Site Audit Report

Ivanhoe Estate
Macquarie Park, NSW 2113

Prepared for

Frasers Property Ivanhoe Pty Ltd

James Davis
NSW EPA Accredited Contaminated Land Site Auditor
Accreditation Number: 0301

Final Report

April 2018 **Report Reference: 600184_0301-2019**

Report Title

Site Audit Report
Ivanhoe Estate, Macquarie Park, NSW 2113

Report Reference: Ref: 600184_0301-2019

Site Audit Details:

Enviroview Project Reference: 600184
Site Auditor: James Davis
Site Auditor NSW EPA Accreditation Number: 0301

List of Site Audit Statements that this report relates to:

0301-2019

Client Details:

Site Audit Commissioned By: Frasers Property Ivanhoe Pty Ltd
Client Contact: Chris Koukoutaris

Document Control:

Revision Status	Date	Approved for Issue	Distribution		
			Client	Council	NSW EPA
Final	6 April 2021		*SAR/SAS-e*	*SAS-e*	*SAS-e*

Notes: (e) – electronic soft copy; (h) – hard copy and number of copies.

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Executive Summary

This Site Audit Report and subsequent Site Audit Statement have been produced to document the findings of a Site Audit, conducted by James Davis of Enviroview Pty Ltd, a New South Wales Environmental Protection Authority (NSW EPA) Contaminated Land Accredited Site Auditor on the subject site identified as Ivanhoe Estate (including Ivanhoe Place, Wilcannia Way, Nyngan Way and Narromine Way) and part of 2-4 Lyon Park Road, Macquarie Park.

The Site Audit has been conducted following a request from Frasers Property Australia to undertake a Site Audit on the site and to determine in the Site Auditor's opinion whether the site is considered suitable for the proposed land use. It is understood that the site is proposed to be developed for high-density residential land use.

The requirement for this Site Audit is in compliance with conditions of development consent for State Significant Development of the site. Conditions require that a Site Auditor is engaged and retained through remediation works and that the Site Auditor issues a Site Audit Statement certifying that the site is suitable for the proposed use. As the Site Audit is a specific requirement of a development consent or approval given under the *Environmental Planning and Assessment Act 1997* it has been conducted as a Statutory Site Audit as defined by section 47(c) of the *Contaminated Land Management Act 1997*.

The objective and scope of the Site Audit was to independently review the site assessment and remediation planning, remediation works, and remediation validation as reported by the contaminated land consultant, and to determine whether the site is suitable for the proposed use, being residential land use with minimal opportunity for soil access, including units, consistent with the land use within the development.

The outcome of the Site Audit is this Site Audit Report and subsequent Site Audit Statement, (SAS number 0301-2019). The Site Audit Statement will be provided to the client, the NSW EPA and Council when issued and is also attached to the end of this report.

In order to achieve the objective, the Site Auditor has reviewed the work undertaken as reported by the various contaminated land consultants and assessed whether the consultant's work complied with relevant guidelines and provides a robust basis for determining whether the land is suitable for the proposed land use.

The reports relating to the assessment and remediation of the site have been reviewed and are considered to have met the requirements of the *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* (NSW EPA, 2017) and other guidelines approved under s.105 of the *Contaminated Land Management Act 1997*, and therefore the objectives of the Site Audit.

The Site Auditor is satisfied that the soil remediation and validation works have been appropriately undertaken. It is considered that the soils at the site are suitable for the proposed land use.

The guidelines for the Site Audit Scheme (NSW EPA, 2017) prescribe that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, Site Auditors should follow the decision-making process for assessing urban redevelopment sites provided in the guidelines.

This decision process has been utilised by the Site Auditor in forming the opinion of whether the site is suitable for the proposed use and it is considered by the Site Auditor that the site is suitable for the most sensitive of the proposed land uses, being residential land use with minimal opportunity for soil access, including units and other less sensitive commercial/industrial land use.

A Site Audit Statement will be issued certifying that in the opinion of the Site Auditor the site is suitable for residential with minimal opportunity for soil access, including units, and commercial/industrial use.

Acronyms and Abbreviations

ACM	asbestos containing material
AEC	areas of environmental concern
AF/FA	Asbestos Fines/Friable Asbestos
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEX	benzene, toluene, ethylbenzene, and xylenes
bgl	below ground level
COC	chain of custody (can also be contaminants of concern)
COPC	contaminants of potential concern
DA	Development Application
DQO	data quality objectives
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DP	Deposited Plan
HILs	health-based investigation levels
IA	interim advice
LOR	limit of reporting
m	metre
MW	monitoring well
NATA	National Association of Testing Authorities
NEHF	National Environmental Health Forum
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OCPs	organochlorine pesticides
OEH	The NSW Office of Environment and Heritage
OPPs	organophosphorus pesticides
PAH	polycyclic aromatic hydrocarbons
PID	photoionisation detector
RAP	Remedial Action Plan
RL	relative level
RPD	relative per cent difference
SAR	Site Audit Report
SAS	Site Audit Statement
SEPP 55	State Environmental Planning Policy No. 55 – Remediation of Land
TPH	total petroleum hydrocarbons
TRH	total recoverable hydrocarbons
VOCs	volatile organic compounds
WHS	work health safety

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1 Introduction

1.1 Overview

This Site Audit Report (SAR) and subsequent Site Audit Statement (SAS) have been produced to document the findings of a Site Audit, conducted by James Davis of Enviroview Pty Ltd, a New South Wales Environment Protection Authority[1] (NSW EPA) Contaminated Land Accredited Site Auditor accredited under Part 4 of the *Contaminated Land Management Act 1997* as a Site Auditor.

The Site Audit has been conducted in accordance with the requirements of the *Contaminated Land Management Act 1997* (the 'Act'). The Act defines the Site Audit as follows:

> "site audit" means a review:
>
> (a) that relates to management (whether under this Act or otherwise) of the actual or possible contamination of land, and
>
> (b) that is conducted for the purpose of determining any one or more of the following matters:
>
> (i) the nature and extent of any contamination of the land,
>
> (ii) the nature and extent of any management of actual or possible contamination of the land,
>
> (iii) whether the land is suitable for any specified use or range of uses,
>
> (iv) what management remains necessary before the land is suitable for any specified use or range of uses,
>
> (v) the suitability and appropriateness of a plan of management, long-term management plan or a voluntary management proposal.

Furthermore, the Act provides the following definitions:

> "Site Audit Report" means a site audit report prepared by a site auditor in accordance with Part 4 [of the Act].
>
> "site audit statement" means a site audit statement prepared by a site auditor in accordance with Part 4 [of the Act].

The *Contaminated Sites: Guidelines for the NSW Auditor Scheme (3rd edition)*, (NSW EPA, 2017) describes that the services of a site auditor can be used by anyone who needs an independent and authoritative review of information relating to possible or actual contamination of a site and that the review may involve independent expert technical advice or 'sign-off' of contaminated site assessment, remediation or validation work conducted by a contaminated site consultant. The guidelines describe the site assessment and Site Audit process where the contaminated land consultant designs and undertakes the site assessments, and if necessary, all remediation and validation activities to achieve specified objectives. The Site Auditor

[1] *The NSW EPA has undergone several name changes in the recent past; however certain statutory functions and powers have always and continue to be exercised in the name of the Environmental Protection Authority (NSW EPA). The NSW EPA is responsible for environmental regulation and associated activities throughout NSW including those activities regulated under the Contaminated Land Management Act 1997. The use of the names NSW Department of Environment and Conservation (NSW DEC), NSW Department of Environment and Climate Change (NSW DECC), NSW Department of Environment, Climate Change and Water (NSW DECCW), NSW Office of Environment and Heritage (NSW OEH) and NSW EPA in this report are used regarding the name relevant at the time and context of the reference but are considered generally interchangeable and can be interpreted as one and the same.*

independently reviews the consultant's work and prepares the material outcome of the Site Audit – the Site Audit Report and Site Audit Statement.

1.2 Guideline Documents

Guidelines made or approved by the NSW EPA under s.105 of the Act at the time of the completion of the Site Audit include:

- Contaminated Land Guidelines: Assessment and Management of Hazardous Ground Gases, NSW EPA, 2019 (NSW EPA, 2019)
- Contaminated Sites: Guidelines for the vertical mixing of soil on former broad-acre agricultural land, NSW EPA, 1995 (NSW EPA, 1995)
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (NSW EPA, 1995)
- Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA, 1997 (NSW EPA, 1997)
- Contaminated Land Guidelines: Consultants Reporting on Contaminated Land, NSW EPA ,2020 (NSW EPA, 2020)
- Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW DEC 2005 (NSW DEC, 2005)
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition), NSW EPA, 2017 (NSW EPA, 2017)
- Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination, NSW DEC, 2007 (NSW DEC, 2007)
- Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW DECC, 2015 (NSW EPA, 2015)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018), (ANZG, 2018) (except for the water quality for primary industries component, which still refer to the ANZECC & ARMCANZ 2000 guidelines)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, 2000 (ANZECC/ARMCANZ, 2000) (primary industries only)
- Composite Sampling. Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide (NEHF, 1996)
- Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards. Department of Health and Ageing and EnHealth Council, Commonwealth of Australia, 2012 (EnHealth, 2012)
- National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 1999 (Amended May 2013) (NEPC, 1999, Amended 2013)

- Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental, February 1996 (NSW Agr., 1996)
- Australian Drinking Water Guidelines. National Health and Medical Research Council and Natural Resource Management Ministerial Council, 2011 (NHRMC/NRMMC, 2011)

From time to time the NSW EPA may amend the guidelines made or approved under s.105 of the Act.

Several additional technical notes and guidance is also provided by the NSW EPA that may not be made or approved under the *Contaminated Land Management Act 1997* that may be relevant to the site contamination management, where relevant these have been considered and include the following:

- Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation. NSW DECCW, 2009. (NSW DECCW, 2009)
- Technical Note: Investigation of Service Station Sites (NSW EPA, 2014a).
- Waste Classification Guidelines Parts 1-4 (Classifying Waste, Immobilisation of Waste, Waste Containing Radioactive Material, and Acid Sulfate Soils). NSW Environment Protection Authority, 2014 (NSW EPA, 2014b).

1.3 Site Auditor

James Davis of Enviroview Pty Ltd, is a NSW EPA Contaminated Land Accredited Site Auditor accredited as a Site Auditor under Part 4 of the *Contaminated Land Management Act 1997* (NSW EPA Accreditation Number 0301) and conducted the Site Audit.

The Site Audit was initiated by a request from representatives of Frasers Property Ivanhoe Pty Ltd who engaged the Site Auditor in November 2020.

1.4 Type of Site Audit

The purpose of the Site Audit is to provide an independent review of the remediation and validation works as presented in the consultant(s) reports. The Site Audit is a requirement of the Project Approval (Development Consent SSD 8903 MOD 1) issued by the Minister for Planning on 10 November 2020.

As the Site Audit is a specific requirement of a development approval it has been conducted as a Statutory Site Audit as defined by s 47 of the *Contaminated Land Management Act 1997*.

1.5 Objective and Scope of the Site Audit

The objective and scope of the Site Audit was to independently review the site assessment and remediation planning, remediation works, and remediation validation as reported by the contaminated land consultant, and to determine whether the site is suitable for the proposed use, being residential with minimal opportunity for soil access consistent with the land use within the development.

The outcome of the Site Audit is this Site Audit Report and subsequent Site Audit Statement, (SAS number 0301-2019). The Site Audit Statement will be provided to the client, the NSW EPA and Council when issued and is also attached to the end of this report.

1.6 Documents Reviewed

The following documents were reviewed as part of this Site Audit:

JBS&G (2016). *Detailed Site Investigation, Ivanhoe Estate, Herring Road, Macquarie Park, NSW*. Document Ref.: 52047/104956 (Rev 0). 24 October 2016. (JBS&G, 2016)

DLA Environmental Services (2016). Letter dated 11 October 2016 Re: *Summary of In-Ground Contamination – Ivanhoe Estate, Cnr Herring and Epping Roads, Macquarie Park NSW 2113*. Document Ref.: DL3531_S005491. (DLA, 2016)

DLA Environmental Services (June 2017). *Supplementary Site Investigation, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road (STET) NSW 2113*. Document Ref.: DL3953_S006887. June 2017. (DLA, 2017a)

DLA Environmental Services (July 2017). *Supplementary Site Investigation - New Property Acquisition - Ivanhoe Estate, 2 Lyon Park Road, Macquarie Pak* (STET) NSW 2113. Document Ref.: DL3953_S007076. 28 July 2017. (DLA, 2017b)

DLA Environmental Services (2018). *Remediation Action Plan, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Park NSW 2113*. Document ref.: S008208 Version 1.2. 12 March 2018. (DLA, 2018)

Environmental Earth Sciences (January 2021) *Technical Memorandum: Additional Investigation at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW.* Dated 29 January 2021. (EES, 2021a)

Environmental Earth Sciences (January 2021). *Technical Memorandum: Addendum to Remediation Action Plan at Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Park, NSW*. Document Ref.: 120077_RAP Addendum_V1. 29 January 2021. (EES, 2021b)

Environmental Earth Sciences (2021). *Validation Report for Ivanhoe Estate (Location BH8), Corner Herring Road and Epping Road, Macquarie Park, NSW*. Document Ref.: 120077_VAL_BH8_V1. 12 March 2021. (EES, 2021b)

1.7 Site Audit Inspections

While undertaking the Site Audit an inspection of the site was conducted. The following table lists the details of the inspection of the site conducted by the Site Auditor.

Table 1-1 Site Inspections

Date	Attendance	Purpose
27 January 2021	James Davis – Enviroview Pty Ltd Chris Koukoutaris – Frasers Ivanhoe Representatives from Environmental and Earth Sciences and the Remediation Contractor	Inspection of the site to be familiar with the site and site context proposed remediation and validation

1.8 Audit Correspondence

Correspondence in the form of Site Audit Interim Advice was issued regarding the Site Audit to clarify and request additional information and to provide guidance on the Site Audit requirements. Site Audit Interim Advice is provided in **Appendix A**.

1.9 Chronology of Site Assessment and Audit Works

The chronology of events of site assessment, remediation, validation, Auditor review and preparation of final audit statement and report undertaken at the site has been summarised in the following table.

Table 1-2 Summary of Assessment and Site Audit Works

Date	Action
24 October 2016	JBS&G issue the Detailed Site Investigation report
June 2017	DLA Issue the *Supplementary Site Investigation* report (Ivanhoe Estate)
28 July 2017	DLA issue the *Supplementary Site Investigation* report (New Property Acquisition)
7 February 2018	DLA issue the *Draft Remediation Action Plan* for the site
12 March 2018	DLA issue finalised *Remediation Action Plan (RAP)*
19 April 2018	Enviroview (James Davis Site Auditor) issues Site Audit Report and Site Audit Statement for Audit number 0301-1803 certifying that the site can be made suitable for the proposed landuse with the implementation of the DLA Remediation Action Plan
30 April 2020	SSD 8903 granted by the Minister for Planning and Public Spaces
10 November 2020	SSD MOD 1 approved by the Minister for Planning and Public Spaces
17 November 2020	Engagement of James Davis of Enviroview Pty Ltd to conduct a Statutory Site Audit for the property (Site Audit 0301-2019)
18 November 2020	Interim Audit Advice (0301-2019_01) issued – *Re: Confirmation of engagement of NSW EPA Accredited Contaminated Land Site Auditor*
23 November 2020	Site Audit Notification submitted to NSW EPA in relation to Statutory Site Audit 0301-2019
November 2020 - January 2021	Demolition, earthworks, and remediation conducted on-site
27 January 2021	Site Inspection by Site Auditor
29 January 2021	Environmental and Earth Sciences issue *Technical Memorandum: Additional Investigation at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW*
29 January 2021	Environmental and Earth Sciences issue *Technical Memorandum: Addendum to Remediation Action Plan*
5 February 2021	Interim Audit Advice (0301-2019_02) issued – *Re: Review of technical Memorandum*
12 March 2021	Environmental and Earth Sciences issue *Validation Report for Ivanhoe Estate (Location BH8), Corner Herring Road and Epping Road, Macquarie Park, NSW*
24 March 2021	Site Auditor review of Validation completed – Email confirming that no revision is required to the report
1 April 2021	Site Audit Report and Site Audit Statement for Audit number 0301-2019 certifying that the site is suitable for the proposed landuse issued

2 Site Description

2.1 Site Identification

A summary of the site identification details is provided in **Table 2-1**.

Table 2-1 Summary Site Details

Street Address:	Ivanhoe Estate (Ivanhoe Place, Wilcannia Way, Nyngan Way and Narromine Way) and part of 2-4 Lyon Park Road, Macquarie Park
Property Description:	Lots 6 to 20 in DP 861433 Part Lot 1 in DP 859537 Lot 100 in DP 1223787 Lot 5 in DP 740753
Zoning:	B4 - Mixed Use under the Ryde Local Environmental Plan 2014
Local Government Area:	City of Ryde
Site Area:	8.2 Ha

Two plans are provided in **Appendix B**: Figure 1 identifies the site location and development site. A plan figure with the Site Audit Site is also presented.

The site comprises several parcels of land located on the corner of Epping Road and Herring Road. Additional land acquisitions to the east of the site will ultimately enable additional access from Lyonpark Road. The site is irregular in shape and has a combined area of approximately 8.2 hectares.

2.2 Site Condition and Surrounding Environment

The site is currently a development site. Prior to demolition works the site is known by the Site Auditor to have comprised 259 social housing residential dwellings with associated local access roads and public open space.

The consultant DLA did not provide a detailed site description of the site condition at the time of investigation. However, the consultant JBS&G undertook site inspection in April 2016 and September 2016 and provided the following description in the Detailed Site Investigation report (JBS&G, 2016).

- The site comprised a moderately undulating parcel of land sloping towards the southeast, the ground surface of which was largely covered by building footprints and concrete, paving and asphalt hardstands. Historical cut and fill activities undertaken to facilitate the construction of larger developments in the estate were apparent.
- The buildings comprised primarily two storey brick and tile townhouses and multistorey apartment blocks. A single storey, stand-alone childcare centre development also existed within the centre of the estate. The buildings were estimated to have been constructed between 1980 and 1990.
- The southeast section of the site (Lot 9 DP861433) comprised parkland area, bound to the southeast by Shrimptons Creek and an approximately 10 m wide strip of trees and shrubs. The parkland area was generally in good condition, with little to no bare soil and no signs of vegetative stress. The lot contained a disused recreational barbeque area, a skate park and was dissected by a shared path (pedestrian and cyclist). Several

fire scars were observed on concrete hardstands and infrequent small collections of rubbish were noted around ground surfaces within the area.

- The southwest of the site comprised an allotment (Lot 8 DP861433) which was entirely covered by thick vegetation, which prevented detailed inspection of the site surfaces at the time of the investigation.
- A transformer existed on the northwest boundary of Lot 16 DP861433, situated on a concrete foundation. No staining or odours associated with the transformer were observed. Additionally, an unnatural undulation in topography was observed on the southwest corner of the lot, potentially associated with cut and fill activities required to meet construction requirements during development of the land.
- Significant alteration of the ground surfaces appeared to have taken place during construction, potentially being achieved from the importation of fill materials or utilisation of building and demolition waste mixed with site won soils. Cut/fill activities appear to have been localised.

The surrounding land uses was described by the consultant (JBS&G, 2016) as:

- North – the site is bound to the northwest by Herring Road and to the northeast by several medium density housing estates. Within the medium density housing estates lie Elouera Reserve, Quandong Reserve and Wilga Park and recreational parklands. Further north, across Herring Road, are some commercial premises including Trinity Chapel Macquarie and Dunmore Lang College then Kikkiya Creek followed by Macquarie University. To the northeast is the Macquarie Centre, a large commercial and retail development.
- East – immediately east and southwest of the site lies Shrimptons Creek. Further east were several commercial office and retail spaces followed by the Optus Business centre.
- South – the site is bound to the southwest by Epping Road and to the southeast by Shrimptons Creek. The land across Epping Road was observed to comprise stand-alone residences. Further south were several recreational parks and sporting fields comprising the Ryde Community Sports Centre; and
- West – the site is bound to the northwest by Herring Road and to the southwest by Epping Road. Adjacent to the Ivanhoe Estate, across Herring Road, were several commercial premises comprising Morling College and Morling Church as well as a large property redevelopment being undertaken at the time of the investigation. Further west, the land use appeared to be primarily low to medium density residential with recreational parkland interspersed between premises.

2.3 Topography and Hydrology

The consultant DLA (DLA, 2017a) reported that the site is elevated between approximately 47m Australian Height Datum (AHD) in the southern-most corner and 75m AHD along the north-western boundary. The Site exhibits an overall gradient from the north-western boundary down towards the south / south-east.

Shrimpton Creek runs along the south-eastern boundary of the Site and flows in a broadly northerly direction, ultimately discharging to the Lane Cove River which is located approximately 1.35 km to the north-east of the Site.

The surface of the Site comprises both sealed and unsealed surfaces. In areas of the Site where unsealed surfaces are present (i.e., lawns and garden beds), it is expected that surface water (rainfall) would infiltrate into the subsurface. In areas of the Site where impervious pavements are present (i.e., roadways), or where the subsurface becomes waterlogged following periods of prolonged or heavy rainfall, run-off water would form overland flow and follow the gradient of the land.

2.4 Geology and Hydrogeology

The consultant (DLA, 2017a) reported that the Geological Survey of NSW 1:100,000 (Sydney Series Sheet 9130) indicated the lithology of geology underlying the site is Triassic-aged Ashfield Shale of the Wianamatta Group and Hawkesbury Sandstone. Ashfield Shale comprises black and dark grey shale and laminite derived from lacustrine environments. Hawkesbury Sandstone comprises medium to coarse grained quartz sandstone with very minor shale and laminite lenses derived from braided alluvial channel fill.

Review of the NSW Office of Water groundwater data indicates that there are no registered bores within a 500m radius of the Site. The closest registered bore to the Site is located approximately 650m to the north / north-east and is registered for use for monitoring purposes. No details regarding the depth to groundwater are available for the nearby registered bores, however, it is expected that regional groundwater would be present at depth within the underlying bedrock. Based on the hydrology of the local area, it is expected that groundwater underlying the Site would flow in a north-easterly direction towards the Lane Cove River.

2.5 Audit Discussion of Site Description

The information provided by the consultants on the site condition and surrounding environment, topography and hydrology, geology and hydrogeology has been checked against, and meets the requirements of NSW EPA Guidelines (NSW EPA, 2020). The information provided in the consultant's report is also consistent with the observations made by the Site Auditor during the site inspection. As such, in the Site Auditor's opinion the information provided meets the requirements of the Site Audit.

3 Site History

Consultant JBS&G reportedly conducted a desktop historical review as part of a Preliminary Site Investigation report. The Auditor has not viewed the Preliminary Site Investigation report however the findings were summarised in the *Detailed Site Investigation* (DLA, 2017a).

The consultant reported that the site has been used for market gardening, with a small number of historical structures, up until development of the site for its current use as government housing.

3.1 Audit Discussion of Site History

The site historical review is limited and not all the information (for example historical land titles) required by NSW EPA 1997 regarding the documentation of the site history was provided. Notwithstanding, the Auditor acknowledges that a Preliminary Site Investigation, including review of the historical land use was conducted and the site has reportedly undergone a consistent land use until its current residential development.

Although limited, the site history information provided by the consultants is considered adequate for the purposes of identifying potential contamination issues at the site.

4 Potential Contaminants of Concern

As part of the investigation of the site, consultant JBS&G (JBS&G, 2016) identified the following areas and contaminants of potential concern.

Table 4-1 Areas of Environmental Concern and Contaminants of Potential Concern

Area of Environmental Concern	Contaminants of Concern
Fill materials of unknown origin observed to be present as a result of site development activities.	Heavy metals, polycyclic aromatic hydrocarbons (PAHs), total recoverable hydrocarbons (TRH) / benzene, toluene, ethylbenzene, and xylenes (BTEX), organochlorine pesticides (OCPs) / polychlorinated biphenyls (PCB) and asbestos.
Hazardous building materials associated with existing / former site structures.	Asbestos, PCBs, and lead.
Former agricultural/market garden site activities.	OCPs, organophosphorus pesticides (OPPs) and heavy metals.

Following identification of an area requiring remediation, the consultant (DLA, 2018) optimised the potential contaminants of concern for remediation and validation activities to focus on TPH.

4.1 Audit Discussion of Potential Contaminants of Concern

The identified potential contamination at the site was based on the findings of the prior site assessments undertaken at the site. The list of potential contaminants is considered to have been suitably comprehensive noting the site location and history.

Therefore, the Auditor is satisfied that the potential contaminants of concern identified were appropriate for the assessment of the site and for carrying forward into the remedial works. The potential contaminants of concern were considered acceptable to enable assessing the suitability, post-remediation, of the site for the intended land use and have met the objectives of the Site Audit.

5 Data Quality Objectives

The Data Quality Objectives (DQO) process is used to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site. It provides a systematic approach for defining the criteria that a data collection design should satisfy. The USEPA developed the DQO process as a seven-step iterative planning approach, to be undertaken prior to investigative work.

The Site Auditor Guidelines (NSW EPA, 2017) states that Site Auditors must check that the consultant has properly addressed and adopted DQOs for the investigation or validation programme and that the consultant's report includes the following:

- A statement of predetermined DQOs for the field and laboratory procedures, including quantitative DQOs (in this instance these DQO are related to the implementation of adequate field and laboratory QA/QC and are referred to as Data Quality Indicators for the quantitative assessment of data quality);
- A plan to achieve pre-determined DQOs; and,
- Procedures to be undertaken if the data does not meet the expected DQOs.

5.1 Audit Discussion on Data Quality Objectives

JBS&G developed DQOs in relation to *Detailed Site Investigation* (JBS&G, 2016) and DLA developed DQO's for the Supplementary Site Investigations (DLA, 2017a) (DLA, 2017b) and remedial planning (DLA, 2018). The full seven steps were documented and were consistent with the stated objectives of the assessment and provided detail on the management of data collection and use.

The details of the DQOs for the investigation and remedial planning works conducted are deemed sufficient and meet the objectives of this Site Audit.

6 Site Assessment

Site assessment works were conducted by JBS&G (JBS&G, 2016) and DLA (DLA, 2017a)(DLA, 2017b) at the site. A summary of the investigation works is presented in the following sections. A Site Audit evaluation of the site assessment works follows in **Section 6.4**.

6.1 Detailed Site Investigation (JBS&G, 2016)

JBS&G were engaged to conduct a Detailed Site Investigation (DSI) at the site prior to development. The scope of the DSI was based on the preliminary site assessment, previously conducted by JBS&G in 2016. The preliminary site investigation report has not been viewed by the Auditor, however, was summarised in the DSI report. The following scope of work was undertaken as part of the DSI (JBS&G, 2016):

- Review of Preliminary Site Investigation report and other relevant documentation provided for the site;
- Detailed intrusive site investigations to enable collection and analysis of representative soil samples;
- Analysis of selected soil samples for heavy metals, polycyclic aromatic hydrocarbons (PAHs), total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), herbicides, asbestos, pH, iron, and cation exchange capacity (CEC);
- Assessment of environmental data collected, including comparison of field and analytical data against appropriate EPA-made or endorsed investigation / screening levels for the proposed land use(s); and
- Preparation of a DSI report in accordance with EPA guidelines and State Environmental Planning Policy 55 – Remediation of Land (SEPP 55).

6.1.1 Soil Assessment Criteria

The consultant compared soil analytical results to a range of health-based soil investigation levels and HSLs as included in the NEPM (NEPC, 1999, Amended 2013) based on the proposed mixed use of the site, including high-density residential (HIL/HSL–B), open space and recreational (HIL/HSL-C), commercial (HIL/HSL-D) and a child care centre (HIL/HSL-A). Ecological-based assessment criteria were also calculated and adopted by the consultant.

6.1.2 Soil Sampling Program

Soil sampling was conducted between 5-6 September 2016 at 32 locations using a hand auger. Sample locations are depicted on the consultant's Figure 4 included in **Appendix C** and were systematically located across the site, with some locations skewed to target an identified area of concern or to where access was able.

Soil samples were collected from various depths throughout the soil profile, with a maximum depth of investigation being 0.6 m below ground surface (bgs). Bore logs were provided and reported the ground conditions encountered at each of the hand auger locations. Hand auger locations were frequently terminated on sandstone cobbles, boulders, and bedrock.

Ground conditions encountered by the consultant were reported to comprise brown, silty sand topsoil with organic matter to 0.1 m depth. Underlying natural materials included orange-brown, gravelly, clayey sand with sandstone gravels. Typically, one to two samples were selected from each location for laboratory analysis. The consultant reported that no potential asbestos containing materials were observed in the soil samples collected or soils observed in each of the sample locations.

The following is a summary of the soil analytical program was provided by the consultant.

Table 6-1 Soil Sampling and Analytical Program

Area	Sample Type	No. Of Sample Location	Analysis (Excl. QA/QC)
Mixed Use Area	Soil	29 Sampling Locations (HA01 – HA29)	Heavy metals – 34 samples PAHs - 30 samples Asbestos – 30 samples TRH/BTEX – 12 samples PCBs – 19 samples OCPs – 19 samples Herbicides – 7 samples OC, CEC, Fe, pH, – 2 samples ASLP/TCLP (metals) – 1 sample TRHs with Silica Gel Clean-up – 1 sample
Public Recreation Area	Soil	3 Sampling Locations (HA30 – HA32)	Heavy metals – 6 samples PAHs - 2 samples Asbestos – 2 samples TRH/BTEX – 2 samples PCBs – 1 samples OCPs – 1 samples Herbicides – 1 samples TRHs with Silica Gel Clean-up – 1 sample

The primary laboratory utilised was Eurofins MGT and the secondary laboratory utilised was Envirolab Services.

6.1.3 Soil Analytical Results

Soil analytical results are summarised in the consultant's Table A which is included in **Appendix D**. The consultant reported the following results for the soil sampling program:

- Heavy metals – concentrations were reported below the adopted human health and ecological criteria in all samples analysed.
- TRH/BTEX – concentrations of TRH (without silica gel clean-up) exceeded the adopted ecological criteria for urban, residential, and public open space land use in two of the sample analysed (HA15_0.0-0.1 – 440 mg/kg (>C16-C34 Fraction) and HA32_0.0-0.5 – 540 mg/kg (>C16-C34 Fraction)). TRH and BTEX concentrations were reported below the adopted human health and ecological criteria in all remaining samples selected for analysis. Re-analysis of the two samples for TRH with silica-gel clean-up provided results below the LOR in both samples, indicating the TRH initially reported was likely associated with natural organic material in the soil profile, rather than any petroleum-based contaminants.
- PAHs – PAH concentrations exceeded the site criteria in the following samples:

- 2.5 mg/kg of benzo(a)pyrene (B(a)P) in HA20_0.0-0.1, exceeding the adopted ecological criteria for urban, residential, and public open space (0.7 mg/kg), and commercial industrial land use (1.4 mg/kg).
- 5.864 mg/kg of Carcinogenic PAHs as B(a)P toxicity equivalent quotient (TEQ) in HA15_0.0-0.1, exceeding the adopted health-based criteria for Residential A (3 mg/kg) and Residential B (4 mg/kg) land use scenarios.

PAH concentrations were reported below the adopted human health and ecological criteria in all remaining samples selected for analysis.

Statistical analysis was completed for Carcinogenic PAHs as B(a)P TEQ and benzo(a)pyrene which reported 95% UCLs within the adopted human health and ecological criteria.

- OCP and PCB – all reported concentrations were less than the adopted site assessment criteria.
- Herbicides – all reported concentrations were less than the adopted site assessment criteria.
- Asbestos – no asbestos detected in any of the samples analysed.

6.1.4 Detailed Site Investigation Quality Assurance / Quality Control

A program of QA/QC sample collection was undertaken as part of field investigation. The consultant included the collection of two intra-laboratory duplicate samples, slightly below the proposed rate of 1 in 20 primary samples. Two inter-laboratory duplicates were analysed however, it was noted by the consultant that one of the inter-laboratory duplicates was not analysed for the same suite of analytes as the primary sample, making one of the samples void.

Results of analysis for the intra-laboratory duplicate and inter-laboratory triplicate analysis were generally within the acceptance criteria of 0-30% RPD apart from some heavy metals and PAHs in the primary and inter- and intra-laboratory duplicate pairs. The discrepancies between the primary and duplicate samples were attributed to the reported concentrations being close to the limit of reporting and/or the soil heterogeneity.

A trip spike, trip blank and rinsate sample were also collected and analysed. The rinsate sample reported low concentrations of copper, nickel, and zinc, however, all concentrations were below the assessment criteria and were not considered to affect the usability of the data.

The internal laboratory QA/QC criteria (spike recoveries, surrogate standards, and laboratory blanks) was reviewed by the consultant and found to be acceptable.

The consultant concluded that the results of the field and laboratory QA/QC program indicated that the data was of acceptable quality for the purpose of the assessment.

6.1.5 Consultant's Conclusions and Recommendations

Based on the findings of the site assessment works the consultant JBS&G presented the following conclusions:

- All contaminants' concentrations, or 95% UCLs were within the adopted health-based criteria for all land use scenarios at the site, therefore no health risks to future site users or workers have been identified at the site.
- Ecological criteria for the PAH benzo(a)pyrene were exceeded at one sample location, with regards to, all potential land uses. However, this exceedance is considered unlikely to present a significant ecological risk at the site as plant uptake of benzo(a)pyrene is typically very low. Based on the analytical results and the discussion above, no risks to on-site ecological receptors have been identified at the site.
- No staining, odours or ACM were observed at site. The fire scars observed on concrete surfaces during the initial JBS&G inspection were noted to have been removed. Areas of fly tipping were observed at the site, however, these typically comprised small quantities of domestic items. No significant aesthetic issues were identified at the site.
- No unacceptable human health or ecological risks were identified associated with soils at the site. Contaminant concentrations in soil were generally low-level and not representative of gross or widespread contamination that would pose a risk of migration to groundwater or via surface water run-off.

The consultant concluded that based on the results of the assessment, the site is suitable for the proposed land uses.

6.2 Supplementary Site Investigation – Ivanhoe Estate (DLA, 2017a)

DLA were engaged to conduct a supplementary soil investigation at Ivanhoe Estate to address data gaps identified following completion of the DSI (JBS&G, 2016). The following scope of work was undertaken as part of the Supplementary Site Investigation (DLA, June 2017):

- advancement of nine boreholes using a hand auger
- soil sampling and analysis
- data interpretation and reporting

Hand auger locations targeted areas of the site not previously investigated, namely three areas where filling was considered likely due to the altered topography and identified as a data gap in previous assessment of the site.

6.2.1 Soil Assessment Criteria

The consultant compared soil analytical results to health-based soil investigation levels (HIL-A) and HSLs for low to high density residential land use as included in the NEPM (NEPC, 1999, Amended 2013). The HSLs adopted by the consultant were for "clay" soil conditions at a depth of 0 to <1 m. Management Limits for 'fine' soils in an urban residential and public open space setting were utilised and Ecological-based assessment criteria were also derived and considered by the consultant.

6.2.2 Soil Sampling Program

Soil samples were collected from nine hand auger locations which were positioned to target areas of the site not previously investigated and where inspection had indicated filling had occurred to alter the topography of the site. Sample locations are depicted on the consultant's Figure 2 included in **Appendix E**

Boreholes were advanced to depths ranging from 0.4 m to 0.8 m bgs and soil samples were collected directly from the hand auger. Typically, one or two samples were selected from each location for laboratory analysis.

A PID was not utilised for the screening of samples for VOCs.

Soil bore logs were provided in the report and ground conditions encountered by the consultant were described as sandy loam topsoil to depths between 0.1m and 0.5m bgs, overlying reworked siltstone and claystone bedrock.

The following table provides the soil analytical program as presented by the consultant.

Table 6-2 Soil Analytical Schedule

Analysis	No. Primary Samples
TRH	14
BTEX	14
PAH	14
Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni	14
OC/OP Pesticides	8
PCB	8
Asbestos	8

The primary laboratory utilised was Envirolab Services in Sydney. A secondary laboratory was not utilised as part of the program.

6.2.3 Soil Analytical Results

Soil analytical results are summarised in the consultant's Table LR1 which is included in **Appendix F**. The consultant reported the following results for the soil sampling program:

- TRH / BTEX – Sample BH8_0.1-0.1 reported a TRH F2 (>C_{10}-C_{16}) concentration of 250 mg/kg, exceeding the adopted Health Screening Levels (HSL) and Ecological Screening Levels (ESL). Sample BH8_0.1-0.4 reported a TRH F2 (>C_{10}-C_{16}) concentration of 120 mg/kg, exceeding the adopted ESL. All other soil samples reported concentrations less that the adopted assessment criteria.
- PAH – All soil samples reported concentrations less than the laboratory LOR and the adopted assessment criteria.
- Pesticides and PCBs - All soil samples reported concentrations less than the laboratory LOR and the adopted assessment criteria.
- Heavy metals – All soil samples reported concentrations less than the adopted assessment criteria.
- Asbestos – asbestos was not detected in any of the soil samples analysed.

6.2.4 Supplementary Site Investigation Quality Assurance / Quality Control

A limited program of QA/QC sample collection was undertaken as part of field investigation. The consultant included the collection of two intra-laboratory duplicate samples, however, no inter-laboratory duplicates, trip spike, trip blank or rinsate samples were collected.

The consultant reported the RPD (relative percentage differences) for the soil duplicates with two exceedances being reported associated with nickel and zinc concentrations in the

duplicate pair BH7_0.2-0.7/BH7_0.2-0.7A. The exceedances were attributed to concentrations being at or near the laboratory LOR.

The internal laboratory QC criteria (spike recoveries, surrogate standards, and laboratory blanks) was reviewed and found to be acceptable.

The consultant stated that they considered the data was representative of the overall site condition at the time of fieldwork.

6.2.5 Consultant's Conclusions and Recommendations

Based on the findings of the site assessment works the consultant DLA (June 2017) presented the following conclusions:

- The combined data presented in the DSI (JBS&G, 2016) and the Supplementary Investigation report is considered sufficient to allow assessment of the suitability of the Site for future land use in accordance with the general requirements of SEPP 55.
- Based on the results of the current investigation data, DLA concludes that the area of the Site in the vicinity of borehole BH8 is not currently considered suitable for the proposed redevelopment from a contamination perspective due to the presence of TRH in soil.
- Although the Site is not considered suitable for the proposed land use in its current condition, DLA considers that the Site can be made suitable with further assessment and the implementation of an appropriate remediation strategy.
- Further investigation and remediation of the Site would include:

    1. Delineation soil sampling and laboratory analysis;
    2. Preparation of a Remediation Action Plan for the Site;
    3. Remediation of the Site which would include the excavation and appropriate off-site disposal of TRH contaminated soils;
    4. Validation sampling of the Site; and
    5. Preparation of a Site Validation Report.

6.3 Supplementary Site Investigation – New Property Acquisition (DLA, 2017b)

DLA were engaged to conduct a soil contamination assessment on an additional allotment of land which will form part of the site. The additional allotment was referred to as Part of 2 Lyon Park Road, Macquarie Park. The allotment comprised paved access roads associated with an adjacent office building and an area of cleared bushland. It is proposed to redevelop the area as a road reserve, providing vehicular access to the southern areas of Ivanhoe Estate. The following scope of work was undertaken as part of the Supplementary Site Investigation (DLA, 2017b):

- advancement of six boreholes using a hand auger
- soil sampling and analysis
- data interpretation and reporting

Field investigations carried out as part of the Supplementary Investigation comprised the collection of 11 primary soil samples from six boreholes (BH1 to BH6). Boreholes were placed systematically across the Site with the aim of achieving sufficient site coverage. Contaminants of potential concern identified by the consultant for assessment included pesticides, heavy metals, PCBs, PAHs and TRHs.

6.3.1 Soil Assessment Criteria

In consideration of the proposed use of the allotment as a road reserve, the consultant compared soil analytical results to health-based soil investigation levels (HILs-D) and HSLs for commercial/industrial land use as included in the NEPM (NEPC, 1999, Amended 2013). The HSLs adopted by the consultant were for "sand" soil conditions as the most conservative option.

Management Limits for 'coarse' soils in a commercial/industrial setting were utilised. Ecological-based assessment criteria were not considered by the consultant.

6.3.2 Soil Sampling Program

Soil samples were collected from six boreholes (BH1 to BH6) located systematically across the area being assessed. Sample locations are depicted on the consultant's Figure 2 included in **Appendix G**.

Boreholes were advanced to depths ranging from 0.4 m to 1.5 m bgs and soil samples were collected directly from the hand auger. Typically, one or two samples were selected from each location for laboratory analysis, although four samples were analysed from BH1 due to the depth achieved.

A PID was not utilised for the screening of samples for VOCs.

Soil bore logs were provided in the report and ground conditions encountered by the consultant were described as sand and clay fill with sandstone gravel and cobbles to the maximum extent of the boreholes, except for borehole BH1 which encountered residual sandy clay at 1.4m bgs.

The following table provides the soil analytical program as presented by the consultant.

Table 6-3 Soil Analytical Schedule

Analysis	No. Primary Samples
TRH	11
BTEX	11
PAH	11
Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni	11
OC/OP Pesticides	5
PCB	5

The primary laboratory utilised was Envirolab Services in Sydney. A secondary laboratory was not utilised as part of the program.

6.3.3 Soil Analytical Results

Soil analytical results are summarised in the consultant's tables included in **Appendix H**. The consultant reported the following results for the soil sampling program:

- TRH / BTEX – All soil samples reported concentrations less than the laboratory LOR and the adopted assessment criteria.
- PAH – All soil samples reported concentrations less than the adopted assessment criteria.
- Pesticides and PCBs - All soil samples reported concentrations less than the laboratory LOR and the adopted assessment criteria.
- Heavy metals – All soil samples reported concentrations less than the adopted assessment criteria.

6.3.4 New Property Acquisition Investigation Quality Assurance / Quality Control

A limited program of QA/QC sample collection was undertaken as part of field investigation. The consultant included the collection of one intra-laboratory duplicate samples, however, no inter-laboratory duplicates, trip spike, trip blank or rinsate samples were collected.

The consultant reported the RPD (relative percentage differences) for the soil duplicate were all with acceptable ranges for all analytes.

The internal laboratory QC criteria (spike recoveries, surrogate standards, and laboratory blanks) was reviewed and were overall found to be acceptable.

The consultant stated that they considered the data was representative of the overall site condition at the time of fieldwork.

6.3.5 Consultant's Conclusions and Recommendations

Based on the findings of the site assessment works the consultant DLA (DLA, 2017b) presented the following conclusions:

- Based on a review of the available investigation data, DLA consider that there is a low likelihood of unacceptable contamination to be present on the Site as a result of past and present land use activities.
- the Site is considered suitable for redevelopment as a road reserve from a contamination perspective.

6.4 Audit Discussion of Investigation Review

6.4.1 Investigation Sampling Design

In combination, sampling locations advanced during the assessment works at the site are considered to provide adequate site coverage. The number of sampling locations to date and those proposed by the data gap assessment meet the minimum requirements of the NSW EPA Guidelines (NSW EPA, 1995). Sample locations were generally systematically positioned across the site, with some locations skewed to where access enabled or to target specific areas of concern.

The collection of samples generally focused on shallow fill material, with deeper samples collected sporadically across the site. The soil sample intervals and depths of sampling locations were considered appropriate given the absence of identified point sources of potential contamination and the site geology.

Groundwater was not encountered during the site investigation and based on the limited soil contamination identified, the potential for groundwater impacts at the site is low.

6.4.2 Investigations Quality Assurance/Quality Control

All consultants utilised the seven-step DQO process as required by the NSW EPA guidelines for Site Auditors (NSW DEC, 2006) during assessment of the site. The consultants developed pre-determined data quality indicators following those referenced in the NEPM (NEPC, 1999, Amended 2013). Both a field and laboratory quality assurance/quality control (QA/QC) program was conducted during the site investigation works.

Intra-laboratory (blind duplicate) and intra-laboratory (split duplicate) samples were collected and analysed as part of the site investigation programs, however, the rates of collection and analysis were slightly below what was deemed acceptable by the PARCC (Precision, Accuracy Representativeness, Comparability and Completeness) parameters.

The reported RPDs calculated were generally within acceptable ranges, with a small number of RPDs exceeding criteria primarily for low-concentration results. These are not considered to affect the reliability of the data reported.

Field trip blanks and trip spikes, where analysed, were within acceptable criteria. Concentrations of heavy metals were detected in the rinsate samples collected, although the reported concentrations were well below the assessment criteria and not considered to adversely impact the reliability of the data.

Matrix spike recoveries and surrogate spike recoveries reported by the laboratory were within the control limits indicating that the accuracy of the results are acceptable for assessing the suitability of the environmental condition of the site.

The laboratory QA/QC results have been reviewed and the results indicate that the laboratory analytical program was achieving adequate levels of precision and accuracy during the time when samples from the site were being analysed. While minor non-conformities with some aspects of the QA/QC program were observed, in general the sampling, analytical and quality protocols undertaken by the consultant were considered satisfactory and the data is adequately reliable for the purpose of assessing the contamination status of the site for the proposed mixed use.

Overall, the Auditors review of the quality assurance/quality control measures employed by the consultant and the laboratory was found to provide adequate information for the purpose of characterising the site.

6.4.3 Site Criteria

The assessment criteria utilised for the site by the consultants were derived from the NEPM (NEPC, 1999, Amended 2013). Consideration was given to HILs and HSLs in the assessment of soils. The DLA investigations (DLA, 2017a) and (DLA, 2017b) also considered the Management Limits derived from the NEPM (NEPC, 1999, Amended 2013).

Ecological criteria, namely EILs and ESLs were considered during all investigations of the site.

The health-based criteria utilised are considered appropriate for the purpose of the investigations.

6.4.4 Investigation Results

The consultants provided tables that summarised the soil laboratory results. The reported concentrations of contaminants by the consultant were reviewed and found to be consistent with those reported by the laboratory. The laboratory procedures were appropriate for the identified potential contaminants of concern.

The site plans provided by the consultant were to scale and adequately identified the sampling locations relevant to the main site features such as the existing buildings, boundaries, and roads.

The investigation conducted by DLA (DLA, 2017a) reported an elevated hydrocarbon concentration in an isolated area of fill at location BH8.

Overall, the Auditor considers that the conclusions reached by the consultant regarding the site assessment are considered appropriate given the data obtained from the site.

7 Remediation Action Plan

The planned remediation works were presented in a Remediation Action Plan (RAP) prepared by DLA in March 2018. A RAP Addendum was prepared by EES in 2021 to revise the validation criteria based on the change of proposed land use from low density residential to high-density residential. The following sub-sections provide an overview of the content of the RAP (DLA, 2018) and RAP Addendum (EES, 2021b).

7.1 Remediation Objectives

The consultant stated that the purpose of the RAP (DLA, 2018) was to detail all necessary actions to be undertaken at the site in order to render the site suitable for the proposed redevelopment, thereby posing no unacceptable risk to human health and the environment.

7.2 Remediation Options

In accordance with NSW DEC 2006, soil remediation and management is implemented in the following preferred order:

1. on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level
2. off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to site
3. removal of contaminated soil to an appropriate facility, followed where necessary by replacement with appropriate material
4. cap and contain material on-site within a properly designed barrier
5. do nothing.

The consultant documented the range of remediation options available in the RAP (DLA, 2018) and discussed each in relation to the site. The consultant reported that excavation and off-site disposal of impacted material was the most appropriate option with respect to the identified contamination.

7.3 Proposed Remediation Works

The consultant identified one area of environmental concern requiring remediation, as shown in the consultant's Figure 2 presented in **Appendix I**. The remediation area at location BH8 was identified during the Supplementary Site Investigation (DLA, 2017a) conducted at the Ivanhoe Estate. Analytical results from location BH8 reported concentration of TRH which exceeded the adopted Health Screening and ecological criteria levels.

The following remediation approach was proposed by the consultant:

- notification to relevant stakeholders of intent to remediate contaminated soils
- implementation of a Site Environmental Management Plan
- site establishment including establishment of necessary plant, equipment, site security and environmental safeguards
- additional investigations (Data Gap Assessment)

- excavation of the hotspot of contamination identified at location BH8. The consultant noted that the vertical extent of the remedial excavations would be a minimum of 0.5 m depth and a PID would be utilised to guide the remedial works
- validation of excavation surfaces
- excavated material will be stockpiled in a designated area for waste classification. and off-site disposal to an appropriately licensed waste facility

The following remediation activities will be conducted in the vicinity of BH8:

1. AEC 1 will be delineated by marking an approximately 5 m x 5 m grid centred quadrant around the original borehole location (i.e. BH8);
2. Soil within the gridded AEC will be excavated to a minimum depth of 0.5 m bgl. Given that the vertical extent of the hydrocarbon impact has not yet been delineated, a PID will be used to screen the faces of the excavation to assist in assessing the likely presence of residual contamination. If PID readings and/or visual or olfactory evidence suggests that contamination extends beyond the proposed depth of the remedial excavation, then excavation will continue until the evidence of contamination has been removed. Similarly, if evidence of contamination is identified on the walls of the remedial excavation, then the excavation will be extended laterally until the evidence of contamination has been removed.
3. Excavated soil will be stockpiled within a designated area of the Site for waste classification in accordance with the RAP; and
4. The walls and base of the excavation will be validated in accordance with the validation strategy described by the RAP.

Following successful validation, where required, the excavation will be reinstated. The RAP states that only validated ENM or VENM will be imported to the site.

7.4 Data Gap Assessment

The RAP included an additional area of the site (recently acquired) that has not yet been subject to intrusive investigation. The area was identified as a data gap requiring assessment to confirm the area is suitable, from a contamination perspective, for the proposed land use. The area is depicted on the consultant's figures in **Appendix I**.

The consultant stated that the assessment of the additional area will be conducted concurrently with the initial phases of remediation works.

The data gap area covers approximately 3,700 m^2 and the consultant proposed a total of 11 test locations to assess the area in accordance with the NSW EPA 1995 Guidelines.

At each test location, test pits will be excavated to depths sufficient to intercept natural ground, thereby confirming the vertical extent of fill material. In the case that access restrictions preclude the excavation of test pits, boreholes will be drilled using a mechanically operated drill rig that is able to extend to depths sufficient to intercept natural ground.

Soil samples will be collected from the fill material at regular intervals and submitted for laboratory analysis for the following analysis: heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TRH, BTEX, PAH, OC/OP Pesticides, PCBs, and asbestos (only where visible evidence of asbestos is noted). Additional soil samples will be collected for QA/QC purposes. Soil samples

will also be screened in the field using a photoionisation detector (PID) to assess the presence of volatile organic compounds (VOCs).

The analytical results obtained during the data gap assessment will be assessed against the validation criteria presented in the RAP and the results of the data gap assessment will be used to assess whether additional areas of contamination are present that require remediation. In the case that additional areas of contamination are identified, remediation will be carried out in accordance with the strategy provided in the RAP.

7.5 Remediation Criteria

The RAP (DLA, 2018) was prepared at a time when the proposed redeveloped of the site was low density residential land use. As such, the soil criteria proposed by the RAP (DLA, 2018) to guide the remedial works for criteria specific for a low-density residential land use setting, including Health-based Investigation Levels (HILs), Ecological Screening Levels (ESLs) and Ecological Investigation Limits (EILs) for urban residential setting. Management Limits were not deemed applicable to the site.

The RAP Addendum (EES, 2021b) was subsequently prepared which revised the remediation and validation criteria and proposed the use of validation criteria suitable for high density residential land use (i.e., HIL-B).

7.6 Proposed Validation Program

The RAP Addendum (EES, 2021b) confirmed that validation samples would be collected from the base and walls of the remediation excavations. Two base samples are to be collected from the excavation base, while wall samples will be collected at a rate of (at least) one sample for each wall (or every five linear metres). The consultant acknowledged that additional samples may be required based on the extent of the excavation.

All excavated material from across the site will be assessed and sampled in accordance with the NSW EPA *Waste Classification Guidelines* (NSW EPA, 2014b) for off-site disposal.

Groundwater sampling was not proposed as part of the validation program.

7.7 Site Management

The consultant included site management provisions to reduce the impact of the remediation works on the remediation workforce and surrounding environment (including neighbouring properties).

7.8 Unexpected Finds Protocol

The consultant presented an unexpected finds protocol for dealing with unidentified contamination in soil. A protocol to mitigate the effects of potential incidents such as identification of asbestos containing soils, suspicious dumped or buried material and evidence of significant staining, odours and discolouration was provided.

7.9 Contingency Plans

A contingency plan was not specifically included in the RAP or RAP Addendum, although procedures were provided in the RAP (DLA, 2018) for dealing with unidentified contamination in soil. Noting the site history, the assessments conducted to date, the relatively limited

extent of the remediation to be undertaken and the remedial method to be employed (excavate and dispose), the potential for encountering significant unidentified contamination or the remediation failing is low. The consultant noted that in the event unidentified contamination was encountered at the site, the contamination would be assessed by a qualified and experienced environmental consultant and the material remediated in accordance with the RAP if necessary.

7.10 Audit Discussion of the Remediation Action Plan

Based on the information contained in the consultant's RAP (DLA, 2018), the Site Auditor finds that the proposed remediation:

- is technically feasible
- is environmentally justifiable given the proposed development activities
- the proposed validation sampling plans are suitably comprehensive to ensure contamination above the remediation criteria is appropriately removed and managed

The RAP identified the area of contamination, located as a result of previous assessment works at the site, that would be subject to remediation. The proposed remediation area comprises concentrations of contaminants of concern that is representative of a hotspot of contamination in the vicinity of BH8.

An additional area of the site has been identified by the RAP as a data gap that requires investigation to confirm the land is suitable for the proposed use, from a contamination perspective. This area will be assessed in conjunction with the proposed remedial works and in the event contamination is identified will be remediated in accordance with the RAP.

The validation sampling programme is based on a systematic sampling programme to evaluate the sufficiency of the excavation and assess the materials to remain in situ. Specific validation sampling densities were also provided in the RAP. The validation sampling strategy is considered appropriate with implementation by a qualified environmental professional.

It is the Site Auditor's opinion that the proposed remediation works as detailed in the RAP is appropriate for the proposed low density residential development at the site. Following the successful implementation of the remediation and validation works as detailed in the RAP, it is considered that the site can be made suitable for the proposed development.

8 Remedial Activities and Validation

The following sub-sections describe the reported remedial works, and the sampling and analysis program for the site validation, as reported by EES in the *Validation Report* (EES, 2021b).

The remedial and validation works were conducted in 9 February and 5 March 2021.

Remedial earthworks were carried out by Mainland Civil and EES performed the role of validating consultant.

8.1 Site Remediation Validation Criteria

It is proposed that the site is redeveloped for use for high-density residential land use. The soil criteria utilised by the consultant to guide the remedial works were a combination of Health-based Investigation Levels (HILs) for residential land use (HIL-B), HSL for vapour intrusion for residential land use (HSL-A/B), and Management Limits for residential, parkland and public open space. Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for urban residential and public open space were also adopted.

All criteria are presented on the consultant tables provided in **Appendix K**.

8.2 Overview of Remediation Area

The *Supplementary Site Assessment* (DLA, 2017a) identified one area of environmental concern (AEC) requiring remediation. Location BH8 reported for total recoverable hydrocarbon (TRH) (>C10 – C16) (F2) of 250 mg/kg between 0 and 0.4 m depth, exceeding the applicable HSL for residential land use (HSL-A/B).

The location of BH8 is provided on the consultant's figure, included in **Appendix J**.

8.3 Remediation Works

8.3.1 Excavation Works

The remediation works comprised the excavation of a 5 by 5 m area to a depth of approximately 1 m below ground level (m bgl) at location BH8. Approximately 20m^3 of excavated material was stockpiled for waste classification assessment.

The stratigraphy encountered during the excavation works was reported by the consultant as follows:

- Fill material (0.00 – 0.20 m bgl) – clay matrix mixed with building rubble (bricks, concrete, metal, plastic, terracotta, tile, glass, wire, ash).
- Natural clay (0.20 – 1.00 m bgl) – clay and sandstone.

The excavation location and extent is depicted in the consultants figures 1 and 2 included in **Appendix J**.

8.3.2 Stockpile Assessment

Three soil samples (WC-BH8-1, WC-BH8-2, WC-BH8-3) were collected from the stockpiled material on the 9 February 2021.

The stockpile was estimated to be approximately 20 m^3. The location of the stockpile and stockpile samples is provided on the consultant's figure 2 included in **Appendix J**.

A total of three representative soil samples were collected from the stockpile (ID: by Environmental Earth Sciences field staff on 9 February 2021 and submitted for analysis.

Soil samples were collected using disposable nitrile gloves between each location and placed into glass jars supplied by the laboratory. Samples were then placed immediately into a chilled esky and dispatched to laboratory under chain of custody procedures.

Samples were analysed for TRH, BTEX, heavy metals and PAH.

A waste classification certificate was prepared for the excavated material and appended to the validation report.

8.4 Validation Program

Validation works comprised the collection of soil samples and was completed by consultant EES, with all samples collected by personnel employed by the consultant. Samples were collected in appropriate containers and provided a unique sample ID.

The validation analytical suite was limited to the contaminants of concern. Stockpile samples collected for waste classification purposes included analysis for TPH, BTEX, PAH, heavy metals. The waste classification results confirmed the absence of these contaminants and the reduced validation analytical suite is considered appropriate.

All analysis was conducted by NATA certified laboratories in accordance with instructions provided by the consultant. The project laboratories included ALS Environmental and Envirolab.

8.4.1 Validation of Excavation Surfaces

The consultant reported that the validation program comprised the collection of validation soil samples from the excavation extents (walls and base) for laboratory analysis.

Analytical summary tables of soil validation results were prepared by the consultant and are provided in **Appendix K**. Site plans illustrating the location of validation sampling points are presented in **Appendix J**.

Two validation samples (VAL-B1 and VAL-B2) were collected from the base of the excavation and four validation samples (VAL-W1 to VAL-W4) were collected from the walls (one from each wall).

All soil samples reported TRH and BTEXN concentrations either below the laboratory LOR or the adopted validation criteria, except for one sample (VAL-WALL-2) which reported an F3 (C16-C34) concentration of 304 mg/kg, exceeding the ESL of 300 mg/kg.

As a result, a further 1.5 m of material was excavated from Wall-2 and two further validation samples were collected and analysed (ID: VAL-WALL-2A and VAL-WALL-2B). All results from the re-validation samples were below the laboratory LOR and the adopted validation criteria.

8.5 Waste Classification

The consultant reported that waste spoil generated on-site was sampled and classified in accordance with the Waste Classification Guidelines (NSW EPA, 2014b). Stockpiled waste

material was sampled and issued with a waste classification prior to disposal. The waste classification certificate was appended to the validation report.

The sampling density performed achieved the requirements of the RAP and stockpile sampling guidance documents. Stockpile samples collected for waste classification purposes were analysed for TRH, BTEX, PAH, heavy metals.

The excavated material was classified as general solid waste and transported to MET Recycling in Silverwater.

Disposal documentation reports that 31.28 tonnes of material were disposed off-site. Disposal dockets for material transported off-site are included in the *Validation Report* (EES, 2021b).

8.6 Validation Data Quality Assurance and Quality Control

A quality assurance/quality control assessment was prepared by the consultant and provided within the *Validation Report* (EES, 2021b). EES reported that one intra-laboratory duplicate, and one inter-laboratory duplicate soil samples were collected as part of the validation sampling activities, exceeding the acceptable duplicate sampling frequency of 1 in 20 samples.

The RPDs between all parent and duplicate samples were unable to be calculated as all samples reported concentrations less than the laboratory limit of reporting.

One trip spike and one trip blank sample was also collected during the validation program and reported acceptable results. The consultant did not utilise reusable sampling equipment noting the use of disposable nitrile gloves for soil sample collection. As such, rinsate samples were not collected.

A review of holding times, documentation and laboratory data quality was provided by the consultant. Overall, the consultant concluded that the data was suitable for the purposes of the validation assessment.

8.7 Ongoing Management

No ongoing management is required at the site following completion of the remediation and validation works.

8.8 Consultant's Conclusions of the Remedial Activities and Validation

The consultant reported the following conclusions:

- Based upon the results and findings, it is considered that following remediation residual soil quality for contamination within the 'BH8' area no longer presents an unacceptable risk to human health and the environment in a high-density residential land use scenario (Setting B) (ASC NEPM, 2013). As such it is considered that contamination management aspects of the RAP and RAP Addendum have been achieved and there is no further investigation required in this area and this portion is suitable for redevelopment.

8.9 Audit Evaluation of Validation Report

The following sections provide discussion of the Site Audit findings of the remediation and validation works reported.

8.9.1 Remediation and Validation Work Program

The remediation and validation work program, as documented in the *Validation Report* prepared by EES (2021), was appropriate for the site.

The contamination observed during the excavation and remediation works was consistent with expected conditions based upon desktop study findings and site conditions observed during the site investigation works. It is understood that the nominated remediation contractor completed demolition and waste removal works.

Contamination identified during assessment of the site was excavated, classified, and disposed off-site.

Validation of the remediation excavation surfaces comprised the collection of validation soil samples from the surface to assess for the contaminants of concern (TRH). The validation sampling program was based on a systematic sampling program with a reasonable sampling density achieved for the areas of remediation and validation. As such, the Auditor considers that the validation program was appropriate for the site conditions identified and provides a satisfactory validation dataset for the area in question.

8.9.2 Validation Data Quality Assurance and Quality Control

A QA/QC program was implemented to provide data of an appropriate quality and validity to meet the objectives. The program consisted of field QA/QC measures and laboratory QA/QC procedures.

Quality assurance/quality control in the field consisted of the following procedures:

- Monitoring and guiding of validation work by environmental consultants experienced in the assessment and remediation of contamination sites, and specific experience in the remediation of asbestos impacted soils.
- Collection of soil samples with disposable nitrile gloves with a fresh pair used for each sample location.
- Samples collected into appropriate laboratory supplied glass jars and zip lock bags (asbestos samples).
- Transporting samples under chain of custody conditions to a laboratory that is a NATA accredited for the analysis performed.

Laboratory QA/QC for non-asbestos related analysis was in accordance with the following procedures:

- analysis and reporting of laboratory duplicate samples
- analysis and reporting of laboratory method blank samples
- analysis and reporting of laboratory control samples or certified control samples
- analysis and reporting of laboratory control spikes, matrix spikes and surrogate spikes

Discussion of the laboratory QA/QC results for the chemical analysis undertaken was provided by the consultant in the *Validation Report* and the laboratory QA/QC reports were provided as an attachment to the report. Overall, it appears that acceptable QA/QC results were reported by the laboratory.

Sufficient intra-laboratory and inter-laboratory duplicates were collected and analysed as part of the validation program to achieve the requirements of the field quality program. RPDs were not able to be calculated due to all concentrations being reported below the laboratory LOR.

One trip blank and one trip spike were analysed as part of the validation program and reported acceptable results. Field rinsate blanks were not collected during the field program but given the sampling methodology adopted and the low concentrations of contaminants reported, this omission is not considered to be significant.

The QA/QC undertaken during the validation sampling and reported by the consultant has been reviewed by the Site Auditor with reference to the parameters of precision, accuracy, representativeness, comparability, and completeness (the PARCC parameters) which are a useful tool for evaluating the quality control techniques used.

The following table summarises the QA/QC in relation to the PARCC parameters.

Table 8-1 Validation QA/QC Summary

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Precision		
Intra-laboratory duplicates	Greater than 5% for COPC analytes Results <30-50% RPD	Yes
Inter-laboratory duplicates	Greater than 5% for COPC analytes Results <30-50% RPD	Yes
Laboratory duplicates	1 in 20 samples, <50% RPD (>10xEQL), <75% RPD (5-10xEQL), <100% RPD (<5xEQL)	RPDs – acceptable*
Accuracy		
Matrix spikes	70-130%	Acceptable
Certified reference material or Laboratory Control Sample	70-130%	Acceptable
Surrogate Spikes	70-130%	Acceptable
Representativeness		
Sampling appropriate for media and analytes	As per NEPM and AS 4482.1	Yes
Rinsate blanks	1 per sample batch <LOR	N/A*
Trip spikes/trip blanks	1 per sample batch 70-130%/<LOR	Yes
Laboratory blanks	1 per 20 or 1 per batch <LOR	<LOR – Yes*
Samples extracted and analysed within holding times.	Extracted within holding times	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures	Yes
Standard analytical methods used for all analyses	Analytical methods are referenced and NATA Accredited	Yes
Consistent field conditions, sampling staff and laboratory analysis	Consistent fieldwork team, single primary laboratory used	Yes

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Limits of reporting appropriate and consistent	Reporting limits less than the appropriate site criteria	Yes
Completeness		
Appropriate and complete COC documentation	Supplied in report	Yes
Satisfactory frequency and result for QC samples	As per NEPM and AS 4482.1	Yes*
Data from critical samples is considered valid	COC	Yes

*Table Notes: * specifically discussed in Auditor comments*

Overall, the sampling, analytical and quality protocols undertaken by the consultant were considered satisfactory and the data is adequately reliable for the purpose of assessing the contamination status of the site for the proposed residential use.

8.9.3 Site Validation Criteria

The site remediation validation criteria have been derived from sources approved by the NSW EPA under s.105 of the *Contaminated Land Management Act 1997* and are considered appropriate for the protection of human health and the environment at the site with consideration to the site land use.

It is noted the NEPM is an endorsed guidance for the *assessment* of contamination and the investigation criteria contained within are not intended for use as remediation criteria. However, with the lack of appropriate alternative remediation criteria the NEPM is often utilised for remediation applications.

The criteria adopted by the consultant are appropriate in the context of the primary contaminants of concern.

8.9.4 Validation Results

The consultant discussed the results and provided tables that adequately presented the analytical results from the laboratory reports. Checks of the concentrations of contaminants reported by the consultant were undertaken and found to be consistent with those reported by the laboratory. The laboratory procedures were appropriate for the identified contaminants of concern and the adopted remediation criteria against which the results were compared.

The remediation plans and sample location records provided by the consultant were detailed and adequately identified the validation sampling locations in relation to the remediation areas.

The conclusions reached by the consultant in relation to the validation of the remediation conducted and required in order to render the site suitable for the proposed land use are considered appropriate.

8.9.5 Waste Management

The Site Auditor has reviewed waste management information provided within the *Validation Report* and the associated waste disposal dockets provided as an attachment to the report. Overall, the waste management approach adopted during the remediation and validation

works appears to have been reasonable and robust with waste removed off-site to appropriately licensed waste management facilities. Waste classification reports were prepared by the consultant however, all waste was disposed of as general solid waste to an EPA licenced facility (MET Recycling in Silverwater). Waste management activities undertaken at the site were representative of site conditions and likely to have been appropriate.

9 Consideration of Regulatory Requirements

As the Site Audit is a requirement of a development consent or approval given under the *Environmental Planning and Assessment Act 1997* and has been conducted as a Statutory Site Audit as defined by s.47(c) of the *Contaminated Land Management Act 1997*. Notification of the commencement of the Site Audit was provided to the NSW EPA as required by the *Contaminated Land Management Act 1997*.

The Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017) do require the Auditor if they conclude that the site should be notified to take reasonable steps to clearly and in writing advise the person who commissioned the site audit of the duty of site owners and polluters to notify the NSW EPA of the contamination and to provide a copy of that written advice to the NSW EPA.

The duty to report contamination on development sites that are being assessed to determine remediation requirements is a complex legal issue.

The requirements for the site to be notified under the *Contaminated Land Management Act 1997* were considered by the Site Auditor in relation to the Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017).

The relevant sections of the Act state:

Section 60

(1) …..

(2) An owner of land that has been contaminated (whether before or during the owner's ownership of the land) must notify the EPA in writing in accordance with this section that the land has been so contaminated.

(3) A person is required to notify the EPA under subsection (1) or (2) only if:

(a) each of the following is true:

(i) the substance contaminating the land (the "contaminant") or any by-product of the contaminant has entered or will foreseeably enter neighbouring land, the atmosphere, groundwater or surface water,

(ii) the regulations prescribe for the purposes of this subparagraph, or the guidelines specify, a level of the contaminant or by-product in the neighbouring land, atmosphere, groundwater or surface water,

(iii) the level of the contaminant or by-product after that entry is, or will foreseeably be, above the level prescribed or specified and will foreseeably continue to remain above that level, or

(b) a guideline specifies a level of the contaminant in soils with respect to a current or approved use of the land and the level of the contaminant on or in any part of the soil on that land is equal to or above that specified in the guideline and a person has been, or foreseeably will be, exposed to the contaminant or any by-product of the contaminant, or

(c) the contamination meets any other criteria that may be prescribed by the regulations for the purposes of this subsection.

In providing advice regarding the requirements of the Act the NSW EPA has prepared the Guidelines on the Duty to Report Contamination (NSW EPA, 2015) made under the *Contaminated Land Management Act 1997*. These guidelines do not provide explicit direction in relation to development sites which are undergoing assessment and future or current remediation in relation to that development and the management of contamination. There is however, an example (Section 2.6.3) of where the guideline states that further assessment is not needed, and a person would not be expected to seek advice and indicate that there is 'no duty to report' where:

- The site is in use for any purpose.
- The site was previously used for commercial or industrial purposes.
- Site contamination is appropriately contained, and disturbance of the cap is subject to:
    - an environmental management plan (EMP) and is carried out in accordance with that plan, or
    - a development consent and is carried out in accordance with that consent, or
    - a site audit statement has been issued certifying that the site is suitable for the current or approved use and no potentially contaminating activities have been carried out at the site since the statement was issued.

In the absence of specific evidence of levels above those specified to neighbouring properties, the atmosphere, groundwater or surface water or exposure of a person the issue of foreseeability becomes relevant. Foreseeability is discussed in the guideline and is to be assessed through the modes of transport of contaminants and in absence of specific data, a precautionary-principle approach is to be applied.

While the site does contain contamination of soils above levels specified in the duty to report guideline, they are unlikely to have impacted neighbouring land, the atmosphere, groundwater, or surface water above specified levels, and while under the control of the developer, or even within the context of the previous use, it is unlikely that a person would have been exposed or foreseeably exposed to those contaminants. In addition to this, the foreseeability that a person will be exposed is limited by the remediation that is planned to take place under the proposed land use where the objective of that remediation will be to enable the site to be suitable for that use. Further the disturbance of the site is to be carried out in accordance with development consent that has been approved.

On this basis, the Site Auditor concluded that there was not an obligation to report the contamination under s 60 of the *Contaminated Land Management Act (1997)*. This however does not present an opinion of the legal obligations of the owner, only the conclusion of the of the Site Auditor regarding their responsibility under the Site Audit Scheme guidelines (NSW EPA, 2017) to take reasonable steps to advise the client of the obligations of the owner or polluter under the Act.

Waste as soil classified as General Solid Waste was removed from the site and transported to MET Recycling in Silverwater. Disposal documentation reporting that 31.28 tonnes of material were disposed was provided, this is consistent with the volume of soil excavated. MET

Recycling in Silverwater hold a Environmental Protection Licence allowing soil classified as General Solid Waste to be received.

10 Evaluation of Site Land Use Suitability

The *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* prescribe that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, Site Auditors must follow the decision process and checklist for assessing urban redevelopment sites (Appendix A page 46-47) of the Site Audit Scheme Guidelines (NSW EPA, 2017).

For the purposes of this Site Audit the objective is to determine whether the site is suitable for **a residential land use with minimal opportunity for soil access (e.g., high rise apartments and flats)**.

The findings of the Site Audit are presented for each requirement of the decision process:

All site assessment, remediation and validation reports follow NSW EPA (1997) *Contaminated sites: Guidelines for consultants reporting on contaminated sites*.

The documents provided by the consultant meet the requirements of the Site Audit in relation to the Guidelines for consultants reporting on contaminated sites (NSW EPA, 2020).

Aesthetic issues have been addressed.

Aesthetic issues have been considered in the works undertaken at the site with the consultants confirming the absence of staining, odours, and significant anthropogenic inclusions at the majority of investigation locations. No asbestos material was identified during the assessments conducted at the site.

Soils have been assessed against relevant health-based investigation levels and potential for migration of contamination from soils to groundwater has been considered

Soils were assessed against the appropriate and equivalent health-based investigation levels during assessment works and levels detected above the assessment criteria deemed to be representative of hotspots of contamination have been the subject of the RAP (DLA, 2018) and RAP Addendum (EES, 2021b). Due to the limited extent of soil contamination identified, the potential for groundwater contamination at the site is considered low and was not considered to present a risk to human health and the environment.

Groundwater (where relevant) has been assessed against relevant health-based investigation levels and, if required, any potential impacts to buildings and structures from the presence of contaminants considered.

Groundwater was not assessed and it is not considered to be at risk from contaminants and is not likely to pose a risk to building structures.

Hazardous ground gases (where relevant) have been assessed against relevant health-based investigation levels and screening values.

Hazardous ground gases are not considered a contaminant of concern at this site.

Any issues relating to local area background soil concentrations that exceed appropriate site soil criteria have been adequately addressed in the site assessments report(s).

No local background soil concentrations above the appropriate criteria were identified as an issue.

All impacts of chemical mixtures have been assessed.

No issues relating to chemical mixtures in relation to the identified contaminants of concern are expected.

Any potential ecological risks have been assessed.

The assessment of the site included the assessment of potential contaminants of concern against the ecological investigation or screening levels. The RAP (DLA, 2018) and RAP Addendum (EES, 2021b) has been prepared to address the exceedances of the ecological criteria identified.

Any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed and reported to the site owner or occupier.

There is not considered to be any evidence of, or potential for, off-site migration of contaminants identified at the site.

The site management strategy is appropriate.

It is considered that all known contamination has been addressed with the completed remediation and validation works at the site, and further management will not be required.

The remediation and validation works have been reviewed and the decision-making process prescribed has been applied regarding those reported works and the site is considered suitable for the proposed residential land use with minimal opportunity for soil access. Further, the application of the decision-making process requirements for those uses with the equivalent or less sensitive land use, including commercial and industrial use are also satisfied.

11 Conclusions

The investigation works, remediation and validation works reported and reviewed are considered to have met the requirements of NSW DEC (2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (3rd edition)* and other guidelines endorsed under s.105 of the *Contaminated Land Management Act 1997* and the objectives of the Site Audit.

The Site Auditor is satisfied that the soil remediation and validation works have been appropriately undertaken. It is considered that that soils at the site are suitable for the proposed land use.

In conclusion, a Site Audit Statement will be issued certifying that, in the opinion of the Site Auditor that the site is suitable for residential use with minimal opportunity for soil access as well as those uses with the equivalent or less sensitive land use, including commercial and industrial use.

12 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. Enviroview Pty Ltd or the Site Auditor 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 the Site Auditor, and should not be relied upon by other parties, who should make their own enquires other than regulatory and planning authorities as required under the *Contaminated Land Management Act 1997* and *State Environmental Planning Policy 55*.

The data used to support the conclusions reached in this report have been obtained by other consultants and have been audited with a reasonable level of scrutiny, care and diligence. Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

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 reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analyses selected are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site that was 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, Enviroview Pty Ltd and the Site Auditor reserves the right to review the report in the context of the additional information.

13 References

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NSW EPA. (2020). *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land.*

Appendix A:
Site Audit Interim Advices

Ref: IA 0301-2019

18 November 2020

Chris Koukoutaris
Frasers Property Ivanhoe Pty Ltd
Level 2, 1C Homebush Bay Drive
RHODES NSW 2138

Via email only: Chris.Koukoutaris@fraserspropery.com.au

Dear Chris,

RE: Interim Site Audit Advice – Confirmation of engagement of NSW EPA Accredited Contaminated Land Site Auditor.

James Davis of Enviroview Pty Ltd has been engaged to provide the services of a NSW EPA Contaminated Land Accredited Site Auditor, accredited under Part 4 of the *Contaminated Land Management Act 1997* (NSW) (the Act), to conduct a Site Audit in relation to the site identified as Ivanhoe Estate comprising Ivanhoe Place, Wilcannia Way, Nyngan Way, Narromine Way and Cobar Way, and part of 2-4 Lyonpark Road, Macquarie Park, NSW (the 'Site'), in accordance with the Act and relevant guidelines made or approved under s 105 of that Act.

The objective of the Site Audit is to provide a Site Audit Report and Site Audit Statement to certify that in the Auditor's opinion, in relation to contaminated land, the site is suitable for the land use commensurate with the proposed development of the site.

The Site Audit is a requirement of conditions of development consent of the approved State Significant Development SSD 8903 and specifically in relation to the conditions B58 and D52 that relate to the engagement of a Site Auditor Accredited by the NSW EPA under the Act to review certain reports and the issuing of a Site Audit Report and Site Audit Statement certifying that the site is suitable from a contamination perspective for the proposed use.

The purpose of this interim advice is to confirm that a Site Auditor has been engaged to undertake the Site Audit in relation to the conditions of development consent. This Interim Advice may be presented as proof of that engagement as required by condition B60 of the development consent conditions. Notification of the commencement of a Statutory Site Audit has also been made to the NSW EPA as is required under the Act.

It is a requirement of the NSW EPA that the Site Auditor specifies that an interim advice does not constitute a Site Audit Statement or a Site Audit Report, does not pre-empt the final Site Audit conclusions and clarifies that a Site Audit Statement will be issued at the end of the audit process.

If you require additional information or clarification, please do not hesitate to contact me.

Yours sincerely

James Davis
NSW EPA Contaminated Land Site Auditor
Enviroview Pty Ltd

Ref: IA 0301-2019_02

5 February 2021

Chris Koukoutaris
Frasers Property Ivanhoe Pty Ltd
Level 2, 1C Homebush Bay Drive
RHODES NSW 2138

Via email only: Chris.Koukoutaris@fraserspropery.com.au

Dear Chris,

RE: Interim Site Audit Advice – Confirmation of engagement of NSW EPA Accredited Contaminated Land Site Auditor.

James Davis of Enviroview Pty Ltd has been engaged to provide the services of a NSW EPA Contaminated Land Accredited Site Auditor, accredited under Part 4 of the *Contaminated Land Management Act 1997* (NSW) (the Act), to conduct a Site Audit in relation to the site identified as Ivanhoe Estate comprising Ivanhoe Place, Wilcannia Way, Nyngan Way, Narromine Way and Cobar Way, and part of 2-4 Lyonpark Road, Macquarie Park, NSW (the 'Site'), in accordance with the Act and relevant guidelines made or approved under s 105 of that Act.

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The Site Audit is a requirement of conditions of development consent of the approved State Significant Development SSD 8903 and specifically in relation to the conditions B58 and D52 that relate to the engagement of a Site Auditor Accredited by the NSW EPA under the Act to review certain reports and the issuing of a Site Audit Report and Site Audit Statement certifying that the site is suitable from a contamination perspective for the proposed use.

The purpose of this interim advice is to confirm that the Site Auditor has been provided and reviewed reports required by the conditions of development consent that relate to additional assessment of the site, specifically conditions B55, B56 and B58.

The documents provided are:

> Environmental Earth Sciences (January 2021a) *Technical Memorandum: Additional Investigation at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW*. Dated 29 January 2021.
>
> Environmental and Earth Sciences (January 2021b) *Technical Memorandum: Addendum to Remediation Action Plan at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW*. Dated 29 January 2021.

The reports provide have been reviewed and are considered acceptable for the purposes they were prepared. The addendum to the remediation action plan included the validation sampling and analysis plan and both reports have been prepared by a consultant with the required practitioner certification.

This Interim Advice may be presented as proof that the Site Auditor has reviewed the above referenced reports.

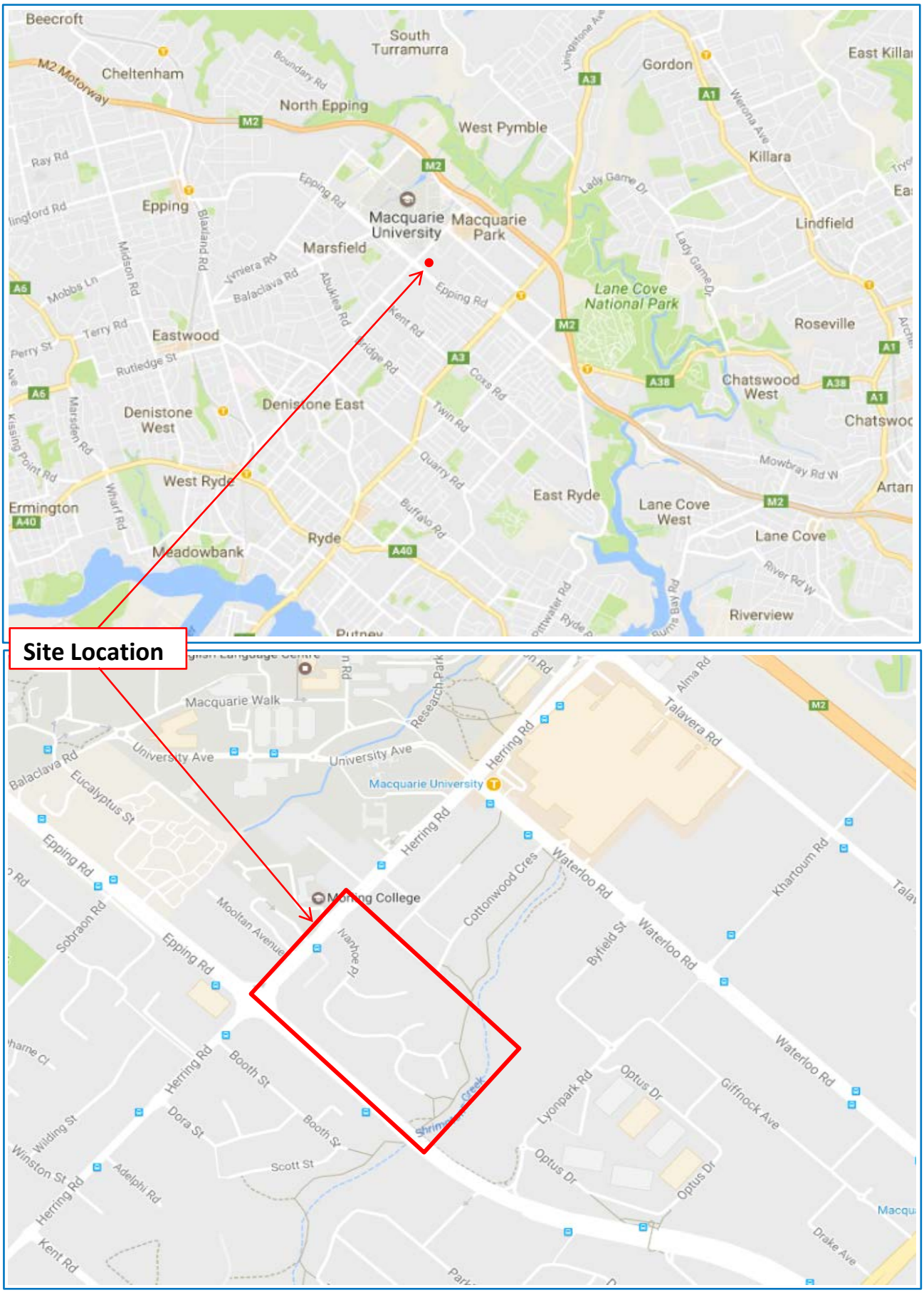
It is a requirement of the NSW EPA that the Site Auditor specifies that an interim advice does not constitute a Site Audit Statement or a Site Audit Report, does not pre-empt the final Site Audit conclusions and clarifies that a Site Audit Statement will be issued at the end of the audit process.

If you require additional information or clarification, please do not hesitate to contact me.

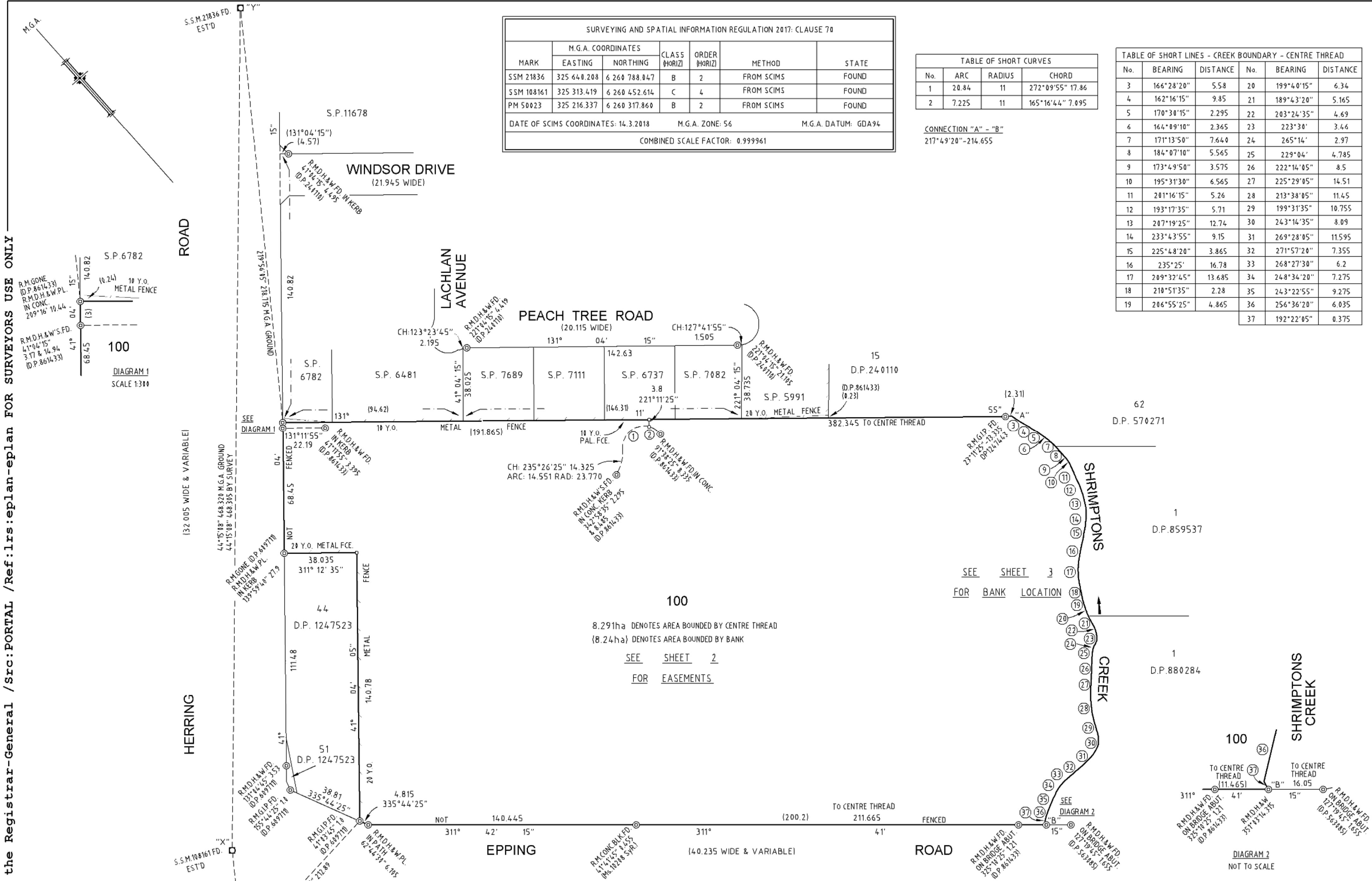
Yours sincerely

James Davis
NSW EPA Contaminated Land Site Auditor
Enviroview Pty Ltd

Appendix B:
Site Audit Location Plans



DLA Environmental Services A Pacific Environment company Unit 3, 38 Leighton Place Hornsby NSW 2077	**DESIGNED:** DLA **COMPILED:** SK **PROJ. No.** DL3953	**FIGURE TITLE:**	SITE LOCATION	
		PROJECT TITLE:	Ivanhoe Estate, Macquarie Park NSW	**DATE:** 02/06/2017
		CLIENT:	Frasers Property Australia	**FIGURE:** 1



SURVEYING AND SPATIAL INFORMATION REGULATION 2017: CLAUSE 70						
MARK	M.G.A. COORDINATES EASTING	NORTHING	CLASS (HORIZ)	ORDER (HORIZ)	METHOD	STATE
SSM 21836	325 640.208	6 260 788.047	B	2	FROM SCIMS	FOUND
SSM 108161	325 313.419	6 260 452.614	C	4	FROM SCIMS	FOUND
PM 50023	325 216.337	6 260 317.860	B	2	FROM SCIMS	FOUND

DATE OF SCIMS COORDINATES: 14.3.2018 M.G.A. ZONE: 56 M.G.A. DATUM: GDA94

COMBINED SCALE FACTOR: 0.999961

TABLE OF SHORT CURVES

No.	ARC	RADIUS	CHORD
1	20.84	11	272°09'55" 17.86
2	7.225	11	165°16'44" 7.095

CONNECTION "A" - "B"
217°49'20"-214.655

TABLE OF SHORT LINES - CREEK BOUNDARY - CENTRE THREAD

No.	BEARING	DISTANCE	No.	BEARING	DISTANCE
3	166°28'20"	5.58	20	199°40'15"	6.34
4	162°16'15"	9.85	21	189°43'20"	5.165
5	170°30'15"	2.295	22	203°24'35"	4.69
6	164°09'10"	2.365	23	223°30'	3.46
7	171°13'50"	7.640	24	265°14'	2.97
8	184°07'10"	5.565	25	229°04'	4.785
9	173°49'50"	3.575	26	222°14'05"	8.5
10	195°31'30"	6.565	27	225°29'05"	14.51
11	201°16'15"	5.26	28	213°38'05"	11.45
12	193°17'35"	5.71	29	199°31'35"	10.755
13	207°19'25"	12.74	30	243°14'35"	8.09
14	233°43'55"	9.15	31	269°28'05"	11.595
15	225°48'20"	3.865	32	271°57'20"	7.355
16	235°25'	16.78	33	268°27'30"	6.2
17	209°32'45"	13.685	34	248°34'20"	7.275
18	210°51'35"	2.28	35	243°22'55"	9.275
19	206°55'25"	4.865	36	256°36'20"	6.035
			37	192°22'05"	0.375

Surveyor: PHILLIP J McQUILLAN

Date of Survey: 4-4-2018

Surveyor's Ref: 1601644_CONSOL

PLAN OF CONSOLIDATION OF LOT 100 D.P.1223787, LOT 5 D.P.740753 & LOTS 6,7,8,10,11,12,13,14,15,16,17, 18,19, 20 D.P. 861433 & LOT 101 D.P.1247443

LGA: RYDE

Locality: MACQUARIE PARK

~~Subdivision No:~~

Lengths are in metres. Reduction Ratio 1:1250

Registered 06.04.2020

DP1262209

Table of mm

EASEMENTS

(A) EASEMENT FOR SERVICES (WHOLE OF LOT 100)
(B) RIGHT OF CARRIAGEWAY (WHOLE OF LOT 100)

EXISTING EASEMENTS

(D) EASEMENT FOR DRAINAGE 2.5 WIDE & VARIABLE (R507051)
(X) (LAND EXCLUDES MINERALS - CROWN GRANT PROVISIONS OF SEC. 235A CROWN LAND CONSOLIDATION ACT 1913)

"Y" S.S.M.21836 FD. EST'D

"X" S.S.M.108161 FD. EST'D

P.M.50023 FD. EST'D

WINDSOR DRIVE

ROAD

HERRING ROAD

EPPING ROAD

(32.005 WIDE & VARIABLE)

(40.235 WIDE & VARIABLE)

161°17'39" 485.123

44°15'10" 468.320 M.G.A. GROUND
44°15'10" 468.305 BY SURVEY

215°45'15" 166.089 M.G.A. GROUND
215°46'20" 166.118 BY SURVEY

276°30'54" 544.073

M.G.A.

(S.C.I.M.S)

43
D.P. 564302

511
D.P. 1153119

R.M.D.H.&W.FD. 310°41' - 4.495 (D.P.243769)

R.M.D.H.&W.FD. 131°56' - 17.455 (D.P.1109955)

21.945 131°41'45"

55'

77.795

41°

(21.945 WIDE)

62
D.P. 870271

R.M.D.H.&W. 331°10' - 6.655

R.M.D.H.&W.FD. 310°51' - 14.5 (D.P.859537)

130° 44' 15"

(A)(B)(D) 100 (A)(B) (A)(B)

(D)

100
D.P. 1262209

SHRIMPTONS CREEK

SEE SHEET 2

101

LYONPARK ROAD

R.M.G.I.P.FD. 210°44'15" - 0.5 (D.P.738002)

R.M.D.H.&W.FD. 265°14'30" - 13.54 (D.P.1019767)

(X)

130° 44'

94.090 15"

511
D.P. 1153119

R.M.D.H.&W.FD. 226°44'20" - 3.725 (D.P.880284)

52°48'10" 110.76 SURVEY
52°48'17" 110.77 DP 880284

1
D.P. 880284

R.M.D.H.&W.FD. ON BRIDGE ABUT 127°19'45" - 1.655 (D.P.563085)

SURVEYING AND SPATIAL INFORMATION REGULATION 2017: CLAUSE 70

MARK	M.G.A. COORDINATES EASTING	M.G.A. COORDINATES NORTHING	CLASS (HORIZ)	ORDER (HORIZ)	METHOD	STATE
SSM 21836	325 640.208	6 260 788.047	B	2	FROM SCIMS	FOUND
SSM 108161	325 313.419	6 260 452.614	C	4	FROM SCIMS	FOUND
PM 50023	325 216.337	6 260 317.860	B	2	FROM SCIMS	FOUND

DATE OF SCIMS COORDINATES: 19.07.2019 M.G.A. ZONE: 56 M.G.A. DATUM: GDA94

COMBINED SCALE FACTOR: 0.999961

Surveyor: PHILLIP J McQUILLAN
Date of Survey: 22-07-2019
Surveyor's Ref: 1601644 Sur06a

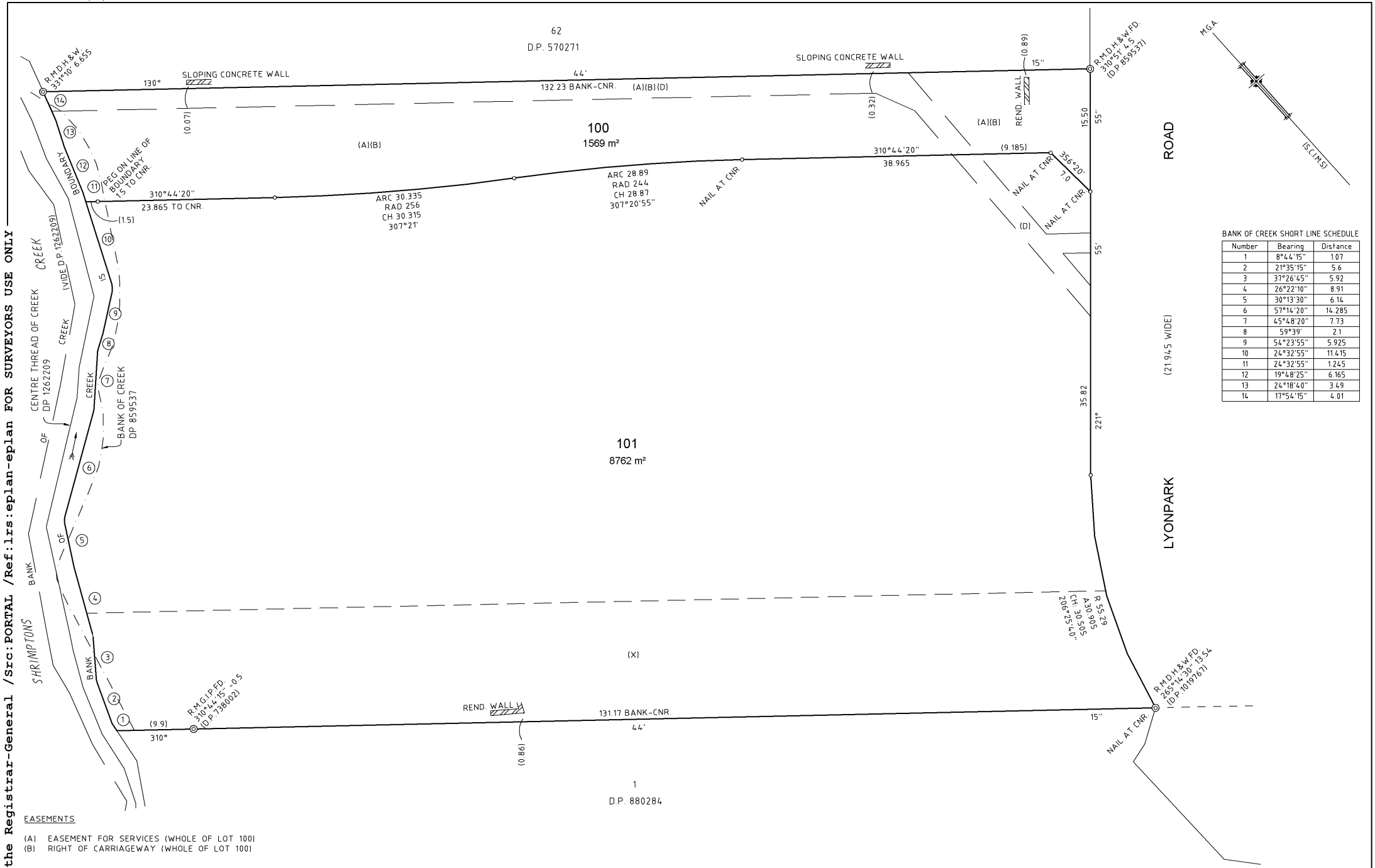
PLAN OF SUBDIVISION OF LOT 1 DP859537

LGA: RYDE
Locality: MACQUARIE PARK
Subdivision No: 16139
Lengths are in metres. Reduction Ratio 1:1000

Registered 30.10.2020

DP1263727

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Table of mm



BANK OF CREEK SHORT LINE SCHEDULE

Number	Bearing	Distance
1	8°44'15"	1.07
2	21°35'15"	5.6
3	37°26'45"	5.92
4	26°22'10"	8.91
5	30°13'30"	6.14
6	57°14'20"	14.285
7	45°48'20"	7.73
8	59°39'	2.1
9	54°23'55"	5.925
10	24°32'55"	11.415
11	24°32'55"	1.245
12	19°48'25"	6.165
13	24°18'40"	3.49
14	17°54'15"	4.01

EASEMENTS

(A) EASEMENT FOR SERVICES (WHOLE OF LOT 100)
(B) RIGHT OF CARRIAGEWAY (WHOLE OF LOT 100)

EXISTING EASEMENTS

(D) EASEMENT FOR DRAINAGE 2.5 WIDE & VARIABLE (R507051)
(X) (LAND EXCLUDES MINERALS - CROWN GRANT PROVISIONS OF SEC. 235A CROWN LAND CONSOLIDATION ACT 1913)

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Table of mm

Surveyor: PHILLIP J McQUILLAN
Date of Survey: 22-07-2019
Surveyor's Ref: 1601644 Sur06a

PLAN OF SUBDIVISION OF LOT 1 DP859537

LGA: RYDE
Locality: MACQUARIE PARK
Subdivision No: 16139
Lengths are in metres. Reduction Ratio 1:300

Registered
30.10.2020

DP1263727

Appendix C:
JBS&G Detailed Site Investigation Location Plans

Legend:

- Approximate Site Boundary
- Areas of Environmental Concern
- Sample Location

JBS&G

Job No: 52047

Client: NSW Land & Housing Corporation

Version: R01 Rev A	Date: 13-Oct-2016
Drawn By: SE	Checked By: LB

Scale 1:2,500

0 25 50
metres

Coor. Sys. GDA 1994 MGA Zone 56

Ivanhoe Estate,
Located Off Herring Road,
Macquarie Park, NSW

AREAS OF ENVIRONMENTAL CONCERN AND SAMPLE LOCATIONS

FIGURE 4:

File Name: 52047_04
Reference: http://maps.au.nearmap.com/, imagery 19/01/2016, accessed 06/04/2016

Appendix D:
JBS&G Detailed Site Investigation Data Summary Tables

Table A: Soil Analytical Data
Project Number: 52047
Project Name: Ivanhoe DSI

Metals & Metalloids; TPHs (NEPC 1999)

Field ID	Depth (m)	Date	Lab Report #	Arsenic (Total)	Cadmium	Chromium (Total)	Copper	Iron	Lead	Mercury (Inorganic)	Nickel	Zinc	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Total)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL				2.00	0.40	1.00	1.00	20.00	1.00	0.05	1.00	1.00	20.00	20.00	50.00	50.00	50.00
NEPM 2013 EIL - Urban Residential (site specific)				100		190[#1]	220		1100		180	560					
NEPM 2013 EIL - Commercial and Industrial (site specific)				160		580[#1]	310		1100		310	800					
NEPM 2013 ESL Urban Residential and Public Open Space, Coarse Soil																	
NEPM 2013 ESL Commercial and Insustrial, Coarse Soil																	
NEPM 2013 Soil HIL A				100[#8]	20	100[#9]	6000		300[#10]	40[#11]	400	7400					
NEPM 2013 Soil HIL B				500[#8]	150	500[#9]	30000		1200[#10]	120[#11]	1200	60000					
NEPM 2013 Soil HIL C				300[#8]	90	300[#9]	17000		600[#10]	80[#11]	1200	30000					
NEPM 2013 Soil HIL D				3000[#8]	900	3600[#9]	240000		1500[#10]	730[#11]	6000	400000					
NEPM 2013 Soil HSL A & HSL B for Vapour Intrusion - Sand 0 to <1m																	
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m																	
HA01 0.0-0.1	0.0-0.1	6/09/2016	514702	14	<0.4	21	23	-	47	<0.05	<5	41	<20	<20	<50	<50	<50
HA01 0.3-0.4	0.3-0.4	6/09/2016	514702	8.3	<0.4	13	12	-	27	<0.05	5.1	17	-	-	-	-	-
HA02 0.0-0.05	0.0-0.05	6/09/2016	514702	9.1	<0.4	9.9	16	-	45	<0.05	<5	45	<20	<20	51	82	133
HA02 0.2-0.3	0.2-0.3	6/09/2016	514702	11	<0.4	29	8.9	-	38	<0.05	<5	36	-	-	-	-	-
HA03 0.0-0.1	0.0-0.1	6/09/2016	514702	3.7 - 6.9	<0.4	6.7 - 10	9 - 18	26,000	16 - 19	<0.05	<5 - 16	47 - 53	-	-	-	-	-
QC20160906-01	0.0-0.1	6/09/2016	514702	7.8	<0.4	14	20	15,000	20	<0.05	17	57	-	-	-	-	-
QC20160906-01A	0.0-0.1	6/09/2016	152979	5	<0.4	14	16	-	19	<0.1	18	64	<25	<50	<100	<100	-
HA04 0.0-0.1	0.0-0.1	6/09/2016	514702	10	<0.4	33	24	-	18	<0.05	37	45	<20	<20	<50	<50	<50
HA04 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA05 0.3-0.4	0.3-0.4	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA06 0.0-0.1	0.0-0.1	6/09/2016	514702	9	<0.4	25	38	-	31	<0.05	40	73	-	-	-	-	-
HA07 0.0-0.1	0.0-0.1	6/09/2016	514702	4.5	<0.4	9.3	7.3	-	13	<0.05	5.4	47	<20	<20	<50	59	59
HA07 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA08 0.0-0.1	0.0-0.1	6/09/2016	514702	4.2	<0.4	5.1	<5	-	11	<0.05	<5	<5	-	-	-	-	-
HA09 0.0-0.1	0.0-0.1	6/09/2016	514702	2.8	<0.4	12	<5	-	5.4	<0.05	<5	<5	<20	33	91	68	192
HA10 0.0-0.1	0.0-0.1	6/09/2016	514702	4.8	<0.4	11	30	-	45	<0.05	11	63	-	-	-	-	-
HA10 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA11 0.0-0.1	0.0-0.1	6/09/2016	514702	6.8	<0.4	8.7	15	-	22	<0.05	10	45	<20	<20	54	63	117
HA11 0.3-0.4	0.3-0.4	6/09/2016	514702	5.5	<0.4	6.5	6.3	-	8.7	<0.05	5.1	12	-	-	-	-	-
HA12 0.0-0.1	0.0-0.1	6/09/2016	514702	9.3	<0.4	15	20	-	22	<0.05	13	32	-	-	-	-	-
HA13 0.0-0.1	0.0-0.1	6/09/2016	514702	9.2	<0.4	11	5.5	-	9	<0.05	<5	14	-	-	-	-	-
HA14 0.0-0.1	0.0-0.1	6/09/2016	514702	11	<0.4	78	22	-	16	<0.05	58	32	-	-	-	-	-
HA14 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.0-0.1	0.0-0.1	6/09/2016	514702	9.2	<0.4	26	15	-	17	<0.05	24	50	<20	27	380	450	857
HA15 0.0-0.1	0.0-0.1	6/09/2016	516962	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA16 0.0-0.1	0.0-0.1	6/09/2016	514702	<2	<0.4	<5	6.4	-	<5	<0.05	<5	12	-	-	-	-	-
HA16 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.0-0.1	0.0-0.1	5/09/2016	514668	7.5	<0.4	11	11	-	23	<0.05	<5	32	<20	<20	72	110	182
HA18 0.0-0.05	0-0.05	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA18 0.2-0.3	0.2-0.3	6/09/2016	514702	4.9	<0.4	13	<5	-	7.3	<0.05	<5	9.2	<20	<20	<50	<50	<50
HA19 0.2-0.3	0.2-0.3	5/09/2016	514668	8.8	<0.4	27	10	-	10	<0.05	20	17	-	-	-	-	-
HA19 0.0-0.1	0.0-0.1	5/09/2016	514668	5.9	<0.4	7.3	10	-	9.3	<0.05	<5	26	-	-	-	-	-
HA20 0.0-0.1	0.0-0.1	5/09/2016	514668	5.6	<0.4	13	12	-	16	<0.05	11	25	<20	<20	60	66	126
HA21 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.4-0.5	0.4-0.5	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.0-0.1	0.0-0.1	5/09/2016	514668	3.2	<0.4	<5	<5	-	9.1	<0.05	<5	14	-	-	-	-	-
HA22 0.0-0.1	0.0-0.1	5/09/2016	514668	8	<0.4	55	23	-	38	<0.05	48	45	-	-	-	-	-
HA23 0.2-0.3	0.2-0.3	5/09/2016	514668	3.5	<0.4	9.2	20	-	13	<0.05	15	18	-	-	-	-	-
HA23 0.0-0.1	0.0-0.1	5/09/2016	514668	5.6	<0.4	7.3	8.9	-	17	<0.05	<5	30	<20	27	100	130	257
HA24 0.0-0.05	0-0.05	5/09/2016	514668	3.9	<0.4	6.8	5.3	-	14	<0.05	<5	22	-	-	-	-	-
HA25 0.2-0.3	0.2-0.3	5/09/2016	514668	4.2	<0.4	11	9	-	18	<0.05	5.3	23	-	-	-	-	-
HA25 0-0.10	0.0-0.1	5/09/2016	514668	3.5	<0.4	11	8.9	-	17	<0.05	6.7	34	<20	<20	<50	<50	<50
HA26 0.0-0.1	0.0-0.1	5/09/2016	514668	8.9	<0.4	23	8.7	-	12	<0.05	<5	17	-	-	-	-	-
QC20160905-01	0.0-0.1	5/09/2016	514668	20	<0.4	32	18	-	16	<0.05	<5	27	-	-	-	-	-
QC20160905-01A	0.0-0.1	5/09/2016	152971	12	<0.4	25	11	-	14	<0.1	2	20	-	-	-	-	-
HA27 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA27 0.0-0.1	0.0-0.1	5/09/2016	514668	12	<0.4	17	5.4	28,000	22	<0.05	<5	20	<20	<20	54	170	224
HA28 0.0-0.1	0.0-0.1	5/09/2016	514668	4.5	<0.4	20	9.8	-	15	<0.05	8.9	52	-	-	-	-	-
HA28 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA29 0.0-0.1	0.0-0.1	5/09/2016	514668	3.8	<0.4	12	10	-	14	<0.05	6	28	<20	<20	<50	<50	<50
HA29 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA30 0.0-0.1	0.0-0.1	5/09/2016	514668	8.7	<0.4	13	15	-	38	0.23	7	50	<20	<20	<50	<50	<50
HA31 0.0-0.1	0.0-0.1	5/09/2016	514668	3.8	<0.4	12	11	-	33	<0.05	5.3	56	-	-	-	-	-
HA31 0.2-0.3	0.2-0.3	5/09/2016	514668	5.7	<0.4	9.5	13	-	33	<0.05	<5	42	-	-	-	-	-
HA32 0.4-0.5	0.4-0.5	5/09/2016	514668	4.3	<0.4	8	<5	-	8	<0.05	<5	<5	-	-	-	-	-
HA32 0.0-0.05	0.0-0.5	5/09/2016	514668	12	<0.4	15	36	-	33	0.08	14	110	<20	43	360	310	713
HA32 0.0-0.05	0.0-0.5	5/09/2016	517819	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TRHs (NEPC 2013); TRHs (Silica-Gel); BTEX

Field ID	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	C6-C10 Fraction	C6 - C10 less BTEX (F1)	>C10 - C16 less Naphthalene (F2)	>C10-C16 Fraction (SG)	>C16-C34 Fraction (SG)	>C34-C40 Fraction (SG)	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	Xylene (Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	50.00	100.00	100.00	20.00	20.00	50.00	50.00	100.00	100.00	0.10	0.10	0.10	0.20	0.10	0.30
NEPM 2013 EIL - Urban Residential (site specific)															
NEPM 2013 EIL - Commercial and Industrial (site specific)															
NEPM 2013 ESL Urban Residential and Public Open Space, Coarse Soil	120[#5]	300[#6]	2800[#6]	180[#7]	180[#5]	120[#5]	120[#5]	300[#6]	2800[#6]	50[#6]	70[#6]	85[#6]			105[#6]
NEPM 2013 ESL Commercial and Insustrial, Coarse Soil	170[#5]	1700[#6]	3300[#6]	215[#7]	215[#5]	170[#5]	170[#5]	1700[#6]	3300[#6]	75[#6]	165[#6]	135[#6]			180[#6]
NEPM 2013 Soil HIL A												160[#12]			
NEPM 2013 Soil HIL B															
NEPM 2013 Soil HIL C															
NEPM 2013 Soil HIL D															
NEPM 2013 Soil HSL A & HSL B for Vapour Intrusion - Sand 0 to <1m					45[#18]	110[#19]				0.5	55	160			40
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m					999999[#18]	999999[#19]				999999	999999	999999			999999
HA01 0.0-0.1	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA01 0.3-0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA02 0.0-0.05	<50	120	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA02 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA03 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC20160906-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC20160906-01A	<50	<100	<100	<25	<25	<50	-	-	-	<0.2	<1	<0.5	<2	<1	-
HA04 0.0-0.1	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA04 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA05 0.3-0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA06 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA07 0.0-0.1	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA07 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA08 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA09 0.0-0.1	<50	150	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA10 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA10 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA11 0.0-0.1	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA11 0.3-0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA12 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA13 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA14 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA14 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.0-0.1	110	440	380	<20	<20	110	-	-	-	<0.1	<0.1	<0.1	0.5	0.2	0.8
HA15 0.0-0.1	-	-	-	-	-	-	<50	<100	<100	-	-	-	-	-	-
HA15 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA16 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA16 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.0-0.1	<50	140	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA18 0.0-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA18 0.2-0.3	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA19 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA19 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA20 0.0-0.1	<50	110	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	0.2	0.1	0.4
HA21 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.4-0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA22 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA23 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA23 0.0-0.1	<50	230	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA24 0.0-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA25 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA25 0-0.10	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA26 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC20160905-01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QC20160905-01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA27 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA27 0.0-0.1	<50	200	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	0.5	0.2	0.6
HA28 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA28 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA29 0.0-0.1	<50	<100	<100	<20	<20	<50	-	-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA29 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA30 0.0-0.1	<50	<100	<100	<20	<20	<50		-	-	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3
HA31 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA31 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA32 0.4-0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA32 0.0-0.05	97	540	230	<20	<20	97	-	-	-	<0.1	<0.1	<0.1	0.7	0.5	1.2
HA32 0.0-0.05	-	-	-	-	-	-	<50	<100	<100	-	-	-	-	-	-

Polycyclic Aromatic Hydrocarbons

Field ID	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (lower bound)*	Benzo(a)pyrene TEQ (medium bound)*	Benzo(a)pyrene TEQ (upper bound)*	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzo(b,j+k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Carcinogenic PAHs as B(a)P TEQ	Phenanthrene	Pyrene	PAHs (Total)	Total Positive PAHs
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.10	0.10	0.10	0.10	0.05	0.50	0.50	0.50	0.50	0.10	0.50		0.10	0.10	0.10	0.10	0.10	0.10		0.10	0.10	0.50	
NEPM 2013 EIL - Urban Residential (site specific)																		170					
NEPM 2013 EIL - Commercial and Industrial (site specific)																		370					
NEPM 2013 ESL Urban Residential and Public Open Space, Coarse Soil					0.7[#6]																		
NEPM 2013 ESL Commercial and Insustrial, Coarse Soil					1.4[#6]																		
NEPM 2013 Soil HIL A																			3[#13]			300[#14]	
NEPM 2013 Soil HIL B																			4[#13]			400[#14]	
NEPM 2013 Soil HIL C																			3[#13]			300[#14]	
NEPM 2013 Soil HIL D																			40[#13]			4000[#14]	
NEPM 2013 Soil HSL A & HSL B for Vapour Intrusion - Sand 0 to <1m																		3					
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m																		999999					
HA01 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA01 0.3-0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA02 0.0-0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA02 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA03 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
QC20160906-01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
QC20160906-01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-
HA04 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-
HA04 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA05 0.3-0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA06 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA07 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA07 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA08 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA09 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA10 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA10 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA11 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA11 0.3-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA12 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA13 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA14 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA14 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA15 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA16 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA16 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA18 0.0-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA18 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA19 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA19 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA20 0.0-0.1	2.5	2.4	2.5	2.4	2.5	5.9	5.9	5.9	3	3	2.7	-	2.4	2.2	2.5	2.8	3	<0.5 - 2.9	5.864[#2]	2.5	2.7	42	-
HA21 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA21 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA22 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA23 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA23 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-
HA24 0.0-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA25 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA25 0-0.10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA26 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
QC20160905-01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
QC20160905-01A	<0.1	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5	-	<0.1	-	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.172[#1]	<0.1	<0.1	-	0[#6]
HA27 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA27 0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA28 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA28 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA29 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-
HA29 0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA30 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-
HA31 0.0-0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA31 0.2-0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA32 0.4-0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA32 0.0-0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.21[#5]	<0.5	<0.5	<0.5	-
HA32 0.0-0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-

Table A: Soil Analytical Data
Project Number: 52047
Project Name: Ivanhoe DSI

JBS&G

				Polychlorinated Biphenyls								Organochlorine Pesticides																									Herbicides & Fungicides												Ecological Parameters				
				Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	PCBs (Total)	4,4-DDE	Aldrin	Aldrin + Dieldrin (Sum of Total)	Dieldrin	DDD	alpha-BHC	DDT	DDT+DDE+DDD (Sum of Total)	beta-BHC	alpha-Chlordane	Chlordane	delta-BHC	gamma-Chlordane	Endosulfan alpha	Endosulfan beta	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Lindane	Methoxychlor	Toxaphene	2,4,5-T	2,4-D	2.4-DB	Actril (Ioxynil)	Dicamba	Dichloroprop	Dinitro-o-cresol	Dinoseb	Fenoprop	MCPA	MCPB	Mecoprop	% Moisture 103oC	Cation Exchange Capacity	pH 1:5 soil:water	Total Organic Carbon	Conductivity (1:5 aqueous extract at 25°C)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	meq/100g	ph Units	%	uS/cm
EQL				0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.50	0.05	0.05		0.05	0.05	0.05	0.05		0.05		0.10	0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.00	0.05	0.10	0.10	10.00
NEPM 2013 EIL - Urban Residential (site specific)																		180																																			
NEPM 2013 EIL - Commercial and Industrial (site specific)																		640																																			
NEPM 2013 ESL Urban Residential and Public Open Space, Coarse Soil																																																					
NEPM 2013 ESL Commercial and Insustrial, Coarse Soil																																																					
NEPM 2013 Soil HIL A											1[#15]			6					240			50						10			6		10		300	20	600	900								600	600	600					
NEPM 2013 Soil HIL B											1[#15]			10					600			90						20			10		15		500	30	900	1600								900	900	900					
NEPM 2013 Soil HIL C											1[#15]			10					400			70						20			10		10		400	30	800	1300								800	800	800					
NEPM 2013 Soil HIL D											7[#15]			45					3600			530						100			50		80		2500	160	5000	9000								5000	5000	5000					
NEPM 2013 Soil HSL A & HSL B for Vapour Intrusion - Sand 0 to <1m																																																					
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m																																																					
Field ID	Depth (m)	Date	Lab Report #																																																		
HA01 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	-	-	-	-
HA01 0.3-0.4	0.3-0.4	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.2	-	-	-	-
HA02 0.0-0.05	0.0-0.05	6/09/2016	514702	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	39	-	-	-	-
HA02 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-
HA03 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	17 - 24	12	5.6	2.5	39
QC20160906-01	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	11	6.3	2.3	38
QC20160906-01A	0.0-0.1	6/09/2016	152979	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.2[#5]	<0.1	<0.1	<0.1	<0.1	<0.3[#1]	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-
HA04 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	12	-	-	-	-
HA04 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.3	-	-	-	-
HA05 0.3-0.4	0.3-0.4	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA06 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.4	-	-	-	-
HA07 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.1	-	-	-	-
HA07 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA08 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
HA09 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	9.7	-	-	-	-
HA10 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	-	-	-	-
HA10 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-
HA11 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-
HA11 0.3-0.4	0.3-0.4	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
HA12 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-
HA13 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8.5	-	-	-	-
HA14 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
HA14 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-
HA15 0.0-0.1	0.0-0.1	6/09/2016	516962	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA16 0.0-0.1	0.0-0.1	6/09/2016	514702	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	27	-	-	-	-
HA16 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA17 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	-
HA18 0.0-0.05	0-0.05	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA18 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-
HA19 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
HA19 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-
HA20 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-
HA21 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.4-0.5	0.4-0.5	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
HA21 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	-	-	-	-
HA22 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-
HA23 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
HA23 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-
HA24 0.0-0.05	0-0.05	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	20	-	-	-	-
HA25 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-
HA25 0-0.10	0.0-0.1	5/09/2016	514668	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-
HA26 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-
QC20160905-01	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-
QC20160905-01A	0.0-0.1	5/09/2016	152971	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-
HA27 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA27 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	16	10	8.5	2.9	97
HA28 0.0-0.1	0.0-0.1	5/09/2016	514668	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-
HA28 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
HA29 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-
HA29 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
HA30 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	-	-
HA31 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-
HA31 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
HA32 0.4-0.5	0.4-0.5	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-
HA32 0.0-0.05	0.0-0.5	5/09/2016	514668	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05	<0.1[#5]	<0.05	<0.05	<0.05	<0.05	<0.15[#1]	<0.05	-	<0.1	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<1	<0.5	<0.5	<5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	46	-	-	-	-
HA32 0.0-0.05	0.0-0.5	5/09/2016	517819	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

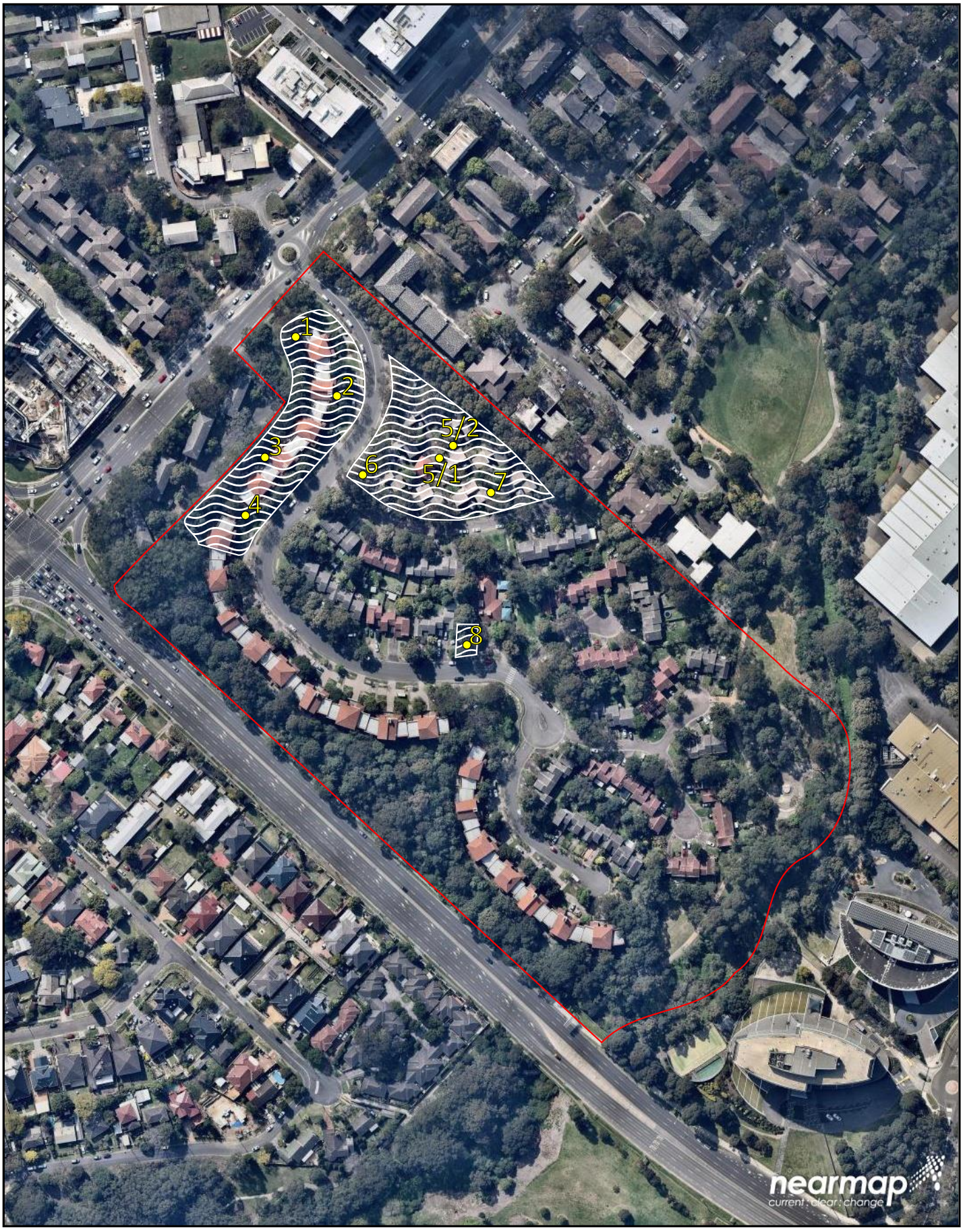
Table A: Soil Analytical Data
Project Number: 52047
Project Name: Ivanhoe DSI

				Asbestos - Trace Analysis																
				Approx. Sample Mass	Asbestos from ACM in Soil	Mass ACM	Mass Asbestos in ACM	Asbestos from FA & AF in Soil	Mass FA	Mass Asbestos in FA	Mass AF	Mass Asbestos in AF	Mass Asbestos in FA & AF	Synthetic Fibres - Comment	ACM - Comment	AF - Comment	FA - Comment	Organic Fibres - Comment	Respirable Fibres - Comment
				g	%w/w	g	g	%w/w	g	g	g	g	g	Comment	Comment	Comment	Comment	Comment	Comment
EQL																			
NEPM 2013 ESL - Urban Residential (site specific)																			
NEPM 2013 ESL - Commercial and Industrial (site specific)																			
NEPM 2013 ESL Urban Residential and Public Open Space, Coarse Soil																			
NEPM 2013 ESL Commercial and Insustrial, Coarse Soil																			
NEPM 2013 Soil HIL A																			
NEPM 2013 Soil HIL B																			
NEPM 2013 Soil HIL C																			
NEPM 2013 Soil HIL D																			
NEPM 2013 Soil HSL A & HSL B for Vapour Intrusion - Sand 0 to <1m																			
NEPM 2013 Soil HSL C for Vapour Intrusion - Sand 0 to <1m																			
Field ID	**Depth (m)**	**Date**	**Lab Report #**																
HA01 0.0-0.1	0.0-0.1	6/09/2016	514702	637	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA01 0.3-0.4	0.3-0.4	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA02 0.0-0.05	0.0-0.05	6/09/2016	514702	348	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA02 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA03 0.0-0.1	0.0-0.1	6/09/2016	514702	414 - 558	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
QC20160906-01	0.0-0.1	6/09/2016	514702	587	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
QC20160906-01A	0.0-0.1	6/09/2016	152979	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA04 0.0-0.1	0.0-0.1	6/09/2016	514702	553	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA04 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA05 0.3-0.4	0.3-0.4	6/09/2016	514702	744	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA06 0.0-0.1	0.0-0.1	6/09/2016	514702	662	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA07 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA07 0.2-0.3	0.2-0.3	6/09/2016	514702	624	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA08 0.0-0.1	0.0-0.1	6/09/2016	514702	623	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA09 0.0-0.1	0.0-0.1	6/09/2016	514702	570	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA10 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA10 0.2-0.3	0.2-0.3	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA11 0.0-0.1	0.0-0.1	6/09/2016	514702	508	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA11 0.3-0.4	0.3-0.4	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA12 0.0-0.1	0.0-0.1	6/09/2016	514702	613	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA13 0.0-0.1	0.0-0.1	6/09/2016	514702	617	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA14 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA14 0.2-0.3	0.2-0.3	6/09/2016	514702	493	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA15 0.0-0.1	0.0-0.1	6/09/2016	514702	477	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA15 0.0-0.1	0.0-0.1	6/09/2016	516962	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA15 0.2-0.3	0.2-0.3	6/09/2016	514702	492	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA16 0.0-0.1	0.0-0.1	6/09/2016	514702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA16 0.2-0.3	0.2-0.3	6/09/2016	514702	615	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA17 0.2-0.3	0.2-0.3	5/09/2016	514668	372	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA17 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA18 0.0-0.05	0-0.05	6/09/2016	514702	341	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA18 0.2-0.3	0.2-0.3	6/09/2016	514702	442	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA19 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA19 0.0-0.1	0.0-0.1	5/09/2016	514668	535	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA20 0.0-0.1	0.0-0.1	5/09/2016	514668	407	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA21 0.2-0.3	0.2-0.3	5/09/2016	514668	619	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA21 0.4-0.5	0.4-0.5	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA21 0.0-0.1	0.0-0.1	5/09/2016	514668	528	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA22 0.0-0.1	0.0-0.1	5/09/2016	514668	528	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA23 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA23 0.0-0.1	0.0-0.1	5/09/2016	514668	409	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA24 0.0-0.05	0-0.05	5/09/2016	514668	400	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA25 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA25 0-0.10	0.0-0.1	5/09/2016	514668	519	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA26 0.0-0.1	0.0-0.1	5/09/2016	514668	446	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
QC20160905-01	0.0-0.1	5/09/2016	514668	355	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
QC20160905-01A	0.0-0.1	5/09/2016	152971	409	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-
HA27 0.2-0.3	0.2-0.3	5/09/2016	514668	688	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA27 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA28 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA28 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA29 0.0-0.1	0.0-0.1	5/09/2016	514668	647	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA29 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA30 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA31 0.0-0.1	0.0-0.1	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA31 0.2-0.3	0.2-0.3	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA32 0.4-0.5	0.4-0.5	5/09/2016	514668	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA32 0.0-0.05	0.0-0.5	5/09/2016	514668	283	0	0	0	0	0	0	0	0	0	[1][87]	[1][87]	[1][87]	[1][87]	[1][88]	[1][88]
HA32 0.0-0.05	0.0-0.5	5/09/2016	517819	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix E:
DLA (DLA, 2017a) Supplementary Site Investigation Location Plans

DLA Environmental Services
A Pacific Environment company

Compiled
AR



Legend

- Site Boundary
- Sample Locations (approximate)
- Altered Topography Areas

N

Approximate Scale

0m 75m 130m

Figure Title
Additional Investigation Locations

Project Title
Ivanhoe Estate, Macquarie Park

Client
Frasers Property Australia

Project No.	Date	Scale	Figure No.	Revision
DL 3953	6/6/2017	As Shown	2	Version 1.0

Appendix F:
DLA (DLA, 2017a) Supplementary Site Investigation Data Summary Tables

Table 1 - Soil Analytical Results
Supplementary Investigation
'Ivanhoe Estate'
Macquarie Park NSW

Sample ID	Depth (m)	Date	Chemical Report	Asbestos	BTEX				Naphthalene	TRH				PAH		Pesticides		PCB	Heavy Metals							
					Benzene	Toluene	Ethylbenzene	Xylene		F1	F2	F3	F4	BaP TEQ	Total PAH	OCP	OPP		As	Cd	Cr VI	Cu	Pb	Hg	Ni	Zn
SITE ASSESSMENT CRITERIA																										
HIL A Residential (NEPC, 2013)				ND	-	-	-	-	-	-	-	-	-	3	300	-	-	-	100	20	100	6000	300	40	400	7400
HSL A Residential, 0-<1m, sand (NEPM, 2013)				-	0.5	160	55	40	3	45	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL A Direct Contact (Friebel, et al, 2011)				-	400	14000	4500	12000	1400	4400	3300	4500	6300	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits, Urban Residential, fine (NEPC, 2013)				-	-	-	-	-	-	700	1000	2500	10000	-	-	-	-	-	-	-	-	-	-	-	-	-
EIL Urban Residential / Public Open Space (NEPC, 2013)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	410	217	1109	-	312	407
ESL Urban Residential / Public Open Space, coarse (NEPM, 2013)				-	50	85	70	45	-	180	120	300	2800	0.7	-	-	-	-	-	-	-	-	-	-	-	-
PRIMARY SAMPLES																										
BH1	0.1-0.2	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	7	<0.4	20	21	25	<0.1	8	31
BH1	0.2-0.5	24-May-17	167858	-	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	7	<0.4	17	18	32	<0.1	7	29
BH2	0.1-0.4	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	5	<0.4	45	17	11	<0.1	36	25
BH2	0.5-0.6	24-May-17	167858	-	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	7	<0.4	14	12	16	<0.1	3	7
BH3	0.0-0.1	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	140	<100	<0.5	<0.05	<0.1	<0.1	<0.1	8	<0.4	23	8	22	<0.1	4	16
BH3	0.1-0.8	24-May-17	167858	-	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	7	<0.4	14	17	22	<0.1	2	16
BH4	0.1-0.2	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	8	<0.4	9	5	6	<0.1	7	17
BH4	0.2-0.4	24-May-17	167858	-	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	5	<0.4	18	18	14	<0.1	14	33
BH5/1	0.1-0.5	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	6	8	8	<0.1	5	32
BH5/2	0.5-0.8	24-May-17	167858	-	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	<4	<0.4	10	2	9	<0.1	2	7
BH6	0.1-0.5	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	8	2	8	<0.1	1	4
BH7	0.2-0.7	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	10	3	8	<0.1	1	7
BH8	0.0-0.1	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	250	650	170	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	14	8	14	<0.1	3	22
BH8	0.1-0.4	24-May-17	167858	-	<0.2	<0.5	<1	<1	<1	<25	120	180	<100	<0.5	<0.05	-	-	-	<4	<0.4	12	5	12	<0.1	2	13
INTRA-LABORATORY DUPLICATE																										
BH2	0.1-0.4A	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	140	<100	<0.5	<0.05	<0.1	<0.1	<0.1	4	<0.4	44	20	11	<0.1	42	29
BH7	0.2-0.7A	24-May-17	167858	ND	<0.2	<0.5	<1	<1	<1	<25	<50	140	<100	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	10	4	8	<0.1	3	11
STATISTICAL ANALYSIS																										
Min	MiMin				0	0	0	0	0	0	120	140	170	0	0	0	0	0	5	0	6	2	6	0	1	4
Max	MaMax				0	0	0	0	0	0	250	650	170	0	0	0	0	0	8	0	45	21	32	0	36	33
Avg	AvAvg				-	-	-	-	-	-	185	323	170	-	-	-	-	-	7	-	16	10	15	-	7	19
Stdev					-	-	-	-	-	-	92	284	-	-	-	-	-	-	1	-	10	7	8	-	9	10

Reported in mg/kg unless stated otherwise

* Depth relates to Depth Below Surface Level

nd = not detected above laboratory LOR

NL = Not Limiting

RED = Exceeds HIL Criteria

YELLOW = Exceeds EIL Criteria

Table 2 - RPD Results
Supplementary Investigation
'Ivanhoe Estate'
Macquarie Park NSW

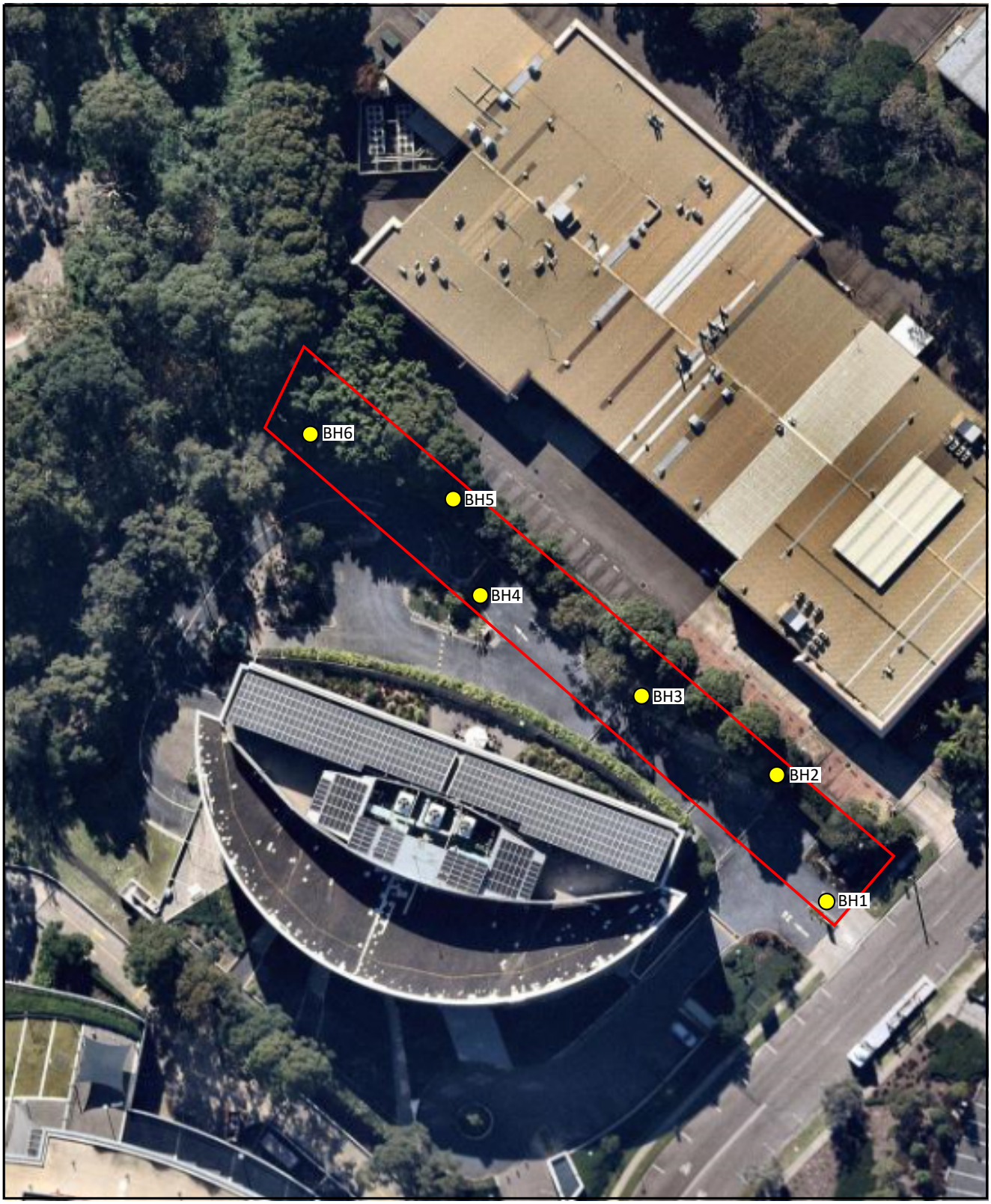
Sample ID	Date	Report	BTEX					TRH				PAH	
			Benzene	Toluene	EthylBenzene	Xylene	Naphthalene	F1	F2	F3	F4	B(a)P TEQ	Total
INTRA-LABORATORY													
BH2_0.1-0.4	24-May-17	167858	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05
BH2_0.1-0.4A	24-May-17	167858	<0.2	<0.5	<1	<1	<1	<25	<50	140	<100	<0.5	<0.05
RPD			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
BH7_0.2-0.7	24-May-17	167858	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05
BH7_0.2-0.7A	24-May-17	167858.0	<0.2	<0.5	<1	<1	<1	<25	<50	140	<100	<0.5	<0.05
RPD			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Sample ID	Date	Report	Heavy Metals							
			As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
INTRA-LABORATORY										
BH2_0.1-0.4	24-May-17	167858	5	<0.4	45	17	11	<0.1	36	25
BH2_0.1-0.4A	24-May-17	167858	4	<0.4	44	20	11	<0.1	42	29
RPD			**22%**	**NA**	**2%**	**16%**	**0%**	**NA**	**15%**	**15%**
BH7_0.2-0.7	24-May-17	167858	<4	<0.4	10	3	8	<0.1	1	7
BH7_0.2-0.7A	24-May-17	167858	<4	<0.4	10	4	8	<0.1	3	11
RPD			**NA**	**NA**	**0%**	**29%**	**0%**	**NA**	***100%***	***44%***

Appendix G:
DLA (DLA, 2017b) Supplementary Site Investigation Sample Location Plan

DLA Environmental Services
A Pacific Environment company

Compiled
AR



Legend

- Approximate Site Boundary
- Sample Locations (approximate)

N

Approximate Scale

0m 7.5m 15m

Figure Title: Site Layout and Sample Locations

Project Title: New Property Acquisition
Ivanhoe Estate, Macquarie Park

Client: Frasers Property Australia

Project No.	Date	Scale	Figure No.	Revision
DL3953	10/7/2017	As Shown	2	Version 1.0

Appendix H:
DLA (DLA, 2017b) Supplementary Site Investigation Data Summary Tables

Table 1 - Soil Analytical Results
Supplementary Investigation
New Property Aquisition
'Ivanhoe Estate'
Macquarie Park NSW

Sample ID	Depth (m)	Date	Chemical Report	BTEX				Naphthalene	TRH				PAH		Pesticides		PCB	Heavy Metals							
				Benzene	Toluene	Ethylbenzene	Xylene		F1	F2	F3	F4	BaP TEQ	Total PAH	OCP	OPP		As	Cd	Cr VI	Cu	Pb	Hg	Ni	Zn
SITE ASSESSMENT CRITERIA																									
HIL D Commercial / Industrial (NEPC, 2013)				-	-	-	-	-	-	-	-	-			-	-	-	3000	900	3600	240000	1500	730	6000	400000
HSL D Commercial / Industrial, 0-<1m, sand (NEPM, 2013)				3.0	NL	NL	230	NL	260	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Commercial / Industrial, 1-<2m, sand (NEPM, 2013)				3.0	NL	NL	NL	NL	370	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HSL D Direct Contact (Friebel, et al, 2011)				430	99000	27000	81000	11000	26000	20000	27000	38000	-	-	-	-	-	-	-	-	-	-	-	-	-
Management Limits, Commercial / Industrial, coarse (NEPC, 2013)				-	-	-	-	-	700	1000	3500	10000	-	-	-	-	-	-	-	-	-	-	-	-	-
PRIMARY SAMPLES																									
BH1	0.2	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	0.4	<0.1	<0.1	<0.1	<4	<0.4	12	24	47	<0.1	7	100
BH1	0.7	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	0.9	-	-	-	<4	<0.4	11	13	70	<0.1	6	62
BH1	1.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	9	<0.4	24	5	24	<0.1	2	13
BH1	0.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	4	<0.4	21	1	10	<0.1	2	3
BH2	0.5	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	<4	<0.4	3	210	6	<0.1	5	42
BH3	0.2	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	<4	<0.4	5	9	6	<0.1	1	7
BH4	0.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	<4	<0.4	1	2	4	<0.1	<1	5
BH5	0.2	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	2.2	<0.1	<0.1	<0.1	<4	<0.4	3	5	9	<0.1	1	22
BH5	0.5	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	4	0.5	12	10	17	<0.1	4	23
BH6	0.1	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	0.51	<0.1	<0.1	<0.1	<4	<0.4	6	12	18	<0.1	2	35
BH6	0.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	-	-	-	4	<0.4	12	5	15	<0.1	2	13
INTRA-LABORATORY DUPLICATE																									
BH1	1.4A	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05	<0.1	<0.1	<0.1	8	<0.4	19	4	30	<0.1	2	15
STATISTICAL ANALYSIS																									
Min	MiMin			0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	1	4	0	1	3
Max	MaMax			0	0	0	0	0	0	0	0	0	0	2	0	0	0	9	1	24	210	70	0	7	100
Avg	AvAvg			-	-	-	-	-	-	-	-	-	-	1	-	-	-	5	1	10	27	21	-	3	30
Stdev				-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	3	-	7	61	20	-	2	29

Reported in mg/kg unless stated otherwise

* Depth relates to Depth Below Surface Level

nd = not detected above laboratory LOR

NL = Not Limiting

RED = Exceeds HIL Criteria

YELLOW = Exceeds EIL Criteria

Table 2 - RPD Results
Supplementary Investigation
New Property Aquisition
'Ivanhoe Estate'
Macquarie Park NSW

Sample ID	Date	Report	BTEX					TRH				PAH	
			Benzene	Toluene	EthylBenzene	Xylene	Naphthalene	F1	F2	F3	F4	B(a)P TEQ	Total
INTRA-LABORATORY													
BH1_1.4	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05
BH1_1.4A	27-Jun-17	170151	<0.2	<0.5	<1	<1	<1	<25	<50	<100	<100	<0.5	<0.05
RPD			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Sample ID	Date	Report	Heavy Metals							
			As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
INTRA-LABORATORY										
BH1_1.4	27-Jun-17	170151	9	<0.4	24	5	24	<0.1	2	13
BH1_1.4A	27-Jun-17	170151	8	<0.4	19	4	30	<0.1	2	15
RPD			**12%**	**NA**	**23%**	**22%**	**22%**	**NA**	**0%**	**14%**

Appendix I:
Remediation Action Plan (DLA, 2018) Figures

DLA Environmental Services
A Pacific Environment company

Compiled
AR

Legend

- Site Boundary
- TRH Exceedance Location
- Remediation Area
- No investigations have been conducted in this area

N

Approximate Scale

0m 75m 130m

Figure Title
Site Layout and Remediation Area

Project Title
Ivanhoe Estate, Macquarie Park

Client
Frasers Property Australia

Project No.	Date	Scale	Figure No.	Revision
DL 3953	7/02/2018	As Shown	1	Version 1.1

Appendix J:
Validation Report (EES, 2021b) Figures

LEGEND:

- Site boundary
- BH-8 remediation location
- WC-BH8 stockpile location

0 25 50 75 m

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

Client: **Frasers Property Australia**		Job No: **120077**
Drawn By: **LL**	Scale: **as shown**	Source: **QGIS, Nearmap Jan 2021**
Project Manager: **LL**	Date: **Feb 2021**	**Figure 1**
Reviewed by: **CN**		

Title: **Site layout**

Location: **Ivanhoe Estate, Macquarie Park**

LEGEND:

BH-8 remediation location

WC-BH8 stockpile location

0 5 10 m

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

Client: **Frasers Property Australia**		Location: **Ivanhoe Estate, Macquarie Park**
Drawn By: **LL**	Scale: **as shown**	Job No: **120077**
Project Manager: **LL**	Date: **Feb 2021**	Source: **QGIS, Nearmap Jan 2021**
Reviewed by: **CN**		**Figure 2**

Title: **Validation sampling locations**

Appendix K:
Validation Report (EES, 2021b) Data Summary Tables

TABLE 3 - FIELD DUPLICATE RPD COMPARISION

Sample ID:		Intra-laboratory and Inter-laboratory Pairs						
		VAL-WALL-1	FD1	IL1	RPD	Note	RPD	Note
Sample date:		9-Feb-21	9-Feb-21	9-Feb-21				
Analyte grouping/Analyte	**Units**							
Moisture Content								
Moisture content	%	8.7	8	10	8	PASS	14	PASS
Total Recoverable Hydrocarbons								
TRH C6 - C10	mg/kg	<10	<10	<25	NC	PASS	NC	PASS
TPH C6 - C10 less BTEX (F1)	mg/kg	<10	<10	---	NC	PASS	NC	---
TRH > C10-C16	mg/kg	<50	<50	<50	NC	PASS	NC	PASS
TRH > C10 - C16 less Naphthalene (F2)	mg/kg	<50	<50	---	NC	PASS	NC	---
TRH > C16-C34	mg/kg	<100	<100	<100	NC	PASS	NC	PASS
TRH > C34-C40	mg/kg	<100	<100	<100	NC	PASS	NC	PASS

Notes:

LOR	Laboratory limit of reporting
mg/kg	Milligrams per kilogram

TABLE 4 - TRIP BLANK AND TRIP SPIKE RESULTS

Sample ID:		Trip Blank	Trip Spike-1
Sample date:		9-Feb-21	9-Feb-21
Analyte grouping/Analyte	**Units**		
Benzene, toluene, ethylbenzene and xylene			
Benzene	mg/kg	<0.2	0.2
Toluene	mg/kg	<0.5	15.2
Ethylbenzene	mg/kg	<0.5	2.3
meta- & para-Xylene	mg/kg	<0.5	11.9
ortho-Xylene	mg/kg	<0.5	4.8
Total Xylenes	mg/kg	<0.5	16.7
Naphthalene	mg/kg	<1	<1
Total Recoverable Hydrocarbons			
TRH C6 - C10	mg/kg	<10	64
TPH C6 - C10 less BTEX (F1)	mg/kg	<10	30

Notes:

LOR	Laboratory limit of reporting
mg/kg	Milligrams per kilogram

TABLE 5- MATRIX SPIKE RECOVERY OUTLIERS

Report ID	Medium	Analyte	Lab Sample ID	Client Sample ID	Recovery %	Control Limits %	Comment
ES2104619	Soil	C10 - C14 Fraction	EB2103370--001	Anonymous	Not determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ES2104619	Soil	C15 - C28 Fraction	EB2103370--001	Anonymous	Not determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ES2104619	Soil	C29 - C36 Fraction	EB2103370--001	Anonymous	Not determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ES2104619	Soil	>C10 - C16 Fraction	EB2103370--001	Anonymous	Not determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ES2104619	Soil	>C16 - C34 Fraction	EB2103370--001	Anonymous	Not determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ES2104619	Soil	>C34 - C40 Fraction	EB2103370--001	Anonymous	Not determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Notes:
Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS

Site Audit Statement

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 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. 0301-2019

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	James Davis		
Company	Enviroview Pty Ltd		
Address	PO Box 327		
	GLADESVILLE NSW	Postcode	2110
Phone	0467 375 481		
Email	james.davis@enviroview.com.au		

Site details

Address	Ivanhoe Estate comprising Ivanhoe Place, Wilcannia Way, Nyngan Way, Narromine Way and Cobar Way, part of 2-4 Lyonpark Road and portions of Shrimptons Creek adjacent to Lot 1 DP859537 to the centre line of the creek.		
	MACQUARIE PARK NSW	Postcode	2113

Property description

(Attach a separate list if several properties are included in the site audit.)

Lots 6 to 20 in DP 861433, Lot 100 in DP 1223787, Lot 5 in DP 740753,

Part Lot 1 in DP 859537 (see attached Plan of Consolidation and Subdivision Plan for

proposed Lot 100)

Local government area	City of Ryde Council
Area of site (include units, e.g. hectares)	8.44 Ha
Current zoning	R4 High Density Residential

Regulation and notification

To the best of my knowledge:

❑ the **site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985,* as follows: (provide the no. if applicable)

- ❑ Declaration no.
- ❑ Order no.
- ❑ Proposal no.
- ❑ Notice no.

☑ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

❑ the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*

☑ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name	Chris Koukoutaris
Company	Frasers Property Ivanhoe Pty Ltd
Address	Level 2, 1C Homebush Bay Drive
	RHODES NSW Postcode 2138
Phone	02 9767 2223
Email	Chris.Koukoutaris@frasersproperty.com.au

Contact details for contact person (if different from above)

Name

Phone

Email

Nature of statutory requirements (not applicable for non-statutory audits)

❑ Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)

❑ Requirements imposed by an environmental planning instrument (please specify, including date of issue)

☑ **Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)**

Condition of consent for modification to development consent SSD 8903 granted by the Minister for Planning and Public Spaces on 30 April 2020.

❑ Requirements under other legislation (please specify, including date of issue)

Purpose of site audit

☑ **A1** To determine land use suitability

Intended uses of the land: Residential with minimal access to soil

OR

❑ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

OR

(Tick all that apply)

❑ **B1** To determine the nature and extent of contamination

❑ **B2** To determine the appropriateness of:

- ❑ an investigation plan
- ❑ a remediation plan
- ❑ a management plan

❑ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

❑ **B4** To determine the compliance with an approved:

- ❑ **voluntary management proposal** or
- ❑ **management order** under the *Contaminated Land Management Act 1997*

❑ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

JBS&G, DLA Environmental, Environmental and Earth Sciences

Titles of reports reviewed:

JBS&G (2016). Detailed Site Investigation, Ivanhoe Estate, Herring Road, Macquarie Park, NSW. Document Ref.: 52047/104956 (Rev 0). 24 October 2016. (JBS&G, 2016)

DLA Environmental Services (2016). Letter dated 11 October 2016 Re: Summary of In-Ground Contamination – Ivanhoe Estate, Cnr Herring and Epping Roads, Macquarie Park NSW 2113. Document Ref.: DL3531_S005491. (DLA, 2016)

DLA Environmental Services (June 2017). Supplementary Site Investigation, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road (STET) NSW 2113. Document Ref.: DL3953_S006887. June 2017. (DLA, 2017a)

DLA Environmental Services (July 2017). Supplementary Site Investigation - New Property Acquisition - Ivanhoe Estate, 2 Lyon Park Road, Macquarie Pak (STET) NSW 2113. Document Ref.: DL3953_S007076. 28 July 2017. (DLA, 2017b)

DLA Environmental Services (2018). Remediation Action Plan, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Park NSW 2113. Document ref.: S008208 Version 1.2. 12 March 2018. (DLA, 2018)

Environmental Earth Sciences (January 2021) Technical Memorandum: Additional Investigation at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW. Dated 29 January 2021. (EES, 2021a)

Environmental Earth Sciences (2021). Technical Memorandum: Addendum to Remediation Action Plan at Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Park, NSW. Document Ref.: 120077_RAP Addendum_V1. 29 January 2021. (EES, 2021b)

Environmental Earth Sciences (2021). Validation Report for Ivanhoe Estate (Location BH8), Corner Herring Road and Epping Road, Macquarie Park, NSW. Document Ref.: 120077_VAL_BH8_V1. 12 March 2021. (EES, 2021b)

Other information reviewed, including previous site audit reports and statements relating to the site:

N/A

Site audit report details

Title	Site Audit Report Ivanhoe Estate, Macquarie Park, NSW
Report no.	600184_0301-2019
Date	6 April 2021

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
    - (B1) the nature and extent of contamination, and/or
    - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
    - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
    - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
    - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

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

Section A1

I certify that, in my opinion:

The **site is 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):~~

_____

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:~~

_____

_____

_____

_____

_____

_____

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is 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):

_____

EMP details

Title

_____

_____

Author

Date

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ requires operation and/or maintenance of **active** control systems[3]

☐ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

Section B

Purpose of the plan[4] which is the subject of this audit:

I certify that, in my opinion:

(B1)

☐ The nature and extent of the contamination **has** been appropriately determined

☐ The nature and extent of the contamination has not been appropriately determined

AND/OR (B2)

☐ The investigation, remediation or management plan is appropriate for the purpose stated above

☐ The investigation, remediation or management plan is not appropriate for the purpose stated above

AND/OR (B3)

☐ The site testing plan:

☐ **is** appropriate to determine

☐ **is not** appropriate to determine

if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

AND/OR (B4)

☐ The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):

☐ **have** been complied with

☐ **have not** been complied with.

*voluntary management proposal no.

**management order no.

AND/OR (B5)

☐ 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

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

- ☐ 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 plan (**attached**):

*Strike out as appropriate

Plan title

Plan author

Plan date No. of pages

Plan title

Plan author

Plan date No. of pages

SUBJECT to compliance with the following condition(s):

Overall comments:

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

Accreditation no. 0301

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 6 April 2021

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

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

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

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses 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 investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may 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.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information

satisfying guidelines made or approved under the *Contaminated Land Management Act 1997* (CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the 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*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

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.

Section B

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 the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified 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. The condition must not specify an individual auditor, only that further audits are required.

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.

Part III

In **Part III** the auditor certifies their 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

- the **NSW Environment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

  AND

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

SURVEYING AND SPATIAL INFORMATION REGULATION 2017: CLAUSE 70						
MARK	M.G.A. COORDINATES EASTING	M.G.A. COORDINATES NORTHING	CLASS (HORIZ)	ORDER (HORIZ)	METHOD	STATE
SSM 21836	325 640.208	6 260 788.047	B	2	FROM SCIMS	FOUND
SSM 108161	325 313.419	6 260 452.614	C	4	FROM SCIMS	FOUND
PM 50023	325 216.337	6 260 317.860	B	2	FROM SCIMS	FOUND

DATE OF SCIMS COORDINATES: 14.3.2018 M.G.A. ZONE: 56 M.G.A. DATUM: GDA94

COMBINED SCALE FACTOR: 0.999961

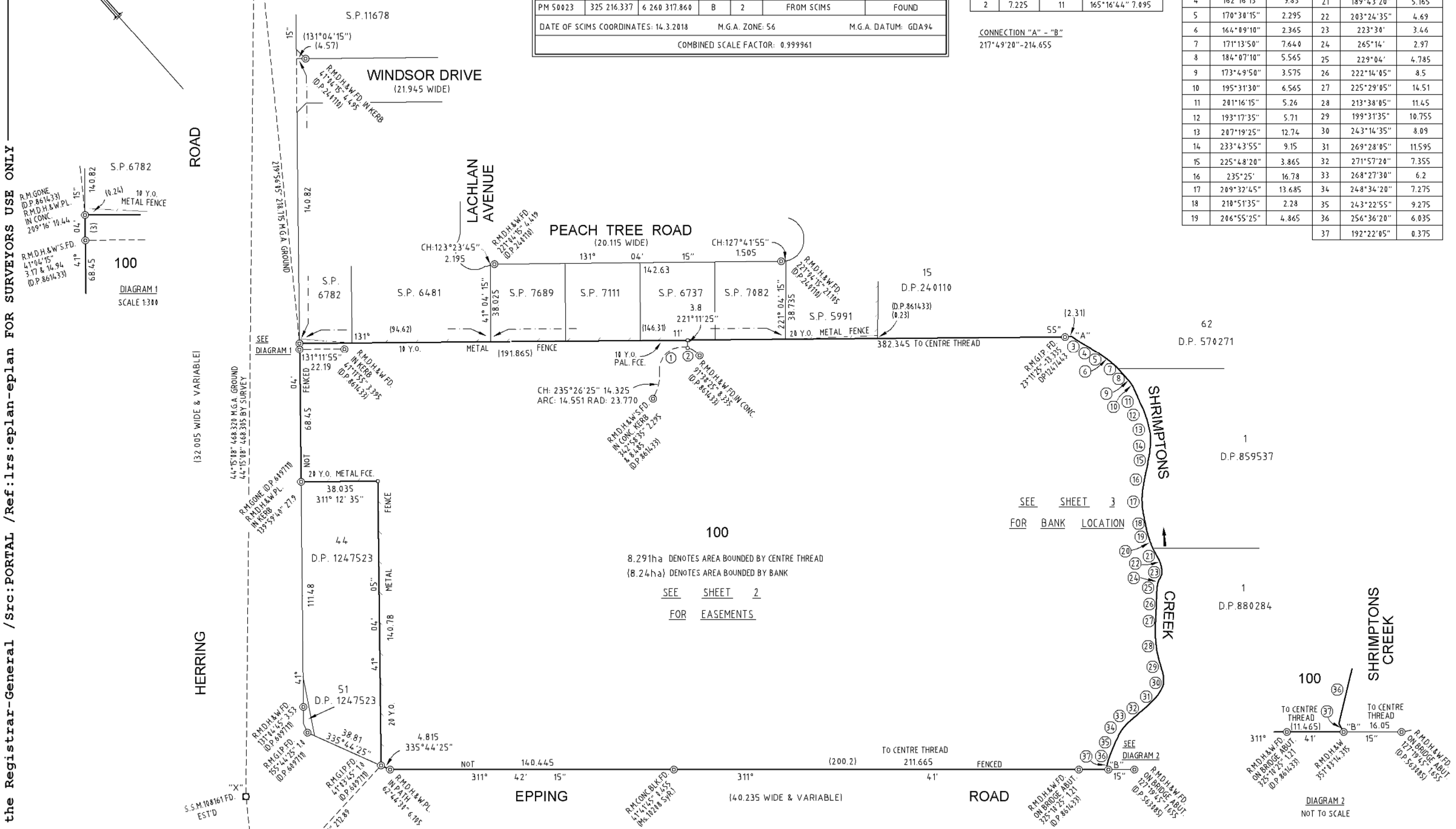
TABLE OF SHORT CURVES

No.	ARC	RADIUS	CHORD
1	20.84	11	272°09'55" 17.86
2	7.225	11	165°16'44" 7.095

CONNECTION "A" - "B"
217°49'20"-214.655

TABLE OF SHORT LINES - CREEK BOUNDARY - CENTRE THREAD

No.	BEARING	DISTANCE	No.	BEARING	DISTANCE
3	166°28'20"	5.58	20	199°40'15"	6.34
4	162°16'15"	9.85	21	189°43'20"	5.165
5	170°30'15"	2.295	22	203°24'35"	4.69
6	164°09'10"	2.365	23	223°30'	3.46
7	171°13'50"	7.640	24	265°14'	2.97
8	184°07'10"	5.565	25	229°04'	4.785
9	173°49'50"	3.575	26	222°14'05"	8.5
10	195°31'30"	6.565	27	225°29'05"	14.51
11	201°16'15"	5.26	28	213°38'05"	11.45
12	193°17'35"	5.71	29	199°31'35"	10.755
13	207°19'25"	12.74	30	243°14'35"	8.09
14	233°43'55"	9.15	31	269°28'05"	11.595
15	225°48'20"	3.865	32	271°57'20"	7.355
16	235°25'	16.78	33	268°27'30"	6.2
17	209°32'45"	13.685	34	248°34'20"	7.275
18	210°51'35"	2.28	35	243°22'55"	9.275
19	206°55'25"	4.865	36	256°36'20"	6.035
			37	192°22'05"	0.375



Surveyor: PHILLIP J McQUILLAN Date of Survey: 4-4-2018 Surveyor's Ref: 1601644_CONSOL	PLAN OF CONSOLIDATION OF LOT 100 D.P.1223787, LOT 5 D.P.740753 & LOTS 6,7,8,10,11,12,13,14,15,16,17, 18,19, 20 D.P. 861433 & LOT 101 D.P.1247443	LGA: RYDE Locality: MACQUARIE PARK ~~Subdivision No:~~ Lengths are in metres. Reduction Ratio 1:1250	Registered 06.04.2020	DP1262209

EASEMENTS

(A) EASEMENT FOR SERVICES (WHOLE OF LOT 100)
(B) RIGHT OF CARRIAGEWAY (WHOLE OF LOT 100)

EXISTING EASEMENTS

(D) EASEMENT FOR DRAINAGE 2.5 WIDE & VARIABLE (R507051)
(X) (LAND EXCLUDES MINERALS - CROWN GRANT PROVISIONS OF SEC. 235A CROWN LAND CONSOLIDATION ACT 1913)

"Y" S.S.M.21836 FD. EST'D

"X" S.S.M.108161 FD. EST'D

P.M.50023 FD. EST'D

WINDSOR DRIVE

ROAD

HERRING ROAD

EPPING ROAD

(32.005 WIDE & VARIABLE)

(40.235 WIDE & VARIABLE)

161°17'39" 485.123

44°15'10" 468.320 M.G.A. GROUND
44°15'10" 468.305 BY SURVEY

215°45'15" 166.089 M.G.A. GROUND
215°46'20" 166.118 BY SURVEY

276°30'54" 544.073

M.G.A.

(S.C.I.M.S)

43
D.P. 564302

511
D.P. 1153119

R.M.D.H.&W.FD. 310°41' - 4.495 (D.P.243769)

R.M.D.H.&W.FD. 131°56' - 17.455 (D.P.1109955)

21.945 131°41'45"

55'

77.795

41°

(21.945 WIDE)

62
D.P. 870271

R.M.D.H.&W. 331°10' - 6.655

R.M.D.H.&W.FD. 310°51' - 14.5 (D.P.859537)

130° 44' 15"

(A)(B)(D) 100 (A)(B) (A)(B)

(D)

100
D.P. 1262209

SHRIMPTONS CREEK

SEE SHEET 2

101

LYONPARK ROAD

R.M.G.I.P.FD. 210°44'15" - 0.5 (D.P.738002)

R.M.D.H.&W.FD. 265°14'30" - 13.54 (D.P.1019767)

(X)

130° 44'

94.090 15"

511
D.P. 1153119

R.M.D.H.&W.FD. 226°44'20" - 3.725 (D.P.880284)

52°48'10" 110.76 SURVEY
52°48'17" 110.77 DP 880284

1
D.P. 880284

R.M.D.H.&W.FD. ON BRIDGE ABUT 127°19'45" - 1.655 (D.P.563085)

SURVEYING AND SPATIAL INFORMATION REGULATION 2017: CLAUSE 70

MARK	M.G.A. COORDINATES EASTING	M.G.A. COORDINATES NORTHING	CLASS (HORIZ)	ORDER (HORIZ)	METHOD	STATE
SSM 21836	325 640.208	6 260 788.047	B	2	FROM SCIMS	FOUND
SSM 108161	325 313.419	6 260 452.614	C	4	FROM SCIMS	FOUND
PM 50023	325 216.337	6 260 317.860	B	2	FROM SCIMS	FOUND

DATE OF SCIMS COORDINATES: 19.07.2019 M.G.A. ZONE: 56 M.G.A. DATUM: GDA94

COMBINED SCALE FACTOR: 0.999961

Surveyor: PHILLIP J McQUILLAN
Date of Survey: 22-07-2019
Surveyor's Ref: 1601644 Sur06a

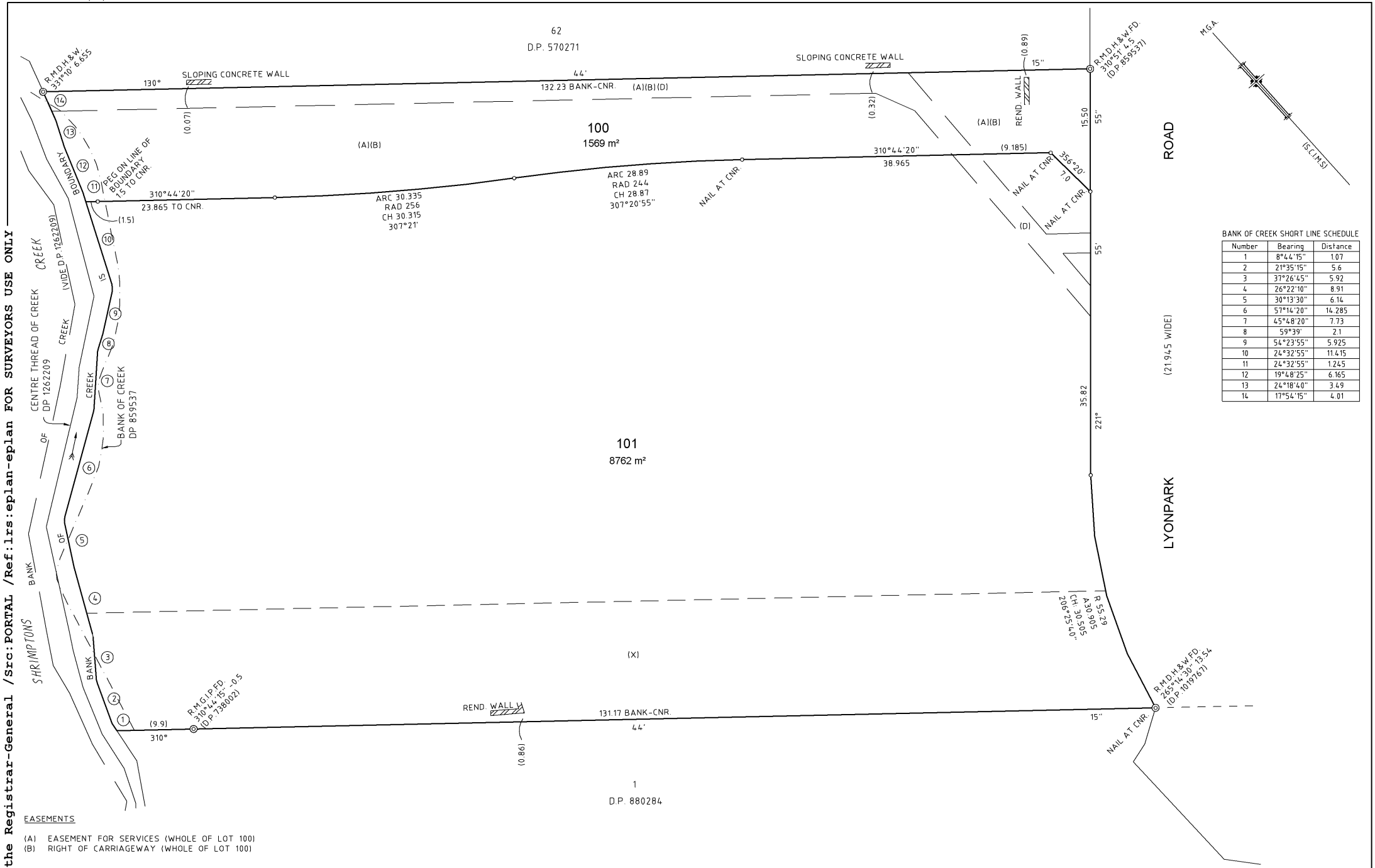
PLAN OF SUBDIVISION OF LOT 1 DP859537

LGA: RYDE
Locality: MACQUARIE PARK
Subdivision No: 16139
Lengths are in metres. Reduction Ratio 1:1000

Registered 30.10.2020

DP1263727

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Table of mm



BANK OF CREEK SHORT LINE SCHEDULE

Number	Bearing	Distance
1	8°44'15"	1.07
2	21°35'15"	5.6
3	37°26'45"	5.92
4	26°22'10"	8.91
5	30°13'30"	6.14
6	57°14'20"	14.285
7	45°48'20"	7.73
8	59°39'	2.1
9	54°23'55"	5.925
10	24°32'55"	11.415
11	24°32'55"	1.245
12	19°48'25"	6.165
13	24°18'40"	3.49
14	17°54'15"	4.01

EASEMENTS

(A) EASEMENT FOR SERVICES (WHOLE OF LOT 100)
(B) RIGHT OF CARRIAGEWAY (WHOLE OF LOT 100)

EXISTING EASEMENTS

(D) EASEMENT FOR DRAINAGE 2.5 WIDE & VARIABLE (R507051)
(X) (LAND EXCLUDES MINERALS - CROWN GRANT PROVISIONS OF SEC. 235A CROWN LAND CONSOLIDATION ACT 1913)

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Table of mm

Surveyor: PHILLIP J McQUILLAN
Date of Survey: 22-07-2019
Surveyor's Ref: 1601644 Sur06a

PLAN OF SUBDIVISION OF LOT 1 DP859537

LGA: RYDE
Locality: MACQUARIE PARK
Subdivision No: 16139
Lengths are in metres. Reduction Ratio 1:300

Registered
30.10.2020

DP1263727