GEOTECHNIQUE® PTY LTD

ABN 64 002 841 063

Job No: 13968/1
Our Ref: 13968/1-AA
28 February 2017

Sydney Business Park
15 Holinsworth Road,
MARSDEN PARK NSW 2765
Email: michael.gray@sydneybusinesspark.com.au

Attention: Mr M Gray

Dear Sir

re: **Proposed Marsden Park Industrial Stage 1.02B, Richmond Road, Marsden Park Contamination Clearance Report**

1.0 INTRODUCTION

As requested, this letter report presents a post construction clearance based on the review of the contamination and validation reports related with Stage 1.02B - Sydney Business Park, located at Richmond Road, Marsden Park (hereafter known as the Site), as shown on the Drawing No 13968/1-AA1 (Attachment 1).

Geotechnique Pty Ltd (Geotechnique) has reviewed the following available reports related to the subject site.

- Level 1 Final Report for Stage 1.02B - Sydney Business Park-Richmond Road, Marsden Park, NSW, prepared by Ground Technologies PTY Ltd (GT), dated 14 February 2017 (Attachment 2a)
- Level 2 Testing Certificate for Stage 1.02B - Sydney Business Park-Richmond Road, Marsden Park, NSW, prepared by Ground Technologies PTY Ltd (GT), dated 14 February 2017 (Attachment 2b)
- Site Validation Report for Remainder Stage 1.02a Development Area Sydney Business Park, Marsden Park, NSW, prepared by JBS and G (JBS &G) dated 10 July 2015 (Attachment 3),
- *Contamination (Review of Contamination and Assessment and Validation Reports) for Proposed Marsden Park Industrial Stage 1.02C,* prepared by Geotechnique Pty Ltd (Geotechnique), dated 9 October 2014 (Attachment 4)

The objective of this review is to provide a post construction clearance of the subject site.

2.0 SITE DESCRIPTION & PROPOSED DEVELOPMENT

The subject (Marsden Park Industrial Stage 1.02B) is irregular shape and covers approximately, 202335m^2 as reported GT (Attachment 2a) and as shown Drawing No 13968/1-AA1. The site is bound by Richmond Road to the east and Access Road to the South.

The site was part of the former Lots 11 to 16 in DP 262886. Proposed Lots 121 to 126 in DP1194052 (unregistered) are included within the former Lots 13 to 16 in DP262886 and the proposed Lots 132 and 133 are included within the former Lots 11 and 12 in DP262886 in the local government area of Blacktown.

The site is proposed for commercial/Industrial use.

3.0 REVIEW OF PREVIOUS REPORTS ASSOCIATED WITH SITE

3.1a Level 1 Final Report for Stage 1.02B prepared by GT, 2017

The scope of services as reported by GT comprised a Level 1 testing, i.e. full time observation and density testing during the bulk filling works in accordance with AS4798-2007 “Guidelines for Earthworks for Commercial and Residential Developments”.

The GT report presented a summary of the geotechnical inspections and testing Services carried out during the course of Bulk Earthworks between the periods 11th July 2014 to 5th February 2016. Early works commenced on 28th February 2014, comprised de-vegetation and topsoil stripping. It was also reported that fill placement was not continuous during this period. Reference can be made to Attachment 2a for details.

The following points were noted in the GT report:

- The stripped services exposed were free of topsoil and any organic matter, consisting of natural brown silty clays.
- The filling material used for the bulk filling operations consisted of the site generated red brown sandy clay.

3.1b Level 2 Testing Certificate for Stage 1.02B prepared by GT, 2017

The scope of Geotechnical testing services provided by GT comprised density testing undertaken to a Level 2 standard, generally in accordance with AS3798-2007. As reported by GT, testing on geotechnical and Flexible Pavement for Stage 1.02B was undertaken during the period of 14 October 2016 to 16 January 2017. It was noted that fill placement was continuous during this period. Reference can be made to Attachment 2b for details.

3.2 Site Validation Report for Remainder Stage 1.02a by JBS & G, 2015

As reported by JBS & G 2015, the Stage 1.02a was defined as proposed Lot 121 to Lot 124 and Lot 126 in Deposited Plan (DP) 1194052 (unregistered) with and an area of approximately 14.5 hectares (ha). Lot 125 (with an area of 8051 m^2) was validated and reported in JBS&G 2014. The Site and Lot boundaries are shown in Figure 1 in report JBS &G 2015.

The Site validation works have been undertaken in general accordance with relevant guidelines, made or approved by the NSW Environment Protection Authority (EPA).

JBS and G concluded that based the historical information and previous investigations completed at the Site did not identify any sources of contamination that required soil or groundwater assessment. Additionally, review of the materials imported to the Site did not identify any contamination issues that warranted further investigation. Based on Site observations, imported fill documentation, previous investigations, it is concluded that the Site is considered suitable for use as a commercial / industrial property.

3.3 Contamination (Review of Contamination and Assessment and Validation Reports) for Proposed Marsden Park Industrial Stage 1.02C), dated 9 October 2014

As part of the review of contamination assessment and validation reports, Geotechnique Pty Ltd (Geotechnique) had reviewed the following available reports related to the Stage 1.02C, including the former Lots 11 and 12 in DP262886:

- *Phase 2 Contamination Assessment Report* prepared by GHD Pty Ltd (GHD) dated May 2009 (GHD Ref: No 21/17717/145254) for a large area of land known as Marsden Park Industrial Precinct (MPIP) located on east and western side of Richmond Road, Marsden Park, NSW (Figure 6 in report No 217717/145254).

- Validation Report (Draft) for Marsden Park Night Soil Depot Remediation, prepared by GHD dated December 2012 (GHD Ref: No.21/21487) for the portion of land within MPIP (known as Marsden Park Night Soil Depot), located at Lots 11 and 12 in DP262886, Richmond Road, Marsden Park, NSW.

- Site Audit Statement (SAS GN319B) issued by the NSW Site Auditor for Lot 11 and Part 12 in DP262886, Richmond Road, Marsden Park, NSW dated February 2013.

Based on the review of the available reports contamination, validation, site audit statement associated with the Stage 1.02C and site inspection, it is considered that the subject site comprising part of the Lot 11 and part Lot 12 as shown on the Figure 2 of Site Audit Statement (SAS GN319B) is considered validated subject to ongoing approved Site Management Plan. It should be noted that adopted soil/validation criteria used for in the GHD report were adopted from the NEPM 1999 for Commercial and Industrial land use (FIL F) were generally below the Health Investigation Levels (HIL) for Soil Contamination for Commercial/Industrial land use (HIL D) as specified in NEPM 1999 (NEPM 2013).

As stated in the site audit statement, the ground water beneath the site has not been significantly impacted with the exception of localised *impact by ammonia and petroleum hydrocarbons* by the former site activities. As the abstraction of groundwater is not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water.

CURRENT SITE CONDITION AND SURROUNDING ENVIRONMENT

An inspection of the site was carried out by an Environmental Engineer on 23 January 2017 the following observations were made:

- The site was vacant and with mostly with a bare ground surface.
- Based on the information received from the client no fill materials were imported on this stage, all filling was cut to fill from site based virgin excavated natural material (VENM). Road Construction and drainage backfill materials were imported only. It is understood that the imported fill for the road construction and drainage were well documented and permitted by the council.
- There were no visual or olfactory indicators of potential contamination. There were no obvious features (bowsers, breather pipe, inlet valve and piping) associated with underground storage tanks or petroleum hydrocarbon staining on the ground surface of the site that would indicate the potential for contamination.
- There were no air emissions emanating from the site.

CONCLUSION AND RECOMMENDATIONS

Based on the review of the available contamination and validation reports associated with the subject site and site inspection, it is noted that:

- The soil/validation criteria used for assessment and validation reports reviewed were adopted from the NEPM 1999 for Commercial and Industrial land use (FIL F). These assessment/validation criteria adopted were generally below the Health Investigation Levels (HIL) for Soil Contamination for Commercial/Industrial land use (HIL D) as specified in NEPM 1999 (NEPM 2013).

- No fill materials were imported on this Stage 1.02B Development after the preparation of the validation report at the subject site. All filling was cut to fill from site based VENM. Road Construction and drainage backfill materials were imported only. It is understood that the imported fill for the road construction and drainage were well documented and permitted by the council.

Based on the above the site (Stage 1.02B) as shown on the attached Drawing is considered suitable for commercial/industrial land use setting (HIL D) as specified in NEPM 1999 (April 2013).

As stated in the site audit statement, the ground water beneath the site has not been significantly impacted with the exception of localised *impact by ammonia and petroleum hydrocarbons* by the former site activities. As the abstraction of groundwater is not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water.

LIMITATIONS

The services performed by Geotechnique in preparing this report have been conducted in a manner consistent with the level of quality and skill generally exercised by members of the profession and consulting practice.

To the best of our knowledge, all information obtained and contained within this report is true and accurate base on the review of the previous contamination and validation reports associated with the subject site. No further investigation has been carried out to authenticate the information provided.

Although information provided by a contamination site assessment can reduce exposure to the risk of the presence of contamination, no contamination site assessment can eliminate the risk.

This report has been prepared for the use of Marsden Park Developments Pty Ltd and Blacktown City Council, as per our agreement for providing environmental services. Marsden Park Developments Pty Ltd and Blacktown City Council are entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval is provided by Geotechnique.

The information in this report is in accordance with the information provided and site inspection carried out on 23 January 2017. Any variations to the site form or use may nullify the conclusions stated.

Attached is a document entitled "Environmental Notes", which should be read in conjunction with this report.

Should you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECHNIQUE PTY LTD

DANDA SAPKOTA
Senior Environmental Engineer

Attachment 1:	Drawing No: 13968/1-AA1
Attachment 2a:	Level 1 Final report for Stage 1.02B Development prepared by GT, 14 February 2017
Attachment 2b:	Level 2 Testing Certificate for Stage 1.02B Development prepared by GT, 14 February 2017
Attachment 3:	Site Validation Report for Remainder Stage 1.02a by JBS & G, 2015
Attachment 4:	Contamination (*Review of Contamination and Assessment and Validation Reports) for Stage 1.02C),* 2014
Attachment 5:	Environmental Notes

LIST OF REFERENCES

Contaminated Land Management Act 1997,

DUAP/EPA 1998, Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land, Department of Urban Affairs and Planning / NSW Environment Protection Authority, Sydney, Australia.

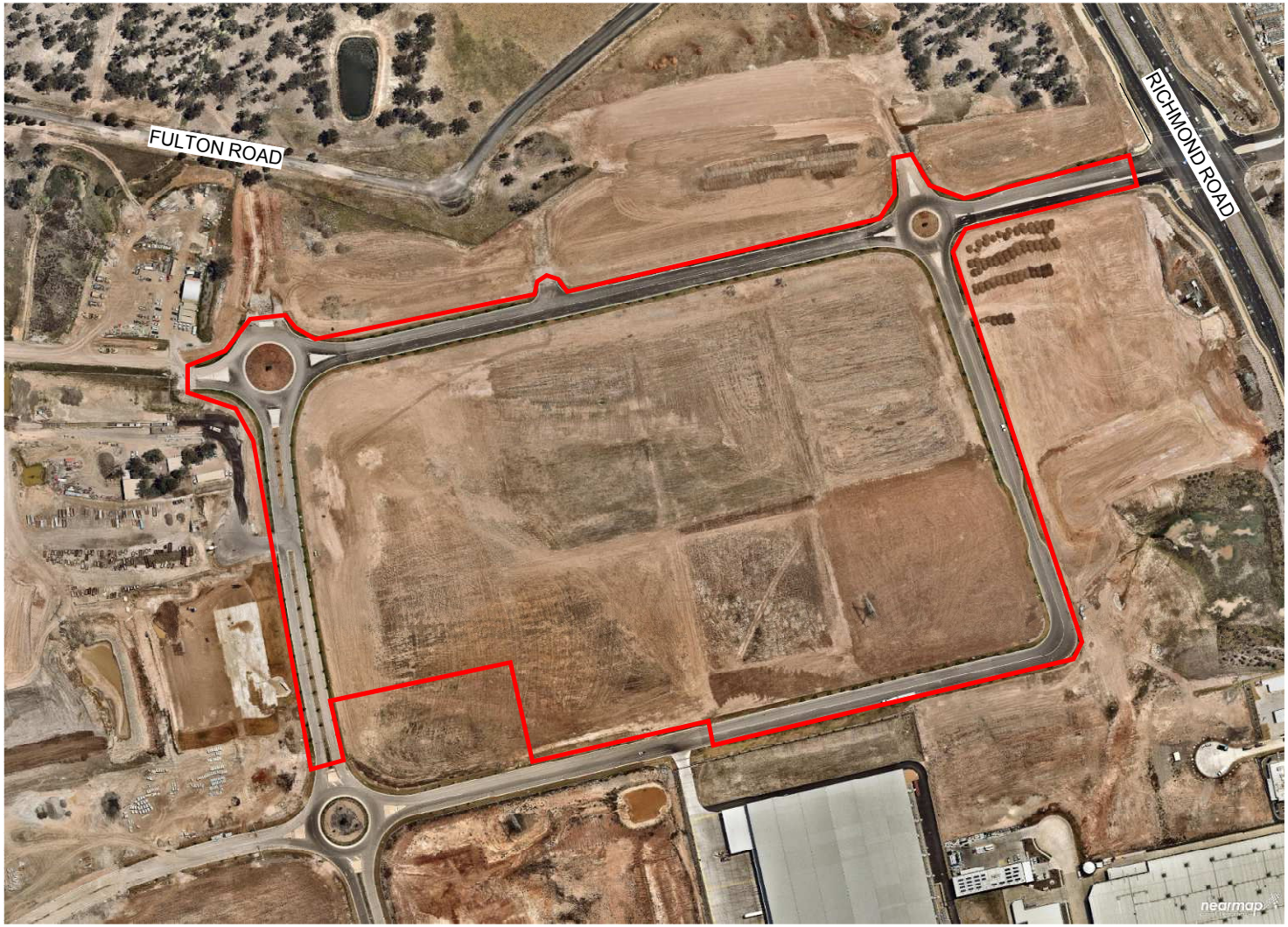
NEPM 1999, National Environmental Protection (Assessment of Site Contamination) Measures, 1999, National Environmental Protection Council (NEPC), Australia.

NEPM 1999 (April 2013), National Environmental Protection (Assessment of Site Contamination) Measures, 1999 (April 2013), National Environmental Protection Council (NEPC), Australia.

NSW DEC 2006, Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition), NSW Department of Environment and Climate Change, Sydney, Australia.

ATTACHMENT 1

DRAWING NO: 13968/1-AA1



Imagery ©2017 NearMap.com

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0 50 100 150 200 250m

Scale 1:5000

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NOTES

1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

Marsden Park Industrial - Stage 1.02B
Sydney Business Park
Richmond Road, Marsden Park

Site Features

Drawing No: 13968/1-AA1
Job No: 13968/1
Drawn By: MH/LY
Date: 28 Februray 2017
Checked By: DS

File No: 13968-1
Layers: 0, AA1

ATTACHMENT 2A

LEVEL 1 FINAL REPORT FOR STAGE 1.02B - SYDNEY BUSINESS PARK-RICHMOND ROAD, PREPARED BY GROUND TECHNOLOGIES PTY LTD, 2017

GROUND TECHNOLOGIES

Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200 Fax: (02) 8783 8210
Email: lab@groundtech.com.au

GT1740e - Level 1 Final Report for Stage 1.02B
14 February 2017

Mulgoa Quarries Pty Ltd
2091 Castlereagh Rd
Penrith, NSW, 2750

Attention: Mr. Phira Na
E-mail: mailto:Phira@mulgoaq.com.au

Dear Sir,

RE: LEVEL 1 FINAL REPORT **for Stage 1.02B - Sydney Business Park – Richmond Road, Marsden Park**

This letter presents a Level 1 Final report on the summary of the Geotechnical Inspection and Testing Services carried out during the course of the Bulk Earthworks between the periods 11th July 2014 to 5th February 2016 at the above project.

Should you have any questions related to this report please do not hesitate to contact the undersigned.

For and on behalf of
Ground Technologies Pty Ltd

Reviewed By:

M. Mourad
Project Manager / Geotechnical Engineer

K. Elmir
Laboratory Manager

GROUND TECHNOLOGIES

TABLE OF CONTENTS

1.0 INTRODUCTION

Ground Technologies have provided geotechnical testing services as requested by Mr. Max Sarkis of Mulgoa Quarries Pty Ltd, at Stage 1.02B - Sydney Business Park, Marsden Park. This report presents a summary of the Geotechnical Inspection and Testing Services carried out during the course of the Bulk Earthworks between the periods 11th July 2014 to 5th February 2016. Early works commenced on the 28th February 2014, comprising of devegetation and topsoil stripping. It should be noted that fill placement was not continuous during this period.

The scope of services provided by Ground Technologies Pty Ltd comprised of Level 1 testing, i.e. full time observation and density testing during bulk filling works in accordance with AS3798-2007 "Guidelines on Earthworks for Commercial and Residential Developments".

2.0 SITE INFORMATION

The site is Irregular in shape and covers approximately 202,335m^2. It is bound by Richmond Road to the East and Access Road 5A to the South.

3.0 PROPOSED USE

It is proposed that the site is to be subdivided into Industrial/Commercial type lots to be developed into large warehouse style facilities.

4.0 SPECIFICATION

The specification was supplied by Mr Max Sarkis of Mulgoa Quarries and can be summarised as follows for geotechnical testing purposes:

Reference: (1) AS3798 – 2007; Level 1, Section 8.2 "Guidelines on Earthworks for Commercial and Residential Developments".

(2) Works Specification Civil – 2005; ENGSPEC Revision 1, section 5, Blacktown City Council.

- Site Stripping – Excavate all uncontrolled fill including top soil and organic materials (Ref 1),
- Proof Roll – using a minimum 8 tonne dead weight roller, (Ref 2)
- Relative Compaction – to a minimum density ratio of 98% Standard Maximum Density (SMD), (Ref 2)
- Moisture Variation – within - 2% wet to +2% dry of Standard Optimum Moisture Content (SOMC), (Ref 1)
- Testing Frequency – as per table 8.1 of AS3798-2007 (1/500m^3), (Ref 1)
- Layer Thickness – place materials not exceeding *250mm loose thickness, (Ref 2)
- Maximum Particle Size – not to exceed two thirds of the layer thickness. (Ref 1)
- Level of Testing – (Level 1) as per AS3798 - 2007, Section 8.2 "Guidelines on Earthworks for Commercial and Residential Developments".

5.0 PROOF ROLLING / SITE STRIPPING

Stripping inspections and proof rolling were undertaken on Stage 1.02B on the following dates:

Date	Reference	Area
28-02-14	SI001	See report attached
02-05-14	SI002	See report attached
26-05-14	SI003	See report attached
19-06-14	SI004	See report attached
05-06-14	SI005	See report attached
30-06-14	SI006	See report attached
03-07-14	SI007	See report attached
08-07-14	SI008	See report attached
09-07-14	SI009	See report attached
10-07-14	SI010	See report attached
10-07-14	SI011	See report attached
12-07-14	SI012	See report attached

15-07-14	SI013	See report attached
16-07-14	SI014	See report attached
23-07-14	SI015	See report attached
29-07-14	SI016	See report attached
31-07-14	SI017	See report attached
31-07-14	SI018	See report attached
24-09-14	SI019	See report attached
30-09-14	SI020	See report attached
01-10-14	SI021	See report attached
22-10-14	SI022	See report attached
10-12-14	SI023	See report attached
19-01-15	SI024	See report attached
17-02-15	SI025	See report attached
13-04-15	SI026	See report attached
12-05-15	SI027	See report attached
05-08-15	SI028	See report attached
12-08-15	SI029	See report attached
09-06-15	SI030	See report attached
07-08-15	SI031	See report attached
19-08-15	SI032	See report attached
18-09-15	SI033	See report attached
16-11-15	SI034	See report attached

The stripped surfaces exposed were free of topsoil and any organic matter, consisting of natural Brown Silty Clays. Density testing was undertaken on the passing proof rolled natural surfaces prior to commencement of fill placement.

6.0 MATERIALS

6.1 FILL MATERIALS

Fill materials used for the bulk filling operations consisted of site derived Red Brown Sandy Clay.

During stages of the filling process some oversize materials were observed within the imported fill. The majority of the oversize material was crushed by the 825 compactor, while others were removed from the fill area. However, there is a possibility that some oversize particles may have remained undetected (lying longitudinally) within the fill layer placed. The probability of such oversize materials existing is low, and the impact

of these oversize materials to the overall geotechnical stability of the fill platform is considered low.

7.0 WORK METHODS

The earthworks operation was undertaken by Mulgoa Quarries. All earthworks involved cut to fill operations with conventional earthmoving practices and usage of site derived fill materials adopted for this site. Any materials that were identified to be deleterious or unsuitable were removed.

7.1 EARTHWORKS EQUIPMENT

- 825 Compactor
- Scrappers
- Water Cart
- Grader
- Smooth Drum roller
- Articulated Dump Trucks

7.2 FILL METHODS

Fill placement commenced at the Southern end of site following initial clearing and grubbing of vegetation. An 825 compactor was used to break existing fill surface prior to placement of the new fill to eliminate lamination at the fill interface.

Scrapers and dump trucks were used to cart fill from cut zones and into the fill placement area. Material unloaded on fill zones were spread and compacted by the 825 compactor in the required thickness. A water cart was used to moisture conditioned fill material in conjuction with the 825 compactor as needed. A Grader was also employed from time to time to aid in spreading of fill material.

It should be noted that the materials were spread in up to 350mm loose thickness to achieve approximately 300mm compacted layers. This was adopted due to the material type available and the larger areas being filled with heavy 825 compacters and earthmoving equipment being utilised.

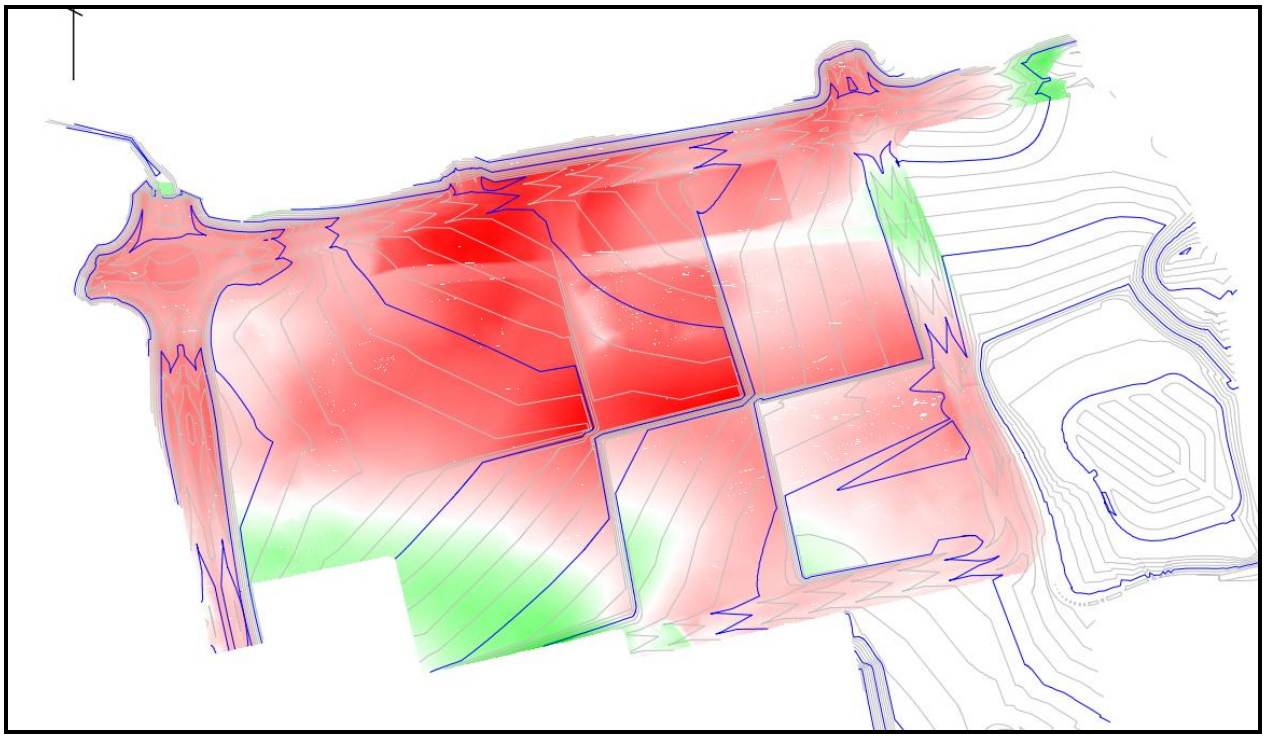
The fill materials were generally close to standard optimum moisture content (SOMC).

A smooth drum vibratory roller was used to seal off work at finished subgrade level.

8.0 EXTENT OF FILLING

The total volume of bulk fill placement for this stage 1.02B was estimated to be approximately 299,000m³. These quantities were supplied by Mulgoa Quarries. The depth of fill averaged at 0.96m with a maximum fill depth of 4.10m. The average depth of cut was 1.34m with a maximum cut of 4.38m.

The figure below outlines the extent of fill highlighted in red.



Refer to survey plans provided to Mulgoa Quarries showing the stripped levels and finished levels.

9.0 TEST RESULTS

Test Methods used:

- Field Density using Nuclear Gauge AS1289 5.8.1
- Standard Hilf Rapid Compaction AS1289 5.7.1
- Standard Dry Density Compaction AS1289 5.1.1
- Moisture Content AS1289 2.1.1

A total of 1512 density tests were undertaken during the bulk earthworks operation and it is summarised in the table below.

Location and Count	Density Tests Range %	Moisture Variation Range %
Density ratio	98.0 – 102.0	2.0 wet to 2.0 dry
Testing Frequency	1/197.8m^3	

10.0 COMMENTS

Ground Technologies Pty Ltd undertook Level 1 Earthworks Control Testing Services within the areas stated in Section 8.0; Extent of filling, in general accordance with the requirements of:

AS3798 – 2007 "Guidelines on earthworks for commercial and residential developments", Section 8.2,

And

Blacktown Council Civil Works Specification, section 5.9.

Based on the inspection and testing services provided by Ground Technologies, it is our opinion that the earthworks, as placed at the time of our presence, undertaken in the stated period, in so far as we were reasonably able to determine unless otherwise stated in this document, comply with the requirements of the above mentioned sections of the specification.

We note however, that the inspection and testing undertaken by Ground Technologies does not relieve the contractor of its responsibility to produce a completed product conforming to the requirements of the specification.

For building on the filled areas, the user should consider the following:

- The possibility that additional filling has been placed after the date of the last field density test or reduced level recorded mentioned in this report.
- Possible disruption of the compacted filling by installation of services.
- Variation in filling depth.
- Suitability of the filled land to support structures of various types without excessive deflection, i.e. allowable bearing capacity and reactivity must be considered.
- Independent geotechnical advice should be obtained for the purpose of designing building structures and external pavements etc.

The following should also be considered:

The shrink/swell movements can occur in the residual Silty Clays. These may be caused by weather, or naturally due to seasonal changes in moisture, and by the reduction in surface evaporation subsequent to covering the site with buildings and pavements as outlined in AS2870-2011 ("Residential Slabs and Footings – Constructions").

Should you have any queries, please do not hesitate to contact the undersigned.

For and on behalf of
Ground Technologies Pty Ltd

Reviewed By:

M. Mourad
Project Manager / Geotechnical Engineer

K. Elmir
Laboratory Manager

ATTACHMENT 2B

LEVEL 2 TESTING CERTIFICATE FOR STAGE 1.02B - SYDNEY BUSINESS PARK-RICHMOND ROAD, PREPARED BY GROUND TECHNOLOGIES PTY LTD, 2017

GROUND TECHNOLOGIES

Geotechnical Testing Services

Ground Technologies Pty Ltd
ABN 25 089 213 294
19 Bernera Road, Prestons NSW 2170
PO Box 1121 Green Valley NSW 2168
Ph: (02) 8783 8200 Fax: (02) 8783 8210
Email: lab@groundtech.com.au

Reference: GTR1740e – Level 2 Testing Certificate
14th February 2017

Mulgoa Quarries Pty Ltd
2091 Castlereagh Rd
Penrith, NSW, 2750

Attention: Mr. Daniel Sullo

RE: LEVEL 2 TESTING CERTIFICATE
SYDNEY BUSINESS PARK - STAGE 1.02B
RICHMOND ROAD, MARSDEN PARK
CERTIFICATION OF EARTHWORKS
BETWEEN 14th OCTOBER 2016 AND 16th JANUARY 2017.

At the request of Mulgoa Quarries Pty Ltd, Ground Technologies (GT) has undertaken testing during the period 14th October 2016 to 16th January 2017 on the Geotechnical and Flexible Pavement works operations carried out at the above-mentioned project. It should be noted that fill placement was not continuous during this period. Refer to plan below;

The scope of Geotechnical testing services provided by GT comprised of density testing undertaken to a Level 2 standard in general accordance with AS3798-2007 “Guidelines on earthworks for commercial and residential developments”, Appendix B, Paragraph B2, and Blacktown City Council -Works Specification Civil – 2005; Section 8, Flexible Road Pavements.

Previous fill has been documented on the site and was placed by Mulgoa Quarries during the initial bulk earthworks phase of the development. Testing and Inspection was carried out at Level 1 responsibility as defined in AS3798-2007 “*Guidelines on Earthworks for Commercial and Residential Developments*”, Section 8.2. Refer to documented in report *“GT1740e Stage 1.02B Final Level 1 Report*”.

During the above period:

- GT has prepared the following Level 2 Density Test Summary Reports:
  - Density Tests 1 to 345 - Ref. No. GTR1740e-L2_1 to GTR1740e-L2_84

Copies of all the above documents have been provided to Mulgoa Quarries during the course of the works provided.

Based on the testing results achieved provided by GT, density ratios of minimum compaction requirement of 100% Standard Maximum Dry Density at Subgrade levels and 98% Modified Maximum Dry Density at Pavement Layers was achieved. Refer to test certificates for details.

If you have any queries regarding the contents contained within, please do not hesitate to contact the undersigned.

For and on behalf of
Ground Technologies Pty Ltd

Reviewed By:

M. Mourad
Project Manager / Geotechnical Engineer

K. Elmir
Laboratory Manager

Attachments

- *Density Test Summary Reports*

ATTACHMENT 3

SITE VALIDATION REPORT FOR REMAINDER STAGE 1.02A, SYDNEY BUSINESS PARK, MARSDEN PARK, NSW, PREPARED BY JBS AND G, 2015

JBS&G (50706-101125)

10 July 2015

Marsden Park Developments Pty Ltd
c/- Michael Gray
APP Corporation Pty Ltd
Via email: michael.gray@app.com.au

Site Validation Report for Remainder Stage 1.02a Development Area, Sydney Business Park, Marsden Park, NSW

Dear Michael,

1. Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by Marsden Park Developments Pty Ltd (the client), c/o APP Corporation Pty Ltd, to prepare a site validation report for the remainder of Stage 1.02a of the proposed Sydney Business Park (SBP), also known as its previous name, 'Marsden Park Industrial Precinct' (MPIP), Richmond Road, Marsden Park, NSW (the Site).

Stage 1.02a is located within SBP and is proposed to be subdivided/redeveloped for commercial/industrial use. It is understood that a validation report is required to meet the Blacktown City Council development conditions for the Site.

The Site is legally defined as Lot 121 to Lot 124 and Lot 126 in Deposited Plan (DP) 1194052 (unregistered) and has an area of approximately 14.5 hectares (ha). Lot 125 was validated and reported in JBS&G 2014[1]. The Site and Lot boundaries are shown in **Figure 1**.

The Site validation works have been undertaken in general accordance with relevant guidelines made or approved by the NSW Environment Protection Authority (EPA).

2. Objectives and Scope of work

The objective of this validation report is to:

- Obtain sufficient data to demonstrate the suitability of the Site for the proposed commercial/industrial use; and
- Document the information in a validation report.

To achieve these objectives, JBS&G undertook the following scope of works:

- Review the previous environmental investigations to date;
- Inspection of the Site following civil construction works;
- Review of imported fill documentation;
- Preparation of a validation report in general accordance with relevant EPA Guidelines; and
- Assessment of whether the Site is suitable from a contamination perspective, for the proposed land use and provision of recommendations for management actions required to ensure the Site remains suitable.

1

3. Site Condition and Surrounding Environment

3.1 Site Identification

The location of the Site is shown in **Figures 1** and **2**. The details of the Site are summarised in **Table 3.1** and described in the following sections.

Table 3.1 Summary Site Details

Lot/DP	Lots 121 to 124 and Lot 126 in DP 1194052 (unregistered)
Address	Richmond Road, Marsden Park
Local Government Area	Blacktown City Council
Site Zoning	IN2 – Light Industrial
Current Use	Vacant Land
Geographical Co-ordinates	Easting – 299558.5, Northing – 6267140.7
Site Area	Approximately 14.5 ha

3.2 Site Description – Pre Construction

As outlined in the Phase 1 Environmental Site Assessment GHD (2008[2]) for the MPIP, which included the Site as a portion of 'Section G' (former Lots 13, 14, 15 and 16 in DP 262886), the Site was largely undeveloped with no buildings observed and no obvious land-uses other than rural/agricultural. The MPIP had been cleared of trees and a number of dams were present.

No ACM, odours, staining or stressed vegetation was observed on the Site during the inspection.

3.3 Topography

Information from GHD (2008) indicated that the MPIP lies between 20 m and 60 m Australian Height Datum (AHD). The regional topography slopes gently to the north-east and north-west from the centre of the southern boundary.

3.4 Geology

Information from GHD (2008) reported that the Site is predominantly underlain by Bringelly Shale of the Wianamatta Group.

Bringelly Shale, which was formed as an alluvial and estuarine coastal plan (saline) deposit, comprises essentially shale, carbonaceous claystone, laminite, fine to medium grained quartz-lithic sandstone, with rare coal and tuff. Claystone and siltstone are normally dominant. The Bringelly Shale contains swelling clay minerals that can result in ready disintegration of the rock fabric in immersion in fresh water (apart from the Minchinbury Sandstone basal unit) and is generally less durable on exposure than the underlying Ashfield Shale (also Wianamatta Group).

3.5 Hydrology

Bells Creek, a tributary of Eastern Creek, is located approximately 250 m east of the Site and flows in a north-east direction toward Eastern Creek.

3.6 Hydrogeology

Information from the Phase 1 ESA (GHD 2008) indicated that saline groundwater is typically expected within the Bringelly Shale and Quaternary alluvium, with joints and more permeable horizons within the bedrock expected to be the main avenues for groundwater migration.

Perched (saline) groundwater may be present within any localised (shallow) filled areas and generally within the soils in the lower landscape. Saline groundwater is also anticipated at relatively shallow depths in the lower landscape portions of the site, hosted by fracturing / jointing of the Wianamatta Shales. This groundwater is likely to have some connectivity within Quaternary Alluvium (if present).

[2] *Report for Marsden Park Industrial Precinct, Phase 1 Contamination Assessment and Sampling Analysis and Quality Plan*, November 2008, GHD Pty Ltd (GHD 2008)

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Six registered groundwater bores were located in a 2 km radius of the Site. Each of the six bores were installed for monitoring purposes with water bearing zones between 8.2 and 17 metres below ground surface.

4. Previous Environmental Investigations

Previous investigations at SBP /MPIP included EM (1998[3]), URS (2002[4]), URS (2004[5]), URS (2005a[6]), URS (2005b[7]), CES (2008[8]), GHD (2008), GHD (2009[9]) and (GHD 2011[10]). These are discussed with respect to the Site (i.e. Lot 125) in **Sections 4.1** to **4.3** below.

4.1 Report for Marsden Park Industrial Precinct, Phase 1 Contamination Assessment and Sampling Plan (GHD 2008)

GHD was commissioned by Marsden Park Development Pty Ltd to undertake a Phase 1 and Phase 2 Contamination Assessment at the MPIP site. The Phase 1 included a review of previous reports which included EM (1998), URS (2002), URS (2004), URS (2005a), URS (2005b) and CES (2008). Following the desktop review, the areas of environmental concern were identified and a sampling, analysis and quality program (SAQP) was developed which included 87 soil sampling locations, 5 surface water sample locations from on-site dams and between 9 to 11 groundwater monitoring locations.

The previous reports EM (1998) and URS (2002) identified that the areas to the north of the MPIP site were historically used as for quarrying, landfill and disposal of night soil. A more detailed site investigation was recommended.

In URS (2004), the areas of environmental concern were investigated by excavation of 128 test pits (94 test pits on a 40 m grid and a further 34 test pits to delineate identified hotspots) and installation of 5 groundwater monitoring wells. The Site was identified to not comprise a portion of the former quarry, landfill or night soil disposal areas. In URS (2005a), further investigations were conducted at the MPIP site, which included the Site. URS (2004) and URS (2005a) identified that the concentrations of the primary contaminants of potential concern (COPCs) at the Site were low and was suitable for residential use without the need for remediation.

URS (2005b) was a letter to council outlining the remedial options for the contamination identified at the MPIP site and did not indicate that remediation was required at the Site. Similarly, CES (2008) did not identify that conditions had changed at the MPIP site.

The desktop review was followed by a summary of Sections A to J and the areas of environmental concern in each section. Section G, which included the Site, was considered to have a low potential to be affected by soil and/or groundwater contamination. In addition, the Site was identified as being partly a 'lower landscape salinity domain' (high salinity risk area) and a 'higher landscape salinity domain' (medium salinity risk area).

---

[3] *Environmental Impact Statement for a proposed Extractive Industry and Landfill at Marsden Park, NSW*, Enviro-Managers Pty Ltd, May 1998 (EM 1998).
[4] *Review of ESA Report – Sanitary Depot, Marsden Park, for Blacktown City Council*, 2002, URS (URS 2002).
[5] *Environmental Site Assessment – Former Marsden Park Sanitary Depot for Blacktown City Council*, 2004, URS (URS 2004).
[6] *Phase 3 Environmental Site Assessment – Former Marsden Park Sanitary Depot for Blacktown City Council*, 2005, URS (URS 2005a).
[7] *Letter report regarding remediation options from URS to Blacktown City Council*, 2005, URS (URS 2005b).
[8] *Annual Environment Monitoring Report 2007, Marsden Park Landfill, Richmond Road, Marsden Park*, Consulting Earth Scientists (CES) for Blacktown Waste Services, February 2008 (CES 2008).
[9] *Report for Marsden Park Industrial Precinct, Phase 2 Contamination Assessment*, 2009, GHD Pty Ltd (GHD 2009).
[10] Marsden Park Industrial Precinct – DA.1.02 Contamination Strategy Report, 29 September 2011, GHD Pty Ltd (GHD 2011).

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4.2 Report for Marsden Park Industrial Precinct, Phase 2 Contamination Assessment (GHD 2009)

The Phase 2 Contamination Assessment (GHD 2009), identified that at the Site (Part of Lots 13 to 16 in DP 262886), potential contamination issues are considered to be localised and not pose a constraint to development. The Site was not subject to intrusive investigations and no further investigations were proposed.

4.3 Marsden Park Industrial Precinct – DA.1.02 Contamination Strategy Report (GHD 2011)

GHD was commissioned by Marsden Park Developments Pty Ltd to detail a strategy to be implemented in accordance with State Environmental Planning Policy 55 (SEPP55) to assess, remediate and validate contamination at the MPIP site, where necessary, to render it suitable for the proposed industrial development. The letter accompanied a development application (DA) for an industrial precinct.

GHD (2011) summarised the findings of GHD (2008) and GHD (2009) and identified the areas of the MPIP site that required remediation and validation. No further investigations were proposed for the Site.

4.4 Summary of Contamination Status

Based on the review of previous environmental investigations for the Site and conclusions in the previous investigations (GHD 2008, 2009 and 2011), no contamination issues were identified at the Site that warranted in-situ soil and groundwater investigation works. Additionally, a remedial action plan, remediation and validation works from a contamination perspective were not required.

5. Works Completed Following GHD (2011)

JBS&G undertook a review of the site works undertaken since GHD (2011) to determine whether any sources of contamination had been introduced to the Site during the civil construction works. Based on information from the client, the earthworks at the Site comprised cut and fill using existing site soils. Further details of civil constructions works conducted at the site is outlined in **Section 5.1**.

5.1 Summary of Civil Construction Works

Based on information supplied by the client (**Attachment 3**), the following civil construction works have been completed at the Site:

- Cut and fill using existing site soils to create proposed site levels and a number of retention basins;
- A total amount of 20294.9 tonnes of Sub base material and 5695.7 tonnes of base material was imported to the site.
- Sub base and base materials comply with Blacktown City Council specifications as documented by Boral compliance certificates included in **Attachment 3**.

5.2 Site Inspection

On 7 July 2015, JBS&G undertook a site inspection while civil construction works were being conducted. The locations of the Lots and Site features are shown in **Figure 2**. Photographs of the Site are included in **Attachment 4**.

<u>Lot 121</u>

Lot 121 was located in the western portion of Stage 1.02 of the SBP. The surface of the lot comprised natural brown clay soil with a number of soil stockpiles of clay and topsoil located within the western portion of the lot. Ponded surface water was observed in the central portion of the lot as shown in **Photograph 1**. No staining or odours were observed in or around the water. There were no observations of asbestos containing materials, odours or staining of the ground surface at the lot.

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Lot 122

Lot 122 was located in the western portion of Stage 1.02 of the SBP and north of Lot 121 as shown in **Photograph 2**. The ground surface of the lot was predominantly natural clay soil. A number of clay stockpiles were observed within the western portion of the lot as shown in **Photograph 3**. A number of concrete drainage infrastructure were stored on the lot at the time of the site inspection, the pipes are shown in **Photograph 4**. There were no observations of asbestos containing materials, odours or staining at the ground surface of the lot.

Lot 123

Lot 123 comprised vacant land with a surface covering of natural brown clay and sandstone gravel fill. Sand, mulch and topsoil stockpiles were located at various locations within the lot as shown in **Photographs 5**, **6** and **7**. A soil embankment was located in the south-western corner of the lot. There were no observations of asbestos containing materials, odours or staining at the lot.

Lot 124

Lot 124 comprised of a rectangular lot which had previously undergone earth works. The ground surface of the lot comprised clay with sandstone gravel as shown in **Photograph 8**. The southern and western boundaries contained worked embankments from the road down to the level portion of the site and the centre of the site comprised a slightly raised, flat area as shown in **Photographs 9** and **10**. A retention pond was located in the north-eastern portion of the lot (**Photograph 11**) and a small (< 1m^3) stockpile of asphalt and gravel was observed in the western portion of the site. Accumulated silt was observed on the eastern and southern boundaries of the lot. There were no observations of asbestos containing materials, odours or staining at the ground surface of the lot.

Lot 126

Lot 126 comprised a vacant lot in the eastern portion of Stage 1.02 of the SBD. The ground surface of Lot 126 comprised of clay with igneous and sandstone gravel fill as shown in **Photograph 12**. A retaining wall was located on the western boundary of the lot, and a number of stockpiles were observed at various locations throughout the lot. The stockpiles contained clay and gravel. There were no observations of asbestos containing materials, odours or staining at the ground surface of the lot.

6. Conclusions

The historical information and previous investigations completed at the Site did not identify any sources of contamination that required soil or groundwater assessment. Additionally, review of the materials imported to the Site did not identify any contamination issues that warranted further investigation. Based on Site observations, imported fill documentation, previous investigations and subject to the limitations presented in **Attachment 1**, it is concluded that the Site is considered suitable for use as a commercial / industrial property.

Should you have any queries or require further clarification, please feel free to contact the undersigned on 02 8245 0300 or by email mbattam@jbsg.com.au.

Yours sincerely:

George Black
Environmental Consultant
JBS&G

Reviewed/Approved by:

Joanne Rosner
Principal Contaminated Land
JBS&G

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Attachments:

1) Limitations
2) Figures
3) Imported Fill Documentation
4) Photographic Log

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Attachment 1 – Limitations

This report has been prepared for use by the client who has 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 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.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

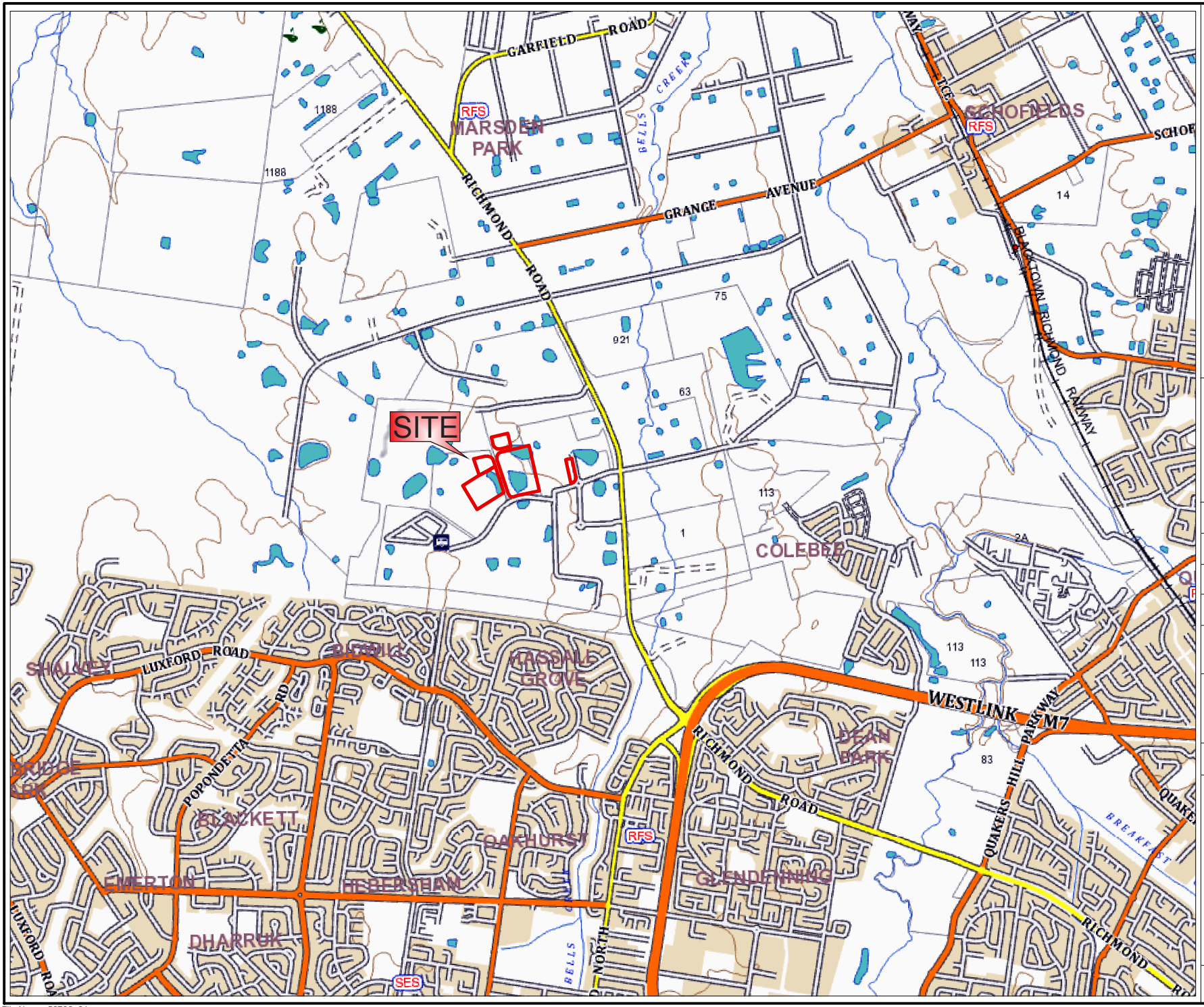
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, 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 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, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Attachment 2 – Figures



Legend:

Approximate Site Boundary

JBS&G

Job No: 50706

Client: Marsden Park Developments Pty Ltd

Version: L001	Date: 10-Jul-2015
Drawn By: SE	Checked By: GB

Scale 1:35,000

0 500 1,000

metres

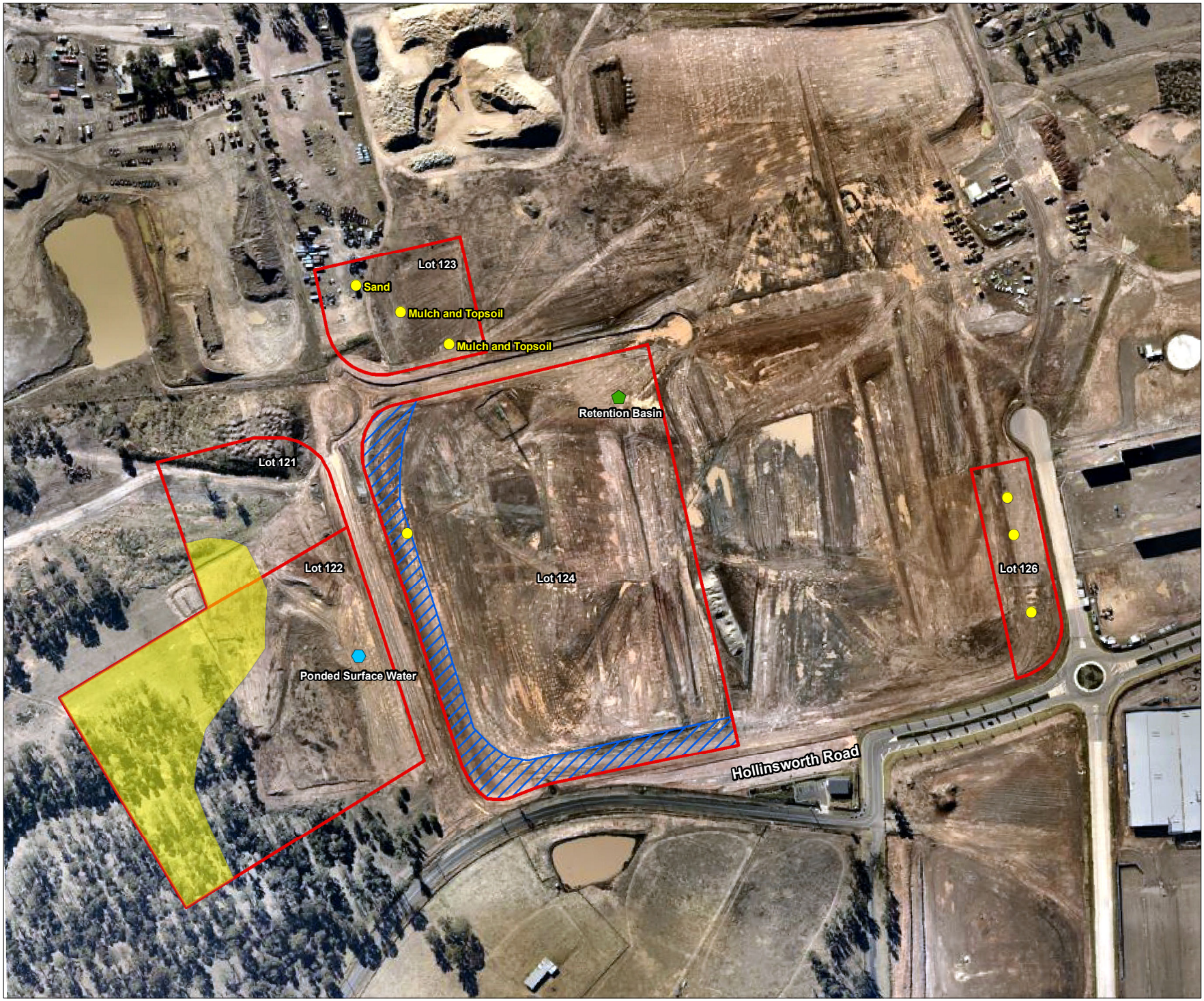
Coor. Sys. GDA 1994 MGA Zone 56

Richmond Road, Marsden Park, NSW

SITE LOCATION

FIGURE 1

File Name: 50706_01
Reference: Nearmap www.nearmap.com.au, imagery date 27-07-2014, accessed 25-09-2014



Legend:

- Approximate Site Boundary
- Embankment
- Soil Stockpiles (Area)
- Stockpile Location
- Ponded Surface Water
- Retention Basin

JBS&G

Job No: 50706

Client: Marsden Park Developments Pty Ltd

Version: L001	Date: 10-Jul-2015
Drawn By: SE	Checked By: GB

Scale 1:4,000

0 40 80
metres

Coor. Sys. GDA 1994 MGA Zone 56

Richmond Road,
Marsden Park, NSW

SITE LAYOUT

FIGURE 2

File Name: 50706_02
Reference: Nearmap www.nearmap.com.au, imagery date 27-07-2014, accessed 25-09-2014

Attachment 3 – Imported Fill Documentation

PLAN FORM 6 (2012) WARNING: Creasing or folding will lead to rejection

DEPOSITED PLAN ADMINISTRATION SHEET

Office Use Only

Registered:

Title System:

Purpose:

Office Use Only

DRAFT DP1194052

PLAN OF SUBDIVISION OF LOT 27 IN DP262886, LOT 292 IN DP1076555, LOT 4 IN DP1198299, LOT 125 IN DP1198296, AND LOT 101 IN DP1188147 AND EASEMENT WITH LOT 4 IN DP270819

LGA: BLACKTOWN

Locality: MARSDEN PARK

Parish: ROOTY HILL

County: CUMBERLAND

Crown Lands NSW / Western Lands Office Approval

I, ... (Authorised Officer) in approving this plan, certify that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature: .....

Date: .....

File №: .....

Office: .....

Subdivision Certificate

I, ...
Authorised Person / General Manager / Accredited Certifier

certify that the provisions of s.109J of the *Environmental Planning and Assessment Act 1979* have been satisfied in relation to the proposed subdivision, new road, or reserve set out herein.

Signature: .....

Accreditation №: .....

Consent Authority: .....

Date of Endorsement: .....

Subdivision Certificate №: .....

File №: .....

** Strike through if not applicable.*

Survey Certificate

I, WAYNE EDMUND STOECKL
of FREEBURN SURVEYING
First Floor, Suite 2 "SURVEYOR HOUSE"
2 CASTLEREAGH STREET
PENRITH NSW 2750
Phone: (02) 4721-2289
a surveyor registered under the *Surveying and Spatial Information Act 2002*, certify that:

*(a) The land shown in the plan was surveyed in accordance with the *Surveying and Spatial Information Regulation 2012*, is accurate and the survey was completed on _____.

~~*(b) The part of the land shown in the plan (*being / *excluding ^) _____ was surveyed in accordance with the *Surveying and Spatial Information Regulation 2012*, is accurate and the survey was completed on _____. The part not surveyed was compiled in accordance with that Regulation.~~

~~*(c) The land shown in this plan was compiled in accordance with the *Surveying and Spatial Information Regulation 2012*.~~

Signature: _____ **Date**: _____

Surveyor ID: **№ 8588**

Datum Line: **X - Y**

Type: **URBAN**

Terrain: **LEVEL-UNDULATING**

**Strike through if not applicable.*

^Specify the land actually surveyed, or specify any land shown in the plan that is not the subject of the survey

Statements of intention to dedicate public roads, public reserves, and drainage reserves.

IT IS INTENDED TO DEDICATE:

ROAD WIDENING VARIABLE WIDTH, TO THE PUBLIC AS PUBLIC ROAD.

IT IS INTENDED TO DEDICATE:

HARRIS AVENUE, 27 WIDE & VARIABLE & DARLING STREET, 24 WIDE AND VARIABLE, TO THE PUBLIC AS PUBLIC ROAD, SUBJECT TO EASEMENT FOR TRANSMISSION LINE 60.96 WIDE (J808757).

Plans used in the preparation of survey

DP262886

DP1076555

DP1169158

If space is insufficient continue on PLAN FORM 6A

Signatures, Seals, and Section 88B statements should appear on PLAN FORM 6A

***SURVEYOR'S REFERENCE*:33444-1.02**

E. No. 14/72a - Clause 29(1)(b)

DEPOSITED PLAN ADMINISTRATION SHEET

Office Use Only

Registered:

PLAN OF SUBDIVISION OF LOT 27 IN DP262886, LOT 292 IN DP1076555, LOT 4 IN DP1198299, LOT 125 IN DP1198296, AND LOT 101 IN DP1188147 AND EASEMENT WITHIN LOT 4 IN DP 270819

Subdivision Certificate №: _____

Date of Endorsement: _____

Office Use Only

DRAFT DP1194052

THIS SHEET IS FOR THE PROVISION OF THE FOLLOWING INFORMATION AS REQUIRED:

- A schedule of lots and addresses – See 60© *SSI Regulation 2012.*
- Statements of intention to create and release affecting interests in accordance with section 88B *Conveyancing Act 1919.*
- Signatures and seals - see 195D *Conveyancing Act 1919.*
- Any information which cannot fit in the appropriate panel on sheet 1 of the administration sheets.

NOTE:

STREET ADDRESSES OF ALL LOTS ARE NOT AVAILABLE.

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, IT IS INTENDED TO CREATE:

1. **POSITIVE COVENANT.**
2. **POSITIVE COVENANT.**
3. **RESTRICTION ON THE USE OF LAND.**
4. **POSITIVE COVENANT.**
5. **RESTRICTION ON THE USE OF LAND.**
6. **EASEMENT TO DRAIN WATER 2.5 WIDE (K).**
7. **EASEMENT TO DRAIN WATER VARIABLE WIDTH.**
8. **RESTRICTION ON THE USE OF LAND.**
9. **RESTRICTION ON THE USE OF LAND.**
10. **POSITIVE COVENANT.**
11. **RESTRICTION ON THE USE OF LAND.**
12. **POSITIVE COVENANT.**
13. **RIGHT OF CARRIAGEWAY VARIABLE WIDTH (L).**
14. **POSITIVE COVENANT (M).**
15. **RIGHT OF CARRIAGEWAY VARIABLE WIDTH (N).**
16. **POSITIVE COVENANT (P).**
17. **EASEMENT FOR PADMOUNT SUBSTATION 2.75 WIDE (T).**
18. **RESTRICTION ON THE USE OF LAND (U).**
19. **RIGHT OF CARRIAGEWAY VARIABLE WIDTH (Q)**
20. **RIGHT OF CARRIAGEWAY 7.25 WIDE (R)**
21. **EASEMENT FOR SERVICES 10.25 WIDE (W)**
22. **EASEMENT TO DRAIN WATER 16 WIDE AND VARIABLE (D)**
23. **EASEMENT TO DRAIN WATER 2.5 WIDE (E)**

If space is insufficient use additional Annexure Sheet

***SURVEYOR'S REFERENCE*: 33444-1.02**

E. No. 14/72a - Clause 29(1)(b)

DEPOSITED PLAN ADMINISTRATION SHEET

Office Use Only

Registered:

PLAN OF SUBDIVISION OF LOT 27 IN DP262886, LOT 292 IN DP1076555, LOT 4 IN DP1198299, LOT 125 IN DP1198296, AND LOT 101 IN DP1188147 AND EASEMENT WITHIN LOT 4 IN DP 270819

Subdivision Certificate №: _____

Date of Endorsement: _____

Office Use Only

DRAFT DP1194052

This sheet is for the provision of the following information as required:

- A schedule of lots and addresses – See 60© *SSI Regulation 2012.*
- Statements of intention to create and release affecting interests in accordance with section 88B *Conveyancing Act 1919.*
- Signatures and seals - see 195D *Conveyancing Act 1919.*
- Any information which cannot fit in the appropriate panel on sheet 1 of the administration sheets.

Executed by

GANIAN PTY LIMITED

ACN _____

in accordance with s127 of the Corporations Act 2001, on the _____ day of _____ 20___

in accordance with its constitution in the presence of:

_____ _____

DIRECTOR (print name) **DIRECTOR (signature)**

_____ _____

DIRECTOR/SECRETARY (print name) **DIRECTOR/SECRETARY (signature)**

If space is insufficient use additional Annexure Sheet

***SURVEYOR'S REFERENCE*: 33444-1.0233444-1.02**

E. No. 14/72a - Clause 29(1)(b)

PLAN FORM 6A Annexure (2012) WARNING: Creasing or folding will lead to rejection

DEPOSITED PLAN ADMINISTRATION SHEET

Office Use Only

Registered:

PLAN OF SUBDIVISION OF LOT 27 IN DP262886, LOT 292 IN DP1076555, LOT 4 IN DP1198299, LOT 125 IN DP1198296, AND LOT 101 IN DP1188147 AND EASEMENT WITHIN LOT 4 IN DP 270819

Subdivision Certificate №: _____

Date of Endorsement: _____

Office Use Only

DRAFT DP1194052

This sheet is for the provision of the following information as required:

- A schedule of lots and addresses – See 60© *SSI Regulation 2012.*
- Statements of intention to create and release affecting interests in accordance with section 88B *Conveyancing Act 1919.*
- Signatures and seals - see 195D *Conveyancing Act 1919.*
- Any information which cannot fit in the appropriate panel on sheet 1 of the administration sheets.

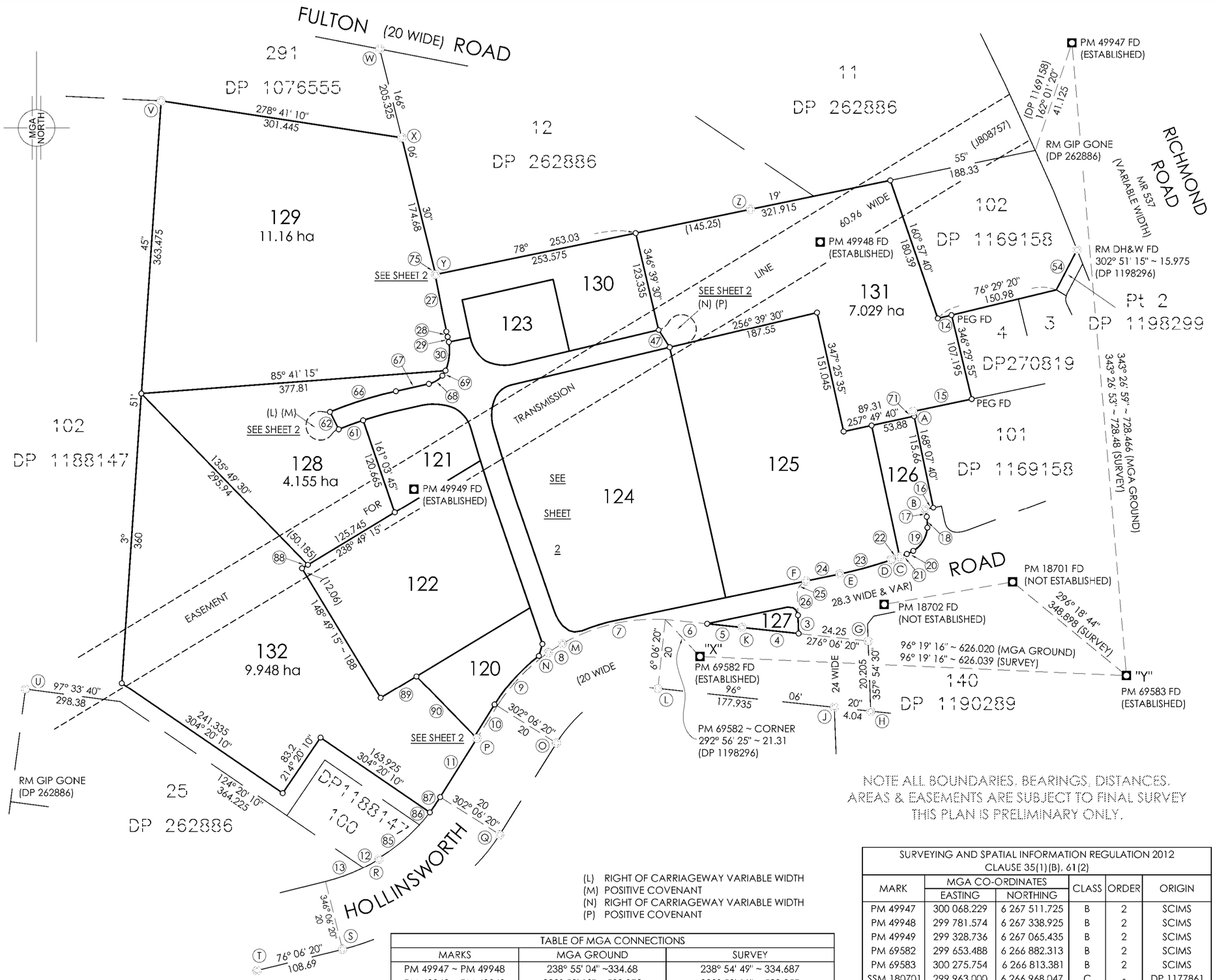
Additional SIGNATURES and/or STATEMENTS OF INTENTION

If space is insufficient use additional Annexure Sheet

***SURVEYOR'S REFERENCE*: 33444-1.02**

SCHEDULE OF SHORT & CURVED LINES			
NUMBER	CHORD	ARC	RADIUS
3	177° 54' 30" ~ 22.675	-	-
4	276° 06' 20" ~ 70.415	-	-
5	276° 06' 20" ~ 43.54	-	-
6	276° 06' 20" ~ 40.89	-	-
7	258° 09' 40" ~ 141.655	143.995	230
8	237° 40' ~ 20.54	20.55	230
9	223° 36' 15" ~ 91.73	92.35	230
10	212° 06' 20" ~ 47.425	-	-
11	32° 06' 20" ~ 90	-	-
12	60° 52' 05" ~ 22.355	22.365	230
13	69° 52' 50" ~ 49.9	50	230
14	76° 29' 20" ~ 17.425	-	-
15	258° 08' 15" ~ 74.145	-	-
16	258° 07' 40" ~ 10.25	-	-
17	168° 07' 40" ~ 7.135	-	-
18	175° 47' ~ 15.92	15.965	59.75
19	211° 12' 40" ~ 33.665	35.02	36.125
20	244° 09' 30" ~ 8.795	8.805	48.75
21	249° 20' 35" ~ 9.665	-	-
22	249° 20' 35" ~ 1.175	-	-
23	253° 49' 20" ~ 75.975	76.055	486.5
24	258° 18' ~ 40.195	-	-
25	218° 06' 15" ~ 21.62	23.5	16.75
26	177° 54' 30" ~ 25.9	-	-
27	348° 37' 10" ~ 77.66	77.665	2013.5
28	167° 23' 45" ~ 3.99	-	-
29	169° 06' 25" ~ 3.775	3.775	65.345
30	186° 32' 10" ~ 35.53	35.985	65.345
47	327° 33' 10" ~ 25.4	-	-
54	27° 22' 55" ~ 55.765	-	-
61	69° 46' 20" ~ 32.195	32.205	463.08
62	153° 10' 45" ~ 24.095	-	-
66	72° 36' 20" ~ 85.535	85.64	489.78
67	77° 30' 25" ~ 41.865	-	-
68	53° 24' 45" ~ 24.74	25.485	30.3
69	25° 49' 15" ~ 1.865	1.865	15.3
71	168° 07' 40" ~ 6.055	-	-
75	258° 19' 55" ~ 0.545	-	-
85	49° 53' ~ 65.6	65.825	230
86	39° 11' ~ 20.07	20.08	230
87	34° 23' 35" ~ 18.375	18.38	230
88	238° 49' 15" ~ 8.49	-	-
89	58° 49' 15" ~ 51.875	-	-
90	135° 49' 30" ~ 107.415	-	-

TABLE OF REFERENCE MARKS			
MARK	REFERENCE	DESCRIPTION	ORIGIN
A	13° 42' 55" ~ 15.685	RM DH&W FD	DP 1169158
A	320° 30' 10" ~ 14.73	RM DH&W FD	DP 1169158
B	326° 46' 25" ~ 9.4	RM DH&W FD	DP 1169158
B	282° 18' 35" ~ 18.715	RM DH&W FD	DP 1169158
C	206° 03' ~ 0.475	RM GIP FD	DP 1198296
D	270° 02' 25" ~ 11.65	RM DH&W FD	DP 1169158
D	313° 05' 15" ~ 25.375	RM DH&W FD	DP 1169158
E	65° 17' ~ 18.47	RM DH&W FD	DP 1169158
E	26° 37' 05" ~ 29	RM DH&W FD	DP 1169158
F	345° 27' 30" ~ 4.175	RM DH&W FD	DP 1169158
F	317° 33' 10" ~ 17.54	RM DH&W FD	DP 1169158
G	157° 54' 10" ~ 12.105	RM DH&W FD	DP 1169158
G	123° 46' 20" ~ 24.45	RM DH&W FD	DP 1169158
H	189° 26' ~ 0.515	RM GIP FD	DP 1185487
J	90° 51' 25" ~ 10.185	RM DH&W FD	DP 1190289
K	6° 08' ~ 1.03	RM GIP FD	DP 1198296
L	186° 06' 20" ~ 0.455	RM CB FD	DP 262886
M	328° 36' 35" ~ 0.54	RM GIP FD	DP 1198296
N	341° 04' ~ 0.97	RM GIP FD	DP 1186201
O	122° 06' 20" ~ 0.455	RM CB FD	DP 262886
P	315° 49' 20" ~ 1	RM GIP FD	DP 262886
Q	122° 06' 20" ~ 0.455	RM CB FD	DP 262886
R	304° 20' 20" ~ 1.025 (BY ME)	RM GIP FD	DP 262886
S	166° 06' 20" ~ 0.455	RM CB FD	DP 262886
T	166° 06' 20" ~ 0.455	RM CB FD	DP 262886
U	188° 46' 20" ~ 1	RM GIP FD	DP 262886
V	182° 41' ~ 0.455	RM GIP FD	DP 231105
W	282° 51' 45" ~ 8.195	RM DH&W IN H/WALL FD	DP 1076555
X	257° 40' ~ 0.42 (BY ME)	RM GIP FD	DP 1076555
Y	258° 19' 55" ~ 1.0	RM GIP FD (0.5 DEEP)	DP 262886
Y	179° 47' 30" ~ 16.105	RM GIP FD	DP 1198296
Z	159° 51' ~ 1.03	RM GIP FD	DP 1169158



NOTE ALL BOUNDARIES, BEARINGS, DISTANCES, AREAS & EASEMENTS ARE SUBJECT TO FINAL SURVEY THIS PLAN IS PRELIMINARY ONLY.

(L) RIGHT OF CARRIAGEWAY VARIABLE WIDTH
(M) POSITIVE COVENANT
(N) RIGHT OF CARRIAGEWAY VARIABLE WIDTH
(P) POSITIVE COVENANT

TABLE OF MGA CONNECTIONS		
MARKS	MGA GROUND	SURVEY
PM 49947 ~ PM 49948	238° 55' 04" ~334.68	238° 54' 49" ~ 334.687
PM 49948 ~ PM 49949	238° 52' 13" ~ 528.972	238° 52' 11" ~ 528.957
PM 49949 ~ PM 69582	119° 25' 04" ~ 372.792	119° 25' 00" ~ 372.769
SSM 180701 ~ SSM 180702	-	251° 42' 59" ~ 158.735
SSM 180702 ~ PM 69582	-	257° 15' 02" ~ 162.774

SURVEYING AND SPATIAL INFORMATION REGULATION 2012 CLAUSE 35(1)(B), 61(2)					
MARK	MGA CO-ORDINATES		CLASS	ORDER	ORIGIN
	EASTING	NORTHING			
PM 49947	300 068.229	6 267 511.725	B	2	SCIMS
PM 49948	299 781.574	6 267 338.925	B	2	SCIMS
PM 49949	299 328.736	6 267 065.435	B	2	SCIMS
PM 69582	299 653.488	6 266 882.313	B	2	SCIMS
PM 69583	300 275.754	6 266 813.381	B	2	SCIMS
SSM 180701	299 963.000	6 266 968.047	C	-	DP 1177861
SSM 180702	299 812.262	6 266 918.241	C	-	DP 1177861
COMBINED SEA LEVEL SCALE FACTOR 1.000 084				ZONE: 56	
SOURCE: MGA COORDS ADOPTED FROM SCIMS ON 21-08-2014					

Surveyor : Wayne Edmund Stoeckl
Date of Survey :
Surveyor's Ref : 33444 - 1.02
E. No. 14/72a - Clause 29(1)(b)

PLAN OF SUBDIVISION OF
LOT 27 IN DP 262886, LOT 292 IN DP 1076555,
LOT 101 IN DP 1188147, LOT 4 IN DP 1198299 AND
LOT 125 IN DP1198296 & EASEMENT
WITHIN LOT 4 IN DP 270819

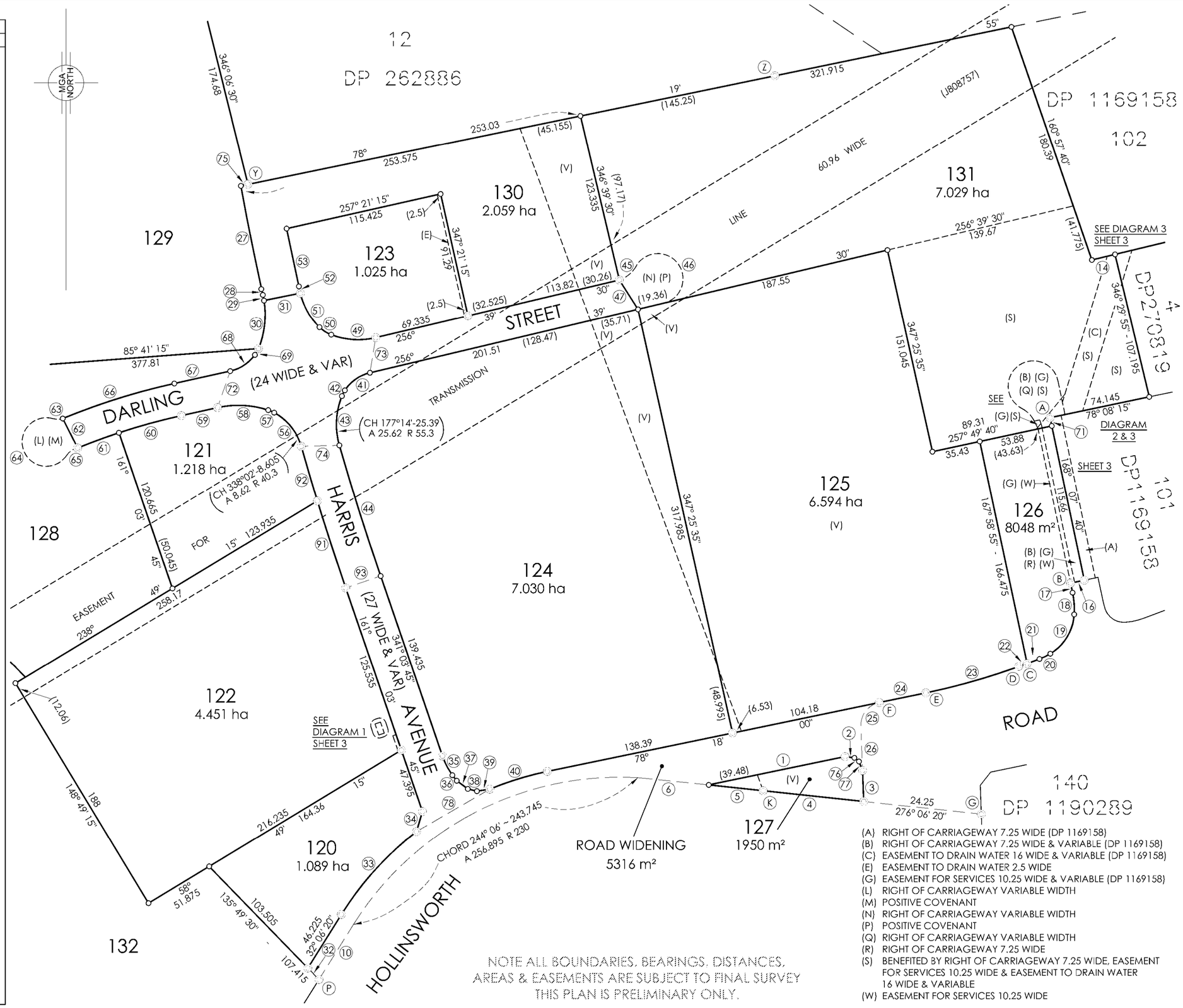
LGA: BLACKTOWN
Locality : MARSDEN PARK
Subdivision No:
Lengths are in metres. Reduction Ratio 1:3500

Registered

DRAFT
DP 1194052

00 | 10 | 20 | 30 | 40 | 50 | Table of mm | 90 | 100 | 110 | 120 | 130 | 140

SCHEDULE OF SHORT & CURVED LINES			
NUMBER	CHORD	ARC	RADIUS
1	78° 18' ~ 101.82	-	-
2	97° 36' 40" ~ 6.89	-	-
3	177° 54' 30" ~ 22.675	-	-
4	276° 06' 20" ~ 70.415	-	-
5	276° 06' 20" ~ 43.54	-	-
6	276° 06' 20" ~ 40.89	-	-
10	212° 06' 20" ~ 47.425	-	-
14	76° 29' 20" ~ 17.425	-	-
16	258° 07' 40" ~ 10.25	-	-
17	168° 07' 40" ~ 7.135	-	-
18	175° 47' ~ 15.92	15.965	59.75
19	211° 12' 40" ~ 33.665	35.02	36.125
20	244° 09' 30" ~ 8.795	8.805	48.75
21	249° 20' 35" ~ 9.665	-	-
22	249° 20' 35" ~ 1.175	-	-
23	253° 49' 20" ~ 75.975	76.055	486.5
24	258° 18' ~ 40.195	-	-
25	218° 06' 15" ~ 21.62	23.5	16.75
26	177° 54' 30" ~ 25.9	-	-
27	348° 37' 10" ~ 77.66	77.665	2013.5
28	347° 23' 45" ~ 3.99	-	-
29	349° 06' 25" ~ 3.775	3.775	65.345
30	6° 32' 10" ~ 35.53	35.985	65.345
31	78° 38' 45" ~ 27.12	-	-
32	135° 49' 30" ~ 3.91	-	-
33	42° 10' 50" ~ 81.765	82.185	233.75
34	16° 36' 25" ~ 15.395	-	-
35	330° 49' 55" ~ 18.93	19.02	55.81
36	321° 03' 45 ~ 1.905	-	-
37	306° 29' 40" ~ 10.06	-	-
38	283° 31' 55" ~ 6.845	-	-
39	261° 24' 50" ~ 9.47	-	-
40	252° 53' 15" ~ 44.085	44.155	233.70
41	53° 52' 20" ~ 23.47	24.1	30.3
42	27° 18' 25" ~ 2.015	2.015	15.3
43	3° 44' 45" ~ 37.435	38.19	55.3
44	342° 30' 45" ~ 100.485	100.495	1986.52
45	52° 32' 20" ~ 14.615	14.88	22.83
46	141° 06' 15" ~ 33.225	74.165	18.4
47	327° 33' 10" ~ 25.4	-	-
49	273° 46' 45" ~ 32.56	33.05	55.3
50	302° 33' 30" ~ 10.225	10.295	25.3
51	330° 43' 40" ~ 28.595	28.995	50.3
52	347° 29' 05" ~ 0.43	0.43	50.3
53	347° 58' 30" ~ 47.845	47.845	1986.5
55	162° 42' 15" ~ 102.445	102.455	2013.5
56	141° 08' ~ 31.53	32.395	40.3
57	113° 07' 20" ~ 4.745	4.75	27.3
58	92° 49' 20" ~ 37.135	37.585	70.3
59	77° 30' 25" ~ 27.04	-	-
60	74° 41' 55" ~ 47.41	47.43	463.08
61	69° 46' 20" ~ 32.195	32.205	463.08
62	153° 10' 45" ~ 24.095	-	-
63	89° 41' 30" ~ 7.115	7.21	12.8
64	339° 27' 15" ~ 28.58	78.3	17.75
65	56° 22' ~ 9.56	9.83	12.085
66	72° 36' 20" ~ 85.535	85.64	489.78
67	77° 30' 25" ~ 41.865	-	-
68	53° 24' 45" ~ 24.74	25.485	30.3
69	25° 49' 15" ~ 1.865	1.865	15.3
71	168° 07' 40" ~ 6.055	-	-
72	19° 12' 50" ~ 28.21	-	-
73	189° 22' ~ 26.015	-	-
74	88° 33' 55" ~ 27.89	-	-
75	258° 19' 55" ~ 0.545	-	-
76	128° 06' 15" ~ 4.26	-	-
77	158° 25' 45" ~ 7.06	-	-
78	59° 56' 35" ~ 61.925	-	-
91	342° 01' 05" ~ 67.09	67.095	2013.5
92	343° 34' ~ 41.795	41.795	2013.5
93	71° 03' 50" ~ 27	-	-



(A) RIGHT OF CARRIAGEWAY 7.25 WIDE (DP 1169158)
(B) RIGHT OF CARRIAGEWAY 7.25 WIDE & VARIABLE (DP 1169158)
(C) EASEMENT TO DRAIN WATER 16 WIDE & VARIABLE (DP 1169158)
(E) EASEMENT TO DRAIN WATER 2.5 WIDE
(G) EASEMENT FOR SERVICES 10.25 WIDE & VARIABLE (DP 1169158)
(L) RIGHT OF CARRIAGEWAY VARIABLE WIDTH
(M) POSITIVE COVENANT
(N) RIGHT OF CARRIAGEWAY VARIABLE WIDTH
(P) POSITIVE COVENANT
(Q) RIGHT OF CARRIAGEWAY VARIABLE WIDTH
(R) RIGHT OF CARRIAGEWAY 7.25 WIDE
(S) BENEFITED BY RIGHT OF CARRIAGEWAY 7.25 WIDE, EASEMENT FOR SERVICES 10.25 WIDE & EASEMENT TO DRAIN WATER 16 WIDE & VARIABLE
(W) EASEMENT FOR SERVICES 10.25 WIDE

NOTE ALL BOUNDARIES, BEARINGS, DISTANCES, AREAS & EASEMENTS ARE SUBJECT TO FINAL SURVEY
THIS PLAN IS PRELIMINARY ONLY.

(V) BENEFITED BY RIGHT OF CARRIAGEWAY 7.25 WIDE (DP 1169158)
BENEFITED BY EASEMENT TO DRAIN WATER 26.5 WIDE & VARIABLE (DP 1169158)
BENEFITED BY EASEMENT TO DRAIN WATER (DP 1169158)
RESTRICTION ON THE USE OF LAND NUMBERED (11) & (12) (DP 1169158)

Surveyor : Wayne Edmund Stoeckl Date of Survey : Surveyor's Ref : 33444 - 1.02 E. No. 14/72a - Clause 29(1)(b)	PLAN OF SUBDIVISION OF LOT 27 IN DP 262886, LOT 292 IN DP 1076555, LOT 101 IN DP 1188147, LOT 4 IN DP 1198299 AND LOT 125 IN DP1198296 & EASEMENT WITHIN LOT 4 IN DP 270819	LGA: BLACKTOWN Locality : MARSDEN PARK Subdivision No: Lengths are in metres. Reduction Ratio 1:2000	Registered	DRAFT DP 1194052

00 | 10 | 20 | 30 | 40 | 50 | Table of mm | 90 | 100 | 110 | 120 | 130 | 140

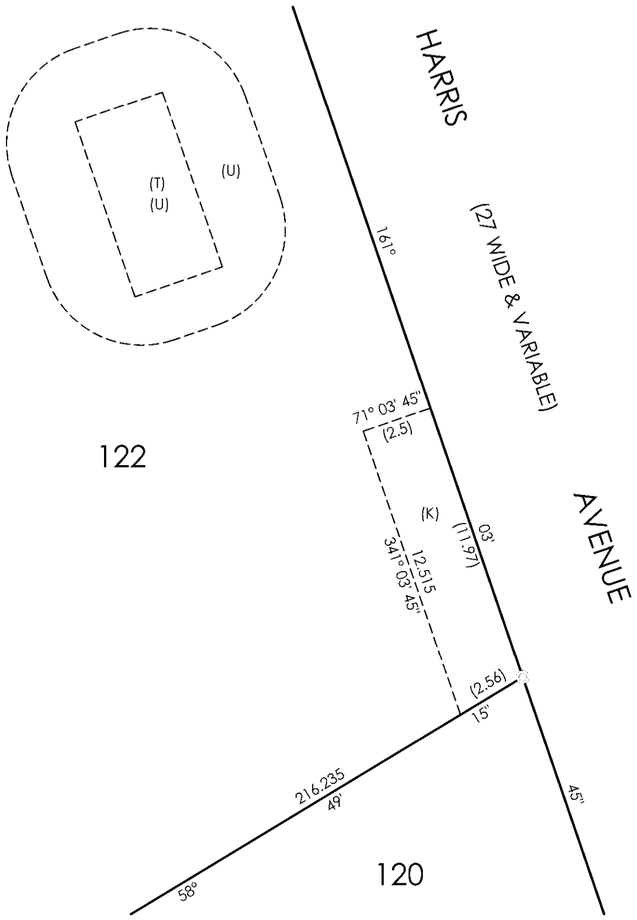


DIAGRAM 1
NOT TO SCALE

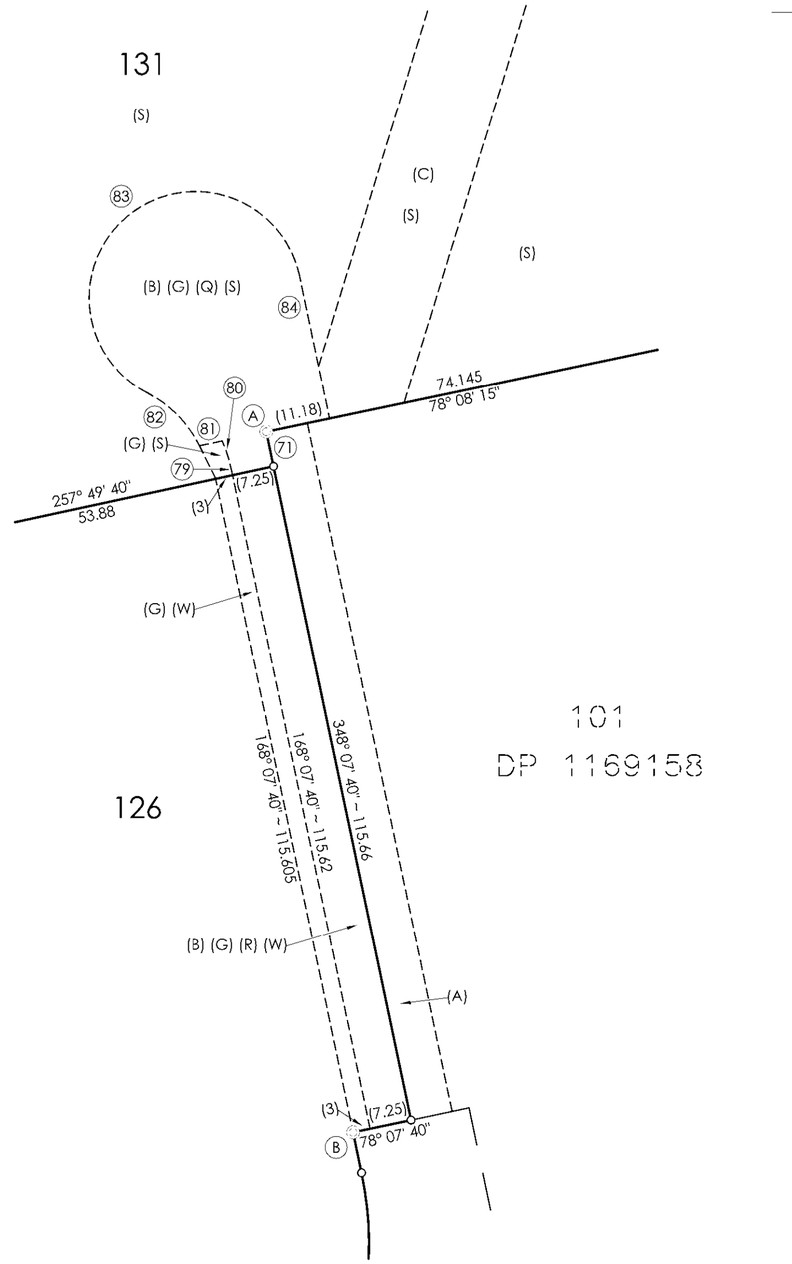


DIAGRAM 2
NOT TO SCALE

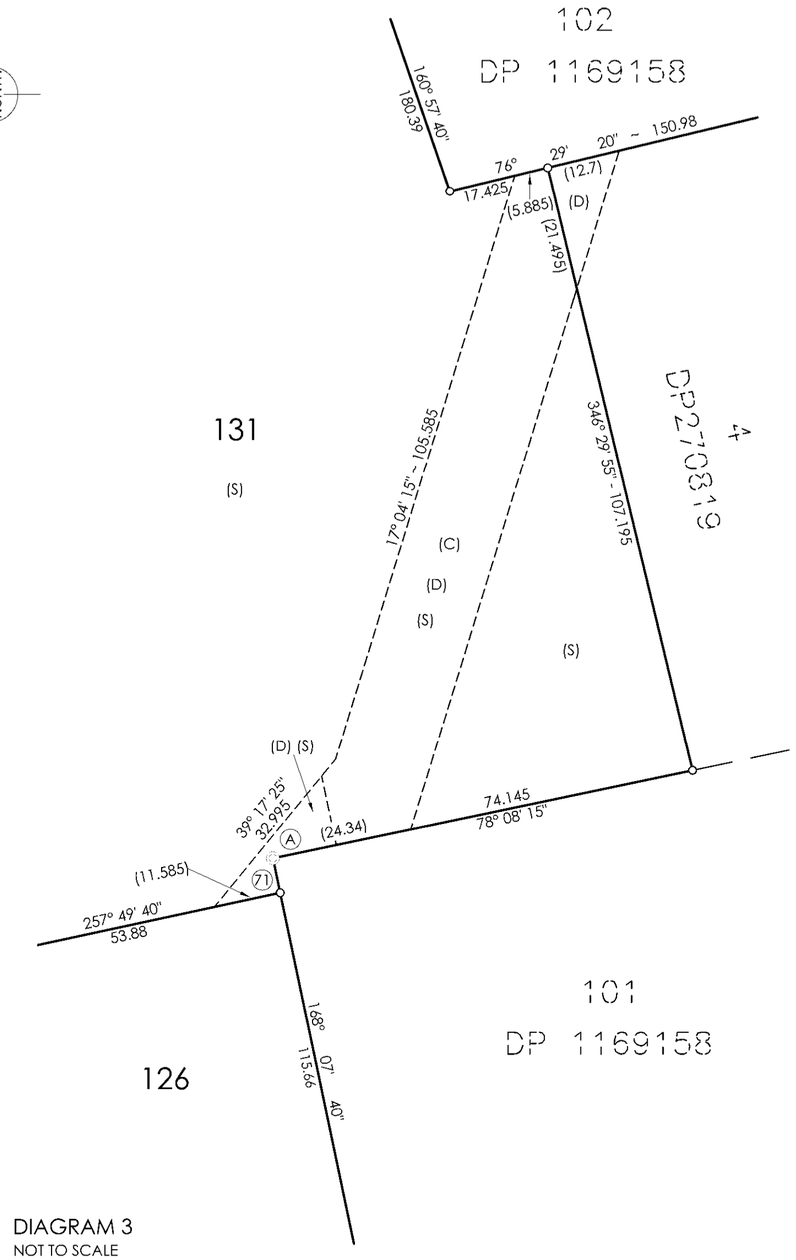


DIAGRAM 3
NOT TO SCALE

(A) RIGHT OF CARRIAGEWAY 7.25 WIDE (DP 1169158)
(B) RIGHT OF CARRIAGEWAY 7.25 WIDE & VARIABLE (DP 1169158)
(C) EASEMENT TO DRAIN WATER 16 WIDE & VARIABLE (DP 1169158)
(D) EASEMENT TO DRAIN WATER 16 WIDE & VARIABLE
(G) EASEMENT FOR SERVICES 10.25 WIDE & VARIABLE (DP 1169158)
(K) EASEMENT TO DRAIN WATER 2.5 WIDE
(Q) RIGHT OF CARRIAGEWAY VARIABLE WIDTH
(R) RIGHT OF CARRIAGEWAY 7.25 WIDE
(S) BENEFITED BY RIGHT OF CARRIAGEWAY 7.25 WIDE, EASEMENT FOR SERVICES 10.25 WIDE & EASEMENT TO DRAIN WATER 16 WIDE & VARIABLE
(T) EASEMENT FOR PADMOUNT SUBSTATION 2.75 WIDE
(U) RESTRICTION ON THE USE OF LAND
(W) EASEMENT FOR SERVICES 10.25 WIDE

SCHEDULE OF SHORT LINES		
NUMBER	BEARING	DISTANCE
71	168° 07' 40"	6.055
79	348° 07' 40"	0.945
81	78° 08'20"	4.005
84	168° 07' 40"	25.2

SCHEDULE OF CURVED LINES			
NUMBER	CHORD	ARC	RADIUS
80	342° 03' 30" ~ 5.18	5.19	24.5
82	315° 22' 20" ~ 12.915	13.139	20.6
83	52° 34' 15" ~ 33.225	74.165	18.4

NOTE ALL BOUNDARIES, BEARINGS, DISTANCES, AREAS & EASEMENTS ARE SUBJECT TO FINAL SURVEY THIS PLAN IS PRELIMINARY ONLY.

Surveyor : Wayne Edmund Stoeckl Date of Survey : Surveyor's Ref : 33444 - 1.02 E. No. 14/72a - Clause 29(1)(b)	PLAN OF SUBDIVISION OF LOT 27 IN DP 262886, LOT 292 IN DP 1076555, LOT 101 IN DP 1188147, LOT 4 IN DP 1198299 AND LOT 125 IN DP1198296 & EASEMENT WITHIN LOT 4 IN DP 270819	LGA: BLACKTOWN Locality : MARSDEN PARK Subdivision No: Lengths are in metres. Reduction Ratio 1:1000	Registered	DRAFT DP 1194052

00 | 10 | 20 | 30 | 40 | 50 | Table of mm | 90 | 100 | 110 | 120 | 130 | 140

Civil Engineering Construction
Bulk Tipping Haulage
Waste Transport & Disposal
Earthmoving Plant Hire
& Contracting

MULGOA QUARRIES PTY. LTD.
A.C.N. 001 005 527 A.B.N. 52 001 005 527
A Member of the Wearn Bros. Group

2091 Castlereagh Road
Penrith NSW 2750
PO Box 347
Kingswood NSW 2747

OFFICE: (02) 4723 9900
FAX: (02) 4721 1809

Ref: MQ-Material Compliance SBP1.02

10th June 2015

Client: Marsden Park Developments
Contact: Michael Gray/Owen Walsh
C/C: Blacktown City Council
Attention: Norm Naisby

Re: Material Compliance for Sydney Business Park Stage 1.02

Mulgoa Quarries Pty Ltd as the principal Contractor wish to confirm that the quantity of base course and sub base material delivered to site is equal to the required calculated volume.

CALCULATIONS

Sub-Base Material Supply Calculations - Sydney Business Park Stage 1.02

Area Calculation Table

Material	Depth (mm)	Area (m2)	Density	Tonneage
4% Stabilised Sub Base	325	7383	1.9	4559.00
4% Stabilised Sub Base	350	15098	1.9	10040.17
Unbound Base Course	150	19985	1.9	5695.725
				20294.90

	Required	Purchased
Total 4% Stabilised Sub Base (Tonnes)	**14599.17**	**20190**
Total Unbound Base Course (Tonnes)	**5695.725**	**6330**
Overall Total (Tonnes)	**20294.90**	**26520**

4% STABILISED BOUND SUB-BASE

Total Area Of 4% Stabilised Sub Base =	7383	m2
Depth Of 4% Stabilised Sub Base =	325	mm
Material Density (Compacted) =	1.9	tn/m3
Actual Qty of Material Required =	**4559.00**	Tonne
Total Area Of 4% Stabilised Sub Base =	15098	m2
Depth Of 4% Stabilised Sub Base =	350	mm
Material Density (Compacted) =	1.9	tn/m3
Actual Qty of Material Required =	**10040.17**	Tonne
TOTAL Actual Qty of Material Required =	**14599.17**	Tonne

Civil Engineering Construction
Bulk Tipping Haulage
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Kingswood NSW 2747

OFFICE: (02) 4723 9900
FAX: (02) 4721 1809

Actual Qty of material Delivered to Site as per Boral Quarries Summary = **20190** Tonne

**Note that the 4% Stabilised Subbase was partially continued into the extension of road 5A in order to bridge service trenches and make future extension of the road easier.*
- Hence the inflated purchased supply Total

UNBOUND BASE COURSE		
Total Area Of Unbound Base Course =	19985	m2
Depth Of unbound Base Course =	150	mm
Material Density (Compacted) =	1.9	tn/m3
TOTAL Actual Qty of Material Required =	**5695.725**	Tonne

Actual Qty of material Delivered to Site as per Boral Quarries Summary = **6330** Tonne

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

Thank You

Max Sarkis
Project Manager
Mulgoa Quarries Pty Ltd
Ph: (02) 4723 9900
Mob: 0407 327 745
E-Mail: max@mulgoaq.com.au

Sum of Delivered Qty	Column Labels		
Row Labels	Road Base Recycled 20mm Dgb	Unbound Base 4 % SM	Grand Total
20-10-14		598	598
21-10-14		445	445
27-10-14		866	866
28-10-14		1043	1043
29-10-14		1034	1034
30-10-14		1131	1131
31-10-14			0
04-11-14		1040.14	1040.14
05-11-14		886.96	886.96
08-11-14		1438	1438
11-11-14		1268.64	1268.64
12-11-14		809.42	809.42
20-11-14		304.42	304.42
22-11-14		492.52	492.52
28-11-14		61.64	61.64
03-12-14	429.3		429.3
10-12-14		507.7	507.7
11-12-14		1143.6	1143.6
16-12-14	692.42		692.42
17-12-14	608.88	937.22	1546.1
07-01-15	1263.8		1263.8
08-01-15		661.93	661.93
09-01-15		786.72	786.72
12-01-15	30.54	458.74	489.28
16-01-15	305.98		305.98
22-01-15		587.18	587.18
23-01-15	454.86		454.86
02-02-15		1007.5	1007.5
03-02-15		1322.88	1322.88
04-02-15		244.92	244.92
10-02-15	240.82		240.82
23-02-15		643.2	643.2
24-02-15		470.16	470.16
27-02-15	91.76		91.76
06-03-15	552.24		552.24
07-03-15	379.78		379.78
13-03-15	371.96		371.96
16-03-15	757.8		757.8
28-03-15	119.8		119.8
01-04-15	29.78		29.78
TOTAL	6329.72	20190.49	26520.21

Stockpiles	
Unbound	DGB20
260	
260	
260	
265	
265	
265	
265	
265	
265	
265	
268	
268	
268	
268	253
268	
	253
280	
280	
280	253
280	253
	253
280	
280	
281	254
	254
281	
	254
281	
281	
281	
	254
287	
287	
	254
	257
	257
	257
	257
	261
	261

SCHEDULE OF SHORT & CURVED LINES			
NUMBER	CHORD	ARC	RADIUS
16	258° 07' 40" ~ 10.25	-	-
17	168° 07' 40" ~ 7.135	-	-
18	175° 47' ~ 15.92	15.965	59.75
19	211° 12' 40" ~ 33.665	35.02	36.125
20	244° 09' 30" ~ 8.795	8.805	48.75
21	249° 20' 35" ~ 9.665	-	-
22	249° 20' 35" ~ 1.175	-	-
23	253° 49' 20" ~ 75.975	76.055	486.5
24	258° 18' ~ 40.195	-	-
35	330° 49' 55" ~ 18.93	19.02	55.81
36	321° 03' 45 ~ 1.905	-	-
37	306° 29' 40" ~ 10.06	-	-
38	283° 31' 55" ~ 6.845	-	-
39	261° 24' 50" ~ 9.47	-	-
40	252° 53' 15" ~ 44.085	44.155	233.70
41	53° 52' 20" ~ 23.47	24.1	30.3
42	27° 18' 25" ~ 2.015	2.015	15.3
43	3° 44' 45" ~ 37.435	38.19	55.3
44	342° 30' 45" ~ 100.485	100.495	1986.52
49	273° 46' 45" ~ 32.56	33.05	55.3
50	302° 33' 30" ~ 10.225	10.295	25.3
51	330° 43' 40" ~ 28.595	28.995	50.3
52	347° 29' 05" ~ 0.43	0.43	50.3
92	343° 34' ~ 41.795	41.795	2013.5

Client: SYDNEY BUSINESS PARK 920 RICHMOND ROAD MARSDEN PARK	Project: PLAN SHOWING CUT & FILL DEPTHS OVER STAGE 1.02 SUBDIVISION, UNREGISTERED DP 1194052 HOLLINSWORTH ROAD, MARSDEN PARK	FREEBURN W E SURVEYING	MATTHEW FREEBURN LAND, ENGINEERING & MINING SURVEYOR SUITE 2, FIRST FLOOR, "SURVEYOR HOUSE" 2 CASTLEREAGH STREET PENRITH 2750	Telephone 02 4721 2289 Fax 02 4721 5646 email matthew@freeburnsurveyors.com	Date: 05/06/2015 / Ref: 33444 / Sheet 1 of 1; Scale 1:1000 / Datum: N/A / Contour: N/A; Surveyor: WS / Drawn By: ML / Checked: WS; STORED: 33444\AUTOCAD\STAGE 1.02\STAGE 1.02 WAE\ LOT FILL PLAN STAGE 1.02.dwg / A1 SHEET

Build something great™

Boral Construction Materials Ltd
Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153

T:+61 (02) 9624 9900
F:+61 (02) 9624 9999

www.boral.com.au

CERTIFICATE OF COMPLIANCE

The N.A.T.A endorsed test results obtained by the Materials Testing Services Laboratory (Accreditation No. 547) on samples of recycled material drawn from Boral Recycling Widemere identified as Unbound Base S/P 260, 265, 268, 280, 281 & 287 are available if required.

The samples tested were recovered from the production lots manufactured in compliance with *"The Recovered Aggregate order 2014"* and represent approximately 4000 tonnes per lot.

The samples tested were taken from 3/07/14 to 12/11/14 as per AS1141 Section 3 "Sampling of Aggregates and Rock" and the RMS Specification No.3051 Table 4 – Minimum Sampling and Testing Requirements.

The results have been compared with the:

- ***RMS Specification 3051 Edition 5 June 1998 and***
- ***Blacktown City Council Recycled Material specifications and Certification of Stockpile Manual requirements.***

The reports indicate the material properties comply with the specification requirements.

We are advised the material from this lot was supplied as follows:

CLIENT: MULGOA QUARRIES

PROJECT: Marsden Park

TONNAGE: 20,190.49 tonnes

PERIOD: 2nd October 2014 – 1st April 2015

Yours faithfully,

JUSTIN DOWSE

per: Mike Formosa
Quarries Coordinator NSW/ACT

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 512

This is to certify that **Stockpile No. 260 of Recycled Unbound Base Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGS material** and may therefore be used within BCC area as a SUB-BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

Surinder Aneja
A/Manager Civil & Open Space Maintenance

15/8/14

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 513

This is to certify that **Stockpile No. 265 of Recycled Unbound Base Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGS material** and may therefore be used within BCC area as a SUB-BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

Surinder Aneja
A/Manager Civil & Open Space Maintenance

15.8.14

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 514

This is to certify that **Stockpile No. 268 of Recycled Unbound Base Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGS material** and may therefore be used within BCC area as a SUB-BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

Surinder Aneja
A/Manager Civil & Open Space Maintenance

...../...../.....

11S2A

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 531

This is to certify that **Stockpile No S/P 280 of Recycled Unbound Base Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGS material** and may therefore be used within BCC area as a SUB-BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Surinder Aneja
A/Manager Civil & Open Space Maintenance
13/11/2014

11 58A

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 532

This is to certify that **Stockpile No S/P 281 of Recycled Unbound Base Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGS material** and may therefore be used within BCC area as a SUB-BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Surinder Aneja
A/Manager Civil & Open Space Maintenance
13/11/2014

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 539

This is to certify that **Stockpile No SP287 of Recycled Unbound Base Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGS material** and may therefore be used within BCC area as a SUB-BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Surinder Aneja
Acting Manager Civil & & Park Maintenance
16/01/2015

Build something great™

Boral Construction Materials Ltd
Unit 4, 3-5 Gibbon Road
Baulkham Hills NSW 2153 Australia
PO Box 400, Winston Hills NSW 2153

T:+61 (02) 9624 9900
F:+61 (02) 9624 9999

www.boral.com.au

CERTIFICATE OF COMPLIANCE

The N.A.T.A endorsed test results obtained by the Materials Testing Services Laboratory (Accreditation No. 547) on samples of recycled material drawn from Boral Recycling Widemere identified as DGB20 S/P253, 254, 255, 257 & 261 are available if required.

The samples tested were recovered from the production lots manufactured in compliance with *"The Recovered Aggregate order 2014"* and represent approximately 4000 tonnes per lot.

The samples tested were taken from 09/09/14 to 24/01/15 as per AS1141 Section 3 "Sampling of
Aggregates and Rock" and the RMS Specification No.3051 Table 4 – Minimum Sampling and Testing Requirements.

The results have been compared with the:

- ***RMS Specification 3051 Edition 5 June 1998 and***
- ***Blacktown City Council Recycled Material specifications and Certification of Stockpile Manual requirements.***

The reports indicate the material properties comply with the specification requirements.

We are advised the material from this lot was supplied as follows:

CLIENT: MULGOA QUARRIES

PROJECT: Marsden Park

TONNAGE: 6329.72 tonnes

PERIOD: 20th October 2014 – 1st April 2015

Yours faithfully,

JUSTIN DOWSE

per: Mike Formosa
Quarries Coordinator NSW/ACT

1142

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 527

This is to certify that **Stockpile No 253 of Recycled Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGB material** and may therefore be used within BCC area as a BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Joseph Buttita
Manager Civil & Open Space Maintenance
06/11/2014

1147

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 528

This is to certify that **Stockpile No 254 of Recycled Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGB material** and may therefore be used within BCC area as a BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Joseph Buttita
Manager Civil & Open Space Maintenance
06/11/2014

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 540

This is to certify that **Stockpile No SP257 of Recycled DGB20 Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGB material** and may therefore be used within BCC area as a BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Surinder Aneja
Acting Manager Civil & Park Maintenance
16/01/2015

1782 B

Blacktown City Council

CERTIFICATION OF STOCKPILE

Number 546

This is to certify that **Stockpile No SP261 of Recycled DGB20 Material** operated by **Boral Recycling Pty Ltd at Widemere** has been accepted by Blacktown City Council as complying with its specification for a **DGB material** and may therefore be used within BCC area as a BASE MATERIAL without further testing for a period of three months from the approval date on this certificate.

.....

Joseph Buttita
Manager Civil & Park Maintenance
17/02/2015

COMPUTATION VIA PRISMS

SURFACES:
==========
Design: Combined June - STAGE 102 WAE DTM
Natural: Combined June - Strip Survey

REGION:
======
Boundary: STAGE 1.02AONLY

SURFACE AREAS:
============
Design: 265673.8 (square meters)
Natural: 259263.3 (square meters)

PLAN AREAS:
==========
Boundary: 265916.5 (square meters) within the boundary
Design: 264042.3 (square meters) within the boundary and within design surface
Natural: 257799.4 (square meters)

Factor:
=======================
Swell: 1.000
Shrink: 1.000

CUT/FILL/MATCHING AREAS:
=======================
Cut: 148477.4 (square meters)
Fill: 109322.0 (square meters)
Matching: 0.0 (square meters)
Total Area: 257799.4 (square meters)

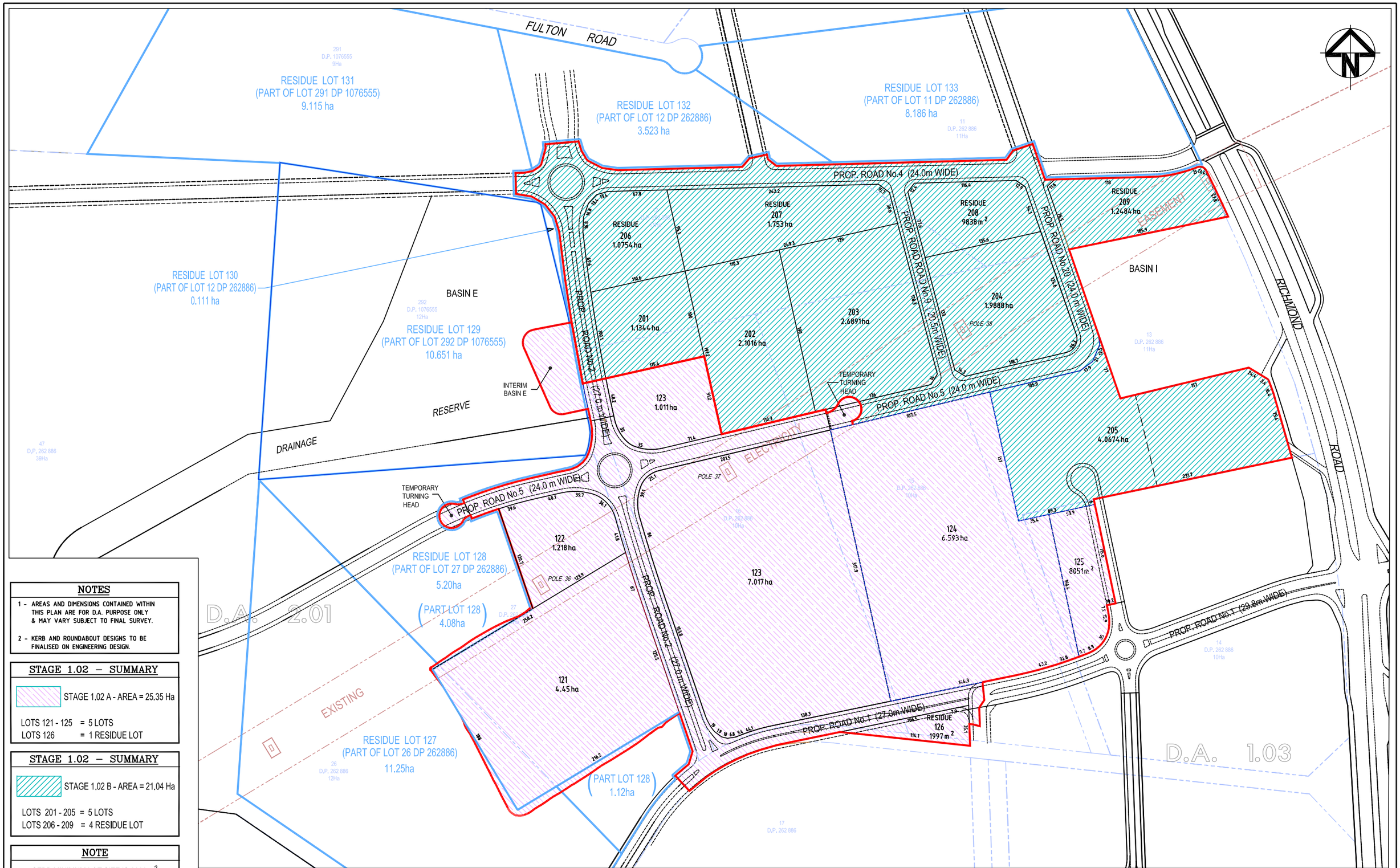
WARNING - There is a difference between volumes area and boundary area.

VOLUMES:
==========
Cut to Fill Ratio: 1.252

Cut: 176389.617 (cubic meters)
Fill: 140921.422 (cubic meters)
Net: 35468.195 (cubic meters) [cut]

Cut: 1.188 (cubic meters) / (square meters)
Fill: 1.289 (cubic meters) / (square meters)

Average Cut Depth: 1.188 (m)
Maximum Cut Depth: 4.387 (m)
Average Fill Depth: 1.289 (m)
Maximum Fill Depth: 5.321 (m)



NOTES

1 - AREAS AND DIMENSIONS CONTAINED WITHIN THIS PLAN ARE FOR D.A. PURPOSE ONLY & MAY VARY SUBJECT TO FINAL SURVEY.

2 - KERB AND ROUNDABOUT DESIGNS TO BE FINALISED ON ENGINEERING DESIGN.

STAGE 1.02 – SUMMARY

STAGE 1.02 A - AREA = 25.35 Ha

LOTS 121 - 125 = 5 LOTS
LOTS 126 = 1 RESIDUE LOT

STAGE 1.02 – SUMMARY

STAGE 1.02 B - AREA = 21.04 Ha

LOTS 201 - 205 = 5 LOTS
LOTS 206 - 209 = 4 RESIDUE LOT

NOTE

SEPP MINIMUM LOT SIZE IS 2000m²

REDUCTION RATIO
PLAN 1:2000 @ A1
1:4000 @ A3

A3 1:4000 0 20 40 60 80 100 200 A1 1:2000

DATUM	A.H.D.	DESIGN	P.L.	CHECKED	P.L.
SURVEY		TRACED	A.C.	DATE	12-10-2011

MARSDEN PARK DEVELOPMENT P/L

STAGE 1.02 - DA 11-2284

ISSUE	DESCRIPTION	DATE
13	SECTION 96 AMENDMENTS	16-2-2015
12	SECTION 96 AMENDMENTS	5-2-2015
11	SECTION 96 AMENDMENTS	27-8-2014
10	SECTION 96 AMENDMENTS	9-8-2014
9	SECTION 96 AMENDMENTS	7-4-2014
8	SECTION 96	23-9-2013
7	COUNCIL COMMENTS	13-2-2013
6	CLIENT COMMENTS	27-7-2012
5	CLIENT COMMENTS	21-5-2012
4	CLIENT COMMENTS	18-5-2012
3	COUNCIL COMMENTS	16-12-2011
2	FINAL REVIEW AMENDMENTS	21-10-2011
1	AMENDMENTS TO PLAN	17-10-2011
0	ORIGINAL ISSUE	12-10-2011

DRAWING. No. X11227-M16
SHEET 1 OF 1 SHEETS
AMEND. 13

Saved: 16.02.2015, By: angelo cavallaro
H:\X11X11227 - Marsden Park Industrial St, 2\Planning\Feasibility\X11227-M16.dwg

Attachment 4 – Photographic Log

Photograph 1 - Lot 121, facing north-west

Photograph 2 - Lot 122, facing south-east

Photograph 3 - Lot 122, facing south

Photograph 4 - Lot 122, facing West

JBS&G

Job No: 50706	
Client: Marsden Park Developments Pty Ltd	
Version: L01 Rev 0	Date: 08/07/2015
Drawn By: GB	Checked By: MB
Not to Scale	
Coord. Sys n/a	

Sydney Business Park – Los 121-124 and 126

ATTACHMENT 4: PHOTO LOG

Photograph 5 - Stockpiles within lot 123, facing North

Photograph 6 - Lot 123, mulch stockpile

Photograph 7 - Lot 123, facing north

Photograph 8 - Lot 124, facing west

JBS&G

Job No: 50706

Client: Marsden Park Developments Pty Ltd

Version: L01-Rev 0	Date: 08/07/2015
Drawn By: GB	Checked By: MB

Not to Scale

Coord. Sys n/a

Sydney Business Park – Lots 121-124 and 126

ATTACHMENT 4: PHOTOLOG

Photograph 9 - Lot 124, facing north

Photograph 10 - Lot 124, facing north-east

Photograph 11 - Retention pond within Lot 124, facing north

Photograph 12 - Lot 126, facing south

JBS&G

Job No: 50706

Client: Marsden Park Developments Pty Ltd

Version: L01-Rev 0	Date: 08/07/2015
Drawn By: GB	Checked By: MB

Not to Scale

Coord. Sys n/a

Sydney Business Park – Los 121-124 and 126

ATTACHMENT 4

ATTACHMENT 4

CONTAMINATION (REVIEW OF CONTAMINATION AND ASSESSMENT AND VALIDATION REPORTS) FOR STAGE 1.02C, PREPARED BY GEOTECHNIQUE PTY LTD, 2014

GEOTECHNIQUE® PTY LTD

Member of
Australian Contaminated
Land Consultants Association Inc

Certified System
Quality
ISO 9001
SAI GLOBAL

ABN 64 002 841 063

Job No: 13270/1
Our Ref: 13270/1-AA-Amended
9 October 2014

Brown Consulting (NSW) Pty Ltd
P O Box 8300
Norwest Business Park
BAULKHAM HILLS NSW 2153

Attention: Ms M Padroth

Dear Madam

re: **Proposed Marsden Park Industrial Stage 1.02C**
Richmond Road, Marsden Park
Contamination (Review of Contamination Assessment and Validation reports)

As requested, this amended letter report presents a summary of review of the contamination and validation reports related with part of land registered as Lots 11 and 12 in DP262886 and Part Lot 292 in DP1076555 (hereafter known as the Site), located at Richmond Road, Marsden Park as shown on the Drawing No 13270/1-AA1 (Attachment 1).

Geotechnique Pty Ltd (Geotechnique) has reviewed the following available reports related to the subject site.

- *Phase 2 Contamination Assessment Report* prepared by GHD Pty Ltd (GHD) dated May 2009 (GHD Ref: No 21/17717/145254) for a large area of land known as Marsden Park Industrial Precinct (MPIP) located on east and western side of Richmond Road, Marsden Park, NSW (Figure 6 in report No 217717/145254) in Attachment 2.

- Validation Report (Draft) for Marsden Park Night Soil Depot Remediation, prepared by GHD dated December 2012 (GHD Ref: No.21/21487) (Attachment 3) for the portion of land within MPIP (known as Marsden Park Night Soil Depot), located at Lots 11 and 12 in DP262886, Richmond Road, Marsden Park, NSW

- Site Audit Statement (SAS GN319B) issued by the NSW Site Auditor for Lot 11 and Part 12 in DP262886, Richmond Road, Marsden Park, NSW dated February 2013 in Attachment 4.

The objective of this review is to provide a data gap for further contamination assessment (if required) of the subject site to address the potential contamination.

SITE DESCRIPTION & PROPOSED DEVELOPMENT

The subject (Marsden Park Industrial Stage 1.02C) is part of the MPIP located at western side of Richmond Road, in the local government area of Blacktown and covers parts of Lots 11 & 12 in DP262886 and part of Lot 292 in DP107655 as shown Drawing No 13270/1-AA1.

The site is proposed for commercial/Industrial use.

REVIEW OF GHD PHASE 2 CONTAMINATION ASSESSMENT REPORT (PHASE 2 CA)

GHD carried out a Phase1 and Phase 2 Contamination Assessments of the large part of land known as Marsden Park Industrial Precinct (MPIP), respectively in 2008 and 2009. Phase 1 Contamination Assessment Report (GHD ref: 2117717/142931) was not available for review, however summary of the assessment results were provided in Phase 2 Contamination Report by GHD (Ref: 2117717/145254).

The Phase 2 CA presents a summary of the scope of work involved in the Phase 1 and Phase 2, the subsequent findings and recommendations with respect to the larger part of the land known as MPIP as mentioned earlier.

The scope of work for the Phase 1 Contamination Assessment (Phase 1 CA) included a study of history, geological and hydrogeological information, review of previous site investigation reports for parts of MPIP and a visual inspection for MPIP.

The objectives of the Phase 1 CA as reported in Phase 2 CA, were to assess the potential for contamination at the MPIP based on past and present site use, to determine the potential contaminants/areas of concern, in order to determine the compatibility of the MPIP for its intended commercial/industrial residential land use. Phase 1 CA identified a number of areas with potential contamination.

The overall objective of Phase 2 CA was to assess whether the MPIP is appears suitable, from contamination perspective or will be suitable after remediation for the proposed use based on the assessment results of Phase 1 CA and Phase 2 CA.

As reported by GHD in Phase 2 CA "*the intrusive investigations undertaken by GHD have not identified the presence of any gross, widespread contamination that would otherwise render the investigated areas unsuitable for rezoning and redevelopment; however some contamination was reported in various lots which require supplementary assessment and potentially remedial work".*

The GHD Phase 2 CA report has identified a number of Areas of Environmental Concern (AECs) within the MPIP and has made recommendation for further investigation and remediation, including for Lots 11 and 12 in DP262886 and Lot 292 in DP1076555 (related with the subject site).

The final contamination risk ranking based on the Phase 1 CA and Phase 2 CA by GHD is as shown in Figure 6 (Attachment 2). As shown on the Figure 6, Lots 11 and 12 in DP262886 were mapped as 'Risk Highly Likely' areas. The adjoining lots to the west (Lots 291 and 292 in DP 1076555) of the subject area for validation (occupied by former Council Sanitary Depot), were ranked as 'Risk Unlikely' to 'Risk Highly Likely'. The remaining adjoining lots (properties) of Lots 11 and 12 in DP262886 were mapped as 'Risk Unlikely'. It should also be noted that as reported in Phase 2 CA *(Section 7 Indicative Layout Plan Assessment),* previous site investigation reports by URS (2002 *to 2005)* indicated that the former Council Sanitary Depot (night soil disposal area) required remediation to enable proposed development.

Based on the results of the Phase 2 CA and the Phase 1 CA, the contamination of concern with respect to the subject site, covering mostly Lots 11 and 12 of DP 262886 (former Council Sanitary Depot) were as follows:

a. **Workshop:** TPH and PAH from use of bitumen and asphalt in workshop and asbestos from demolished buildings.
b. **Nightsoil disposal area:** TPH, PAH, metals and pathogens, from night soil disposal.

c. **Potential burial of industrial waste:** TPH, VOCs from burial of 200litre (L) drums of industrial waste.

REVIEW OF VALIDATION REPORT-MARSDEN PARK NIGHTSOIL DEPOT

In order to render the Lots 11 and 12 in DP 262886 for the proposed commercial/industrial use, GHD prepared a Validation Report for Marsden Park Night Soil Depot (Ref No. GHD 21/21487) based on the previous investigation since 2002 and the Remedial Action Plan (RAPs prepared by ERM in March 2011) which focused on remediation work within the following areas of concern.

a. Workshop and drainage area (north eastern portion Lot 11)
b. Nightsoil disposal area (south western portion of Lot 12)
c. Potential burial of industrial waste (south west corner of nightsoil disposal area)

Based on the validation test results, GHD concluded that Lot 11 (except the one validation sample location in the western key area), the Lot 12 southwest night soil disposal area, trenches, deep excavation and hot spots present no acceptable risk to human health for the proposed industrial and commercial land use or the environment and therefore the areas are considered validated.

It was also concluded by GHD that the sample location in the western key area of Lot 11 former workshop area and other un-remediated areas of Lot 11 and 12 will be managed under a Site Management Plan considering insignificant compared to the scale of remediation completed at the site.

Based on the results, with regards to groundwater, GHD considers that the site has not been significantly impacted by the former site activities in the areas assessed and is not considered to impact the sites suitability for the proposed commercial redevelopment. It is also to be noted that there is no requirement to monitor groundwater for contamination at the site under the site management plan.

REVIEW OF SITE AUDIT STATEMENT

The site audit statement (SAS GN319B) dated February 2013, has been issued by NSW EPA accredited site auditor (Graeme Nyland) for Lot 11 and part Lot 12 in DP262886 (a 75m wide strip of land is excluded from Lot 12). The area covered by SAS GN319B is as shown on the Figure 2 in SAS GN319B. Based on the SAS GN319B, Lot 11 and part Lot 12 is certified to be suitable for commercial /industrial land use subject to the implementation of approved Site Management Plan. The area covered by SAS GN319B is as indicated on Figure 2 - Site Layout Plan (page 5 in Attachment 4).

It was also noted in the SAS GN319B that '*Groundwater investigations at the site have indicated the potential for localised impact by ammonia and petroleum hydrocarbons. Abstraction of groundwater would not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water'.*

CURRENT SITE CONDITION AND SURROUNDING ENVIRONMENT

An inspection of the site was carried out by an Environmental Engineer on 24 September 2014 and the following observations were made:

- The site was divided into northern part and southern part by a gravel/dirt driveway. A skip bin yard was located at western end of the site.
- Northern part of the site was mainly grass and trees covered with the exception of an area with large sandstone stockpiles located at the eastern boundary of the site. A small soil stockpile was located to the west of the sandstone stockpile.

- Southern part of the site was generally disturbed by existing subdivision. An area with large sandstone stockpiles and a shale stockpile was located at western side of the site. Several areas for soil stockpiling were allocated along the gravel driveway at eastern portion of the site. The middle section of the southern part of the site was mainly grass covered. Part of the site in the north eastern portion and southern portion was excavated to natural soil / sandstone.
- There were no visual or olfactory indicators of potential contamination. There were no obvious features (bowsers, breather pipe, inlet valve and piping) associated with underground storage tanks or petroleum hydrocarbon staining on the ground surface of the site that would indicate the potential for contamination.
- There were no air emissions emanating from the site.

Surrounding Environment

At the time of inspection observations of the neighbouring properties were as follows:

To the north	Vacant land
To the east	Richmond Road
To the south	Existing subdivision
To the west	Landfill

There were no air emissions emanating from the neighbouring properties.

CONCLUSION AND RECOMMENDATIONS

Based on the review of the available reports contamination, validation, site audit statement associated with the subject site and site inspection, it is considered that the subject site comprising part of the Lot 11 and part Lot 12 as shown on the Figure 2 of Site Audit Statement (SAS GN319B) is considered validated subject to ongoing approved Site Management Plan.

However, the western portion of the site (part Lot 12 and part Lot 292 DP1076555) covering about approximately 1.3ha, as indicated on Drawing No 13270/1-AA1, is not covered in the Site Audit Statement, dated February 2013 and is considered not validated. It is therefore that this part of the site is recommended for contamination assessment. Should the soil have concentrations of analytes that would pose a risk of harm to human health and/or the environment, remediation will be required. Any impacted area(s) could be made suitable for the proposed use after remediation, if required.

Numbers of soil, sandstone and shale stockpiles were noted within the site as indicated on the Drawing No 13270/1-AA1. The stockpiles based on the visual observation appeared to be naturally excavated material. However, site history review and chemical analysis were beyond the scope of this report. It is considered that these stockpiles, if not validated / certified by a qualified environmental consultant are subject to ongoing Site Management Plan for appropriate management with contamination assessment based on the site history and chemical analysis.

As stated in the site audit statement, the ground water beneath the site has not been significantly impacted with the exception of localised *impact by ammonia and petroleum hydrocarbons* by the former site activities. As the abstraction of groundwater is not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water.

LIMITATIONS

The services performed by Geotechnique in preparing this report have been conducted in a manner consistent with the level of quality and skill generally exercised by members of the profession and consulting practice.

To the best of our knowledge, all information obtained and contained within this report is true and accurate. No further investigation has been carried out to authenticate the information provided.

This report has been prepared for the purpose stated within. Any reliance on this report by other parties shall be at such parties' sole risk, as the report might not contain sufficient information for their purposes.

This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval is provided by Geotechnique.

The information in this report is in accordance with the information provided. Any variations to the site form or use may nullify the conclusions stated.

Attached is a document entitled "Environmental Notes", which should be read in conjunction with this report.

Should you have any questions, please do not hesitate to contact the undersigned.

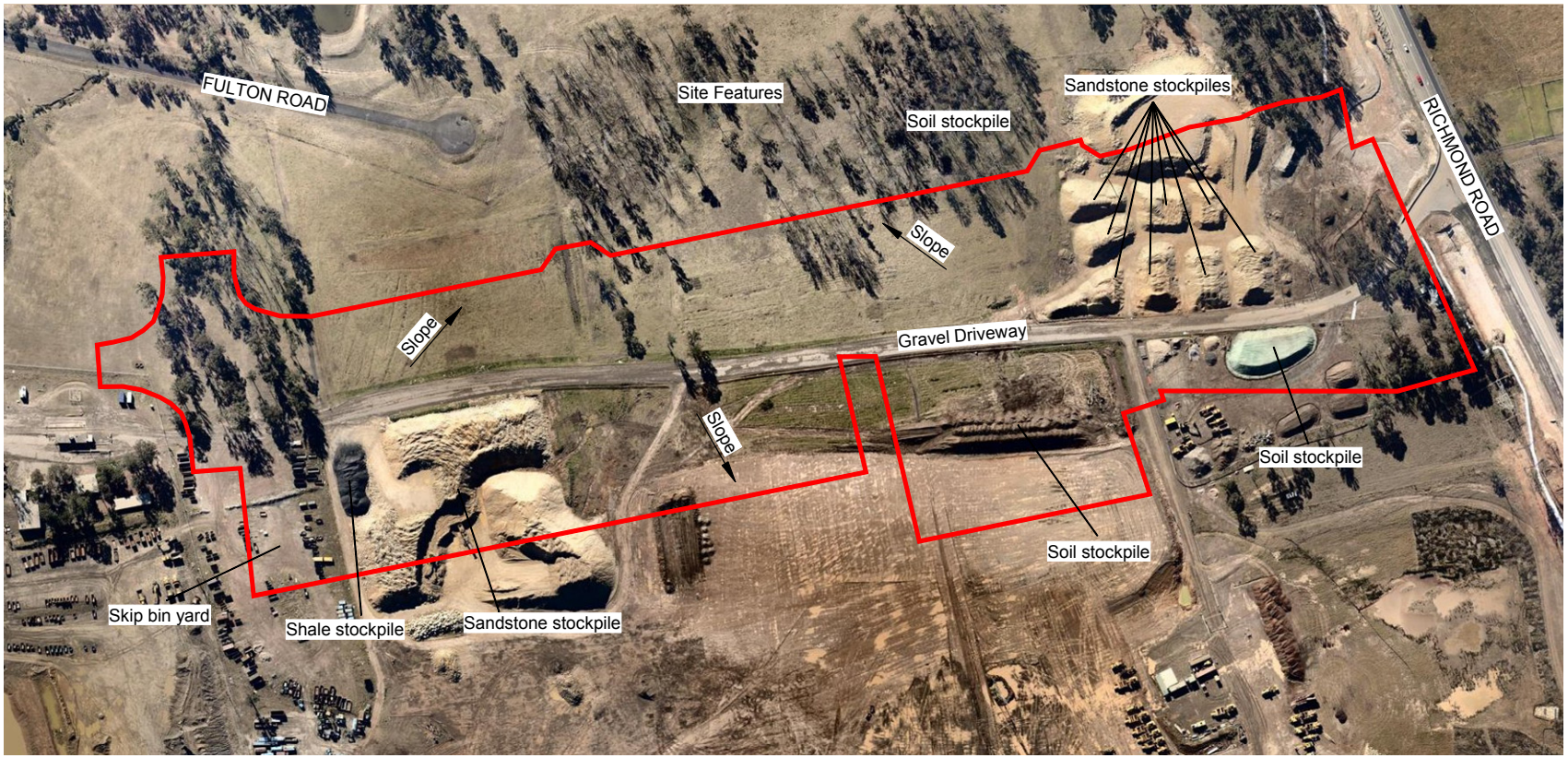
Yours faithfully
GEOTECHNIQUE PTY LTD

DANDA SAPKOTA
Senior Environmental Engineer

Attachment 1:	Drawing No: 13270/1-AA1
Attachment 2:	Figure 6 (Extracted from GHD Phase 2 Contamination Assessment)
Attachment 3:	Validation Report (Draft) - Marsden Park Night Soil Depot Remediation
Attachment 4:	Site Audit Statement - Lot 11 and Part 12 DP262886, Richmond Road, Marsden Park
Attachment 5:	Environmental Notes

ATTACHMENT 1

DRAWING NO: 13270/1-AA1



N

0 40 80 120 160 200m

Scale 1:4000

GEOTECHNIQUE ® PTY LTD

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Penrith NSW 2750
Tel: 02 4722 2700
Fax: 02 4722 2777
e-mail:info@geotech.com.au
www.geotech.com.au

NOTES

1. Site features are indicative and are not to scale.
2. This drawing has been produced using a base plan provided by others to which additional information e.g test pits, borehole locations or notes have been added. Some or all of the plan may not be relevant at the time of producing this drawing

Brown Consulting (NSW) Pty Ltd
Marsden Park Industrial Stage 1.02C
Richmond Road
Marsden Park

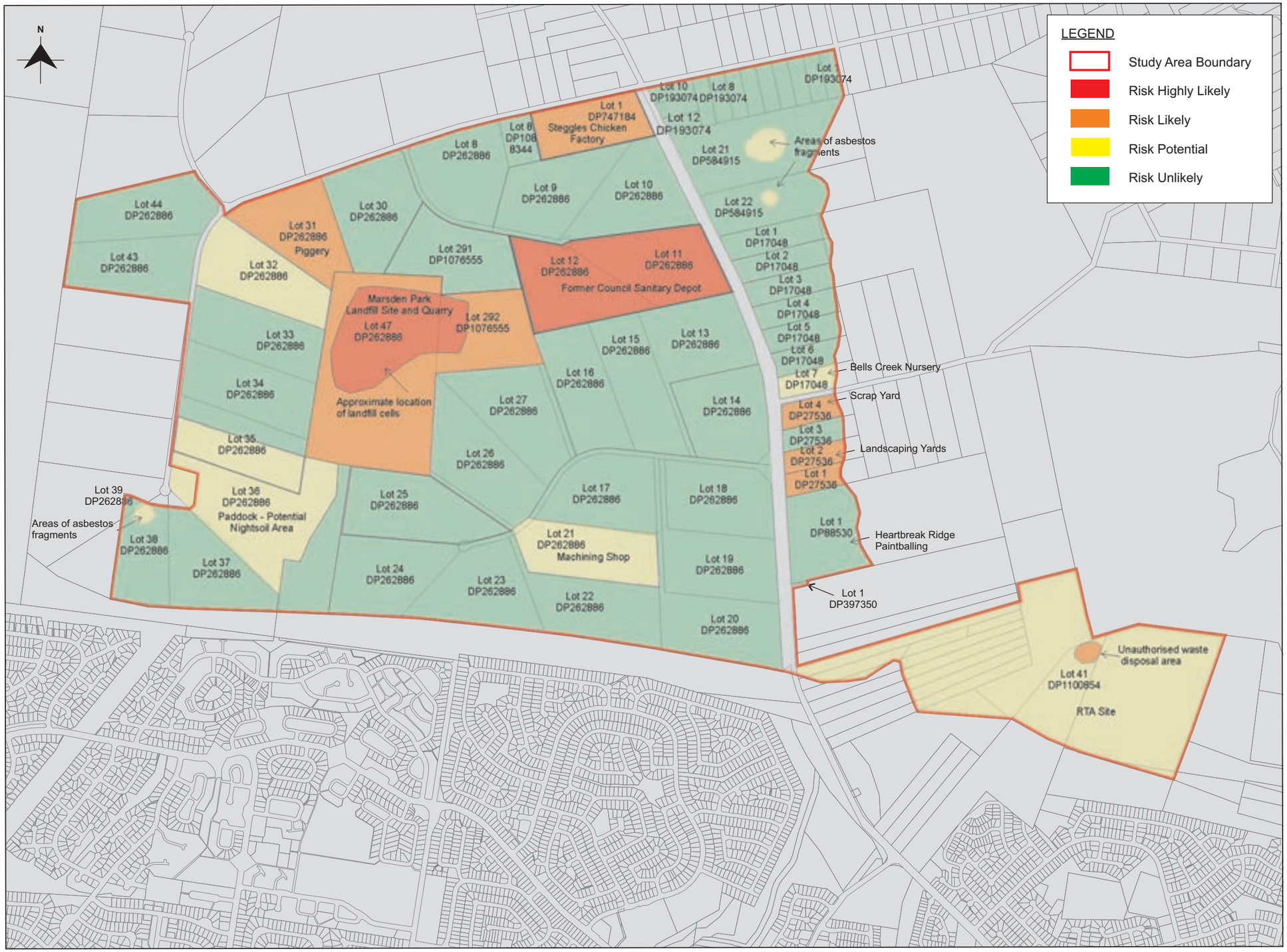
Site Features

Drawing No: 13270/1-AA1
Job No: 13270/1
Drawn By: MH
Date: 29 September 2014
Checked By: DS

File No: 13270-1
Layers: 0, AA1

ATTACHMENT 2

FIGURE 6 (EXTRACTED FROM GHD PHASE 2 CONTAMINATION ASSESSMENT)



GHD Note: Not all areas of the Site have been accessed therefore some risk rankings may be subject to change

Source: Growth Centres Commission

GHD CLIENTS |PEOPLE| PERFORMANCE

Phase 2 Contamination Assessment - Marsden Park Industrial Precinct
Marsden Park Developments Pty Ltd

Final Contamination Risk Ranking

scale | as shown date | November 2008

job no | 21-17717
file ref | 21_17717-P2Fig6.cdr

Figure 6

10 Bond Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7194 **E** sydmail@ghd.com.au **W** www.ghd.com.au

ATTACHMENT 3

VALIDATION REPORT (DRAFT) - MARSDEN PARK NIGHT SOIL DEPOT REMEDIATION

Ganian Pty Ltd

Marsden Park Night Soil Depot Remediation

Validation Report

December 2012

Executive summary

GHD Pty Ltd (GHD) was commissioned by Ganian Pty Ltd acting as trustee for Blacktown Waste and Quarrying Land Unit Trust to undertake remediation consultancy associated with the remediation of the former night soil depot at Lots 11 and 12 DP 262886, Richmond Road, Marsden Park, NSW (the site). Remediation contracting was undertaken by Mulgoa Quarries and remediation project management was undertaken by APP.

Remediation was necessary to render the site suitable for proposed commercial/industrial development. The objective of this project was to remediate and validate the remediation areas identified in the Remedial Action Plans (RAPs) prepared by ERM so that they no longer pose an unacceptable risk to human (health (with respect to its proposed future commercial/industrial use) or the environment.

To achieve this objective GHD supervised the remedial excavations and conducted validation sampling and subsequent laboratory analysis to assess whether remediation goals had been achieved. Excavated material was stockpiled and analysed to assess its suitability for reuse onsite and/or to classify it for offsite disposal. Groundwater was also monitored to validate whether past site activities had impacted groundwater.

Approximately 23,000 tonnes of excavated and stockpiled material was assessed to be unsuitable for reuse on site. It was subsequently classified and disposed of at licenced waste disposal facilities. This included a small volume of asbestos impacted material which was handled by an AS1 licensed asbestos removal contractor and was reported by APP to have been appropriately of at a suitably licensed landfill. Contaminated water collected in a drum disposal excavation in Lot 12 was also pumped and disposed of by a licensed liquid waste contractor.

Soil classified as suitable for reuse onsite were used to backfill the excavations along with a large quantity of VENM imported for road construction but temporarily stored in the Lot 11 workshop remediation area. Backfilling was not completed to pre remediation levels.

The results of the validation sampling indicate that most of the remediated areas have been validated in accordance with the RAPs and SAQP although there are minor exceptions they are considered to be insignificant compared to the scale of remediation completed and will be managed thought the implantation of a site management plan.

The results of post remediation groundwater sampling suggests that groundwater has not been impacted by the remedial works.

In summary, subject to preparation of a site management plan, the areas remediated are considered suitable for the proposed commercial/industrial landuse.

This report is subject to, and must be read in conjunction with, the disclaimer set out in **Section 14**, the scope of works set out it **Section 1.3** and the assumptions and qualifications contained throughout the Report.

Table of contents

Table index

Appendices

1. Introduction and Objectives

1.1 Introduction

GHD Pty Ltd (GHD) was commissioned by Ganian Pty Ltd acting as trustee for Blacktown Waste and Quarrying Land Unit Trust to undertake remediation consultancy associated with the remediation of the former night soil depot at Lots 11 and 12 DP 262886, Richmond Road, Marsden Park, NSW (the site). Remediation contracting was undertaken by Mulgoa Quarries and remediation project management was undertaken by APP.

Remediation was necessary to render the site suitable for proposed commercial/industrial development on the site in accordance with the North West Structure Plan (NSW Department of Planning, 2005).

The Site has been the subject of a number of investigations since 2002, which have identified that areas of elevated concentrations of contaminants require remediation.

ERM produced Remedial Action Plans (RAPs) in March and April 2011, outlining the scope of the required remedial work, which predominantly comprised excavation of soils within the identified areas of concern.

A final Sampling, Analysis and Quality Plan (SAQP) was prepared by GHD in May 2012 to outline the sampling works to be undertaken during remediation and validation. This included soil validation sampling, groundwater sampling and stockpile characterisation for off-site disposal or on-site reuse. The SAQP should be read in conjunction with the ERM RAPs (2011), all of which have been approved by the NSW EPA accredited Site Auditor, Mr Graeme Nyland.

1.2 Objectives

The key objective of the project was to validate (in accordance with GHDs SAQP) the remediation areas (as identified in the ERM RAPs (2011)) as not posing an unacceptable risk to human health or the environment and suitable for the proposed commercial/industrial development of the site.

1.3 Scope of Work

As part of the remediation, the following tasks were carried out:

- Inspection of remedial excavations and validation sampling for subsequent laboratory analysis;
- Assessment of the results of validation sampling to assess whether remediation goal have been achieved;
- Sampling and analysis of stockpiled excavated material to assess its suitability for reuse on-site;
- Waste classification of the soils designated for off-site disposal and preparation of appropriate waste classification documentation;
- Groundwater monitoring to assess whether the remediation activities has impacted groundwater; and
- Preparation of this Validation Report documenting the outcomes of the works and the requirement for a site management plan to be implemented at the site following remediation.

1.4 Key Documents

A summary of key documents referenced throughout this report is presented in **Table 1**.

Table 1 Key Document Reference

Document	Reference	Abbreviation
Remedial Action Plan – Lot 12	ERM - Remediation Action Plan, Lot 12, Former Marsden Park Sanitary Depot, Marsden Park, NSW, 30 March 2011	ERM Lot 12 RAP (2011) ERM RAPs (2011) when referring to the Lot 11 and 12 RAPs
Remedial Action Plan – Lot 11	ERM - Remediation Action Plan, Lot 11, Former Marsden Park Sanitary Depot, Marsden Park, NSW, 29 April 2011,	ERM Lot 11 RAP (2011) ERM RAPs (2011) when referring to the Lot 11 and 12 RAPs
Sampling, Analysis and Quality Plan	GHD - Sampling, Analytical and Quality Plan, Validation Sampling Program - Lots 11 and 12, former Marsden Park Sanitary Depot, Marsden Park, NSW, May 2012	SAQP

2. Site Characterisation

2.1 Site Location, Condition and Environment

A summary of the site location is presented below.

2.1.1 Site Location

The site is located on Richmond Road, Marsden Park, NSW within Blacktown City Council, and is described as Lots 11 and 12 in Deposited Plan (DP) 262886 (formerly referred to as Lot 11 and Lot 12 DP 616003) (**Figure 1** in **Appendix A**).

Lot 11 is trapezoidal in shape and covers an area of approximately 11.6 hectares, which includes a frontage onto Richmond Road of approximately 280 m. The elevation of Lot 11 varies from approximately 40 m Australian Height Datum (AHD) on the western site boundary to approximately 30 m AHD in the south east. Lot 11 joins Lot 12 which is located adjacent to the west.

Lot 12 is triangular in shape and covers an area of approximately 8.2 hectares. The elevation of this Lot varies from approximately 40 m AHD on the western site boundary to approximately 30 m AHD in the south east.

2.1.2 Site Condition and Environment

According to the ERM RAPs (2011), prior to the remediation the site was being used for farming purposes. The previous buildings and other infrastructure associated with the former night soil depot located in Lot 12 had been removed prior to 2003.

The site is zoned In2 (Light Industrial), B7 (Business Park) and SP2 (Infrastructure) in the State Environmental Planning Policy (SEPP) (Sydney Region Growth Centres) 2006. The proposed land use of the site according to the North West Structure Plan (NSW Department of Planning, 2005) is Industrial/Employment Lands. It is understood approval for the site to be redeveloped for a commercial/industrial use has been granted.

2.1.3 Surrounding Land Uses

The areas in the vicinity of the site are mostly undeveloped. The surrounding land uses are:

- North: open paddock area;
- West: the Marsden Park Landfill, operated by Blacktown Waste Services;
- East: Richmond Road, then open paddocks, bushland and commercial landuse; and
- South: open paddock areas with an overhead electricity easement and a Mosque.

2.1.4 Topography and Drainage

Overall, the site and surrounding area comprises gently undulating hills. Surface water originating from the site would be expected to infiltrate or pool in localised depressions through unsealed surfaces.

2.1.5 Geology and Hydrogeology

According to the *1:100,000 Penrith Geological Series Sheet 9030 (1st Edition) 1991* the site is underlain by Bringelly Shales of the Wianamatta Group and is comprised of shale, carbonaceous claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff.

The ERM RAPs reported that groundwater monitoring data reported by URS (2004 and 2005) indicated that groundwater standing water levels ranged from approximately 3.2 to 4.3 metres below ground level (m bgl) top of well casing and elevations ranged from 32.16 to 34.77 m AHD on the site. Local groundwater flow was interpreted to be in an easterly direction towards Bells Creek.

2.2 Site History

The ERM RAPs (2011) provide a summary of the history of the site which is presented as follows:

The site was operated by Blacktown City Council (BCC) as a sanitary depot from 1955 on a 50 year lease and accepted night soil or septic tank waste primarily from the mid-1960s to the mid-1990s. Waste was primarily disposed of in trenches, which were to be covered later, although there is evidence to suggest that this practice was not always followed. The latest recorded disposal of night soil and/or septic tank waste occurred in the early 2000s in the eastern portion of Lot 12 near the current roadway. No records were available to indicate specific disposal locations throughout the operation of the depot.

In addition to the approved night soil and septic tank waste disposal in Lot 12, there was also evidence of unapproved waste disposal occurring. These unapproved waste materials consisted of waste water, industrial waste, drums and other materials which were disposed of in various undocumented locations, which may include areas of both Lot 11 and Lot 12.

Activities in the Workshop Area of Lot 11 included maintenance of metal nightsoil cans, comprising cleaning and re-tarring. Wastewater from these operations was disposed of in a bunded drainage area to the west of the workshop buildings (the Drainage Area), which may have also contained tar wastes on occasion. In addition, two Underground Storage Tanks (USTs) were present in the south east corner of the Workshop Area. These were removed in December 2004. URS (2004) conducted soil validation of the tank pits with laboratory analytical results indicating that the soils were suitable to remain in place.

The landfill upgradient (west) of the site commenced operations in late 2003 and was not considered to have affected the site (URS, 2004).

2.2.1 Previous Investigations

A number of previous environmental investigations have been completed on the site. These have been discussed in detail in the ERM RAPs (2011). A list of these reports is provided below;

- Geotechnique Pty Ltd (2002) *Preliminary Environmental Site Assessment, Sanitary Depot, Richmond Road, Marsden Park*;
- URS (2002) *Review of ESA Report, Sanitary Depot, Marsden Park*;
- Megharaj, M., Owens, G. and Naidu, R. (2004) *Phytotoxicity Assessment of a Sanitary Contaminated Site*;
- URS (2004) *Environmental Site Assessment- Former Marsden Park Sanitary Depot*;
- Alpha Geoscience Pty Ltd (2005) *Geophysical Survey (Total Field Magnetics), Marsden Park, Sydney NSW*;
- URS (2005) *Phase 3 Environmental Site Assessment, Former Marsden Park Sanitary Depot*;
- CES (2008) *Former Marsden Park Sanitary Depot, Richmond Road, Marsden Park, NSW: Review of Remediation Options and Provision of Advice*;

- CES (2009) *Remediation Quantities Assessment Former Marsden Park Night Soil Depot, NSW*;
- Alpha Geoscience (2009) *Geophysical Survey: Conductivity Survey over Landfill*;
- CES (2009) *Scope of Work for the Supplemental Phase 2 ESA and the RAP, Former Marsden Park Night Soil Depot*;
- CES (2010) *Supplemental Environmental Site Assessment: Former Marsden Park Night Soil Depot, Marsden Park NSW*; and
- ERM (2010) *Supplemental Environmental Site Assessment, Former Marsden Park Sanitary Depot, Marsden Park NSW.*

2.3 Identified Contamination

The SAQP summarised the contamination status of the site, described in the ERM RAPs (2011) as follows:

Lot 11

- Impacted soils (PAHs and TPH) were generally confined to the former workshop and drainage areas in the north eastern portion of the site with some isolated contamination hotspots identified at former test pit locations TP224, TP376, TP382 and TP525A which were contaminated with TPHs and PAHs. Fill material was identified to a depth of approximately 0.9 metres below ground level (m bgl) by URS (2004) in the former workshop and drainage areas, however concentrations of contaminants of concern were not identified above the nominated assessment criteria below a depth of approximately 0.7 m bgl;
- The results of CES (2009) investigation indicated that although waste materials (ash, glass bottles and wood) were identified at shallow depths in test pits excavated near TP372, the concentrations of contaminants of concern in the samples collected and analysed were below the assessment criteria; and
- ERM undertook additional investigation near the reported location of TP525A in September 2010, the results of which indicated that fill material was present to approximately 0.4 m bgl and that the hotspot comprised an area of approximately 100 m^2.

Lot 12

- Results of laboratory analysis of soil samples collected and analysed during previous investigations indicated the area of most widespread impact was described by URS (2009) as the Southwest Night Soil Disposal Area in the south western portion of Lot 12, which was subject to TPH and PAH contamination. Smaller hotspots of contamination were also identified at previous test pit locations TP307 (TPH and copper), TP312 (TPH) and TP360 (Lead).
- Buried drums containing liquid waste were uncovered by URS in 2003 at TP325 in the southwest corner of the Southwest Night Soil Disposal Area to a depth of approximately 3 m bgl.

CES (2010) completed a geophysical survey to identify subsurface objects such as drums and night soil cans. The results of this investigation indicated that the only area of gross anomaly in Lot 12 was located near TP325 where buried drums were previously identified by URS. The survey also identified that the soil impact in the former workshop/drainage areas on Lot 11 (as identified by URS 2003, 2004) extended further to the north towards the site boundary to a maximum depth of approximately 0.35 m bgl.

Groundwater

- Groundwater standing water level at the site was measured by URS in 2004 and 2005(at depths of between approximately 2.0 to 4.3 m bgl (29.96 to 34.77 m AHD). Groundwater was generally shown to be free of impact by chemicals of concern associated with the night soil depot. Although generally low concentrations of ammonia, cadmium and nickel were detected, these were considered not to impact the suitability of the site for the proposed commercial/industrial use. The Auditor has expressed the opinion that further investigation or remediation of groundwater on the site is not considered necessary in relation to the proposed commercial/industrial land use (Environ, 2009).

2.4 Extent of Remedial Works

The extent of soil remediation required at the site was deemed by ERM to be primarily confined to the following areas:

2.4.1 Lot 11 Former workshop and drainage area

Fill materials were impacted by PAHs and TPH which extended across the area of the former workshop and drainage area. Impacted material was required to be excavated to an average depth of approximately 0.7 m bgl across the remediation area, or until natural material was encountered. The extent of excavation should continue where fill material is observed to contain bitumen/asphalt waste, however excavation to natural clay is not required where fill material is not suspected to be contaminated. The remediation area of the Lot 11 former workshop area is presented in **Figure 3**, **Appendix A**.

2.4.2 Lot 12 Southwest Night Soil Disposal Area

Fill materials impacted by PAHs, TPH and heavy metals are present in the southern and western extents of the south west night soil disposal area. This material is required to be excavated to a depth of approximately 1.0 m bgl across the majority of the remediation area, with isolated areas requiring excavation to approximately 2 m bgl and 3 m bgl as presented in **Figure 4**, **Appendix A**.

2.4.3 Lot 11 and Lot 12 Hotspots

Material identified at the hotspots is considered to be impacted to the extent they are not suitable to remain in situ. Excavation at these locations should proceed in a vertical direction to the top of natural soils, which should be inspected for evidence of impact from the overlying contaminated fill materials. The lateral extent of required remediation in these areas was estimated based on the results from previous investigations and validation of the walls and bases of the hotspot excavations were conducted once field observations indicated that contaminated material has been removed.

3. Remediation methodology

The extent of excavation continued to where fill material and or visual contamination was observed such as that containing bitumen/asphalt waste. Excavation to natural clay was not required where fill material was not suspected to be contaminated. In summary, the remedial works undertaken comprised:

- Excavation of contaminated shallow fill materials and natural soil;
- Validation of the walls and bases of the excavations (**Section 6.1**);
- Segregation of excavated material into contaminated and uncontaminated stockpiles where possible based on visual and olfactory observations and laboratory analytical results;
- Classification of the contaminated stockpiles for off-site disposal in accordance with NSW DECC (2008) *Waste Classification Guidelines*;
- Classification of the uncontaminated stockpiles for reinstatement in accordance with the site validation criteria;
- Classification and disposal of waste water collected within the excavations where necessary;
- Importation of validated material to be used as backfill (as required);
- Placement of backfill where required; and
- Post remediation groundwater monitoring.

4. Data Quality Objectives (DQO)

The purpose of establishing Data Quality Objectives (DQO) is to ensure that the field investigations and subsequent analyses are undertaken in a way that enables the collection and reporting of reliable data on which to base the assessment.

A process for establishing DQOs for a site has been defined by the US EPA. That process has been adopted within the Australian Standard: AS 4482.1-2005 and referenced by the National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999) and the Guidelines for the NSW Site Auditor Scheme, 2nd ed (NSW DEC, 2006).

The DQO process involves seven steps as follows:

- Step 1: State the problem;
- Step 2: Identify the decision;
- Step 3: Identify inputs to the decision;
- Step 4: Define the study boundaries;
- Step 5: Develop a decision rule;
- Step 6: Specify limits on decision errors; and
- Step 7: Optimise the design for obtaining data.

The DQO steps defined above have been addressed as follows.

4.1 Step 1: State the Problem

Previous investigations conducted at the site have identified contamination of soil associated with historical activities undertaken at the site. This contamination is interpreted to be associated with the historical use of the site as a night soil disposal depot and associated workshop. Some additional uncontrolled disposal of waste is also understood to have occurred on site.

The aim of the project is to remediate remediation areas as determined in the ERM RAPs 2011 (Figure 2) as suitable for the proposed commercial/industrial development of the site.

4.2 Step 2: Identify the Decisions

The decision to be made with respect to the contamination is to verify that the remediation has been completed successfully to ensure the remediation areas of the site are suitable for the proposed commercial/industrial development of the site.

Previous investigations have provided data on the contamination status of the site. A number of areas on site, as nominated in the ERM RAPs (2011), are required to be remediated to ensure the site is suitable for proposed commercial/industrial land use, and that contamination does not pose an unacceptable risk to human health and/or the environment.

The decisions that are required to be made in this project include:

1. Do the validation sampling results demonstrate that remediation of the remedial areas has been successful?
2. Is the material utilised to backfill the excavations suitable to be utilised on site under the proposed commercial/industrial landuse?
3. Is groundwater management and/or remediation necessary following soil remediation?

4.3 Step 3: Identify Inputs to the Decision

The validation sampling program was designed to provide sufficient information to allow a sound scientific and statistical evaluation of the questions set out in Section 5.2.

This was achieved by:

1. Undertaking validation sampling and analysis of soil to provide a statistically valid data set upon which to base subsequent decisions;
2. Comparing the validation data to the adopted site validation criteria presented in the SAQP to evaluate the potential for contamination to adversely impact upon human health and/or environmental receptors; and
3. Evaluating (based on contaminant ⇨ pathway ⇨ receptor analysis) whether or not the site is suitable (from a contamination perspective) for commercial/industrial land use.

The outcome of these analyses will be used to address Questions 1-4 (as set out in **Section 4.2**).

4.4 Step 4: Define the Study Boundaries

The lateral boundaries of the study area are the remediation areas specified in the ERM RAPs (**Figure 2, Appendix A**) within the site known as Lots 11 and 12 in DP 262886, Richmond Road, Marsden Park, NSW. These areas are illustrated on **Figure 2, Appendix A**.

The vertical boundary is considered depth of fill or depth at which impact is no longer recorded.

The vertical boundary with respect to groundwater shall be the depth into the profile which existing groundwater table was encountered.

4.5 Step 5: Develop a Decision Rule

The soil assessment criteria identified in tables 2 and 3 of the SAQP and are based on the Soil Investigation Levels outlined in the NEPM (1999) *Schedule B (1) Guideline on Investigation Levels for Soil and Groundwater* and reproduced in NSW DEC (2006) *Guidelines for the NSW site Auditor Scheme (2nd edition)*. In the absence of relevant guidelines for industrial land use for petroleum hydrocarbons, assessment criteria for these constituents were based on sensitive land use guidelines provided within the NSW EPA (1994) *Guidelines for Assessing Service Station Sites*. Further information about the nominated soil guideline values is presented in **Section 5**.

A 95% Upper Confidence Limit (UCL) of the mean concentration of substances in soils will be considered acceptable in relation to site criteria (health-based) with no individual sample exceeding 250% of the assessment criteria (health-based). Furthermore, the standard deviation of the results must be less than 50% of the health-based assessment criteria. Soils exceeding 250% of the assessment criteria were deemed to represent hot spots and would require additional remediation.

The NSW DECC (2008) Waste Classification Guidelines was utilised to classify waste for off-site disposal, where applicable. The 95% UCL on the mean concentration of the substance in soil was considered acceptable in relation to the waste classification guidelines.

Soil and groundwater concentrations should be at levels below the guidelines presented in the SAQP and therefore are not deemed to constitute an unacceptable risk to human health or the environment as outlined.

4.6 Step 6: Specify Limits on Decision Errors

Data Quality Indicators (DQIs) – data completeness, data comparability, data representativeness, sampling and analysis accuracy and precision. The DQIs are a measure of the data quality controls implemented during the assessment. The quality control measures to be adopted are discussed in **Section 7** below.

4.7 Step 7: Optimise the Design for Obtaining Data

To optimise the design of the validation a sampling and analytical program was prepared in accordance with the SAQP. This is outlined in **Section 6**.

5. Basis for Validation

5.1 Relevant Guidelines

The framework for the contamination assessment has been developed in accordance with guidelines "made or approved" by the NSW EPA under Section 105 of the Contaminated Land Management Act, 1997.

These guidelines include the following:

- NSW EPA (1994), *Contaminated Sites: Guidelines for Assessing Service Station Sites*.
- NSW EPA (1995), *Contaminated Sites: Sampling Design Guidelines*
- NSW EPA (2011), *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*
- NSW EPA (1999), *Contaminated Sites: Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report*
- NEPM (1999), *National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council (NEPC).*
- ANZECC (2000), *National Water Quality Management Strategy, Paper No. 4, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, October 2000, Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).*
- NSW DEC (2006), *Contaminated Sites: Guidelines for NSW Site Auditor Scheme, 2nd edition*
- NSW DEC (2007), *Guidelines for the Assessment and Management of Groundwater Contamination*
- NSW DECC (2008) *Waste Classification Guidelines Part 1: Classifying Wastes.*
- Sydney Water (2012) *Trade Waste Acceptance Standards*

5.2 Validation Assessment Criteria (soil)

The assessment criteria (investigation levels) have been adopted from those outlined in the ERM RAPs and are taken from those guidelines made or approved by the NSW EPA.

5.2.1 Health Based Investigation Levels

Health-based soil Investigation Levels (HILs) are provided for a range of different exposure settings, which are based on the nature of the use(s) for which the land is currently used and/or its approved use(s). Based on the proposed land use, *Schedule B(1): Health Investigation Levels -Exposure Setting F for commercial / industrial premises* have been nominated as the site validation criteria.

For some contaminants (including TPH C_6 -C_9) for which no HIL is presented in the NSW EPA (2006) *"Guidelines for the NSW Site Auditor Scheme"*, reference is made to the sensitive land use threshold provided in the NSW EPA (1994) *"Guidelines for Assessing Service Station Sites"*.

Table 2 provides a summary of the adopted soil criteria that will be used to assess soil contamination levels at the site following completion of the remedial activities.

It is noted aesthetic issues will be considered when assessing the overall project data set. Any soil exhibiting adverse odours, staining, or other physical evidence of potential contamination may be deemed unsuitable for use on-site (or be deemed to require remediation or management), due to aesthetic factors.

Table 2 Adopted Soil Validation Criteria

Parameter	Adopted Site Criteria (mg/kg)
Arsenic (total)	500[1]
Cadmium	100[1]
Chromium (III)	60%[1]
Chromium (VI)	500[1]
Copper	5,000[1]
Lead	1,500[1]
Nickel	3,000[1]
Zinc	35,000[1]
Total Mercury (inorganic)	75[1]
TPH- C6-C9	65[2]
TPH >C10-C26	1 000[2]
Benzene	1[2]
Toluene	13[2]0
Ethyl Benzene	50[2]
Total Xylenes	25[2]
Polycyclic aromatic hydrocarbons (total) (PAH)	100[1]
Benzo(a)pyrene	5[1]

1. NEPM *(1999) Health-based Investigation Levels HIL (F) – Commercial Industrial land use*
2. NSW EPA (1994) *Guidelines for the Assessment of Service Station Sites, threshold concentrations for sensitive land use – soils*.

5.2.2 Pathogens

The risk from pathogens relates to the historic disposal of night soil on Lot 12 within the southwest nightsoil disposal area (**Figure 4**, **Appendix A**). This was assessed as being low by URS in 2004 and is expected to continue to attenuate further with time (ERM RAPs). The ERM RAPs stated the *New South Wales Department of Environment, Climate Change and Water (DECCW) has indicated that discussions with the New South Wales Department of Health, (DoH) regarding appropriate assessment criteria should be undertaken when assessing the risk from pathogens on contaminated sites (URS, 2009). This opinion was reiterated during* [ERMs] *discussions with the Auditor in July 2010.*

The results of the additional investigation indicated that current levels of enteric viruses and other biological agents (e.g. E. coli, salmonella, faecal coliforms and helminth ova) at test pit locations TP377 and TP308 (as shown in Table 1) were low.

The RAP stated communication received from the DoH (Sydney West Area Health Service) in December 2010 stated the application of the NSW EPA (2000) Environmental Guidelines: Use and Disposal of Biosolids Products, Stabilisation Grade A would not be technically applicable for

adoption as remediation criteria for pathogens but advised the Biosolids Guidelines could be used as a general means of providing some context when interpreting laboratory results for pathogens. Consequently, the Biosolids Guidelines are proposed as screening levels only and not as soil validation criteria. If pathogens results for validation samples exceed the levels stipulated in Table 3, it is anticipated discussion with the Site Auditor (and potentially DoH), will be undertaken to assess effectiveness of remediation in these areas, potential risks to future users of the site and any need for further excavation or other treatment.

Table 3 Adopted Pathogens Criteria

Pathogens	Limit of reporting	Adopted Site Criteria
Enteric Viruses	1 PFU	<1 PFU per 4 grams total dry solids
Helminth Ova	1 Ova	<1 Ova per 4 grams total dry solid
Faecal Coliforms	1 MPN	< 1000 MPN per gram (dry weight)
E. coli	1 MPN	<100 MPN per gram (dry weight)
Salmonella	Detect/Non Detect per 100 ml	Not detect per 50 grams (dry weight)

PFU - Plaque-Forming Unit

MPN - Most Probably Number

5.2.3 Asbestos

In the absence of appropriate guidelines, the asbestos criteria adopted for the validation sampling is no asbestos fibres detected in the representative samples collected.

5.3 Assessment Criteria (groundwater)

Groundwater was assessed with reference to the guidelines outlined in the Australian and New Zealand Environment Conservation Council (ANZECC) (2000) *Australia and New Zealand Guidelines for Fresh and Marine Water Quality* and data compared to the 95% level of protection for freshwater ecosystems.

There are no current NSW EPA endorsed high reliability assessment criteria for TPH in groundwater, however the ANZECC/ARMCANZ (2000) guidelines provide an interim low reliability value for crude oil of 7 ug/L (0.007 mg/L), which is known to contain numerous hydrocarbon species. As current laboratory techniques cannot quantify TPH to this level, the laboratory reporting limits of 0.02mg/L for C_6-C_9 fractions, 0.05 mg/L for C_{10}-C_{14} fractions and 0.1 mg/L for C_{15}-C_{28} fractions and 0.05 mg/L for C_{29}-C_{36} fractions have been adopted as screening values, as nominated in the ERM RAPs.

The RAP outlined active groundwater remediation is not proposed on the site. The assessment criteria outlined in

Table 4 pertains to the post remediation groundwater investigation.

Table 4 adopted Groundwater Criteria

Parameter	Limit of reporting (mg/L)	Adopted Groundwater Criteria - Trigger Values 95% Freshwater[a] (mg/L)
Arsenic (As III / As V)	0.001	0.024 / 0.013
Cadmium	0.0001	0.0002
Chromium (VI)	0.001	0.001
Copper	0.001	0.0014
Lead	0.001	0.0034
Mercury (inorganic)	0.0001	0.0006
Nickel	0.001	0.011
Zinc	0.005	0.008
Total Petroleum Hydrocarbons (TPH)		
C_6-C_9	0.02	ns
C_{10}-C_{14}	0.05	ns
C_{15}-C_{28}	0.1	ns
C_{29}-C_{36}	0.05	ns
Benzene	0.001	0.95
Toluene	0.002	ns
Ethylbenzene	0.002	Ns
o-xylene	0.002	0.35
m-xylene	0.002	
p-xylene	0.002	0.2
Total PAH	0.001-0.005	ns
Naphthalene	0.001	0.016
Benzo(a)pyrene	0.0005	0.0002

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000), 95% Protection Level for Fresh Water.

ns- criteria not stated

5.4 Waste Classification

All soils and other materials disposed of off-site were classified, transported and consigned to appropriately licensed landfills in accordance with the NSW DECC (2008) *Waste Classification Guidelines Part 1: Classifying Wastes*.

Based on the NSW DECC (2008) guidelines, any material containing asbestos is classified as Special Waste and if Special Waste is mixed with any other class of waste the waste must be managed to meet the requirements of both the Special Waste and the other class of waste.

Soils classified as *General Solid Waste* and *Special Waste - Asbestos* were transported and disposed of at Blacktown Waste located next the site. Soils classified as *Restricted Solid Waste* and *Hazardous Waste* were transported and disposed of at Worth Recycling.

5.4.1 Pre-classified Waste

URS undertook pre-classification assessment works for the asphalt waste in the vicinity of the workshop and drainage areas on Lot 11 as part it's investigation in 2004 (URS, 2005). The results of laboratory analysis for samples from within this area indicated that the majority of excavated fill material would require disposal as Hazardous Waste. However, subsequent analysis indicated that the fill material contained high levels of asphaltenes. URS concluded that the results of asphaltene analysis combined with the historical use of this area as a workshop for sealing nightsoil cans with bitumen/asphalt mixtures indicated that the bitumen/asphalt wastes from the workshop and drainage areas could be pre-classified as **General Solid Waste** based on the *Waste Classification Guidelines* (DECC, 2008).

In *Site Audit Report - Remediation Action Plan, Former Marsden Park Sanitary Depot* (Environ, 2009) the Site Auditor indicated that night soil cans, metal pieces and other pieces of general rubbish in shallow fill materials on the site could be disposed of as **General Solid Waste** based on the requirements of the Waste Classification Guidelines (DECC, 2008). However, drums, if uncovered during remedial excavation, should be handled with care and disposed of as Hazardous Waste based on requirements of the *Australian Code for the Transport of Dangerous Goods by Road and Rail*. Some pre-treatment may be necessary prior to disposal based on the condition of the drum(s) and its contents. Based on the results of previous investigations in Lot 12, buried drums are expected to be encountered in the South west Night Soil Disposal Area near the previous test pit location TP325 with an estimated lateral coverage area of approximately 25m^2. Given that the drums were observed at approximately 1.5 m depth, it is estimated that there would be a maximum of approximately 25 drums in this area. Successful completion of a pre-treatment process may allow the drums to be disposed of as General Solid Waste, dependent on the condition of the drum(s) and its contents. Pre-treatment should entail application of one wash of each drum with a non-phosphate detergent followed by two rinses with potable water. Based on this regime, it is estimated that a maximum amount of wash water generated would be approximately 200 L for each drum. Drum washing was not deemed necessary onsite because water collected in the drum disposal excavation had removed the majority of residues from drums and very few drums were identified.

5.4.2 Waste water

All surface water that was found onsite was required to be analysed to assess the suitability of the water for disposal to sewer in accordance with the requirements of Sydney Water *Trade Waste Guidelines*.

Surface water that was assessed to be unsuitable for discharge to sewer it was pumped and disposed from site by a licensed liquid waste contractor.

6. Sampling and Analytical Program

Soil sampling and analysis was used evaluate the residual soils at the nominated remediation areas which are presented in Figure 2. In summary, the remedial areas are:

- The former workshop and drainage area in Lot 11 (**Figure 3**);
- The southwest night soil disposal area in Lot 12 (**Figure 4**); and
- Contamination hotspots (TP224, TP376, TP525, TP307, TP312, TP360 and TP325) (**Figures 8** and **9**).

Within the Lot 11 former workshop area additional areas were identified for remediation. These areas were:

- The former UST location;
- A drainage pit, easement, and basin (the western key area); and
- The northern key area.

Within the Lot 12 southwest night soil disposal area additional areas were identified for remediation. These areas were:

- The drum disposal area;
- The two metre deep excavation;
- The trenches in the centre and east of the Lot 12 validation area (**Figure 5**);
- The trenches in the south west of the Lot 12 validation area (**Figure 6**); and
- The trenches in the north west of the Lot 12 validation area (**Figure 7**).

Validation soil sampling was undertaken in accordance with the SAQP.

6.1 Validation Sampling Methodology

Validation of the final excavation surfaces in the remedial excavation was undertaken in accordance with the following procedures and requirements:

- Samples were collected from excavation walls between 0 and 150 mm below the surface of the exposed walls and on a 10 metre grid at the base of the excavation with additional deep wall samples collected at every metre in excavations greater than 1 m bgl;
- Where fill materials were present in the excavation walls and base, sampling preference was given to these materials over natural soils based on the identified impacts in fill materials on the site;
- New disposable nitrile gloves were used for the collection of each sample;
- Samples were collected directly from excavator bucket or by hand using a gloved hand or clean (decontaminated) stainless steel trowel and placed in laboratory prepared sample jars with no head space. Soils were described with features such as discolouration, staining, odours and other indications of contamination being noted;
- Sample containers were labelled with an individual identification number, sampling date and the sampler's initials;
- Samples were stored in an ice filled container for transport to the project analytical laboratory with chain of custody documentation;

- Samples were submitted to the project laboratory to enable sufficient time for extraction and analysis within holding times specified in Schedule B(3) of NEPM (1999);
- All sampling equipment was thoroughly decontaminated where necessary between each sample location, using a mixture of phosphate free detergent and potable water;
- A visual assessment was made of all samples for the potential presence of asbestos in fill material on the Site; and
- All field observations was recorded in field log books

A summary of the sampling requirements for final excavation surfaces was provided in the ERM RAPs and GHDs SAQP. These are presented in **Table 5**.

Table 5 Validation Sampling Plan

Location	Sampling Rate	Analytes
Excavations less than 25m^2		
Excavation base	1 sample	TPH, BTEX, PAHs and heavy metals (8)
Excavation walls	1 sample per 10 linear metres 1 samples per 1 metre vertically	TPH, BTEX, PAHs and heavy metals (8)
Excavation base and walls	25% of total samples in night disposal areas only	Pathogens
Excavations greater than 25m^2		
Excavation base	10 x 10 metre grid	TPH, BTEX, PAHs and heavy metals (8)
Excavation walls	1 sample per 10 linear metres 1 samples per 1 metre vertically	TPH, BTEX, PAHs and heavy metals (8)
Excavation base and walls	25% of total samples in night disposal areas only	Pathogens

1. *In-situ validation sample locations were based on visual and olfactory assessment of soils following removal of impacted materials*

Inspection of fill materials for ACM was undertaken during remedial excavation and preparation of the final validation surfaces. Where potential ACM was observed, laboratory analysis was undertaken for confirmation.

Where analytical results or visual or olfactory assessments indicated that soils did not meet the validation assessment criteria, further excavation was undertaken until the analytical results indicated that the residual soil reported concentrations of contaminants of concern below the validation acceptance criteria (see **Section 8**)

6.1.1 Alterations to the Analytical Program

During the remedial works the following trends were observed in the analytical results of validation soil samples and stockpiles identified as potentially suitable for reuse onsite:

- No salmonella, enteric viruses (adenovirus, enterovirus and reovirus) or helminth ova (ascaris and taenia) were detected in 28 soil samples collected and analysed; and

- No detectable concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX) detected in 716 soil samples collected and analysed.

After receiving advice from GHD on 20 June 2012 the client contacted the site auditor to request that salmonella, enteric viruses and helminth ova be removed from the validation analytical suite. This was approved by the Site Auditor on 26 July 2012.

After receiving advice from GHD on 3 October 2012 the client contacted the site auditor to request that BTEX be removed from the validation analytical suite. This was approved by the Site Auditor on 9 October 2012.

6.2 Groundwater Sampling

Based on the requirement of the ERM RAPs, validation of groundwater was required in order to demonstrate the soil remediation works undertaken have not affected the condition of the groundwater in such a way as to require active remediation. The following scope of works was required:

- Prior to sampling, existing wells were required to be assessed for whether they were still suitability for collecting groundwater samples to achieving validation requirements as groundwater monitoring had not been conducted on the site for a number of years. The location of existing groundwater wells is shown in **Figure 2**, **Appendix A**;
- Additional monitoring wells were to be installed to replace those found to be broken;
- Groundwater sampling was to be undertaken near the completion of the soil remedial works; and
- Water samples were to be collected using 'low-flow' procedures.

All water samples collected were to be analysed for heavy metals, PAH, TPH and BTEX, in accordance with the SAQP.

6.3 Stockpile Characterisation

Excavated fill material and natural soils were assessed based on an initial stockpile sampling program. The initial stockpile sampling program included sample collection at a rate of one per 100 m^3 and analysis for TPH, PAH and heavy metals. The results from the initial sampling program were used to assess the second stage of sampling for either reuse (**Section 6.3.1**) or offsite disposal (**Section 6.3.2**).

6.3.1 Onsite Reuse of Stockpiled Excavated Soil

Fill material and natural soils that were excavated and assessed as potentially *uncontaminated* based on the initial sampling program were scheduled for the following additional sampling and analysis to assess for reuse on site:

- Collection of one sample per 25 m^3 of material; and
- Collected samples were analysed for TPH, BTEX, PAHs and heavy metals (8) and pathogens were analysed in 25% of stockpile reuse samples collected and analysed.

Laboratory results for samples collected from *uncontaminated* stockpiles were required to meet the validation acceptance criteria presented in **Section 5.2.1** and **Section 5.2.2** prior to being deemed suitable for onsite reuse.

6.3.2 Off-site Disposal

Fill material and natural soils that were assessed as *unsuitable for reuse onsite* based on initial stockpile sampling program, were scheduled for TCLP analysis for PAH and heavy metals (where necessary) to classify them for offsite disposal.

GHD advised the client that the material should be transported by suitably licensed vehicles and disposed of at a facility appropriately licensed to accept this waste.

7. Quality Assurance and Quality Control

7.1 Field Program

All fieldwork were conducted in general accordance with GHD's Standard Field Operating Procedures that are aimed at ensuring that all environmental samples are collected by a set of uniform and systematic methods.

These procedures include the following key elements:

- Decontamination procedures - including the use of new disposable gloves for the collection of each sample, decontamination of all multiple use sampling equipment between each sampling location (using a phosphate free detergent) and the use of dedicated sampling containers provided by the laboratory;
- Logging procedures - all test pits should be logged using a recognised system;
- Calibration procedures - all field monitoring equipment should be appropriately calibrated;
- Sample identification and preservation procedures; and
- Chain of custody information requirements.

7.1.1 Field Quality Control

Field quality control procedures for use during the project shall comprise the collection and analysis of the following:

Blind Field Duplicates: Comprise a single sample that is divided into 2 separate sampling containers. Both samples are sent anonymously to the project laboratory. Blind duplicates provide an indication of the analytical precision of the laboratory, but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.

Blind duplicates (soil and water) were collected and analysed at a rate of approximately 1 per 20 samples (i.e. 5%).

Interlaboratory Duplicates: Identical to a blind duplicate, except that the primary sample is sent to the project laboratory and the duplicate is sent to the check laboratory.

Split duplicates (soil and water) will be collected and analysed at a rate of approximately 1 per 20 samples (i.e. 5%).

Trip Blank: A sample of laboratory supplied deionised water is bottled and accompanies the other samples over the course of the fieldworks and submitted to the laboratory for analyses. Trip blanks provide an indication of contamination introduced during sample transport and handling.

One trip blank was to be analysed along with each batch of soil and water samples submitted to the primary testing laboratory. This was undertaken until volatile contamination was deemed not to be present at the site

Trip Spike: A water sample is prepared by the testing laboratory, containing known quantities of volatile contaminants. The trip spike accompanies the samples between the site and laboratory. The trip spike is analysed for BTEX compounds, and results are used to assess the loss of volatile contaminants during transportation of samples.

One trip spike was to be analysed along with each batch of soil and water samples submitted to the primary testing laboratory. This was undertaken until volatile contamination was deemed not to be present at the site

7.2 Laboratory Program

The NATA certified laboratory, MGT Labmark Environmental Laboratories, completes it's own quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data (provided within the laboratory results reports, as **Appendix C**).

Surrogate spikes, laboratory blanks and laboratory control samples were used by MGT Labmark for the analytical program.

Primary samples were analysed within the holding times as recommended by testing laboratories, based on holding times set out in Schedule B(3) of the NEPM (1999).

Method blanks returned results less than the PQL, surrogate spike and laboratory control sample recovery were within the laboratory acceptance criteria.

GHD QA/QC parameters were considered to be within the specified requirements and therefore, overall, the data was considered to be valid and of sufficient quality to meet the data quality objectives for the assessment.

8. Soil Validation Results

GHD conducted validation works as described in **Section 6**. Soil validation results are presented in **Appendix B** and laboratory reports are presented in **Appendix C**. The following sections provide details of the field work and laboratory results of the soil validation completed by GHD from May to December 2012. Photographs collected during field works are presented in the photo log in **Appendix D**.

8.1 Lot 11 Former Workshop Area

8.1.1 Overview

Validation sampling in the Lot 11 former workshop area was conducted on a 10 X 10 m grid as presented in **Figure 3**. Wall samples were taken at no greater than 10 m intervals from 0-0.15 m bgl. Samples were labelled with a combination of a letter and a number which together gave the grid reference of where the sample was collected. In addition to the main grid validation area (Lot 11 Main Workshop Grid Area), contamination was chased out on the northern and western boundaries of the validation area (named Northern and Western Key Areas). Areas of stained soil at the base of the main excavation (trenches) were also excavated to remove the stained soil, the drainage pit and the drainage line. Following excavation these areas were validated. Areas where drums and or tar were found were excavated until the underlying natural soil was successfully validated.

Asbestos was noted in some stockpiles that had been excavated in various areas of the Lot 11 former workshop area. These stockpiles were combined to form SP50. All fill material potentially contaminated with asbestos was removed from these areas by an AS1 licenced contractor. Soils in the Northern Key Area were validated for asbestos. Reported results are in **Appendix C** and no asbestos was detected in the validation samples. Asbestos fragments in the EXC 3 excavation were hand-picked by an asbestos removal contractor and combined with stockpile SP50. Further excavation in this area did not identify any additional asbestos. As such, validation sampling for asbestos was not considered necessary in this area.

8.1.2 Lot 11 Main Workshop Grid Area Results

Validation sampling in the main workshop grid area of Lot 11 involved sampling the natural material at the base of the excavation and sampling the walls at the boundaries of the validation area. The results of the validation sampling in the Lot 11 Main Grid Area are presented in **Appendix B** (**Table A**) and a summary of the excavation depths and sampling is presented in **Table 6**. **Figure 10** (**Appendix A**) presents a summary of the excavation depths.

Table 6 Lot 11 Main Workshop Grid Area Validation Summary

Location Area	Depth of Excavation and Samples	Analytical Results Summary
Excavation base	Excavation depth from 0.25m – 0.5m until natural material was encountered. Samples taken from base.	Two exceedances reported at F11 and G9. Contamination was chased out and these areas validated on 9 August 2012.
Southern wall	Excavation depth from 0.25m – 0.4m. Samples taken from 0 – 0.15 m bgl.	No exceedances reported.
Eastern Wall	Excavation depth from 0.25m – 0.4m. Samples taken from 0 – 0.15	No exceedances reported.

Location Area	Depth of Excavation and Samples	Analytical Results Summary
	m bgl.	
Northern Wall	Excavation depth from 0.3m – 0.5m. Samples taken from 0 – 0.15 m bgl.	Exceedances reported at F12, G12 and I12. The chasing out of the area commenced on 13 September 2012. The excavation that resulted from the contamination chase out is labelled "*Northern Key Area*" (see **Section 8.1.3**). Locations F12, G12 and I12 were resampled as floor samples and validated.
Western Wall	Excavation depth from 0.25m – 0.4m. Samples taken from 0 – 0.15 m bgl.	Exceedances reported at A7 and A8. The chasing out of the area commenced on 3 September 2012. The excavation that resulted from the chasing out is labelled "*Western Key Area*" (see **Section 8.1.4**). Locations A8 was resampled as a floor sample and validated. Sample Z8 superceded A7 and was validated.

8.1.3 Northern Key Area

The Northern Key Area was created as a result of the chasing out of PAH contamination reported in the northern wall of the Lot 11 Main Workshop Grid Area (**Section 8.1.2**). Excavation of contaminated soil was conducted on seven occasions due to validation samples returning exceedances of the validation criteria. The excavation extended beyond the boundary of Lot 11 into the adjacent Lot 10 until the concentrations of contaminants of concern in the validation samples were below the validation criteria.

The results of the validation sampling in the Northern Key Area are presented in **Appendix B** (**Table B**) and a summary of the excavation progress and sampling is presented in **Table 7**.

Figure 3 (**Appendix A**) presents the progression of the Northern Key Area excavation and **Figure 10** (**Appendix A**) presents a summary of the excavation depths.

Table 7 Lot 11 Northern Key Area Validation Summary

Excavation Date	Description of Excavation	Analytical Results Summary
13 September 2012	Excavation extended north from the northern boundary of the Lot 11 Main Grid Area at D12, E12, F12 and G12. A second excavation extended north from I12 Samples D12.5, E13, F13, G13 and I12.5 collected from the walls of the formed excavations.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in samples F13 and G13, and PAHs in samples D12.5, E13, F13 and G13. There were no exceedances reported for I12.5.
17 September 2012	Excavation extended east from the eastern boundary of the excavation formed on 13 September 2012. Samples H12.5, H13.5, I13 and I13.5 collected from the walls and H13, from the floor of the formed excavation.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in samples H13.5 and I13.5, and G13 and PAHs in samples H12.5, H13.5, I13 and I13.5. No exceedances reported for sample H13
5 October 2012	Excavation extended north and east from the boundary of the Northern Key excavation. Samples collected at D13, D14,	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in samples D14, E14, E14.5 and I12.55 and PAHs in samples D14,

Excavation Date	Description of Excavation	Analytical Results Summary
	E14, E14.5, F14, G14, H14, I12.55, I14, I15 and I16	E14, E14.5, F14, I12.55 and I14. No exceedances reported for samples D13, G14, H14, I15 and I16.
17 October 2012	Excavation extended to the northwest from the 5 October 2012 boundary of the Northern Key excavation. Samples collected at D15, E15 and F15	No exceedances reported for samples D15, E15 and F15.
23 October 2012	Excavation extended to the east of the 5 October 2012 boundary and south of the 17 September 2012 boundaries of the Northern Key excavation. Samples collected at D14.2, I13.6, I14.5 and I15.5	Exceedances of the validation criteria reported for benzo(a)pyrene in samples D14.2 and I13.6. No exceedances reported for samples I14.5 and I15.5.
26 October 2012	Excavation chased out contamination at the two remaining failed wall samples D14.2 and I13.6. Samples collected at D14.3 and I13.7.	No exceedances of the validation criteria reported for samples D14.3 and I13.7.
14 November 2012	Sampling of the base of the Northern Key Area using grid sampling.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in sample NBV11 and PAHs in samples NBV11 and NBV12.
20 November 2012	Excavation of the area of failed floor samples NBV11 and NBV12 until any visual signs of contamination removed. Samples NBV11A and NBV12A collected	No exceedances of the validation criteria reported for samples NBV11A and NBV12A.

8.1.4 Western Key Area

The Western Key Area was created as a result of the chasing out of PAH contamination reported in the western wall of the Lot 11 Main Workshop Grid Area (**Section 8.1.2**). Excavation of contaminated soil was conducted on six occasions due to validation samples returning exceedances of the validation criteria. The excavation extended west and then north until the concentrations of contaminants of concern in the validation samples were below the validation criteria.

The results of the validation sampling in the Western Key Area are presented in **Appendix B** (**Table C**) and a summary of the excavation depths and sampling is presented in

Table 8.

Figure 3 (**Appendix A**) presents the progression of the Western Key Area excavation and **Figure 10** (**Appendix A**) presents a summary of the excavation depths.

Table 8 Lot 11 Western Key Area Validation Summary

Excavation Date	Description of Excavation	Analytical Results Summary
3 September 2012	Excavation extended west from the western boundary of the Lot 11 Main Grid Area at A7 and A8. Samples Z7 and Z8 collected from the walls of the formed excavation.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} and PAHs in sample Z8. There were no exceedances reported for Z7.
17 September 2012	Excavation extended west from Z8. Sample collected at Y8.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} and PAHs in sample Y8
4 October 2012	Excavation extended west from Y8. Samples collected at AA1, AA2 and AA3.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in AA2 and AA3 and PAHs in samples AA1, AA2 and AA3.
17 October 2012	Excavation extended to the north, west and south from the 4 October 2012 boundary of the Western Key excavation. Samples collected at AA4 and AA5 (south wall), AA6 (west wall) and AA7 and AA8 (north wall)	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in AA7 and PAHs in samples AA7 and AA8. No exceedances reported for samples AA4, AA5 and AA6.
24 October 2012	Excavation extended to the North of AA7. Sample collected at AA9	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} and PAHs in sample AA9.
26 October 2012	Floor sampling of the Western Key Area. Samples collected at AA10, AA11 and AA12.	No exceedances of the validation criteria reported for samples AA10, AA11 and AA12.
30 October 2012	Excavation extended north and east of the 24 October 2012 boundary. Samples collected at AA8.5 and AA9.5.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in AA8.5 and PAHs in samples AA8.5 and AA9.5.
5 November 2012	Excavation extended north and east of the 30 October 2012 boundary. Sample collected at AA13, AA14, AA15 and AA16.	Exceedances of the validation criteria reported for TPH C_{10}-C_{36} in sample AA15 and PAHs in samples AA14 and AA15. No exceedances of the validation criteria reported for samples AA13 and AA16.
14 November 2012	Excavation extended north and east of the 5 November 2012 boundary. Sample collected at AA17.	No exceedances of the validation criteria reported for sample AA17.
19-20 November 2012	Collection of samples from the wall an floor of the Western Key Area. Samples AA18 - AA24 collected	No exceedances of the validation criteria reported for samples AA18 - AA24.

One wall sample at AA8 reported a concentration of benzo(a)pyrene of 7.7 mg/kg which is an exceedance of the validation criteria of 5 mg/kg. This exceedance is not considered to pose a risk under the proposed commercial/industrial landuse. This is discussed further in **Section 12**.

8.1.5 Lot 11 Trenches

During remedial works, two drainage trenches were encountered within the Lot 11 Main Workshop Grid area (See **Figure 3**, **Appendix A**). These trenches were excavated until all visible and olfactory indicators of contamination were removed. Validation samples were collected from all walls and the floor of the formed excavation. The results of the validation sampling are presented in **Appendix B** (**Table D**). In summary, one failed validation sample (T2_13) was recorded on the eastern end wall of Trench 2. The contamination in this location was chased out on 3 September 2012 and validation samples T2_15 and T2_16 were subsequently collected and analysed. Results for these samples reported no exceedances of the validation criteria. There were no other exceedances of the validation criteria in the Lot 11 trench soil validation samples collected and analysed.

8.1.6 Lot 11 Deep Excavations

During remedial works, three areas were found to contain visual and/or olfactory indicators of deeper contamination. These areas (See **Figure 3**, **Appendix A**), named EXC1-3 were excavated to remove the contaminated soil. The results of validation sampling are presented in **Appendix B** (**Table E**).

EXC1 and EXC2 were excavations from which underground storage tanks had previously been removed from but still contained soil with significant hydrocarbon odours. Soil from EXC1 was excavated until natural material was encountered at 2.5 m bgl. Validation samples were collected from the walls at depths from 1-1.5 m bgl and from the base at 2.5 m bgl. Analytical results for the base validation sample reported a concentration of 2,070 mg/kg for TPH C_{10}-C_{36} which was an exceedance of the adopted site validation criteria. Additional excavation was conducted and an additional validation sample was collected on 9 August 2012 which reported a concentration of 2,160 mg/kg for TPH C_{10}-C_{36}. Additional excavations were conducted until bedrock was encountered and a GHD field scientist observed that no additional soil could be removed however a hydrocarbon odour was still noted in the bedrock. As no deeper soil remediation could be undertaken, a groundwater assessment was considered necessary to further assess contamination in this area. This assessment is discussed later in this report.

EXC2 was excavated to 1.8 m bgl and a floor validation sample collected. Wall samples were also collected at 1 m bgl. There were no exceedances of the validation criteria for any samples collected from EXC2.

EXC3 was excavated in the location of a former water separator pit in the workshop area of Lot 11. The excavation was completed with a sloping base from 1.5 to 2 m bgl. Two floor samples were collected and six wall samples were collected at 1 m bgl. There were also four additional samples (EXC3_V1 - 4) collected from the surface around the excavation to assess whether any excavated material (waste from within the former pit) had been dropped onto the ground surface. There were no exceedances of the validation criteria recorded in any of the soil validation samples collected for this area.

8.2 Lot 11 Hotspots

Four hotspots at site investigation test pit locations TP224, TP376, TP382 and TP525A, were excavated during the remedial works to remove TPH (TP376 and TP382) and PAH contamination (TP224, TP376 and TP525A). The location of the hotspots and sampling locations are presented in **Figure 8** (**Appendix A**). Laboratory summary tables are presented in **Appendix B** (**Table F**) and works undertaken in these areas are summarised below:

Table 9 Lot 11 Hotspot Validation Summary

Hotspot	Excavation Details	Analysis Details
TP224	Excavated to 0.3 m bgl. Six wall samples (V1-6) and two floor samples (V7-8) collected.	No exceedances of the validation criteria.
TP376	Excavated to 0.25 m bgl. Six wall samples (V1-6) and two floor samples (V7-8) collected. Contamination chased out and validation samples V9 and V10 collected from the excavation wall on 3 September 2012	V4 exceeded the validation criteria for TPH C_{10}-C_{36} and PAHs. No exceedances of the validation criteria reported.
TP382	Excavated to 0.2 m bgl. Four wall samples (V1-4) and one floor sample (V5) collected.	No exceedances of the validation criteria.
TP525A	Excavated to 0.1 m bgl. Four wall samples (V1-3 and 5) and one floor sample (V4) collected.	No exceedances of the validation criteria.

8.3 Lot 12 South West Night Soil Disposal Area

Validation sampling in the Lot 12 night soil disposal area was conducted on a 10 X 10 m grid as presented in **Figure 4**. Wall samples were taken at approximately 10 m intervals from 0-0.15 m bgl. Samples were labelled with a combination of a letter and a number which together gave the grid reference for where the sample was collected. In addition to the south west nightsoil disposal area main grid validation area (Lot 12 Main Grid Area), contamination was chased out on the western, southern and eastern boundaries of the validation area (named East, South and West Chase Out Areas). Areas where drums and or tar were found were excavated until the underlying natural soil was validated. Night soil trenches were also identified in this area by visually stained soil at the base of the main excavation. These were also excavated and validated to remove the stained soil. The location of these trenches are presented in **Figure 5, 6 and 7** in **Appendix A**

Asbestos was noted in one stockpile that had been excavated from Hotspot TP360. All fill material potentially contaminated with asbestos was removed from this area by an AS1 licenced contractor. Soils in Hotspot TP360 were validated for asbestos. Reported results are in **Appendix C** and no asbestos was detected in the validation samples.

8.3.1 Lot 12 Main Grid Area

Validation sampling in the Main Grid Area of Lot 12 involved sampling the natural material at the base of the excavation and sampling the walls at the boundaries of the validation area. The results of the validation sampling in the Lot 12 Main Grid Area are presented in **Appendix B** (**Table G**) and a summary of the excavation depths and sampling is presented in

Table 10. **Figure 11** (**Appendix A**) presents a summary of the excavation depths.

Table 10 Lot 12 Main Grid Area Validation Summary

Location Area	Depth of Excavation and Samples	Analytical Results Summary
Excavation base	Excavation depth from 0.1m bgl – 1.2 m bgl until natural material was encountered. Samples taken from base.	Validation criteria exceedances were reported at B3, B6, E3, E6 and G7. Contamination was chased out and the areas validated on 17 September 2012 (G7) and 14 November 2012 (B3, B6, E3 and, E6).
Eastern Wall	Excavation depth from 0.35 m bgl – 0.6 m bgl. Samples taken from 0 – 0.15 m bgl.	Visual signs of contamination extended east beyond validation sample P4 beyond the remediation boundary for the Lot 12 Main Grid Area as outlined in the ERM RAP. This area was excavated and validated on 5 September 2012 and the resulting formed excavation was labelled *East Chase Out Area* (See **Section 8.3.2**). Sample P4 was collected from the floor of the excavation. No exceedances of the site validation criteria were reported.
Southern Wall	Excavation depth from 0.25 m bgl – 0.4 m bgl. Samples taken from 0 – 0.15 m bgl.	Validation criteria exceedances were reported at C0, D0, E0 and F0. Excavation of the area commenced on 30 August 2012 and the resulting formed excavation was labelled *South Chase Out Area* (See Section **8.3.3**). Validation locations E0 and F0 were resampled as floor samples. No other validation criteria exceedances were reported.
Western wall	Excavation depth from 0.3 m bgl – 0.6 m bgl. Samples taken from 0 – 0.15 m bgl.	Visual signs of contamination extended beyond the remediation boundary of the Lot 12 Main Grid Area as specified in the ERM RAP at validation sample locations A3, A4 and A5. Contamination extended west onto the adjacent Lot 28. Excavation of this area commenced on 20 November 2012 and the resulting formed excavation was labelled *West Chase Out Area* (See **Section 8.3.4**) Validation samples A3, A4 and A5 were collected as floor samples. No validation criteria exceedances reported.
Northern Wall	Excavation depth from 0.1 m bgl – 1.2 m bgl. Samples taken from 0 – 0.15 m bgl.	A validation criteria exceedance was reported at sample location O5. The chasing out of the area commenced on 5 September 2012. The excavation that resulted from this chasing out was labelled *East Chase Out Area* (See **Section 8.3.2**) due to its proximity to this area. There were no other exceedances of the validation criteria recorded.

8.3.2 Lot 12 East Chase Out Area

The East Chase Out Area was created as a result of the chasing out of TPH contamination reported in the northern and eastern walls of the Lot 12 Main Grid Area excavation (**Section 8.3.1**). Excavation of contaminated soil in this area was conducted on 5 September 2012. Impacted material in this area was excavated until the concentrations of contaminants of concern in the validation samples were below the validation criteria.

The results of the validation sampling in the East Chase Out Area are presented in **Appendix B** (**Table H**). In summary, the were no exceedances of the validation criteria for any samples collected in the East Chase Out Area.

Figure 4 (**Appendix A**) presents the progression of the East Chase Out Area excavation and **Figure 11** (**Appendix A**) presents a summary of the excavation depths

8.3.3 Lot 12 South Chase Out Area

The Southern Chase Out Area was created as a result of the chasing out of PAH contamination reported in the southern wall of the Lot 12 Main Grid Area (**Section 8.3.1**). Excavation of contaminated soil was conducted on three occasions due to validation samples reporting exceedances of the validation criteria. The excavation extended until the concentrations of contaminants of concern in the validation samples were below the validation criteria.

The results of the validation sampling in the Southern Chase Out Area are presented in **Appendix B** (**Table I**) and a summary of the excavation progress and sampling is presented in **Table 11**.

Figure 4 (**Appendix A**) presents the progression of the Southern Chase Out Area excavation and **Figure 11** (**Appendix A**) presents a summary of the excavation depths.

Table 11 Lot 12 South Chase Out Area Summary

Excavation Date	Description of Excavation	Analytical Results Summary
30 August 2012	Excavation extended south of the Lot 12 Main Grid Area at E0 and F0. Validation samples collected at D99, E98, E99 and F99.	No exceedances of the validation criteria reported.
27 November 2012	Excavation extended south of the Lot 12 Main Grid Area at C0 and D0. Validation samples collected from the excavation walls at C98, C99 and D98 and floor at C97 and D97.	Sample C99 reported an exceedance of the validation criteria for benzo(a)pyrene. There were no other exceedances reported.
6 December 2012	Excavation extended south of the South Chase Out Area remediation boundary at C99. Validation sample collected at C100.	No exceedances of the validation criteria reported.

8.3.4 Lot 12 West Chase Out Area

The West Chase Out Area was created as a result of the chasing out of visually observed tar contamination in the western wall of the Lot 12 Main Grid Area (**Section 8.3.1**). Excavation of contaminated soil was conducted on two occasions due to validation samples reporting

exceedances of the validation criteria. The excavation extended beyond the remediation boundary and was chased out until the concentrations of contaminants of concern in the validation samples were below the validation criteria.

The results of the validation sampling in the West Chase Out Area are presented in **Appendix B** (**Table J**) and a summary of the excavation progress and sampling is presented in **Table 12**.

Figure 4 (**Appendix A**) presents the progression of the West Chase Out excavation and **Figure 11** (**Appendix A**) presents a summary of the excavation depths.

Table 12 Lot 12 West Chase Out Area Summary

Excavation Date	Description of Excavation	Analytical Results Summary
20 November 2012	Excavation extended west of the Lot 12 Main Grid Area at A3, A4, and A5 based on visual observations of tar. Validation samples were collected from the excavation walls at Z3, Z4, Z5 and Z5.5.	Samples Z4 and Z5 reported exceedances of the validation criteria for benzo(a)pyrene. There were no other exceedances reported.
27 November 2012	Excavation extended west of A4 and A5. Validation samples were collected from the excavation walls at Y4 and Y5 and floor at A4.5 and A5.5.	There were no exceedances of the validation criteria reported.

8.3.1 Lot 12 Trenches

During remedial works, numerous areas of staining indicating night soil disposal trenches were encountered within the floor of the Lot 12 Main Grid area (See **Figure 5, 6 and 7**, **Appendix A**). The trenches were excavated until all visible and olfactory indicators of contamination had been removed. Validation samples were collected from the walls and the floors of the formed excavations. The results of the validation sampling are presented in **Appendix B** (**Tables K**, **L** and **M**). In summary:

- Validation sample T37 (**Figure 5**) on the southern end wall of one of the trenches reported an exceedance of the TPH C_{10}-C_{36} validation criteria with a concentration of 3,325 mg/kg. This contamination was chased out on 29 August 2012 and validation samples T62, 63 and 64 were collected. Analysis of these samples reported no exceedances of the validation criteria;
- Validation sample T1/3 (**Figure 6**) on the base of a trench running north-south reported an exceedance of the TPH C_{10}-C_{36} validation criteria with a concentration of 6,310 mg/kg. The contamination was chased out until no more soil could be removed due to refusal on bedrock (visually confirmed by GHD);
- Validation sample T38/6 (**Figure 7**) on the western wall of trench running north-south reported an exceedance of the benzo(a)pyrene validation criteria with a concentration of 5.7 mg/kg. The contamination was chased out on 5 November 2012 and validation sample T38/14 was collected. Analysis of this sample reported no exceedances of the validation criteria; and
- Validation sample T49/3 (**Figure 7**) on the western wall of trench running north-south reported an exceedance of the TPH C_{10}-C_{36} validation criteria with a concentration of 1,625 mg/kg. The contamination was chased out on 14 November 2012 and validation

samples T49/3, T49/4 and T49/5 were collected. Analysis of these samples reported no exceedances of the validation criteria.

8.3.1 Lot 12 Deep Excavations

During remedial works, two areas of deeper contamination were identified in the south west corner of Lot 12. One was found to contain drums and night soil cans and the other was found to contain visually stained soil. These areas (See **Figure 9**, **Appendix A**), were named EX and EXC1 respectively and were excavated to remove the waste and contaminated soil. No pre-treatment of drums was necessary because the majority of contamination on the drums had been washed by the water collected in the excavation. The results of validation sampling are presented in **Appendix B** (**Table N**).

EX was excavated until natural material was encountered between 2 and 3 m bgl. Validation samples were collected from the walls at three depths, surface, mid wall and base of wall and from the base. There were no reported exceedances of the validation criteria within the validation samples collected and analysed from EX.

EXC1 was excavated until natural material was encountered at approximately 2.7 m bgl. Validation samples were collected from the walls and base at depths of 0.2, 1.0 and 2.0 m bgl and from the base at 2.7 m bgl. There were no reported exceedances of the validation criteria for samples collected from EXC1.

8.4 Lot 12 Hotspots

Four hotspots at former site investigation Lot 12 test pit locations TP307, TP312, TP322 and TP360 were excavated during the remedial works. The location of the hotspots and sampling locations are presented in **Figure 9** (**Appendix A**). Laboratory summary tables are presented in **Appendix B** (**Table O**) and summarised below:

Table 13 Lot 12 Hotspot Validation Summary

Hotspot	Excavation Details	Analysis Details
TP307	Excavated to 1 m bgl. Six wall samples and four floor samples collected.	No exceedances of the validation criteria.
TP312	Excavated to approximately 0.2-0.3 m bgl. eight wall samples and two floor samples collected.	No exceedances of the validation criteria.
TP322	Excavated to 2 m bgl. Four shallow wall samples (0.1-0.4 m bgl), four deep wall samples (1-1.2 m bgl) and four floor samples collected.	No exceedances of the validation criteria.
TP360	Excavated to approximately 1 m bgl in the centre and sloping up at the edges. Minor areas of deeper visual contamination were also grubbed out. Initial validation sampling of the walls was conducted on 13 and 17 September 2012. Samples V1-11 collected. On 4 October 2012 the excavation was	TPH C_{10}-C_{36} validation criteria exceedances reported for V3, V9 and V11. TPH C_{10}-C_{36} validation criteria

Hotspot	Excavation Details	Analysis Details
	extended to the north of V3 and V9. Samples V12-22 were collected from the excavation.	exceedance were reported for V20.
	On 17 October 2012 the excavation was extended west of V20. Samples V23-25 were collected from the excavation.	TPH C_{10}-C_{36} exceedance were reported for V24
	On 24 October 2012 the excavation was extended west of V24. Samples V26 and V27 were collected from the excavation walls. On 5 and 14 November 2012, twenty floor samples were collected from the excavation.	There were no exceedances of the validation criteria.

8.5 Lot 12 Northern Stockpile Storage Area

An area north of the Lot 12 Main Grid Area was used to stockpile excavated soil towards the end of the project (all other contaminated soil stockpiling was undertaken in remediation areas prior to them being excavated and validated) to avoid stockpiling excavated material on areas that had already been validated (See **Figure 4** in **Appendix A**). The majority of the soil was stockpiled on plastic sheeting to minimise the exposure of the ground surface with the excavated material. During an inspection of this area by GHD staff, small quantities of the excavated material were observed to extend beyond the plastic sheet and onto the ground surface in addition to a couple of entire stockpiles that were not placed on plastic sheeting.

After the contaminated soil was removed from this location, validation samples were collected from the ground surface including a sample of a small quantity of a tar impacted material. Laboratory analysis confirmed that the material contained concentrations of TPH and PAH significantly above the validation criteria and that an additional sample, X2 reported a TPH C_{10}-C_{36} concentration of 1,285 mg/kg which exceeded the validation criteria. Analytical results are presented in **Appendix B** (**Table P**).

The area was excavated to 0.1 m bgl in an attempt to remove impacted material. Validation Sample X5 confirmed that the contamination had been successfully chased out at failed validation sample X2. Sample X6 confirmed that the significantly PAH and TPH impacted material had been excavated although this new validation sample reported a TPH C_{10}-C_{36} concentration of 2,625 mg/kg which exceeded the site validation criteria. GHD discussed this exceedance with the Site Auditor during a site meeting on 14 December 2012 and it was suggested by the Auditor that this contamination was likely be localised and could be managed under the Site Management Plan.

8.6 On-site Reuse Stockpile Results

Stockpiled soil was initially assessed as to whether it was potentially suitable for reuse onsite based on initial stockpile sampling at a sample density of 1 sample per 100 m^3. If the initial sampling results reported no exceedances of the site validation criteria additional sampling was conducted (at a sample density of 1 sample per 25 m^3) to further assess the suitability of the material to be reused on site as described in **section 6.3.1**. The results for stockpiles assessed to be suitable for reuse onsite are described below. Stockpiles assessed to be unsuitable for reuse onsite were subjected to waste classification for offsite disposal (**Section 0**)

8.6.1 Lot 11 Stockpiles Suitable for Reuse Onsite

A total of approximately 546 m^3 of excavated soil from 14 stockpiles in Lot 11 was assessed to be suitable for reuse onsite. The analytical results for the stockpiles are presented in **Appendix B** (**Table Q**) and are summarised in **Table 14**.

Table 14 Lot 11 Onsite Reuse Stockpiles Summary

Stockpile	Volume (m^3)	Results Summary	Comments
29	50	One exceedance of Benzo(a)pyrene (5.3 mg/kg) from 6 samples analysed	95% UCL for Benzo(a)pyrene calculated to be 3.6 mg/kg which is below the validation criteria. Suitable for reuse onsite
31	50	No exceedances of the validation criteria	Suitable for reuse onsite
35	45	One exceedance reported for benzo(a)pyrene (8.1 mg/kg) and Total PAHs (110.8 mg/kg) from 9 samples analysed	95%UCL calculated for Benzo(a)pyrene (3.6 mg/kg) and Total PAHs (79 mg/kg) both are below the validation criteria. Suitable for reuse onsite
36	45	Exceedances of the validation criteria Reported in an interlaboratory duplicate for benzo(a)pyrene (29mg/kg), Total PAHs (232.4 mg/kg) and TPH C10-C36 (1,915 mg/kg) There were no visual or olfactory indicators of contamination.	Assessed to be suitable for reuse on site based on no exceedances reported in the three primary samples. Due to report timing pressure the inter laboratory duplicate result was overlooked. Despite this the site management plan will cover the management to protect human health and the environment from this material in future if required. This is discussed in **Section 12.5**
38	75	No exceedances of the validation criteria	Suitable for reuse onsite
39	10	No exceedances of the validation criteria	Suitable for reuse onsite
47	25	No exceedances of the validation criteria	Suitable for reuse onsite
49	38	No exceedances of the validation criteria	Suitable for reuse onsite
65	30	No exceedances of the validation criteria	Suitable for reuse onsite
66	60	No exceedances of the validation criteria	Suitable for reuse onsite
67	24	No exceedances of the validation criteria	Suitable for reuse onsite
67A	24	No exceedances of the validation criteria	Suitable for reuse onsite
69	5	No exceedances of the validation criteria	Suitable for reuse onsite
72	65	No exceedances of the validation criteria	Suitable for reuse onsite

8.6.2 Lot 12 Stockpiles Suitable for Reuse Onsite

A total of approximately 3,533 m^3 of excavated soil from 35 stockpiles in Lot 12 were assessed to be suitable for reuse onsite. The analytical results for the stockpiles are presented in **Appendix B** (**Table R**) and are summarised in **Table 15**.

Table 15 Lot 12 Onsite Reuse Stockpiles Summary

Stockpile	Volume (m^3)	Results Summary	Comments
1	240	One exceedance of TPH C_{10}-C_{36} (2,485 mg/kg) from 12 samples analysed.	95% UCL for TPH C_{10}-C_{36} calculated to be 925 mg/kg, which is less than the validation criteria. Suitable for reuse onsite.
2	240	No exceedances of the validation criteria	Suitable for reuse onsite.
3	110	No exceedances of the validation criteria	Suitable for reuse onsite.
9	90	No exceedances of the validation criteria	Suitable for reuse onsite.
10	200	No exceedances of the validation criteria	Suitable for reuse onsite.
17	145	No exceedances of the validation criteria	Suitable for reuse onsite.
27	60	No exceedances of the validation criteria	Suitable for reuse onsite.
31	50	No exceedances of the validation criteria	Suitable for reuse onsite.
36	412	No exceedances of the validation criteria	Suitable for reuse onsite.
37	520	One exceedance of TPH C_{10}-C_{36} (1,075 mg/kg) from 26 samples analysed. Sample SP37U reported a TPH C_{10}-C_{36} concentration of 605 mg/kg in the field duplicate which was greater than the parent sample.	Field duplicate value of 605 mg/kg substituted for the parent sample in the 95%UCL calculation. 95% UCL for TPH C_{10}-C_{36} calculated to be 599 mg/kg, which is less than the validation criteria. Suitable for reuse onsite.
38	30	No exceedances of the validation criteria	Suitable for reuse onsite.
40	48	No exceedances of the validation criteria	Suitable for reuse onsite.
53	55	No exceedances of the validation criteria	Suitable for reuse onsite.
54	85	One exceedance of TPH C_{10}-C_{36} (1205 mg/kg) reported in the field duplicate for SP54A, which was greater than the parent sample.	Field duplicate value of 1,205 mg/kg substituted for the parent sample in the 95%UCL calculation. 95% UCL for TPH C_{10}-C_{36} calculated to be 992 mg/kg, which is less than the validation criteria. Suitable for reuse onsite.
55	8	No exceedances of the validation criteria	Suitable for reuse onsite.

Stockpile	Volume (m^3)	Results Summary	Comments
56	100	One exceedance of TPH C_{10}-C_{36} (1,285 mg/kg) from 6 samples analysed	95% UCL for TPH C_{10}-C_{36} calculated to be 873 mg/kg, which is less than the validation criteria. Suitable for reuse onsite.
57	45	No exceedances of the validation criteria	Suitable for reuse onsite.
58	37.5	One exceedance of TPH C_{10}-C_{36} (1,005 mg/kg) from 9 samples analysed	95% UCL for TPH C_{10}-C_{36} calculated to be 462 mg/kg, which is less than the validation criteria. Suitable for reuse onsite.
59	31.5	No exceedances of the validation criteria	Suitable for reuse onsite.
60	63	No exceedances of the validation criteria	Suitable for reuse onsite.
61	96	No exceedances of the validation criteria	Suitable for reuse onsite.
62	132	No exceedances of the validation criteria	Suitable for reuse onsite.
64	25	No exceedances of the validation criteria	Suitable for reuse onsite.
65	73.5	No exceedances of the validation criteria	Suitable for reuse onsite.
66	94.5	No exceedances of the validation criteria	Suitable for reuse onsite.
68	92	No exceedances of the validation criteria	Suitable for reuse onsite.
86	50	No exceedances of the validation criteria	Suitable for reuse onsite.
87	50	No exceedances of the validation criteria	Suitable for reuse onsite.
88	50	No exceedances of the validation criteria	Suitable for reuse onsite.
89	50	No exceedances of the validation criteria	Suitable for reuse onsite.
90	50	No exceedances of the validation criteria	Suitable for reuse onsite.
91	50	No exceedances of the validation criteria	Suitable for reuse onsite.
92	50	No exceedances of the validation criteria	Suitable for reuse onsite.
93	50	No exceedances of the validation criteria	Suitable for reuse onsite.
94	50	No exceedances of the validation criteria	Suitable for reuse onsite.

8.6.3 Hotspot Stockpiles Suitable for Reuse Onsite

A total of approximately 140 m^3 of excavated soil from four stockpiles excavated from Hotspot 360 was assessed to be suitable for reuse onsite. The analytical results for the stockpiles are presented in **Appendix B** (**Table S**) and are summarised in

Table 16.

Table 16 Hotspot Onsite Reuse Stockpiles Summary

Stockpile	Volume (m^3)	Results Summary	Comments
360C	100	One exceedance of Lead (1,800 mg/kg) from 12 samples analysed.	95% UCL for TPH C_{10}-C_{36} calculated to be 1,142 mg/kg, which is less than the validation criteria. Suitable for reuse onsite.
360E	15	No exceedances of the validation criteria	Suitable for reuse onsite.
360G	20	No exceedances of the validation criteria	Suitable for reuse onsite.
360I	5	No exceedances of the validation criteria	Suitable for reuse onsite.

Stockpiles that were assessed to be suitable for reuse onsite were used to backfill the excavation. A figure showing locations where the stockpiles were placed is presented in **Appendix G**. It should be noted that the site was not backfilled to pre remediation levels. It is understood that he site will undergo bulk earthworks for development and should any material be imported to site it must be validated as suitable for the proposed landuse.

8.6.4 Imported VENM Classification

After the remediation excavation of the Lot 11 former workshop area, approximately 9,600 tonnes of VENM was imported to the site and stockpiles in the Lot 11 former workshop area. This material was crushed sandstone and is to be used for access roads during the construction phase of the development of the site. A validation letter for the site is presented in **Appendix F**. The results of the sample analysis reported heavy metal concentrations in soil within the natural background levels, as described in NEPC (1999). PAHs, TPH/BTEX, PCBs, OCPs and asbestos concentrations were all reported below the laboratory limit of reporting (LOR). A figure showing location where the VENM is stockpiled is presented in **Appendix G**.

9. Waste Classification

9.1 Waste Soil Stockpiles

Soil stockpiles assessed to be unsuitable for reuse onsite after initial analysis or onsite reuse sampling were classified in accordance with the NSW DECC (2008) *Waste Classification Guidelines Part 1: Classifying Wastes*.

The ERM RAPs assessed the PAHs in the former workshop area of Lot 11 to be associated with historical waterproofing using asphalt. The stockpiles in Lot 11 therefore qualified for preclassification as *General Solid Waste* for PAHs in accordance with the waste classification guidelines.

Several stockpiles with elevated PAHs in Lot 12 were analysed for asphaltenes to assess whether the PAHs were associated with asphalt from historical waterproofing activities. Several stockpiles in Lot 12 were assessed to qualify for preclassification as *General Solid Waste* for PAHs.

A summary of the quantities of waste soil is presented in **Table 17** and the documentation for the Restricted, Hazardous and Special Waste is included in **Appendix E**.

The dockets for Lot 11 SP50 and Lot 12 SP52 indicate that the material from these stockpiles was accepted as *General Solid Waste*. However GHD has been advised by AAP that "all stockpiles containing asbestos were disposed of under AS1 Supervision on 13 September 2012. Mulgoa Quarries provided GHD's waste classification letters to Blacktown Waste Services for all the material to be disposed on that day and communicated the stockpile name to the weighbridge for every load disposed. Any inaccuracies in the classification (or the stockpile name) detailed on the disposal dockets are an administration error at Blacktown Waste Services end."

Table 17 Waste Soil Summary

	General Solid Waste	Restricted Solid Waste	Hazardous Waste	Special Waste (Asbestos)
Lot 11 Including Hotspots				
Total Loads	672	0	1	8
Total Qty. (Tonnes)	12,024.10	0	32.04	213.92
Lot 12 Including Hotspots				
Total Loads	583	29	2	10
Total Qty. (Tonnes)	9,224.84	914.68	35.22	308.44

9.2 Waste Water

During remediation works in August 2012, water was observed in the drum disposal excavation in Lot 12. A sample of the water was analysed to assess it's suitability for discharge to sewer. The sample reported concentrations of hydrocarbons above the Trade Waste Limits and therefore the water was assessed to be unsuitable for discharge to sewer. The laboratory documentation is presented in **Appendix C**.

The water was transported from site and disposed of by suitably licenced contractors and disposed of at a facility licenced to accept the waste. The transport dockets and waste acceptance documentation are presented in **Appendix E**.

10. Quality Control Results

10.1 Field Duplicates

Field duplicate analysis was assessed by the Relative Percent Difference (RPD) between the primary and duplicate samples. The generally accepted range for RPDs is +/- 30% for inorganic compounds and +/- 50% for organic compounds.

The results of field duplicate analysis are presented in **Appendix B (Table T)**.

RPDs could not be calculated for many of the analytes, as concentrations were reported below the laboratory Practical Quantitation Limit (PQL) in both the primary and duplicate samples.

A total of 137 field duplicates were collected during the remedial works of which 62 were duplicates of stockpile samples and 75 were duplicates of validation samples.

Stockpile Duplicate Results

20 of the stockpile duplicates were for stockpiles that where reused on site and in all instances where a 95% $UCL_{average}$ was calculated, the greater of the duplicate and parent sample was used.

Exceedances of the generally accepted RPDs for inorganics were reported for metals, however given the generally low concentrations in the duplicate and parent samples the exceedances do not cast doubt on the reliability of the data set.

Exceedances of the generally accepted RPDs for organics were reported for TPHs and PAHs and as explained above, the greater of the parent and duplicate sample concentration was used when classifying the soil. The soils in the stockpiles were observed to be heterogeneous and while representative samples were collected in the field it is likely that when the samples were subsampled, that the subsamples where of different composition and therefore resulting in high reported RPDs.

Validation duplicate results

The final validation samples reported generally low concentrations of contaminants of concern and there were few RPD exceedances.

In summary, given the heterogeneous nature of the sampled material, low concentrations of analytes in final validation samples and conservative use of field duplicates in statistical analysis, the data set is considered to be reliable. In no instances do the results of field duplicate analysis cast doubt on the reliability of the data set.

10.2 Interlaboratory Duplicates

Interlaboratory duplicate analysis was assessed by the Relative Percent Difference (RPD) between the primary and interlaboratory duplicate sample. Interlaboratory duplicate analysis is subject to greater variability of results due to different analytical methodologies between laboratories as well as heterogeneity of the sampled material.

The results of interlaboratory duplicate analysis are presented in **Appendix B (Table T)**.

A total of 34 interlaboratory duplicates were collected from excavated stockpiles and the excavation surfaces.

RPDs could not be calculated for many of the analytes, as concentrations were reported below the laboratory Practical Quantitation Limit (PQL) in both the primary and duplicate samples.

The RPDs for interlaboratory duplicates of final validation samples are considered acceptable due to the low concentrations in both the primary and duplicate samples.

The interlaboratory duplicate analysis for sample Lot 11 SP 34 reported large RPD exceedances due to high concentrations of benzo(a)pyrene, Total PAHs and TPH C_{10}-C_{36} and the corresponding parent sample reporting very low, mostly non detectable. There were no olfactory or visual indicators of contamination in this stockpile and given the relatively small size of the stockpile (45 m^3), that there were no other exceedances reported for the stockpile, the proposed industrial/commercial landuse and the implementation of a future site management plan, this exceedance is not considered to cast doubt on the data set.

10.3 Trip Blanks

Trip blanks were initially analysed for BTEX and TPH C_6-C_{10} as described in the SAQP. However, as the soil analytical results consistently reported no detectable BTEX or TPH C_6-C_{10} the frequency of conducting trip blank analysis was reduced. Ultimately BTEX was removed from the analytical program so trip blanks were assessed to not be necessary.

In all sixteen trip blanks were analysed with no detects reported. The trip blank results are presented in **Appendix B (Table U.)**

10.4 Trip Spikes

Trip spikes were initially analysed for BTEX and TPH C_6-C_{10} as described in the SAQP. However, as the soil analytical results consistently reported no detectable BTEX or TPH C_6-C_{10} the frequency of conducting trip spike analysis was reduced. Ultimately BTEX was removed from the analytical program so trip spikes were assessed to not be necessary.

In all sixteen trip spikes were analysed with all recoveries acceptable within a 70–130% range. The trip spike results are presented in **Appendix B** (**Table V**).

11. Groundwater Sampling

A groundwater monitoring event undertaken at the site by GHD in April 2012 identified that two of these seven previously installed groundwater monitoring wells at the site were in good condition, while the remainder of these monitoring wells had been damaged preventing their use for sampling. During subsequent field work, GHD observed that one of these wells previously sampled was also broken. In order to assess the groundwater quality following remediation works at the site, GHD were commissioned to install an additional six groundwater wells in Lots 11 and 12 to replace the damaged wells. The new wells were installed to 6.0 m bgl and were developed in accordance with GHDs Standard Operating Procedures. The new wells were named MW 100 – MW 105 and their locations are illustrated on **Figure 2.**

The wells were positioned in different areas across the site to target specific areas of contamination and to gain background information on groundwater quality at the site. **Figure 1** shows the locations of the wells.

In summary:

- MW5 was utilised to assess background groundwater quality;
- MW101 was installed in order to discern whether any groundwater contamination resulted from the drum disposal area in the southwest night soil disposal area;
- MW100 was installed to assess whether any groundwater contamination resulted from the southwest nightsoil disposal area;
- MW102 was installed to assess whether any groundwater contamination resulted from soil contamination hotspots TP307 and TP312 in the northern portion of Lot 12;
- MW103 was installed to assess whether any groundwater contamination resulted from soil contamination hotspot TP360;
- MW104 was installed to assess whether any groundwater contamination resulted from resulted from the former underground fuel tanks previously removed from Lot 11; and
- MW105 was installed to assess whether groundwater contamination resulted from the drainage line in the Lot 11 workshop area.

11.1 Groundwater Monitoring

An environmental scientist from GHD conducted groundwater sampling on 12 October 2012. Eight existing monitoring wells at the site were inspected for sampling (**Appendix A**). The following observations were made in regards to the status of those existing wells:

- MW1 could not be located;
- MW2, MW3, MW4, MW6 were found to be damaged or destroyed and could therefore not be sampled; and
- MW5, MW7, MW100, MW101, MW102, MW103, MW104 and MW105 were found to be in good condition.

Monitoring wells MW5, MW7, MW100, MW101, MW102, MW103, MW104 and MW105 were purged (where possible) and sampled using low density polyethylene tubing coupled with a peristaltic pump system. Field parameters measured during purging included pH, conductivity, dissolved oxygen, redox potential and temperature. Where there was sufficient water, monitoring wells were purged until the field parameters stabilised before sampling. Where purging was successful approximately 4 to 10 litres of water was purged. Purging of wells MW104 and MW105 could not be completed as there was minimal water in these wells. Given

there was insufficient water in MW105 on 12 October 2012 to collect a collect a sample as such sampling of this location took place on 18 October 2012 following water recovery.

Groundwater samples were transferred to sample bottles provided by the laboratory, appropriate for each analyte. Groundwater samples were filtered in the field using dedicated 0.45 µm filters to remove suspended matter prior to transferring into appropriate sample bottles for dissolved metals analysis.

All sample containers were clearly labelled with a sample number, sample location, sample date and samplers initials. The sample containers were transferred to an ice filled cool box for sample preservation prior to and during shipment to the sampling laboratory. A chain of custody form was completed, and forwarded with the samples to the testing laboratory.

11.2 Laboratory Analysis

Groundwater samples were submitted to a NATA certified testing laboratory (MGT Labmark Environmental Laboratory) to be analysed for the schedule of analysis, as set out in **Table 18**.

Table 18 Schedule of Groundwater Analysis

Analytes	Analysed Samples
TPH, BTEX, PAH, Dissolved Heavy Metals, VOCs, nitrate, nitrite and ammonia	8 (plus 1 duplicate)

Groundwater results are provided in **Appendix B** and laboratory certificates of analysis are provided in **Appendix C.**

11.3 Analytical Results

Groundwater analytical results are presented in **Appendix B** (**Table W**).

In summary, the following points are noted:

- Dissolved heavy metal concentrations in groundwater from many of the wells slightly exceeded the ANZECC (2000) 95% freshwater guidelines. These included:
  - Cadmium – MW103, MW104 and MW105;
  - Chromium – MW105;
  - Copper – MW7, MW100, MW101, MW102, MW103, MW104 and MW105;
  - Lead – MW105;
  - Nickel – MW7, MW104 and MW105; and
  - Zinc – MW7, MW100, MW101, MW102, MW103, MW104 and MW105.
- The results for benzo(a)pyrene were below the practical quantification limit (PQL) in all groundwater samples collected and analysed, however the PQL exceeded the nominated investigation levels; and
- All other analytes reported concentrations below the laboratory PQL and the nominated investigation levels.

12. Discussion

12.1 Lot 11 Former Workshop Area

The initial validation of Main Grid Area in the former workshop area reported two exceedances of the validation criteria. These areas were excavated to chase out any contamination and subsequent validation sampling of the final reported concentrations of analytes less than the validation criteria.

The Northern Key Area was excavated on seven occasions to chase out PAH contamination. The excavation extended north into Lot 10 to the north of Lot 11. This was required to chase out the contamination in this direction. By 20 November 2012 all final wall and floor samples reported concentrations of analytes less than the validation criteria.

The Western Key Area was excavated on six occasions to chase out PAH and TPH contamination. The excavation extended west from the original boundary of the Lot 11 former workshop remediation area and then turned north to chase out additional contamination. Validation sample location AA8 is the only remaining sample to report an exceedance of the validation criteria in this area. It contained a benzo(a)pyrene concentration of 7.7 mg/kg. The areas immediately to the south and west of this validation sampling location have been excavated and validated and it is highly likely that the residual contamination is localised. Given this likelihood and the low leachability of benzo(a)pyrene on the site (no leachable benzo(a)pyrene detected in 101 analysed samples), this failed validation result is not considered to present an unacceptable risk to human health given the proposed industrial landuse of the site. In addition, isolated contamination such as this which remains on the site following remediation will be managed under a site environmental management plan.

The Lot 11 drainage trenches were excavated to chase out stained soil within the former workshop area (most notably associated with a drainage trench running east west). The results of the initial validation sampling of these trenches reported one exceedance of the validation criteria for benzo(a)pyrene. This area was excavated further and validated, with all validation samples collected from the final walls and floors of the trenches reporting no exceedances of the validation criteria.

The deep excavations, EXC1 and EXC2 where the former underground tanks were located were excavated and one validation sample from EXC1 reported an exceedance of the validation criteria for TPH C_{10}-C_{36} following the results of initial validation sampling in this area. This area was further excavated and sampled, but the floor validation sample still reported an exceedance of the validation criteria. Additional excavation removed all soil to depth until refusal on bedrock was met. This was visually confirmed by GHD although a hydrocarbon odour remained after all the soil had been removed. This is not considered to present an unacceptable risk to human health due to the depth of the excavation being greater than 2.7 m bgl, the low volatility of the hydrocarbons encountered at the area and proposed industrial landuse. Additionally, a groundwater monitoring well (MW104) was installed near the excavation reported no detectable TPH, BTEX, PAH or lead. The initial validation sampling of EXC2 reported no exceedances of the validation criteria.

EXC3 was a drainage pit that was excavated and validated. The initial validation sampling of EXC3 reported no exceedances of the validation criteria.

12.2 Lot 11 Hotspots

Hotspots TP224, TP382 and TP525A were excavated and initial validation sampling reported no exceedances of the remediation criteria.

Initial validation sampling of hotspot TP376 reported exceedances of the validation criteria in one of the excavation walls. This was excavated to chase out the contamination and validation sampling of the resulting wall reported concentrations of the contaminants of concern less than the validation criteria.

12.3 Lot 12 Southwest Nightsoil Disposal Area

Initial validation results for the southwest night soil disposal area reported several exceedances of the validation criteria. These areas were excavated and the results of the final validation of the excavation surfaces reported no exceedances of the validation criteria.

The eastern chase out area was excavated specifically because of TPH and visually identified PAH contamination. The validation sampling of this area reported no exceedances of the validation criteria.

The southern chase out area was excavated on three occasions because of TPH and PAH contamination reported above the validation criteria. The excavations chased out the contamination and validation sampling of the final walls and floor of the excavation reported no exceedances of the validation criteria.

The western chase out area was excavated on two occasions because of visual indicators of PAH contamination and results reported above the site validation criteria. The excavation chased out the contamination to the west beyond the remediation area specified in the ERM RAP and validation sampling of the final walls and floor of the excavation reported no exceedances of the validation criteria.

Trenches were excavated throughout the western half of the southwest night soil disposal area to remove visually stained soil from night soil disposal. Four validation samples collected from the trench excavations reported exceedances of the validation criteria. Three of these, T37, T38/6 and T49/3 were excavated to chase out the contamination and validation sampling of the resulting excavation reported no exceedances of the validation criteria. Trench validation sample T1/3 reported an exceedance of the validation criteria for TPH C_{10} –C_{36} of 6,310 mg/kg. Additional excavation was conducted until all soil was removed down to bedrock. Although no validation sample was able to be collected to assess whether all of the contamination had been removed GHD visually observed that the excavation had terminated on competent bedrock. Any residual contamination below this depth is assessed to present no unacceptable risk to human health, as it is likely to be of low volatility and the proposed landuse is industrial/commercial. Groundwater monitoring has also revealed that this contamination has not impacted groundwater in the vicinity of this location. Additionally, isolated contamination such as this which remains on the site following remediation will be managed under a site environmental management plan.

12.4 Lot 12 Hotspots

Hotspots TP307, TP312 and TP322 were excavated and initial validation sampling reported no exceedances of the remediation criteria.

Initial validation sampling of hotspot TP360 reported exceedances of the validation criteria in one of the excavation walls. This was excavated to chase out the TPH and PAH contamination on several occasions and validation sampling of the final resulting walls and base of the excavation reported concentrations of the contaminants of concern less than the validation criteria.

12.5 Onsite Reuse of Soil

Stockpiles that were assessed to be potentially suitable for reuse onsite after initial sampling were sampled a second time at a density of 1 sample per 25 m^3. If the results of the second round of sampling reported results less than the validation criteria stockpiles were deemed suitable for onsite reuse. Where there were small exceedances of the validation criteria a 95% $UCL_{average}$ was calculated to assess whether the average concentration of the exceeding contaminant in the stockpile was less than the validation criteria. In all instances where statistical analysis was used, if a duplicate sample contained a higher concentration than the parent sample, the duplicate was substituted in the calculation.

Lot 11

Fourteen stockpiles in Lot 11 having a cumulative volume of approximately 546 m^3 were assessed to be suitable for reuse onsite of which two stockpiles (SP29 and SP35) required statistical analysis to confirm their suitability.

Stockpile SP36 (45 m^3) was reported to be suitable for reuse onsite base on three samples that were sent to the primary laboratory. Subsequent to the stockpile being classified, a review of interlaboratory duplicates revealed that the duplicate for SP36 reported exceedances of TPH C_{10} – C_{36} (1,915 mg/kg), benzo(a)pyrene (29 mg/kg) and Total PAH (232.4 mg/kg). It is noted that the field notes reported no visual or olfactory indicators of contamination in the stockpile. This stockpile represents 8.2% of volume of the stockpiled soil that was reused on Lot 11 and even if the interlaboratory duplicate is assumed to be correct, the quantity of contaminated material that is in the fill is likely to be small. Given the proposed industrial/ commercial landuse, the sparingly leachable nature of the PAHs and the sites sparingly permeable clay soils, if the site is managed in accordance with the site management plan, this should not present an unacceptable risk to human health or the environment.

Lot 12

Thirty five stockpiles from Lot 12 having a cumulative volume of approximately 3,533 m^3 were assessed to be suitable for reuse onsite of which five stockpiles (SP1, SP37, SP54, SP56 and SP58) required statistical analysis to confirm their suitability.

12.6 Lot 12 Northern Stockpile Storage Area

The area north of the Lot 12 Main Grid Area was excavated to attempt to remove the PAH and TPH contaminated soil from an area used to stockpile contaminated soil near the end of the project. Validation samples were collected and the validation samples confirmed that most of the contamination had been successfully chased out though there was still some TPH which exceeded the site validation criteria. GHD discussed this exceedance with the Site Auditor during a site meeting on 14 December 2012 and it was suggested by the Auditor that this contamination was likely be localised and could be managed under the Site Management Plan.

12.7 VENM and Imported Backfill

Approximately 9,600 tonnes of validated VENM has been imported to site, however this material will not be used to backfill the excavations, rather to build access roads for construction. Additional fill may be required to be imported to site to backfill the excavations. Any additional fill imported to site must be validated as suitable under the proposed commercial/industrial landuse.

12.8 Groundwater

The results of groundwater sampling and analysis at the site indicated that it did not contain any contaminants tested which could pose a risk to the environment or future site occupants under the proposed development because:

- The land is proposed to undergo commercial redevelopment which will result in little potential for exposure to groundwater;
- The soil at the site has low permeability and groundwater at the site would have little potential to impact the nearest sensitive receptor which is Eastern Creek (approximately 2 km east of the site); and
- A review of registered groundwater bores on or near site, revealed that groundwater in the area does not appear to be extracted for human use, stock watering or irrigation.

12.9 Site Management Plan

Unexpected contamination is possibly located in the un-remediated areas of Lots 11 and 12. To manage this and the remediated areas, a site management plan will be prepared to detail procedures to be implemented at the site which aim to protect human health and the environment from contamination remaining at the site.

13. Conclusions

The results of the validation discussed in **Section 12** indicate the Lot 11 former workshop area, (except validation sample location AA8 in the Western Key Area), the Lot 12 southwest night soil disposal area, and Lot 11 and 12 trenches, deep excavations and hotspots present no unacceptable risk to human health for the proposed industrial/commercial land use or the environment and therefore these areas are considered validated.

Validation sample AA8 in the western key area of Lot 11, the Lot 11 former workshop area backfilled with stockpile Lot 11 SP36 and other un-remediated areas of Lots 11 and 12 will be managed under a site management plan. These areas are considered to be insignificant compared to the scale of remediation completed at the site.

On the basis of the work undertaken, the results of the most recent round of groundwater monitoring were consistent with the results obtained from previous monitoring rounds. As such, GHD considers that groundwater at the site has not been significantly impacted by the former site activities in the areas assessed. Consequently further monitoring and/or management of groundwater at the site is not considered to be required and hence is not considered to impact the sites suitability for the proposed commercial redevelopment. It is also considered that there is no requirement to monitor groundwater for contamination at the site under the site management plan.

14. Disclaimer

This Marsden Park Night Soil Depot Remediation – Validation Report ("Report"):

1. has been prepared by GHD Pty Ltd for Ganian Pty Ltd;

2. may only be used and relied on by Ganian Pty Ltd;

3. must not be copied to, used by, or relied on by any person other than Ganian Pty Ltd without the prior written consent of GHD and subject always to the next paragraph; and

4. may only be used for the purpose as stated in Section 1.2 of the Report (and must not be used for any other purpose).

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Ganian Pty Ltd arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- were limited to those specifically detailed in section 1.3 of this Report and GHD proposal dated 14 September 2011, document number Proposal 201_APP Marsden Park; and
- were undertaken in accordance with current profession practice and by reference to relevant environmental regulatory authority and industry standards, guidelines and assessment criteria in existence as at the date of this Report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of roads, fences and vegetation etc. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking the services mentioned above and preparing the Report ("Assumptions"), as specified throughout this Report.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation of this Report and are relevant until such times as the site conditions

or relevant legislations changes, at which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations."

GHD has prepared this Report on the basis of information provided by Ganian Pty Ltd, APP, Mulgoa Quaries and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked ("Unverified Information") beyond the agreed scope of work.

GHD expressly disclaims responsibility in connection with the Unverified Information, including (but not limited to) errors in, or omissions from, the Report, which were caused or contributed to by errors in, or omissions from, the Unverified Information."

Except as otherwise expressly stated in this Report GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill material has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or material from such buildings disposed of on the site, the site may contain asbestos or ACM.

Subsurface conditions can vary across a particular site and cannot be exhaustively defined by the investigations carried out prior to this Report. As a result, it is unlikely that the results and estimations expressed or used to compile this Report will represent conditions at any location other than the specific points of sampling. A site that appears to be unaffected by contamination at the time of the Report may later, due to natural causes or human intervention, become contaminated.

Except as otherwise expressly stated in this Report, GHD makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.

These Disclaimers should be read in conjunction with the entire Report and no excerpts are taken to be representative of the findings of this Report.

Appendices

Appendix A – Figures

Appendix B – Results Tables

Appendix C – Chain of Custody Documentation and Laboratory Analytical Reports

Appendix D – Site Photographs

Appendix E – Waste Dockets

Appendix F – VENM Classification Letter

Appendix G – Backfill Plan

GHD

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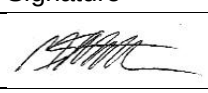
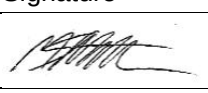
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft	P McDougall	M. Clutterham		M. Clutterham		21/12/2012

www.ghd.com

ATTACHMENT 4

SITE AUDIT STATEMENT - LOT 11 AND PART 12 DP262886, RICHMOND ROAD, MARSDEN PARK

NSW Site Auditor Scheme
SITE AUDIT STATEMENT

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the* Contaminated Land Management Act 1997 *on 31st October 2012. For more information about completing this form, go to Part IV.

PART I: Site audit identification

Site audit statement no. GN 319B

This site audit is a ~~**statutory audit**~~**/non-statutory audit*** within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details (as accredited under the *Contaminated Land Management Act 1997*)

Name:	Graeme Nyland	Company:	ENVIRON Australia Pty Ltd
Address:	Level 3, 100 Pacific Highway (PO Box 560)		
	North Sydney NSW	Postcode:	2060
Phone:	02 9954 8100	Fax:	02 9954 8150

Site details

Address: Richmond Road, Marsden Park, NSW

Postcode: 2765

Property description *(attach a list if several properties are included in the site audit)*

Lots 11 and Part Lot 12 in Deposited Plan (DP) 262886 (formerly referred to as Lot 11 and Lot 12 DP 616003) (a 75 m wide strip of land on the western boundary is excluded from Lot 12, refer attachment at end of Part 1)

Local Government Area: Blacktown City Council

Area of site (e.g. hectares): 19.8 ha (approximately)

Current zoning: Ln2 (Light Industrial), B7 (Business Park) and SP2 (Infrastructure)

To the best of my knowledge, the site ~~**is**~~**/is not*** the subject of a declaration, order, agreement or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

Declaration/Order/Agreement/Proposal/Notice* no(s): N/A

Strike out as appropriate

Site audit commissioned by

Name: Laura O'Hea Company: APP on behalf of Ganian Pty Ltd

Address: c/o APP Corporation, PO Box 1573, North Sydney NSW

Postcode: 2059

Phone: 9957 1279 Fax: 9954 1951

Name and phone number of contact person (if different from above)

NA

Purpose of site audit

☑ A. To determine land use suitability *(please specify intended use[s])*

Commercial or industrial land use

~~**OR**~~

~~☐ B(i) To determine the nature and extent of contamination, and/or~~

~~☐ B(ii) To determine the appropriateness of an **investigation/remedial action/management plan***, and/or~~

~~☐ B(iii) To determine if the land can be made suitable for a particular use or uses by implementation of a specified **remedial action plan/management plan*** *(please specify intended use[s])*~~

~~……~~

Information sources for site audit

Consultancy(ies) which conducted the site investigation(s) and/or remediation

- GHD Pty Ltd (GHD)
- Environmental Resource Management Australia Pty Ltd (ERM)
- Consulting Earth Scientists Pty Ltd (CES)

Title(s) of report(s) reviewed:

- Report 'Supplemental Environmental Site Assessment: Former Marsden Park Night Soil Depot, Marsden Park NSW' dated 3 February 2010 by CES
- Letter 'Re: Advice on Remediation Category Classification – Lot 12, former Marsden Park Nightsoil Depot Area' dated 25 June 2010 by ERM
- Final Report 'Supplemental Environmental Site Assessment, Former Marsden Park Sanitary Depot, Marsden Park, NSW' dated March 2011 by ERM
- Final Report 'Remediation Action Plan, Lot 11, Former Marsden Park Sanitary Depot, Marsden Park, NSW' dated 29 April 2011 by ERM
- Final Report 'Remediation Action Plan, Lot 12, Former Marsden Park Sanitary Depot, Marsden Park, NSW' dated 30 March 2011 by ERM

Strike out as appropriate

- Report ‘Sampling, Analytical and Quality Plan, Validation Sampling Program - Lots 11 and 12, former Marsden Park Sanitary Depot, Marsden Park, NSW’, May 2012 by GHD
- Letter “Marsden Park Former Night Soil Depot, Pathogen Analyses”, 20 July 2012, by GHD
- Letter “Marsden Park RAP, Groundwater Monitoring Event’, 6 September 2012, by GHD
- Letter “Marsden Park Former Night Soil Depot, BTEX Analyses”, 3 October 2012, by GHD
- Letter “Marsden Park Former Night Soil Depot, Additional Groundwater Well Installation”, 12 October 2012, by GHD
- Letter “Marsden Park RAP, Groundwater Monitoring Event October 2012”, 7 November 2012, by GHD
- Report “Marsden Park Night Soil Depot Remediation, Validation Report”, dated February 2013, by GHD
- “Marsden Park Night Soil Depot Remediation, Site Management Plan”, dated February 2013 by GHD

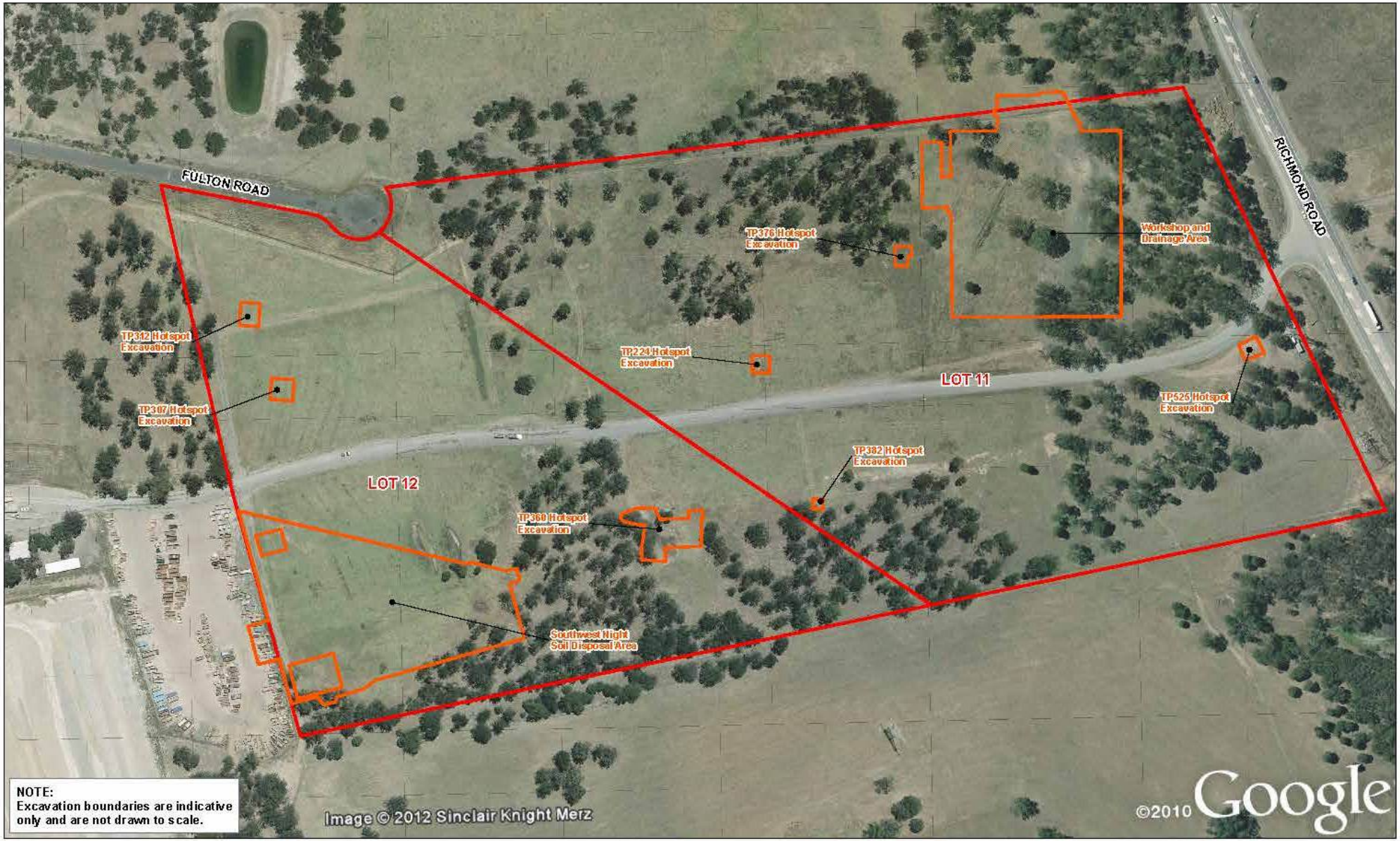
Other information reviewed (including previous site audit reports and statements relating to the site)

- Site Audit Report and Site Audit Statement No GN 319, Remediation Action Plan, Former Marsden Park Sanitary Depot, April 2009, ENVIRON Australia Pty Ltd.

Site audit report

Title: Site Audit Report –Former Marsden Park Sanitary Depot

Report no. GN 319B (ENVIRON Ref: AS121476) Date: February 2013



0 20 40 60 80 100
Metres

Map Projection : Transverse Mercator
Horizontal Datum : Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND
- Site Boundary (Approximate)
- Validation Excavation Locations (Approximate)

Ganian Pty Ltd
Marsden Park Night Soil Depot Remediation
Site Management Plan

Job Number	21-21487
Revision	A
Date	14 Feb 2013

Site Layout Plan

Figure 2

N:\AUSydney\Projects\21\21487\GIS\Maps\MXD\21_21487_J002_MARSDENPARK_SiteLayout.mxd

Data Source: Google Earth Pro 2012 - Imagery. Created by: Inham

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

PART II: Auditor's findings

Please complete either Section A or Section B, **not** both. *(Strike out the irrelevant section.)*

Use Section A where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land use(s).

Use Section B where the audit is to determine the nature and extent of contamination and/or the appropriateness of an investigation or remedial action or management plan and/or whether the site can be made suitable for a specified land use or uses subject to the successful implementation of a remedial action or management plan.

Section A

☑ **I certify that, in my opinion, the site is SUITABLE for the following use(s)** *(tick all appropriate uses and strike out those not applicable)*:

- ~~☐ Residential, including substantial vegetable garden and poultry~~
- ~~☐ Residential, including substantial vegetable garden, excluding poultry~~
- ~~☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~
- ~~☐ Day care centre, preschool, primary school~~
- ~~☐ Residential with minimal opportunity for soil access, including units~~
- ~~☐ Secondary school~~
- ~~☐ Park, recreational open space, playing field~~
- ☑ Commercial/industrial
- ~~☐ Other *(please specify)* ……~~

subject to compliance with the following environmental management plan *(insert title, date and author of plan)* **in light of contamination remaining on the site: …**

- "Marsden Park Night Soil Depot Remediation, Site Management Plan", dated February 2013 by GHD Pty Ltd.

~~**OR**~~

~~☐ **I certify that, in my opinion, the site is NOT SUITABLE for any use due to the risk of harm from contamination.**~~

Overall comments…

The site was previously used as a nightsoil disposal depot. Remediation of known major contamination has taken place, however, the potential for contamination remains. Potential contamination consists mainly of polycyclic aromatic hydrocarbons and general waste used in the nightsoil depot operations and pathogens. A Site Management Plan (SMP) provides procedures for identifying and appropriately assessing and managing contamination which could be encountered during construction or operation of the proposed commercial/industrial developments on the site.

Key elements of the SMP are as follows:

- The procedures outlined are required to be incorporated into future site specific occupational health and safety and environmental management plans
- It is assumed that pavements will be present across the majority of the site under the proposed commercial/ industrial usage

- Consideration of additional management or validation requirements if large areas of potentially contaminated soil are unpaved within the future development
- Personal Protective Equipment (PPE) and hygiene measures for subsurface workers are specified
- Management measures for excavated soil including dust control and protection of surface water
- In the event of unexpected finds, segregation of materials and involvement of a suitably qualified consultant for assessment/ management
- Waste classification procedures for soils to be disposed offsite
- Annual inspection that pavements are intact
- Initial review of SMP following site development and prior to occupation, then annual review of SMP during site operation.

Groundwater investigations at the site have indicated the potential for localised impact by ammonia and petroleum hydrocarbons. Abstraction of groundwater would not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water.

~~Section B~~

Purpose of the plan[1] which is the subject of the audit …

I certify that, in my opinion:

- ❑ **the nature and extent of the contamination HAS/HAS NOT* been appropriately determined**

AND/OR

- ❑ **the investigation/remedial action plan/management plan* IS/IS NOT* appropriate for the purpose stated above**

AND/OR

- ❑ **the site CAN BE MADE SUITABLE for the following uses** *(tick all appropriate uses and strike out those not applicable)*:
  - ❑ Residential, including substantial vegetable garden and poultry
  - ❑ Residential, including substantial vegetable garden, excluding poultry
  - ❑ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
  - ❑ Day care centre, preschool, primary school
  - ❑ Residential with minimal opportunity for soil access, including units
  - ❑ Secondary school
  - ❑ Park, recreational open space, playing field
  - ❑ Commercial/industrial
  - ❑ Other *(please specify)* ……

if the site is remediated/managed* in accordance with the following remedial action plan/management plan* *(insert title, date and author of plan)*

…

~~**subject to compliance with the following condition(s):**~~

…

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

**** Strike out as appropriate***

~~**Overall comments**~~

PART III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (Accreditation No. 9808).

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed.....

Date.....27/2/2013

PART IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remedial action or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use(s) of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A or Section B of Part II, **not** both.

In **Section A** the auditor may conclude that the land is *suitable* for a specified use(s) OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further remediation or investigation of the site was needed to render the site fit for the specified use(s). Any **condition** imposed should be limited to implementation of an environmental management plan to help ensure the site remains safe for the specified use(s). The plan should be legally enforceable: for example a requirement of a notice under the *Contaminated Land Management Act 1997* (CLM Act) or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of the *Environmental Planning and Assessment Act 1979*.

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

In **Section B** the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or whether land can be made suitable for a particular land use or uses upon implementation of a remedial action or management plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

In **Part III** the auditor certifies his/her standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to:

EPA (NSW)
Contaminated Sites Section
PO Box A290, SYDNEY SOUTH NSW 1232
nswauditors@epa.nsw.gov.au

AND

the **local council** for the land which is the subject of the audit.

ATTACHMENT 5

ENVIRONMENTAL NOTES

IMPORTANT INFORMATION REGARDING YOUR ENVIRONMENTAL SITE ASSESSMENT

These notes have been prepared by Geotechnique Pty Ltd, using guidelines prepared by the ASFE (Associated Soil and Foundation Engineers). The notes are offered to assist in the interpretation of your environmental site assessment report.

REASONS FOR AN ENVIRONMENTAL ASSESSMENT

Environmental site assessments are typically, though not exclusively, performed in the following circumstances:

- As a pre-acquisition assessment on behalf of a purchaser or a vendor, when a property is to be sold
- As a pre-development assessment, when a property or area of land is to be redeveloped, or the land use has changed, e.g. from a factory to a residential subdivision
- As a pre-development assessment of greenfield sites, to establish baseline conditions and assess environmental, geological and hydrological constraints to the development of e.g. a landfill
- As an audit of the environmental effects of previous and present site usage

Each circumstance requires a specific approach to assessment of soil and groundwater contamination. In all cases the objective is to identify and if possible quantify the risks that unrecognised contamination poses to the ongoing proposed activity. Such risks may be financial (clean-up costs or limitations in site use) and physical (health risks to site users or the public).

ENVIRONMENTAL SITE ASSESSMENT LIMITATIONS

Although information provided by an environmental site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment might not detect all contamination within a site. Contaminants could be present in areas that were not surveyed or sampled, or migrate to areas that did not show signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant that may occur; only the most likely contaminants are screened.

AN ENVIRONMENTAL SITE ASSESSMENT REPORT IS BASED ON A UNIQUE SET OF PROJECT SPECIFIC FACTORS

In the following events and in order to avoid cost problems, you should ask your consultant to assess any changes in the conclusion and recommendations made in the assessment:

- When the nature of the proposed development is changed e.g. if a residential development is proposed, rather than a commercial development
- When the size or configuration of the proposed development is altered e.g. if a basement is added
- When the location or orientation of the proposed structure is modified
- When there is a change of land ownership, or
- For application to an adjacent site

ENVIRONMENTAL SITE ASSESSMENT FINDINGS ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual sub-surface conditions only at those points where samples are taken, when they are taken. Data obtained from the sampling and subsequent laboratory analyses are interpreted by geologists, engineers or scientists and opinions are drawn about the overall sub-surface conditions, the nature and extent of contamination, the likely impact on any proposed development and appropriate remediation measures. Actual conditions may differ from those inferred, because no professional, no matter how qualified and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, however, steps can be taken to help minimise the impact. For this reason site owners should retain the services of their consultants throughout the development stages of the project in order to identify variances, conduct additional tests that may be necessary and to recommend solutions to problems encountered on site.

Soil and groundwater contamination is a field in which legislation and interpretation of legislation by government departments is changing rapidly. Whilst every attempt is made by Geotechnique Pty Ltd to be familiar with current policy, our interpretation of the investigation findings should not be taken to be that of the relevant authority. When approval from a statutory authority is required for a project, approval should be directly sought.

STABILITY OF SUB-SURFACE CONDITIONS

Sub-surface conditions can change by natural processes and site activities. As an environmental site assessment is based on conditions existing at the time of the investigation, project decisions should not be based on environmental site assessment data that may have been affected by time. The consultant should be requested to advise if additional tests are required.

ENVIRONMENTAL SITE ASSESSMENTS ARE PERFORMED FOR SPECIFIC PURPOSES AND CLIENTS

Environmental site assessments are prepared in response to a specific scope of work required to meet the specific needs of specific individuals e.g. an assessment prepared for a consulting civil engineer may not be adequate to a construction contractor or another consulting civil engineer.

An assessment should not be used by other persons for any purpose or by the client for a different purpose. No individual, other than the client, should apply an assessment, even for its intended purpose, without first conferring with the consultant. No person should apply an assessment for any purpose other than that originally contemplated, without first conferring with the consultant.

MISINTERPRETATION OF ENVIRONMENTAL SITE ASSESSMENTS

Costly problems can occur when design professionals develop plans based on misinterpretation of an environmental site assessment. In order to minimise problems, the environmental consultant should be retained to work with appropriate design professionals, to explain relevant findings and to review the adequacy of plans and specifications relative to contamination issues.

LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists, based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these would not be redrawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however, contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. Should this occur, delays and disputes, or unanticipated costs may result.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of sub-surface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations, such as contractors.

READ RESPONSIBILITY CLAUSES CLOSELY

An environmental site assessment is based extensively on judgement and opinion; therefore, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. In order to aid in prevention of this problem, model clauses have been developed for use in written transmittals. These are definitive clauses, designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment and you are encouraged to read them closely. Your consultant will be happy to give full and frank answers to any questions you may have.

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Each circumstance requires a specific approach to assessment of soil and groundwater contamination. In all cases the objective is to identify and if possible quantify the risks that unrecognised contamination poses to the ongoing proposed activity. Such risks may be financial (clean-up costs or limitations in site use) and physical (health risks to site users or the public).

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- When the size or configuration of the proposed development is altered e.g. if a basement is added
- When the location or orientation of the proposed structure is modified
- When there is a change of land ownership, or
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ENVIRONMENTAL SITE ASSESSMENT FINDINGS ARE PROFESSIONAL ESTIMATES

Site assessment identifies actual sub-surface conditions only at those points where samples are taken, when they are taken. Data obtained from the sampling and subsequent laboratory analyses are interpreted by geologists, engineers or scientists and opinions are drawn about the overall sub-surface conditions, the nature and extent of contamination, the likely impact on any proposed development and appropriate remediation measures. Actual conditions may differ from those inferred, because no professional, no matter how qualified and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, however, steps can be taken to help minimise the impact. For this reason site owners should retain the services of their consultants throughout the development stages of the project in order to identify variances, conduct additional tests that may be necessary and to recommend solutions to problems encountered on site.

Soil and groundwater contamination is a field in which legislation and interpretation of legislation by government departments is changing rapidly. Whilst every attempt is made by Geotechnique Pty Ltd to be familiar with current policy, our interpretation of the investigation findings should not be taken to be that of the relevant authority. When approval from a statutory authority is required for a project, approval should be directly sought.

STABILITY OF SUB-SURFACE CONDITIONS

Sub-surface conditions can change by natural processes and site activities. As an environmental site assessment is based on conditions existing at the time of the investigation, project decisions should not be based on environmental site assessment data that may have been affected by time. The consultant should be requested to advise if additional tests are required.

ENVIRONMENTAL SITE ASSESSMENTS ARE PERFORMED FOR SPECIFIC PURPOSES AND CLIENTS

Environmental site assessments are prepared in response to a specific scope of work required to meet the specific needs of specific individuals e.g. an assessment prepared for a consulting civil engineer may not be adequate to a construction contractor or another consulting civil engineer.

An assessment should not be used by other persons for any purpose or by the client for a different purpose. No individual, other than the client, should apply an assessment, even for its intended purpose, without first conferring with the consultant. No person should apply an assessment for any purpose other than that originally contemplated, without first conferring with the consultant.

MISINTERPRETATION OF ENVIRONMENTAL SITE ASSESSMENTS

Costly problems can occur when design professionals develop plans based on misinterpretation of an environmental site assessment. In order to minimise problems, the environmental consultant should be retained to work with appropriate design professionals, to explain relevant findings and to review the adequacy of plans and specifications relative to contamination issues.

LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists, based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these would not be redrawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however, contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. Should this occur, delays and disputes, or unanticipated costs may result.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of sub-surface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations, such as contractors.

READ RESPONSIBILITY CLAUSES CLOSELY

An environmental site assessment is based extensively on judgement and opinion; therefore, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. In order to aid in prevention of this problem, model clauses have been developed for use in written transmittals. These are definitive clauses, designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment and you are encouraged to read them closely. Your consultant will be happy to give full and frank answers to any questions you may have.