL A - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), also includes children's day care centres, preschools and primary schools;
 - HSL B - Residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats;
 - HSL C - Public open space such as parks, playgrounds, playing fields (eg: ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate; and
 - HSL D - Commercial/industrial such as shops, offices, factories and industrial sites.

For the ESA, the soil results have been compared to NEPM (1999: amendment 2013) Health Screening Levels and Health Investigation Levels (where relevant), land use scenario A+B for silty clay based soils.

The soil results are compared against the relevant soil guidelines in the results summary tables provided in **Table T1** in the Tables section at the end of this report

6.2 Groundwater Investigation Levels

Human Health

The NEPM (1999 - Amendment 2013) provides Tier 1 groundwater HSLs for vapour intrusion for Petroleum Hydrocarbons, that have been developed for protection of site users from vapours released from the impacted groundwater. The HSLs take into consideration the land use receptors (HSL-A, HSL-B, HSL-C, and HSL-D); the depth of groundwater intersection (2m to <4m, 4m to <8m, and 8m+), and the dominant soil type (Sand, Silt or Clay) overlying the groundwater intersection depth. The HSLs are not clean-up levels but are used to trigger additional assessment (Tier 2 or Tier 3) or for development of appropriate risk management options.

As indicated previously, the site is used for commercial industrial purposes, and as such, HSL-D has been selected as the land use receptor. The depth groundwater was encountered as either moist or saturated conditions was approximately 1.5m bgl, which corresponded to the 1m to <2m depth interval. The geology below the site is predominantly weathered shale. As such, the dominant lithology type for comparing the reported COPC concentrations with was Silt. Furthermore, to evaluate groundwater conditions at the site, analyte concentrations have been compared to the relevant groundwater guidelines.

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Ecological Investigation Levels

The groundwater analytical data has been compared to the following investigation levels for fresh water:

- NEPM (1999 – Amendment 2013), Schedule B (1) Groundwater Investigation Levels (GILs);

Based on the setting of the site and off-site area, 95% protection levels in fresh water has been used for the assessment of groundwater conditions. The analytical results are compared against the relevant groundwater guidelines in the results summary tables provided in **Table T2** in the Tables section at the end of this report.

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7. ANALYTICAL RESULTS SUMMARY

7.1 Soil Analytical Results

Analytical results of soil samples obtained during the soil boring program indicated the following:

- Concentrations of all organic analytes including TPH, TRH and BTEXN in each soil sample analysed in boreholes SB1, SB2, SB4, and SB6 were below the laboratory's Limit of Reading (LOR);
- Concentrations of TPH C₆-C₁₀ – BTEX (referred to as F1) exceeded the NEPM (2013) Assessment Criteria (HSLs) for residential land use in the 2.3m to 2.5m sample from borehole SB3 and the 2.5m to 3.0m samples from borehole SB7, located in the western portion of the site; and
- Concentrations of F1 also exceeded the NEPM 2013 Environmental Screening Levels (ESLs) in the 2.5m to 3.0m sample from borehole SB7;
- Concentrations of organic analytes including TPH, TRH and BTEXN in all remaining soil samples analysed in borehole SB3, SB5, and SB7 were either below the laboratory's Limit of Reading (LOR) or below the adopted NEPM (2013) Assessment Criteria for residential land use; and
- Concentrations of organic analytes in all soil samples were below the NEPM 2013 Assessment Criteria (HSLs) for commercial land use.

Analytical data and comparison to the relevant site assessment criteria is summarised in **Table T1** in the **Tables** section at the end of this report. The laboratory reports for the soil samples and associated documentation are provided in **Appendix D**.

7.2 Groundwater Analytical Results

Analytical results of groundwater samples indicated the following:

- TPH (C₆-C₉) compound concentrations in groundwater samples collected from each of the sampled monitoring wells ranged between below laboratory detection limits in MW2, MW3 and MW7, up to 2,270 ug/L in MW4;
- TPH (C₁₀-C₃₆) compound concentrations in groundwater samples collected from each of the sampled monitoring wells ranged between below laboratory detection limits in several wells, up to 5,170ug/L in MW4;
- Total Recoverable Hydrocarbon concentrations were either below laboratory detection limits (MW2, MW3 and MW7), or below the NEPM (2013) site assessment criteria (MW1, MW4, MW5 and MW6) for all sampled monitoring wells. Monitoring well MW4 recorded elevated TRH concentrations

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however concentrations were below the NEPM (2013) health screening levels (HSLs) for soil vapour intrusion when compared to residential land use criteria for Silt based soils;

- Benzene concentrations in each of the sampled monitoring wells were below the laboratory detection limits with the exception of MW4, which recorded a concentration of benzene below the NEPM (2013) health screening levels (HSLs) for soil vapour intrusion compared to residential land use criteria for Silt based soils;
- Concentrations of Toluene, Ethylbenzene, and Xylene compounds in groundwater collected from each of the sampled monitoring wells were below the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water; and
- Concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) ranged between below laboratory detection limits in MW2, MW3, MW6 and MW7, up to 218 ug/L in MW4. Naphthalene concentrations were detected above the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in MW4 only, located in the central portion of the site;

Analytical data for groundwater and comparison to the relevant site assessment criteria is summarised in **Table T2** in the **Tables** section at the end of this report. The laboratory reports and associated documentation are provided in **Appendix D**.

7.3 Discussion of Results

Soil

The analysis results of the soil samples identified the extent of petroleum hydrocarbon impacts to soil appears to be generally contained to within the operational areas of the site, extending towards the south western boundary of the site, in the vicinity of impacted soil bores SB3 and SB7, and at a depth of between 2.0m and 3.0m. Petroleum hydrocarbon impact beyond SB7 has not been delineated, however impact is unlikely to extend beyond the site boundary, as the assessment has been based on a residential land-use exposure setting. The concentrations do not exceed recreational/open space land use criteria which would apply across the site's western boundary.

Groundwater

The extent of petroleum hydrocarbon impacts to groundwater appears isolated to the area around MW4 in the central portion of the site. Groundwater impact is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6, and to the south by MW7. As such, the risk of harm to any potential aquatic ecosystem with the site in its current state is considered low.

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Site Redevelopment / Remediation Works

Overall, there was an absence of significant hydrocarbon impacts to soil and groundwater associated with the current and historical service station operations. The identified contamination appears to be securely immobilised within the site, under the building and car wash/ concreted areas, and is unlikely to be currently causing any offsite consequences to the community or environment.

Any potential re-development of the site would require these contaminated areas to be cleaned up, in conjunction with any subsequent excavation or redevelopment of the land. Such remediation works would likely be addressed through the planning and development consent process.

As such the environmental condition of the site is considered unlikely to present a risk of harm to current users of the site in its current state. Remediation works including the excavation of the service station's Underground Petroleum Storage System (UPSS) and identified petroleum hydrocarbon impacted soils would be conducted during re-development to validate the site for alternative land uses.

Excavation works in the areas of identified impact would need to be managed in accordance with a site-specific management plan to ensure the short term risk of exposure of workers to hydrocarbon vapours was managed to an acceptable level.

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8. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To ensure that the data reported during the ESA was of known quality, that is, it fulfilled overall project objectives, specific qualitative and quantitative Data Quality Objectives (DQOs) were determined to clarify the study objectives; define appropriate types and methods of collecting data; and, specify tolerable levels of potential error. The DQOs are demonstrated by assessment in terms of Data Quality Indicators (DQIs) that include precision; accuracy; representativeness; completeness; and, comparability. The DQIs that have been adopted for analytical data validation purposes for this project are:

- Use of appropriate field and analytical sampling methodology (i.e. sample location and analysis rationale) including standardised field forms and documentation of (as well as calibration if applicable) field instrumentation utilised;
- Preservation of samples upon collection and during transport to the laboratory meet applicable standards and guidelines;
- Sample holding times meet applicable standards and guidelines;
- Testing must be carried out by a laboratory accredited by NATA, using methods approved by NATA (or the United States Environmental Protection Agency USEPA) for that type of test;
- Laboratory Limits of Reporting (LOR) or Estimated Quantitation Limits (EQL) meet applicable standards and guidelines;
- Frequency of collection of field and laboratory quality control samples meet applicable standards and guidelines;
- Results of the field quality control samples meet applicable standards and guidelines (i.e. trip blanks; rinsates; duplicate and triplicate samples);
- Results of the laboratory quality control samples meet applicable standards and guidelines (i.e. method blanks, laboratory control samples, duplicates, matrix spike, and surrogate recoveries); and
- Occurrence of apparent inconsistencies between laboratory data results as compared to field observations and measurements.

A QA/QC Program was implemented to assess the quality and reliability of the data collected and used in this investigation.

8.1 Field QA/QC Program

Quality control sampling and analysis is routinely conducted as part of Aurora's ongoing QA/QC program to validate the integrity of field procedures and assess the reliability of laboratory analyses. In summary, the

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following table outlines the quality control samples collected during the field activities and the analyses conducted on these samples:

Table 5: QA/QC Program

QA/QC Sample	Parent Sample	Date Obtained	QA/QC Sample Type
Soil Boring Program			
QS3	SB5 0.4 – 1.0m	30/7/15	Intra-laboratory duplicate
QS4	SB4 2.3 - 2.5m	30/7/15	Intra-laboratory duplicate
TRIP BLANK		30/7/15	Trip Blank
TRIP SPIKE		30/7/15	Trip Spike
Groundwater Monitoring Event			
QW1	MW7	06-08-15	Intra-laboratory duplicate
TRIP BLANK		06-08-15	Trip Blank
TRIP SPIKE		06-08-15	Trip Spike

Primary or parent samples and intra-laboratory duplicates were submitted to Australian Laboratory Services (ALS) of Smithfield, New South Wales. The QA/QC program analytical data is summarised in **Table T3** in the **Tables** section at the end of this report.

8.2 Laboratory QA/QC Program

ALS's analytical methods for the tests requested are certified by NATA. The analytical testing laboratory utilised during this ESA was also required to adhere to accepted analytical methodologies and conduct regular quality control checks on their analysis. These procedures and results are documented in the laboratory reports in **Appendix D**.

The QA/QC assessment indicated that, overall, the laboratory results are considered to be indicative of the concentrations present on the site at the time of sample collection. As such, the QAQC data for the assessment has shown that the data set is valid and can be relied upon for the purposes of the investigation.

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9. CONCLUSIONS

Based on the results of the baseline ESA conducted, including laboratory analysis for soil and water samples, at the BP branded service station located at 482 The Esplanade, Warners Bay, the following can be concluded.

- The site is currently owned by Nine One One Convenience Pty Ltd and leased to Darton Warners Bay Pty Ltd who operate the site. The service station is located within a mixed residential and commercial setting in Warners Bay, on the north – eastern shores of Lake Macquarie. The service station site covers an area of approximately 2,200m², and slopes at a low gradient to the west.
- At the time of assessment, the site comprised an underground petroleum storage system (UPSS) including four underground storage tanks (USTs) with six storage compartments, five (5) fuel dispensing pumps and associated pipelines. The UPSS at the site was installed in 1996.
- There were no visible signs of vegetation stress within the site, or in areas located down gradient (north-west) of the site.
- The closest environmentally sensitive receptor to the site is Lake Macquarie, a large saltwater coastal lake, located 100m to the west of the site.
- During the assessment, seven (7) boreholes (SB1 to SB7) were drilled to depths of up to 4.5m BGL and one (1) additional monitoring well installed (to complement the six existing wells) in a location targeted to identify and/or define areas of potential soil and groundwater contamination associated with former service station operations.
- The geology encountered during drilling consisted of gravely sand fill extending from below the concrete slab to approximately 0.4m BGL, underlain by dark grey and black silty clay alluvium to varying depths of between approximately 1.0 m and 3.8m below ground level. This was underlain by orange brown silty clays grading to clayey sand residual soils of the Boolaroo Subgroup to the maximum depth of drilling at 4.5m.
- Groundwater below the site occurs as a semi confined aquifer within the silty clay and clayey sands between 1.5m and 2.2m BGL. The groundwater is flowing in a westerly direction towards Lake Macquarie with a slope of 1.89 degrees, or 0.033m/m.
- Petroleum hydrocarbon impacts to the soils were below the adopted site assessment criteria in all samples submitted for analysis with the exception of boreholes SB3 and SB7 at approximately 2.5m depth which exceeded the NEPM (2013) criteria for based on a residential land use setting for soil vapour intrusion. The criteria was not exceeded based on a commercial land use setting.
- Concentrations of petroleum hydrocarbon compounds in groundwater samples collected from monitoring wells MW1 to MW7 were below the adopted site assessment criteria, with the exception of the Naphthalene concentration in monitoring well MW4 which exceeded the NEPM (2013) groundwater investigation levels for the protection of aquatic ecosystems in fresh water.

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In summary, the extent of petroleum hydrocarbon impacts to soil appears to be generally contained to within the operational areas of the site, extending towards the south western boundary of the site, in the vicinity of impacted soil bore SB7. Petroleum hydrocarbon impact beyond SB7 has not been delineated, however impact is unlikely to extend beyond the site boundary, based on a residential land-use exposure setting.

The extent of petroleum hydrocarbon impacts to groundwater appears isolated to the area around MW4 in the central portion of the site. Groundwater impact is below a concrete slab within an operational service station, and is delineated towards the nearest environmental receptor by downgradient monitoring wells MW2, MW5 and MW6, and to the south by MW7. As such, the risk of harm to any potential aquatic ecosystem with the site in its current state is considered low.

Overall, there was an absence of significant hydrocarbon impacts to soil and groundwater associated with the current and historical service station operations. The identified contamination appears to be securely immobilised within the site, under the building and car wash/ concreted areas, and is unlikely to be currently causing any offsite consequences to the community or environment.

Any potential re-development of the site would require these contaminated areas to be cleaned up, in conjunction with any subsequent excavation or redevelopment of the land. Such remediation works would likely be addressed through the planning and development consent process.

As such the environmental condition of the site is considered unlikely to present a risk of harm to current users of the site in its current state. Remediation works including the excavation of identified petroleum hydrocarbon impacted soils would be conducted during re-development to validate the site for alternative land uses.

On the basis of the assessment, Aurora considers the assessment suitable for application as an assessment of current site conditions.

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10. LIMITATIONS OF REPORT

The findings of this report are based on site conditions that existed at the time this Environmental Site Assessment (ESA) was conducted at the BP branded service station located at 482 The Esplanade, Warners Bay, NSW. The report was prepared in accordance with accepted environmental practices used by environmental professionals working within this area. Conclusions are made from a limited number of observation points assuming that the soil, groundwater, geological and chemical conditions are representative across the site. No other warranties are made or intended.

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11. REFERENCES

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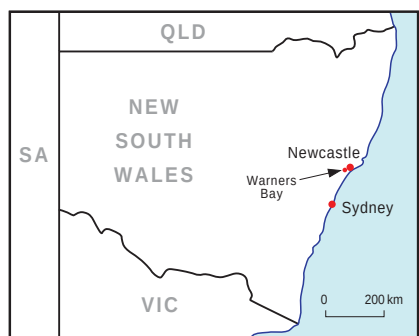
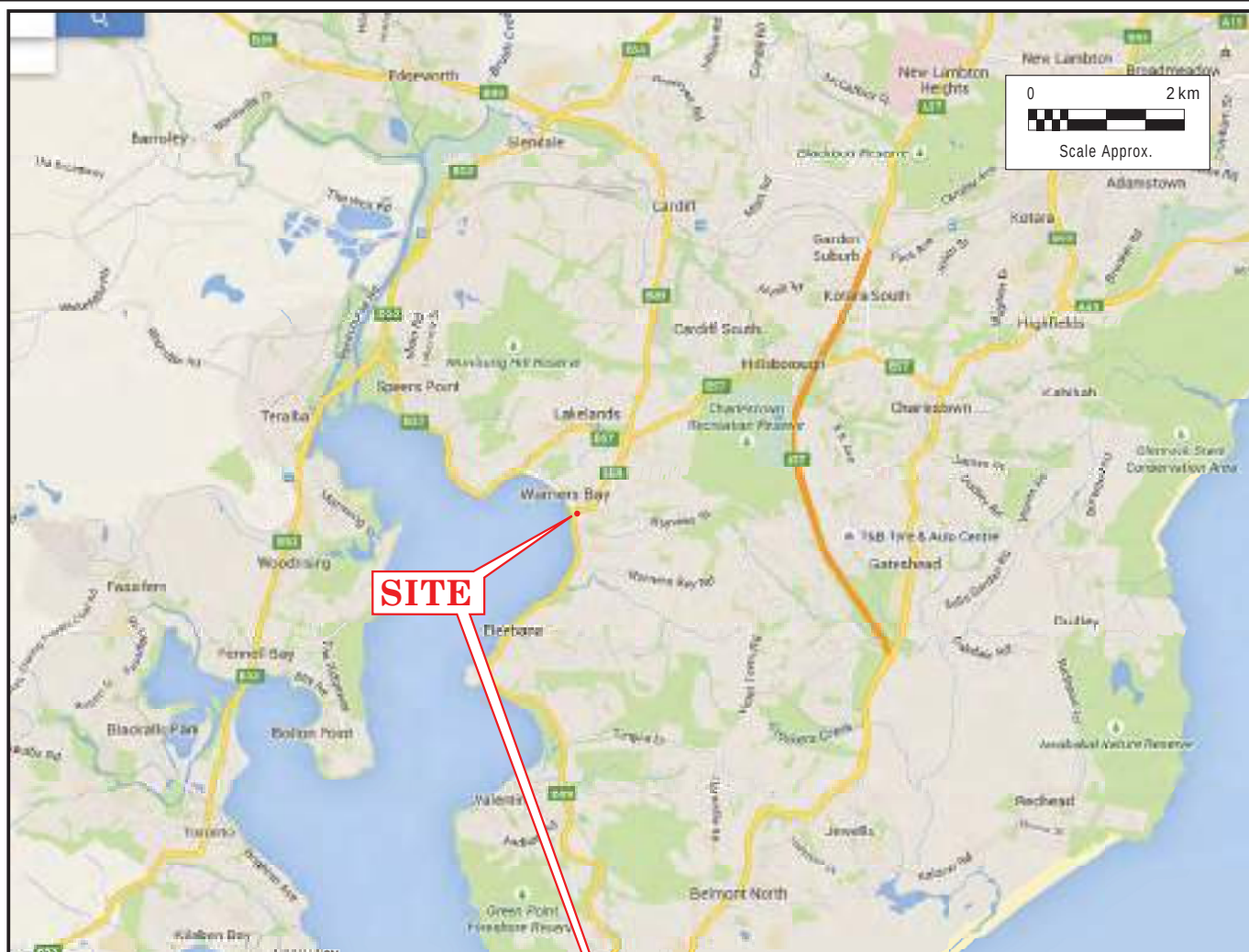
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Appendix A

Figures



MAP DATA REPRODUCED WITH THE PERMISSION OF GOOGLE MAPS (2015)

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ENVIRONMENTAL CONSULTING

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CHECKED:

APPROVED:

BP SERVICE STATION WARNERS BAY
Environmental Site Assessment
SITE LOCATION PLAN

CLIENT:

YAHAV PROPERTY INVESTMENTS

LOCATION:

482 THE ESPLANADE, WARNERS BAY, NSW

DESIGNED:

TB

DATE:

8.8.2015

PROJECT NO.:

P15071

DRAWN:

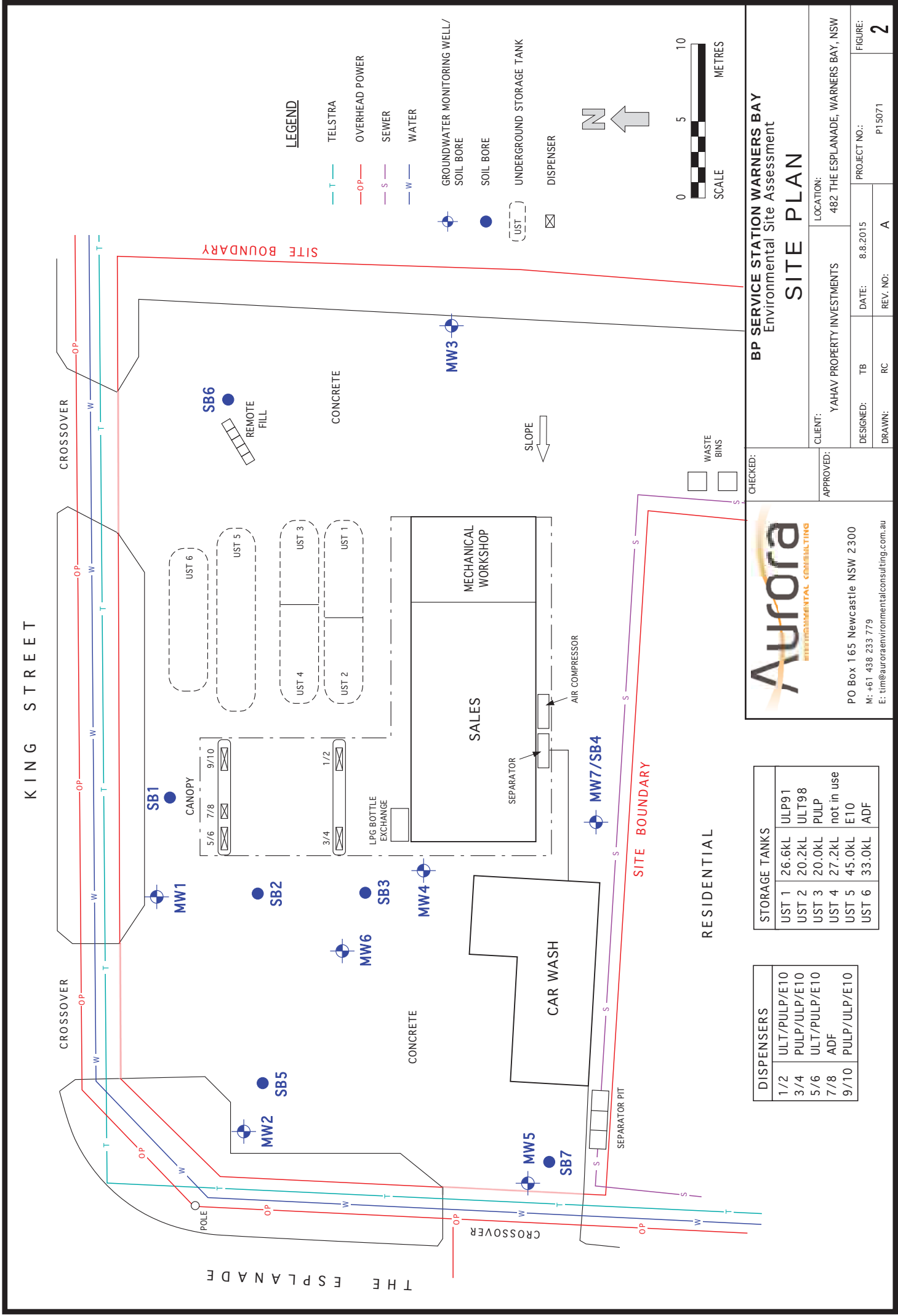
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REV. NO:

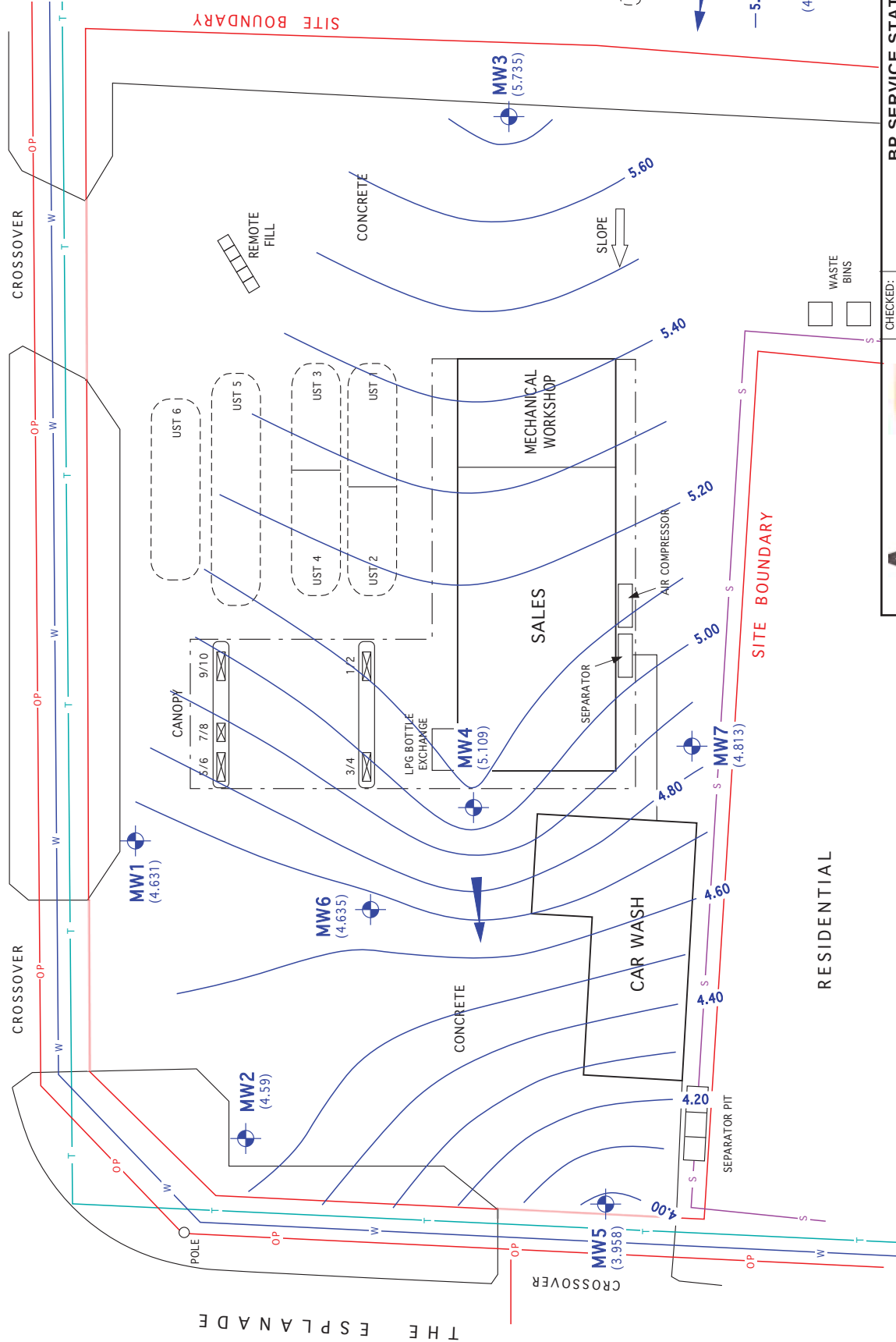
A

FIGURE:

1



KING STREET



CHECKED:

BP SERVICE STATION WARNERS BAY
Environmental Site Assessment

GROUNDWATER ELEVATION CONTOURS

APPROVED:

CLIENT: YAHAV PROPERTY INVESTMENTS
LOCATION: 482 THE ESPLANADE, WARNERS BAY, NSW

DESIGNED: TB
DATE: 8.8.2015
PROJECT NO.: PT15071
DRAWN: RC
REV. NO: A
FIGURE: 3

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Appendix B

Soil and Groundwater Results Summary Tables



TABLE T1
Soil Analytical Summary
TPH, TRH & BTEXN and Lead
BP SERVICE STATION
482 THE ESPLANADE, WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Total Petroleum Hydrocarbons (TPH)				Total Recoverable Hydrocarbons (TRH)					Benzene, Toluene, Ethylbenzene & Xylenes (BTEXN)				Lead					
		C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	Total TPH C ₁₀ -C ₃₆ ^	C ₆ -C ₁₀	C ₆ -C ₁₀ (F1)	C ₁₀ -C ₁₆ (F2)	C ₁₅ -C ₃₄	C ₃₄ -C ₄₀	Total TRH C ₅ -C ₄₀ ^	Benzene	Toluene		Ethylbenzene	m & p Xylenes	o-Xylenes	Total BTEXN^	Naphthalene
SB1 0.8-1.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7
SB1 2.3-2.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	6
SB1 3.8-4.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SB2 0.8-1.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	14
SB2 2.3-2.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	8
SB2 3.8-4.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SB3 0.8-1.0m	30-Jul-15	17	nd	nd	nd	nd	25	25	nd	nd	nd	25	nd	nd	nd	nd	nd	nd	nd	nd
SB3 2.3-2.5m	30-Jul-15	122	50	nd	nd	50	156	156	nd	nd	nd	156	nd	nd	nd	nd	nd	nd	nd	6
SB3 3.8-4.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SB4 0.4-0.6m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	119
SB4 2.3-2.5m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7
SB4 3.8-4.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	9
SB5 0.4-1.0m	30-Jul-15	27	nd	nd	nd	nd	36	35	nd	nd	nd	36	nd	nd	nd	1.0	nd	1.0	nd	49
SB5 2.5-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7
SB6 0.6-0.8m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	10
SB6 2.8-3.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SB7 0.5-1.0m	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	9
SB7 2.5-3.0m	30-Jul-15	477	60	nd	nd	60	608	576	nd	nd	nd	608	nd	nd	7.0	24.9	nd	31.9	3.0	6
SB7 3.5-4.0m	30-Jul-15	27	nd	nd	nd	nd	33	33	nd	nd	nd	33	nd	nd	0.5	0.5	nd	0.5	nd	nd
QS3	30-Jul-15	41	nd	nd	nd	nd	52	49	nd	nd	nd	52	nd	nd	0.6	2.0	nd	2.6	nd	-
QS4	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-
TRIP SPIKE	30-Jul-15	28	nd	nd	nd	nd	34	15	nd	nd	nd	34	nd	8.0	1.2	7.0	3.0	19.2	nd	-
TRIP BLANK	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-

NEPM (2013) Environmental Screening Levels (ESLs)											
Urban residential and public open space											
								180	120	300	2800
								50	85	70	105

NEPM (2013) Health Screening Levels (HSLs)																			
HSL A (low density residential) & HSL B (High Density Residential)	SILT	0 to <1m	1 to <2m	2 to <4m	4m+	Saturation Concentration (Csat)	0.6	390	NL	93	4								
		41	230	NL	NL	NL	0.7	NL	NL	210	NL								
		64	NL	NL	NL	NL	1	NL	NL	NL	NL								
		100	NL	NL	NL	NL	2	NL	NL	NL	NL								
	910	570	69	330	10	—	—	—	—	—	—								

NEPM (2013) Health Screening Levels (HSLs)																		
HSL D (commercial / industrial)	SILT	0 to <1m	1 to <2m	2 to <4m	4m+	250	NL	4	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
		1 to <2m	2 to <4m	4m+	590	NL	NL	6	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
		2 to <4m	4m+	910	NL	NL	NL	10	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
		4m+	910	570	440	640	69	330	10	10	10	10	10	10	10	10	10	
	Saturation Concentration (Csat)	4m+	910	570	440	640	69	330	10	10	10	10	10	10	10	10	10	10

Laboratory Methodology												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008/0071												EP008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- Notes:
- Sample ID: SB#/#/#-#/# denotes a soil sample taken at a specific depth (m) and Q# denotes a quality assurance sample;
 - All Units = µg/L;
 - 'nd' denotes concentrations not detected above the laboratory Limit of Reporting (LOR);
 - C6-C10 (F1) fraction is determined by subtracting the total BTEX value from the C6-C10 fraction result as reported by the laboratory;
 - C10-C16 (F2) fraction is determined by subtracting the total Naphthalene value from the C10-C16 fraction result as reported by the laboratory;
 - '-' denotes that analysis was not requested;
 - 'n' denotes that no relevant criteria are available;
 - 'nr' denotes that no relevant results are available;
 - '95%' denotes 95% Upper Confidence Level of mean;
 - '95%UCL of mean denotes 95% Upper Confidence Level of mean;
 - Sample mean, standard deviating and 95%UCL of mean do not include the quality assurance samples;

TABLE T2
Groundwater Analytical Summary
TPH, TRH, BTEXN
BP Service Station
482 The Esplanade, Warners Bay, NSW

Sample ID	Date Sample Obtained	Land Use at Well Location	Soil Profile Conditions		Total Petroleum Hydrocarbons (TPH)						Total Recoverable Hydrocarbons (TRH)						Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)				PAHs			
			Depth Water Encountered (mBGS)	Major Soil Texture above Water	HSL Texture Category	C ₁ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₈	Total TPH C ₃₉ -C ₆₄ ^Δ	F1 (C ₁ -C ₁₀)	F2 (C ₁₁ -C ₃₈)	>C ₃₉ -C ₆₄	>C ₁₁ -C ₃₈ ^Δ	>C ₁₁ -C ₆₄	Total TPH C ₉ -C ₆₄ ^Δ	Benzene	Toluene	Ethylbenzene	m & p Xylenes	o-Xylenes	Total BTEX ^Δ	Naphthalene	Total PAHs
MW1	06-Aug-15	A & B: Low to High Density Residential	2.2	Silty Clay	Silt	50	220	160	nd	380	50	200	190	190	nd	390	nd	nd	nd	nd	nd	nd	5.8	5.8
MW2	06-Aug-15	A & B: Low to High Density Residential	1.5	Silty Clay	Silt	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW3	06-Aug-15	A & B: Low to High Density Residential	2.3	Silty Clay	Silt	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW4	06-Aug-15	A & B: Low to High Density Residential	1.9	Silty Clay	Silt	2270	3,100	700	1,370	5,170	2,610	2,390	2,600	1,240	1,100	5,300	242	4	nd	16	2	18	218.0	218.0
MW5	06-Aug-15	A & B: Low to High Density Residential	2.0	Silty Clay	Silt	80	nd	nd	nd	nd	90	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	38.5	38.5
MW6	06-Aug-15	A & B: Low to High Density Residential	2.2	Silty Clay	Silt	90	nd	nd	nd	nd	100	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
MW7	06-Aug-15	A & B: Low to High Density Residential	2.2	Silty Clay	Silt	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
QW1	06-Aug-15	A & B: Low to High Density Residential	2.2	Silty Clay	Silt	nd	nd	nd	nd	nd	nd	nd	nd	140	nd	140	nd	nd	nd	nd	nd	nd	nd	nd
NEPM (1999 amendment 2013) Groundwater Investigation Levels																								
Fresh Water																								
950																								
200 ^g																								
350																								
16																								
NEPM (1999 amendment 2013) Groundwater HSLs for Vapour Intrusion																								
HSL A & HSL B	A & B: Low to High Density Residential	2 to <4m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NL	NL	NL	NL	---	NL	---
		4 to <8m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NL	NL	NL	---	NL	---
		8m+	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NL	NL	---	NL	---
Solubility Limit		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
NEPM (1999 amendment 2013) Groundwater HSLs for Vapour Intrusion																								
HSL D	D: Commercial / Industrial	2 to <4m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NL	NL	NL	---	NL	---
		4 to <8m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NL	NL	NL	---	NL	---
		8m+	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	NL	NL	---	NL	---
Solubility Limit		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
EP080/071																								
EP075																								



Table T3
Soil and Groundwater QA/QC Summary
TPH, TRH, BTEXN
BP SERVICE STATION
482 THE ESPLANADE, WARNERS BAY, NEW SOUTH WALES

Sample ID	Date Sample Obtained	Total Petroleum Hydrocarbons (TPH)			Total Recoverable Hydrocarbons (TRH)				Benzene	Toluene	Ethyl-Benzene	Xylenes	Naphthalene	
		C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	C ₆ -C ₁₀	C ₉ -C ₁₀ (F1)	C ₁₀ -C ₁₆	C ₁₆ -C ₃₄	C ₃₄ -C ₄₀				
Duplicate/Triplicate Sample														
SB5 0.4-1.0 Q53	30-Jul-15	27	nd	nd	nd	nd	nd	nd	nd	nd	nd	1	nd	
	RPD %	41	nd	nd	nd	nd	nd	nd	nd	nd	0.6	2	nd	
		41.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	66.7%	N/A
SB4 2.3-2.5 Q54	30-Jul-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
	RPD %	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MW7 QW1	06-Aug-15	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
	RPD % (BHL 2.0 and Q2)	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

- Sample ID: SB#/#.#.#.# denotes a soil sample taken a specific depth (m) and Q# denotes a quality assurance sample;
- All Units = mg/kg;
- "nd" denotes concentrations not detected above the laboratory Limit of Reporting (LOR);
- "n." denotes that analysis was not requested;
- "wv" denotes that the total is the sum of individual results;
- RPD = relative percent difference of duplicate sample results;
- Concentrations in **RED** are half the LOR for purposes of calculating RPD where the laboratory results returned nd for either the parent or the duplicate sample, but a detectable concentration was reported for the other sample; and
- Shading denotes an unacceptable RPD (>5xLOR).

Yahav Property Investments

Environmental Site Assessment Report

BP Service Station, 482 The Esplanade, Warners Bay, NSW 2282

Appendix C

Soil Borelogs

BOREHOLE LOG REPORT



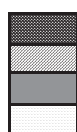
BOREHOLE LOG: SB1

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW
 Job Description: Environmental Site Assessment

Date hole commenced: 30/07/2015	Borehole depth: 4.5m	Contractor: Terratest
Date hole completed: 30/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			CONCRETE	#	0	SB1 0.8-1.0m	No Odour
				FILL: GRAVELEY SAND: brown, moist, dense				
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm				
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency				
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	0	SB1 2.3-2.5m	No Odour
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	SB1 3.8-4.0m	No Odour
5.0	Borehole Terminated at 4.5m depth							
6.0								

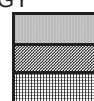


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



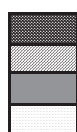
BOREHOLE LOG: SB2

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW
 Job Description: Environmental Site Assessment

Date hole commenced:	30/07/2015	Borehole depth:	4.5m	Contractor:	Terratest
Date hole completed:	30/07/2015	R.L casing:		Driller:	JC
Logged by:	T Brown	R.L surface:		Drill rig:	Geoprobe
		Datum:		Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			CONCRETE				
				FILL: GRAVELEY SAND: brown, moist, dense, blocky fill with pieces of brick				
2.0				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm	#	0	SB2 0.8-1.0m	No Odour
				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency				
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	0	SB2 2.3-2.5m	No Odour
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	SB2 3.8-4.0m	No Odour
5.0				Borehole Terminated at 4.5m depth				
6.0								

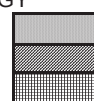


Cement/Grout
Backfill/Cuttings
Bentonite
Sand/Filter Pack



Asphalt/Concrete
Sand
Silt

GEOLOGY



Clay
Rock
Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: SB3

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW
 Job Description: Environmental Site Assessment

Date hole commenced: 30/07/2015	Borehole depth: 4.5m	Contractor: Terratest
Date hole completed: 30/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			CONCRETE				
				FILL: GRAVELEY SAND: brown, moist, dense				
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm	#	10	SB3 0.8-1.0m	Slight Odour
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	75		Slight Odour
					#	115	SB3 2.3-2.5m	Moderate Odour
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	45		Slight Odour
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	45	SB3 3.8-4.0m	Slight Odour
5.0		Borehole Terminated at 4.5m depth						
6.0								

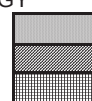


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: SB4/MW7

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW
 Job Description: Environmental Site Assessment

Date hole commenced:	30/07/2015	Borehole depth:	4.5m	Contractor:	Terratest
Date hole completed:	30/07/2015	R.L casing:	6.964m	Driller:	JC
Logged by:	T Brown	R.L surface:		Drill rig:	Geoprobe
		Datum:	8m	Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
				CONCRETE				
				FILL: GRAVELEY SAND: brown, moist, dense				
1.0				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm	#	0	SB4 0.4 - 0.6m	No Odour
					#	0		No Odour
2.0	P U S H T U B E			RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0		No Odour
				RESIDUAL: SANDY GRAVELEY CLAY: moderate plasticity, fine to medium gravels, well graded, light and dark brown bands, very moist, firm consistency	#	0	SB4 2.3-2.5m	No Odour
3.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0	QS4	No Odour
				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3.5m, dense				
4.0				RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	SB4 3.8-4.0m	No Odour
5.0				Borehole Terminated at 4.5m depth				
6.0								

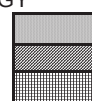


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: SB5

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay

Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW

Job Description: Environmental Site Assessment

Date hole commenced: 30/07/2015

Borehole depth: 3.0m

Contractor: Terratest

Date hole completed: 30/07/2015

R.L casing:

Driller: JC

Logged by: T Brown

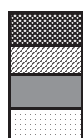
R.L surface:

Drill rig: Geoprobe

Datum:

Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	PUSH TUBE			CONCRETE				
				FILL: GRAVELEY SAND: brown, moist, dense	#	0		No Odour
				ALLUVIUM: SILTY CLAY, high plasticity, well graded, dark brown/grey, moist, firm consistency	#	0	SB5 0.4-1.0m QS3	No Odour
2.0				RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0		No Odour
3.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet, dense	#	0	SB5 2.5-3.0m	No Odour
4.0	Borehole Terminated at 3.0m depth							
5.0								
6.0								

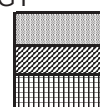


Cement/Grout
Backfill/Cuttings
Bentonite
Sand/Filter Pack



Asphalt/Concrete
Sand
Silt

GEOLOGY



Clay
Rock
Gravel

BOREHOLE LOG REPORT



BOREHOLE LOG: SB6

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 122 DP578045 (16 King St) Warners Bay, NSW
 Job Description: Environmental Site Assessment

Date hole commenced:	30/07/2015	Borehole depth: 4.5m	Contractor:	Terratest
Date hole completed:	30/07/2015	R.L casing:	Driller:	JC
Logged by: T Brown		R.L surface:	Drill rig:	Geoprobe
		Datum:	Drilling fluid:	

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments		
1.0	P U S H T U B E			CONCRETE		0	SB6 0.6-0.8m	No Odour		
				FILL: GRAVELEY SAND: brown, moist, dense						
				ALLUVIUM: SILTY CLAY, high plasticity, well graded, dark brown/grey, moist, firm						
2.0						RESIDUAL: SANDY CLAY with some GRAVEL: moderate plasticity, fine to medium grained, well graded, grey/brown, moist, firm consistency	#	0	SB6 0.6-0.8m	No Odour
3.0						RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense				
4.0						RESIDUAL: SANDSTONE: low plasticity, fine grained, yellow, dry, hard	#	0	SB6 2.8-3.0m	No Odour
5.0			Borehole Terminated at 4.5m depth							
6.0										

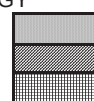


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

BOREHOLE LOG REPORT



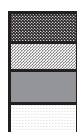
BOREHOLE LOG: SB7

Page 1 of 1

Site Name: Yahav Property Investments - Warners Bay
 Location: Lot 1 DP90877 (482 The Esplanade) Warners Bay, NSW
 Job Description: Environmental Site Assessment

Date hole commenced: 30/07/2015	Borehole depth: 4.5m	Contractor: Terratest
Date hole completed: 30/07/2015	R.L casing:	Driller: JC
Logged by: T Brown	R.L surface:	Drill rig: Geoprobe
	Datum:	Drilling fluid:

Depth (m)	Drilling Method	Piezometer Construction Details	Symbol	Material Description	Field Sample ANALYSED	PID Readings (ppm)	Lab Analysis	Other Comments
1.0	P U S H T U B E			CONCRETE	#	0	SB7 0.5-1.0m	No Odour
				FILL: GRAVELEY SAND: brown, moist, dense				
				ALLUVIUM: SILTY SANDY CLAY, high plasticity, well graded, dark brown/grey, moist, firm				
2.0				ALLUVIUM: SILTY SAND: fine to medium grained, well graded, grey/brown, wet, firm consistency				
3.0								
4.0				RESIDUAL: CLAYEY SAND: moist, fine grained, well graded, grey, wet below 3m, dense	#	45	SB7 3.5-4.0m	Slight Odour
5.0	Borehole Terminated at 4.5m depth							
6.0								

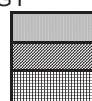


Cement/Grout
 Backfill/Cuttings
 Bentonite
 Sand/Filter Pack



Asphalt/Concrete
 Sand
 Silt

GEOLOGY



Clay
 Rock
 Gravel

Yahav Property Investments

Environmental Site Assessment Report

BP Service Station, 482 The Esplanade, Warners Bay, NSW 2282

Appendix D

Soil and Groundwater Laboratory Analytical Reports



Environmental

CERTIFICATE OF ANALYSIS

Work Order : ES1527269

234%50) AURORA ENVIRONMENTAL CONSULTING

2+50'=0) >?Ä"@>ÄÄ?BCD

E<<#%:..) &BÄABFÄ*GÄ

6L8'43 D6C2E;" 6ÄD;CHEI;"?E. @EÄJK!!

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U'=4843%) TG*ÄIRÄKÄMJKÄK--N

8#+V%=0) LLLL

B#<%#Ä5S8/%#) A&ÄCE?D6?;ÄAEW

2LBL2Ä5S8/%#) LLLL

'8O3%#) LLLL

;40%) "@>ÄÄ?BCD

X\$+0%Ä5S8/%#) A&ÄCE?D6?;ÄAEW

"Q4:Ä#%O+#0Ä:\$O%#:;%<%:Ä'5'1ÄO#%74+\$Ä#%O+#0Y:ZÄ'4ÄOÄOÄ\$Ä5#%9634ÄO+Ä0Q%Ä:8O3%Y:ZÄ:Ä:\$8400%<ÄÄ

"Q4:Ä2%#04,4='0%Ä+,ÄE5'31:4:Ä=+50'45:Ä0Q%Ä,+33+145(Ä45,+8'04+5

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WORLD RECOGNISED
ACCREDITATION

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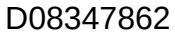
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;1<5%1ÄB#('54=:

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General Comments

D08347862



& (%
C-#PAB#<%#
234%50
&#+V%=0
) K* Å-
) 6* ÅJ-JGN
) E!7B?EÄ6D`@?BD>6D"E.Ä2BD;!."@D^
) A&ACE?D67;AAEW

Analytical Results

, \$01\$.!*		, /Ä&##+"/01/Ä! +""#&+4+##Ä0&		/Ä&##+"/01/Ä+23		SB1 0.8-1.0		SB1 2.3-2.5		SB1 3.8-4.0		SB2 0.8-1.0		SB2 2.3-2.5	
, /Ä+9.0;& ; 678		5/Ä#		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi	
EA055: Moisture Content				ES1527269-001		ES1527269-002		ES1527269-003		ES1527269-004		ES1527269-005			
jÄ Moisture Content (dried @ 103°C)		LLLL * k		7%		7%		7%		7%		7%		7%	
EG005T: Total Metals by ICP-AES															
Lead		-RKNLNJL* Ä		8(aP(		7		cÄ		14		8			
EP080/071: Total Petroleum Hydrocarbons															
C6 - C9 Fraction		LLLL *!		8(aP(		c*!		c*!		c*!		c*!		c*!	
C10 - C14 Fraction		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
C15 - C28 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
C29 - C36 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ C10 - C36 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions															
C6 - C10 Fraction		2G!2*!		8(aP(		c*!		c*!		c*!		c*!		c*!	
jÄ C6 - C10 Fraction minus BTEX (F1)		2G!2*!A"6F		8(aP(		c*!		c*!		c*!		c*!		c*!	
>C10 - C16 Fraction		m2"!2"G		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
>C16 - C34 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
>C34 - C40 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ >C10 - C40 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
jÄ >C10 - C16 Fraction minus Naphthalene (F2)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080: BTEXN															
Benzene		-!LRKLJ !J		8(aP(		clJ		clJ		clJ		clJ		clJ	
Toluene		*!MLMLK !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
Ethylbenzene		*!ILR*LR !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
meta- & para-Xylene		*!MLKMLKÄ*IGLRJLK !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
ortho-Xylene		NÄLR-LG !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
jÄ Sum of BTEX		LLLL !J		8(aP(		clJ		clJ		clJ		clJ		clJ	
jÄ Total Xylenes		*KKILJIL- !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
Naphthalene		N*LJILK *		8(aP(		c*		c*		c*		c*		c*	
EP080S: TPH(V)/BTEX Surrogates															
1,2-Dichloroethane-D4		*-!GILI-LI !J		k		92.8		83.5		93.7		101		94.4	
Toluene-D8		JIK-LJGLÄ !J		k		112		103		117		122		113	
4-Bromofluorobenzene		RGIL!ILR !J		k		120		114		122		124		118	



& (%
C-#PAB#-%#
234%50
&#+V%=0
R*Ä-
) 6*ÄJ-JGN
) E!7B?EÄ6D`@?BD>6D"E.Ä2BD;!."@D^
) A&ÄCE?D67;ÄAEW

Analytical Results

, \$01\$;!*		, /Ä+9.0;& ; 678		5/Ä#		ES1527269-006 7%,\$30		ES1527269-007 7%,\$30		SB3 2.3-2.5		SB3 3.8-4.0		SB4 0.4-0.6	
		, /Ä&##+*01/Ä! +**#&+4+Ä0&				HKIL,\$3LJ!*Äi		HKIL,\$3LJ!*Äi		HKIL,\$3LJ!*Äi		HKIL,\$3LJ!*Äi		HKIL,\$3LJ!*Äi	
EA055: Moisture Content															
jÄ Moisture Content (dried @ 103°C)		LLLL * k				16.2		15.0		18.8		20.4		12.7	
EG005T: Total Metals by ICP-AES															
Lead		-RKNLNJL* Ä		8(aP(		cÄ		cÄ		6		cÄ		119	
EP080/071: Total Petroleum Hydrocarbons															
C6 - C9 Fraction		LLLL *!		8(aP(		c*!		17		122		c*!		c*!	
C10 - C14 Fraction		LLLL Ä!		8(aP(		cÄ!		cÄ!		50		cÄ!		cÄ!	
C15 - C28 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
C29 - C36 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ C10 - C36 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		50		cÄ!		cÄ!	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions															
C6 - C10 Fraction		2G!2*!		8(aP(		c*!		25		156		c*!		c*!	
jÄ C6 - C10 Fraction minus BTEX (F1)		2G!2*!A*6F		8(aP(		c*!		25		156		c*!		c*!	
>C10 - C16 Fraction		m2*!l2*G		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
>C16 - C34 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
>C34 - C40 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!	
jÄ >C10 - C40 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
jÄ >C10 - C16 Fraction minus Naphthalene (F2)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!	
EP080: BTEXN															
Benzene		-!LRKLJ !J		8(aP(		clJ		clJ		clJ		clJ		clJ	
Toluene		*!MLMLK !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
Ethylbenzene		*!ILR*LR !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
meta- & para-Xylene		*!MLKMLKÄ*!GLR!JK !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
ortho-Xylene		NÄLR-LG !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
jÄ Sum of BTEX		LLLL !J		8(aP(		clJ		clJ		clJ		clJ		clJ	
jÄ Total Xylenes		*KKILJIL- !Ä		8(aP(		clÄ		clÄ		clÄ		clÄ		clÄ	
Naphthalene		N*!JILK *		8(aP(		c*		c*		c*		c*		c*	
EP080S: TPH(V)/BTEX Surrogates															
1,2-Dichloroethane-D4		*-!GILI-LI !J		k		74.8		77.3		91.1		89.2		90.2	
Toluene-D8		JIK-LJGLÄ !J		k		90.8		90.8		110		115		115	
4-Bromofluorobenzene		RGIL!ILR !J		k		92.6		96.8		112		118		119	



& (%
C-#PAB#-%#
234%50
&#+V%=0
) Ä* Ä-
) 6*ÄJ-JGN
) E!7B?EÄ6D' @?BD>6D"E.Ä2BD;!."@D^
) A&ACE?D67;AAEW

Analytical Results

;\$/L>0#4d : SOIL (>0#4d SOIL)		,/Ä&#+""01/&+23																	
, \$01\$;!*		,/Ä&#+""01/Ä! +""#&+4+Ä0&		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi		hkil,\$3LJ!*Äi	
		,(/Ä+9.0:& 9 ; 678		5/Ä#		ES1527269-011		ES1527269-012		ES1527269-013		ES1527269-014		ES1527269-015					
						7%,\$30		7%,\$30		7%,\$30		7%,\$30		7%,\$30		7%,\$30		7%,\$30	
EA055: Moisture Content																			
jÄ Moisture Content (dried @ 103°C)		LLLL *		k		24.2		24.4		19.5		22.7		16.9					
EG005T: Total Metals by ICP-AES		-RKNLNJL*		Ä		8(aP(		7		9		49		7		10			
EP080/071: Total Petroleum Hydrocarbons																			
C6 - C9 Fraction		LLLL *		8(aP(		c*!		c*!		27		c*!		c*!					
C10 - C14 Fraction		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!					
C15 - C28 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!					
C29 - C36 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!					
jÄ C10 - C36 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions		2GI2*!		8(aP(		c*!		c*!		36		c*!		c*!		c*!			
C6 - C10 Fraction																			
jÄ C6 - C10 Fraction minus BTEX (F1)		2GI2*!LA*6F		*!		8(aP(		c*!		35		c*!		c*!					
>C10 - C16 Fraction		m2*!l2*G		Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!					
>C16 - C34 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!					
>C34 - C40 Fraction		LLLL *!		8(aP(		c*!!		c*!!		c*!!		c*!!		c*!!					
jÄ >C10 - C40 Fraction (sum)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!					
jÄ >C10 - C16 Fraction minus Naphthalene (F2)		LLLL Ä!		8(aP(		cÄ!		cÄ!		cÄ!		cÄ!		cÄ!					
EP080: BTEXN		-!LRKLJ		! J		8(aP(		cl J		cl J		cl J		cl J		cl J		cl J	
Benzene																			
Toluene		*!MLMMLK		! Ä		8(aP(		cl Ä		cl Ä		cl Ä		cl Ä					
Ethylbenzene		*!ILR*LR		! Ä		8(aP(		cl Ä		cl Ä		cl Ä		cl Ä					
meta- & para-Xylene		*!MLKMLKÄ*!GLRJLK		! Ä		8(aP(		cl Ä		1.0		cl Ä		cl Ä					
ortho-Xylene		NÄLR-LG		! Ä		8(aP(		cl Ä		cl Ä		cl Ä		cl Ä					
jÄ Sum of BTEX		LLLL		! J		8(aP(		cl J		1.0		cl J		cl J					
jÄ Total Xylenes		*KKILJIL-		! Ä		8(aP(		cl Ä		1.0		cl Ä		cl Ä					
Naphthalene		N*!JILK		*		8(aP(		c*		c*		c*		c*					
EP080S: TPH(V)/BTEX Surrogates		*-!GILI-LI		! J		k		86.4		84.9		92.9		87.8		107			
1,2-Dichloroethane-D4																			
Toluene-D8		JIK-LJGLÄ		! J		k		112		103		112		106					
4-Bromofluorobenzene		RGIL!ILR		! J		k		114		105		111		112					

- GA, A-
- 6,*AJ-JGN
- EI?B?EĀ6
- A&ĀCE?D6

```
;/L>'0#4d: SOIL
(>'0#4d SOIL)
```

;\$/L>^0#4d : SOIL (>^0#4d SOIL)											
./Ä&##+""01/Ä! +**#&+4+#Ä0& .,(Ä+9.0:& ; 678 5/Ä#											
.\$01\$/!*					?%.\$30	ES1527269-016	SB6 2.8-3.0	SB7 0.5-1.0	SB7 2.5-3.0	SB7 3.5-4.0	QS3
							hkKlL\$3LJ)*Ä!	hkKlL\$3LJ)*Ä!	hkKlL\$3LJ)*Ä!	hkKlL\$3LJ)*Ä!	hKkLL\$S3LJ)*Ä!
							?%.\$30	?%.\$30	?%.\$30	?%.\$30	?%.\$30
EA055: Moisture Content											
jÄ Moisture Content (dried @ 103°C)	LLLL	*	k			27.6	15.3	20.8	23.8	27.5	
EG005T: Total Metals by ICP-AES											
Lead	-RKNLNUL†	Ä	8(aP)	cÄ		9	6	cÄ		----	
EP080/074: Total Petroleum Hydrocarbons											
C6 - C9 Fraction	LLLL	*!	8(aP)	c*!				477	27		41
C10 - C14 Fraction	LLLL	Ä!	8(aP)	cÄ!				60	cÄ!		cÄ!
C15 - C28 Fraction	LLLL	*!!	8(aP)	c*!!				c*!!	c*!!		c*!!
C29 - C36 Fraction	LLLL	*!!	8(aP)	c*!!				c*!!	c*!!		c*!!
jÄ C10 - C36 Fraction (sum)	LLLL	Ä!	8(aP)	cÄ!				60	cÄ!		cÄ!
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction	2Gi2*!	*!	8(aP)	c*!				608	33		52
jÄ C6 - C10 Fraction minus BTEX (F1)	2Gi2*!LA"6F	*!	8(aP)	c*!				576	33		49
>C10 - C16 Fraction	m2*!l2*G	Ä!	8(aP)	cÄ!					cÄ!		cÄ!
>C16 - C34 Fraction	LLLL	*!!	8(aP)	c*!!					c*!!		c*!!
>C34 - C40 Fraction	LLLL	*!!	8(aP)	c*!!					c*!!		c*!!
jÄ >C10 - C40 Fraction (sum)	LLLL	Ä!	8(aP)	cÄ!					cÄ!		cÄ!
jÄ >C10 - C16 Fraction minus Naphthalene (F2)	LLLL	Ä!	8(aP)	cÄ!					cÄ!		cÄ!
EP080: BTEXN											
Benzene	-!LRklJ	i J	8(aP)	cl J					cl J		cl J
Toluene	*!MLMMLK	i Ä	8(aP)	cl Ä					cl Ä		cl Ä
Ethylbenzene	*!!lR*Lr	i Ä	8(aP)	cl Ä				7.0	cl Ä		0.6
meta- & para-Xylene	*!MLKMLKÄ*IGLRJLK	i Ä	8(aP)	cl Ä				24.9	cl Ä		2.0
ortho-Xylene	NÄLR-LG	i Ä	8(aP)	cl Ä					cl Ä		cl Ä
jÄ Sum of BTEX	LLLL	i J	8(aP)	cl J				31.9	cl J		2.6
jÄ Total Xylenes	*KKlLJlL-	i Ä	8(aP)	cl Ä				24.9	cl J		2.0
Naphthalene	N*!JlLK	*	8(aP)	c*				3	c*		c*
EP080S: TPH(V)/BTEX Surrogates											
1,2-Dichloroethane-D4	*-jGllL-lJ	i J	k	81.1			74.4	99.7	78.0		89.0
Toluene-D8	JlK-LJGlÄ	i J	k	102			94.0	98.9	84.8		110
4-Bromofluorobenzene	RGl!ilR	i J	k	103			100	106	87.1		112

-) -Ä-Ä-
-) 6*ÄJ-JGN
-) C+P#ÄB#<%#
-) 234%50
-) E!/?EÄD'._@?BD>6D"E.Ä2BD;!."@D^
-) A&ÄCE?D6?;ÄAEW
-) &#+ V%#0
-) &!(%)

Analytical Results

:\$/L>^0#4d : SOIL (>0#4d SOIL)										./Ä-^01/Ä! +^*#&+4+^#Ä0&										./Ä-^01/Ä! +^*#&+4+^#Ä0&										./Ä-^01/Ä! +^*#&+4+^#Ä0&									
, \$01\$;!* (>0#4d SOIL)										, (Ä+9.0;& 9 678 5/Ä#										, (Ä+9.0;& 9 678 5/Ä#										, (Ä+9.0;& 9 678 5/Ä#									
EA055: Moisture Content										EA055: Moisture Content										EA055: Moisture Content										EA055: Moisture Content									
jÄ Moisture Content (dried @ 103°C)										jÄ Moisture Content (dried @ 103°C)										jÄ Moisture Content (dried @ 103°C)										jÄ Moisture Content (dried @ 103°C)									
EG005T: Total Metals by ICP-AES										EG005T: Total Metals by ICP-AES										EG005T: Total Metals by ICP-AES										EG005T: Total Metals by ICP-AES									
Lead										Lead										Lead										Lead									
EP080/071: Total Petroleum Hydrocarbons										EP080/071: Total Petroleum Hydrocarbons										EP080/071: Total Petroleum Hydrocarbons										EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction										C6 - C9 Fraction										C6 - C9 Fraction										C6 - C9 Fraction									
C10 - C14 Fraction										C10 - C14 Fraction										C10 - C14 Fraction										C10 - C14 Fraction									
C15 - C28 Fraction										C15 - C28 Fraction										C15 - C28 Fraction										C15 - C28 Fraction									
C29 - C36 Fraction										C29 - C36 Fraction										C29 - C36 Fraction										C29 - C36 Fraction									
jÄ C10 - C36 Fraction (sum)										jÄ C10 - C36 Fraction (sum)										jÄ C10 - C36 Fraction (sum)										jÄ C10 - C36 Fraction (sum)									
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions										EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions										EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions										EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction										C6 - C10 Fraction										C6 - C10 Fraction										C6 - C10 Fraction									
jÄ C6 - C10 Fraction minus BTEX (F1)										jÄ C6 - C10 Fraction minus BTEX (F1)										jÄ C6 - C10 Fraction minus BTEX (F1)										jÄ C6 - C10 Fraction minus BTEX (F1)									
>C10 - C16 Fraction										>C10 - C16 Fraction										>C10 - C16 Fraction										>C10 - C16 Fraction									
>C16 - C34 Fraction										>C16 - C34 Fraction										>C16 - C34 Fraction										>C16 - C34 Fraction									
>C34 - C40 Fraction										>C34 - C40 Fraction										>C34 - C40 Fraction										>C34 - C40 Fraction									
jÄ >C10 - C40 Fraction (sum)										jÄ >C10 - C40 Fraction (sum)										jÄ >C10 - C40 Fraction (sum)										jÄ >C10 - C40 Fraction (sum)									
jÄ >C10 - C16 Fraction minus Naphthalene (F2)										jÄ >C10 - C16 Fraction minus Naphthalene (F2)										jÄ >C10 - C16 Fraction minus Naphthalene (F2)										jÄ >C10 - C16 Fraction minus Naphthalene (F2)									
EP080: BTEXN										EP080: BTEXN										EP080: BTEXN										EP080: BTEXN									
Benzene										Benzene										Benzene										Benzene									
Toluene										Toluene										Toluene										Toluene									
Ethylbenzene										Ethylbenzene										Ethylbenzene										Ethylbenzene									
meta- & para-Xylene										meta- & para-Xylene										meta- & para-Xylene										meta- & para-Xylene									
ortho-Xylene										ortho-Xylene										ortho-Xylene										ortho-Xylene									
jÄ Sum of BTEX										jÄ Sum of BTEX										jÄ Sum of BTEX										jÄ Sum of BTEX									
jÄ Total Xylenes										jÄ Total Xylenes										jÄ Total Xylenes										jÄ Total Xylenes									
Naphthalene										Naphthalene										Naphthalene										Naphthalene									
EP080S: TPH(V)/BTEX Surrogates										EP080S: TPH(V)/BTEX Surrogates										EP080S: TPH(V)/BTEX Surrogates										EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4										1.2-Dichloroethane-D4										1.2-Dichloroethane-D4										1.2-Dichloroethane-D4									
Toluene-D8										Toluene-D8										Toluene-D8										Toluene-D8									
4-Bromofluorobenzene										4-Bromofluorobenzene										4-Bromofluorobenzene										4-Bromofluorobenzene									



Environmental

QUALITY CONTROL REPORT

Work Order : ES1527269

5 6733 , AURORA ENVIRONMENTAL CONSULTING

5.73Ä>3 , ?@#A?#B@CDE

F==(?! , *#BCG#-H\$

8N:Ä6 E8D5F<18#E<DIFJ<@F1AF#KL&&

" "PR.7" , 36:TÄ\.(Ä"796(.7:"73Ä >.7!) 367+>%> .%Ä)

ÄÄ>16:6 " , UH-#&S#LOKL#LMMO

*(Z)">3 , NNNN

C(=(#7):2"(, B*#DF@E8@<#BF[

5NCN5#7):2"(, NNNN

<Ä.P "(, 'A?#B@CDE

<63" , B*#DF@E8@<#BF[

V):3"#7):2"(, NNNN

'R6I#("P.(3#)P"(!="!#Ä74#P"(!="!#(P.(3WIX#j63R#3R6I#(!"8"7%#@"!) 3I#ÄPP 4#3.#3R"#Ä.P "WIX#ÄI#)2:633"=%##

'R6I#V)Ä 634#5.73(. #@"P.(3#>.73Ä67I#3R"#I. j67+#67I\(.Ä36.7 ,

• 1Ä2 (Ä3 (4#):P 6>Ä3"#W,J"X#@"P"Ä" Ä369"#(">"73Ä+"#6I/"7>"#W@":XÄ7=FF>"P3Ä7>"#16.63!

• ?"3R.=#B Ä7Q#W7BX#Ä7=#1Ä2.(Ä3.(4#5.73(. #<P6Q"#W15<X#P"Ä"Ä7=FF>"P3Ä7>"#16.63!

• ?Ä3(6_#<P6Q"#W7<X#@"Ä"Ä7=FF>"P3Ä7>"#16.63!



WORLD RECOGNISED
ACCREDITATION

ÄÄ !"#\$\$%Ä&'

EF'F#F>>("=63"=#

1Ä2 (Ä3 (4#OK\$

F>>("=63"=#I./#

>.:P 6Ä7>"#j63R#

A<CbA85#-M&K\$% , Ä26#<)22Ä

5" 67"#"5.7>"6>Ä.

*RÄ ÄQ#Ä73RÄQ"1.7"

<Ä7Z"IR76#V.36

<R.2R7Ä#5RÄ7=(Ä

'R6I# =.:>:"73# RÄI# 2""7# " ">3(.76>Ä 4#I 6+7"=# 24#"# Ä)3R.(6"=# 16+7Ä3.(6"i# 67=6>Ä3"-# j)## 8 ">3(.76>#! 6+767+RÄI# 2""7# >Ä(6#=#)3# 8

>.:P 6Ä7>"#j63R#P(.>")("I#IP">6/6"=#67#K-#5Ä@#*Ä(3#--%

ÄÄ !"#\$\$%Ä&'

<"76.(#<P">3(!> P6I3

<"76.(#C(+Ä76>#5R":6I3

1Ä2.(Ä3 (4#?Ä7Ä+"#N#C(+Ä76>I

<"76.(#5R":6I3#a. Ä36 "I

? "3Ä I#5.(=67Ä3.(

(!)%&*Ä#"Ä\$I+,"#&\$%-

<4=7"4#Ä7.(+Ä76>I

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5 6"73
*(Z">3
 , K# / #0
 , 8<-\$KMKH0
 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEc
 , B*#DF@E8@<#BF[

General Comments

'R"# Å7 Å 436>Å¶.>")="(#
="9".P"#=#P(>")("Å("#" :P 4"=#67#3R"#Å2I"7>"#/#=>):."73"=# 13Å7=Å(=I#.(#24#> 6"73#("Y)"13%
DR"("#.#.6I3)("#="3"("67Å36.7#RÅ#2""7#P"(/("=#("I) 3I#Å("#" P.(3"=#.7#Å#=(4#I"6+R3#2ÅI6I%
DR"("#Å#("P.(3"=# "I#3RÅ7#WVeX#("I) 3#6I#R6+R" (#3RÅ7#3R6#Å@#2X#="Y#3.#P(6.Å(4#Å.P "# _3(Å>3b=6+"I3Å3"#=6+)36I#Å7H)/6>6"73#Å.P "#/(#Å7 Å 4I6I%#DR"("3R"#I C@#.#Å#¶Iß3#=6I/"I#(/.#I3Å7=Å(=#I C@#3R6#.#Å4#2" #=")3.#R6+
h"4# , F 7.74.:)#¶#@"/"(/#3.#Å.P "#I#JR6>R#Å(" #7 3#IP">6I6>Å 4#PÅ(3#3R6I#I)[Q#(="(#2)3#I.(;"=#PÅ(3#.#3R"#V5#P((>"I#I# 3
5F<#E).2" (##5F<#(" +6I3(4#7).2" (#I(:#=#Å3Å2ÅI"#.Å673Å67"=#24#5R" :6>Å #F2I3(Å>3I#<"(96>"%#R"#5R" :6>Å #F2I3(Å>3I#<"(96>"#690Å6.7#/#3R"#F.:"(6>Å7#5R" :6>Å #<>6"34%#
1C@#I#16.63#.#I#("P.(367+#
@*##@#" Å369"#"(">"73Å+"#6I/"I"7>"
g###A7=6>Å3"i#I#Å6 "=#V5

- * $\tilde{A}^n$
- D.(Q#C)=(
- 5 6⁷3
- * (Zⁿ>3
- L#/#0
- 8<-\$KMKH0
- FJ@C@F#8eA@CE?8EF#5CE<J1AEc
- B*DF@E8@<#BF[

Laboratory Duplicate (DUP) Report

[illegible]

Laboratory sample ID		Client sample ID	Method: <Compound		Laboratory Duplicate (DUP) Report				
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (QC Lot: 170482)									
8<-\$KMKHON&K	F7.74.:)#	8F&\$S\$N-&L.#? 6(3)("H5.73"73#W=(6"=#T#-&Lk5X	NNNN	-	i	H%H	O%L	KK%&	E #16:63
8<-\$KMKHON&K\$	F7.74.:)#	8F&\$S\$N-&L.#? 6(3)("H5.73"73#W=(6"=#T#-&Lk5X	NNNN	-	i	-0%H	K-%&	H%OM	&#N#K&i
EA055: Moisture Content (QC Lot: 170483)									
8<-\$KMKHON&0	<BL#L%ONS%&#	8F&\$S\$N-&L.#? 6(3)("H5.73"73#W=(6"=#T#-&Lk5X	NNNN	-	i	K&%S	K&%H	8%OSH	&#N#K&i
8<-\$KMKHON&K&	V<L#	8F&\$S\$N-&L.#? 6(3)("H5.73"73#W=(6"=#T#-&Lk5X	NNNN	-	i	KM%\$	KS%O	-&%S	&#N#K&i
EG005T: Total Metals by ICP-AES (QC Lot: 171857)									
8<-\$KMKHON&-&	<BSH%&SN&%H#	8c&\$\$.#1"Ä=	MSLONOKN-	\$	:+bQ+	-0	-M	-&%H	&#N#K&i
8<-\$KMKK\$N&\$&\$	F7.74.:)#	8c&\$\$.#1"Ä=	MSLONOKN-	\$	:+bQ+	S0	LK	L0%O	E #16:63
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 169984)									
8<-\$KMKHON&-	<B-#&%ON-%&#	8*O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
8<-\$KMKHON&--	<BSH%&LNK%\$#	8*O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 169991)									
8<-\$KMKMSN&-	F7.74.:)#	8*O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
8<-\$KMKSON&-	F7.74.:)#	8*O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170059)									
8<-\$KMKHON&-	<B-#&%ON-%&#	8*M-&.#5\$#N#5KO#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
		8*M-&.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
		8*M-&.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:+bQ+	e\$&	e\$&	8%&&	E #16:63
8<-\$KMKHON&--	<BSH%&LNK%\$#	8*M-&.#5\$#N#5KO#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
		8*M-&.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
		8*M-&.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:+bQ+	e\$&	e\$&	8%&&	E #16:63
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170100)									
8<-\$KMKHON&K-	F7.74.:)#	8*M-&.#5\$#N#5KO#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
		8*M-&.#5KO#N#5LH#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
		8*M-&.#5-&#N#5-S#Ä(Ä>36.7	NNNN	\$&	:+bQ+	e\$&	e\$&	8%&&	E #16:63
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 170122)									
8<-\$KMKH-N&S-	F7.74.:)#	8*O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
8<-\$KMKO0N&&S	F7.74.:)#	8*O&.#5H#N#50#Ä(Ä>36.7	NNNN	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 169984)									
8<-\$KMKHON&-	<B-#&%ON-%&#	8*O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
8<-\$KMKHON&--	<BSH%&LNK%\$#	8*O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 169991)									
8<-\$KMKMSN&-	F7.74.:)#	8*O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:+bQ+	e-&	e-&	8%&&	E #16:63
8<-\$KMKSON&-	F7.74.:)#	8*O&.#5H#N#5-&#Ä(Ä>36.7	5Hl5-&	-&	:+bQ+	e-&	e-&	8%&&	E #16:63



Å+
D:(Q#C(="(
5 6"73
*(Z">3
S# / #0
, 8<-\$KMKH0
, FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEC
, B*#DF@E8@<#BF[

Laboratory sample ID			Client sample ID	Method:Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
<2N?Ä3(6: SOIL											
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170059)											
8<-\$KMKHON&&-		<B-#8%ON-%&#	8*&M-,#j5-H#N#5LS#Ä(Ä>36.7	NNNN -&&		: +bQ+	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5LS#N#5S&#Ä(Ä>36.7	NNNN -&&		: +bQ+	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5-&#N#5-H#Ä(Ä>36.7	j5-&i5-H \$&		: +bQ+	e\$&	e\$&	&%&&	E #16:63	
			8*&M-,#j5-H#N#5LS#Ä(Ä>36.7	NNNN -&&		: +bQ+	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5LS#N#5S&#Ä(Ä>36.7	NNNN -&&		: +bQ+	e-&&	e-&&	&%&&	E #16:63	
8<-\$KMKHON&--		<BS#K%LNK%\$#	8*&M-,#j5-&#N#5-H#Ä(Ä>36.7	j5-&i5-H \$&		: +bQ+	e\$&	e\$&	&%&&	E #16:63	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170100)											
8<-\$KMKHON&K-		F7.74:.)#	8*&M-,#j5-H#N#5LS#Ä(Ä>36.7	NNNN -&&		: +bQ+	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5LS#N#5S&#Ä(Ä>36.7	NNNN -&&		: +bQ+	e-&&	e-&&	&%&&	E #16:63	
			8*&M-,#j5-&#N#5-H#Ä(Ä>36.7	j5-&i5-H \$&		: +bQ+	e\$&	e\$&	&%&&	E #16:63	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 170122)											
8<-\$KMKH-N&S-		F7.74:.)#	8*&O&,#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	: +bQ+	e-&	e-&	&%&&	E #16:63	
			8*&O&,#5H#N#5-&#Ä(Ä>36.7	5HI5-&	-&	: +bQ+	e-&	e-&	&%&&	E #16:63	
EP080: BTEXN (QC Lot: 169984)											
8<-\$KMKHON&&-		<B-#8%ON-%&#	8*&O&,#B"7"7"	M-NSLNK &%K	&%K	: +bQ+	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
				-&HNSKNL							
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#."j"7"	-&ONOO NL &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#EÄPR3RÄ "7"	0-NK&NL -	-	: +bQ+	e-	e-	&%&&	E #16:63	
			8*&O&,#B"7"7"	M-NSLNK &%K	&%K	: +bQ+	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
				-&HNSKNL							
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#."j"7"	-&ONOO NL &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#EÄPR3RÄ "7"	0-NK&NL -	-	: +bQ+	e-	e-	&%&&	E #16:63	
			EP080: BTEXN (QC Lot: 169991)								
8<-\$KMKHON&&-		F7.74:.)#	8*&O&,#B"7"7"	M-NSLNK &%K	&%K	: +bQ+	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
				-&HNSKNL							
			8*&O&,#(3R.NG4 "7"	0\$NSMNH &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
8<-\$KMKHON&&-		F7.74:.)#	8*&O&,#."j"7"	-&ONOO NL &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#EÄPR3RÄ "7"	0-NK&NL -	-	: +bQ+	e-	e-	&%&&	E #16:63	
			8*&O&,#B"7"7"	M-NSLNK &%K	&%K	: +bQ+	e&%K	e&%K	&%&&	E #16:63	
			8*&O&,#83R4 2"7"7"	-&&NS-NS &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	
			8*&O&,#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL# &%\$	&%\$	: +bQ+	e&%\$	e&%\$	&%&&	E #16:63	



Å+
D,(Q#C(="(, \$#/ #0
5 6"73 , 8<-\$KMKH0
*(Z">3 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEc
 , B*#DF@E8@<#BF[

<2N?Ã3(6: 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: BTEXN (QC Lot: 169991) - continued									
8<-\$KMK\$0N&&-	F7.74:.)#	8*8O&.#(3R.NG4 "7"	0\$NSMNH	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#.)7"	-&ONOOHL	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#EÃPR3RÃ "7"	0-NK&NL	-	:+bQ+	e-	e-	8%&&	E #16:63
EP080: BTEXN (QC Lot: 170122)									
8<-\$KMKH+N&S-	F7.74:.)#	8*8O&.#B"7"7"	M-NSLNK	8%K	:+bQ+	e&%K	e&%K	8%&&	E #16:63
		8*8O&.#83R4 2"7"7"	-&&NS-NS	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#:"3ÃN#m#PÃ(ÃNG4 "7"	-&ONLONL#	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
			-&HNSKNL						
	F7.74:.)#	8*8O&.#(3R.NG4 "7"	0\$NSMNH	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#.)7"	-&ONOOHL	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#EÃPR3RÃ "7"	0-NK&NL	-	:+bQ+	e-	e-	8%&&	E #16:63
		8*8O&.#B"7"7"	M-NSLNK	8%K	:+bQ+	e&%K	e&%K	8%&&	E #16:63
		8*8O&.#83R4 2"7"7"	-&&NS-NS	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#:"3ÃN#m#PÃ(ÃNG4 "7"	-&ONLONL#	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
			-&HNSKNL						
8<-\$KMK00N&&S	F7.74:.)#	8*8O&.#(3R.NG4 "7"	0\$NSMNH	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#.)7"	-&ONOOHL	8%\$	:+bQ+	e&%\$	e&%\$	8%&&	E #16:63
		8*8O&.#EÃPR3RÃ "7"	0-NK&NL	-	:+bQ+	e-	e-	8%&&	E #16:63



A+
; H# / #0
; 8<-\$KMKH0
D,(Q#C/="(
; FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEC
5 6"73
*(Z">3
; B*#DF@E8@<#BFI

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

'R"# Y)Ä 634# 73(. # 3"(. # ?"3R.==# 1Ä2.(Ä3.(4#B Ä7Q#"/" (# 3.#Ä7#Ä7Ä 43"#"# .Ä3(6_#3# J#6>R#Ä #/"Ä+73# Ä(" #Ä==="#67#6R"#Ä: "#9.):"# .(#P(.P.(36.7# Ä#))"-# 67#3Ä7=Ä(=#Ä.P"# P("PÄ(Ä36.%#R"# P)(P.I"# .# 3R6I#Ä/5# PÄ(Ä:"3"(. # 0# 3.# : 763.(#P.3"736Ä #Ä2.(Ä3.(4#>73Ä.67Ä36.7%#R"# Y)Ä 634# 73(. # 3"(.# 1Ä2.(Ä3.(4# 5.73(. # <Ä.P"# W15<X#"/"I(# 3.# Ä#>'(36/6"=#/"/"7">"# : Ä3"(6Ä #/ #Ä#Q7.J7# 673"(/"7">"# (/"# : Ä3(6_#P6Q"=#J63R#3Ä(+3# Ä7Ä 43"1%#R"#P)(P.I"#.#3R6I#Ä/5#PÄ(Ä:"3"(.#6I#3.#.763.(#:"3#P("6I6.7#Ä7=Ä>>)(Ä>4#67="P"7="73#.#/Ä.P"#Ä3(6_ %#Ä7Ä8>8@#16.63I#Ä("#2ÄI"=#.7#I3Ä36I36>Ä #9Ä)Ä36.7#.#/P(<.>#I5<%<2N?Ä3(6:_SOIL

Method: Compound				Laboratory Control Spike (LCS) Report				
Method Blank (MB) Report		Spike Concentration		Spike Recovery (%)		Recovery Limits (%)		
Result	Unit	LOR	CAS Number	Low	High	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 171857)								
8c&\$', #1"Ä=	: +bQ+	\$	MSLON0KN	e\$		0S%-	OH	-KS
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169984)								
8*O&, #5H#N#50#Ä(Ä>36.7	:bQ+	-&	NNNN	e-&		0K%&	HO	-KO
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169991)								
8*O&, #5H#N#50#Ä(Ä>36.7	:bQ+	-&	NNNN	e-&		0&%\$	HO	-KO
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)								
8*M-, #5-&N#5-S#Ä(Ä>36.7	:bQ+	\$&	NNNN	e\$&		-&0	M-	-L-
8*M-, #5-\$#N#5KO#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-H	MS	-LO
8*M-, #5KO#N#5LH#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-&0	HS	-KO
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170100)								
8*M-, #5-&N#5-S#Ä(Ä>36.7	:bQ+	\$&	NNNN	e\$&		---	M-	-L-
8*M-, #5-\$#N#5KO#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-\$	MS	-LO
8*M-, #5KO#N#5LH#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-&L	HS	-KO
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170122)								
8*O&, #5H#N#50#Ä(Ä>36.7	:bQ+	-&	NNNN	e-&		MH%&	HO	-KO
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169984)								
8*O&, #5H#N#5-&#Ä(Ä>36.7	:bQ+	-&	5HI5-&	e-&		0K%S	HO	-KO
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169991)								
8*O&, #5H#N#5-&#Ä(Ä>36.7	:bQ+	-&	5HI5-&	e-&		0&%L	HO	-KO
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170059)								
8*M-, #j5-&N#5-H#Ä(Ä>36.7	:bQ+	\$&	j5-&I5-H	e\$&		-&\$	M&	-L&
8*M-, #j5-H#N#5LS#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-M	MS	-LO
8*M-, #j5LS#N#5S&#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-&-	HL	-L-
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170100)								
8*M-, #j5-&N#5-H#Ä(Ä>36.7	:bQ+	\$&	j5-&I5-H	e\$&		00%S	M&	-L&
8*M-, #j5-H#N#5LS#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-K&	MS	-LO
8*M-, #j5LS#N#5S&#Ä(Ä>36.7	:bQ+	-&&	NNNN	e-&&		-&S	HL	-L-
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170122)								
8*O&, #5H#N#5-&#Ä(Ä>36.7	:bQ+	-&	5HI5-&	e-&		ML%L	HO	-KO
EP080: BTEXN (QCLot: 169984)								
8*O&, #B"7"7"	: +bQ+	&%K	M-NSLNK	e&%K		-#-+bQ+	HK	-H
8*O&, #83R4 2'7"7"	:bQ+	&%\$	-&&NS-NS	e&%\$		-#-+bQ+	\$O	-O



Ä+
D,(Q#C(="(
5 6"73
*(Z">3
 , M# / #0
 , 8<-\$KMKH0
 , FJ@C@F#8EaA@CE?8EF1#5CE<J1'AEC
 , B*#DF@E8@<#BF[

Method: Compound				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
EP080: BTEXN (QCLot: 169984) - continued				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
CAS Number	LOR	Unit				LCS	Low	High	
8*O&.#:3ÄN#m#PÄ(ÄNG4 "7"	&%\$	: +bQ+	e&%\$	K#:+bQ+	0M%O	H&			-K&
8*O&.#EÄPR3RÄ "7"	-	: +bQ+	e-	#:+bQ+	0-%K	HK			-LO
8*O&.#:(3R.NG4 "7"	&%\$	: +bQ+	e&%\$	#:+bQ+	0M%M	H&			-K&
8*O&.#.)7"	&%\$	:bQ+	e&%\$	#:+bQ+	0L%O	HK			-KO
EP080: BTEXN (QCLot: 169991)									
8*O&.#B"7 "7"	&%K	: +bQ+	e&%K	#:+bQ+	0-%O	HK			-H
8*O&.#83R4 2"7 "7"	&%\$	:bQ+	e&%\$	#:+bQ+	0\$%&	\$O			-O
8*O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	&%\$	: +bQ+	e&%\$	K#:+bQ+	0S%\$	H&			-K&
8*O&.#EÄPR3RÄ "7"	-	: +bQ+	e-	#:+bQ+	0K%&	HK			-LO
8*O&.#:(3R.NG4 "7"	&%\$	: +bQ+	e&%\$	#:+bQ+	0M%L	H&			-K&
8*O&.#.)7"	&%\$	:bQ+	e&%\$	#:+bQ+	0M%K	HK			-KO
EP080: BTEXN (QCLot: 170122)									
8*O&.#B"7 "7"	&%K	: +bQ+	e&%K	#:+bQ+	M0%-	HK			-H
8*O&.#83R4 2"7 "7"	&%\$	:bQ+	e&%\$	#:+bQ+	HM%K	\$O			-O
8*O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	&%\$	: +bQ+	e&%\$	K#:+bQ+	HO%H	H&			-K&
8*O&.#EÄPR3RÄ "7"	-	: +bQ+	e-	#:+bQ+	MS%M	HK			-LO
8*O&.#:(3R.NG4 "7"	&%\$	: +bQ+	e&%\$	#:+bQ+	HO%H	H&			-K&
8*O&.#.)7"	&%\$	:bQ+	e&%\$	#:+bQ+	OO%0	HK			-KO
Matrix Spike (MS) Report									
Laboratory sample ID		Client sample ID	Method: Compound		CAS Number	Spike Concentration	SpikeRecovery(%)	Recovery Limits (%)	
EG005T: Total Metals by ICP-AES (QCLot: 171857)			8c&&\$:#1"Ä=		MSLON0KN-	K\$&#:+bQ+	-&S	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	-K-	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169984)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 169991)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059)			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN	LK%\$#:+bQ+	---	M&	-L&
8<-\$KMKHON&&-<B-#&%ON-%&#			8*O&.#5H#N#50#Ä(Ä>36.7		NNNN				

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- *('Z'">3
- B*DF@E8@<#BF[

Matrix Spike (MS) Report								
			Spike	SpikeRecovery(%)	Recovery Limits (%)			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170059) - continued								
8<-\$KMKHON&<-	<B-#&%ON-%&#	8*&M-,#5-\$#N#5KO#A(Å>36.7	NNNN	KL-O#:-+bQ+	-&-	\$L		-L-
		8*&M-,#5K0#N#5LH#A(Å>36.7	NNNN	-M-S#:-+bQ+	-K&	\$K		-LK
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170100)								
8<-\$KMKHON&<-	F7.74:.)#	8*&M-,#5-&#N#5-S#A(Å>36.7	NNNN	\$KL#:-+bQ+	OH%H	ML		-LM
		8*&M-,#5-\$#N#5KO#A(Å>36.7	NNNN	KL-O#:-+bQ+	-&K	\$L		-L-
		8*&M-,#5K0#N#5LH#A(Å>36.7	NNNN	-M-S#:-+bQ+	-K&	\$K		-LK
EP080/071: Total Petroleum Hydrocarbons (QCLot: 170122)								
8<-\$KMKH-N&S-	F7.74:.)#	8*&O&,#5H#N#50#A(Å>36.7	NNNN	LK%\$#:-+bQ+	-&K	M&		-L&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169984)								
8<-\$KMKHON&<-	<B-#&%ON-%&#	8*&O&,#5H#N#5-&#A(Å>36.7	5HI5-&	LM%\$#:-+bQ+	-K&	M&		-L&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 169991)								
8<-\$KMK\$ON&<-	F7.74:.)#	8*&O&,#5H#N#5-&#A(Å>36.7	5HI5-&	LM%\$#:-+bQ+	-&O	M&		-L&
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170059)								
8<-\$KMKHON&<-	<B-#&%ON-%&#	8*&M-,#5-&#N#5-H#A(Å>36.7	j5-&I5-H	OH&#:-+bQ+	OH%K	ML		-LM
		8*&M-,#5-H#N#5LS#A(Å>36.7	NNNN	LKKL#:-+bQ+	-H	\$L		-L-
		8*&M-,#5LS#N#5S&#A(Å>36.7	NNNN	-&O\$#:-+bQ+	-&	\$K		-LK
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170100)								
8<-\$KMKHON&<-	F7.74:.)#	8*&M-,#5-&#N#5-H#A(Å>36.7	j5-&I5-H	OH&#:-+bQ+	-&&	ML		-LM
		8*&M-,#5-H#N#5LS#A(Å>36.7	NNNN	LKKL#:-+bQ+	-O	\$L		-L-
		8*&M-,#5LS#N#5S&#A(Å>36.7	NNNN	-&O\$#:-+bQ+	-&O	\$K		-LK
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 170122)								
8<-\$KMKH-N&S-	F7.74:.)#	8*&O&,#5H#N#5-&#A(Å>36.7	5HI5-&	LM%\$#:-+bQ+	-&-	M&		-L&
EP080: BTEXN (QCLot: 169984)								
8<-\$KMKHON&<-	<B-#&%ON-%&#	8*&O&,#B"7" "7"	M-NSLNK	K%\$#:-+bQ+	O0%K	M&		-L&
		8*&O&,#83R4 2"7" "7"	-&#NS-NS	K%\$#:-+bQ+	-&K	M&		-L&
		8*&O&,#"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL#	K%\$#:-+bQ+	-M	M&		-L&
			-&HNSKNL					
		8*&O&,#EÄPR3RÄ "7"	0-NK&NL	K%\$#:-+bQ+	OS%K	M&		-L&
		8*&O&,#(3R.NG4 "7"	O\$NSMNH	K%\$#:-+bQ+	-&-	M&		-L&
		8*&O&,#.)7"	-&ONOONL	K%\$#:-+bQ+	-K	M&		-L&
EP080: BTEXN (QCLot: 169991)								
8<-\$KMK\$ON&<-	F7.74:.)#	8*&O&,#B"7" "7"	M-NSLNK	K%\$#:-+bQ+	OK%O	M&		-L&
		8*&O&,#83R4 2"7" "7"	-&#NS-NS	K%\$#:-+bQ+	OK%L	M&		-L&
		8*&O&,#"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL#	K%\$#:-+bQ+	0-%S	M&		-L&
			-&HNSKNL					
8*&O&,#EÄPR3RÄ "7"			0-NK&NL	K%\$#:-+bQ+	OH%K	M&		-L&



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 , B*#DF@E8@<#BF[

		Matrix Spike (MS) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP080: BTEXN (QCLot: 169991) - continued							
8-<\$KMK\$0N&&-	F7.74:.)#	8*&O&.#(3R.NG4 "7"	0\$NSMNH	K%\$#:+bQ+	0-%K	M&	- L&
		8*&O&.#.)7"	-&ONOO NL	K%\$#:+bQ+	0L%K	M&	- L&
EP080: BTEXN (QCLot: 170122)							
8-<\$KMKH-N&S-	F7.74:.)#	8*&O&.#B"7"7"	M-NSLNK	K%\$#:+bQ+	00%0	M&	- L&
		8*&O&.#83R4 2"7"7"	-&&NS-NS	K%\$#:+bQ+	00%-	M&	- L&
		8*&O&.#:"3ÄN#m#PÄ(ÄNG4 "7"	-&ONLONL#	K%\$#:+bQ+	00%-	M&	- L&
			-&HNSKNL				
		8*&O&.#EÄPR3RÄ "7"	0-NK&NL	K%\$#:+bQ+	00%L	M&	- L&
		8*&O&.#(3R.NG4 "7"	0\$NSMNH	K%\$#:+bQ+	-&-	M&	- L&
		8*&O&.#.)7"	-&ONOO NL	K%\$#:+bQ+	0L%&	M&	- L&



QA/QC Compliance Assessment for DQO Reporting

Work Order	: ES1527269	"#\$!	%&()***
/01/2-	%AURORA ENVIRONMENTAL CONSULTING	+#+,Ä#-(Ä.	%3241Ä(2512-#0'614171(2'8.92!.
/12-#:-	%<Ä=;'><?@A	Ä0IBC(2!	%DE&FGFHHJH****
"Ä(K!:-	%@"@L<A3<8'>LM	6#-!8#5B017<!;114!9	%NOFP 0FGO&*
81-J	%@"@L<A3<8'>LM	=77 !6#-!	%O*FL \$FGO&*
8#5B01Ä	%Ä=;'><?@A	A(Q()7#5B017'Ä!;114!9	%GJ
?Ä9!Ä'2 5,Ä	%FFFF	A(Q()7#5B017#2#0.7!9	%GJ

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

>Ä11)5I-C(97 55#Ä117#29Ä!)Ä!2:17#Ä!#07'(BÄ(419!9-('771 7-12'-Ä#;!#;101-Q

Summary of Outliers

Outliers : Quality Control Samples

ÄC17ÄB(Ä-C1\$C01\$C-7(' -01Ä7)0\$S\$9'12'-C!R #01-./3Ä(Ä<B(Ä-Q

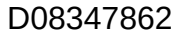
- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

#Å[1]: SOIL

Method		Sample Date	Date extracted		Date analysed		ÃÄ /#S#			
Container / 4\$ÃÄ+5 6\$ / +728#9			%&(')\$*Ä+,+/- / ('\$*Ä		%0 11 '\$*Ä		21.+3*(+ Ä /#S#			
EA055: Moisture Content										
Soil Glass Jar - Unpreserved (EA055-103)			30-Jul-2015	----	FFFF	FFFF	31-Jul-2015	&NFL\$FGO&*	✓	
8>&'GQNFQGQ^ 8>G'OQHF&QQ^ 8>G'NQHFJQO^ 8>N'GQNFQGQ^ 8>J'OQJFOQE^ 8>J'NQHFJQO^ 8>*GQ*FNQO^ 8>E'GQHFNQO^ 8>I'GQ*FNQO^ R8N^										
R8J										
EG005T: Total Metals by ICP-AES										
Soil Glass Jar - Unpreserved (EG005T)				30-Jul-2015	03-Aug-2015	GEFP#2FGO&E	✓	04-Aug-2015	GEFP#2FGO&E	✓
8>&'GQNFQGQ^ 8>G'OQHF&QQ^ 8>G'NQHFJQO^ 8>N'GQNFQGQ^ 8>J'OQJFOQE^ 8>J'NQHFJQO^ 8>*GQ*FNQO^ 8>E'GQHFNQO^ 8>I'GQ*FNQO^										
8>I'NQ*FJQO										



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#-Ä1: SOIL 34#0 # 1(2%*c_ (0912\$-15t'Ä#C'b' ✓'c@1-C12C(0912\$-15tQ'

Method	Sample Date	Date extracted	%&(')\$*Ä+ + / ('\$*Ä	%0 11 '\$*Ä	Date analysed	ÄÄ !"#\$#	%0 11 '\$*Ä
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP071)							
8>&'GQNFQG*^	30-Jul-2015	31-Jul-2015	&NFL\$FGO&*	✓	03-Aug-2015	OVF8BFGO&*	✓
8>G'OQHF&QO^							
8>&'NQHFJQO^							
8>G'GQNFQG*^							
8>N'OQHF&QO^							
8>N'GQNFQG*^							
8>J'OQJFOQE^							
8>J'NQHFJQO^							
8>*GQ*FNQO^							
8>E'GQHFNQO^							
8>'OQ*F&QO^							
8>'NQ*FJQO^							
R8J							
EP080S: TPH(V)/BTEX Surrogates							
Soil Glass Jar - Unpreserved (EP080)							
8>&'GQNFQG*^	30-Jul-2015	31-Jul-2015	&NFL\$FGO&*	✓	03-Aug-2015	&NFL\$FGO&*	✓
8>G'OQHF&QO^							
8>&'NQHFJQO^							
8>G'GQNFQG*^							
8>N'OQHF&QO^							
8>N'GQNFQG*^							
8>J'OQJFOQE^							
8>J'NQHFJQO^							
8>*GQ*FNQO^							
8>E'GQHFNQO^							
8>'OQ*F&QO^							
8>'NQ*FJQO^							
Ä<="g"=d3^							
Ä8/							
Soil Glass Jar - Unpreserved (EP080)							
R8J	30-Jul-2015	31-Jul-2015	&NFL\$FGO&*	✓	31-Jul-2015	&NFL\$FGO&*	✓



"#S!
@(\u0022\u0026amp;\u0026amp;*GIGEV
%LW<?<L'3AX=<?A;3A\u0026amp;L+?'A8W+\u0026amp;A=Y
"(\u0026amp;K):-
%>"@L<A3<8>LM

Quality Control Parameter Frequency Compliance

ACI)\00[12\$A\u0026amp;B(\u0026amp;A-7 55\$A\u0026amp;1717-C)\u0026amp;A' 12: '\u0026amp;0# (\u0026amp;A-'\u0026amp;R' 7#5B017#2#0.719[1-C12-C\u0026amp;#2#0.-1.#0'0(-S7T'12[C1:C-C\u0026amp;17 ,\u0026amp;_--197#5B01S7T'#7Sj\u0026amp;A\u0026amp;TB\u0026amp;A:\u0026amp;7719Q\u0026amp;L:- #0\u0026amp;A#;\u0026amp;17C(09;\u0026amp;A\u0026amp;# -\u0026amp;A'-C#2'(\u0026amp;A' #0-'
-C\u0026amp;1[\u0026amp;B\u0026amp;:-19\u0026amp;A#-1Q\u0026amp;L\u0026amp;17-12\$'\u0026amp;)\u0026amp;A#;C\u0026amp;17'17B\u0026amp;A(41919'12-C\u0026amp;18 5 5#A\u0026amp;'\u0026amp;)\u0026amp;? -01\u0026amp;A7Q

#\u0026amp;A'1: soil 34#0 #-1(2%*\u0026amp;cR #01:- '(\u0026amp;2-\u0026amp;A\u0026amp;0')\u0026amp;A' 12: '\u0026amp;2(-[1-C127B\u0026amp;1)1#-1(2B \u0026amp;'\u0026amp;cR #01:- '(\u0026amp;2-\u0026amp;A\u0026amp;0')\u0026amp;A' 12: '\u0026amp;J1-C127B\u0026amp;1)1#-1(2Q'

R #01:-'(\u0026amp;2-\u0026amp;A\u0026amp;08#5B01'\u0026amp;A;B\u0026amp;I	>.'?*\u0026amp;	4*1\u0026amp;A'	Actual	Expected	%0'1' S*\u0026amp;A
+\u0026amp;A'(\u0026amp;A-'\u0026amp;6 B01#-17'S6W"TT					
:(17- \u0026amp;A'1'(\u0026amp;2-12-	3LO**F&ON	G	10.00	10.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A'(\u0026amp;#0'1;#\u0026amp;07'.'='FL38	3YOO*\u0026amp;A	G	10.00	10.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'F'81514(0#-10'e\u0026amp;A#;-1(2	3'O\u0026amp;I&	G	10.00	10.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'X(0#-1017>\u0026amp;A3f	3'OHO	G	10.00	10.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
+\u0026amp;A'(\u0026amp;A-'\u0026amp;2-\u0026amp;A\u0026amp;0'8#5B017'S+8T					
\u0026amp;A'(\u0026amp;#0'1;#\u0026amp;07'.'='FL38	3YOO*\u0026amp;A	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'F'81514(0#-10'e\u0026amp;A#;-1(2	3'O\u0026amp;I&	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'X(0#-1017>\u0026amp;A3f	3'OHO	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
!-C\u0026amp;19>0#2U7'S>T					
\u0026amp;A'(\u0026amp;#0'1;#\u0026amp;07'.'='FL38	3YOO*\u0026amp;A	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'F'81514(0#-10'e\u0026amp;A#;-1(2	3'O\u0026amp;I&	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'X(0#-1017>\u0026amp;A3f	3'OHO	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
#\u0026amp;A'1'8B1U17'S;8T					
\u0026amp;A'(\u0026amp;#0'1;#\u0026amp;07'.'='FL38	3YOO*\u0026amp;A	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'F'81514(0#-10'e\u0026amp;A#;-1(2	3'O\u0026amp;I&	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-
\u0026amp;A<_'X(0#-1017>\u0026amp;A3f	3'OHO	&	5.00	5.00	A3";GO&N"8:C\u0026amp;19 0'>SNT#29'L+8'R/8N'\u0026amp;A' 1\u0026amp;A\u0026amp;512-



"#S!
@(\ÄU"²Ä9iÄ
/0112-
"Ä(KI:-
%*'()**
%38&*GIGEV
%LW<?<L'3AX=<?A:3AÄL+'17A8W+Ä=AY
%>"@L<A3<8>LM

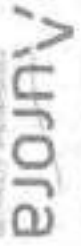
Brief Method Summaries

ÄC!#2#0-1.#0BÄ:(9 Ä17 719:.-C!3241Ä(2512-#0614171(2'C# 4! ,!129!4!0(B!9)Ä(5!7-#;017C!9!12-Ä2#-(2#00:Ä!:(S21Z!9B Ä:(9 Ä!77 .C#7-C(7!B; 017C!9!.-C!W83"L^L" L^!L8#29A 3":Q=2'C(7!'
9!4!0(B!9BÄ:(9 Ä17 #Ä!"!5B0(!9!12-C!#; 7!2:!()9(5!2-!9' 7-#29#Ä97(Ä! .:0112-Ä! !7-Q'ÄC!)00(12\$Ä!B(Ä-BÄ(4!9!7 Ä!B-1(27')-C!#2#0-1.#0BÄ:(!9 Ä!7!5B0(!9)Ä!7 0-7Ä!B(Ä-!9!12-C!
/!Ä-1)!#1')L2#0.717Q8(Ä:17)Ä(5!7C!C!L+8!5!-C(97'C#4!;! 129!4!0(B!9#Ä!BÄ(4!9!9!1-C12'-C!;!C(9!6!7-Ä!B-1(27Q

ÄÄ !""\$) !+>. ?' @#	>. ?' @	> '\$&	>. ?' @+2.#)('\$*Ä#	>. ?' @+2.#)('\$*Ä#
;(17- Ä!/(2-!2-	3LO**F&ON	8?+=	=2FC(7!Q'L\$Ä#4!5!-Ä! :BÄ:(!9 Ä! #7!9(2'!1\$C-0(77(4!Ä# &G'C(Ä!9Ä.12\$B!Ä!19#-&ONF&O*9!\$Ä!7/Q"	ÄC17'5!-C(9!17:(5B0!#2-!1-C'A3";SGO&NT'8:C!9 0!>SNT'8!:-1(2 '!Q& #29'Ä#;0!&'S&J'9#.'C(09!2\$'-15!TQ
Ä(-#0':!#07'.'='FL38	3YOO*Ä	8?+=	=2'C(7!%<!))Ä!2:!9-('L _L'N&GOB'W83"L'8@HJEF'E&OQ";!#07 #Ä!9!-Ä5!12!9)(00(12\$#2#BBÄ(BÄ!#-!' #:19'9!\$!7-1(2')-C!7(10Q'ÄC!='L38-!;C2! '!(217!7#5B0 !7!2#B0#75#^!5!1--12\$#':C#Ä#:-!Ä!7-1:' 7B!:-Ä 5' #7!9(2'5!-#07'BÄ!7!2-Q'=2!271-1!7#-7!0!:-!9!#4! 0!2\$-C7#Ä!:(5B#Ä!9#\$#127--C(7!')5#Ä!1[5#-:C!97-#29#Ä97Q'ÄC!17'5!-C(9!17:(5B0!#2-!1-C'A3";SGO&NT'8C!9 0!>SNT	#Ä!9!-Ä5!12!9)(00(12\$#2#BBÄ(BÄ!#-!' !7!2#B0#75#^!5!1--12\$#':C#Ä#:-!Ä!7-1:' 0!2\$-C7#Ä!:(5B#Ä!9#\$#127--C(7!')5#Ä!1[5#-:C!97-#29#Ä97Q'ÄC!17'5!-C(9!17:(5B0!#2-!1-C'A3";SGO&NT'8C!9 0!>SNT
Ä< 'F'8!5!14(0#-10!eÄ#:-1(2	3"OI&	8?+=	SW83"L'8@HJEF'FHO&*L'T'8#5B0!;!Ä#:-7#Ä!#2#0.7!9'./#B100# Ä.'Y!e=6#29' #2-1)1!9#\$#127-#0U#2!' 7-#29#Ä97(4!Ä-C!Ä#2\$!/&O'F!JQO	SW83"L'8@HJEF'FHO&*L'T'8#5B0!;!Ä#:-7#Ä!#2#0.7!9'./#B100# Ä.'Y!e=6#29' #2-1)1!9#\$#127-#0U#2!' 7-#29#Ä97(4!Ä-C!Ä#2\$!/&O'F!JQO
Ä< _X(0#-10!7!>Ä3f	3"OHO	8?+=	SW83"L'8@HJEF'FHGEO>T'3!-Ä#:-7#Ä!#2#0.7!9'./#Ä!#29'ÄÄ#B'!#B100#Ä.'Y!8Q!R #2-1)!#1(2'17'.,' :(5B#Ä!17(2#\$#127-#2!7-#017C!9""B(12:~#01.Ä#-1(2': ÄÄ!Q	SW83"L'8@HJEF'FHGEO>T'3!-Ä#:-7#Ä!#2#0.7!9'./#Ä!#29'ÄÄ#B'!#B100#Ä.'Y!8Q!R #2-1)!#1(2'17'.,' :(5B#Ä!17(2#\$#127-#2!7-#017C!9""B(12:~#01.Ä#-1(2': ÄÄ!Q
-/(('\$Ä+>. ?' @#	>. ?' @	> '\$&	>. ?' @+2.#)('\$*Ä#	>. ?' @+2.#)('\$*Ä#
!-C#2(01:3!-Ä#:-1(2')8(107')Ä" Ä\$!	g ?<Y&E	8?+=	SW83"L'8@HJEF'F*ONOLT*\$()7(0!9!177'C#U!2!1-C7 ÄÄ(\$#-!#28O5+5!-C#2(0BÄ!1(Ä-('#2#0.7!7'./" Ä\$!' #29'ÄÄ#B	SW83"L'8@HJEF'F*ONOLT*\$()7(0!9!177'C#U!2!1-C7 ÄÄ(\$#-!#28O5+5!-C#2(0BÄ!1(Ä-('#2#0.7!7'./" Ä\$!' #29'ÄÄ#B'F"Y!^8Q
Ä 5,0!Ä3!-Ä#:-1(2')8(0!97	?<Y&I	8?+=	=2FC(7!^!;C#21 #0#\$1-# 1(2'S- 5,0!ÄTQ&O\$()7#5B0!^A#G8?#29!7 ÄÄ(\$#-!#Ä!;!Ä#:-!9!1-C'NO5+&%&' 6!/L-!-(2!.,!129(4!Ä!29- 5,0!Q"ÄC!7(04!2-!7'9!:#2-!9^9 !C.9Ä#-!9#29':(2:12-Ä#!9'S.,!d6T'-(-C!' 9!7!Ä!9!4(0 5!')Ä#2#0.7!7Q	=2FC(7!^!;C#21 #0#\$1-# 1(2'S- 5,0!ÄTQ&O\$()7#5B0!^A#G8?#29!7 ÄÄ(\$#-!#Ä!;!Ä#:-!9!1-C'NO5+&%&' 6!/L-!-(2!.,!129(4!Ä!29- 5,0!Q"ÄC!7(04!2-!7'9!:#2-!9^9 !C.9Ä#-!9#29':(2:12-Ä#!9'S.,!d6T'-(-C!' 9!7!Ä!9!4(0 5!')Ä#2#0.7!7Q

E-MAILED

Telephone: +61-2-8784 8565



CLIENTS/PROJECT DATA										SITE, COC AND CONTRACT DATA									
Client Name					AP Landcare Pty					Sample Name					T. Brown				
418 Ditch					Smythe 54/156/15					Contract Number					CAG3233779				
Job No.					AP Landcare Pty					Contract e-mail									
Proposed TOL					24 hrs					48 hrs					3 days				
Date QA work										24 hrs (if not analysed)					7 days				
CHANGES/COMMENTS										Laboratory: ALS Sydney 277 Woodson Rd Smithfield NSW 2146 Contact: Brian Hynes Phone: (02) 8746085 Fax: (02) 8746450 Send Results to: Mr Tim Brown PO Box 165 Newcastle NSW 2300 Email: tim@auroraenvironmentalconsulting.com.au Phone: (02) 84523779									
Requisitioned by (org)					Received by (org)					Requisitioned by (org)					Received by (org)				
Date / Time					Date / Time					Date / Time					Date / Time				
Temp (°C)					Temp (°C)					Temp (°C)					Temp (°C)				
Notes					Notes					Notes					Notes				
Kc present / no Kc added					Kc present / no Kc added					Kc present / no Kc added					Kc present / no Kc added				
Notes					Notes					Notes					Notes				
Sample ID					Lab ID					Sample Point					Sample Type				
Date					Start Depth					End Depth					Units				
# Containers					TPH					BTEX					PAH				
GFA SCREEN					CCPs					PCBs					Lead				
Copper					Zinc					Cadmium					Chromium				
Manganese					Nickel					Selenium					Silver				
Vanadium					Molybdenum					Cobalt					Manganese				
Iron					Aluminum					Silicon					Calcium				
Magnesium					Sulfur					Phosphorus					Potassium				
Sodium					Chlorine					Fluorine					Bromine				
Iodine					Barium					Strontium					Zirconium				
Hafnium					Tantalum					Niobium					Molybdenum				
Rhenium					Osmium					Iridium					Platinum				
Gold					Silver					Copper					Zinc				
Nickel					Cadmium					Lead					Chromium				
Manganese					Vanadium					Selenium					Cobalt				
Molybdenum					Copper					Zinc					Nickel				
Sulfur					Iron					Aluminum					Silicon				
Calcium					Magnesium					Sodium					Potassium				
Chlorine					Fluorine					Bromine					Iodine				
Barium					Strontium					Zirconium					Hafnium				
Tantalum					Niobium					Molybdenum					Rhenium				
Osmium					Iridium					Platinum					Gold				
Silver					Copper					Zinc					Nickel				
Cadmium					Lead					Chromium					Manganese				
Vanadium					Selenium					Cobalt					Molybdenum				
Copper					Zinc					Nickel					Sulfur				
Iron					Aluminum					Silicon					Calcium				
Magnesium					Sodium					Potassium					Chlorine				
Fluorine					Bromine					Iodine					Barium				
Strontium					Zirconium					Hafnium					Tantalum				
Niobium					Molybdenum					Rhenium					Osmium				
Iridium					Platinum					Gold					Silver				
Copper					Zinc					Nickel					Cadmium				
Lead					Chromium					Manganese					Vanadium				
Selenium					Cobalt					Molybdenum					Copper				
Zinc					Nickel					Sulfur					Iron				
Aluminum					Silicon					Calcium					Magnesium				
Sodium					Potassium					Chlorine					Fluorine				
Bromine					Iodine					Barium					Strontium				
Zirconium					Hafnium					Tantalum					Niobium				
Molybdenum					Rhenium					Osmium					Iridium				
Platinum					Gold					Silver					Copper				
Zinc					Nickel					Cadmium					Lead				
Chromium					Manganese					Vanadium					Selenium				
Cobalt					Molybdenum					Copper					Zinc				
Nickel					Sulfur					Iron					Aluminum				
Silicon					Calcium					Magnesium					Sodium				
Potassium					Chlorine					Fluorine					Bromine				
Iodine					Barium					Strontium					Zirconium				
Hafnium					Tantalum					Niobium					Molybdenum				
Rhenium					Osmium					Iridium					Platinum				
Gold					Silver					Copper					Zinc				
Nickel					Cadmium					Lead					Chromium				
Manganese					Vanadium					Selenium					Cobalt				
Molybdenum					Copper					Zinc					Nickel				
Sulfur					Iron					Aluminum					Silicon				
Calcium					Magnesium					Sodium					Potassium				
Chlorine					Fluorine					Bromine					Iodine				
Barium					Strontium					Zirconium					Hafnium				
Tantalum					Niobium					Molybdenum					Rhenium				
Osmium					Iridium					Platinum					Gold				
Silver					Copper					Zinc					Nickel				
Cadmium					Lead					Chromium					Manganese				
Vanadium					Selenium					Cobalt					Molybdenum				
Copper					Zinc					Nickel					Sulfur				
Iron					Aluminum					Silicon					Calcium				
Magnesium					Sodium					Potassium					Chlorine				
Fluorine					Bromine					Iodine					Barium				
Strontium					Zirconium					Hafnium					Tantalum				
Niobium					Molybdenum					Rhenium					Osmium				
Iridium					Platinum					Gold					Silver				
Copper					Zinc					Nickel					Cadmium				
Lead					Chromium					Manganese					Vanadium				
Selenium					Cobalt					Molybdenum					Copper				
Zinc					Nickel					Sulfur					Iron				
Aluminum					Silicon					Calcium					Magnesium				
Sodium					Potassium					Chlorine					Fluorine				
Bromine					Iodine					Barium					Strontium				
Zirconium					Hafnium					Tantalum					Niobium				
Molybdenum					Rhenium					Osmium					Iridium				
Platinum					Gold					Silver					Copper				
Zinc					Nickel					Cadmium					Lead				
Chromium					Manganese					Vanadium					Selenium				
Cobalt					Molybdenum					Copper					Zinc				
Nickel					Sulfur					Iron					Aluminum				
Silicon					Calcium					Magnesium					Sodium				
Potassium					Chlorine					Fluorine					Bromine				
Iodine					Barium					Strontium					Zirconium				
Hafnium					Tantalum					Niobium					Molybdenum				
Rhenium					Osmium					Iridium					Platinum				
Gold					Silver					Copper					Zinc				
Nickel					Cadmium					Lead					Chromium				
Manganese					Vanadium					Selenium					Cobalt				
Molybdenum					Copper					Zinc					Nickel				
Sulfur					Iron					Aluminum					Silicon				
Calcium					Magnesium					Sodium					Potassium				
Chlorine					Fluorine					Bromine					Iodine				
Barium					Strontium					Zirconium					Hafnium				
Tantalum					Niobium					Molybdenum					Rhenium				
Osmium					Iridium					Platinum					Gold				
Silver					Copper					Zinc					Nickel				
Cadmium					Lead					Chromium					Manganese				
Vanadium					Selenium					Cobalt					Molybdenum				
Copper					Zinc					Nickel					Sulfur				
Iron					Aluminum					Silicon					Calcium				
Magnesium					Sodium					Potassium					Chlorine				
Fluorine					Bromine					Iodine					Barium				
Strontium					Zirconium					Hafnium					Tantalum				
Niobium					Molybdenum					Rhenium					Osmium				
Iridium					Platinum					Gold					Silver				
Copper					Zinc					Nickel					Cadmium				
Lead					Chromium					Manganese					Vanadium				
Selenium					Cobalt					Molybdenum					Copper				
Zinc					Nickel					Sulfur					Iron				
Aluminum					Silicon					Calcium					Magnesium				
Sodium					Potassium					Chlorine					Fluorine				
Bromine					Iodine					Barium					Strontium				
Zirconium					Hafnium					Tantalum					Niobium				
Molybdenum					Rhenium					Osmium					Iridium				
Platinum					Gold					Silver					Copper				
Zinc					Nickel					Cadmium					Lead				
Chromium					Manganese					Vanadium					Selenium				
Cobalt					Molybdenum					Copper					Zinc				
Nickel					Sulfur					Iron					Aluminum				
Silicon					Calcium					Magnesium					Sodium				
Potassium					Chlorine					Fluorine					Bromine				
Iodine					Barium					Strontium					Zirconium				
Hafnium					Tantalum					Niobium					Molybdenum				
Rhenium					Osmium					Iridium					Platinum				
Gold					Silver					Copper					Zinc				
Nickel					Cadmium					Lead					Chromium				
Manganese					Vanadium					Selenium					Cobalt				
Molybdenum					Copper					Zinc					Nickel				
Sulfur					Iron					Aluminum					Silicon				
Calcium					Magnesium					Sodium					Potassium				
Chlorine					Fluorine					Bromine					Iodine				
Barium					Strontium					Zirconium					Hafnium				
Tantalum					Niobium					Molybdenum					Rhenium				
Osmium					Iridium					Platinum					Gold				
Silver					Copper					Zinc					Nickel				
Cadmium					Lead					Chromium					Manganese				
Vanadium					Selenium					Cobalt					Molybdenum				
Copper					Zinc					Nickel					Sulfur				
Iron					Aluminum					Silicon					Calcium				
Magnesium					Sodium					Potassium					Chlorine				
Fluorine					Bromine					Iodine					Barium				
Strontium					Zirconium					Hafnium					Tantalum				
Niobium					Molybdenum					Rhenium					Osmium				
Iridium					Platinum					Gold					Silver				
Copper					Zinc					Nickel					Cadmium				
Lead					Chromium					Manganese					Vanadium				
Selenium					Cobalt					Molybdenum					Copper				
Zinc					Nickel					Sulfur					Iron				
Aluminum					Silicon					Calcium					Magnesium				
Sodium					Potassium					Chlorine					Fluorine				
Bromine					Iodine					Barium					Strontium				
Zirconium					Hafnium					Tantalum					Niobium				
Molybdenum					Rhenium					Osmium					Iridium				
Platinum					Gold					Silver					Copper				
Zinc					Nickel					Cadmium					Lead				
Chromium					Manganese					Vanadium					Selenium				
Cobalt					Molybdenum					Copper					Zinc				
Nickel					Sulfur					Iron					Aluminum				
Silicon					Calcium					Magnesium					Sodium				
Potassium					Chlorine					Fluorine					Bromine				
Iodine					Barium					Strontium					Zirconium				
Hafnium					Tantalum					Niobium					Molybdenum				
Rhenium					Osmium					Iridium					Platinum				
Gold					Silver					Copper					Zinc				
Nickel					Cadmium					Lead					Chromium				
Manganese					Vanadium					Selenium					Cobalt				
Molybdenum					Copper					Zinc					Nickel				
Sulfur					Iron					Aluminum					Silicon				
Calcium					Magnesium					Sodium					Potassium				
Chlorine					Fluorine					Bromine					Iodine				
Barium					Strontium					Zirconium					Hafnium				
Tantalum					Niobium					Molybdenum					Rhenium				
Osmium					Iridium					Platinum					Gold				
Silver					Copper					Zinc					Nickel				
Cadmium					Lead					Chromium					Manganese				
Vanadium					Selenium					Cobalt					Molybdenum				
Copper					Zinc					Nickel					Sulfur				
Iron					Aluminum					Silicon					Calcium				
Magnesium					Sodium					Potassium					Chlorine				
Fluorine					Bromine					Iodine					Barium				
Strontium					Zirconium					Hafnium					Tantalum				
Niobium					Molybdenum					Rhenium					Osmium				
Iridium					Platinum					Gold					Silver				
Copper					Zinc					Nickel					Cadmium				
Lead					Chromium					Manganese					Vanadium				
Selenium					Cobalt					Molybdenum					Copper				
Zinc					Nickel					Sulfur					Iron				
Aluminum					Silicon					Calcium					Magnesium				
Sodium					Potassium					Chlorine					Fluorine				
Bromine					Iodine					Barium					Strontium				
Zirconium					Hafnium					Tantalum					Niobium				
Molybdenum					Rhenium					Osmium					Iridium				
Platinum					Gold					Silver					Copper				
Zinc					Nickel					Cadmium					Lead				
Chromium					Manganese					Vanadium					Selenium				
Cobalt					Molybdenum					Copper					Zinc				
Nickel					Sulfur					Iron					Aluminum				
Silicon					Calcium					Magnesium					Sodium				
Potassium					Chlorine					Fluorine					Bromine				
Iodine					Barium					Strontium					Zirconium				
Hafnium					Tantalum					Niobium					Molybdenum				
Rhenium					Osmium					Iridium					Platinum				
Gold					Silver					Copper					Zinc				
Nickel					Cadmium					Lead					Chromium				
Manganese					Vanadium					Selenium					Cobalt				
Molybdenum					Copper					Zinc					Nickel				
Sulfur					Iron					Aluminum					Silicon				
Calcium					Magnesium					Sodium					Potassium				
Chlorine					Fluorine														



&(%
B*#PAA#:#
123%/!
&#V%<!
) RÅ+Ä,
) 5:ÄFIKKJM
) DH>A>DÄ5C`?>AC=5C"D-Ä1AC:H-"?C]
) BD>C5>:Ä@DW

Analytical Results

:\$.L=/'#3c : WATER (=/'#3c: WATER)								
,Ä&#+"01/&+23								
		,Ä&#+"01/Ä! +*'#&+4+Ä0&		MW1	MW2	MW3	MW4	MW5
,\$01\$.!*	(Ä+9.0;& ; 678 5/Ä#		j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk
			ES1527738-001	ES1527738-002	ES1527738-003	ES1527738-004	ES1527738-005	
			>%9\$2/	>%9\$2/	>%9\$2/	>%9\$2/	>%9\$2/	>%9\$2/
EP080: BTEXN - Continued								
Benzene	KÄLRJLJ	Ä	l(-	bÄ	bÄ	bÄ	242	bÄ
Toluene	ÄIMLMMLJ	I	l(-	bl	bl	bl	4	bl
Ethylbenzene	ÄILRÄLR	I	l(-	bl	bl	bl	bl	bl
meta- & para-Xylene	ÄIMLJMLJÄÄILRLJ	I	l(-	bl	bl	bl	16	bl
ortho-Xylene	NFLRKLJ	I	l(-	bl	bl	bl	2	bl
mÄTotal Xylenes	ÄJLILILK	I	l(-	bl	bl	bl	18	bl
mÄSum of BTEX	LLLL	Ä	l(-	bÄ	bÄ	bÄ	264	bÄ
Naphthalene	NÄLILJ	F	l(-	6	bF	bF	361	bF
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	ÄÄIKLMMMLJ	Ä	p	27.5	25.1	28.7	24.4	23.0
2-Chlorophenol-D4	NJNFÄLKJLJ	Ä	p	64.2	52.8	60.9	49.8	49.8
2,4,6-Tribromophenol	ÄÄMLKNL,	Ä	p	80.9	68.0	65.1	80.0	65.2
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	JJÄL,ILM	Ä	p	75.0	68.6	68.6	64.3	66.1
Anthracene-d10	ÄKÄNL,LM	Ä	p	79.8	82.1	79.3	84.9	94.5
4-Terphenyl-d14	ÄKÄMLFÄL	Ä	p	86.9	85.8	81.4	87.7	75.3
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	ÄK,ILIKL	I	p	101	102	113	108	106
Toluene-D8	ILJKL,LF	I	p	105	106	130	119	120
4-Bromofluorobenzene	R,ILILR	I	p	101	104	122	119	118

-) F^Å+^Å.
-) 5.ÅFKKJM
-) DH>A>D^Å5C' ?>AC=5C"D-^Å1AC:H-"?C]
-) BD>C5>:^Å@DW

Analytical Results

,Ä'01/&+23 (=/#3c: WATER)									
,\$!\$,* (=/#3c: WATER)	,Ä'01/&+23 (=/#3c: WATER)		678	5/Ä#	MW6 j!,LD\$(LI)ÄFk ES1527738-006 >%9\$Z/	MW7 j!,LD\$(LI)ÄFk ES1527738-007 >%9\$Z/	QW1 j!,LD\$(LI)ÄFk ES1527738-008 >%9\$Z/	TRIP SPIKE j!,LD\$(LI)ÄFk ES1527738-009 >%9\$Z/	TRIP BLANK j!,LD\$(LI)ÄFk ES1527738-010 >%9\$Z/
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	NÄLILJ	Ä	I<-		bÄ!	bÄ!			
Acenaphthylene	IIMLNLM	Ä	I<-		bÄ!	bÄ!			
Acenaphthene	MJLJIIN	Ä	I<-		bÄ!	bÄ!			
Fluorene	M_LKJK_K	Ä	I<-		bÄ!	bÄ!			
Phenanthrene	MFLIÄLM	Ä	I<-		bÄ!	bÄ!			
Anthracene	ÄIIÄILK	Ä	I<-		bÄ!	bÄ!			
Fluoranthene	II_LRRLL	Ä	I<-		bÄ!	bÄ!			
Pyrene	ÄNLIILI	Ä	I<-		bÄ!	bÄ!			
Benz(a)anthracene	F_ILFFLJ	Ä	I<-		bÄ!	bÄ!			
Chrysene	IÄMLIÄLN	Ä	I<-		bÄ!	bÄ!			
Benzo(b+j)fluoranthene	IIIFLNLIÄIFLMILJ	Ä	I<-		bÄ!	bÄ!			
Benzo(k)fluoranthene	IKLIMLN	Ä	I<-		bÄ!	bÄ!			
Benzo(a)pyrene	FILJILM	I F	I<-		b! F	b! F			
Indeno(1.2.3.cd)pyrene	ÄNJLJNLF	Ä	I<-		bÄ!	bÄ!			
Dibenz(a,h)anthracene	FJLKILJ	Ä	I<-		bÄ!	bÄ!			
Benzo(g,h,i)perylene	ÄNÄLIRLI	Ä	I<-		bÄ!	bÄ!			
mSum of polycyclic aromatic hydrocarbons	LLLL	I F	I<-		b! F	b! F			
mBenzo(a)pyrene TEQ (zero)	LLLL	I F	I<-		b! F	b! F			
EP080/074: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	LLLL	II	I<-		90	b!!	b!!		b!!
C10 - C14 Fraction	LLLL	FI	I<-		bFI	bFI	bFI		
C15 - C28 Fraction	LLLL	ÄII	I<-		bÄ!!	bÄ!!	bÄ!!		
C29 - C36 Fraction	LLLL	FI	I<-		bFI	bFI	bFI		
mC10 - C36 Fraction (sum)	LLLL	FI	I<-		bFI	bFI	bFI		
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	1,n1ÄI	II	I<-		100	b!!	b!!		b!!
mC6 - C10 Fraction minus BTEX (F1)	1,n1ÄI@%5E	II	I<-		100	b!!	b!!		b!!
>C10 - C16 Fraction	o1ÄIn1Ä,	ÄII	I<-		bÄ!!	bÄ!!	bÄ!!		
>C16 - C34 Fraction	LLLL	ÄII	I<-		bÄ!!	bÄ!!	140		
>C34 - C40 Fraction	LLLL	ÄII	I<-		bÄ!!	bÄ!!	bÄ!!		
mC34-C10 - C40 Fraction (sum)	LLLL	ÄII	I<-		bÄ!!	bÄ!!	140		
mC34-C10 - C16 Fraction minus Naphthalene (F2)	LLLL	ÄII	I<-		bÄ!!	bÄ!!	bÄ!!		
EP080: BTEXN									



&(%
B*#PAA#:#
123%4/
&#V%<I
) ,Ä+Ä,
) 5:ÄFIKKJM
) DH>A>DÄ5C`?>AC=5C"D-Ä1AC:H-"?C]
) BD>C5>:Ä@DW

Analytical Results

:\$.L=#3c : WATER (=#3c: WATER)								
		,Ä&#+"01/&+23		MW6	MW7	QW1	TRIP SPIKE	TRIP BLANK
,Ä&#+"01/Ä! +""#&+4+Ä0&		,Ä&#+"01/Ä! +""#&+4+Ä0&		j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk	j!,LD\$(LIÄFk
,Ä+9.0;& ; 678 5/Ä#		,Ä+9.0;& ; 678 5/Ä#		ES1527738-006	ES1527738-007	ES1527738-008	ES1527738-009	ES1527738-010
				>%9\$2/	>%9\$2/	>%9\$2/	>%9\$2/	>%9\$2/
EP080: BTEXN - Continued								
Benzene	KÄLRJLJ	Ä	l(-	bÄ	bÄ	bÄ	17	bÄ
Toluene	ÄIMLMMLJ	I	l(-	bl	bl	bl	16	bl
Ethylbenzene	ÄILRÄLR	I	l(-	bl	bl	bl	16	bl
meta- & para-Xylene	ÄIMLJMLJÄÄILRLJ	I	l(-	bl	bl	bl	16	bl
ortho-Xylene	NFLRKLJ	I	l(-	bl	bl	bl	17	bl
mÄTotal Xylenes	ÄJLILILK	I	l(-	bl	bl	bl	33	bl
mÄSum of BTEX	LLL	Ä	l(-	bÄ	bÄ	bÄ	82	bÄ
Naphthalene	NÄILIJ	F	l(-	bF	bF	bF	17	bF
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	ÄÄIKLMMMLJ	Ä	p	27.5	25.2	----	----	----
2-Chlorophenol-D4	NJNFÄIKJLJ	Ä	p	61.4	55.3	----	----	----
2,4,6-Tribromophenol	ÄÄMLKNLJ	Ä	p	79.4	77.5	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	JJÄLJLM	Ä	p	74.5	70.7	----	----	----
Anthracene-d10	ÄKÄNLJLM	Ä	p	84.7	81.4	----	----	----
4-Terphenyl-d14	ÄKÄMLFÄLJ	Ä	p	90.5	84.5	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	ÄKJLILIKLJ	I	p	107	104	99.3	114	106
Toluene-D8	IJUKLJLF	I	p	122	104	106	125	106
4-Bromofluorobenzene	RJLILJR	I	p	116	100	101	126	105



Environmental

QUALITY CONTROL REPORT

Work Order : ES1527769

4 5'62
4-62Ä=2
E<<(!
7M9Ä5
" "PR-6"
ÄÄ=I595 "
*(-Z"=2
B(<("69)1"(
4MBM4#691"(
;Ä9P "(
;52"
V)-2"#69)1"(
AURORA ENVIRONMENTAL CONSULTING
>?# @>#A?BCD
*B#ABF#\$G/
D7C4E;07#D;CHEI;?E0@E#JK&&
259TÄ)-(-Ä"685(-69"62Ä =-6) 256+%= -9%Ä)
UG\$#&S#KNJK#KLLO
MMMM
CE?D7?;#AE[
MMMM
MMMM
'@>#A?BCD
'A*CE?D7?;#AE[
MMMM

,\$\$.#
7685(-69"62Ä #;585I5-6#;3<6"3
,JLLMUNO#C--<PÄ(Q#?-Ä<#;952R.5" <#D;C#E)2(Ä 5Ä#J\$GS
,UG\$MJMNLNS#N//
,UG\$MJMNLNS#N/&&
,D7*>#J&\$K#;="R"<) "#AWKX#Ä6<#E0;#V4;K#("Y)5("9"62
,&GME)+MJ&\$/
,&LME)+MJ&\$/
, \$KME)+MJ&\$/
, \$&
, \$&
*Ä+"
0Ä1-(Ä2-(3
4-62Ä=2
E<<(!
7M9Ä5
" "PR-6"
ÄÄ=I595 "
V4#0"8"
:Ä2"#;Ä9P "I#?"="58"<
:Ä2"#E6Ä 3I5I#4-99"6="<
@!!)"#Ä2"
D-%#-.#IÄ9P "I#("="58"<
D-%#-.#IÄ9P "I#Ä6Ä 3I"<

'R5I#("P-(2#)P"("I<"#Ä63#P("85-)I#("P-(2WIX#52R#2R5I#(" "Ä"6#;?"I) 2I#ÄPP 3#2-#2R"#IÄ9P "WIX#ÄI#I)19522"<%##

'R5I#V)Ä 523#4-62(- #?"P-(2#=-62Ä56I#2R"#.- -I56+*#56-(0A25-6,

- 0Ä1-(Ä2-(3#;P 5=Ä2"#W;I"X#?"P-(Ä258"#*(("62Ä+"#5."("6="W?":X#Ä6<#E="P2Ä6="05952I
- >"2R-<#A Ä6Q#W>AX#Ä6<#0Ä1-(Ä2-(3#4-62(- #;P5Q"#W04;X#P-Ä2(3#Ä6<#E="P2Ä6="05952I
- >Ä2(5"#;P5Q"#W>:X#?"I#Ä2=-8"(3#Ä6<#E="P2Ä6="05952I



WORLD RECOGNISED
ACCREDITATION

ÄÄ I"#\$\$%Ä&'

DE'E#E=="<52"<#
0Ä1-(Ä2-(3#NJI
E=="("<52"<#.-I#
=-9P 5Ä6="52R#
@;B'@74#\$.L&J/%
'R5I# <=>9"62# RÄI# 1""6# " "=2(-65=Ä 3#I 5+6"<# 13# Ä2R-(5_ "<#I5+6Ä2-(5"#! 5+656+RÄI# 1""6# =Ä((5Ä# -)2# Ä
=-9P 5Ä6="52R#P(-=>)"#I#P"=5.5"<#56#J\$4Ä?#*Ä(2#\$\$%
ÄÄ I"#\$\$%Ä&'
*Ä15#;11Ä
; "65-(#B(+Ä65=#4R"95I2
(I)%&*Ä#"#Ä\$I+;#& \$%-
;3<6"3#B(+Ä65=I



*Ä+"
C-(Q#B(<("
4 5'62
*(-Z"=2
J#.#
, 7,\$/JLLKN
, E?B?E#7Da@?BD>7D'E0#4BD;0'@Db
, CE?D7?#AEI

General Comments

'R"# Å6Ä 325=ÄÄ<="<)"#)|"<# 13#ÄR"# 7685(-69"62Ä # :585I5-6#RÄB"# 1""6# <"8" -P"<# (-9# "I2Ä 1 5IR"<# 562"(6Ä25-6Ä Ä#-+65_ "<# P(-="<)"#)=R# Ä# 2R-I"# P) 1 5IR"<# 13#ÄR"# I,7"EH# E*cEH# E:# Ä6<#D7*>#%# @#R-)"#
<"8" -P"<#P(-="<)"#Ä("9P -3"<#56#2R"#Ä 1"6="#-#<=>9"62"<# 12Ä6<Ä(<I#-(#13#= 5"62#("Y)"12%
CR)("9-5I2)("#<"2"("<# 125-6Ä25-6ÄRÄ 1"6#P"(-9"<H#("I) 2I#Ä("P-(2"<#6#Ä#<(3#"5+R2#1ÄI5I%
CR)("Ä#("P-(2"<# "I#2RÄ6#WdX#("I) 2#5I#R5+R" (#2RÄ6#2R3#BÄ8#2"#<) "#2-#P(59Ä (3#Ä9P "#^2(Ä=2"<5+"I2Ä2"#<5 25-6Ä25-6ÄRÄ 1"6#P"(-9"<H#("I) 2I#Ä("P-(2"<#6#Ä#<(3#"5+R2#1ÄI5I%
g"3# E6-639-)"#e#?" (I#2-#IÄ9P "I#R5=R#Ä("6-2#IP"=5.5=Ä 3#PÄ(ÄÄR5I#-(Q#-<")#1)2#-(9"<#PÄ(2#-#2R"#V4#P(-="I# -2
4E:#D)9I" (#e#4E:#("+5I2(3#6)91" (#(-9#<Ä2Ä1Ä"#9Ä562Ä56"<#13#4B5=Ä #E1I2(Ä=2#;"(85="65ÄÄ5-6#-#2R"#E9(5=Ä6#4R"95=Ä #-=5"23%#
0B?#e#05952#-#("P-(256+#
?*.#e#?" Ä258"##"("=62Ä+ "#:5.." "6="

f##e#@6<5=Ä2"i# Ä5 "<#V4



Å+
C-(Q#B(<("'
4 5"62
*(-Z"=2
, K#.#
, 7.\$/JLLKN
, E!7B?E#7Da@?BD>7D'E0#4BD:10!@Db
, CE?D7?#AEI

Laboratory Duplicate (DUP) Report

'R'# Y)Å 523#-62(-#2"(9# 0Å1-(Å2-(3#.)P 5=Å2"#(" "(l# 2#Å# (Å6<-9 3# ! " "=2"<# 562(Å Å1-(Å2-(3#P 52%0Å1-(Å2-(3#<)P 5=Å2"l#R-85<"# 56.-(9Å25-6H(""+Å(<56+#9"2R-<# P("=5!5-6#Åg<# Å9P "# R"2"(-+"6" 523%R"# P"(9522"<#(Å6+"l#
.-(# 2R"#? " Å258"#("=62# ."85Å25-6#W7":X#-.# 0Å1-(Å2-(3#.)P 5=Å2l# Å"# ! P"=5.5"<#66#E0.# >"2R-<# VC@M7D KÑ6<#Å(("#<"P"6<"62#-6# R"#9Å+652)<"#-.# ("l) 2l# 56#--9PÅ(5l-6# 2# 2R"#8" # -# ("P-(256+# ?"l) 2# d# \$&#59"# 0B? .#
D-#05952l#?) 2#1"2\ ""6#&#Å6<#J8#259"l#0B?,M#&h#M#l#h)##259"l#0B?,&h#M#J8#h%
;)1M>Å2(5: WATER

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP0901074: Toš uPesouen(48dro) tr3oal hQC Los 177y7- /										
7.\$/JLLKNM&&\$	>C\$#	7* &N&, #4G#M#4O#Å(Å=25-6	7* &N&, #4G#M#4O#Å(Å=25-6	MMMM J&	J&	J+0	/ &	S&	&%&&	D-#05952
7.\$/JLO\$&M&&\$	E6-639.)l#	7* &N&, #4G#M#4O#Å(Å=25-6	7* &N&, #4G#M#4O#Å(Å=25-6	MMMM J&	J&	J+0	C&	C&	&%&&	D-#05952
EP0901074: Toš uRe) onert 3ø 48dro) tr3oal HNEPM 2016 crt) soal hQC Los 177y7- /										
7.\$/JLLKNM&&\$	>C\$#	7* &N&, #4G#M#4\$&#Å(Å=25-6	7* &N&, #4G#M#4\$&#Å(Å=25-6	4Gk4\$&	J&	J+0	/ &	/ &	&%&&	D-#05952
7.\$/JLO\$&M&&\$	E6-639.)l#	7* &N&, #4G#M#4\$&#Å(Å=25-6	7* &N&, #4G#M#4\$&#Å(Å=25-6	4Gk4\$&	J&	J+0	C&	C&	&%&&	D-#05952
EP090: FTEBN hQC Los 177y7- /										
7.\$/JLLKNM&&\$	>C\$#	7* &N&, #A"6 "6"	7* &N&, #A"6 "6"	L\$MSKlMJ \$	\$	J+0	d\$	d\$	&%&&	D-#05952
		7* &N&, #72R3 1"6 "6"	7* &N&, #72R3 1"6 "6"	\$&&MSS\$MS J	J	J+0	dJ	dJ	&%&&	D-#05952
		7* &N&, #9"2ÅM#PÅ(ÅMF3 "6"	7* &N&, #9"2ÅM#PÅ(ÅMF3 "6"	\$&NMKNMK# J	J	J+0	dJ	dJ	&%&&	D-#05952
				\$&GMSJMK						
		7* &N&, #-(2R-MF3 "6"	7* &N&, #-(2R-MF3 "6"	O/MSLMG J	J	J+0	dJ	dJ	&%&&	D-#05952
		7* &N&, #-)"6"	7* &N&, #-)"6"	\$&NMNNMK J	J	J+0	dJ	dJ	&%&&	D-#05952
		7* &N&, #DÄPR2RÄ "6"	7* &N&, #DÄPR2RÄ "6"	O\$MJ&MK /	/	J+0	G	G	&%&&	D-#05952
		7* &N&, #A"6 "6"	7* &N&, #A"6 "6"	L\$MSKlMJ \$	\$	J+0	S	S	&%&&	D-#05952
		7* &N&, #72R3 1"6 "6"	7* &N&, #72R3 1"6 "6"	\$&&MSS\$MS J	J	J+0	dJ	dJ	&%&&	D-#05952
		7* &N&, #9"2ÅM#PÅ(ÅMF3 "6"	7* &N&, #9"2ÅM#PÅ(ÅMF3 "6"	\$&NMKNMK# J	J	J+0	dJ	dJ	&%&&	D-#05952
				\$&GMSJMK						
		7* &N&, #-(2R-MF3 "6"	7* &N&, #-(2R-MF3 "6"	O/MSLMG J	J	J+0	dJ	dJ	&%&&	D-#05952
		7* &N&, #-)"6"	7* &N&, #-)"6"	\$&NMNNMK J	J	J+0	dJ	dJ	&%&&	D-#05952
7.\$/JLO\$&M&&\$	E6-639.)l#	7* &N&, #DÄPR2RÄ "6"	7* &N&, #DÄPR2RÄ "6"	O\$MJ&MK /	/	J+0	d/	d/	&%&&	D-#05952



A+
C-(Q#B(<(" , S#. #
4 5'62 , 7.\$/JLLKN
*('Z=2 , E?B?E#7Da@?BD>7D'E0#4BD:10'@Db
CE?D7?#AEI

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

'R'P# Y)Ä 523# 62(- #2'9#>2R<# #0Ä1-(Ä2-(3#A Ä6Q#".(I# 2-#Ä6#Ä6Ä 32#"(" 9Ä2(5'Ä2# IR5=R#Ä #("Ä+"62#Ä Ä("Ä<"<#56#ÄR"#Ä9 "#8-)9"i# -(#P(-P-(25-6#Ä#Ä)I"<# 56#2Ä6<Ä(<#Ä9P "# P(PÄ(Ä25-6#ÄR"# P)(P-"# -#ÄR5I#Ä/4# PÄ(Ä9"2"(# 5# 2# 9 -652(-#P-2'625Ä #Ä1-(Ä2-(3#=-62Ä966Ä25-6%Ä"# Y)Ä 523# 62(- # 2'(9# 0Ä1-(Ä2-(3#4-62(- # :Ä9P"# W04:X#".(I# 2# Ä# =(25.5"<#".("6=" 9 Ä2'(5Ä H## Ä# Q6-16# 562"(("6=" 9 Ä2(5'ÄP5Q"<#Ä52R#2Ä(+2# Ä6Ä 32'1%#ÄR"#P)(P-"# #2R5I#Ä/4#PÄ(Ä9"2'(5I#2-#9-652(-#9ÄR#Ä=515-6#Ä6<#Ä=)(Ä=3#56<"P"6<"62#-#Ä9P "#Ä2(5'Ä# 36Ä9#Ä6#05952I#Ä("Ä1I"<#6#I2Ä25I25=Ä #R8Ä)Ä25-6#-#P(-#0Ä#%)1M>Ä2(5'Ä WATER

Method: Compound				Method Blank (MB) Report		Spike Concentration		Laboratory Control Spike (LCS) Report	
CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High	
EP07515IM/F: Poßan) uet r Aro(t s) 48dro) t r3oaI tQCLos 17- 559/									
7*&LW:@>X.#E="6ÄPR2R"6"	NKMKJMO	\$	J+0	d\$%&		GO%G	GJ	\$\$\$K	
7*&LW:@>X.#E="6ÄPR2R3 "6"	J&NM0GWN	\$	J+0	d\$%&		LK%\$	GS	\$\$\$S	
7*&LW:@>X.#E62R(Ä="6"	\$J&M\$JML	\$	J+0	d\$%&		NS%&	GS	\$\$\$G	
7*&LW:@>X.#A"6_WÄXÄ62R(Ä="6"	/GM/IMK	\$	J+0	d\$%&		NL%N	GS	\$\$\$L	
7*&LW:@>X.#A"6_WÄXP3("6"	/MKJMN &%/		J+0	d&%/		NN%J	GK	\$\$\$L	
7*&LW:@>X.#A"6_W1UZX_)-(Ä62R"6"	J&/MOOMJ#	\$	J+0	d\$%&		NK%\$	GJ	\$\$\$O	
J&/MNJMK									
7*&LW:@>X.#A"6_-W+%R%5XP"(3 "6"	\$O&MJSVJ	\$	J+0	d\$%&		OS%G	/O	\$\$\$N	
7*&LW:@>X.#A"6_-WQX_)-(Ä62R"6"	J&LM&NMO	\$	J+0	d\$%&		\$&G	GJ	\$\$\$L	
7*&LW:@>X.#4R(3I"6"	J&NM&\$MO	\$	J+0	d\$%&		NO%N	GK	\$\$\$G	
7*&LW:@>X.#51"6_WÄ%RXÄ62R(Ä="6"	/KML&MK	\$	J+0	d\$%&		CL%J	G\$	\$\$\$L	
7*&LW:@>X.#Ä_)-(Ä62R"6"	J&GMSSM&	\$	J+0	d\$%&		NG%N	GS	\$\$\$N	
7*&LW:@>X.#Ä_)-(6"	NGMLKML	\$	J+0	d\$%&		LJ%N	GS	\$\$/	
7*&LW:@>X.#@6<"6-W\$%J%K%=<XP3("6"	\$OKMKOM/	\$	J+0	d\$%&		OG%/	G&	\$\$\$N	
7*&LW:@>X.#DÄPR2RÄ "6"	O&MJ&MK	\$	J+0	d\$%&		L&%K	/O	\$\$\$O	
7*&LW:@>X.#R"6Ä62R("6"	N/M&\$MN	\$	J+0	d\$%&		LG%N	GK	\$\$\$G	
7*&LW:@>X.#3("6"	\$JOW&&M&	\$	J+0	d\$%&		N%O	GK	\$\$\$N	
EP0901071: Toß uPesoen(48dro) t r3oaI tQCLos 17- 55XI									
7*&L\$, #4\$&#M#4\$S#Ä(Ä=25-6	MMMM	/&	J+0	d/&		OK%J	/O	\$JO	
7*&L\$, #4\$#M#4JN#Ä(Ä=25-6	MMMM	\$&&	J+0	d\$&&		OL%L	L\$	\$K\$	
7*&L\$, #4JO#M#4KG#Ä(Ä=25-6	MMMM	/&	J+0	d/&		\$&K	GJ	\$J&	
EP0901071: Toß uPesoen(48dro) t r3oaI tQCLos 177y7-I									
7*&N&, #4G#M#4O#Ä(Ä=25-6	MMMM	J&	J+0	dJ&		LN%K	L/	\$JL	
EP0901071: Toß uRe) oert 3ue 48dro) t r3oaI HNEPM 2016 crt) soaI tQCLos 17- 55XI									
7*&L\$, #4\$&#M#4\$G#Ä(Ä=25-6	14\$&k4\$G	\$&&	J+0	d\$&&		OL%J	/O	\$K\$	
7*&L\$, #4\$G#M#4KS#Ä(Ä=25-6	MMMM	\$&&	J+0	d\$&&		O/%K	LS	\$KN	
7*&L\$, #4KS#M#4S&#Ä(Ä=25-6	MMMM	\$&&	J+0	d\$&&		\$&&	GL	\$JL	
EP0901071: Toß uRe) oert 3ue 48dro) t r3oaI HNEPM 2016 crt) soaI tQCLos 177y7-I									
7*&N&, #4G#M#4\$&#Ä(Ä=25-6	4Gk4\$&	J&	J+0	dJ&		LL%S	L/	\$JL	
EP090: FTEBN tQCLos 177y7-I									
7*&N&, #A"6_"6"	L\$MSKMJ	\$	J+0	d\$		O&%N	L&	\$JS	
7*&N&, #72R3 1"6_"6"	\$&&M\$S\$MS	J	J+0	dJ		NG%S	L&	\$J&	
7*&N&, #9"2ÄM#M#PÄ(ÄMF3 "6"	\$&NMKNMK#	J	J+0	dJ		NN%O	GO	\$J\$	
\$&GMSJMK									



Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP090: FTEBN HQCLOS 177y7- / H) oasaned									
7*8N&,#DAPR2RÄ "6"	O\$MJ&MK	/	j+°	d/	\$&#j+°	O%S	L&	\$J\$	
7*8N&,#(2R-MF3 "6"	O/MSL MG	J	j+°	dJ	\$&#j+°	O&%/	LJ	\$JJ	
7*8N&,#-)"6"	\$&NNMNMK	J	j+°	dJ	\$&#j+°	NO%\$	G/	\$JO	

[illegible]

Laboratory sample ID		Client sample ID	Method-Compound	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EP090i071: Toš uPesouen(48dro) tr3oaI bQCLos 177y7- /							
7,\$JULLKNM&\$&	>C\$#		7*&N&, #4G#M#4O#Ä(Ä=25-6	KJ/#j+`0	ON%G	L &	\$K&
EP090i071: Toš uRe) onert 3u 48dro) tr3oaI HNEPM 2016 crt) soaI bQCLos 177y7- /							
7,\$JULLKNM&\$&	>C\$#		7*&N&, #4G#M#4\$&#A(Ä=25-6	KL/#j+`0	OK%O	L &	\$K&
EP090: F TEbN bQCLos 177y7- /							
7,\$JULLKNM&\$&	>C\$#		7*&N&, #A "6_ "6"	J/#j+`0	LO%L	L &	\$K&
			7*&N&, #72R3 1"6_ "6"	J/#j+`0	N\$%\$	L &	\$K&
			7*&N&, #9"2ÄM#PÄ(ÄMF3 "6"	J/#j+`0	N\$%J	L &	\$K&
			7*&N&, #DÄPR2RÄ "6"	J/#j+`0	NN%K	L &	\$K&
			7*&N&, #- /2R-MF3 "6"	J/#j+`0	NK%S	L &	\$K&
			7*&N&, #-)6"	J/#j+`0	N&%I	L &	\$K&



QA/QC Compliance Assessment for DQO Reporting

Work Order	: ES1527738	"#&!	%&()*
/0112-	%AURORA ENVIRONMENTAL CONSULTING	+#{Ä#-(Ä.	%3241Ä(2512-#0'614171(2'8.921.
/12-#:-	%<Ä=;'><?@A	Ä0IBC(2!	%DE&FGFHH*"HJJJ
"Ä(K!:-	%@L<A3<8>LM	6#-!8#5B017<!;11419	%NEFL \$FGN&J
81-J	%&"@L<A3<8>LM	=77 !6#-!	%&OFL \$FGN&J
8#5B01Ä	%Ä=;'><?@A	A(P')7#5B017'Ä!;11419	%&N
?Ä9Ä'2 5,Ä	%FFF	A(P')7#5B017#2#0.719	%&N

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

>Ä11)5I-C(97 55#Ä117#29Ä!)Ä12:17#Ä!#07'(BÄ(41919-('771 7-12'-Ä#:#,101-.P

Summary of Outliers

Outliers : Quality Control Samples

ÄC17ÄB(Ä-C1\$C01\$C-7(' -01Ä7)0\$S\$9'12-C!Q #01-.'/(ÄÄ(8<B(Ä-P

- NO Method Blank value outliers occur.
- NO Duplicate outliers occur.
- NO Laboratory Control outliers occur.
- NO Matrix Spike outliers occur.
- For all regular sample matrices, NO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



"#S!
@(\ÄT?Ä9\Ä
0112-
"Ä(KI:-
%G()'*
%38&JGII0H
%LU<?<L'3AV=<?A:3AÄL+/?A8U+Ä=AW
%@L<A3<8>LM

Outliers : Frequency of Quality Control Samples

#-Ä1X WATER

Q #01-/(2-Ä0#5B0\Ä.BI	/(2-		<#-' R' S		Q #01-/(2-Ä0#B1:1)1.#-1(2
!-C(9	Q/	<# 0#Ä	L-: #0	3XB!:-I9	
+ # (Ä#-(Ä'6 B01-#-17R6U"S					
"L\["C12(07RW\!8F'8=-:S	N	I	'NPNN	'&NPNN	A3";'GN&O"8:C19 0!>ROS#29L+8'Q/8O'ÄZ 1ÄI5I2-
Ä<[F8I514(0#-10!"]Ä#:-1(2	N	H	'NPNN	'&NPNN	A3";'GN&O"8:C19 0!>ROS#29L+8'Q/8O'ÄZ 1ÄI5I2-
#-Ä1X'8B1T17R:8S					
"L\["C12(07RW\!8F'8=-:S	N	I	'NPNN	'JPNN	A3";'GN&O"8:C19 0!>ROS#29L+8'Q/8O'ÄZ 1ÄI5I2-
Ä<[F8I514(0#-10!"]Ä#:-1(2	N	H	'NPNN	'JPNN	A3";'GN&O"8:C19 0!>ROS#29L+8'Q/8O'ÄZ 1ÄI5I2-

Analysis Holding Time Compliance

AC17ÄB(Ä' 7 55ÄÄ17 1X-Ä#:-1(2 \ BÄB#Ä#-1(2#29' #2#0.717-617' #29' :(5B#Ä17' !#C' _1-C' L+8' Ä!:(55I29I9' C(0912\$-15I7' RÄ!)Ä:12\$' U83'L' 8@' H+E' L"["' L8' #29' A3";S' ,#7I9' (2' -C' 7#5B0I' :(2 -#12Ä'
BÄ(419I9P"6#-17ÄB(Ä-19ÄBÄ17I2-1)1Ä7-9#-1\)'X-Ä#:-1(2(Ä2#0.717#29BÄ!0 9I'7, 7I2 I2-910 -1(27#29ÄÄ 27P!L017-2\$(Y'Ä#C17R1)#2.S17BÄ(419I9CÄ112P
[0912\$' -15I' XÄ' 0#C#-! 5I-C(97' RP\$P Ä+S' 4#Ä' #::Ä912\$' -(' -C' #2#0-17' ÄB(Ä-19P" L77I775I2' : (5B#Ä17' -C' 0#C' 9#-! _1-C' -C' 7C(Ä-17-#2#0-! C(0912\$-15I')Ä' -C' IZ 14#0I2- 7(105I- C(9PÄC17' #Ä!%:(Ä\$#21:7
&*9#-75Ä: Ä'GH9#-7a(-CÄ5I-#07&HN9#-7P"LÄ!:(Ä9I9' Ä#C9(172(-\$ #Ä#2-1I#',Ä#C)(Ä#002(2F4(0#-10'B#Ä5I-1 Ä7P
[0912\$' -15I7' XÄ' VOC in soils' 4#Ä' #::Ä912\$' -(' #2#0-17' (12-Ä17-P' V12.0/C0(Ä19I' #29' 8-ÄI2I' Q0912\$-15I' 7' I' 9#-7b' (-CÄ7' &*9#-7 P' L' Ä!:(Ä9I9' Ä#C' 9(17' 2(-' \$ #Ä#2-1I' #, Ä#C')Ä' #00V7' #2#0-17' #29'
7C(09,14IÄ1)1I9'12-#7I'-CÄB(Ä-19',Ä#C-17#)#07I'B(71- 14I' (ÄV12.0/C0(Ä19I#29I8-ÄI2I#Ä1'2(-T1.#2#0-17\)'12-Ä I7-:(2:Ä2P
#-Ä1X WATER

Method	Sample Date	%&()\$*Ä+,+(/(\$*Ä		ÄÄ"#\$#	
Container / 4ISÄ+5 6I/+728#9	Date extracted	21+3'(+&())\$*Ä	%011'\$*Ä	Date analysed	21+3'(+Ä!#\$#
EP080/071: Total Petroleum Hydrocarbons					
Amber Glass Bottle - Unpreserved (EP071)					
;&G' ;&O' ;&J' ;&I'	06-Aug-2015	07-Aug-2015	07-Aug-2015	12-Aug-2015	&EF8BFGN&J
Q@&					
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons					
Amber Glass Bottle - Unpreserved (EP075(SIM))					
;&G' ;&O' ;&J' ;&I'	06-Aug-2015	07-Aug-2015	07-Aug-2015	12-Aug-2015	&EF8BFGN&J
;&G' ;&O' ;&J' ;&I'					
EP080: BTEXN					
Amber VOC Vial - Sulfuric Acid (EP080)					
Ä<="g"=d3	06-Aug-2015	10-Aug-2015	10-Aug-2015	10-Aug-2015	GNFL\$FGN&J
EP080/071: Total Petroleum Hydrocarbons					
Amber VOC Vial - Sulfuric Acid (EP080)					
;&G' ;&O' ;&J' ;&I'	06-Aug-2015	10-Aug-2015	10-Aug-2015	10-Aug-2015	GNFL\$FGN&J
Ä<=">+LAd					



"#S!
@(!ÄT?Ä9)Ä
/0112-
"Ä(K!:-
%Q()**
%38&JGIIOH
%LU<?<L'3AV=<?A:3AÄL+/?A8U+Ä=AW
%@L<A3<8>LM

Quality Control Parameter Frequency Compliance

ÄC()!00L_125ÄIB(Ä-7 55ÄÄ 1717-C!)ÄIZ 12.:()0#(Ä#(Ä'Q/ 7#5B017#2#0.719' 1-C12'-C!#2#0.-1:#0'0(-R7S'12'_C1:C-C!7'1519'7#5B01R7S'_#7R_Ä!S'BA(Ä:17719P'L:- #0Ä#-17C(09!'\$Ä#-Ä'-C#2'(Ä'Z #0'-(-C!'XB!:-19Ä#-!P'L'017-12\$(Y'Ä#C!7'17BÄ(41919'12-C!8 5 5#Ä'Y)? -01Ä7P

#-Ä1X WATER 34#0 #-1(2%*cQ #01:-'(2-Ä(0')ÄIZ 12: '2(-_1-C12'B:1)1#-1(2B √cQ #01:-'(2-Ä(0')ÄIZ 12: '1 \$S''+4*Ä'(*+5/)S\$S) \$S*Ä

Q #01:-'(2-Ä(0#5B01'Ä.BI ÄÄ'!' "\$) !+> :?@#	>.'?@	4*1Ä'	Ä	4	Expected	%0.1' \$*Ä
+.#(Ä#-Ä'.6 B01 #-17'R6U'S						
"L['C!2(07'RW\;8F'8=-;S	3"N!JR8=-;S	N	I	10.00	10.00	✖
Ä<['F8!514(0#-10!Ä#-1(2	3"N!&	N	H	10.00	10.00	✖
Ä<['V(0#-10!7!>Ä3e	3"NHN	G	GN	10.00	10.00	✓
+.#(Ä#-Ä'./(2-Ä(0#5B017'R+/8S						
"L['C!2(07'RW\;8F'8=-;S	3"N!JR8=-;S	&	I	14.29	5.00	✓
Ä<['F8!514(0#-10!Ä#-1(2	3"N!&	&	H	12.50	5.00	✓
Ä<['V(0#-10!7!>Ä3e	3"NHN	&	GN	5.00	5.00	✓
!-C(9>0#2T7'R>S						
"L['C!2(07'RW\;8F'8=-;S	3"N!JR8=-;S	&	I	14.29	5.00	✓
Ä<['F8!514(0#-10!Ä#-1(2	3"N!&	&	H	12.50	5.00	✓
Ä<['V(0#-10!7!>Ä3e	3"NHN	&	GN	5.00	5.00	✓
#-Ä1X8B1T!7'R:8S						
"L['C!2(07'RW\;8F'8=-;S	3"N!JR8=-;S	N	I	0.00	5.00	✖
Ä<['F8!514(0#-10!Ä#-1(2	3"N!&	N	H	0.00	5.00	✖
Ä<['V(0#-10!7!>Ä3e	3"NHN	&	GN	5.00	5.00	✓



"#S!
@(!ÄT?Ä9/Ä
/0112-
"Ä(K!:-
%*')**
%38&JGIIIOH
%LU<?<L'3AV=<?A:3AÄL+/?A8U+Ä=AW
%@L<A3<8>LM

Brief Method Summaries

ÄC!#2#0.-1.#0*BÄ(:9 Ä!7' 7!9'.!-C!3241Ä(25!2-#0614171(2'C# 4!'.!29!4!0(B!9)Ä(5!7-#.#017C!9!12-!Ä2#-1(2#00.Ä!:(!\$2!1'9!B Ä(:9 Ä!7'7'.C#7'-C(7!B.#017C!9'.!-C!U8'3"L'L"["L'.L8#29'A 3":P=2'C(7!
9!4!0(B!9!BÄ(:9 Ä!7'Ä!"!5B0(19!12-C!#.#7!2:!)9(! 5!2-!9' 7-#29#Ä97'(Ä'.!01!2-Ä!Z !7-P'ÄC!)00[12\$Ä!B(Ä-BÄ(4!9!7Ä!1!9!7:Ä!B-1(27!)-C!#2#0.-1.#0BÄ(:9 Ä!7!5B0(:!9)Ä!7 0-7Ä!B(Ä-!9!12-C!
/!Ä-1!)1:#!1!)!L2#0.7!17P'8(Ä!7')Ä(5' C!C'L+8'5!-C(97'C#4!'.! 129!4!0(B!9#Ä!BÄ(4!9!9' 1-C!2'-C!':!-C(96!7:Ä!B-1(27P

ÄÄ !"\$) !+>.?'*#@#	>.'?*@+2.#)(\$*\$Ä#	>{ \$&	@LÄ3<	3"NI&
Ä<[F8!514(0#-10!])Ä#-1(2		@LÄ3<		3"NI&
"L["C!2(07'RW\;8'F'8=;S		@LÄ3<		3"NIJ R6=; S
Ä<[V(0#-10!7!>Ä3e		@LÄ3<		3"NHN

Aurora		SITE COC AND CONTACT DATA		LABORATORY	
Site Name: SP WARRIORS RD		Project Name: SP WARRIORS RD		ALS Sydney	
ALS Code: SYNTH 26/15		Contract Number: 0438253379		277 Woodbine Rd Surrey Hills NSW 2158	
Site No: WARRIORS RD		Contract e-mail: tim.brown@auroraenv.com.au		Contact: Barbara Hannan Phone: (61) 67400000 Fax: (61) 67400000	
Sampling Z.T.: 24.5.15		SOLYS: 7 days		Send Results to: Mr Tim Brown PO Box 165 Newcastle NSW 2300	
Date of brief		Ref e-mail		tim@auroraenvironmentalconsulting.com.au Phone: 0438253378	
CHAIN OF CUSTODY		Received by (Name) (Signature)		Received by (Name) (Signature)	
Prepared by (Name) (Signature)		Date / Time		Date / Time	
6/8/15		6/8/15 11.12		6/8/15 19.05	
Temp (°C)		Temp (°C)		Temp (°C)	
Notes		Notes		Notes	
w. bay H		4.0 C		for presents / no test result / no test	
Sample ID		Lab ID		Sample Point	
Sample Type		Date		Start Depth	
End Depth		Units		# Containers	
TPH		BTEX		PAH	
EPS SCREEN		GC/MS		PCBs	
Lead		C metals		Other Analysis	
Comments					
Plu01		1		Plu01 6/8/15	
Plu02		2		Plu02 6/8/15	
Plu03		3		Plu03 6/8/15	
Plu04		4		Plu04 6/8/15	
Plu05		5		Plu05 6/8/15	
Plu06		6		Plu06 6/8/15	
Plu07		7		Plu07 6/8/15	
Plu08		8		Plu08 6/8/15	
Plu09		9		Plu09 6/8/15	
Plu10		10		Plu10 6/8/15	

E-MAILED



Environmental Division
Sydney
 Work Order Reference
ES1527738
 Telephone +61-2-9784 9555

Sample Plu01: AL, CU, CR, CO, FE, NI, Pb, Zn, V and Zn
 Sample Plu02: AL, CU, CR, CO, FE, NI, Pb, Zn, V and Zn

Sample Type: Soil (Groundwater) - Surface water (Drainage) - Soil (Vapour) - Trade Waste - Resuspension - Air (Dust)

Sample Plu01: AL, CU, CR, CO, FE, NI, Pb, Zn, V and Zn
 Sample Plu02: AL, CU, CR, CO, FE, NI, Pb, Zn, V and Zn

12 – WASTE MANAGEMENT PLAN

9.2 APPENDIX 2 - SITE WASTE MINIMISATION AND MANAGEMENT PLAN - DEMOLITION, CONSTRUCTION & ON-GOING OPERATION OF PREMISES

To facilitate waste management and reduction Council requires on-site sorting and storage of waste products pending re-use or collection.

The applicable sections of this Site Waste Minimisation and Management Plan must be completed and submitted with a Development Application.

Completing the relevant sections of this Plan will assist in identifying the type of waste that will be generated and in advising Council how you intend to reuse, recycle or dispose of the waste.

The information provided through this form and development proposal plans will be assessed against the controls within Council's Development Control Plan which aim to reduce the amount of construction and demolition waste to landfill and promote waste avoidance, re-use and recycling.

This form can be copied to allow further information if space is insufficient in the provided table.

OUTLINE OF PROPOSAL

Site Address: CAN KING STREET EXPLANADE, HOWARD
ST. WARNERS BAY, NSW.

Applicant's Name & Address: ANDREW PEDNIN
2/13 NATIONAL CIRCUIT, BARTON,
CANBERRA.

Phone: 62606362 Fax: 62607269

Mobile: 043086779 E-mail: ANDREW.PEDNIN@DOC.COM.AU

Buildings and Other Current Structures on the Site: 4x HOUSES,
1x SERVICE STATION

Brief Description of Proposal: DEMOLITION OF THE ABOVE,
BUILD 113 UNITS, 1500M² COMMERCIAL
AND ASSOCIATED BASEMENT CARPARKING.

The details provided on this form are the intentions for managing waste relating to this project only.

Signature of Applicant: [Signature] Date: 21/04/17



Waste Management Guideline

DEMOLITION STAGE

MATERIALS ON-SITE		DESTINATION		
TYPE OF MATERIAL	ESTIMATED VOLUME (M ³) / WL(t)	REUSE AND RECYCLING		DISPOSAL
		ON-SITE *Specify proposed reuse or on-site recycling methods	OFF-SITE *Specify contractor and recycling outlet	*Specify contractor and landfill site
Excavation Material				
Green Waste	120		120m ³	
Bricks	380		380M ³	
Concrete	80		80M ³ CONCRETE RECYCLING THERMAL	
Timber - Please specify	20		20M ³	
Plasterboard	40			40m ³
Metals - Please specify	20		20M ³	
Other - Please specify				
Other - Please specify				

Note: Details of site area to be used for on-site separation, treatment and storage (including weather protection) should be provided on the plan drawings accompanying a Development Application.



Waste Management Guideline

CONSTRUCTION STAGE

MATERIALS ON-SITE		DESTINATION		
TYPE OF MATERIAL	ESTIMATED VOLUME (M ³) / WL (t)	REUSE AND RECYCLING		DISPOSAL *Specify contractor and landfill site
		ON-SITE *Specify proposed reuse or on-site recycling methods	OFF-SITE *Specify contractor and recycling outlet	
Excavation Material	7000		TBA	
Green Waste	—			
Bricks	5 M ³		5 M ³	
Concrete	40 M ³		40 M ³ CONCRETE & TERRAZZO	
Timber – Please specify	15 M ³		15 M ³	
Plasterboard	150 M ³			150 M ³
Metals – Please specify	45 M ³		45 M ³	
Other – Please specify	750 M ³			750 M ³ GENERAL WASTE
Other – Please specify				

Note: Details of site area to be used for on-site separation, treatment and storage (including weather protection) should be provided on the plan drawings accompanying a Development Application.



Waste Management Guideline

USE OF PREMISES

TYPE OF WASTE TO BE GENERATED	EXPECTED VOLUME PER WEEK	PROPOSED ON-SITE STORAGE AND TREATMENT FACILITIES	DESTINATION
Please specify, for example: - Glass - Paper - Food waste - Off-cuts - Organic (trees, off-cuts, lawn clippings)	- Litres or m³ - See Appendix 1 for estimates relating to Commercial and Retail Uses	For example: - Waste storage and recycling area - On-site composting - Compaction equipment	- Recycling - Disposal - Please specify contractor
113 UNITS @ 80/L/week	9040 m ³	WASTE STORAGE	DISPOSAL
113 UNITS @ 50/L/week	5600 m ³	RECYCLING STORAGE	RECYCLING
COMMERCIAL 10L/100/m ² /PER DAY	150 m ³	WASTE STORAGE	DISPOSAL
	150 m ³	RECYCLING STORAGE	RECYCLE

Note: Details of site area to be used for on-site separation, treatment and storage (including weather protection) should be provided on the plan drawings accompanying a Development Application.

ON-GOING MANAGEMENT

Describe how you intend to ensure on-going management of waste on-site (e.g. Lease conditions, on-site caretaker/manager).

* Private contractor collection from Howard Street



13 – NOISE IMPACT ASSESSMENT



Project No: 171395

Noise Impact Assessment Mixed Use and Residential Development Corner King Street & The Esplanade, Warners Bay, NSW

Prepared for:

Yahav Property Investment (Warners Bay) Pty Ltd

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Principal / Director

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April 2017

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Appendix I – PROPOSED FLOOR PLANS

Appendix II – NOISE LOGGER CHARTS

INTRODUCTION

This report provides the results, findings and recommendations arising from an acoustical assessment of a proposed commercial and residential development to be constructed on land on the corner of King Street and The Esplanade, Warners Bay, NSW. The development is to consist of two separate buildings with two levels of car parking, ground floor residential units and commercial space and residential units up to the seventh floor.

Site details have been obtained from inspections and also with reference to plans obtained from the proponent (plans by Stewart Architecture, dated 2016).

The assessment was requested to support a D.A. to Lake Macquarie City Council (LMCC).

Table 1 contains a glossary of commonly used acoustic terms and is presented as an aid in understanding this report.

TABLE 1 GLOSSARY OF ACOUSTICAL TERMS	
Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level – The summation of noise events integrated over a selected period of time. This noise descriptor is commonly used to correlate noise exposure and human annoyance.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level.

BACKGROUND TO THE PROPOSAL

The proposal is to demolish the existing buildings on the site and construct a seven storey development in two residential buildings with lower level car parks, commercial space and residential space on the ground floor and up to seven floors of residential above this (see **Appendix I**).

The site may be potentially impacted by noise from traffic on King Street and The Esplanade.

From an acoustic point of view the significant sections of the development will be:

- Road traffic noise intrusion,
- Mechanical plant associated with residential and commercial premises, and
- Traffic noise associated with the development.

EXISTING ACOUSTIC ENVIRONMENT

Traffic noise levels were measured on the site and supplemented with data from previous noise measurements made in the near vicinity.

A Rion NL-4.2 sound level meter set up an environmental noise logger was installed on the site, on the first floor verandah of number 482 The Esplanade from 21th to 24th March, 2017. Since the dominant noise source in the area is road traffic, the NSW Industrial Noise Policy (INP) requires a minimum of three days valid data, which was successfully obtained during the survey.

The microphone had full line of sight to the road (and traffic) and was approximately the same distance from the edge of traffic as the closest façade of the proposed development.

In addition to this, data was obtained from previous noise logging undertaken for a nearby project. To this end, a noise logger was located on the fence line of at the boundary of numbers 51 and 53 King Street, from Friday, 23rd until Friday 30th October, 2015.

Each instrument was programmed to accumulate environmental noise data continuously over sampling periods of fifteen (15) minutes duration for the entire monitoring period. Internal software calculates and stores the Ln Percentile Noise Levels for the chosen sampling period, which are then retrieved for detailed analysis.

Tables 2 and 3 show a summary of the relevant measured data, which is also shown graphically in **Appendix II**. The acoustic environment of the area is characterised by noise from road traffic, with some contributions from commercial and domestic sources, particularly during the day.

TABLE 2 MEASURED AMBIENT NOISE LEVELS 482 THE ESPLANADE 21/3/17 to 24/3/17			
	Noise Levels dB(A)		
Percentile	Day	Evening	Night
L90	58	56	41
Leq	64	63	59
Leq (1 hr)	66		62

TABLE 3 MEASURED AMBIENT NOISE LEVELS 51 KING STREET 23/10/15 to 30/10/15			
	Noise Levels dB(A)		
Percentile	Day	Evening	Night
L90	49	41	29
Leq	62	59	56
Leq (1 hr)	64		61

NOISE ASSESSMENT CRITERIA

Mechanical Plant

Noise emissions from all mechanical plant at the site must comply with criteria determined using procedures in the *NSW Industrial Noise Policy* (INP). The same will apply to any noise emissions from the communal area on the ground floor.

The INP sets out two separate noise criteria designed to ensure developments meet environmental noise objectives. The first criteria account for intrusive noise and the others apply to the protection of amenity of particular land uses. Depending on the existing acoustic environment, a new development is usually assessed by applying both criteria to the situation and adopting the more stringent of the two.

The amenity criterion is designed to protect areas from increasing industrial noise. As such, the acceptable noise levels for various receiver types listed in the INP refer only to noise from industrial sources.

The data shows that the noise levels from the King Street logger are lower than those from the logger located at The Esplanade. For

conservatism the noise measurements from the King Street logger have been used to determine the environmental noise criteria as per the procedures in the INP.

The site in question is relatively remote from major industrial noise sources. The measured noise levels were dominated by emissions from road traffic. Noise from nearby commercial areas would not have significantly influenced the measured results.

In this instance then the Intrusiveness criteria (background + 5dB(A)) are the ones applicable to the assessment. The Project Specific Noise Levels for residential receivers for this assessment are thus shown in **Table 4**.

TABLE 4 PROJECT SPECIFIC NOISE GOALS	
Period	Intrusiveness Criterion* L _{eq} (15 min) dB(A)
Day (7 a.m. to 6 p.m. 6 days, 8 a.m. to 6 p.m. Sunday)	54
Evening (6 p.m. to 10 p.m.)	46
Night (all other times)	35**

* - Rating Background Level (RBL) + 5 dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the "L90 of the L90's" for each separate day of the monitoring period.

** - Minimum RBL of 30 dB(A) adopted per procedures in the INP.

Received Road Traffic Noise

The development is on the corner of King Street and The Esplanade, Warners Bay and parts of it may, therefore, be potentially impacted by noise emissions from road traffic on those roads.

In NSW new residential developments near busy roads must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW, 2007). The SEPP (2007) is supported by the Department of Planning guideline "Development near Rail Corridors and Busy Roads – Interim Guideline" (2008) (Guideline) which gives the following criteria in Section 3.5:

- In any bedroom in the building: **35 dB(A) L_{eq}** at any time 10pm – 7am, and
- Anywhere else in the building (other than a garage, kitchen, bathroom or hallway): **40dB(A) L_{eq}** at any time.

These criteria originated from the Rail Infrastructure Corporation (RIC) publication "Consideration of Rail Noise and Vibration in the Planning Process" (2003). In the RIC document it is explicit that the criteria apply with windows and doors closed.

The Guideline doesn't contain criteria in relation to commercial premises. At the time of writing this report there is no end user for the commercial spaces in the development.

Criteria for this area has been taken from AS/NZS 2107 2000, Acoustics—Recommended design sound levels and reverberation times for building interiors.

This Standard details recommended design sound levels for restaurants and coffee bars in public buildings and small retail outlets or show rooms as **45 dB(A) Leq**, and this will be adopted here for the commercial areas.

Generated Road Traffic Noise

Noise generated by road traffic associated with a proposed development is assessed separate to site noise using the OEH accepted Intermittent Traffic Noise guidelines. This is due to the non-continuous nature of traffic flow to and from the site.

The NSW Road Noise Policy (RNP) as adopted by Roads and Maritime Services (RMS) NSW, recommends various criteria for different road developments and uses.

Traffic generated by the current proposal will enter and leave the site via Howard Street. This would be regarded as a local road as per definitions in the RNP. An extract Table 3 of the RNP relating to land use developments with the potential to create traffic on local roads is shown in **Table 5**.

TABLE 5		
BASE TRAFFIC NOISE OBJECTIVE		
Situation	Recommended Criteria	
	Day - (7am - 10pm)	Night (10pm – 7am)
Existing residences affected by additional traffic on existing local roads generated by land use developments	55 Leq(1hr) External	50 Leq (1 hr) External

NOISE ASSESSMENT

Mechanical Plant

The proposed building is at the development application stage. As such, locations and specifications of all mechanical plant items have yet to be finalised.

Noise from mechanical plant may impact on surrounding residential areas. As it is possible some mechanical plant may run at any time of the day, the lower, or limiting, of the criteria, that for night-time, has been used here to determine any potential noise impacts. This is, **35 dB(A) Leq (15 min)** for all surrounding residential receivers.

Air Conditioning

Each unit will be individually air conditioned by split systems with the condenser unit mounted on each verandah.

Typically air conditioner condensers for this sort of application have an Lw in the range 66 to 70 dB(A). For a condenser with an average Lw of 68 dB(A) Leq, this means that compliance with the most stringent night time criterion will be achieved at a minimum, unshielded, distance of 17m.

In reality the balcony of each unit will be separated from others by a blade wall which will provide additional noise attenuation. As a result of this, it is unlikely that there will be any adverse impacts due to noise emissions from the air conditioning condensers for each unit.

It is very important that vibrating equipment such as a/c condenser units must be mounted such that vibrations cannot transfer to the surrounding structure.

There will be a number of verandahs to units that face towards the rear of the site, and towards residential receivers. Those on lower floors may have line of sight to the residences across the road in Howard Street. Units on higher floors will be shielded from the boundary by the barrier effects of the verandah floor (as well as additional distance to the boundary).

To look at a worst case all condenser units on the Levels 2 and 3 of the building were considered to be operating at maximum capacity (i.e. 68 dB(A) Leq) for a full 15 minute period. For 16 units this equates to a combined Lw of 80 dB(A) Leq (15 min).

It is noted that each unit will be mounted on a verandah which will have a solid glass balustrading. This will act as an acoustic barrier in the direction of receivers. Assuming a 1.2m high balustrade the barrier insertion loss will be -7 dB(A) for a receiver directly across the road from a condenser.

The condensers will be at various distances from the boundary. For ease of calculation all were considered to be impacting on a single reception on the boundary at an average distance of 40m (see Point "R" on **Figure 1**). Assuming a direct line of sight from all 16 condensers to the reception point, this equates to a received noise of

40 dB(A) with a barrier insertion loss of 7, resulting in a received noise of **33 dB(A) Leq (15 min)**, which is below the most stringent night time criterion.

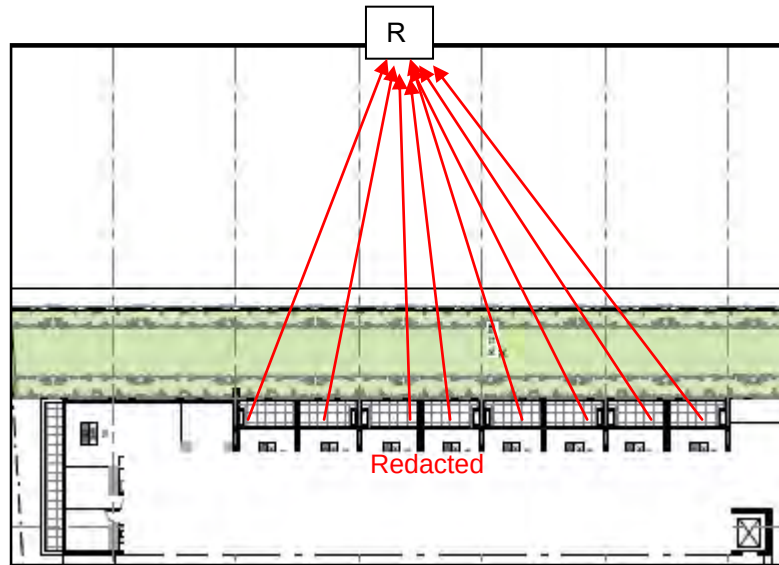


Figure 1 – A/C Condensers – Approximate Location

Vent Fans

The development will have a car park vent fan which will have a roof mounted exhaust outlet via a riser adjacent to the gym.

Noise associated with vent fans can come from both “break out” through ducting, and from “down duct” noise emanating from the end of ducting. To reduce break out noise, lined ducting should be used where there is the possibility of noise impacting on adjoining or neighbouring apartments or residences. Rectangular sheet metal duct work attenuates low frequency noise, but in doing so has increased break out noise levels. Cylindrical duct work will have a reduced break out level (useful in exposed locations) but also reduced low frequency noise attenuation.

To minimise down duct noise, a silencer, or silencers could be fitted either directly after the fan, or near the end of the ductwork. If possible, restrictions to air flow near the outlet of duct work, such as 90 degree bends etc., should be avoided.

To avoid the possibility of structure borne noise due to vibrations, all duct work for car park venting must be isolated from the main structure of the building. Duct and pipe penetrations must be kept free of the structure either by externally lagging or by use of non-setting sealants at the point of penetration.

The fans will exhaust to the roof top a minimum of approximately 20m from the nearest receivers to the south, in Howard Street. A car park

vent will typically extend approximately 0.5m from the flat of the roof. The results of theoretical noise level calculations at the nearest point receiver are shown, below, in **Table 6**.

TABLE 6 RECEIVED NOISE – CAR PARK VENT FAN	
Item	dB(A) Leq
Sound Power Level (at outlet)	65
Distance Loss to Receiver, (20 m)	-36
Shielding Effects (from roof)	-12
Received Noise	17
Criterion (Night)	35
Noise Impact	0

The results in Table 6 show that noise from the car park vent fans will comply with the most stringent night time criterion under the assessed conditions.

Received Road Traffic Noise

Due to the multi storey design of the building the use of acoustic barriers, or similar treatments, to mitigate road traffic noise would not be possible. To achieve adequate internal noise levels under these circumstances, noise control is, typically, achieved through architectural modifications to standard residence design and the recommendation of minimum construction types.

The acoustically weak points in the façade of a multi storey building, such as that proposed, are windows or glass sliding doors. The supplied plans for the building show that many of the proposed units will have living rooms and bedrooms in façades that are exposed to traffic noise from King Street and The Esplanade. Each of these areas of occupancy will have windows or glass sliding doors in this façade.

Calculations to determine appropriate internal noise levels can be performed based on the room dimensions and glazing areas. All such dimensions and areas were determined by reference to, and scaling from, the appropriate site plans.

Once the noise level at the outer face of each glazed section was determined from the logger data, the required R_w was calculated in accordance with the mathematical procedure given in AS3671-1989 "Acoustics - Road traffic noise intrusion - Building siting and construction". This procedure is based on the required internal noise level as shown in Tables 3 and 3a of the Standard.

The residential sections of the development will be in two separate “buildings”. The eastern most of these buildings will front King and Howard Streets (Howard Building), whilst the western building will be on the corner of King Street and The Esplanade (Esplanade Building).

For the calculation of potential impacts the noise measurements from the logger at King Street will be used for all calculations relating to the Howard Building and the noise measurements from the logger on The Esplanade will be used for the Esplanade Building.

Sample Calculation

Detailed below is a sample calculation of the R_w for the glass sliding door in the Lounge Room of the southernmost unit on Level 2 of the Esplanade Building (as shown in **Figure 2**). This has line of sight to The Esplanade.

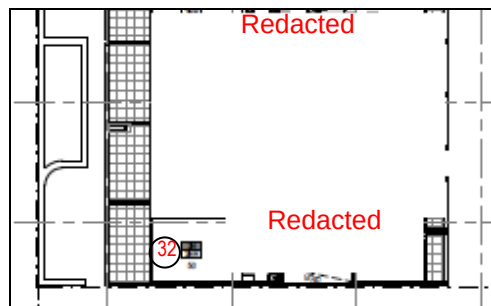


Figure 2 – Sample R_w Calculation

The measured Leq (1hr) night time (10 pm to 7am) noise levels were used in the calculations for bedrooms, whilst the Leq (1hr) day time (7am to 10pm) levels were used for all other areas.

The road traffic noise level at the window is 66 dB(A), (i.e. Leq (1hr) day time). As the criterion for the lounge room is 40 dB(A) the required traffic noise reduction is;

$$TNR = 66 - 40 = 26 \text{ dB(A)}.$$

The traffic noise attenuation, TNA , required of the window is calculated according to the equation given in Clause 3.4.2.6 of AS 3671,

$$TNA = TNR + 10 \log_{10}[(S/S_f) \times 3/h \times 2T_{60} \times C] \quad \text{equation 1}$$

where

- S = Surface area of windows = 10m^2
- S_f = Surface area of floor = 23m^2
- h = Ceiling height, assumed to be 2.4m
- T_{60} = Reverberation time, 0.5s
- C = No. of components in wall = 2 windows

Assuming that the room is acoustically average (neither too 'live' nor too 'dead') equation 9.26 in *Noise and Vibration Control*, L.L.Beraneck, 1971, gives a reverberation time of 0.46s. Consequently, the value of 0.5s was used in equation 1.

Using the values listed above gives

$$TNA = 26\text{dB(A)} \text{ for the windows.}$$

Substituting this value into the equation given in Clause 3.4.3.1 of AS3671 gives

$$Rw = TNA + 6 \approx 32. \text{ (note: the +6 is an allowance for the low frequency component of road and rail traffic noise)}$$

The results show that the glass door in the lounge room should be fitted with a system with an Rw of at least 32. Data from window manufacturers indicates that 6.38mm laminated glass would, typically, achieve Rw 32.

Similar calculations to that outlined above were performed for the windows and glass sliding doors on all affected facades of all units with the results shown in the figures in Appendix I. The figures are notated with the Rw indicated at each window or glass door. As the room types are mirrored from floor to floor only windows and doors on representative floors are shown. Those windows and doors on floor not specifically shown in the Appendix are the same as for the corresponding window or door that is shown.

Published sound insulation performance in terms of Rw ratings relate to partitions tested in ideal laboratory conditions or opinions based on such measurements and suppliers must be able to ensure compliance with the detailed Rw ratings when windows are installed.

That is, the Rw of glazing systems varies with manufacturers and can be influenced by such things as seals, closing systems etc. As indicated, before installation, the glazing supplier should provide evidence that the proposed window systems to be fitted will meet the minimum Rw requirements detailed.

All windows must be in solid frames fitted as neatly as possible to the parent wall. Any remaining gaps between the frame and the parent wall must be filled with a flexible acoustic sealant prior to fitting of architraves.

All other windows to residential areas of the development may be standard glazing.

It is envisaged that the windows to any commercial space will be fitted with minimum 6mm safety glass which will provide adequate noise attenuation to achieve an internal noise level of 45 dB(A) Leq.

It is, however, recommended that a review of the acoustic requirements for the commercial space be undertaken should end users be determined to be particularly noise sensitive.

That is, for example, if part of the area is proposed as specialist offices (rather than retail or open plan office space) then there may be a requirement to provide greater attenuation.

Generated Road Traffic Noise

Due to the non-continuous nature of traffic flow to and from the site the OEH accepted Intermittent Traffic Noise guidelines are used. **Equation 2** outlines the mathematical formula used in calculating the Leq,T noise level for intermittent traffic noise.

$$L_{eq,T} = L_b + 10 \log \left[1 + \frac{ND}{T} \left(\frac{10^{(L_{max} - L_b) / 10} - 1}{2.3} - \frac{(L_{max} - L_b)}{10} \right) \right] \quad \text{Equation 2}$$

Where;

- L_b is background noise level, dB(A)
- L_{MAX} is vehicle noise, dB(A)
- T is the time for each group of vehicles (min)
- N is number of vehicle trips
- D is duration of noise of each vehicle (min)

Typical vehicle noise levels were sourced from Spectrum Acoustics library of technical data, while background noise levels are those measured by our unattended logger. The Lmax vehicle noise levels used in Equation 2 are the maximum predicted noise levels produced at the facade of a residence by vehicles entering and departing the site.

Traffic coming to or leaving the site and travelling on nearby roads is assessed separate to site noise and is subject to the road traffic criteria described earlier in this report.

Typically vehicles will come and go from a car park at a mixed use building, such as that proposed, at varying rates.

The approach in this assessment has been to determine the maximum number of vehicle movements that could be generated by the development to maintain compliance with the relevant criterion.

Impacts have been calculated to a theoretical receiver located 15 m from the centre of traffic flow with results shown in **Table 7**. An average sound power level of 98 dB(A) has been used in the calculations to represent a mix of heavy and light vehicles.

TABLE 7	
TRAFFIC NOISE – NEARBY ROADS	
Typical Maximum Sound Power, dB(A)	98
Distance Loss to Receiver, (15 m)	30
Received Noise dB(A)	66
Traffic Volume, (cars/hr)	35
Time each vehicle audible at 60 kph (mins)	<0.1
Background Noise Level dB(A)	30
Calculated Traffic Noise, dB(A)(Leq 1 hr)	50
Criteria (Night) dB(A) (Leq 1 hr)	50

The results in Table 7 show that there may be up to 35 vehicle movements generated (in one direction) by the development at night before the criterion is exceeded. Similar calculation show that there may be more than 110 vehicle movements during the day before the criterion is exceeded.

CONCLUSIONS

A noise assessment has been carried out in regard to a proposed mixed use and residential development at the corner of King Street and The Esplanade, Warners Bay, NSW 51 – 53 King Street, Warners Bay, NSW. The development is to consist of residential units and commercial space.

The results of the assessment have shown that noise from mechanical plant will create no adverse impacts at any receiver.

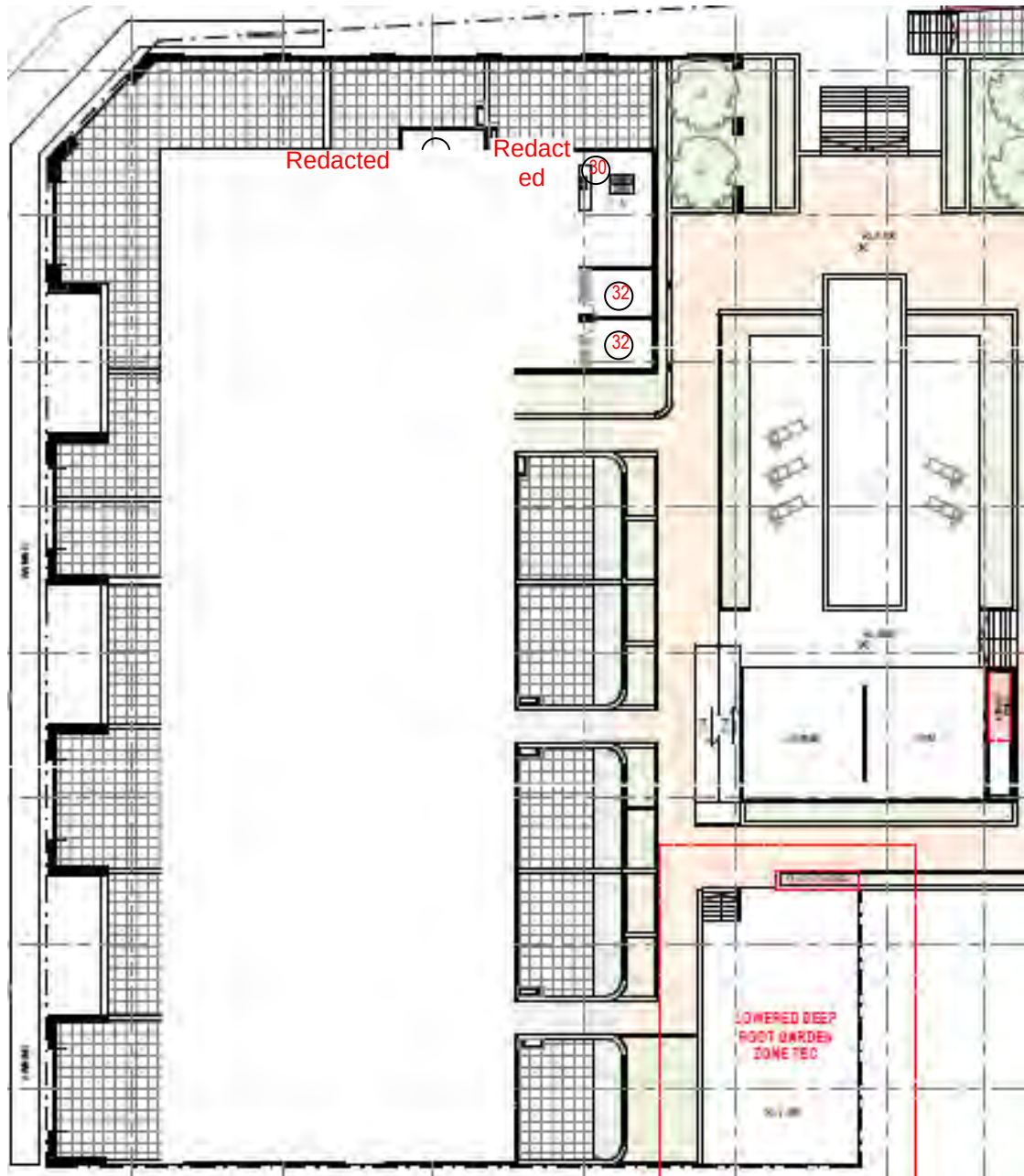
Received noise from car park vent fans will be below the most stringent noise goal at all times.

A schedule of windows has been determined that shows the minimum Rw for window/sliding door systems that must be achieved in order to attain an acceptable internal acoustic amenity for various areas of occupancy in the building.

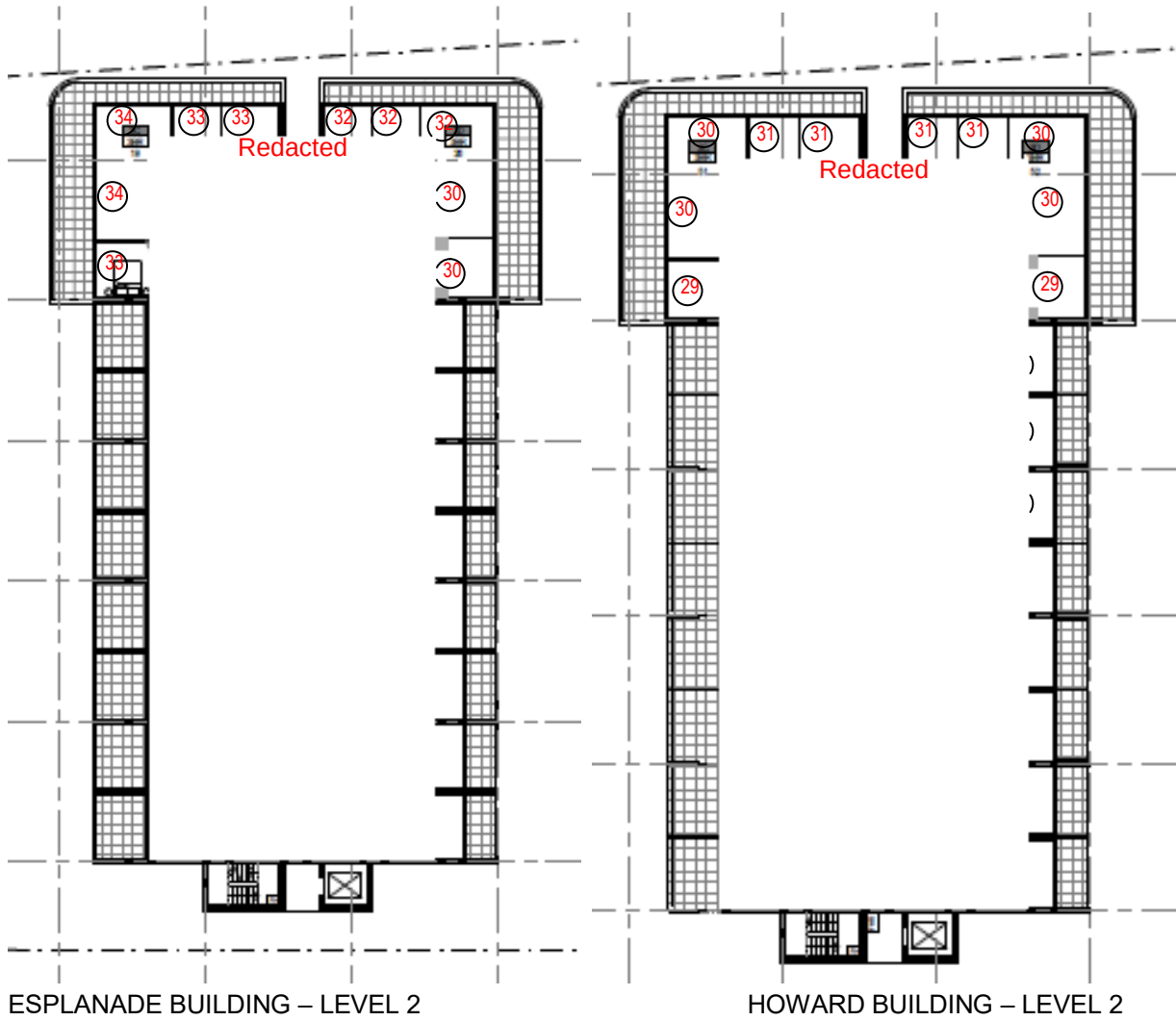
There will be no adverse noise impacts as a result of noise from traffic created by the development.

Appendix I

Proposed Floor Plans

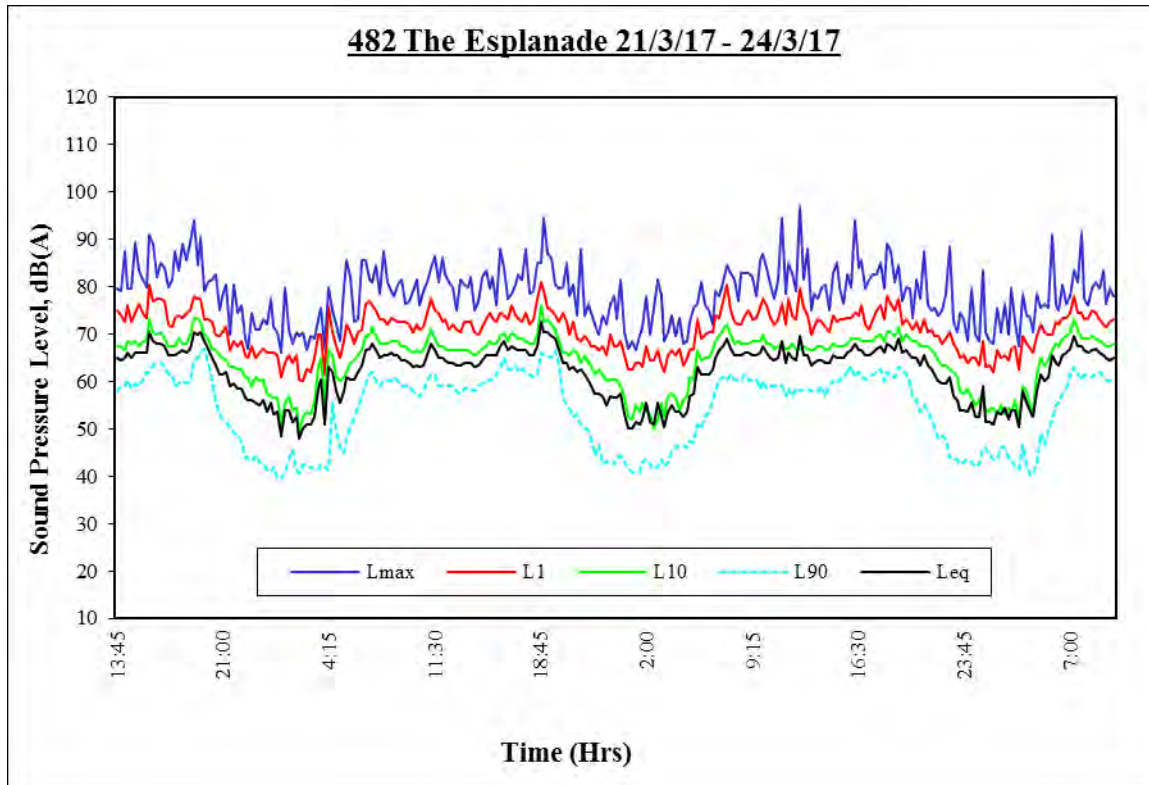


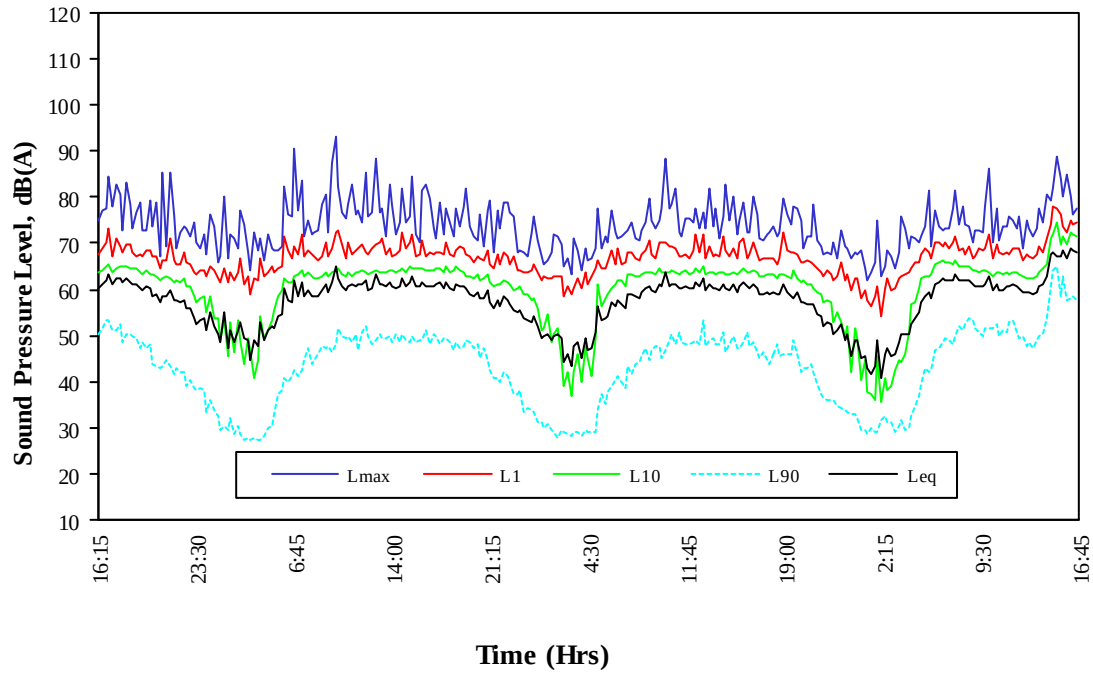
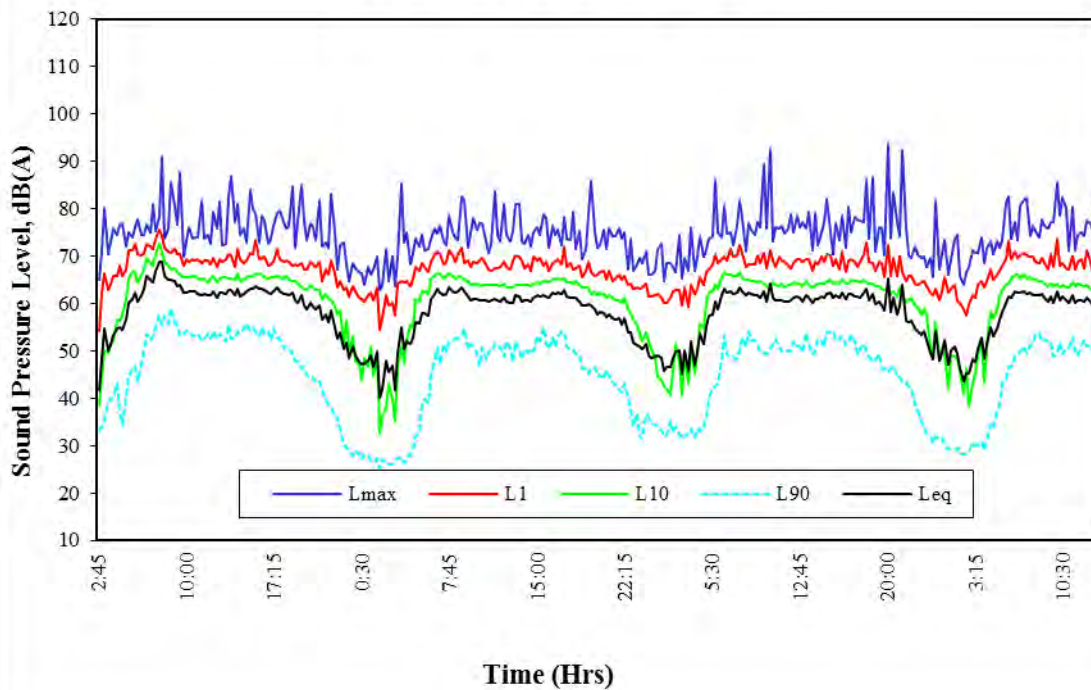
ESPLANADE BUILDING - UPPER GROUND FLOOR



Appendix I

Noise Logger Charts



51 King St 23/10/15 - 26/10/15**51 King St 26/10/15 - 12/10/15**

14 – CRIME RISK ASSESSMENT

JAMES MARSHALL & Co

CPTED

**Mixed Use Development 482 The Esplanade, Warners Bay
NSW.**

April 2017

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1. Introduction

James Marshall & Co has been engaged to prepare a Crime Prevention Through Environmental Design (CPTED) report for a proposed mix use development at 482 The Esplanade Warners Bay, NSW. The development is located on three street frontages and the total apartments for the Lake Front Building is 60 and the Howard Street Building 52 apartments. The proposal includes a mix of 1, 2 and 3 bedroom apartments and commercial spaces. There are 11 adaptable apartments proposed for the development.

The development site is highlighted in Figure 1 and regional context of the development site is shown in Figure 2.



Figure 1: Development Site Highlighted.

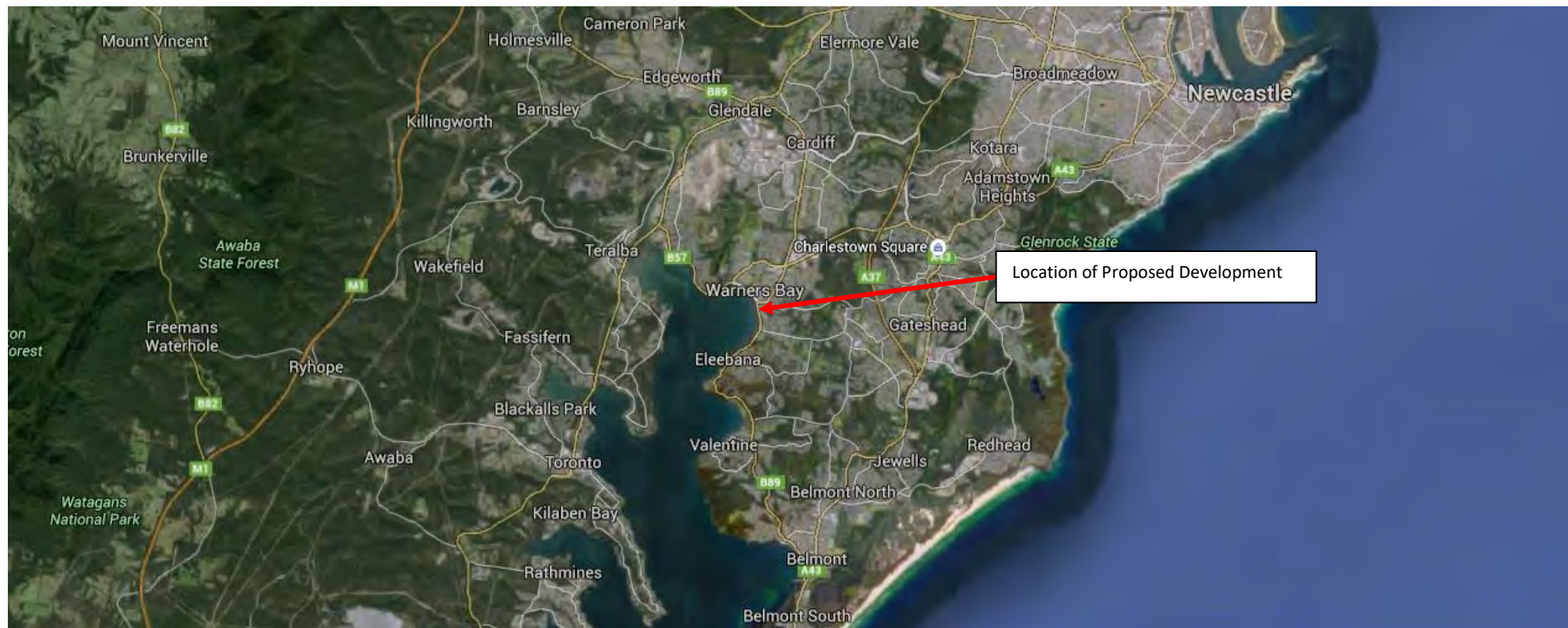


Figure 2: Regional Context

2. Safer By Design

2.1 Overview

This CPTED assessment has incorporated the following methodology:

- Site visit and land use assessment of the proposed development site and surrounding area.
- Consultation with identified stakeholders.
- Assessment of architectural drawings for the proposed development using Safer by Design principles.
- Assessment of crime statistics/data for both the Lake Macquarie LGA and area surrounding the development site.
- An assessment of whether this development is likely to contribute to an increased incidence of crime (or perceived) if it is approved.

The recommendations made in this report are consistent with Safer by Design principles.

In April 2001, the then NSW Department of Infrastructure, Planning and Natural Resources (Department of Planning and Environment) introduced Crime Prevention Legislative Guidelines to Section 79C of the Environmental Planning and Assessment Act, 1979. These guidelines require consent authorities to ensure that development provides safety and security to users and the community. If a development is thought to present a crime risk, the guidelines can be used to justify modification of the development on the grounds that crime risk cannot be appropriately minimised.

Councils and local police are encouraged to identify the types of development that will ‘typically’ require a crime risk assessment, and prepare a consultation protocol. Protocols are location (need) based agreements which outline the types of development that will be jointly assessed, how construction will occur and timeframes for consultation. Subject to council direction, development types not listed in local consultation protocols will not require a formal crime risk (CPTED) assessment.

CPTED is a crime prevention strategy that focuses on the planning, design and structure of cities, communities and neighbourhoods. It reduces opportunities for crime by using design and place management principles that reduce the likelihood of essential crime ingredients (law, offender, victim or target, opportunity) from intersecting in time and space.

This is because predatory offenders often make cost benefit assessment of potential victims and locations before committing crime. CPTED aims to create the reality (or perception) that the costs of committing crime are greater than the likely benefits. This is achieved by creating environmental and social conditions that:

- Maximise risk to offenders (increasing the likelihood of detection, challenge and apprehension);
- Maximise the effort required to commit crime (increasing the time, energy and resources required to commit crime);
- Minimise the actual and perceived benefits of crime (removing, minimising or concealing crime attractors and rewards); and
- Minimise excuse making opportunities (removing conditions that encourage / facilitate rationalisation of inappropriate behaviour).

2.2 CPTED Principles

CPTED employs four key strategies which are outlined below:

2.2.1 Territorial re-enforcement

Community ownership of public space sends 'signals' to the community. Places that feel owned and cared for are likely to be used, enjoyed and revisited. People who have guardianship or ownership of areas are more likely to provide effective supervision and are more likely to intervene if crime is taking place, or if there is a risk of crime occurring. Furthermore, criminals rarely commit crime in areas where the risk of detection is high.

Territorial re-enforcement uses actual and symbolic boundary markers, spatial legibility and environmental cues to 'connect' people with space, to encourage communal responsibility for public areas and facilities, and to communicate to people where they should not be and what activities are appropriate.

2.2.2 Surveillance

People feel safe in public areas when they can see and interact with others, particularly people connected with that space, such as shopkeepers or adjoining residents. Criminals are often deterred from committing crime in places that are well supervised.

Natural surveillance is achieved when normal space users can see and be seen by others. This highlights the importance of building layout, orientation and location; the strategic use of design; landscaping and lighting – it is a by-product of well planned, well designed and well used space.

Technical / mechanical surveillance is achieved through mechanical / electronic measures such as CCTV, help points and mirrored building panels. It is commonly used as a 'patch' to supervise isolated, high risk locations.

Formal (or Organised) surveillance is achieved through the tactical positioning of guardians. An example would be the use of the on-site supervisors, e.g. security guards at higher risk locations.

2.2.3 Access control

Access control treatments restrict, channel and encourage people and vehicles into, out of and around the development. Way-finding, desire-lines and formal/informal routes are important crime prevention considerations as they minimise opportunities for people to wander in areas where they are not supposed to. Effective access control can be achieved by using physical and symbolic barriers that channel and group pedestrians into areas, therefore increasing the time and effort required for criminals to commit crime.

Natural access control includes the tactical use of landforms and waterways features, design measures including building configuration, formal and informal pathways, landscaping, fencing and gardens.

Technical / Mechanical access control includes the employment of security hardware.

Formal (or Organised) access control includes on-site guardians such as employed security officers.

2.2.4 Space / Activity Management

Space / Activity Management strategies are an important way to develop and maintain natural community control. Space management involves the formal supervision, control and care of the development. All space, even well planned and well-designed areas need to be effectively used and maintained to maximise community safety. Conversely, places that are infrequently used are commonly abused. There is also a high correlation between urban decay, fear of crime and avoidance behaviour. The recommendations below relate to the general surrounds and also the internal layout to the development.

The proposed development has been assessed against these four principles. Furthermore, personal safety has been considered given the nature of the development.

2.3 Author's Qualifications

The CPTED Report has been undertaken by James Marshall. James has over twenty years' experience in the community development and social planning sector and during this time held a number of senior management roles in both the welfare sector and in local government. Some examples of experience relating to the preparation of crime risk assessments and Crime Prevention Through Environmental Design (CPTED) are illustrated below.

- McCabe Park, Wollongong (crime risk assessment and subsequent redesign).
- Wollongong City mall (crime risk assessment and redesign as well as policy development).
- Wollongong Youth Centre (crime risk assessment and subsequent redesign).
- Peace Park (Chinaman's Hollow) Cessnock (crime risk assessment in its development phase).
- Cessnock Civic precinct and main street upgrade (crime risk assessment in its development phase).
- Rotary Park, Kurri Kurri (crime risk assessment and redesign).
- ALDI Stores (Kurri Kurri, Taree, Muswellbrook and Mayfield).
- McDonalds Restaurants (Cessnock, Kurri Kurri, Dubbo, Tuncurry).
- Lake Macquarie Yacht Club
- Various aged care residential developments (Morisset, Whitebridge, Cessnock)
- KFC (Hunter Street Newcastle)
- New residential release areas (Dubbo City Council – Keswick Estate)
- Strategic site investigation and risk assessment (McDonald's, ALDI, private developers).
- Various open space assessments (Wollongong City Council, Cessnock City Council, Orange City Council, NSWLPMA).
- Coles Stores (various).
- One Stop Wine Barn (Cessnock).

These projects have involved the facilitation of a consultative approach with Council officers, NSW Police, business owners, users of the areas under review (target group focused), business chamber representatives etc. James understands the principles behind the crime risk assessment process, including the use of and application of crime statistics as well as the influencing factors of public safety and risk via urban design and use of public space.

James Marshall has also completed approved NSW Police Safer by Design training in 2012 as well as numerous short courses and programs on crime risk assessment and CPTED throughout his career.

3. Area Analysis

3.1 Lake Macquarie Crime Characteristics

Lake Macquarie LGA is located in the Hunter Region of New South Wales, about 110 kilometres north of Sydney. Lake Macquarie City is bounded by Newcastle City in the north, the Tasman Sea in the east, Wyong Shire in the south and Cessnock City in the west. Lake Macquarie City is both a rural and residential area with some industrial land use. The City encompasses a total land area of about 750 square kilometres, of which a large proportion is National Park, State Forest and nature reserves.

Residential areas are dispersed around the lake and the largest population centres are located north of the lake (in suburban Newcastle) including Charlestown, Glendale and Cardiff. The other main population centres are Belmont, Morisset, Mount Hutton, Swansea, Toronto and Warners Bay.

The Lake Macquarie LGA is one of the fastest growing cities in the Hunter, and one of the largest cities in New South Wales. In summary:

- Estimated residential population of 202,347 as at March 2012
- The fourth most populous city in NSW, and in the top 7% in Australia for largest growth in a city
- Accounting for 37% of the Lower Hunter population
- Population distributed around the lake in over 90 communities. The median household income is \$922 per week, with the most significant change between 2001 and 2006, a growth in the highest income group of \$93,032 and over.
- Approximately 40% of the population hold educational qualifications, with the most significant change between 2001 and 2006, a growth in the number of people with bachelor or higher degrees.
- Population is expected to grow by 60,000 people between 2006-2031 creating demand for 36,000 new dwellings and 12,200 new jobs.

The vision for the City, held by Council and the community, is that it is a place:

- Where the environment is protected and enhanced.
- Where the scenic, ecological, recreational, and commercial values and opportunities of the Lake and coastline are promoted and protected.
- With a prosperous economy and a supportive attitude to balanced economic growth, managed in a way to enhance quality of life and satisfy the employment and environmental aims of the community.
- That recognises, encourages, develops its diverse cultural life and talents, protects, and promotes its heritage.
- That encourages community spirit, promotes a fulfilling lifestyle, enhances health and social well-being, encourages lifestyle choices, and has opportunities to encourage participation in sport and recreation.
- That promotes equal access to all services and facilities and enables all citizens to contribute to and participate in the City's economic and social development.
- That promotes affordable housing.

(Source: LMCC: Lifestyle 2030)

3.2 Site Characteristics

The site of the proposed development is located on the corner of The Esplanade, Howard Street and King Street, Warners Bay. Figure 3 shows the land use characteristics of the area. Immediately to the south of the development site are residential unit complexes (including commercial premises (on the ground floor). The proposed development is within 100 meters of the Warners Bay commercial / retail area and is located adjacent to Lake Macquarie. The site is busy with traffic and pedestrians. The Warners Bay CBD is also active late into the evening due to lake side activities and cafes, restaurants etc.



Figure 3: Site Boundary (approximate) and Surrounding Characteristics

4. Crime Characteristics

4.1 Local Crime Characteristics

The Lake Macquarie Crime Prevention Strategy (2015 – 2018) identifies crime categories that are to be subject to resources and strategies. While the areas in the plan may be specific, it is important that new development does not create or contribute to the incidence of crime, or transfer an issue from one area to another. With that in mind, while the specific strategies may not directly relate to this development, knowledge of the general issues and the aims and goals of the Crime Prevention Plan are important.

The Lake Macquarie Crime Prevention Strategy (2015 – 2018) states that “an analysis of crime activity in Lake Macquarie provided by Lake Macquarie Local Area Command (LMLAC 2014) and statistical information available through the NSW Bureau of Crime Statistics (BOCSAR 2014) have been used to develop this crime profile. After further discussion and agreement with NSW Police the following two priority crime categories have been identified and will be targeted by the Lake Macquarie Crime Prevention Strategy (LMCPS).

- Steal from Dwelling / Break and Enter Dwelling (or Residential Burglary)
- Steal from Motor Vehicle

In addition to the two priority crime categories identified through consultation with NSW Police, the crime categories of Malicious Damage and Assault – Domestic Violence have also been included due to the high rate of occurrence.

The information presented in Table 1 indicates that there has been a decline in crime activity in all categories except for domestic violence which is recorded as stable across the latest three reporting years from October 2011 until September 2014. The largest improvement can be seen in the categories of break and enter – non dwelling, robbery and motor vehicle theft. The categories where there has been the least reportable improvement are assault, steal from person and steal from dwelling.

The most prevalent crime activities in the Lake Macquarie LGA continue to be malicious damage, steal from motor vehicle and break and enter – dwelling. This confirms the selection of these crime categories as priority areas for actions in this strategy”.

Table 1: Historical Crime Data from 2011/12 to 2013/14 for Lake Macquarie LGA

Crime Activity / Category	Occurrence 2011-2012 Year	Occurrence 2012-2013 Year	Occurrence 2013-2014 Year	3 Year Variance	3 Year Trend
Assault (Alcohol Related)	572	540	489	- 83	Fall 14%
Assault (Non-DV)	852	755	717	- 135	Fall 16%
Assault (DV)	693	789	693	0	Stable
Break and Enter – Dwelling	1062	1021	820	- 242	Fall 23%
Break and Enter – Non Dwelling	713	601	344	- 369	Fall 52%
Malicious Damage	2702	2311	1975	- 727	Fall 27%
Robbery	92	82	59	- 33	Fall 46%
Steal from Dwelling	609	598	551	- 58	Fall 10%
Steal from Motor Vehicle	1660	1549	1290	- 370	Fall 22%
Steal from Person	107	104	97	- 10	Fall 9%
Steal from Retail Store	703	547	586	- 117	Fall 17%
Motor Vehicle Theft	786	727	502	- 284	Fall 36%

Source: LMCC Crime Prevention Strategy (2015 – 2018 p9).

Table 2: Analysis of Break and Enter Offences for Lake Macquarie

Occurrence Suburbs	Occurrence Days	Property Stolen	Victim Profile	Offender Profile
Charlestown Windale Swansea Warners Bay Belmont	Friday Tuesday	Cash/Document (e.g. currency, driver's licence). Personal Item (e.g. wallet). Home Entertainment Equipment (e.g. television).	Unoccupied residential premises throughout the day and both unoccupied and occupied premises during the night, at random.	Drug offenders and property crime offenders.

Source: LMCC Crime Prevention Strategy (2015 – 2018 p129).

Table 3: Analysis of Steal from Dwelling Offences for Lake Macquarie

Occurrence Suburbs	Occurrence Days	Property Stolen	Victim Profile	Offender Profile
Windale	Monday	Cash/Document	Victims are targeted at random where premises are unlocked/unsecured.	Opportunistic Crime committed by offenders.
Toronto	Tuesday	Communications		
Belmont	Saturday	Equipment (e.g. mobile phone).		
	Friday			

Source: LMCC Crime Prevention Strategy (2015 – 2018 p13).

Table 4: Analysis of Steal from Motor Vehicle Offences for Lake Macquarie

Occurrence Suburbs	Occurrence Days	Property Stolen	Victim Profile	Offender Profile
Charlestown	Friday	Cash/Document (e.g. currency, drivers' licence).	Victims leave vehicles unlocked or with valuables on display.	Opportunistic crime committed by offenders.
Cardiff		Personal Item (e.g. wallet)		
Belmont		Vehicle Plate		
Warners Bay		Tools		

Source: LMCC Crime Prevention Strategy (2015 – 2018 p14).

Table 5: Analysis of Malicious Damage Offences for Lake Macquarie

Occurrence Suburbs	Occurrence Days	Premise Type
General		
Windale	Friday	Residential (e.g. house detached).
Belmont	Saturday	Outdoor/Public Place (e.g. road/street).
Charlestown		
Graffiti		
Belmont	Friday	Business/Commercial (e.g. shopping complex [i.e. Lake Macquarie Fair]).
Mount Hutton		Residential (e.g. yard/fencing).
Charlestown		

Source: LMCC Crime Prevention Strategy (2015 – 2018 p14).

Table 5: Analysis of Assault – Domestic Violence Offences for Lake Macquarie

Occurrence Suburbs	Occurrence Days	Premise Type
Windale	Friday	Residential (93%) - (BOCSAR 2015b)
Toronto	Saturday	
Belmont	Sunday	
Cardiff		

Source: LMCC Crime Prevention Strategy (2015 – 2018 p15).

Updated crime data for the Lake Macquarie Local Government Area (refer NSW Bureau of Crime Statistics and Research for the period 2009 - 2015) identifies that reported crime of; robbery; motor vehicle theft; steal from motor vehicle; steal from retail store, are generally ranged within the top 50 LGA's in NSW for the period. Refer Table 6.

Table 6: Ranking of Reported Crime for Lake Macquarie LGA against each NSW LGA (2009 – 2015)

Reported Crime	Ranking out of 139 NSW Local Government Areas (with a population greater than 3,000 people)						
	2009	2010	2011	2012	2013	2014	2015
Assault – Non DV Related	81	76	81	73	83	87	85
Assault – DV Related	64	76	81	73	67	79	72
Robbery	73	75	48	40	44	51	57
B/E Dwelling	71	92	67	53	60	66	73
B/E Non-Dwelling	52	43	55	48	52	93	76
MV Theft	33	24	15	13	12	31	25
Steal from MV	38	58	25	21	37	35	43
Steal from Retail Store	31	34	27	27	45	35	55
Steal from Dwelling	76	82	80	80	75	89	84
Steal from Person	77	66	52	61	53	46	54
Malicious Damage to Property	60	58	50	57	68	63	64

Source: BOCSAR

The number of incidences of reported crime (selected offences) by premises is shown in Table 7. This information helps understand the correlation between premises type and the incidence of crime (and risk potential). Table 7 illustrates that crime is largely determined by the premises type, the opportunity and the risk of detection. For example, break and enter (dwellings) is usually in residential areas, during the day when occupants are away. The use of 'hot spot' maps shows where crime is concentrated (the higher concentration / number of the incidence of crime appear a darker shade of red). The purpose of this is to identify the areas / locations where crime is more likely to occur, as well as the incidence and type of crime so resources and strategies can be put into place to address specific issues. The hot spot maps for the proposed development site are shown below.

Table 7: Number of Incidents of Selected Offences Recorded by NSW Police by Premises Type

Premises Type *	Assault - non-domestic violence	Assault - domestic violence related	Sexual Offences	Robbery	Break and enter - dwelling	Break and enter - non-dwelling	Motor vehicle theft	Steal from motor vehicle	Steal from retail store	Steal from dwelling	Steal from person	Malicious damage to property	Trespass
Public Transport Facilities	29	4	7	2	0	2	1	3	0	0	11	89	3
Retail/Wholesale	73	11	5	20	0	111	17	76	426	0	30	193	16
Outdoor/Public Place	133	44	26	14	0	5	169	385	2	0	11	272	26
Recreational Facilities	2	1	0	0	0	24	3	5	0	0	3	29	0
Industrial Sites	1	0	0	1	0	67	10	36	0	0	0	25	0
Residential - Dwelling	247	652	206	6	563	0	106	62	0	253	14	727	9
Residential - Outside of Dwelling	7	9	1	0	153	0	158	472	0	279	0	214	0
Residential - Temporary Accommodation	7	6	7	0	0	10	2	2	0	0	0	14	0
Carpark	12	8	1	0	0	1	53	160	0	0	0	80	1
Education	49	2	28	0	0	60	0	2	0	0	2	101	1
Licensed Premises	51	3	1	2	0	19	3	8	52	0	6	32	6

Source: BOCSAR (Sourced 1 February 2017)

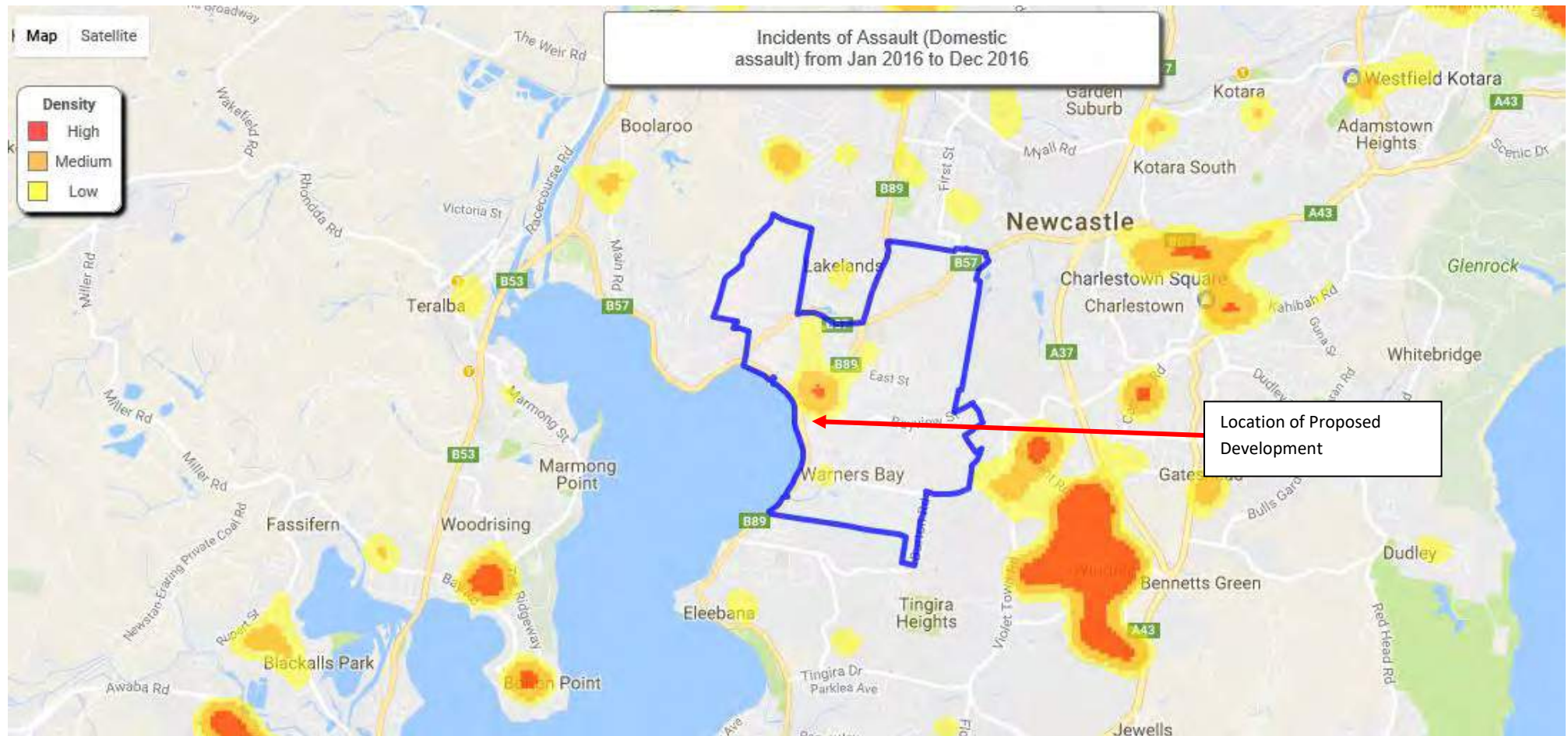


Figure 4: Incidents of Domestic Assault (January 2016 – December 2016)

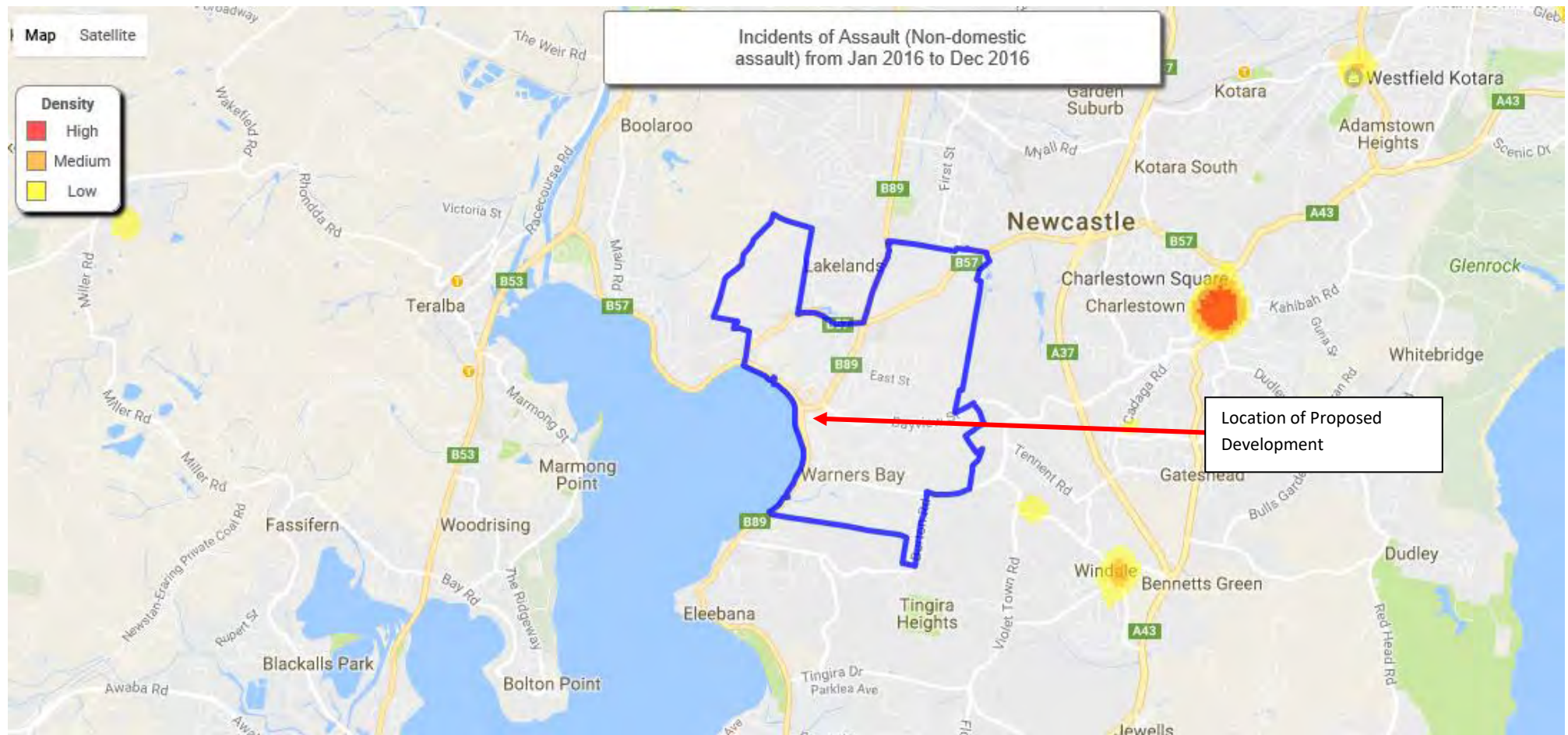


Figure 5: Incidents of Non-Domestic Assault (January 2016 – December 2016)



Figure 6: Incidents of Robbery (January 2016 – December 2016)

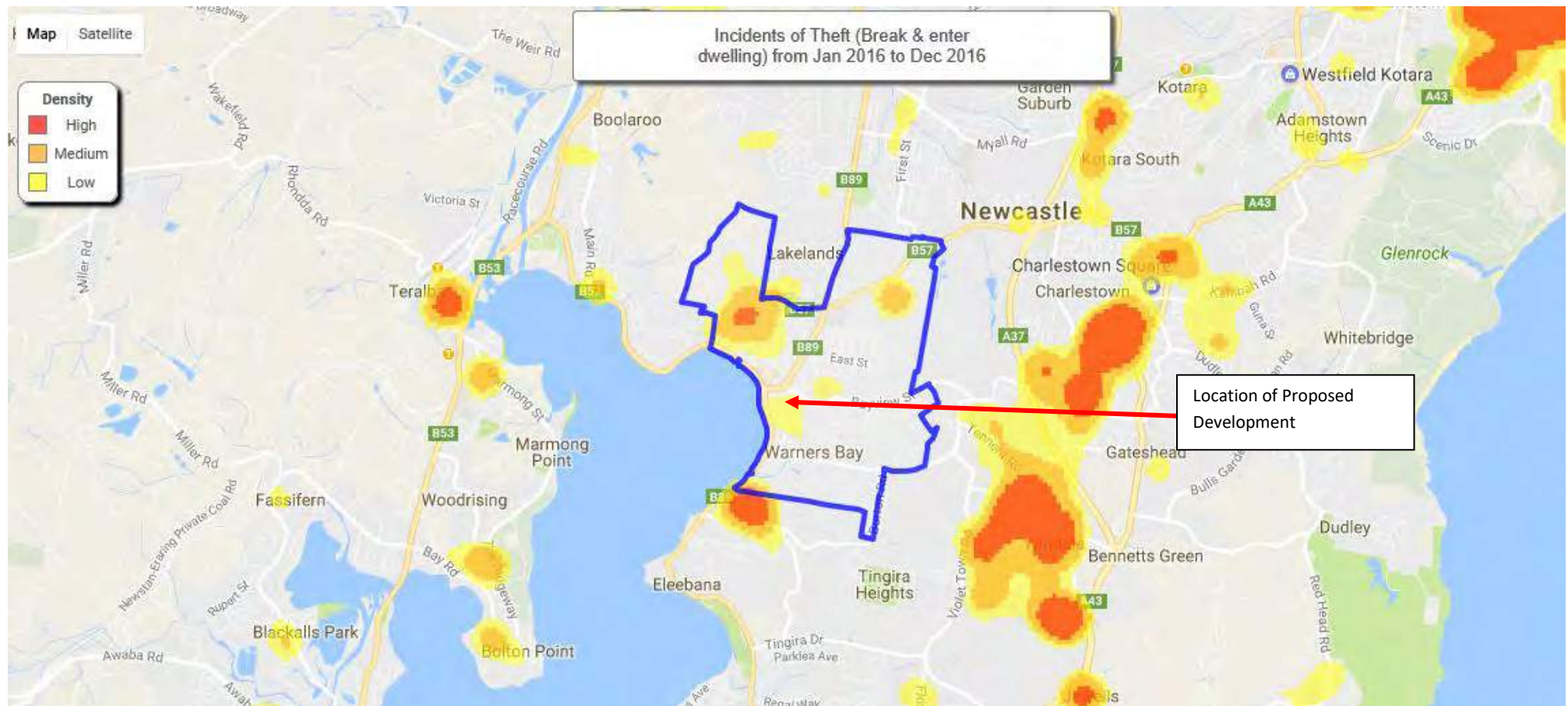


Figure 7: Incidents of Theft / Break and Enter Dwelling (January 2016 – December 2016)

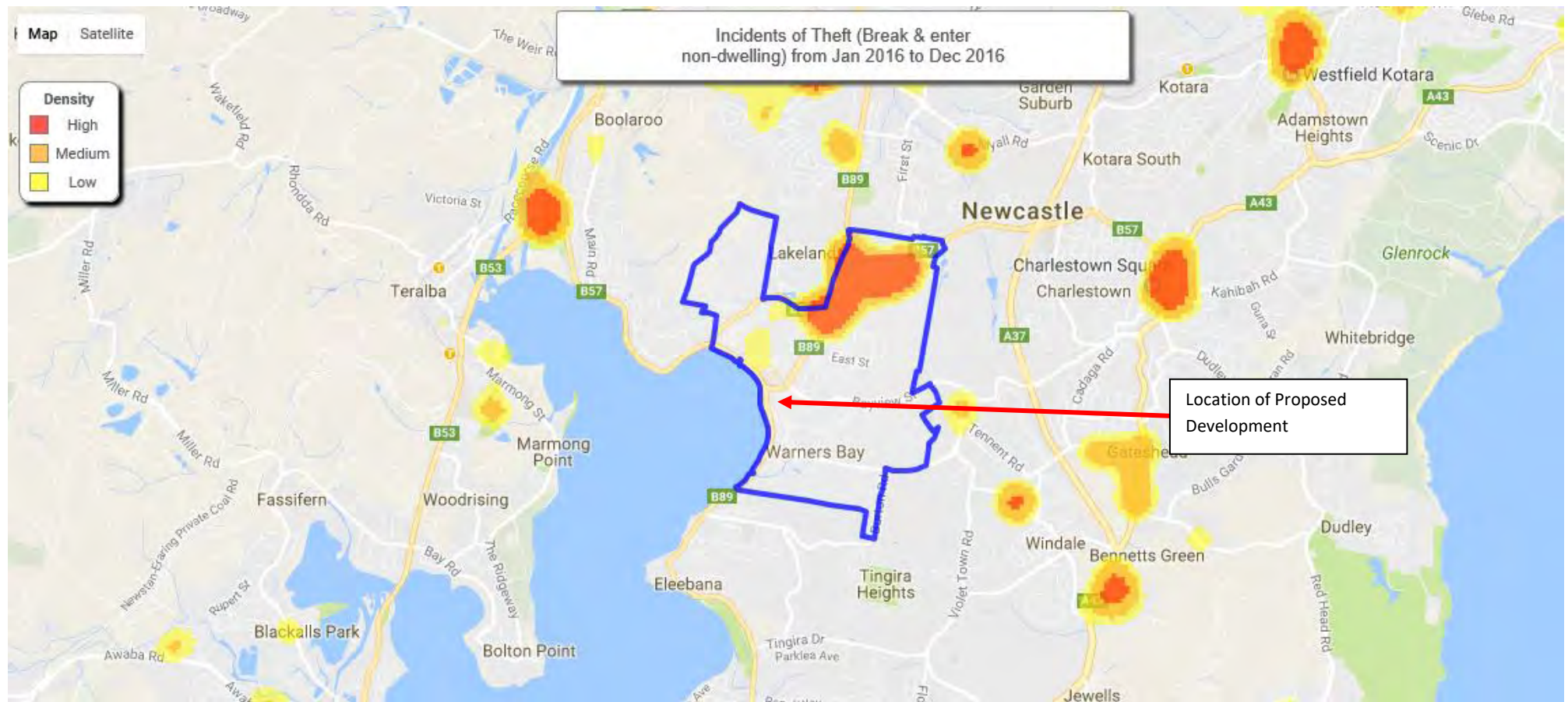


Figure 8: Incidents of Theft / Break and Enter Non - Dwelling (January 2016 – December 2016)

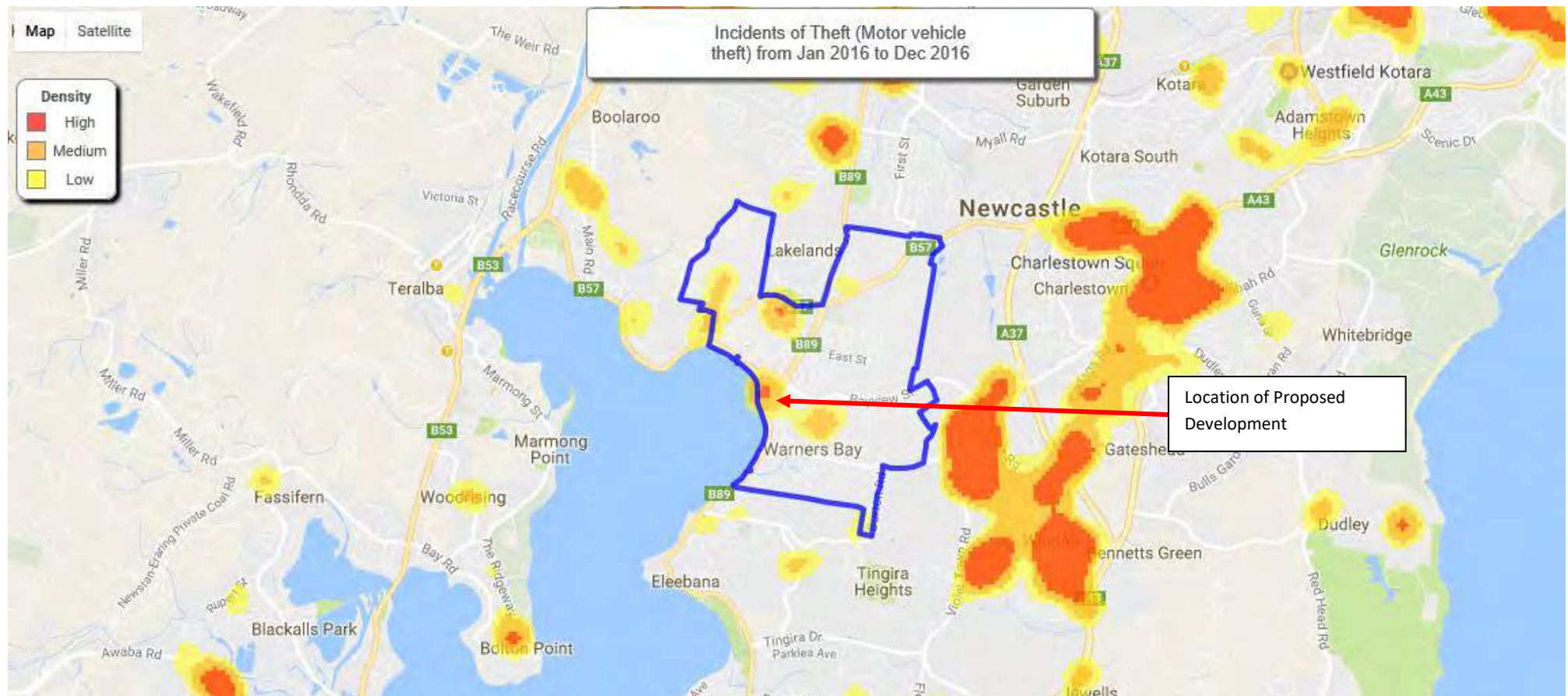


Figure 9: Incidents of Motor Vehicle Theft (January 2016 – December 2016)

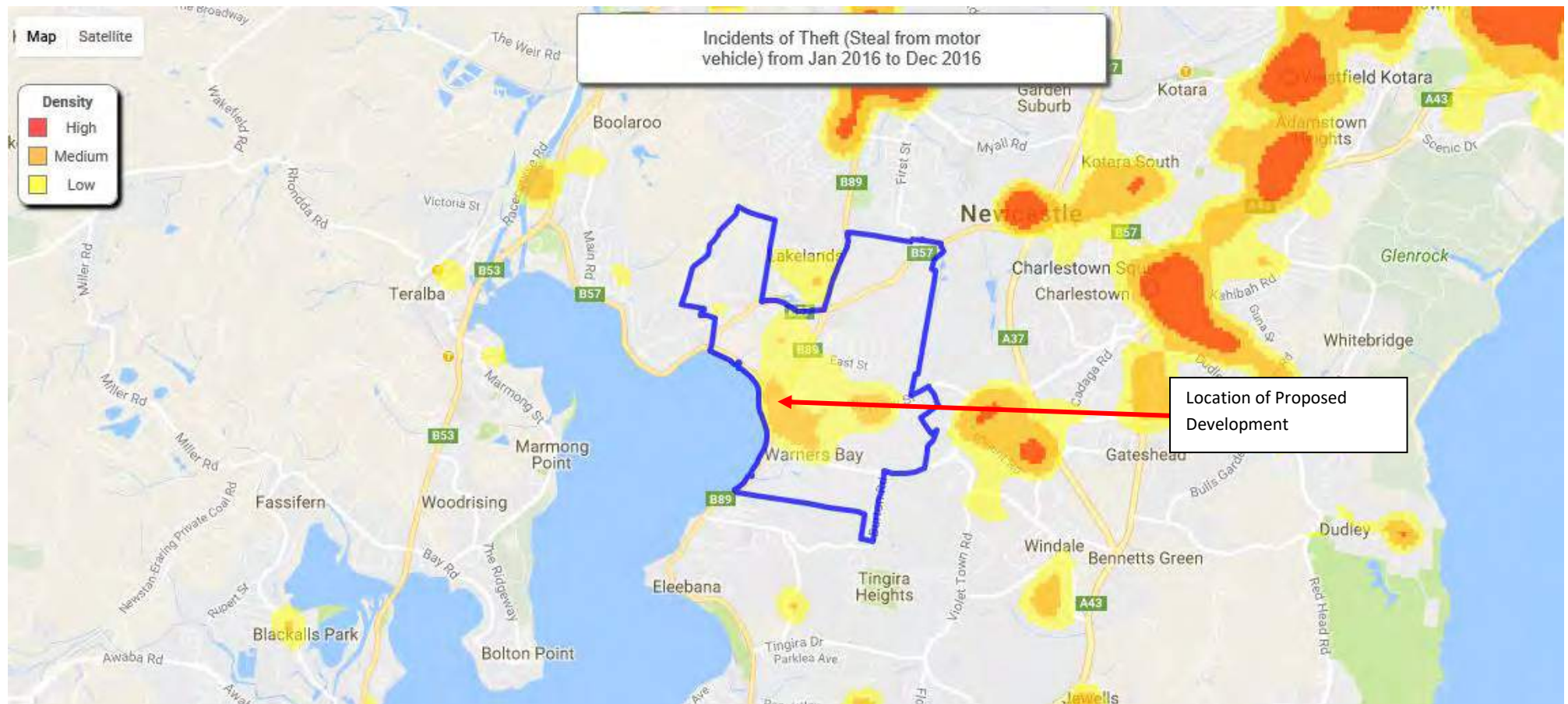


Figure 10: Incidents of Theft / Steal from Motor Vehicle (January 2016 – December 2016)

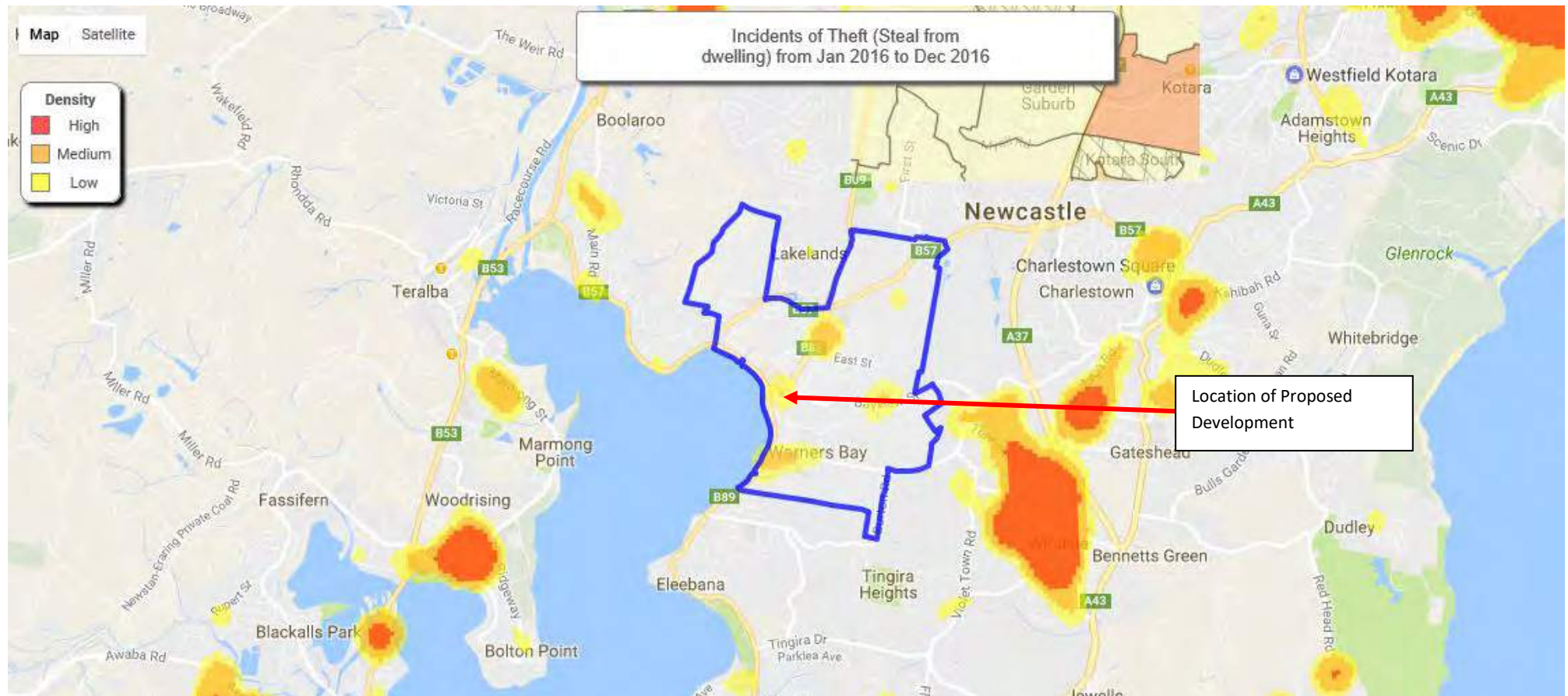


Figure 12: Incidents of Theft / Steal From Dwelling (January 2016 – December 2016)

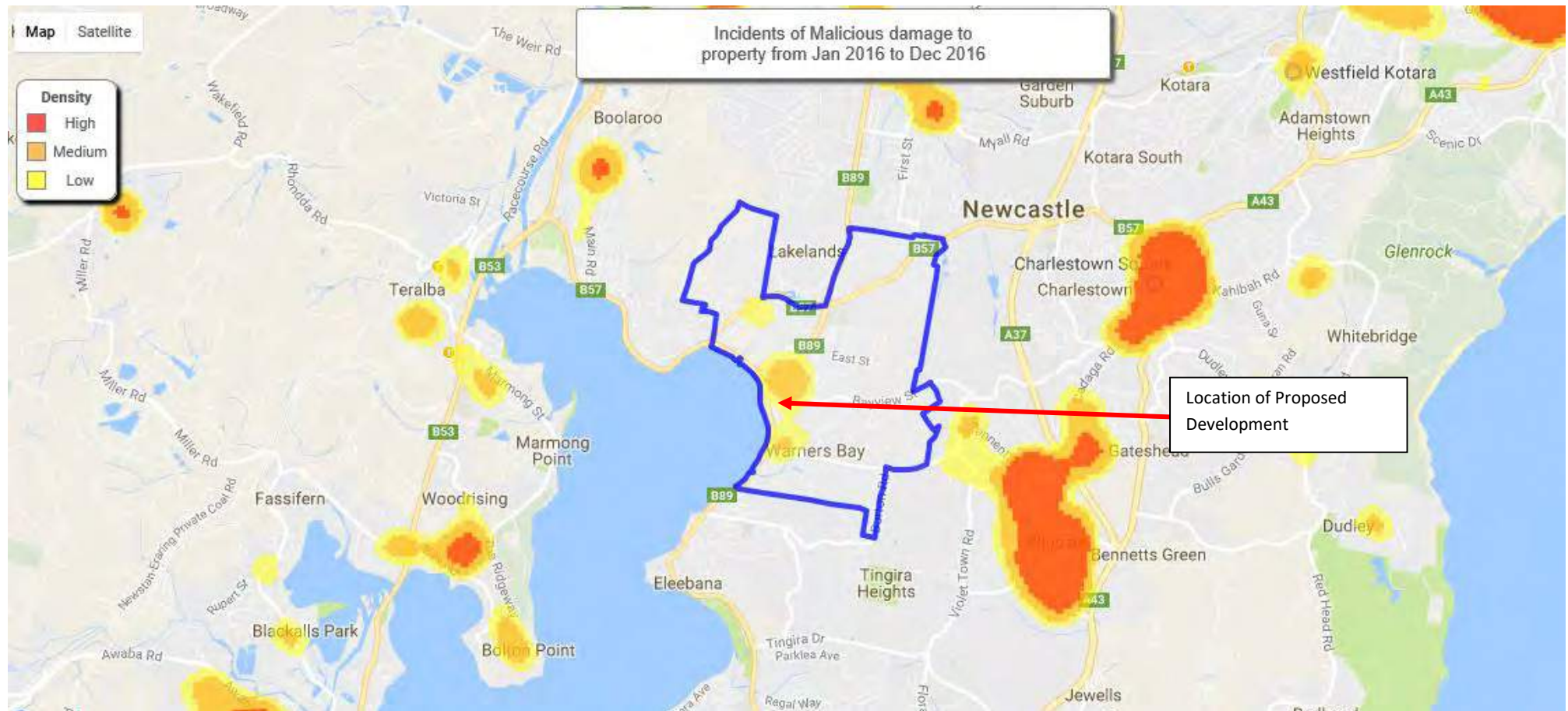


Figure 13: Incidents of Malicious Damage to Property (January 2016 – December 2016)

Crime data from the Bureau of Crime Statistics and Research show the following influencing / contributing factors for the crime characteristics for the Lake Macquarie LGA:

- Outdoor and public spaces are more likely to be targets for assault, sexual offences, break and enter, theft of motor vehicle, steal from motor vehicle and malicious damage.
- Areas where late night hotel trading venues are located are areas where there is a high concentration of malicious damage and non-domestic assault.
- Retail stores are targeted for the highest amount of break and enter.
- Steal from motor vehicle is more likely from a car park.
- There is evidence of motor vehicle theft in areas isolated from public transport.
- Females are more likely to be victims of domestic violence related assault.
- Males are more likely to be victims of non-domestic violence related assault.
- Alcohol affectation is a factor but not the most significant factor in all crime categories in the Lake Macquarie LGA.

The crime trend data and hot spot maps clearly show that the proposed development site and surrounding area is an area where there are incidences of reported crime and the following crime characteristics occur in the area:

- Domestic Assault
- Steal from Dwelling
- Motor Vehicle Theft
- Steal from Motor Vehicle
- Malicious Damage to Property

These incidents of crime are likely to be opportunistic and factors to minimise opportunities are incorporated into the recommendations outlined in Section 5.

5. General Recommendations

The following CPTED principles are recommended for the proposed site:

5.1 Territorial re-enforcement

- The use of a fence will assist in creating territorial reinforcement along neighbouring property boundaries. The pool will be fenced as per pool safety standards.
- Signage at entry points into the site should be erected and clearly identify direction of travel and areas where entry is prohibited.
- Clearly signpost any area in the site where access is prohibited or is private.

5.2 Surveillance

- Landscaping should not inhibit natural surveillance (block sight lines) or provide concealment and entrapment opportunities. When selecting and maintaining vegetation, consideration should be given to the possibility of areas becoming entrapment sites in the future.

Heavy vegetation should also be avoided at the entrance areas of all the buildings throughout the site so as not to provide concealment opportunities and inhibit line of sight.

Shrubs should not be greater than 1 metre in height and the canopy of tall trees should be higher than 1.8 metres. Refer Figure 14.

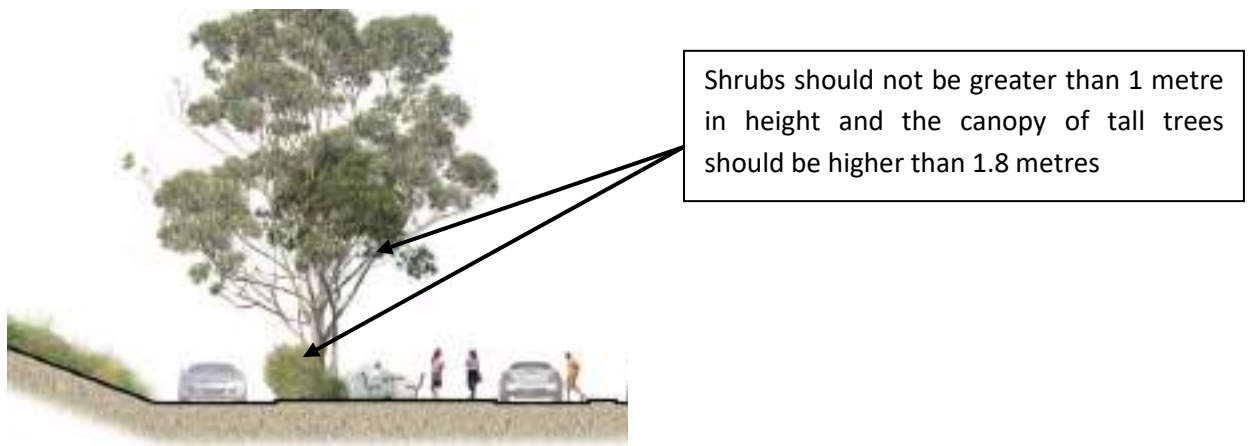


Figure 14: Landscaping not to Inhibit Line of Sight.

- The building design should not inhibit natural surveillance (block sight lines) or provide concealment and entrapment opportunities. It is recommended that the set back of entry foyers and door recess be a maximum of 1 metre.
- Australian and New Zealand Lighting Standard 1158.1 – Pedestrian, requires lighting engineers and designers to consider crime risk and fear when selecting lamps and lighting levels.
- Front entry should be secure with secure access facility (i.e. buzzer and alarm to desired unit with CCTV camera to unit).
- Entry doors to have deadlocks, windows to be deadlocked to reduce opportunities for forced entry.
- Pathways / line of pedestrian travel should be lit with low lighting to mark the path of travel.
- Underground car park to be painted a light colour as it assists detect shadows and movement.

5.3 Access control

- All entry points (pedestrian and vehicle) should be clearly signposted and identify the area as being private property.
- Trees should not be planted close to the building as it creates a 'natural ladder' to the roof of any building.

5.4 Space / Activity Management

- Directional signage is to be provided throughout the development. The signage is to be clear and legible to aid 'way finding' throughout the development.
- Installation of 'Park Smarter' signage (or similar) is recommended to minimise opportunity for theft from vehicle.
- The area (including gardens, hard walls, fencing) should be well maintained. Any evidence of anti-social behaviour (e.g. graffiti, malicious damage, broken lights etc.) should be cleaned / fixed / replaced within 24 hours. A maintenance plan should be developed for the site.
- The garbage bin area to be secured and kept out of general sight.

- Regular walk through to ensure the site is kept clean and also monitor the grounds.

5.5 Design Layout Comments

The following comments relate to the design of the proposed building.





6. Conclusion

James Marshall & Co has been engaged to prepare a Crime Prevention Through Environmental Design (CPTED) report for a proposed mix use development at 482 The Esplanade Warners Bay, NSW. The development is located on three street frontages. The proposal includes a mix of 1, 2 and 3 bedroom apartments and commercial spaces and the total number of apartments for the Lake Front Building is 60 and the Howard Street Building 52 apartments.

The CPTED assessment of the proposed development has taken into account factors such as the building design / layout, area characteristics and crime data for the LGA and suburb.

The crime trend data and hot spot maps clearly show that the proposed development site and surrounding area is an area where there are incidences of reported crime and the following crime characteristics occur in the area:

- Domestic Assault
- Steal from Dwelling

- Motor Vehicle Theft
- Steal from Motor Vehicle
- Malicious Damage to Property

These incidents are likely to be opportunistic however this risk should be taken into account. The recommendations in Section 5 can be easily implemented and will aim to address this potential risk.

Overall the design appears secure. The areas of potential concealment (highlighted in Section 5.5) are within a secure building so any risk is considered low. Safety can be enhanced via lighting and CCTV (although not essential).

The commercial use will add to the overall security of the building and the residential component will add to the overall safety of the area during after-hours periods.

With the adoption of the strategies listed in this report, the crime risk is considered to be low.

15 – ACCESS REPORT

DESIGN REVIEW

ACCESS

Lakehouse Village

**482 The Esplanade,
Warners Bay**

Report Prepared for: Stewart Architecture
Report Prepared by: Lindsay Perry
Our Ref: AN17-208539
Date: 11 April 2017



☐ BUILDING CODE ☐ ACCESS CONSULTING ☐ ESSENTIAL SERVICES



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DOCUMENT ACCEPTANCE

	Name	Signed	Date
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REVISION HISTORY

Revision No.	Prepared by	Description	Date
00	Lindsay Perryt	DRAFT report issued fro review	4 April 2017
01	Lindsay Perryt	Issued for DA	11 April 2017

This report has been prepared based on the available time allocated to conduct the review, and all reasonable attempts have been made to identify key compliance matters pursuant to the BCA and additional issues which have been deemed an impediment to access provision and may increase Client risk of attracting a complaint under the DDA.

The information provided within this report is relevant to this project and the documentation referenced. As such the information provided may not be transferred to other projects. This report must not be issued for public comment or be used for any other purpose without prior permission from Philip Chun Access.

Philip Chun Access accepts no responsibility for any loss suffered as a result of any reliance upon such assessment or report other than providing guidance to alleviate access barriers in the built environment and reduce Client risk of attracting a complaint under the DDA.



1. EXECUTIVE SUMMARY

We have assessed the architectural documentation available to date and have reviewed the proposed building works with respect to the Building Code of Australia 2016 and Premises Standards. The design is at a point where the inherent BCA philosophies have been checked and development consent can be sought. The finer details with respect to BCA compliance can be finalised prior to the issue of a Construction Certificate.

The development has also been considered with respect to the provision of adaptable housing per Lake Macquarie City Council DCP and livable housing per SEPP 65. Both have been provided within the development.

The proposed development is capable of achieving a high level of accessibility for people with disabilities and meeting all the relevant standards.

The following items should be addressed during detail design to ensure compliance prior to construction:

- Accessible carparking layouts;
- Setback of the accessible ramp to Howard Street;
- Access to the pool for people with disabilities;
- Accessible entrance to adaptable apartments pre-adaption.



2. INTRODUCTION

This report documents a comprehensive review of the proposed project documentation with consideration to all aspects of accessibility to the site and throughout the development and with reference to the Building Code of Australia (BCA), Disability (Access to Premises – Buildings) Standards 2010 (Premises Standards), relevant Australian Standards as they relate to access to premises and the spirit and intent of the Disability Discrimination Act 1992 (*Cth*) (DDA).

This report has been prepared by Philip Chun Access with the aim of providing reasonable recommendations in regards to access to premises. Philip Chun Access has endeavoured to clearly identify each issue of concern with respect to the building element and with reference to relevant legislation and guidelines.

Matters that fall outside the scope of this report include structure or installation methods and assessment against Occupational Health and Safety legislation.

2.1 Site and Contexts

The site is located at 482 The Esplanade Warners Bay and has three street frontages being The Esplanade, King Street and Howard Street. The main pedestrian approach to the building is from the street footpath along The Esplanade where the residential lobbies and majority of commercial tenancies are located. Vehicular entrance to the site is from Howard Street.

The project consists primarily of residential apartments (112 in total) with five commercial tenancies provided at the street level. Adaptable and livable housing units are provided and evenly distributed.

2.2 Reviewed Documentation

This report is based upon the following architectural documentation produced by Stewart Architecture for Philip Chun Access review:

Document No	Title	Revision
DA101	Plan – Basement 1	A
DA102	Plan – Lower Ground	B
DA103	Plan – Upper Ground	D
DA104	Plan – Level 2	B
DA105	Plan – Level 3	C
DA106	Plan – Level 4	B
DA107	Plan – Level 5	C
DA108	Plan – Level 6	B
DA109	Plan – Level 7	B
DA110	Plan – Roof	A
DA181	Plan – Adaptable Units	B
DA182	Plan – Adaptable Units	B



2.3 Council Requirements

Lake Macquarie City Council Development Control Plan 2014 requires the provision of adaptable units within the development. Part 9 – Specific Land Uses – 13 Residential Flat Buildings requires that one adaptable dwelling must be provided for every 10 dwellings (Clause 13.13.) As such, 12 adaptable apartments are required within this development (based on a total of 112 residential apartments). We note that this has been provided as discussed in subsequent sections of this report.

2.4 State Environmental Planning Policy (SEPP) 65 Apartment Design Guide

The units and other facilities will be required to comply with the accessibility provisions of SEPP 65 (Apartment Design Guidelines) that require 20% of units to incorporate Liveable Housing Guidelines to silver level. These units can be included within the adaptable units required by Council's DCP.

2.5 Methodology

Philip Chun Access aims to provide achievable recommendations related to the provision of access to premises based on current legislation and best practice options, enabling independent, equitable and functional access for all.

Accessibility is paramount in providing an inclusive environment for all users. Phillip Chun Access looks beyond basic compliance issues to ensure that all users are offered the opportunity to participate in society. We incorporate the principles of Universal Design into all of our work, taking a holistic approach in the provision of access for people with disabilities.



3. LEGISLATION

3.1 The National Construction Code / The Building Code of Australia

The National Construction Code (NCC) comprises the Building Code of Australia (BCA) and the Plumbing Code of Australia (PCA). NCC is all encompassing and contains Volumes One, Two and Three; The Guide; and the Consolidated Performance Requirements. Detailed of these are as follows:

- Volume One contains the requirements for Class 2 to 9 (multi-residential, commercial, industrial and public) buildings and structures (BCA).
- Volume Two contains the requirements for Class 1 (residential) and Class 10 (non-habitable) buildings and structures.
- Volume Three contains the requirements for plumbing and drainage for all classes of buildings.
- The Guide is a companion manual to Volume One. The Guide provides clarification, illustration and examples for complex NCC provisions.
- Consolidated Performance Requirements provides a compilation of all NCC Performance Requirements and the supporting General Requirements in a single document.

The primary classification for the proposed buildings pursuant to the BCA is a Class 2, being a residential development.

Level	Proposed Use	Building Classification
Basement	Carparking	Class 7a
Lower Ground	Carparking	Class 7a
Lower Ground	Commercial Tenancies	Class 5
Lower Ground	Residential Lobbies	Class 2
Upper Ground	Residential Areas	Class 2
Upper Ground	Commercial Tenancies	Class 5
Levels 2 - 7	Residential Areas	Class 2

Part D3 of the BCA and Premises Standards prescribes the minimum requirement for access to a building. Access for people with disabilities is required through the principal pedestrian entrance and throughout the building in accordance with Table D3.1. The following table outlines the general building access requirements for this project:

Class of building	Access requirements
Class 2	
Common areas	From a pedestrian entrance <i>required</i> to be accessible to at least one floor containing <i>sole-occupancy units</i> and to the entrance doorway of each <i>sole-occupancy unit</i> located on that level. To and within not less than one of each type of room or space for use in common by the residents, including a cooking facility, sauna, gymnasium, <i>swimming pool</i>, common laundry, games room, individual shop, eating area, or the like. Where a ramp complying with AS 1428.1 or a passenger lift is installed- (a) to the entrance doorway of each sole-occupancy unit; and (b) to and within rooms or spaces for use in common by the residents, located on the levels served by the lift or ramp.



Class 3	
Class 6	To and within all areas normally used by the occupants
Class 7a	To and within any level containing <i>accessible</i> carparking spaces
Class 10b	
Swimming pool	To and into <i>swimming pools</i> with a total perimeter greater than 40m, associated with a Class 1b, 2, 3, 5, 6, 7, 8 or 9 building that is <i>required</i> to be <i>accessible</i> , but not <i>swimming pools</i> for the exclusive use of occupants of a 1b building or a <i>sole-occupancy unit</i> in a Class 2 or Class 3 building

3.2 Disability Discrimination Act 1992 (Cth) (DDA)

The accessibility assessment process covers all aspects of the infrastructure (premises), to the extent required to meet the objectives of the Disability Discrimination Act 1992 (Cth), including, however not limited to, Section 23 which relates to access to premises and facilities which the public may enter or use.

The Act is enforced primarily through a complaints mechanism, which allows individuals who have directly or indirectly experienced unlawful discrimination to seek a conciliated outcome through the Australian Human Rights Commission and, in the instance of unsuccessful conciliation, to bring an action in the Federal Magistrates Court or the Federal Court of Australia.

3.3 Access to Premises Standards – General

In contrast to building regulations, the DDA is not prescriptive. The implementation of the Premises Standards in 2010, and corresponding changes to the BCA, is a significant step towards achieving equal access to premises and is crucial to justice and social inclusion for people with disabilities.

It is noted that the Premises Standards are limited in scope, covering aspects of building compliance applicable under the BCA. It is acknowledged that the Premises Standards could address a broader range of accessibility issues including considerations to accessibility of parkland, playgrounds, transport vehicles, interior fit-out of buildings, and fixtures and fittings. As such, there are features which fall beyond the scope of the Standards which may be subject to the general complaints provisions of the DDA.

3.4 (NSW) State Environmental Planning Policy N0. 65 – Design Quality of Residential Apartment Development

SEPP 65 and the Apartment Design Guide apply to residential flat buildings, shop top housing and the residential component of mixed use developments within NSW. They apply to buildings that are three or more storeys and that have four or more dwellings in the following situations:

- The erection of a new building
- The substantial redevelopment or refurbishment of an existing building
- The conversion of an existing building to a residential flat building.

Objective 4Q-1 of Part 4 of the Apartment Design Guide requires Universal design features to be included in the apartment design to promote flexible housing for all community members. The design guidance for this objective is;

- Developments are to achieve a benchmark of 20% of the total apartments incorporating the Liveable Housing Guideline's silver level universal design features.



4. ACCESS AND APPROACH – EXTERNAL AREAS

External areas of the development generally comprise the pedestrian approach from the street footpaths along The Esplanade, King Street and Howard Street and the residential common areas at the upper ground level.

Entrances along The Esplanade provide easy access from the street footpath to commercial tenancies and the residential lobbies. While stairs provide access to residential common areas midway along King Street, the entrances to commercial tenancies along the King Street footpath are accessible to people with disabilities. An accessible ramp is provided for access to the development from the Howard Street footpath.

4.1 Approach from the Allotment Boundary (BCA Part D3.2)

The BCA requires that a continuous accessible path of travel within the meaning of AS1428 be provided from the allotment boundary at the main points of pedestrian entry to the main entrance.

Drawings indicate that a formed footpath with areas conducive to an accessible path of travel has been provided from the allotment boundaries to the building entrances.

Detailed design should address the setback of the accessible ramp from the Howard Street boundary to facilitate the provision of handrail extensions and tactile indicators – refer to Appendix B for compliance requirements regarding pathways, ramps and walkways.

4.2 Approach from the Accessible Carparking (BCA Part D3.2)

The BCA requires that a continuous accessible path of travel within the meaning of AS1428.1 (2009) be provided from the accessible carparking areas to the main entrance.

Drawings indicate that a formed footpath with areas conducive to an accessible path of travel has been provided from the accessible carparking to the building entrances – lifts are provided as a part of the accessible path of travel between levels. Refer to Appendix B for compliance details.

4.3 Approach between Buildings on Site (BCA Part D3.2)

The BCA requires that a continuous accessible path of travel within the meaning of AS1428 be provided between associated accessible buildings.

Not applicable to this development.

4.4 Accessible Carparking (BCA Part D3.5)

Accessible carparking, designed and constructed in accordance with AS 2890.6 (2009), is required to be provided as per the below ratio:

Class of building to which the Class 7a building or carparking area is associated	Number of accessible carparking spaces required
Class 6	
(a) Up to 1 000 carparking spaces; and	1 space for every 50 carparking spaces or part thereof.
(b) for each additional 100 carparking spaces or part thereof in excess of 1 000 carparking spaces.	1 space.



For Class 2 buildings, there is no requirement for accessible carparking. However, for adaptable housing units at least one allocated car space complying with AS4299 Clause 3.7 is required for each of the adaptable units.

There are a total of 218 carparking spaces provided on the site, 13 of which are designated as accessible spaces. General configuration of the spaces appears to offer compliance with AS 2890.6 (2009). Refer to Appendix B for compliance requirements.

We assume twelve of these spaces will be allocated to the adaptable apartments per AS4299.

4.5 Building Entrance (BCA Part D3.2)

A continuous, accessible path of travel must be provided through the principal pedestrian entrance and not less than 50% of all pedestrian entrances / exits.

Where the total floor area of the building exceeds 500m², therefore the distance of travel between accessible and inaccessible entrances must not exceed 50m.

Where a door required to be accessible has more than one door leaf, one of the leaves must have a clear opening of 850mm.

Single swinging doors are provided for entry to the residential areas of the development and appear to be capable of compliance - refer to Appendix B for compliance requirements.

Double swinging doors are provided for entry to the commercial components of the building and appear to be capable of compliance - refer to Appendix B for compliance requirements.



5. ACCESSIBILITY PROVISIONS FOR INTERNAL AREAS – COMMERCIAL AND RESIDENTIAL COMMON AREAS

The internal areas of the development include the commercial tenancies and common areas of the residential component.

This report has been prepared to address the base building component of building works only. Fit-out of individual commercial tenancies will be subject to a separate development and as such do not form a part of this access report.

5.1 Internal Paths of Travel Generally (BCA Part D3.3)

BCA Part D3.3 requires that accessways complying with AS 1428.1 (2009) must be provided to and throughout areas of buildings required to be made accessible, including:

- Minimum corridor widths of not less than 1000mm;
- Passing spaces with a minimum width of 1800mm and minimum length of 2000mm to be provided in corridors at maximum 20m intervals where a direct line of sight is not available; and
- Turning spaces of minimum 1540mm width and minimum 2070mm length to be provided within 2m of the end of corridors and at maximum 20m intervals.

Note: a passing space may serve as a turning space.

Increased landings are required at changes of direction, including 1500mm x 1500mm turning spaces to facilitate a 60-90 degree turn.

Drawings indicate that sufficient areas are provided for circulation purposes.

5.2 Floor Finishes / Surfaces (BCA Part D3.3)

The following applies to interior finished and surface materials, in keeping with AS1428.1 (2009):

- Where carpet or any soft flexible materials are used as flooring material, the pile height or pile thickness is to be no greater than 11mm and the carpet backing to be not more than 4mm thick.
- Matting recessed within a continuous accessible path of travel to have a surface level difference to surrounding materials not more than 3mm for vertical and 5mm for rounded or bevelled edges.
- Grates are to have openings no greater than 13mm in diameter and any slotted openings to be no more than 13mm wide and orientated perpendicular to the dominant direction of travel.

We recommend that the abovementioned items be addressed during subsequent design stages.

5.3 Internal Doors – Circulation Areas

Doors and doorways to be provided with the following circulation clearances as per AS 1428.1 (2009):

Table 5.3(a) – Hinged Door Requirements

Door Approach	Door opening direction	Clearances (mm)		
		Latch side	Hinge side	Depth in front of door
Front	Towards occupant	530	110	1450
	Away from occupant	510	-	1450



Latch Side	Towards occupant	900	110	1670
	Away from occupant	660	240	1240
Hinge Side	Towards occupant	900	660	1670
	Away from occupant	340	560	1220
Either Side	Towards occupant	900	660	1670
	Away from occupant	660	560	1240

Table 5.3(b) – Sliding Door Requirements

Door Approach	Clearances (mm)		
	Latch side	Slide side	Depth in front of door
Front	530	-	1450
Slide Side	395	660	1280
Latch Side	660	185	1230
Either Side	660	660	1280

Note: the above clearances are based upon an unobstructed door opening of 850mm, which is the minimum required clearance. Unobstructed door openings greater than 850mm will have different requirements. This will be reviewed upon provision of a door schedule and detailed architectural drawings.

Where a door required to be accessible has more than one door leaf, one of the leaves must have a clear opening of 850mm.

The distance between successive doors within airlocks, vestibules and the like require a minimum 1450mm depth between swing doors, 900mm for the path of travel to ambulant toilet cubicles.

Drawings indicate that doorways are provided with adequate circulation areas for compliance. For additional compliance requirements, refer to Appendix B.

5.4 Internal Doors – Operational Forces

Door operating forces to manual doors to meet the requirements of AS 1428.1 (2009), Clause 13.5.2 (e).

Ensure any door closers selected (and when installed) will meet the requirements for operating forces, that is:

- 20N to initially open the door;
- 20N to swing the door; and
- 20N to hold the door open between 60 and 90°.

We recommend that the abovementioned items be addressed during subsequent design stages.

5.5 Exemptions (BCA Part D3.4)

Where full access is unachievable due to the functions of the space, there may be opportunity to access the area under the permitted exemptions of the BCA D3.4 which states:

The following areas are not required to be accessible:

- An area where access would be inappropriate because of the particular purpose for which the area is used.
- An area that would pose a health or safety risk for people with a disability.
- Any path of travel providing access only to an area exempted by (a) or (b).



5.6 Signage (BCA Part D3.6)

Braille and tactile signage is required to be provided throughout any building required to be made accessible in accordance with BCA specification D3.6 and AS1428.1 (2009) and must identify:

- Each sanitary facility
- Any space with a hearing augmentation system
- Accessible unisex facilities and indicate whether the facility is suitable for left or right handed use
- Ambulant accessible sanitary facilities on the door of the cubicle
- Where an entrance is not accessible, directional signage to identify nearest accessible entrance
- Where a bank of sanitary facilities is not provided with an accessible sanitary facility, directional signage to identify nearest accessible sanitary facility.
- Each door required by Part E4.5 to be provided with an exit sign and state "Exit" and "Level" followed by either the floor level number, the floor descriptor or combination of these.

We recommend that the abovementioned items be addressed during subsequent design stages.

5.7 Hearing augmentation (BCA Part D3.7)

A hearing augmentation system must be provided where an inbuilt amplification system is provided, other than one used for emergency purposes only as required by BCA Part D3.7.

Further, for buildings that are required to be accessible, the BCA (Part D3.7) requires hearing augmentation systems at service counters **where the user is screened from the service provider.**

Note: Consideration to the design specifications of AS 1428.5 (2010) is recommended, however is not mandatory to meet the Premises Standards.

We do not foresee any requirements for hearing augmentation. If required by the BCA, we recommend that the abovementioned items be addressed during subsequent design stages.

5.8 Tactile indicators (BCA Part D3.8)

Where a building is required to be made accessible, BCA Part D3.8 requires that tactile indicators must be provided, in accordance with AS1428.4.1 (2009)) to:

- A stairway
- A ramp, other than kerb ramp
- Any overhead obstruction less than 2m above the FFL, other than a doorway, where a suitable barrier has not been provided
- Where an accessway meets a vehicular way in the absence of a kerb or kerb ramp

Tactile indicators will be required to stairs and ramps within the development and the requirements above should be addressed during detailed design stages.

5.9 Swimming pools (BCA Part D3.10)

The BCA Part D3.10 requires access for persons with a disability to swimming pools with a total perimeter greater than 40m that are associated with as Class 1b, 2, 3, 5, 6, 7, 8, or 9 building that is required to be accessible (Table D3.1).

For pools required to be accessible by this clause, not less than one accessible entry / exit must be provided by means of a fixed or moveable ramp and an aquatic wheelchair; or a zero depth entry at a maximum gradient of 1:14; or a platform swimming pool lift; or a swing style swimming pool lift.



For pools with a perimeter greater than 70m, the use of a swing stile swimming pool lift is not permitted.

The pool has a perimeter of approximately 44m. As such, an accessible means on entry to the pool is required. We recommend this be addressed during subsequent design stages.

5.10 Glazing on an accessway (BCA Part D3.12)

BCA Part D3.12 requires that where full height glazing that can be mistaken for an unobstructed opening is provided along an accessway, the glazing must be provided with visual identification as per AS 1428.1 (2009).

We recommend that the abovementioned items be addressed during subsequent design stages – refer to Appendix B for compliance requirements.

5.11 Slip Resistance (BCA Part D2.14)

Landings in a stairway must have;

- (a) a surface with a slip-resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586; or
- (b) a strip at the edge of the landing with a slip-resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586, where the edge leads to a *flight* below.

We recommend that the abovementioned items be addressed during subsequent design stages.

5.12 Thresholds (BCA Part D2.15)

The threshold of a doorway must not incorporate a step or ramp at any point closer to the doorway than the width of the door leaf unless—

- (a) in patient care areas in a Class 9a health-care building, the door sill is not more than 25 mm above the finished floor level to which the doorway opens; or
- (b) in a Class 9c aged care building, a ramp is provided with a maximum gradient of 1:8 for a maximum height of 25 mm over the threshold; or
- (c) in a building required to be accessible by Part D3, the doorway
 - (i) opens to a road or open space; and
 - (ii) is provided with a threshold ramp or step ramp in accordance with AS 1428.1 (2009); or

NSW D2.15 (d) and (e):

- (d) in a Class 9b building used as an entertainment venue, the door sill of a doorway opening at a road, open space, external stair landing or external balcony is not more than 50mm above the finished floor level to which the doorway opens; or
- (e) in other cases
 - (i) the doorway opens to a road or open space, external stair landing or external balcony; and
 - (ii) the door sill is not more than 190 mm above the finished surface of the ground, balcony, or the like, to which the doorway opens.

We recommend that the abovementioned items be addressed during subsequent design stages – refer to Appendix B for compliance requirements.



6. VERTICAL CIRCULATION – COMMERCIAL AND RESIDENTIAL COMMON AREAS

Lifts provide the main access between levels of the building. Stair and ramps are also provided as a means of access between levels.

6.1 Passenger Lifts (BCA Part E3)

Every passenger lift in an accessible building must be suitable for use by people with a disability and offer compliance with AS1725.12. Typically, the following is required to be provided:

Lift dimensions

- Lift floor dimensions of not less than 1100mm X 1400mm for lifts which travel not more than 12m.
- Lift floor dimensions of not less than 1400mm X 1600mm for lifts which travel more than 12m.
- Provision for a stretcher facility within at least one emergency lift required by E3.4, or where an emergency lift is not required, if passenger lifts are installed to serve any storey above an effective height of 12m, in at least one of those lifts to serve every floor served by lifts.

Lift Features

- Handrail complying with the provisions for a mandatory handrail in AS1735.12.
- Minimum clear door opening complying with AS1735.12.
- Passenger protection system complying with AS1735.12.
- Lift landing doors at the upper landing.
- Lift car and landing control buttons complying with AS1735.12.
- Lighting in accordance with AS1735.12.
- Emergency hands-free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received.

All passenger lifts serving more than 2 levels must possess:

- Automatic audible information within the lift car to identify the level each time the car stops.
- Audible and visual indications at each lift landing to indicate the arrival of the lift car.
- Audible information and audible indication must be provided in a range between 20-80dB(A) at a maximum frequency of 1500Hz.

We recommend that the abovementioned items be addressed during subsequent design stages – refer to Appendix B for compliance requirements. The area proposed for the lift offers a floor area conducive to compliance.

6.2 Accessible Ramps (BCA Part D3.3 & D3.11)

All accessible ramps must be designed and constructed in accordance with AS 1428.1 (2009) Clause 10. The maximum allowable gradient of the ramp is 1:14, minimum clear width to be 1000mm and maximum length between landings to be 9m (for 1:14 gradient).

On and accessway –

- (a) A series of connected ramps must not have a combined vertical rise of more than 3.6m; and
- (b) A landing for a step ramp must not overlap a landing for another step ramp or ramp.

Two accessible ramps are provided within the development. One is located within the residential common area, the other for access to the site from Howard Street. We note that the ramp from Howard Street will need to be set back from the boundary to facilitate handrail extensions and tactile indicators as required by AS1428.1. We recommend that the



abovementioned items be addressed during subsequent design stages. – refer to Appendix B for compliance requirements.

6.3 Stairs (BCA Part D3.3)

All stairways, excluding fire-isolated stairs, must be designed and constructed in accordance with AS 1428.1 (2009) Clause 11 and include the provision of handrails, handrail extensions, opaque risers, contrasting nosing strips and tactile indicators.

Further to this is recommended that fire-isolated stairways proposed to be used as a means of general communication between floors should meet these enhanced requirements for the safety of all occupants.

Stairs are provided as a part of the approach to the building from King Street and within the residential common areas.

We recommend that the abovementioned items be addressed during subsequent design stages – refer to Appendix B for compliance requirements.

6.4 Fire Isolated Stairs (BCA Part D3.3)

All fire-isolated stairways must possess luminance contrast to the stair nosing as per AS 1428.1 (2009) Clause 11.1(f) and (g).

As per BCA Clause D2.17 (vi), handrails within the fire isolated stairways are required to comply with Clause 12 of AS 1428.1 (2009). The height of handrails is to be between 865-1000mm and be consistent along the length of the stair. Consider the design of a staggered stair to avoid handrail extensions intruding into stairway landings, particularly in the down flight.

We recommend that the abovementioned items be addressed during subsequent design stages – refer to Appendix B for compliance requirements.



7. SANITARY AND OTHER FACILITIES – COMMERCIAL AND RESIDENTIAL COMMON AREAS

7.1 Unisex Accessible Toilets (BCA Part F2)

Accessible unisex sanitary compartments must be provided in accessible parts of the building in accordance with Table F2.4(a). That is:

Class of building	Minimum accessible unisex sanitary compartments to be provided
Class 2	Where <i>sanitary compartments</i> are provided in common areas, not less than 1
Class 5, 6, 7, 8 and 9 — except for within a ward area of a Class 9a <i>health-care building</i>	Where Part F2.3 of the <i>BCA</i> requires closet pans: (a) 1 on every <i>storey</i> containing <i>sanitary compartments</i> ; and (b) where a <i>storey</i> has more than 1 bank of <i>sanitary compartments</i> containing male and female <i>sanitary compartments</i> at not less than 50% of those banks
Class 10a — except: (a) a Class 10a appurtenant to another Class of building; and (b) a <i>sanitary compartment</i> dedicated to a single caravan/camping site	At each bank of <i>sanitary compartments</i> containing male and female <i>sanitary compartments</i> , not less than 1

Design

- An accessible unisex sanitary compartment must contain a closet pan, washbasin, shelf or bench top and adequate means of disposal of sanitary towels.
- The circulation spaces, fixtures and fittings of all accessible sanitary facilities must comply with the requirements of AS1428.1.
- Where two or more of each type of accessible unisex sanitary facility are provided, the number of left and right handed mirror image facilities must be provided as evenly as possible.
- The door to a fully enclosed sanitary compartment must:
 - (i) Open outwards; or
 - (ii) Slide; or
 - (iii) Be readily removable from the outside of the sanitary compartment,
 Unless there is a clear space of at least 1.2m measured in accordance with Figure F2.5, between the closet pan with the sanitary compartment and the doorway.
- An accessible sanitary facility must be located so that it can be entered without crossing an area reserved for one sex only.
- Where male sanitary facilities are provided in a separate location to female sanitary facilities, accessible unisex sanitary facilities are only required at one of these locations.

Unisex accessible sanitary facilities are provided within each commercial tenancy meeting BCA requirements. General arrangement of fixtures and room sizes appear to be capable of compliance – refer to Appendix B for compliance requirements.

Note that if sanitary facilities are provided within residential common areas, a unisex accessible facility will be required. The sanitary facility associated with the plant areas is considered an exempt area.



7.2 Unisex Accessible Showers (BCA Part F2)

Accessible unisex showers must be provided in accordance with Table F2.4(b). That is:

Class of building	Minimum accessible unisex showers to be provided
Class 2	Where showers are provided in common areas, not less than 1.
Class 5, 6, 7, 8 and 9 — except for within a ward area of a Class 9a <i>health-care building</i>	Where Part F2.3 of the <i>BCA</i> requires 1 or more showers, not less than 1 for every 10 showers or part thereof.
Class 10a except – (a) A Class 10a appurtenant to another Class of building; and (b) A sanitary compartment dedicated to a single caravan/camping site	Where showers are provided, 1 for every 10 showers or part thereof.

Not applicable – no showers provided within commercial or common residential areas.

7.3 Sanitary compartments for people with an ambulant disability (BCA Part F2)

At each bank of toilets where there are one or more toilets are provided in addition to an accessible unisex sanitary compartment at that bank of toilets, a sanitary compartment suitable for people with an ambulant disability (PAD) must be provided for use by males and females.

Design of the cubicles is to include the following:

- PAD cubicles within male and female toilets to be in compliance with AS1428.1 (2009).
- Width of PAD cubicles is to be 900–920mm.
- Provide grabrails to PAD cubicles.
- Provide 900 x 900mm circulation space in front of pan and each side of doors on path to the toilet. Doors are not to swing into circulation spaces.

PAD cubicles are provided for gender specific use within commercial areas of the building – Tenancy 5 and 6. General arrangement of fixtures and room size appears to be capable of compliance – refer to Appendix B for compliance requirements.



8. ADAPTABLE HOUSING PROVISIONS

A total of 112 apartments are proposed within the development, including a number of apartments have been designed to enable future adaptability. The Council requirement of one in ten units (10%) to be adaptable to Class C of AS4299 can be met. All adaptable units will require full compliance with the accessibility requirements for sole-occupancy units under the BCA, including a complying accessway as per AS 1428.1 (2009) to the entry door. Additional information regarding the design of adaptable housing units is provided in Appendix C.

The apartments nominated as adaptable include:

- Esplanade Building: Units 33-41 (Unit Types 1A & 2B)
- Howard St Building: Unit 20 and 26 (Unit Type 3D)

8.1 Design of Adaptable Units – Pre-adaption

To achieve the performance requirements of AS4299, **at the time of construction** the following are required for all adaptable units:

- **Access to and through the main entrance** with clear opening widths to entrances of not less than 850mm and appropriate circulation spaces per AS 1428.1 (2009) Clause 13.3.
- A **visitable toilet** on the entrance floor that complies with the requirements for sanitary facilities of AS4299. That is, a toilet that accommodates an area 900 x 1250mm between the pan and door swing.
- An **accessible path of travel from entrance to the visitable toilet**. Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.
- An **accessible path of travel from entrance to a living area**. Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.

The designated adaptable units are considered capable of adaptation. Key elements required at the time of construction have been addressed in the design of the units. The number of nominated adaptable units is in keeping with Council DCP requirements.

The entrance to Unit Types 1A and 3D will need to be modified during detailed design to accommodate an accessible entrance in the pre-adapted state per AS4299 requirements.

8.2 Design of Adaptable Units – Post-adaption

On adaption of the units, the following are required and should be considered in the design to ensure ease of adaption as required by AS4299:

- In regards to **internal doors**, each requires appropriate clear opening width with a minimum clear width of 820mm, with the door to the accessible bathroom meeting AS1428.1 (2009) requirements with a minimum clear width of 850mm. We recommend providing 850mm to all doors in adaptable units from the onset.
- Critical minimum **circulation areas** for adaptable units are as follows:
 - o 2250mm diameter clear space within living area to allow wheelchair access. Furniture arrangement will need modification.
 - o 1550mm clear to front of kitchen and laundry benches.
 - o turning space at foot of bed minimum 1540 mm wide and 2070mm long (in the direction of travel).
 - o door circulation in accordance with AS1428.1 (2009).



- The dimensions of **bathrooms** should provide scope for a post adapted bathroom that will provide sufficient circulation space per AS 1428.1 (2009).
- **Structural support** (such as structural ply sheeting) is recommended at toilet and shower grab rail zones to allow for ease of installation of any future fixings.
- **Service locations** should be considered in respect to the potential post adaption layouts, thereby allowing fixtures to easily be relocated.
- **Kitchen** layout to achieve a minimum circulation of 1550mm between opposing walls, cabinets and appliances to facilitate completion of a 180 degree turn by a wheelchair user. In addition the design of the kitchen is to accommodate for the potential of adaption including:
 - o an 800mm length of worktop that can be adjusted in height, with a removable base unit under
 - o the location of the fridge adjoining a suitable work surface
 - o potential to adjust sink height, with a sink bowl depth of 150mm - lever type taps to be provided to the side of the sink
 - o cooktops with side controls
 - o isolation switches for appliances to be accessible / reachable (e.g. oven and fridge / freezer)
 - o suitable oven height and worktop adjoining.
- The **main bedroom** within the adaptable units requires sufficient circulation space to permit movement by a wheelchair user, being not less than 1540mm x 2070mm clear circulation to at least one side and/or base of a queen size bed on post adaption.
- **Window sills** within the bedroom and living areas will be a maximum of 600mm and 730mm above finished floor level respectively, to enable viewing by persons in the seated position and persons who may be confined to bed (AS 4299:1995 Clauses 4.6.2 / 4.7.2).
- **Laundry facilities** and joinery to be designed to allow for adjustment to cater for accessibility in the future; the post adaption location will provide for a clear 1550mm approach to the facility.

The designated adaptable units are considered capable of adaptation. Post-adaption layouts reflect the above mentioned features.



9. APARTMENT DESIGN GUIDE - NSW

SEPP 65 and the Apartment Design Guide apply to residential flat buildings, shop top housing and the residential component of mixed use developments with NSW. They apply to buildings that are three or more storeys and that have four or more dwellings in the following situations:

- The erection of a new building
- The substantial redevelopment or refurbishment of an existing building
- The conversion of an existing building to a residential flat building.

Objective 4Q-1 of Part 4 of the Apartment Design Guide requires Universal design features to be included in the apartment design to promote flexible housing for all community members. The design guidance for this objective is;

- Developments are to achieve a benchmark of 20% of the total apartments incorporating the Liveable Housing Guideline's silver level universal design features.

The eight core design elements for silver level are as follows; (for a detailed explanation of these elements refer to the Appendix D that provides an extract from the Liveable Housing Design Guidelines (3rd ed 2013))

The requirements for livable housing under the SEPP have been achieved. Unit type 2B and 1A will conform with the liveable standard – 32 in total which represents 28% of the residential units.

9.1 Access from Street Entrance and/or Parking

Provide a safe, continuous and step free path of travel from the street entrance and / or carparking area to a dwelling entrance that is level, and a minimum clear width of 1000mm to path of travel. This element is not applicable to Class 2 buildings as they already have access requirements to the entries of sole occupancy units.

Drawings indicate that this has been provided.

9.2 Step Free Entrance

Provide at least one level (step-free) entrance into the dwelling with reasonable shelter and level landing area of minimum 1200mm x 1200mm at the entrance door.

Drawings indicate that this has been provided.

9.3 Car Parking

Where a parking space forms part of the dwelling access, it should incorporate a minimum 3200mm width x 5400mm length with a maximum 1:40 gradient and maximum 1:33 for bitumen. This allows a persons to open their car door fully and easily move around the vehicle.

Not applicable to this development.

9.4 Unimpeded Internal Movement

Internal doors and corridors are to facilitate comfortable and unimpeded movement between spaces. On entry level, doors used for living, dining, bedroom, bathroom, kitchen, laundry and toilet should have a clear opening width of 820mm and internal corridors to be a minimum 1000mm clear width.

Drawings indicate that this has been provided.



9.5 Easy Access Toilet

Provide a toilet on the ground (or entry) level that provides easy access

- i. Minimum 900mm clear width between bathroom walls of in a separate room
- ii. Minimum 1200mm clear circulation space in front of toilet pan (clear of door swing)

Toilet pan is to be in the corner of the room to enable installation of grabrails.

Drawings indicate that this has been provided.

9.6 Step Free Shower

A bathroom should contain a hobless (step-free) shower recess and be located in the corner of the room for grabrails installation at a future date.

Drawings indicate that this has been provided.

9.7 Reinforced Walls for Grabrails

Reinforced walls to be provided around the toilet, shower and bath to support the safe installation of grabrails at a later date. Refer Liveable Housing Design Guidelines for further reinforcement details.

We recommend that the abovementioned items be addressed during subsequent design stages.

9.8 Continuous Stair Handrails

Provide a continuous handrail on one side of any stairway where there is a rise of more than one metre. Note that for Class 2 buildings, this requirement is only applicable to stairs within individual apartments. BCA has requirements for stairs in common areas to be designed in accordance with AS1428.1 which requires handrails to both sides of the stairs.

Not applicable to this development



10. ADDITIONAL ACCESSIBILITY CONSIDERATIONS

As detailed above, it is acknowledged that the Premises Standards are limited in scope, covering aspects of building compliance applicable under the BCA only.

Philip Chun Access provides the following as a summary of additional accessibility issues that can be addressed in order to reduce Client risk of attracting a discrimination complaint. Refer to Appendix E for specific requirements

- Fire Egress for People with Disabilities
- Seating in Public Areas
- Signage and Wayfinding
- Access controlled entries to carpark
- Luminance Contrast



11. CONCLUSION

We have assessed the architectural documentation available to date and have reviewed the proposed building works with respect to the Building Code of Australia 2016 and Premises Standards. The design is at a point where the inherent BCA philosophies have been checked and development consent can be sought. The finer details with respect to BCA 2016 compliance can be finalised prior to the issue of a Construction Certificate.

The proposed development is capable of achieving access for people with disabilities and meeting all the relevant standards. Detailed design should address the following items to ensure compliance:

- Accessible carparking layouts;
- Setback of the accessible ramp to Howard Street;
- Access to the pool for people with disabilities;
- Accessible entrance to adaptable apartments pre-adaption.



APPENDIX A

MARKED PLANS

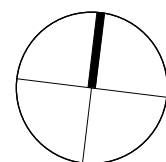
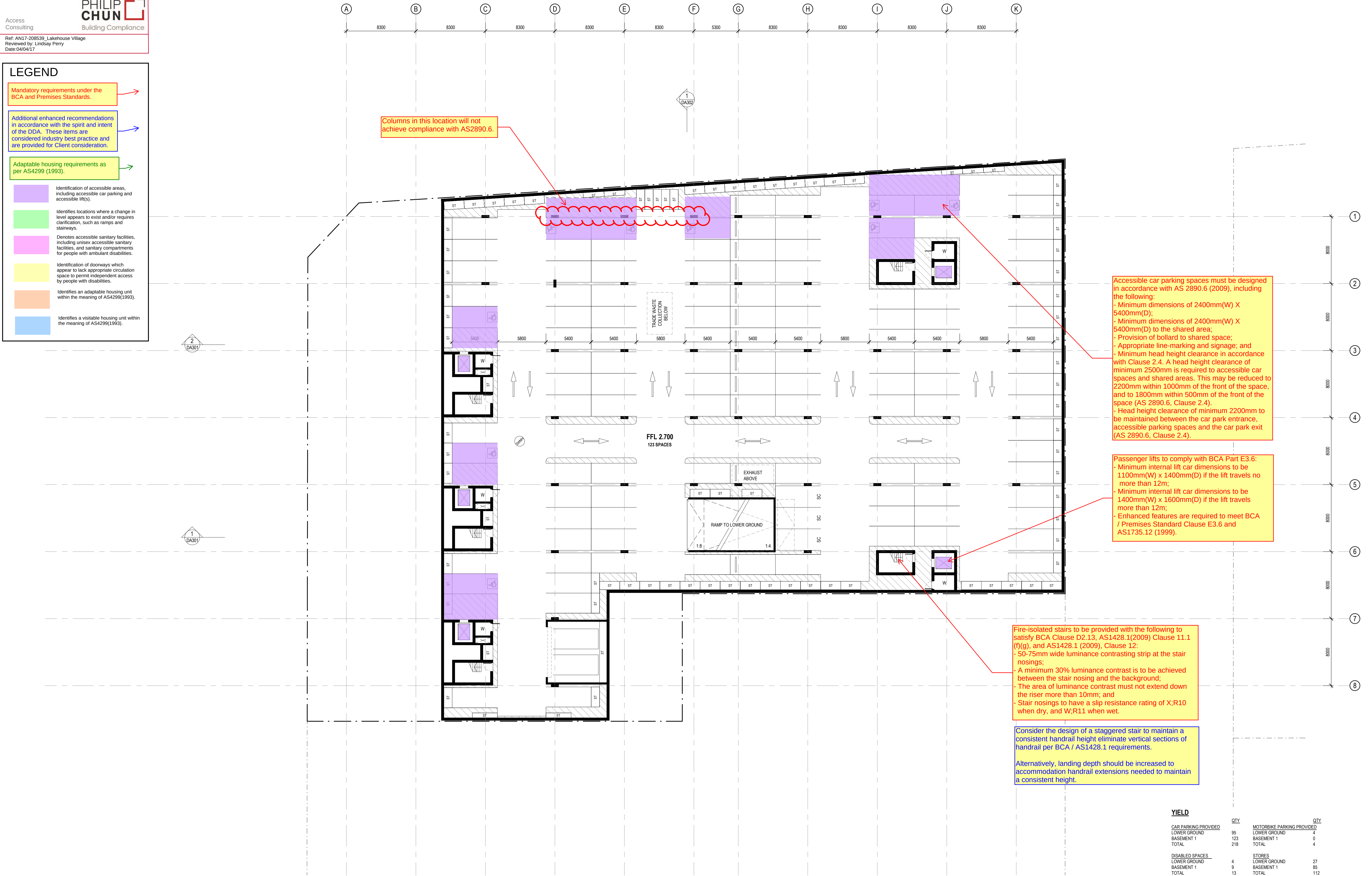
LEGEND

Mandatory requirements under the BCA and Premises Standards.

Additional enhanced recommendations in accordance with the spirit and intent of the DDA. These items are considered industry best practice and are provided for Client consideration.

Adaptable housing requirements as per AS4299 (1993).

- Identification of accessible areas, including accessible car parking and accessible lift(s).
- Identifies locations where a change in level appears to exist and/or requires clarification, such as ramps and stairways.
- Denotes accessible sanitary facilities, including unisex accessible sanitary facilities, and sanitary compartments for people with ambulant disabilities.
- Identification of doorways which appear to lack appropriate circulation space to permit independent access by people with disabilities.
- Identifies an adaptable housing unit within the meaning of AS4299(1993).
- Identifies a visitable housing unit within the meaning of AS4299(1993).



A continuous accessible path of travel is to be provided to any building required to be accessible from:

- The main points of pedestrian entry at the allotment boundary; and
- From another accessible building connected by a pedestrian link; and
- From any required accessible car parking space on that allotment.

(BCA Clause D3.1)

Provide ambulant facilities for male and female use.

All accessible sanitary facilities to offer compliance with AS1428.1 (2009).

Directional signage incorporating the international symbol for access is required at the location of sanitary facilities that are not accessible, to direct a person to the location of the nearest accessible unisex sanitary facility.

Stairs to comply with AS1428.1 (2009).

Stairs must be set back at least 600mm to ensure handrail extensions and TGSIs do not protrude into the transverse path of travel (AS1428.1 (2009), Clause 11.1(b)).

Accessible car parking spaces must be designed in accordance with AS 2890.6 (2009), including the following:

- Minimum dimensions of 2400mm(W) X 5400mm(D);
- Minimum dimensions of 2400mm(W) X 5400mm(D) to the shared area;
- Provision of bollard to shared space;
- Appropriate line-marking and signage; and
- Minimum head height clearance in accordance with Clause 2.4. A head height clearance of minimum 2500mm is required to accessible car spaces and shared areas. This may be reduced to 2200mm within 1000mm of the front of the space, and to 1800mm within 500mm of the front of the space (AS 2890.6, Clause 2.4).
- Head height clearance of minimum 2200mm to be maintained between the car park entrance, accessible parking spaces and the car park exit (AS 2890.6, Clause 2.4).

Consider providing a luminance contrast of not less than 30% between columns and the ground surface.

The following areas are not required to be accessible:

- (a) An area where access would be inappropriate because of the particular purpose for which the area is used.
- (b) An area that would pose a health or safety risk for people with a disability.
- (c) Any path of travel providing access only to an area exempted by (a) or (b).

(BCA Clause D3.4).

Toilet associated with this area is considered an exempt area.

LIFTS:

Passenger lifts to comply with BCA Part E3.6:

- Minimum internal lift car dimensions to be 1100mm(W) x 1400mm(D) if the lift travels no more than 12m;
- Minimum internal lift car dimensions to be 1400mm(W) x 1600mm(D) if the lift travels more than 12m;
- Enhanced features are required to meet BCA / Premises Standard Clause E3.6 and AS1735.12 (1999).

FIRE ISOLATED STAIRS:

Consider the design of a staggered stair to maintain a consistent handrail height eliminate vertical sections of handrail per BCA / AS1428.1 requirements.

Alternatively, landing depth should be increased to accommodate handrail extensions needed to maintain a consistent height.

Consider increasing size of stair landings (on all accessible levels) to:

- Incorporate 800mm x 1300mm safe refuge at stair landings of every accessible floor;
- Maintain 1000mm unobstructed egress width.

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Consider increasing size of stair landings (on all accessible levels) to:

- Incorporate 800mm x 1300mm safe refuge at stair landings of every accessible floor;
- Maintain 1000mm unobstructed egress width.

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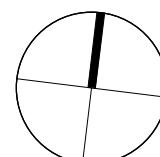
PROJECT

LAKEHOUSE VILLAGE
LOT 384 DP 32518, LOT 1 DP 90877, LOT 1-3
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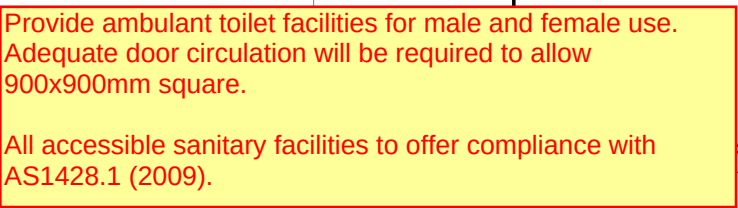
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DATE 2017



Class 2

BCA Clause D3.1 requires access for people with disabilities to:

- from a pedestrian entrance required to be accessible to at least 1 floor containing sole occupancy units and to the entrance doorway of each sole occupancy unit located on that level;
- to and within not less than 1 of each type of room or space used in common by the residents;



The following areas are not required to be accessible:

- (a) An area where access would be inappropriate because of the particular purpose for which the area is used.
- (b) An area that would pose a health or safety risk for people with a disability.
- (c) Any path of travel providing access only to an area exempted by (a) or (b).

(BCA Clause D3.4).

Ramp must be set back at least 900mm from the property boundary to ensure handrail extensions and TGSIs do not protrude into the transverse path of travel.

LIVABLE HOUSING REQUIREMENTS (SILVER)

SEPP 65 requires the provision of livable housing units (20% to be livable - silver level).

The eight core design elements for silver level are:

1 Access from Street Entrance and/or Parking:

A minimum 1000mm width to path of travel that is step free from the street entrance and/or car parking area to a dwelling entrance.

2 Step free entrance:

At least one level step-free entrance to the dwelling with reasonable shelter and level landing area of minimum 1200x1200mm at the entrance door. Minimum 820mm clear door opening.

3 Car Parking:

A minimum of 3200 x 5400mm for parking spaces with a maximum 1:40 gradient and maximum 1:33 for bitumen. Note this is only required where the car park forms part of the approach to the livable unit - for example, a carport.

4 Internal doors & corridors:

Internal corridors to be a minimum of 1000mm clear width. 820mm clear door openings are required for living, dining, bedroom, bathroom, kitchen, laundry and toilet. A level transition at thresholds is required.

5 Easy Access Toilet:

a) Provide a toilet on the ground or entry level with a minimum of 900 x 1200mm circulation space in front of toilet pan and clear of door swing.

b) Toilet pan to be in the corner of the room to enable installation of grab-rails.

6 Step Free Shower:

A bathroom should contain a hobless (step-free) shower recess and be located in the corner of the room for grabrails installation at a future date.

7 Reinforced Walls for Grabrails:

Reinforced walls around the toilet, shower and bath to support the safe installation of grabrails at a later date. Refer Livable Housing Design Guidelines for further reinforcement details.

8 Internal Stairway:

Provide a continuous handrail on one side of any stairway where there is a rise of more than one metre.

ADAPTABLE UNIT REQUIREMENTS:

AT TIME OF CONSTRUCTION THE FOLLOWING ARE REQUIRED:

Entrances:

All adaptable units are designed to enable access to and through the main entrance with clear opening widths to entrances of not less than 850mm and appropriate circulation spaces per AS 1428.1 (2009) Clause 13.3.

Visible Toilet:

An adaptable unit is required to have a toilet on the ground (or main) floor that complies with the requirements for sanitary facilities of AS4299.

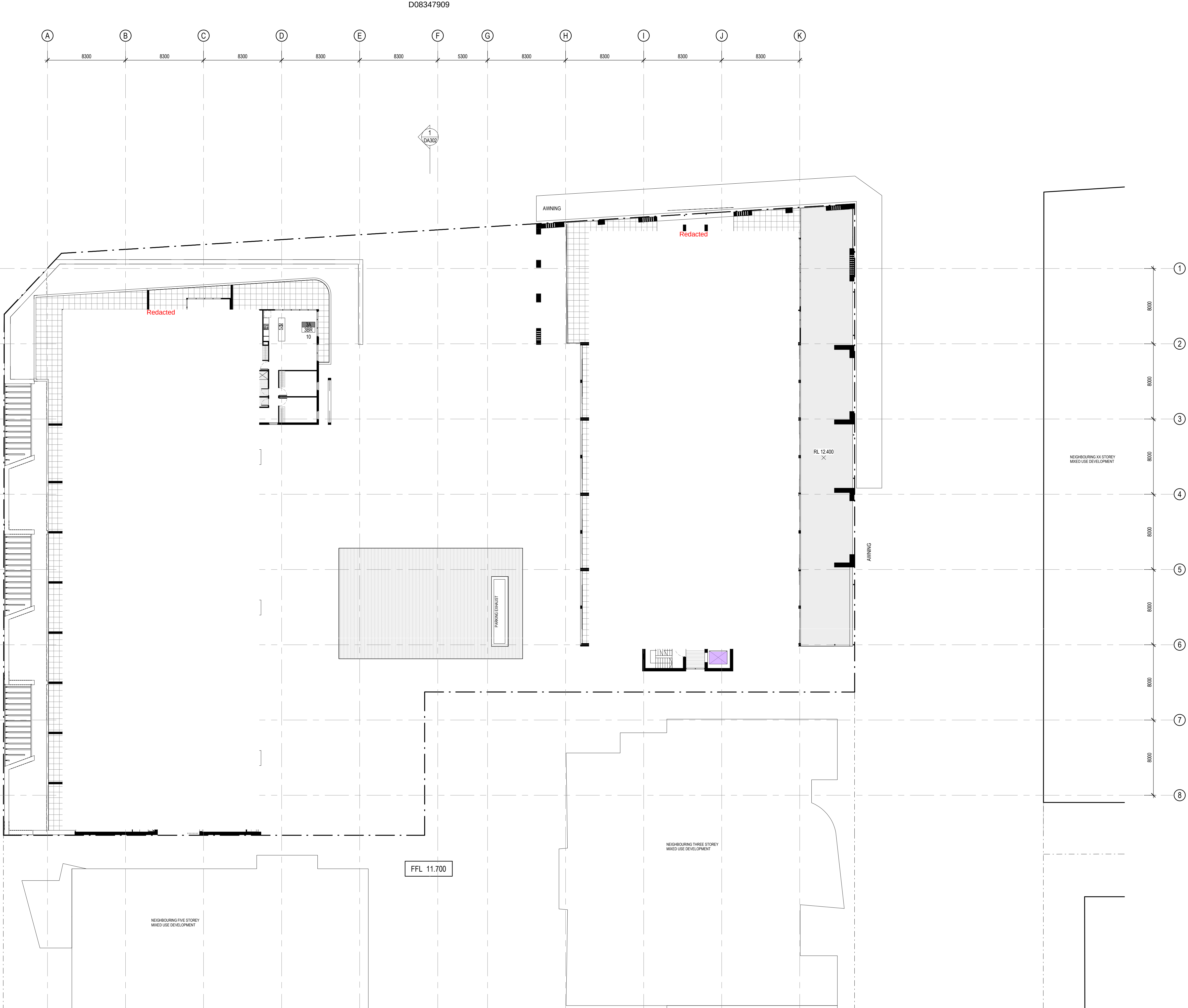
That is, a visible toilet being a toilet with a space of minimum 2000mm x 1000mm to accommodate. An area 900x1250mm is required between the pan and door swing.

Accessible Path of Travel from Entrance to Visible Toilet:

Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.

Accessible Path of Travel from Entrance to a Living Area:

Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.



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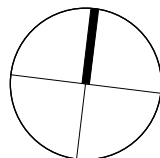
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PROJECT
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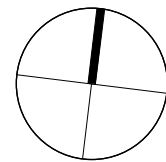
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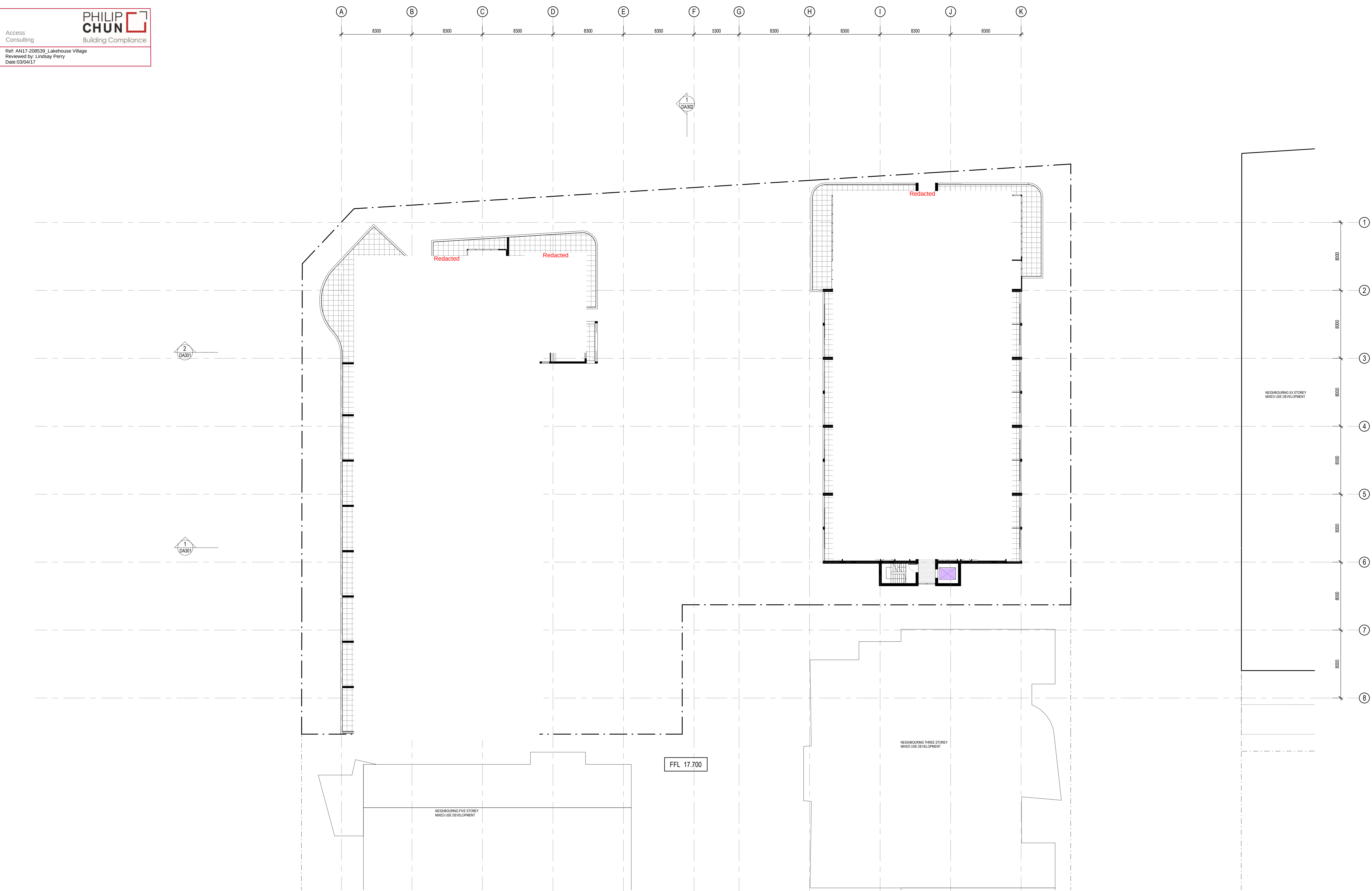
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DATE **2017**





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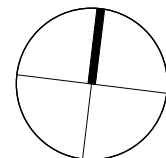
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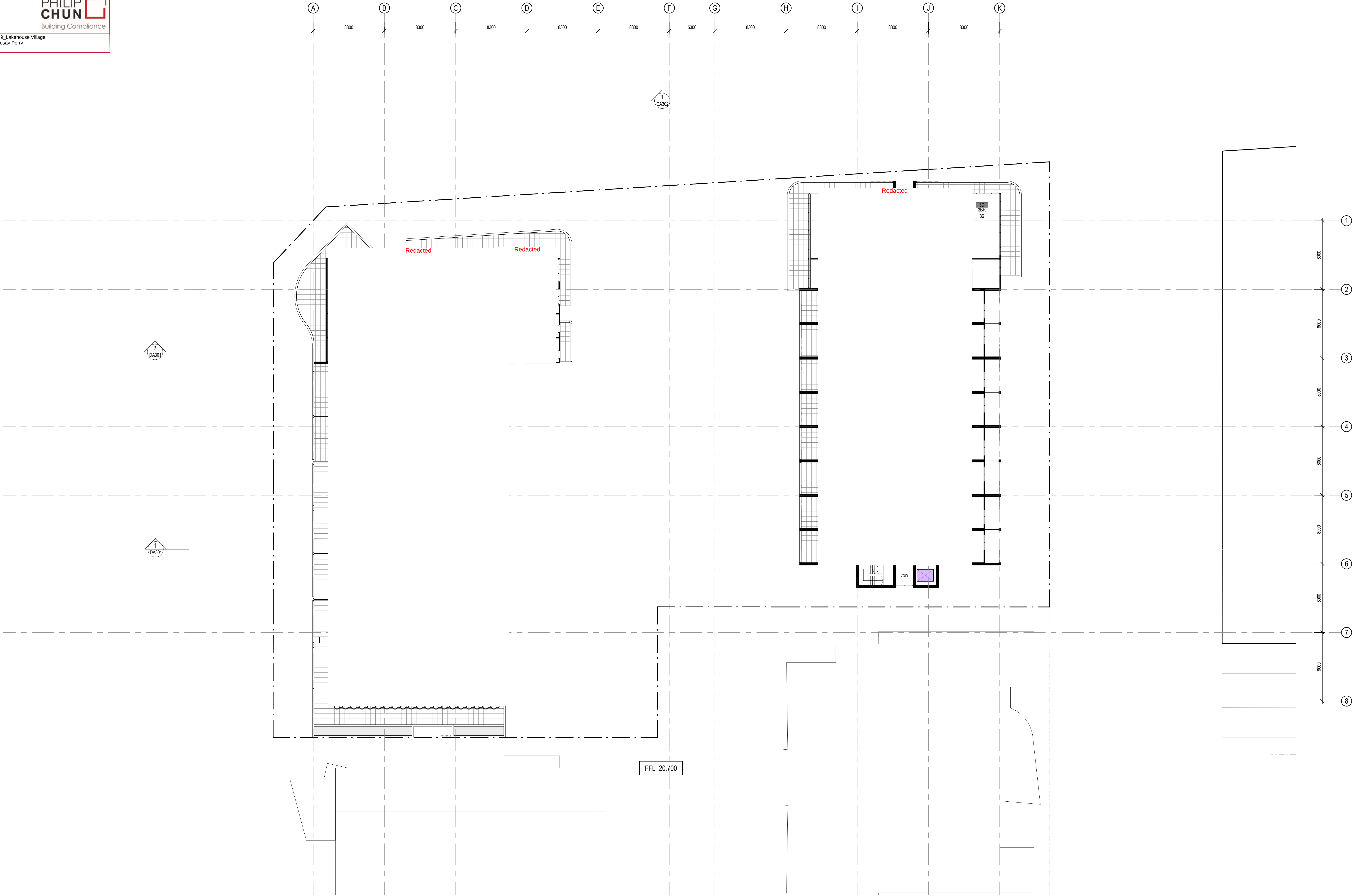
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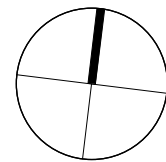
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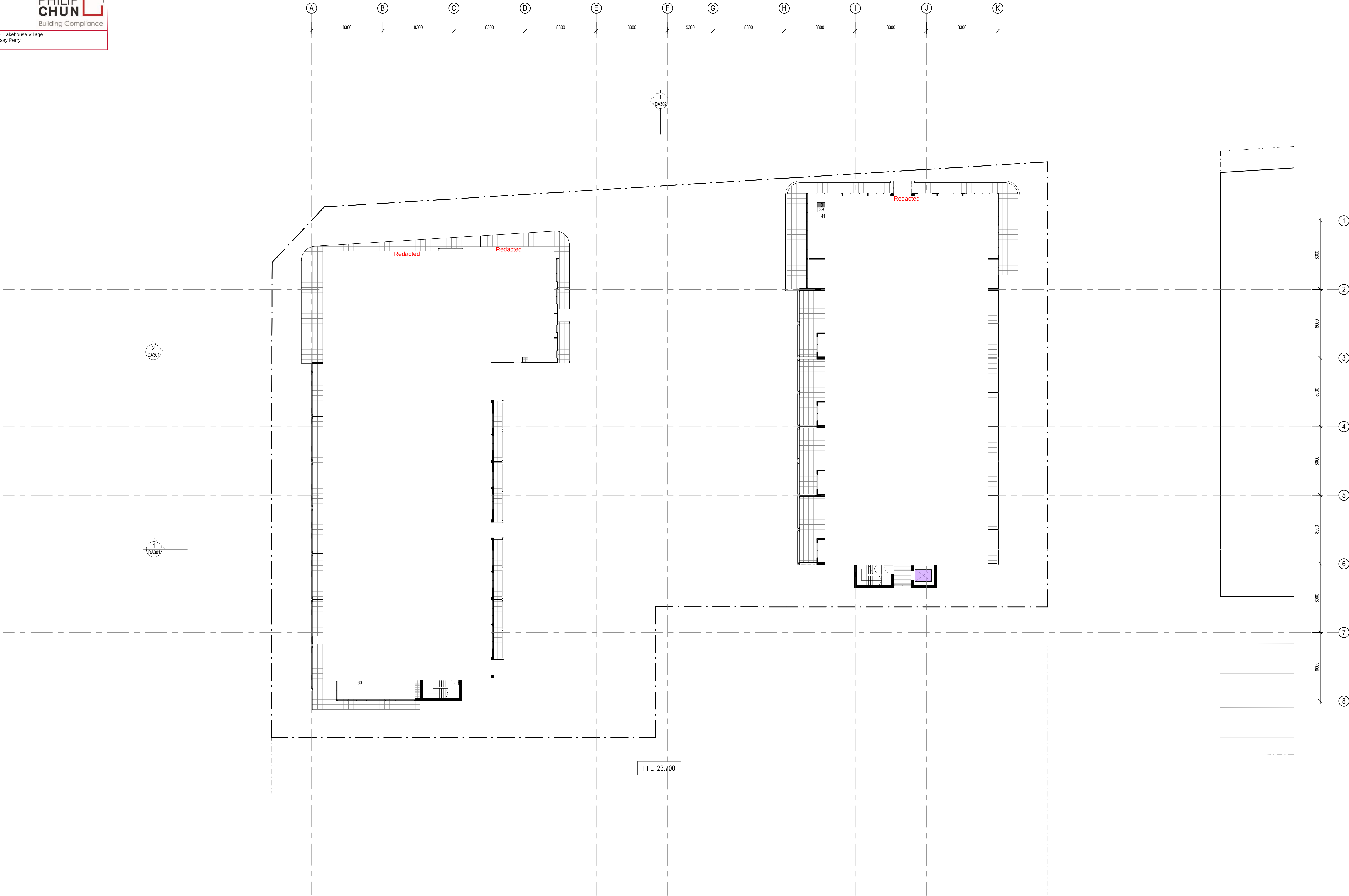
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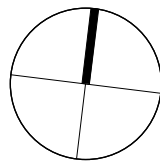
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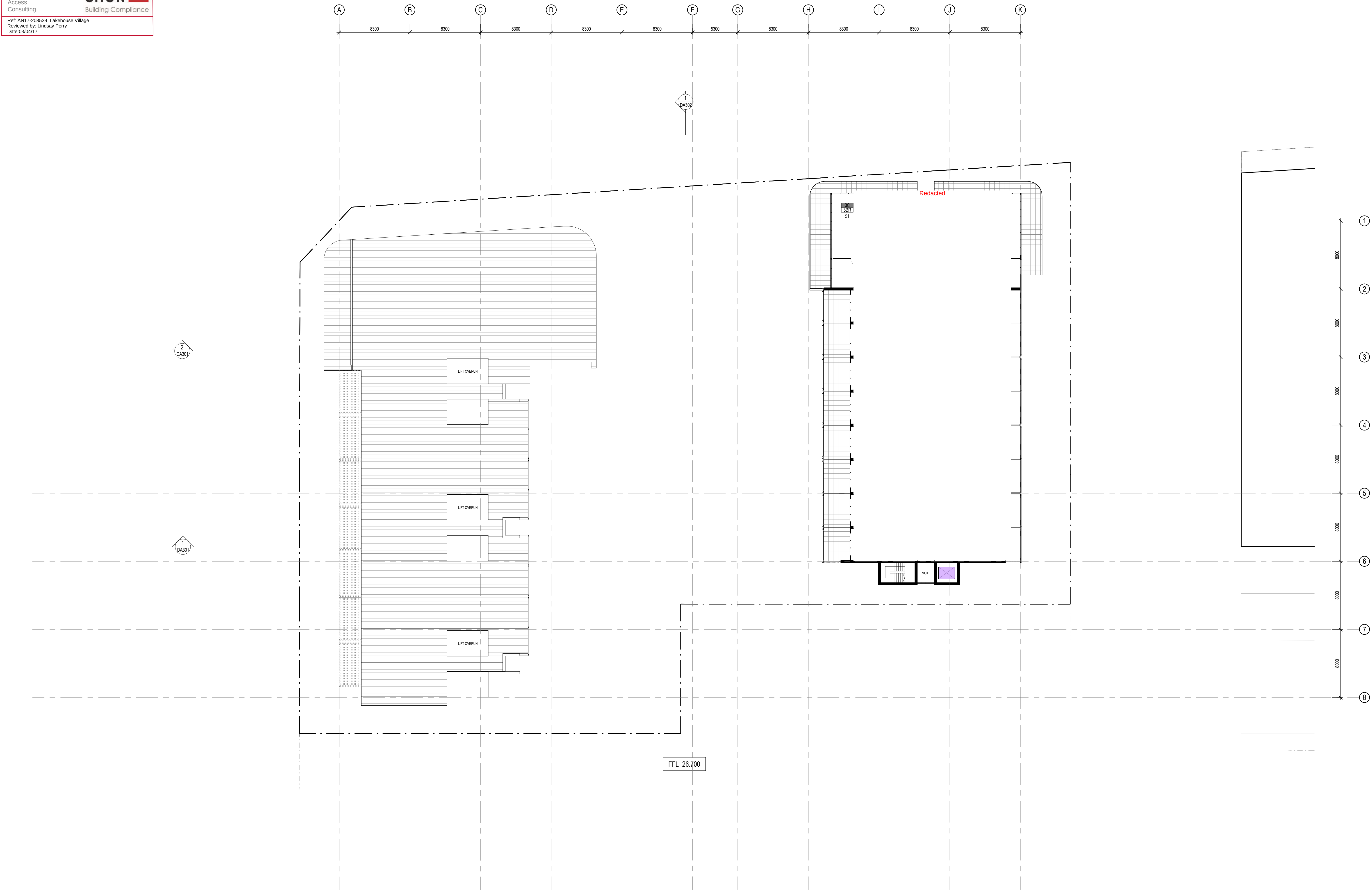
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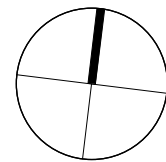
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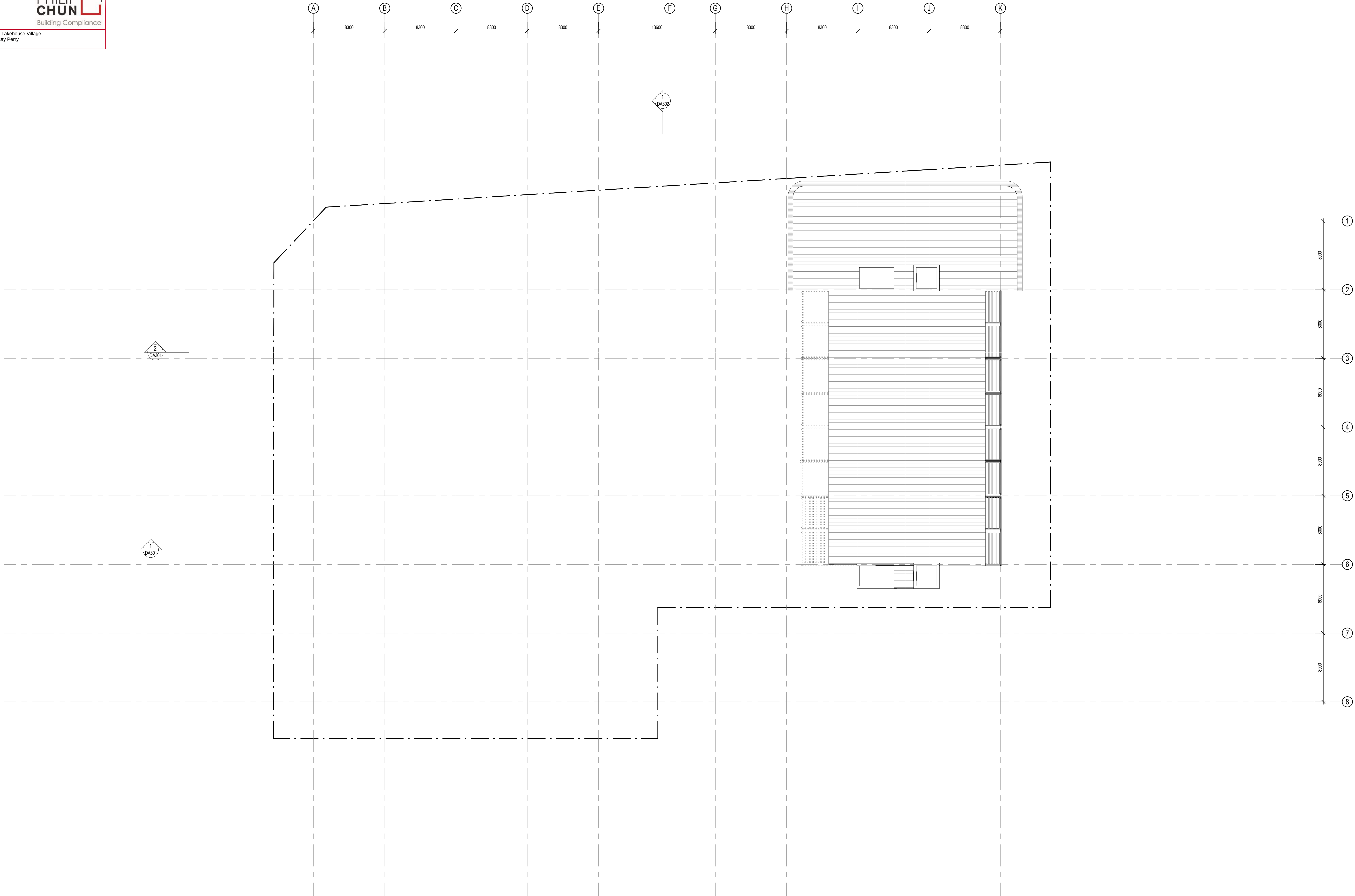
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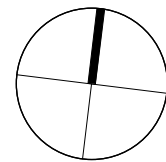
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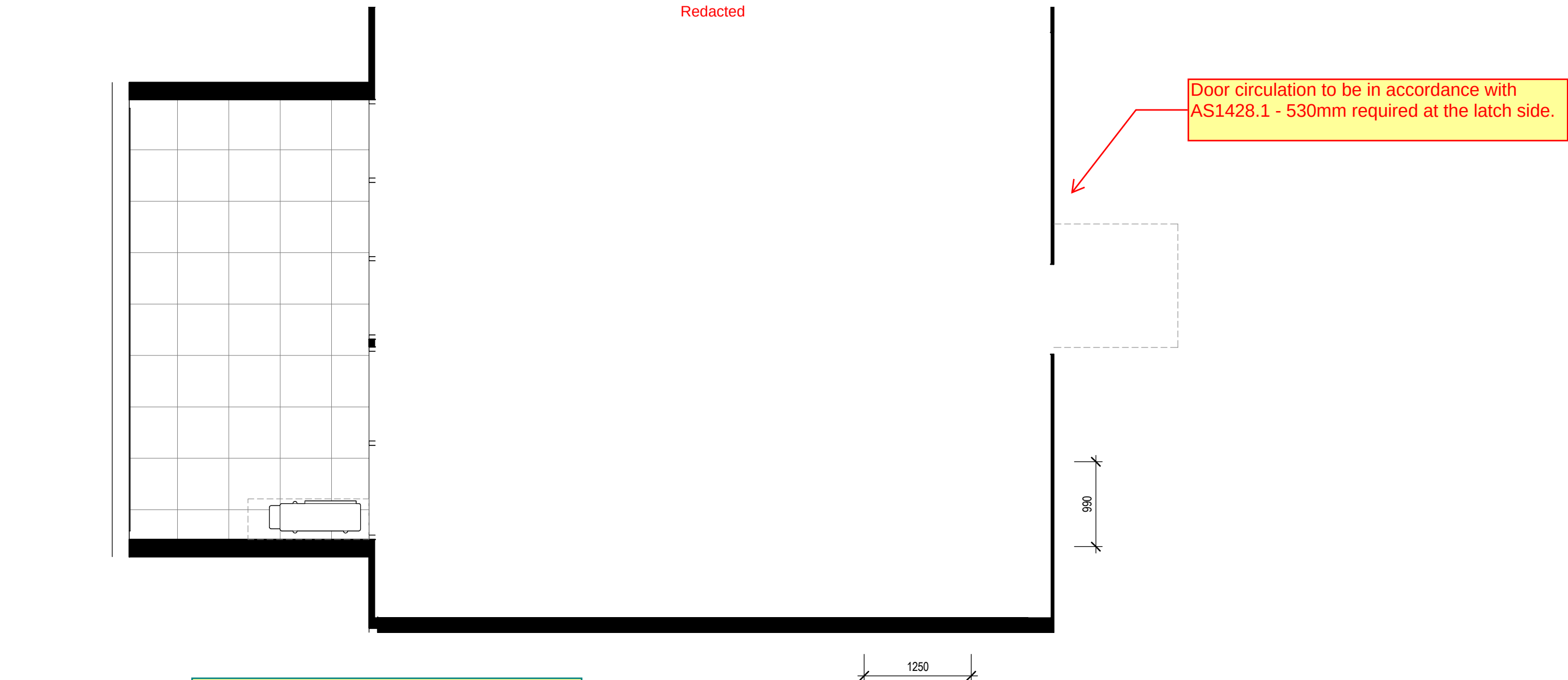
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2 UNIT TYPE 1A

ADAPTABLE UNIT REQUIREMENTS:

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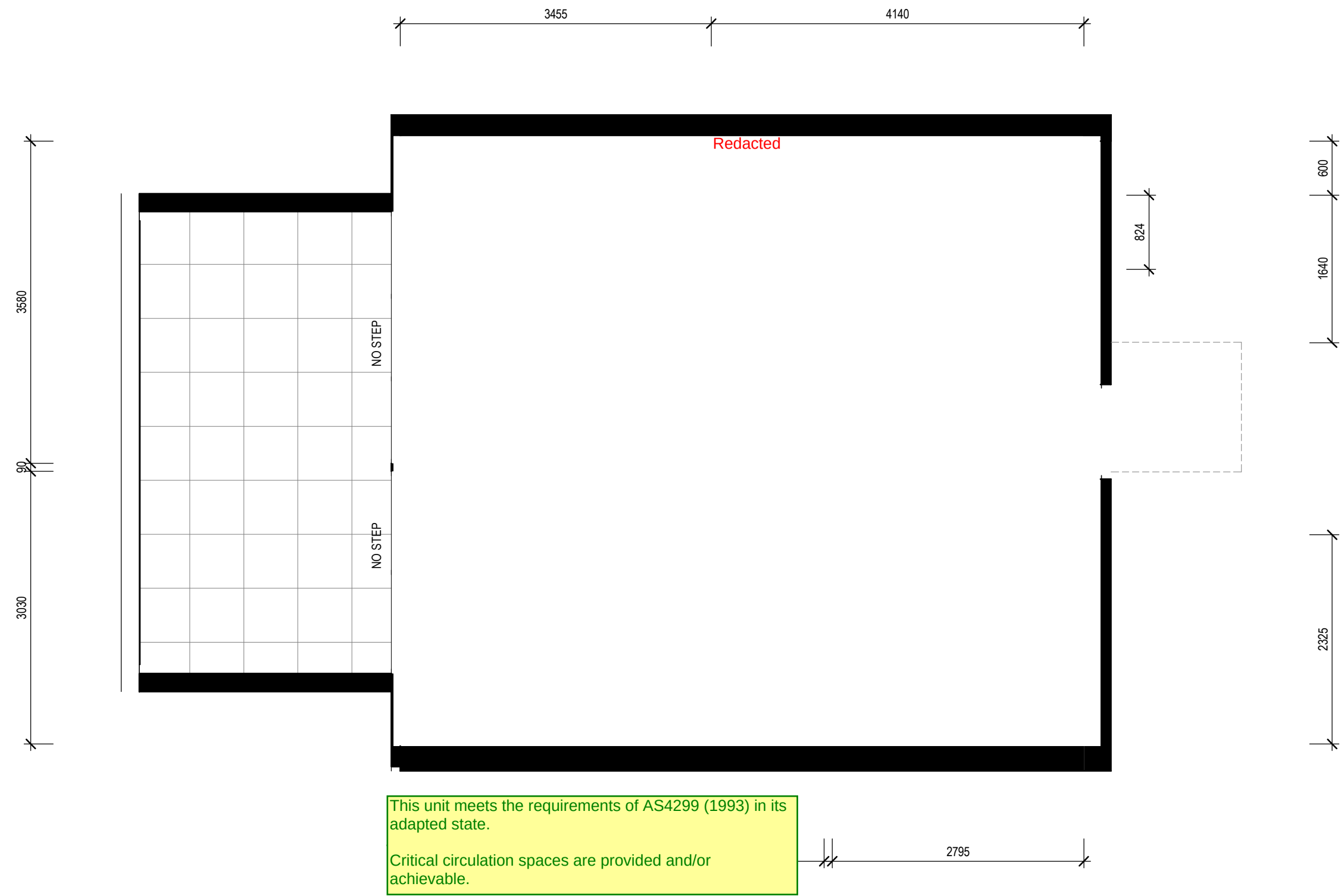
Entrances:
All adaptable units are designed to enable access to and through the main entrance with clear opening widths to entrances of not less than 850mm and appropriate circulation spaces per AS 1428.1 (2009) Clause 13.3.

Visible Toilet:
An adaptable unit is required to have a toilet on the ground (or main) floor that complies with the requirements for sanitary facilities of AS4299.

That is, a visible toilet being a toilet with a space of minimum 2000mm x 1000mm to accommodate. An area 900x1250mm is required between the pan and door swing.

Accessible Path of Travel from Entrance to Visible Toilet:
Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.

Accessible Path of Travel from Entrance to a Living Area:
Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.



1 UNIT TYPE 1A - ADAPTED

This unit meets the requirements of AS4299 (1993) in its adapted state.

Critical circulation spaces are provided and/or achievable.

ADAPTABLE UNIT REQUIREMENTS:

ON ADAPTION THE FOLLOWING ARE REQUIRED:

Doorways:
In regards to internal doors, each requires appropriate clear opening width with a minimum clear width of 920mm, with the door to the accessible bathroom meeting AS1428.1 (2009) requirements with a minimum clear width of 850mm. We recommend providing 850mm to all doors in adaptable units from the onset.

Circulation:
Critical minimum circulation areas for adaptable units are as follows:
- 2250mm diameter clear space within living area to allow wheelchair access. Furniture arrangement will need modification.
- 1550mm clear to front of kitchen and laundry benches.
- turning space at foot of bed minimum 1540 mm wide and 2070mm long (in the direction of travel).
- door circulation in accordance with AS1428.1 (2009).

Bathroom:
The dimensions of bathrooms should provide scope for a post adapted bathroom that will provide sufficient circulation space per AS 1428.1 (2009).

Structural support (such as structural ply sheeting) is recommended at toilet and shower grab rail zones to allow for ease of installation of any future fixings.

Service locations should be considered in respect to the potential post adaption layouts, thereby allowing fixtures to easily be relocated.

Kitchen:
Kitchen layout to achieve a minimum circulation of 1550mm between opposing walls, cabinets and appliances to facilitate completion of a 180 degree turn by a wheelchair user.

In addition the design of the kitchen is to accommodate for the potential of adaption including:
- an 800mm length of worktop that can be adjusted in height, with a removable base unit under
- the location of the fridge adjoining a suitable work surface
- potential to adjust sink height, with a sink bowl depth of 150mm - lever type taps to be provided to the side of the sink
- cooktops with side controls
- isolation switches for appliances to be accessible / reachable (e.g. oven and fridge / freezer)
- suitable oven height and worktop adjoining.

Bedroom:
The main bedroom within the adaptable units requires sufficient circulation space to permit movement by a wheelchair user, being not less than 1540mm x 2070mm clear circulation to at least one side and/or base of a queen size bed on post adaption.

Window sills within the bedroom and living areas will be a maximum of 600mm and 730mm above finished floor level respectively, to enable viewing by persons in the seated position and persons who may be confined to bed (AS 4299:1995 Clauses 4.6.2 / 4.7.2).

Laundry:
Laundry facilities and joinery to be designed to allow for adjustment to cater for accessibility in the future, the post adaption location will provide for a clear 1550mm approach to the facility.

LIVABLE HOUSING (SILVER)

- DWELLING ACCESS**
- 1000 mm clear width to path of travel
 - Max 1:14 slope
 - 1200 mm landings
- DWELLING ENTRANCE**
- Min 820 mm clear opening
 - No step at door (may have a 50 mm step with ramping)
 - 1200 mm x 1200 mm landing FINISHED FLOOR LEVEL
- CAR PARKING**
- NOT APPLICABLE AS NOT A PART OF THE DWELLING ENTRANCE
- INTERNAL DOORS & CORRIDORS**
- All internal doors 820 mm clear opening
 - All corridors 1000 mm minimum width
- TOILET**
- A minimum clear 900 width
 - 1200 mm clear in front of the toilet
 - LOCATED IN THE CORNER OF THE ROOM TO ALLOW FUTURE INSTALLATION OF GRAB RAILS
- SHOWER**
- HOBLESS SHOWER ENTRY
 - LOCATED IN THE CORNER OF THE ROOM TO ALLOW FUTURE INSTALLATION OF GRAB RAILS
- WALL REINFORCEMENT**
- WALLS AROUND TOILET AND SHOWER TO HAVE 12MM PLYWOOD TO ALLOW FUTURE INSTALLATION OF GRABRAILS
- INTERNAL STAIRWAYS**
- 1000mm CLEAR WITH CONTINUOUS HANDRAIL

- KITCHEN**
- NIL REQUIREMENTS
- LAUNDRY**
- NIL REQUIREMENTS
- GROUND (OR ENTRY) FLOOR BEDROOMS**
- NIL REQUIREMENTS
- SWITCHED & POWER POINTS**
- NIL REQUIREMENTS
- DOOR & TAP HARDWARE**
- NIL REQUIREMENTS
- FAMILY / LIVING ROOM SPACE**
- NIL REQUIREMENTS
- WINDOW SILLS**
- NIL REQUIREMENTS
- FLOORING**
- NIL REQUIREMENTS

- KITCHEN**
- 1 DOUBLE GPO WITHIN 300mm OF FRONT OF WORK SURFACE
 - SLIP RESISTANT FLOOR TO AS/NZS3661.1
 - RAISED CROSS BAR TO CONTROLS
 - ISOLATING SWITCH TO COOKTOP
 - REFRIGERATOR ADJACENT WORK SURFACE
 - GPO FOR REFRIGERATOR TO BE EASILY WITHIN REACH
 - INSTALLATION OF THERMOSTATIC MIXING VALVES
 - LOCATE HANDLES TOWARDS THE TOP OF UNDER-BENCH CUPBOARDS AND TO THE BOTTOM OF OVER-BENCH CUPBOARDS
 - PROVIDE SPACE FOR MICROWAVE IN OVER-BENCH CUPBOARD
- LIVING**
- POTENTIAL ILLUMINATION TO BE MIN 300LUX
 - PROVISION FOR CIRCULATION SPACE OF MIN 2250mm DIAMETER MIN 4 DOUBLE GPOS
- BEDROOM**
- MIN 1000mm UNOBSTRUCTED SPACE ALONG 1 SIDE OF BED
 - PROVISION FOR CIRCULATION SPACE OF MIN 1540mm X 2070 IN DIRECTION OF TRAVEL
 - MIN 2 DOUBLE GPOS
- EXTERIOR**
- SLIP RESISTANT FLOOR TO AS/NZS3661.1
 - MAX 5mm STEP BETWEEN EXTERNAL FLOORING AND INTERNAL FLOORING
 - AND TO FULL WIDTH OF DOOR OPENING

NOTE: ADAPTABLE UNIT TO MEET AS4299:2009 ON COMPLETION ALL DIMENSION TO STUD WALL

INDICATES ADJUSTABLE BENCHTOP

- PROVIDE DOUBLE GPO
- SLIP RESISTANT FLOOR TO AS/NZS 3661.1
- INSTALLATION OF THERMOSTATIC MIXING VALVES
- PROVIDE 1550mm CLEAR IN FRONT OF WASHING MACHINE
- TUB MIXER TO FRONT OF TUB

REV	DESCRIPTION	DATE
A	FOR INFORMATION	03/04/2017
B	REVISED FOR INFORMATION	04/04/2017

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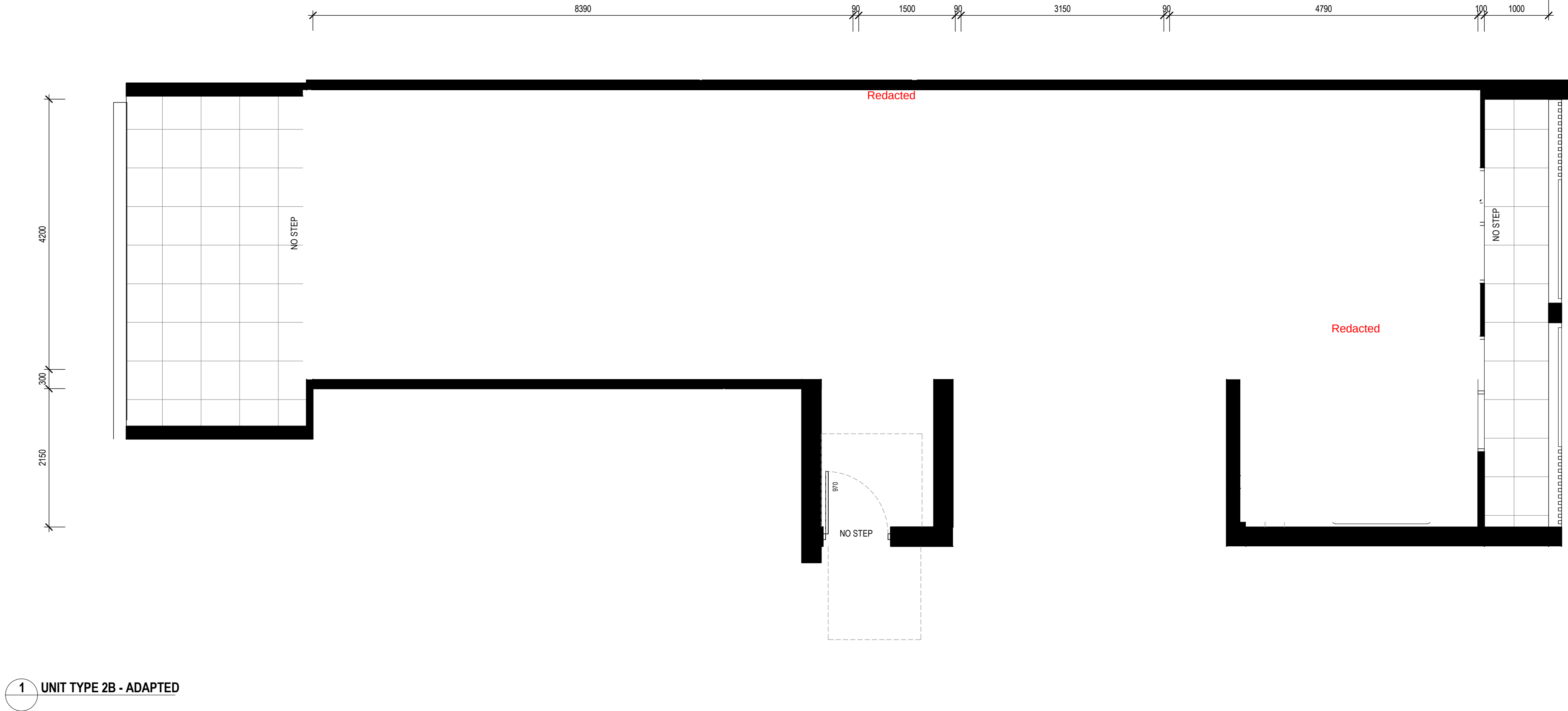
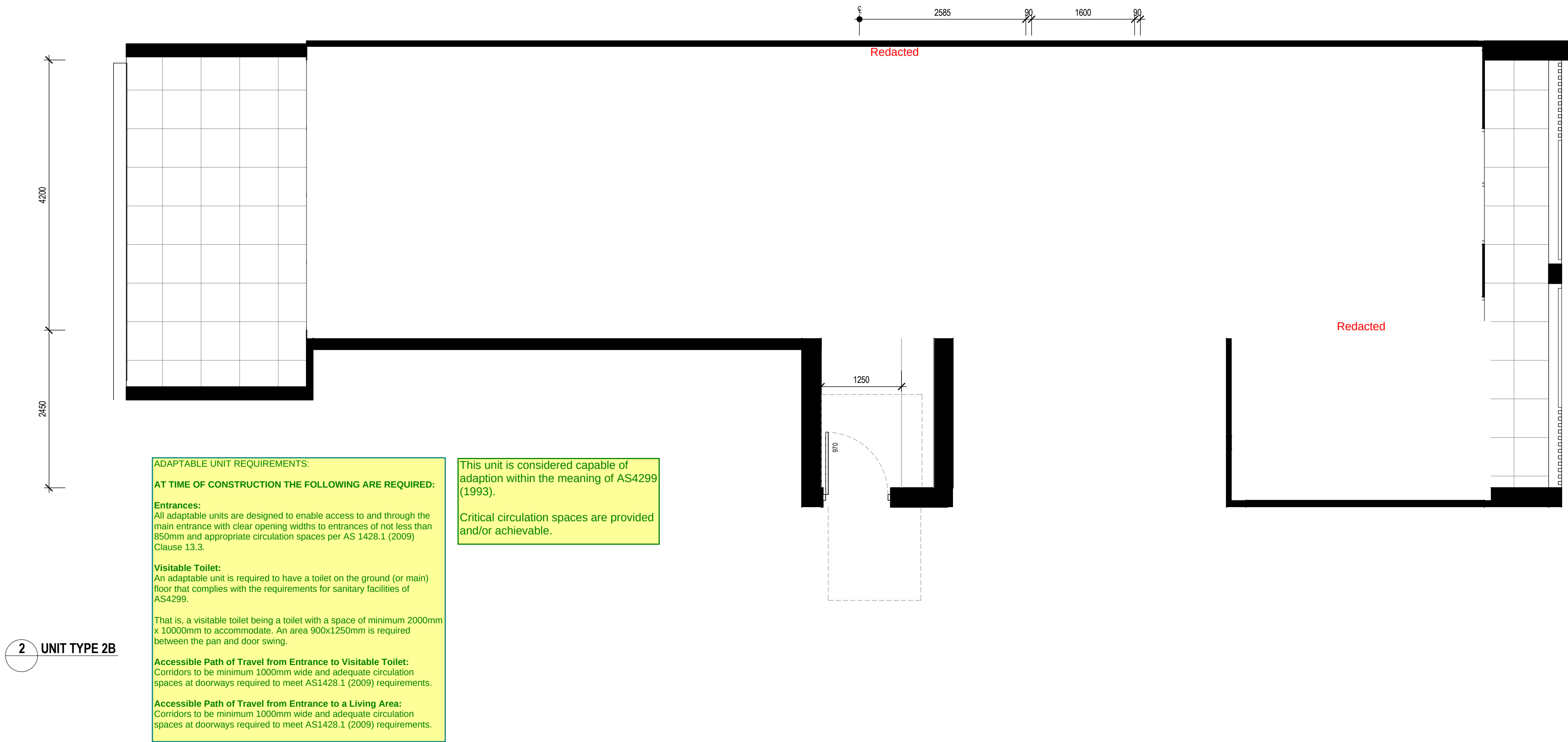
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PROJECT LAKEHOUSE VILLAGE
LOT 384 DP 32518, LOT 1 DP 90877, LOT 1-3
DP 155951, LOT 112 DP 578045
482 THE ESPLANADE, WARNERS BAY

PROJECT No. 1635
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DRAWING No. DA181
DRAWING TITLE PLAN - ADAPTABLE UNITS
SCALE 1 : 50 @ A1
DATE 2017



This unit meets the requirements of AS4299 (1993) in its adapted state.

Critical circulation spaces are provided and/or achievable.

ADAPTABLE UNIT REQUIREMENTS:

ON ADAPTION THE FOLLOWING ARE REQUIRED:

Doorways:
In regards to internal doors, each requires appropriate clear opening width with a minimum clear width of 820mm, with the door to the accessible bathroom meeting AS1428.1 (2009) requirements with a minimum clear width of 850mm. We recommend providing 850mm to all doors in adaptable units from the onset.

Circulation:
Critical minimum circulation areas for adaptable units are as follows:
- 2250mm diameter clear space within living area to allow wheelchair access. Furniture arrangement will need modification.
- 1550mm clear to front of kitchen and laundry benches.
- turning space at foot of bed minimum 1540 mm wide and 2070mm long (in the direction of travel).
- door circulation in accordance with AS1428.1 (2009).

Bathroom:
The dimensions of bathrooms should provide scope for a post adapted bathroom that will provide sufficient circulation space per AS 1428.1 (2009).

Structural support (such as structural ply sheeting) is recommended at toilet and shower grab rail zones to allow for ease of installation of any future fixings.

Service locations should be considered in respect to the potential post adaption layouts, thereby allowing fixtures to easily be relocated.

Kitchen:
Kitchen layout to achieve a minimum circulation of 1550mm between opposing walls, cabinets and appliances to facilitate completion of a 180 degree turn by a wheelchair user.

In addition the design of the kitchen is to accommodate for the potential of adaption including:
- an 800mm length of worktop that can be adjusted in height, with a removable base unit under
- the location of the fridge adjoining a suitable work surface
- potential to adjust sink height, with a sink bowl depth of 150mm - lever type taps to be provided to the side of the sink
- cooktops with side controls
- isolation switches for appliances to be accessible / reachable (e.g. oven and fridge / freezer)
- suitable oven height and worktop adjoining.

Bedroom:
The main bedroom within the adaptable units requires sufficient circulation space to permit movement by a wheelchair user, being not less than 1540mm x 2070mm clear circulation to at least one side and/or base of a queen size bed on post adaption.

Window sills within the bedroom and living areas will be a maximum of 600mm and 730mm above finished floor level respectively, to enable viewing by persons in the seated position and persons who may be confined to bed (AS 4299:1995 Clauses 4.6.2 / 4.7.2).

Laundry:
Laundry facilities and joinery to be designed to allow for adjustment to cater for accessibility in the future; the post adaption location will provide for a clear 1550mm approach to the facility.

LIVABLE HOUSING (SILVER)

- DWELLING ACCESS**
- 1000 mm clear width to path of travel
 - Max 1:14 slope
 - 1200 mm landings
- DWELLING ENTRANCE**
- Min 820 mm clear opening
 - No step at door (may have a 50 mm step with ramping)
 - 1200 mm x 1200 mm landing FINISHED FLOOR LEVEL
- CAR PARKING**
- NOT APPLICABLE AS NOT A PART OF THE DWELLING ENTRANCE
- INTERNAL DOORS & CORRIDORS**
- All internal doors 820 mm clear opening
 - All corridors 1000 mm minimum width
- TOILET**
- A minimum clear 900 width
 - 1200 mm clear in front of the toilet
 - LOCATED IN THE CORNER OF THE ROOM TO ALLOW FUTURE INSTALLATION OF GRAB RAILS
- SHOWER**
- HOBBLESS SHOWER ENTRY
 - LOCATED IN THE CORNER OF THE ROOM TO ALLOW FUTURE INSTALLATION OF GRAB RAILS

- REINFORCEMENT**
- WALLS AROUND TOILET AND SHOWER TO HAVE 12MM PLYWOOD TO ALLOW FUTURE INSTALLATION OF GRABRAILS
- INTERNAL STAIRWAYS**
- 1000mm CLEAR WITH CONTINUOUS HANDRAIL

ADAPTABLE NOTES

- INTERNAL STAIRWAYS**
- 1000mm CLEAR WITH CONTINUOUS HANDRAIL
- ADAPTABLE NOTES**
- INTERNAL STAIRWAYS**
- 1000mm CLEAR WITH CONTINUOUS HANDRAIL
- ADAPTABLE NOTES**
- SWITCHES LOCATED AT 900 - 1100 ABOVE FLOOR AND IN LINE WITH DOOR HANDLES
 - GPO ADJACENT TO TELEPHONE
 - GPO'S LOCATED NO LOWER THAN 300mm ABOVE FLOOR UNLESS NOTED OTHERWISE
 - ENTRY DOOR HANDLES & HARDWARE TO AS1428.2
 - DOOR HARDWARE TO BE OPERABLE WITH ONE HAND AND LOCATED 900-1100 ABOVE FFL
 - ALL DOORS TO HAVE 850mm MIN CLEARANCE
 - CORRIDORS MIN WIDTH OF 1200mm (UNLESS NOTED OTHERWISE) COMPLIANCE WITH AS1428.1 FOR DOOR APPROACHES
- ADAPTABLE NOTES**
- BATHROOM WATERPROOFED TO AS3740
 - FALL TO WASTE TO MEET AS1428.1
 - PROVIDE RECESSED SOAP HOLDER
 - POSITION SHOWER MIXER AS PER AS1428.1
 - POSITION SHOWER MIXER BETWEEN 900 AND 1100mm ABOVE THE FINISHED FLOOR LEVEL
 - SHOWER RAIL TO BE 580-600mm FROM CORNER OF SHOWER, WITH LOCATED BELOW THE RAIL AT 700mm ABOVE THE FINISHED FLOOR
 - PROVIDE REINFORCED AREAS TO WALLS FOR INSTALLATION OF GRAB RAILS TO SHOWER AND WC TO AS1428.1
 - LEVER MIXER TO BASIN
 - SLIP RESISTANT FLOOR TO AS/NZS3661.1
 - PROVIDE ONE DOUBLE GPO LOCATED BESIDE MIRROR TO AS1428.1
 - SHOWER WASTE MIN DIAMETER 80mm
 - BASIN, W/C, GRAB RAILS & FOLDING SHOWER SEAT TO COMPLY WITH AS1428.1
 - PROVIDE SHOWER CURTAIN AND RAIL
- ADAPTABLE NOTES**
- PROVIDE DOUBLE GPO
 - SLIP RESISTANT FLOOR TO AS/NZS 3661.1
 - INSTALLATION OF THERMOSTATIC MIXING VALVES
 - PROVIDE 1550mm CLEAR IN FRONT OF WASHING MACHINE
 - TUB MIXER TO FRONT OF TUB

- KITCHEN**
- NIL REQUIREMENTS
- LAUNDRY**
- NIL REQUIREMENTS
- GROUND (OR ENTRY) FLOOR BEDROOMS**
- NIL REQUIREMENTS
- SWITCHED & POWER POINTS**
- NIL REQUIREMENTS
- DOOR & TAP HARDWARE**
- NIL REQUIREMENTS
- FAMILY / LIVING ROOM SPACE**
- NIL REQUIREMENTS
- WINDOW SILLS**
- NIL REQUIREMENTS
- FLOORING**
- NIL REQUIREMENTS

- KITCHEN**
- 1 DOUBLE GPO WITHIN 300mm OF FRONT OF WORK SURFACE
 - SLIP RESISTANT FLOOR TO AS/NZS3661.1
 - RAISED CROSS BAR TO CONTROLS
 - ISOLATING SWITCH TO COOKTOP
 - REFRIGERATOR ADJACENT WORK SURFACE
 - GPO FOR REFRIGERATOR TO BE EASILY WITHIN REACH
 - INSTALLATION OF THERMOSTATIC MIXING VALVES
 - LOCATE HANDLES TOWARDS THE TOP OF UNDER-BENCH CUPBOARDS AND TO THE BOTTOM OF OVER-BENCH CUPBOARDS
 - PROVIDE SPACE FOR MICROWAVE IN OVER-BENCH CUPBOARD
- LIVING**
- POTENTIAL ILLUMINATION TO BE MIN 300LUX
 - PROVISION FOR CIRCULATION SPACE OF MIN 2250mm DIAMETER
 - MIN 4 DOUBLE GPOS
- BEDROOM**
- MIN 1000mm UNOBSTRUCTED SPACE ALONG 1 SIDE OF BED
 - PROVISION FOR CIRCULATION SPACE OF MIN 1540mm X 2070 IN DIRECTION OF TRAVEL
 - MIN 2 DOUBLE GPOS
- EXTERIOR**
- SLIP RESISTANT FLOOR TO AS/NZS3661.1
 - MAX 5mm STEP BETWEEN EXTERNAL FLOORING AND INTERNAL FLOORING
 - AND TO FULL WIDTH OF DOOR OPENING

NOTE: ADAPTABLE UNIT TO MEET AS4299-2009 ON COMPLETION ALL DIMENSION TO STUD WALL

INDICATES ADJUSTABLE BENCHTOP

UNCONTROLLED ISSUE

REV	DESCRIPTION	DATE
A	FOR INFORMATION	03.04.2017

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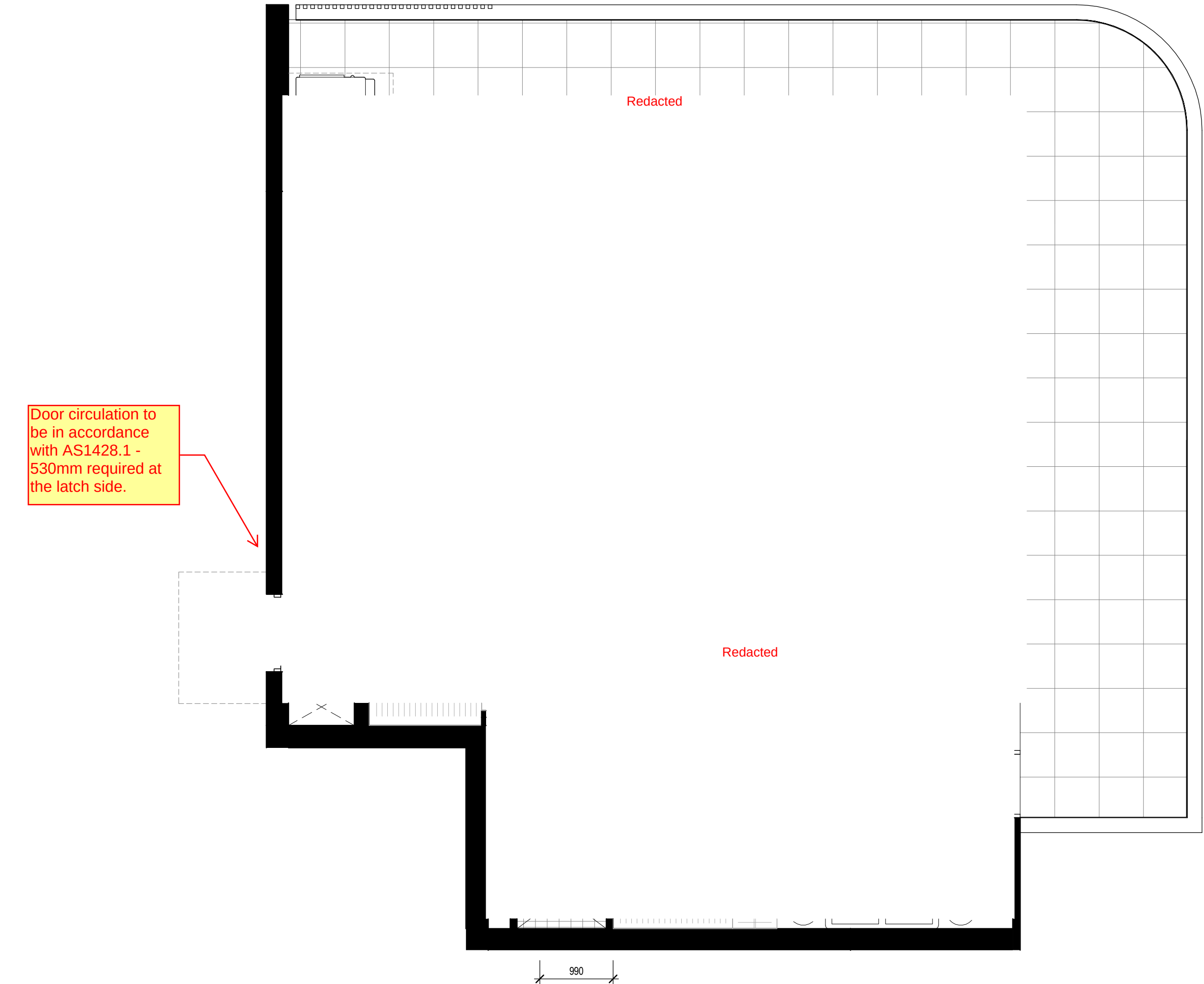
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LAKEHOUSE VILLAGE
LOT 384 DP 32518, LOT 1 DP 90877, LOT 1-3
DP 155951, LOT 112 DP 578045
482 THE ESPLANADE, WARNERS BAY

DRAWING No. DA182
DRAWING TITLE PLAN - ADAPTABLE UNITS
SCALE 1:50 @ A1
DATE 2017

PROJECT No. 1635
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2 UNIT TYPE 3D

ADAPTABLE UNIT REQUIREMENTS:

AT TIME OF CONSTRUCTION THE FOLLOWING ARE REQUIRED:

Entrances:
All adaptable units are designed to enable access to and through the main entrance with clear opening widths to entrances of not less than 850mm and appropriate circulation spaces per AS 1428.1 (2009) Clause 13.3.

Visible Toilet:
An adaptable unit is required to have a toilet on the ground (or main) floor that complies with the requirements for sanitary facilities of AS4299.

That is, a visitable toilet being a toilet with a space of minimum 2000mm x 1000mm to accommodate. An area 900x1250mm is required between the pan and door swing.

Accessible Path of Travel from Entrance to Visible Toilet:
Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.

Accessible Path of Travel from Entrance to a Living Area:
Corridors to be minimum 1000mm wide and adequate circulation spaces at doorways required to meet AS1428.1 (2009) requirements.

This unit meets the requirements of AS4299 (1993) in its adapted state.

Critical circulation spaces are provided and/or achievable.

ADAPTABLE UNIT REQUIREMENTS:

ON ADAPTION THE FOLLOWING ARE REQUIRED:

Doorways:
In regards to internal doors, each requires appropriate clear opening width with a minimum clear width of 820mm, with the door to the accessible bathroom meeting AS1428.1 (2009) requirements with a minimum clear width of 850mm. We recommend providing 850mm to all doors in adaptable units from the onset.

Circulation:
Critical minimum circulation areas for adaptable units are as follows:
- 2250mm diameter clear space within living area to allow wheelchair access. Furniture arrangement will need modification.
- 1550mm clear to front of kitchen and laundry benches.
- turning space at foot of bed minimum 1540 mm wide and 2070mm long (in the direction of travel).
- door circulation in accordance with AS1428.1 (2009).

Bathroom:
The dimensions of bathrooms should provide scope for a post adapted bathroom that will provide sufficient circulation space per AS 1428.1 (2009).

Structural support (such as structural ply sheeting) is recommended at toilet and shower grab rail zones to allow for ease of installation of any future fixings.

Service locations should be considered in respect to the potential post adaption layouts, thereby allowing fixtures to easily be relocated.

Kitchen:
Kitchen layout to achieve a minimum circulation of 1550mm between opposing walls, cabinets and appliances to facilitate completion of a 180 degree turn by a wheelchair user.

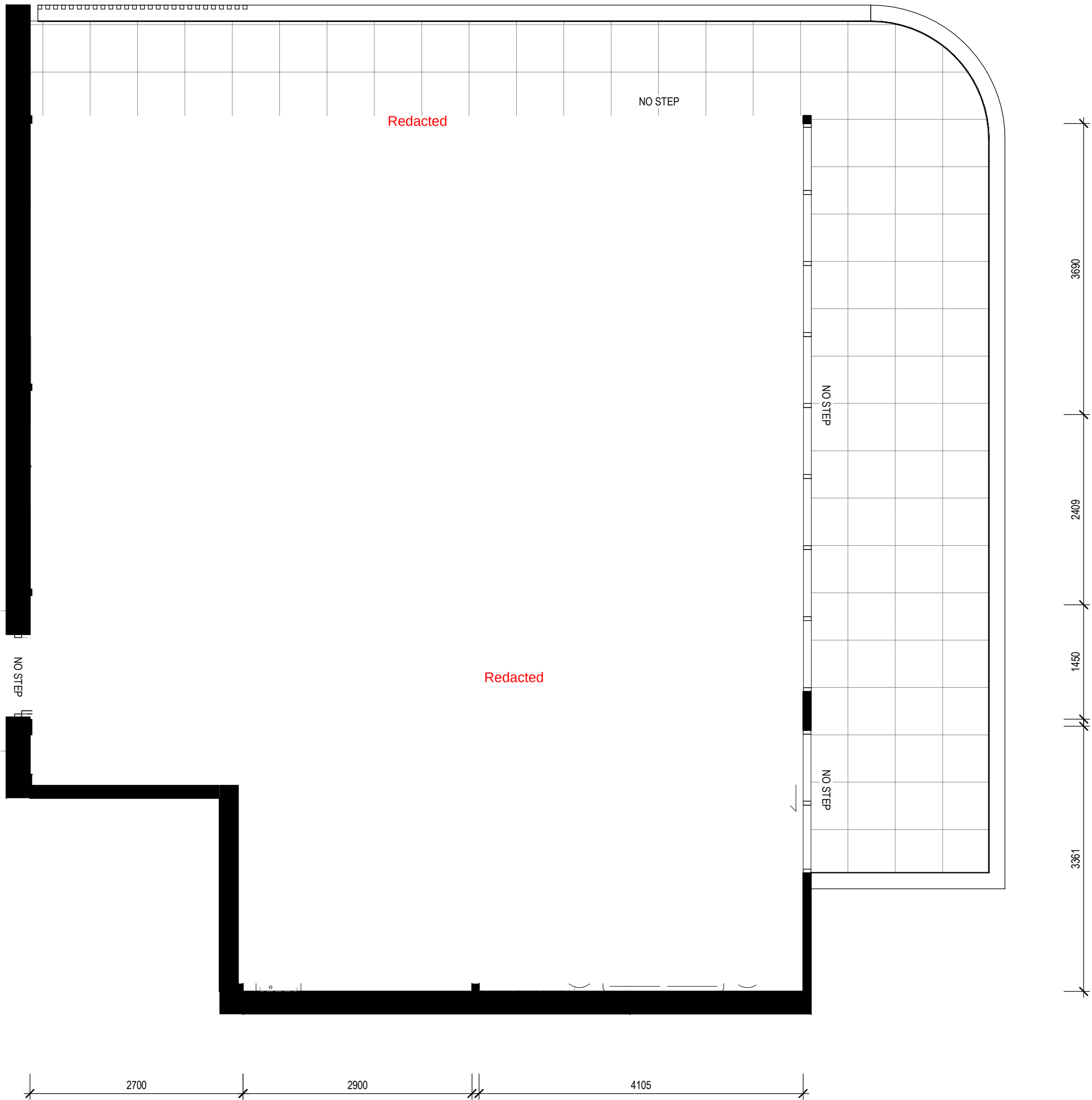
In addition the design of the kitchen is to accommodate for the potential of adaption including:
- an 800mm length of worktop that can be adjusted in height, with a removable base unit under
- the location of the fridge adjoining a suitable work surface
- potential to adjust sink height, with a sink bowl depth of 150mm - lever type taps to be provided to the side of the sink
- cocktops with side controls
- isolation switches for appliances to be accessible / reachable (e.g. oven and fridge / freezer)
- suitable oven height and worktop adjoining.

Bedroom:
The main bedroom within the adaptable units requires sufficient circulation space to permit movement by a wheelchair user, being not less than 1540mm x 2070mm clear circulation to at least one side and/or base of a queen size bed on post adaption.

Window sills within the bedroom and living areas will be a maximum of 600mm and 730mm above finished floor level respectively, to enable viewing by persons in the seated position and persons who may be confined to bed (AS 4299:1995 Clauses 4.6.2 / 4.7.2).

Laundry:
Laundry facilities and joinery to be designed to allow for adjustment to cater for accessibility in the future; the post adaption location will provide for a clear 1550mm approach to the facility.

1 UNIT TYPE 3D - ADAPTED



ADAPTABLE NOTES

GENERALLY

- SWITCHES LOCATED AT 900 - 1100 ABOVE FLOOR AND IN LINE WITH DOOR HANDLES
- GPO ADJACENT TO TELEPHONE
- GPOS LOCATED NO LOWER THAN 300mm ABOVE FLOOR UNLESS NOTED OTHERWISE
- ENTRY DOOR HANDLES & HARDWARE TO AS1428.2
- DOOR HARDWARE TO BE OPERABLE WITH ONE HAND AND LOCATED 900-1100 ABOVE FFL
- ALL DOORS TO HAVE 850mm MIN CLEARANCE
- CORRIDORS MIN WIDTH OF 1200mm (UNLESS NOTED OTHERWISE)
- COMPLIANCE WITH AS1428.1 FOR DOOR APPROACHES

BATHROOMS

- BATHROOM WATERPROOFED TO AS3740
- FALL TO WASTE TO MEET AS1428.1
- PROVIDE RECESSED SOAP HOLDER
- POSITION SHOWER MIXER AS PER AS1428.1
- POSITION SHOWER MIXER BETWEEN 900 AND 1100mm ABOVE THE FINISHED FLOOR LEVEL
- SHOWER RAIL TO BE 580-600mm FROM CORNER OF SHOWER, WITH OUTLET LOCATED BELOW THE RAIL AT 700mm ABOVE THE FINISHED FLOOR
- PROVIDE REINFORCED AREAS TO WALLS FOR INSTALLATION OF GRAB RAILS TO SHOWER AND WC TO AS1428.1
- LEVER MIXER TO BASIN
- SLIP RESISTANT FLOOR TO AS/NZS3661.1
- PROVIDE ONE DOUBLE GPO LOCATED BESIDE MIRROR TO AS1428.1
- SHOWER WASTE MIN DIAMETER 80mm
- BASIN, W/C, GRAB RAILS & FOLDING SHOWER SEAT TO COMPLY WITH AS1428.1
- PROVIDE SHOWER CURTAIN AND RAIL

LAUNDRY

- PROVIDE DOUBLE GPO
- SLIP RESISTANT FLOOR TO AS/NZS 3661.1
- INSTALLATION OF THERMOSTATIC MIXING VALVES
- PROVIDE 1550mm CLEAR IN FRONT OF WASHING MACHINE
- TUB MIXER TO FRONT OF TUB

KITCHEN

- 1 DOUBLE GPO WITHIN 300mm OF FRONT OF WORK SURFACE
- SLIP RESISTANT FLOOR TO AS/NZS3661.1
- RAISED CROSS BAR TO CONTROLS
- ISOLATING SWITCH TO COOKTOP
- REFRIGERATOR ADJACENT WORK SURFACE
- GPO FOR REFRIGERATOR TO BE EASILY WITHIN REACH
- INSTALLATION OF THERMOSTATIC MIXING VALVES
- LOCATE HANDLES TOWARDS THE TOP OF UNDER-BENCH CUPBOARDS AND TO THE BOTTOM OF OVER-BENCH CUPBOARDS
- PROVIDE SPACE FOR MICROWAVE IN OVER-BENCH CUPBOARD

LIVING

- POTENTIAL ILLUMINATION TO BE MIN 300LUX
- PROVISION FOR CIRCULATION SPACE OF MIN 2250mm DIAMETER
- MIN 4 DOUBLE GPOS

BEDROOM

- MIN 1000mm UNOBSTRUCTED SPACE ALONG 1 SIDE OF BED
- PROVISION FOR CIRCULATION SPACE OF MIN 1540mm X 2070 IN DIRECTION OF TRAVEL
- MIN 2 DOUBLE GPOS

EXTERIOR

- SLIP RESISTANT FLOOR TO AS/NZS3661.1
- MAX 5mm STEP BETWEEN EXTERNAL FLOORING AND INTERNAL FLOORING
- AND TO FULL WIDTH OF DOOR OPENING

NOTE: ADAPTABLE UNIT TO MEET AS4299-2009 ON COMPLETION ALL DIMENSION TO STUD WALL

INDICATES ADJUSTABLE BENCHTOP

REV	DESCRIPTION	DATE
A	FOR INFORMATION	03.04.2017
B	REVISED FOR INFORMATION	04.04.2017

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PROJECT

LAKEHOUSE VILLAGE

LOT 3&4 DP 32518, LOT 1 DP 90877, LOT 1-3
DP 155951, LOT 112 DP 578045
482 THE ESPLANADE, WARNERS BAY

PROJECT No.

1635

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DRAWING No.

DA183

DRAWING TITLE

PLAN - ADAPTABLE UNITS

SCALE

1 : 50 @ A1

DATE

2017



APPENDIX B

MANDATORY ACCESS COMPLIANCE REQUIREMENTS



B1 ACCESSIBLE CARPARKING

Accessible carparking to be a minimum of 2400mm wide with a shared area to one side of the space 2400mm wide. Circulation space can be shared between adjacent accessible carparks. For a single space, a total width of 4800mm is required. The car space and the shared zone should be a minimum of 5400mm long.

Provide a bollard to the shared circulation space as illustrated in AS2890.6, Figure 2.2. The maximum allowable crossfall of an accessible carparking area is to be 1:40, (1:33 for outdoor spaces). This crossfall applies both parallel and perpendicular to the angle of parking.

For covered carparking, the clear height of the accessible carparking space to be 2500mm as illustrated in AS2890.6, Figure 2.7 and approach path is to have a minimum of 2200mm.

Designated accessible carparking is to be identified using the International Symbol for Access (ISA) and line marked as specified in AS2890.6.

B2 EXTERNAL PATHWAYS AND WALKWAYS

The minimum unobstructed width of all pathways and walkways is to be 1000mm (AS1428.1 (2009), Clause 6.3). A width of 1200mm is preferred for compliance with AS1428.2 (1992).

All pathways and walkways are to be constructed with no lip or step at joints between abutting surfaces. A construction tolerance of 3mm is allowable, 5mm for bevelled edges -refer to Figure 6 of AS1428.1(2009).

The maximum allowable crossfall of pathways and walkways is to be 1:40. The surfaces of an accessible path of travel are to be slip-resistant.

The ground abutting the sides of the pathways and walkways should follow the grade of the pathway and extend horizontally for 600mm. This is not required where there is a kerb or handrail provided to the side of the pathway (refer to AS1428.1 (2009) Clause 10.2).

Maximum allowable gradient of the walkway is 1:20 and maximum length between landings to be 15m (for 1:20 gradient). Landings to be a minimum 1200mm in length (where there is no change in direction). For changes in direction of 180°, landings to be 1540mm in length – refer to AS1428.1 (2009), Clause 10.8.

B3 KERB RAMPS

Kerb ramps to comply with AS1428 (2009) Amendment 1, Clause 10.7.

Maximum gradient of the kerb ramps to be 1:8 and maximum length to be 1520mm (providing a maximum height of 190mm).

Kerb ramps to have a non-slip surface as required by AS1428.

A tooled joint should be provided between parts of the kerb ramp to assist persons with a vision impairment with orientation.

B4 STEP RAMPS

The configuration of the step ramps to comply with the requirements of AS1428.1, Clause 10.6. Maximum gradient of the step ramp is to be 1:10 and maximum length to be 1900mm (providing a maximum height of 190mm).

Provide landings at the top and bottom of the step ramp to comply with AS1428.1, Clause 10.8.2.

Step ramp to be enclosed on both sides (minimum height 450mm) or a kerb and handrail needs to be installed. Where a kerb is to be installed, the height of kerb rails is to be less than 65mm or greater



than 150mm above the finished surface level of the ramp. This is to ensure that the foot plate of a wheelchair cannot become lodged on the kerb rail.

B5 ACCESSIBLE RAMPS

Ramps are to comply with AS1428.1 (2009) Clause 10.3. Maximum allowable gradient of the ramp is 1:14, minimum clear width to be 1000mm and maximum length between landings to be 9m (for 1:14 gradient).

Accessible ramp are to have a maximum rise of 3.6m (BCA Part 3.11).

Externally, ramps are required to be set back a minimum 900mm from the property boundary (AS1428.1 (2009), Clause 10.3 (f)). This allows tactile indicators and handrail extensions to occur within the boundary and not protrude into the footpath area.

Internally, ramps are required to be set back a minimum 600mm from an internal corridor (AS1428.1 (2009), Clause 10.3 (f)). This allows tactile indicators and handrail extensions to be provided an not protrude into the corridor area.

Provide handrails, with extensions, to both sides of the ramp to comply with AS1428.1 (2009), Clause 12. Handrails are to have an external diameter between 30-50mm to assist persons with a manual disability such as arthritis. Handrails are required on both sides of the ramp to cater for left and right handed disabilities.

Where a ramp is not enclosed, provide kerb rails in accordance with AS1428.1 (2009). The height of kerb rails is to be less than 65mm or greater than 150mm above the finished surface level. This is to ensure that the foot plate of a wheelchair cannot become lodged on the kerb rail.

Provide tactile indicators at the top and bottom of the ramps to comply with BCA Part D3.8 and AS1428.4.1 (2009). Tactile indicators are to be detectable, durable, non-slip and have a minimum 30% luminance contrast to the background colour. Tactile indicators at the top and bottom of the ramps to be 600-800mm deep across the width of the ramp and set back 300mm from the edge of the ramp (refer AS1428.4 (2009), Figure A1).

Tactile indicators will be required at a mid-landing where the ramp is not continuous. Where the handrail is continuous along both sides of the mid-landing, tactile indicators are not required.

B6 PEDESTRIAN CROSSINGS

Where kerb ramps are to be provided at pedestrian crossings to provide an accessible path of travel for persons with a disability they are to comply with AS1428.1 (2009), Clause 10.7.

Where a pedestrian crossing is at the same level as the roadway, provide tactile indicators to both sides of the roadway to alert persons with a vision impairment of the hazard. Tactile indicators are to be 600-800mm deep across the width pedestrian crossing. Tactile indicators are to be detectable, durable, non-slip and have a minimum 30% luminance contrast to the background colour.

B7 THRESHOLD RAMPS

Threshold ramps are to comply with AS1428.1 (2009), Clause 10.5.

Threshold ramps are to have a maximum rise of 35mm, maximum length of 280mm and maximum gradient of 1:8.

Threshold ramps to be located within 20mm of the door leaf that it services.

B8 BUILDING ENTRANCES

Entrances are to comply with AS1428.1 (2009), Clause 13 as part of the accessible path of travel.



Doors are to have a minimum clear opening width of 850mm to comply AS1428.1 (2009), Clause 13.2.

Door thresholds are to be level to provide seamless entry to the building. The maximum allowable construction tolerance is 3mm for compliance with AS1428.1 (2009), 5mm where bevelled edges are provided between surfaces – refer to Figure 6.

Door to have hardware within the accessible height range of 900-1100mm above the finished floor level (AS1428.1 (2009), Clause 13.5)

For glass doors, provide decals to assist persons with a vision impairment. Decals to be solid and have a minimum 30% luminance contrast to the background colour and be not less than 75mm high located within the height range of 900-1100mm above the finished floor level. Decals are to be solid pattern to AS1428.1 (2009) Clause 6.6.

B9 TACTILE INDICATORS AT THE BUILDING ENTRANCE

BCA Clause 3.8 (a) (v) states that for a building that is required to be accessible, tactile ground surface indicators must be provided to warn people who are blind or have a vision impairment that they are approaching – in the absence of a suitable barrier – an accessway meeting a vehicular way adjacent to any pedestrian entrance to a building...if there is no kerb or kerb ramp at that point, except for areas exempted by D3.4.

Tactile indicators are to be detectable, durable, non-slip and have a minimum 30% luminance contrast to the background colour.

Tactile indicators are to be 600-800mm deep across the width of the path of travel.

B10 DOORWAYS

Doorways within the accessible path of travel are to have a minimum clear opening width of 850mm (AS1428.1 (2009), Clause 13.2). We recommend the use of a 920 leaf door as a minimum to achieve adequate clear width.

All doorways within the accessible path of travel to have complying circulation areas as illustrated in AS1428.1 (2009), Figure 31. Circulation areas are to have a maximum crossfall of 1:40.

Doorways to have minimum 30% luminance contrast as described in AS1428.1 (2009), Clause 13.1.

Doors to have hardware within the accessible height range of 900-1100mm above the finished floor level (AS1428.1 (2009), Clause 13.5) and allows for single handed operation.

B11 TACTILE INDICATORS

Installation of tactile indicators is to be in accordance with AS1428.4.1 (2009).

Tactile indicators are to be detectable, durable, non-slip and have a minimum 30% luminance contrast to the background colour.

Tactile indicators are to be 600-800mm deep across the width of the path of travel.

B12 VISUAL INDICATION TO GLAZING

Provide decals to assist persons with a vision impairment. Decals to be solid and have a minimum 30% luminance contrast to the background colour and be not less than 75mm high located within the height range of 900-1100mm above the finished floor level. Decals are to be solid pattern to AS1428.1 Clause 6.6.



B13 SIGNAGE

The BCA has requirements for Braille and tactile signage within Specification D3.6. This provides information for the provision of statutory signage

Braille and tactile signage is required to be provided throughout any building required to be made accessible in accordance with BCA specification D3.6 and AS1428.1 (2009) and must identify:

- Each sanitary facility
- Any space with a hearing augmentation system
- Accessible unisex facilities and indicate whether the facility is suitable for left or right handed use
- Ambulant accessible sanitary facilities on the door of the cubicle
- Where an entrance is not accessible, directional signage to identify nearest accessible entrance
- Where a bank of sanitary facilities is not provided with an accessible sanitary facility, directional signage to identify nearest accessible sanitary facility.
- Each door required by Part E4.5 to be provided with an exit sign and state "Exit" and "Level" followed by either the floor level number, the floor descriptor or combination of these.

In addition, AS1428.2 (1992) contains additional information as to the form of signage.

Signage should be easily comprehended by all building users. In this regard, the use of pictograms is highly recommended. The message that the sign conveys should be unambiguous.

Placement of signage should be considered at the following locations:

- Where it is clearly visible to people in both a standing and seated position.
- At changes in direction.
- At locations where directional decisions are made.
- As required to amenities and exits

B14 HEARING AUGMENTATION

A hearing augmentation system must be provided where an inbuilt amplification system is provided, other than one used for emergency purposes only as required by BCA Part D3.7.

Further, for buildings that are required to be accessible, the BCA (Part D3.7) requires hearing augmentation systems at service counters **where the user is screened from the service provider.**

While it is not referenced by the BCA, AS1428.5 (2010): Communication for people who are deaf or hearing impaired contains information regarding assisted listening systems and can be used to ensure equitable facilities are provided for this user group.

The standard provides information relating to design solutions and equipment for the following:

- Assisted listening systems.
- Early warning systems
- Visual display systems for intercommunication, public announcements and the like
- Telephone services and telecommunications available to the public.

B15 WHEELCHAIR SEATING

Where fixed seating is provided in an assembly building, the required wheelchair seating spaces (number per BCA) are required to be:

- Accessed via an accessible path of travel.
- Located adjacent to, and at the same level as, other seating in a row.
- Located to allow lines of sight comparable to those for general viewing areas.

The special requirement for the footprint of a single wheelchair seating space is 800x1250mm.



B16 PASSENGER LIFTS

Every passenger lift in an accessible building must be suitable for use by people with a disability and offer compliance with AS1725.12. Typically, the following is required to be provided:

Lift dimensions

- Lift floor dimensions of not less than 1100mm X 1400mm for lifts which travel not more than 12m.
- Lift floor dimensions of not less than 1400mm X 1600mm for lifts which travel more than 12m.
- Provision for a stretcher facility within at least one emergency lift required by E3.4, or where an emergency lift is not required, if passenger lifts are installed to serve any storey above an effective height of 12m, in at least one of those lifts to serve every floor served by lifts.

Lift Features

- Handrail complying with the provisions for a mandatory handrail in AS1735.12.
- Minimum clear door opening complying with AS1735.12.
- Passenger protection system complying with AS1735.12.
- Lift landing doors at the upper landing.
- Lift car and landing control buttons complying with AS1735.12.
- Lighting in accordance with AS1735.12.
- Emergency hands-free communication, including a button that alerts a call centre of a problem and a light to signal that the call has been received.

All passenger lifts serving more than 2 levels must possess:

- Automatic audible information within the lift car to identify the level each time the car stops.
- Audible and visual indications at each lift landing to indicate the arrival of the lift car.
- Audible information and audible indication must be provided in a range between 20-80dB(A) at a maximum frequency of 1500Hz.

B17 PLATFORM LIFTS – LOW RISE

The BCA has limitations for the use of this type of lift. They must not travel more than 1m. Confirmation should be sought from the manufacturers to confirm compliance with AS1735.16 prior to installation.

Basic access requirements for Part 16 lifts are as follows (BCA Table E3.6a).

- Car size should be a minimum of 1100x1400mm to accommodate a wheelchair.
- Clear opening of the lift door to be minimum 900mm.
- All lift control buttons are to be in the accessible height range of 900-1100mm affl and have a minimum 30% luminance contrast to the background colour. This includes buttons within the lift car and at each public lift lobby. All buttons are to be provided with information in Braille and tactile formats.

B18 PLATFORM LIFTS - OTHER THAN LOW RISE

The BCA has limitations for the use of this type of lift. They must not travel more than 2m when unenclosed or 4m when enclosed.

Confirmation should be sought from the manufacturers to confirm compliance with AS1735.16 prior to installation.

- Basic access requirements for Part 16 lifts are as follows (BCA Table E3.6a).
- Car size should be a minimum of 1100x1400mm to accommodate a wheelchair.



- Clear opening of the lift door to be minimum 900mm.
- Handrail complying with the provisions for a mandatory handrail in AS1735.12.
- All lift control buttons are to be in the accessible height range of 900-1100mm affl and have a minimum 30% luminance contrast to the background colour. This includes buttons within the lift car and at each public lift lobby. All buttons are to be provided with information in Braille and tactile formats.

B19 STAIRWAY PLATFORM LIFTS

The BCA has limitations for the use of this type of lift .It must not:

- Be used to serve a space in a building accommodating more than 100 persons,
- Be used in a high traffic public use areas, or
- Be used where it is possible to install another type of passenger lift, or
- Connect more than 2 storeys

Stairway platform lifts must comply with AS1735.7. When in the folded position, it must not encroach on the minimum width of a stairway required by D1.6.

B20 ESCALATORS

Escalators do not form a part of the accessible path of travel within the meaning of AS 1428.1 (2009). However, they are subject to BCA requirements with regard to the provision of tactile indicators. TGSIs to be provided at the top and bottom of escalators to be setback 300±10mm from the moving handrail and extend a depth of 600-800mm per AS 1428.4.1 (2009).

B21 TRAVELATORS

Travelators do not form a part of the accessible path of travel within the meaning of AS 1428.1 (2009). However, they are subject to BCA requirements with regard to the provision of tactile indicators. TGSIs to be provided at the top and bottom of travelators to be setback 300±10mm from the moving handrail and extend a depth of 600-800mm per AS 1428.4.1 (2009).

B22 STAIRS

Stair construction is to comply with AS1428.1 (2009) Clause 11.1.

Stairs are to have closed or opaque risers. Open risers cause confusion for persons with a vision impairment and may trigger conditions such as epilepsy due to light penetrating through the open risers.

Where the stair intersects with an internal corridor, the stair shall be set back in accordance with AS1429.1 (2009) Figure 26C/D to allow adequate space for handrail extensions and tactile indicators.

Provide handrails, with extensions, to both sides of the stair (AS1428.1 (2009), Clause 11.2). Handrails are to have an external diameter between 30-50mm to assist persons with a manual disability such as arthritis. Handrails should be continuous around the landings where possible. Handrails are required on both sides of the stair to cater for left and right handed disabilities. A central handrail is also an acceptable solution where adequate width is available.



Stair nosings to have minimum 30% luminance contrast strip 50-75mm wide to the top of the stair tread to assist persons with a vision impairment. The strip can be set back 15mm from the edge of the riser.

Stair nosings shall not project beyond the face of the riser.

Provide tactile indicators at the top and bottom of the stair to comply with BCA Part D3.8 and AS1428.4.1 (2009).

Tactile indicators are to be detectable, durable, non-slip and have a minimum 30% luminance contrast to the background colour.

Tactile indicators at the top and bottom of the stair to be 600-800mm deep across the width of the stair set back 300mm from the edge of the stair.

B23 FIRE ISOLATED STAIRS

Stair nosings to have minimum 30% luminance contrast strip 50-75mm wide to the top of the stair tread to assist persons with a vision impairment. The strip can be set back 15mm from the edge of the riser. Stair nosings shall not project beyond the face of the riser.

B24 UNISEX ACCESSIBLE SANITARY FACILITIES

Set-out of fixtures and fittings within the accessible sanitary facilities to offer compliance with AS 1428.1 (2009) Clause 15 as follows.

Crucial dimensions for the toilet are 450mm from centreline of pan to side wall, 800mm from front of pan to rear wall and a seat height of 470mm.

A minimum clear dimension of 1400mm is required from the toilet pan to any other fixture (see figure 43).

For the basin, a minimum dimension of 425mm is required from the centreline of the basin to the side wall and height of basin to be between 800 and 830mm.

Grabrails are to be provided at the side and rear of the toilet in compliance with AS1428.1 at a height of 800mm.

Taps are to have lever handles, sensor plates or similar controls. For lever taps a minimum of 50mm clearance to be provided to adjacent surfaces.

Toilet seat shall be of the full round type, be securely fixed in position when in use and have fixings that create lateral stability. They should be load rated to 150kg, have a minimum 30% luminance contrast to the background colour (e.g. pan, wall or floor) and remain in the upright position when fully raised.

Provide a backrest to accessible toilets to comply with AS1428.1, Clause 15.2.4.

Accessible toilet to be identified using the International Symbol for Access. Pictograms / lettering to have a minimum 30% luminance contrast to the background colour. Signage is to comply with AS1428.1, Clause 8 and include information in tactile and Braille formats (as required by the BCA).

Doorways are to have a minimum clear opening width of 850mm to comply AS1428.1 (2009), Clause 13.2 as part of the accessible path of travel. Adequate circulation area at the latch side of the doorway is required to allow independent access to the facility – for details refer to AS1428.1, Figure 31.



Door hardware are to be located within the accessible height range of 900-1100mm above the finished floor level. The use of lever handles is encouraged to assist persons with a manual disability such as arthritis.

Controls within the accessible toilet facilities, such as light switches, are to be in the accessible height range of 900-1100mm above the finished floor level to comply with AS1428.1 (2009), Clause 14. Controls should be located not less than 500mm to a corner.

B25 UNISEX ACCESSIBLE SHOWERS

Showers are to comply with AS 1428.1, Clause 15.5 and include accessible features such as grabrails, adjustable height shower rose and fixtures within an accessible height range. The minimum dimensions of an accessible shower are to be 1160 x 1000mm. A folding seat, at a height of 470mm is to be provided. All taps to be located within the height range of 900-1100mm above the finished floor level.

Circulation space in front of the shower is to be provided as illustrated in AS1428.1, Figure 47.

B26 PEOPLE WITH AMBULANT DISABILITIES CUBICLES (PAD)

PAD cubicles within male and female toilets to be in compliance with AS1428.1, Clause 16.

Width of PAD cubicles is to be 900-920mm.

Provide grabrails to PAD cubicles to comply with AS1428.1, Clause 17 and Figure 53A.

Doors are to have a minimum opening width of 700mm and comply with AS1428.1 Figure 53B.

Provide signage to the PAD cubicles to comply with AS1428.1, Clause 16.4.

Provide 900x900 circulation space in front of pan and each side of doors on path to the toilet. Door are not to swing into circulation spaces.



APPENDIX C

ADAPTABLE HOUSING REQUIREMENTS



C1 PERFORMANCE REQUIREMENTS

The performance requirements of AS4299 (Clause 2.2) state that an adaptable unit will be designed and constructed to meet the following requirements:

- a) Visitability – all adaptable units are required to be "visitable" from the outset. That is, there must be at least one wheelchair entry and path of travel to the living area and to a toilet that is either visitable or accessible.
- b) Avoidance of level Change – all units to have no steps which will ensure adaptability will be easy to accommodate.
- c) Manoeuvrability – adequate space for a wheelchair to manoeuvre within a living area, bedroom and bathroom with an accessible path of travel linking these areas to the entrance.
- d) Ease of adaption – if the design for adaption requires demolition of walls, these need to be non-loadbearing and free of services.
- e) Ease of reach – key services and controls should be located so they are within the reach range of a wheelchair user.
- f) Laundry facilities – these need to be capable of being accessible against the provisions of AS4299 post-adaption.

C2 ACCESS TO COMMON USE AREAS

Access routes required for access by those living in the adaptable units is to comply with AS1428.1 (2009) requirements. Access is to be provided to all common use facilities. Letterboxes are to have a hard standing area and be connected to an accessible pathway.

C3 CAR PARKING

One car parking space is required for each of the adaptable units to comply with AS4299 Clause 3.7. The allocated spaces for the adaptable units are to have a minimum width available of 3.8 m and have 2.5m head clearance over the parking space to allow the use of wheelchair loading ramps.

C4 ENTRANCE, DOORWAYS AND INTERNAL CIRCULATION

All adaptable units are designed to enable access to and through the main entrance with clear opening widths to entrances of not less than 850mm and appropriate circulation spaces per AS 1428.1 (2009) Clause 13.3.

In regards to internal doors, each requires appropriate clear opening width with a minimum clear width of 820mm, with the door to the accessible bathroom meeting AS1428.1 (2009) requirements with a minimum clear width of 850mm. We recommend providing 850mm to all doors in adaptable units from the onset.

A minimum unobstructed width of internal pathways will be 1000mm.

C5 BATHROOM

At least one pre adaption toilet is to provide 1250x900mm clear circulation space in front of the toilet so as to comply as a visitable toilet.

The post adapted bathroom that is to provide sufficient circulation space for compliance with AS1428.1 (2009).

Structural support (such as structural ply sheeting) is to be provided at toilet and shower grab rail zones, to allow for ease of installation of any future fixings.



C6 KITCHEN

On adaption, the kitchen facilities will need to achieve a minimum circulation of 1540mm between opposing walls, cabinets and appliances to facilitate completion of a 180 degree turn by a wheelchair user.

In addition the design of the kitchen should accommodate the following on adaptation:

- An 800mm length of worktop that can be adjusted in height, with a removable base unit under
- The location of the fridge adjoining a suitable work surface
- Potential to adjust sink height, with a sink bowl depth of 150mm - lever type taps to be provided to the side of the sink
- Cooktops with side controls
- Isolation switches for appliances to be accessible / reachable (e.g. oven and fridge / freezer)
- Suitable oven height and worktop adjoining

C7 BEDROOM

The main bedroom, on adaption, will require sufficient circulation space to permit movement by a wheelchair user, being not less than 1540mm x 2070mm clear circulation to at least one side and/or base of a queen size bed on post adaption.

Window sills within the bedroom and living areas should be a maximum of 600mm and 730mm above finished floor level respectively, to enable viewing by persons in the seated position and persons who may be confined to bed (AS 4299:1995 Clauses 4.6.2 / 4.7.2).

C8 LIVING AREAS

Living areas are to be designed to enable a wheelchair to turn 360 degrees after the placement of furniture so as to be visitable. An area of 2250mm minimum diameter is required to facilitate this.

C9 LAUNDRY

On adaption, laundry facilities and joinery will need to accommodate a clear 1500mm in front of the appliances to allow for wheelchair access.

C10 BALCONIES

It is recommended that the width of the balconies to adaptable units should be 1540mm or greater which will permit access to these spaces and facilitate completion of a 180 degree turn by wheelchair user. Internal and external surfaces will be designed and constructed at grade (the maximum change in level between abutting surfaces to be 3mm, or 5mm where edges are rounded or bevelled) to enable access by all.

Where waterproofing is a concern a maximum threshold of 35mm will be provided, with a 1:8 graded ramp abutting the door (with a maximum length of 280mm). Alternatively, consideration will be given to a raised, permeable balcony surface, such as decking which will not impede drainage. The door accessing the balcony will possess appropriate clear opening width and circulation space to permit independent operation by a person with a disability and either provided with door furniture complying with AS1428.1 (2009) or capable of being added or modified.

C11 POWER AND LIGHTING SWITCHES AND TELEPHONE / TELEVISION OUTLETS

AS4299 has guidance on the location of key services and switches to assist residents with a disability. As part of the detailing of the apartments this will be considered, including:

- Power outlets located at strategic points, 600mm - 1000mm off floor level, including
 - o points 300mm from the edge of kitchen worktops



- o adjoining the bedhead
 - o in living room (four outlets)
 - o laundry areas (double outlet)
- Light switches, 900mm - 1100mm of floor level at convenient locations including:
 - o adjoining potential bedhead
- Telephone points in the bedroom and living room (both adjoining a power outlet)
- Television outlets in the bedroom (opposite potential bedhead) and two points in living / dining areas



APPENDIX D

EXTRACTS FROM LIVEABLE HOUSING GUIDELINES



1 Dwelling access

Performance Statement

There is a safe, continuous, step-free pathway from the street entrance and/or parking area to a dwelling entrance that is level.



Silver Level

- a. Provide a safe and continuous pathway from:
 - i. the front boundary of the allotment; or
 - ii. a car parking space, where provided, which may include the driveway on the allotment, to an entrance that is level (step-free) as specified in Element 2.

This provision does not apply where the average slope of the ground where the path would feature is steeper than 1:14.

- b. The path of travel as referred to in (a) should have a minimum clear width of 1000mm and –
 - i. an even, firm, slip resistant surface;
 - ii. a crossfall of not more than 1:40;
 - iii. a maximum pathway slope of 1:14, with landings provided at no greater than 9m for a 1:14 ramp and no greater than 15m for ramps steeper than 1:20. Landings should be no less than 1200mm in length; and
 - iv. be step-free
- c. A step ramp may be incorporated at an entrance doorway where there is a change in height of 190mm or less. The step ramp should provide:
 - i. a maximum gradient of 1:10
 - ii. a minimum clear width of 1000mm (please note: width should reflect the pathway width)
 - iii. a maximum length of 1900mm

Level landings no less than 1200mm in length, exclusive of the swing of the door or gate than opens onto them, must be provided at the head and foot of the ramp.

Note The width of the landing will be determined by the adjoining pathway.



If the landing directly adjoins the doorway please refer to Element 2 for dimensional requirements:

Gold Level

As for silver level except in (b) replace the minimum clear pathway width of 1000mm with 1100mm.

Platinum Level

As for silver level except in (b) replace with a minimum clear pathway width of 1100mm with 1200mm provided from:

- i. the front boundary of the allotment, and
- ii. any car parking space, where provided, which may include the driveway on the allotment, to an entrance that is level (step-free) as specified in Element 2.



2 Dwelling entrance

Performance Statement

There is at least one level (step-free) entrance into the dwelling to enable home occupants to easily enter and exit the dwelling.



e. Entrance

Silver Level

- a. The dwelling should provide an entrance door with -
 - i. a minimum clear opening width of 820mm (see Figure 2(a));
 - ii. a level (step-free) transition and threshold (maximum vertical tolerance of 5mm between abutting surfaces is allowable provided the lip is rounded or beveled); and
 - iii. reasonable shelter from the weather.
- b. A level landing area of at least 1200mm x 1200mm should be provided at the level (step free) entrance door.
- c. Where the threshold at the entrance exceeds 5mm and is less than 56mm, a ramped threshold may be provided (see Figure 1(b)).
- d. The level (step-free) entrance should be connected to the safe and continuous pathway as specified in Element 1.

Note The entrance must incorporate waterproofing and termite management requirements as specified in the NCC.

Gold Level

As for silver level except replace:

- (b) with a level landing area of at least 1350mm x 1350mm, and
- (a) (i) with minimum clear door opening width of 850mm (see Figure 2(b)).

Platinum Level

As for silver level except replace:

- (b) with a level landing area of at least 1500mm x 1500mm, and
- (a) (i) with a minimum clear door opening width of 900mm (see Figure 2(c)).



3 Car parking (Where part of the dwelling access)

Performance Statement

Where the parking space is part of the dwelling access it should allow a person to open their car doors fully and easily move around the vehicle.



Silver Level

- a. Where the parking area forms part of the dwelling access the space should incorporate:
 - i. minimum dimensions of at least 3200mm (width) x 5400mm (length);
 - ii. an even, firm and slip resistant surface; and
 - iii. a level surface (1:40 maximum gradient, 1:33 maximum gradient for bitumen).

Gold Level

As for silver level with the following additional features incorporated for Class 1a dwellings:

- iv. a vertical clearance over the parking space of at least 2500mm; and
- v. a covered parking space to ensure protection from the weather.

Platinum Level

As for gold level for Class 1a dwellings except that the parking space in (a)/(i) should be at least 3800mm (width) x 6000mm (length).

- b. For Class 2 dwellings, parking spaces compliant with the accessible parking provisions detailed in AS2890.6 (2009), should be provided as follows:
 - i. where individual parking spaces form part of the individual unit's title, at least one accessible parking space should be provided for each unit; and
 - ii. if visitor parking is provided, then at least 1 space per 100 units (or part thereof) should be an accessible parking space.



4 Internal doors & corridors

Performance Statement

Internal doors and corridors facilitate comfortable and unimpeded movement between spaces.



Silver Level

- a. Doorways to rooms on the entry level used for living, dining, bedroom, bathroom, kitchen, laundry and sanitary compartment purposes should provide:
 - i. a minimum clear opening width of 820mm (see Figure 2(a)); and
 - ii. a level transition and threshold (maximum vertical tolerance of 5mm between abutting surfaces is allowable provided the lip is rounded or beveled).
- b. Internal corridors/passageways to the doorways referred to in (a) should provide a minimum clear width of 1000mm.

* Corridor widths should be measured as described in Clause 6.3 of AS 1428.1 – 2009

Gold Level

As for the silver level except replace:

- (a)/(i) with a minimum clear opening width of 850mm (see Figure 2(b)), and
- (b) with a minimum corridor/passageway width of 1200mm.

Platinum Level

As for the silver level except replace:

- (a)/(i) with a minimum clear opening width of 900mm (see Figure 2(c)), and
- (b) with a minimum corridor/passageway width of 1200mm.



5 Toilet

Performance Statement

The ground (or entry) level has a toilet to support easy access for home occupants and visitors.



Silver Level

- a. Dwellings should have a toilet on the ground (or entry) level that provides:
 - i. a minimum clear width of 900mm between the walls of the bathroom if located in a separate room; and
 - ii. a minimum 1200mm clear circulation space forward of the toilet pan exclusive of the swing of the door in accordance with Figure 3(a).
- b. If the toilet is located within the ground (or entry) level bathroom, the toilet pan should be located in the corner of the room to enable the installation of grabrails.

Gold Level

As for silver level except replace (a)/(i) with a minimum clear width of 1200mm between the walls of the bathroom if located in a separate room, or between amenities if located in a combined bathroom.

Platinum Level

As for the gold level with the following features added to (a):

- iii. a toilet pan positioned between 450mm – 460mm from the nearest wall as measured from the centre line of the toilet;
- iv. 600mm minimum clearance forward of the cistern measured from the front of the cistern to the front of the toilet pan. 800mm (+/-10mm) clearance is required if the cistern is recessed; and
- v. a height for the pan of between 460mm - 480mm above the finished floor level as detailed in Figure 4.



6 Shower

Performance Statement

The bathroom and shower is designed for easy and independent access for all home occupants.



Silver Level

- a. One bathroom should feature a slip resistant, hobless (step-free) shower recess. Shower screens are permitted provided they can be easily removed at a later date.
- b. The shower recess should be located in the corner of the room to enable the installation of grabrails at a future date.

Gold Level

As for silver level except:

- c. The hobless (step-free) shower recess described in (a) should:
 - i. be located in a bathroom on the ground (or entry) level;
 - ii. provide minimum dimensions of 900mm (width) x 900mm (length); and
 - iii. provide a clear space of at least 1200mm (width) x 1200mm (length) forward of the shower recess entry as detailed in Figure 5(a).

Platinum Level

As for gold level except:

- i. replace (c)/(ii) with dimensions of at least 1160mm (width) x 1100mm (length); and
- ii. replace (c)/(iii) with dimensions of at least 1600mm (width) x 1400mm (length) forward of the shower recess as detailed in Figure 5(b).



7 Reinforcement of bathroom & toilet walls

Performance Statement

The bathroom and toilet walls are built to enable grabrails to be safely and economically installed.



Silver Level

- a. Except for walls constructed of solid masonry or concrete, the walls around the shower, bath (if provided) and toilet should be reinforced to provide a fixing surface for the safe installation of grabrails.
- b. The fastenings, wall reinforcement and grabrails combined must be able to withstand at least 1100N of force applied in any position and in any direction. When it comes to assessing the existence of wall reinforcing, the Assessor Handbook provides information on a Wall Scanning device that can be used to verify that reinforcement exists behind wall sheeting. This information along with evidence such as details and drawings collected from the builder may be sufficient to satisfy an assessor. It is also possible that an inspection of the walls prior to sheeting is needed. Assessors should determine the inspection requirements for As Built inspections with their client and builder as early in the construction process as possible. Often asking the builder to photograph the wall before the sheeting is applied is sufficient.
- c. The walls around the toilet are to be reinforced by installing:
 - i. noggings with a thickness of at least 25mm in accordance with Figure 6(a); or
 - ii. sheeting with a thickness of at least 12mm in accordance with Figure 6(b).
- d. The walls around the bath are to be reinforced by installing:
 - i. noggings with a thickness of at least 25mm in accordance with Figure 7(a); or
 - ii. sheeting with a thickness of at least 12mm in accordance with Figure 7(b).
- e. The walls around the hobless (step-free) shower recess are to be reinforced by installing:
 - i. noggings with a thickness of at least 25mm in accordance with Figure 8(a); or
 - ii. sheeting with a thickness of at least 12mm in accordance with Figure 8(b).

Silver level requirements apply.

Silver level requirements apply.

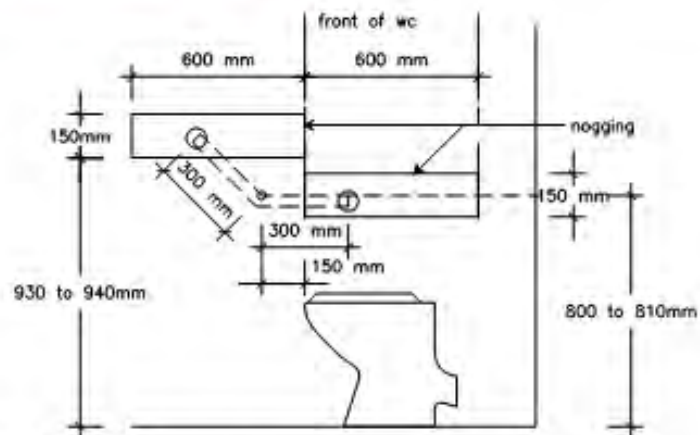


Figure 8(a) Toilet - Location of noggings

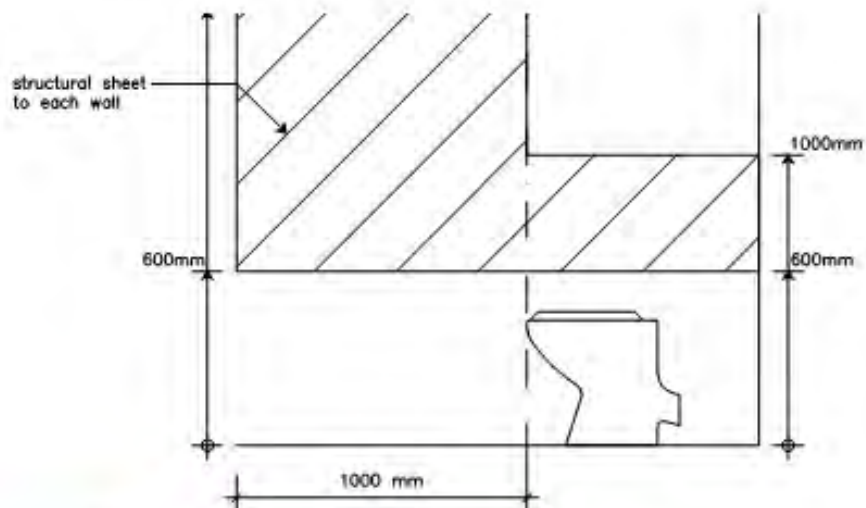


Figure B(b) Toilet – Location of sheeping

Performed Statement

The bathroom and toilet walls are built to enable partitions to be safely and conveniently installed.



8 Internal stairways

Performance Statement

Where installed, stairways are designed to reduce the likelihood of injury and also enable future adaptation.



Silver Level

- a. Stairways in dwellings must feature:
 - i. a continuous handrail on one side of the stairway where there is a rise of more than 1m.

Gold Level

As for the silver level with the following additional features:

- ii. a minimum clear width of 1000mm;
- iii. be straight in design; and
- iv. be positioned adjoining a load bearing wall.

Note The steps must provide a slip resistant finish and suitable non-slip tread as specified in the NCC. Handrails on both sides of the stairway are preferred.

Platinum Level

As for the gold level with the following additional features:

- v. closed risers;
- vi. continuous handrails on both sides of the stairway; and
- vii. minimum landing areas of 1200mm x 1200mm at the top and base of the stairway.

Note The steps must provide a slip resistant finish and suitable non-slip tread as specified in the NCC.



9 Kitchen space

Performance Statement

The kitchen space is designed to support ease of movement between fixed benches and to support easy adaptation.



Silver Level

No requirements.

Gold Level

- a. The kitchen space should be designed to support ease of movement and adaptation with:
 - i. at least 1200mm clearance provided in front of fixed benches and appliances; and
 - ii. slip resistant flooring.⁶
- b. Where practicable, floor finishes should extend under kitchen cabinetry to enable cupboards to be removed without affecting the flooring. An Assessor should ask the builder / client if he/ she can confirm that flooring runs completely under cupboards. Sometimes it is relatively easy to confirm that floor coverings have been applied after cupboards have been installed and sometimes it is not so easy. If relying on advice from a third party, Assessors are advised to provide a note in the notes column of the Assessment.

Platinum Level

As for the gold level except that the kitchen space described in (a) should be designed to support ease of movement and adaptation with:

- i. at least 1550mm clearance should be provided in front of fixed benches and appliances;
- ii. slip resistant flooring⁶; and
- iii. task lighting installed above workspaces.

⁶ Slip Resistance is referenced in the National Construction Code and ultimately, Usable Housing Australia would like to defer to the NCC and the Australian Building Codes Board (ABCB) for rulings related to slip resistance. Standards Australia publish a number of standards as well as a handbook that address slip resistance of surfaces.



10 Laundry space

Performance Statement

The laundry space is designed to support ease of movement between fixed benches and to support easy adaptation.



Silver Level

No requirements.

Gold Level

As for silver level except:

- a. The laundry space should be designed to support ease of movement and adaptation with:
 - i. at least 1200mm clearance provided in front of fixed benches and appliances; and
 - ii. slip resistant flooring.⁶
- b. Where practicable, floor finishes should extend under laundry cabinetry to enable cupboards to be moved without affecting the flooring.

Platinum Level

As for the gold level except that in laundry space described in (a) should be designed to support ease of movement and adaptation with:

- i. at least 1550mm clearance should be provided in front of fixed benches and appliances;
- ii. slip resistant flooring; and
- iii. task lighting installed above workspaces.



11 Ground (or entry level) bedroom space

Performance Statement

There is a space on the ground (or entry) level that can be used as a bedroom.



Silver Level

No requirements.

Gold Level

- a. The dwelling should feature a space (or room) on the ground (or entry) level that:
 - i. is of at least 10m² with one wall a minimum length of 3m;
 - ii. provides for a minimum path of travel of at least 1000mm on at least one side of the bed.

Platinum Level

As for the gold level, but it also:

- i. provides a space of at least 1540mm (width) x 2070mm (in the direction of travel) on the side on the bed that is closest to the door approach; and
- ii. provides for a minimum path of travel of 1000mm on the remaining side of the bed.

For Platinum level, it should be assumed that a bed with dimensions 1500mm x 2000mm (as shown on the sketch overleaf) is present. This will mean that the minimum clear dimensions of a room would need to be 3000mm x 4040mm to meet the Platinum level requirements. Where a bed is present (in the case of an As Built Inspection), the clearance should be measured to the edges of the bed for beds smaller than 1500mm x 2000mm. If the bed provided is larger than 1500mm x 2000mm compliance should be determined based upon a bed with dimensions 1500mm x 2000mm.