ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED

14 May 2021

Frasers Property Ivanhoe Pty Ltd
Level 2
Homebush Bay Drive
Rhodes NSW 2138

Attention: **Chris Koukoutaris**
Senior Development Manager

Report for SEARs Condition 11: Contamination as part of Development of Stage 2 Ivanhoe Estate, Macquarie Park, NSW

1 Introduction

Environmental Earth Sciences NSW was engaged by Frasers Property Australia to prepare this letter in response to specific requirements requested in the Secretary's Environmental Assessment Requirements (SEARs) Condition 11: Contamination for Stage 2 development (comprising of Building C2, C3 and C4) at Ivanhoe Estate, Macquarie Park, NSW:

The environmental impact statement (EIS) must include a preliminary investigation assessing and quantifying any soil or groundwater contamination, and demonstrating that the site is suitable (or may be made suitable after remediation) for the proposed use, in accordance with the State Environmental Planning Policy No 55 - Remediation of Land and the associated guidelines.

Where recommended in the preliminary investigation, or requested by the Planning Secretary, the EIS must also include a detailed site investigation, a remediation action plan and/or a preliminary long-term environmental management plan.

2 Guidelines and Legislation

Contamination investigation works were undertaken at the Ivanhoe Estate with reference to the following guidelines:

- National Environment Protection Council (NEPC), 2013 – *National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amended 2013)* (ASC NEPM, 2013).
- NSW EPA (2014) – *Waste classification guidelines: Part 1: Classifying waste* (the 'Waste Guidelines').

Further detailed information on the management of asbestos can be found in the following guidelines that are referenced in the ASC NEPM (2013):

- Western Australia Department of Health (WA DoH) (2009) – *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DoH, 2009).
- WA DoH (2018) – *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – Summary Update* (WA DoH, 2018).

2.1 Codes of practice

Works were undertaken with reference to the following codes of practice:

- WorkCover NSW (2014) – *Managing Asbestos in or on Soil.*
- Safe Work Australia (2019a) – *How to Manage and Control Asbestos in the Workplace.*
- Safe Work Australia (2019b) – *How to Safely Remove Asbestos Code of Practice.*

3 Summary of investigations

3.1 Contamination investigations

The site has been the subject of the following known investigations to assess the risk posed by contaminants in soil:

- Douglas Partners Pty Ltd (2017) – *Report on Preliminary Waste Classification, Proposed Residential Development, Ivanhoe Estate, Macquarie Park, Prepared for Frasers Property Ivanhoe Pty Ltd* (ref: 86043.01.R.004; Rev 0; December 2017) (DP, 2017).
- David Lane & Associates Environmental Services Pty Ltd (DLA) (2018a) – *Supplementary Site Investigation, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road NSW 2113* (ref: DL3953_S006887; June 2017) (DLA, 2018a).
- Environmental Earth Sciences (2021a) – *Waste Classification of Material at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120120_WC_V3; 31 March 2021) (Environmental Earth Sciences, 2021a).
- Environmental Earth Sciences (2021b) – *Virgin Excavated Natural Material Characterisation Assessment – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW* (ref: 120120_ENM_No.1_V3; 1 April 2021) (Environmental Earth Sciences, 2021b).
- Environmental Earth Sciences (2021c) – *Waste Classification Advice for Stockpile Nos. #2, #3 and #5 and Pipe #1 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120120_WC_No.2_V2; 3 March 2021) (Environmental Earth Sciences, 2021c).

- Environmental Earth Sciences (2021d) – *Virgin Excavated Natural Material (VENM) Characterisation Assessment (TP1 Area) - Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW* (ref: 120120_ENM_No.2_V1; 12 February 2021) (Environmental Earth Sciences, 2021d).

- Environmental Earth Sciences (2021e) – *Waste Classification No.3 for Fill Material at Ivanhoe Estate – Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120120_WASTE_No.3_V1; 5 March 2021) (Environmental Earth Sciences, 2021e).

3.1.1 Fill material

Following the Douglas Partners (DP, 2017), DLA (DLA, 2018a) and Environmental Earth Sciences (2021a) investigations, an estimated 23,676 cubic metres (m^3) of *in situ* material was classified as **General Solid Waste (GSW)** in accordance with the Waste Guidelines, should the material be removed from the site.

A further soil assessment was conducted by Environmental Earth Sciences (2021e) in the area south and southeast of the Midtown sales office whereby an estimated 1,000 m^3 of *in situ* material was classified as **GSW** in accordance with the Waste Guidelines.

3.1.2 Unconsolidated natural layer

Approximately 3,023 m^3 (~4,837 tonnes (t)) of unconsolidated soil material was chemically and physically assessed and considered suitable for offsite beneficial reuse as virgin excavated natural material (VENM), as per the definition of VENM documented in Schedule 1 of the POEO Act. Refer to Environmental Earth Sciences (2021b, 2021d and 2021e).

3.1.3 Bedrock layer

Approximately 59,576 m^3 (~154,898 t) of bedrock material was subject to assessment as natural material as per the definition of VENM documented in Schedule 1 of the POEO Act. Assessment also included ascertaining the chemical and physical attributes of the material in accordance with chemical testing requirements of the Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (POEO) (Waste) Regulation 2014 - *the excavated natural material order 2014* (the "ENM Order"), ENM Order.

Based upon results and findings from this assessment it was concluded that material in this layer met the definition of VENM. This was supported by results of chemical and physical attributes testing which reported concentrations of all samples within acceptable threshold criteria of the ENM Order. Refer to Environmental Earth Sciences (2021b) for further information.

3.2 Remediation action plan

The site has been the subject of a remediation action plan (RAP), waste classification and validation report, to remediate soil contamination present at the location referred to as BH8.

These works were required to render the site suitable for redevelopment as detailed in the following reports:

- DLA (2018a) – *Supplementary Site Investigation, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road NSW 2113* (ref: DL3953_S006887; June 2017) (DLA, 2018a).

- DLA (2018b) – *Remediation Action Plan, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road NSW 2113* (ref: 0448889 Version 1.2; March 2018) (the "RAP") (DLA, 2018b).

- Environmental Earth Sciences (2021f) – *Technical Memorandum: Addendum to Remediation Action Plan at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW* (ref: 120077_RAP Addendum_V1; 29 January 2021) (Environmental Earth Sciences, 2021f).

- Environmental Earth Sciences (2021g) – *Waste Classification of Soil Material in Vicinity of Location BH8 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120077_WC_BH8_V1; 2 March 2021) (Environmental Earth Sciences, 2021g).

- Environmental Earth Sciences (2021h) – *Validation Report for Ivanhoe Estate (Location BH8) – Corner of Herring Road and Epping Road, Macquarie Park, NSW* (ref: 120077_VAL_BH8_V1; 12 March 2021) (Environmental Earth Sciences, 2021h).

- Enviroview Pty Ltd (2021a) – *Site Audit Report, Ivanhoe Estate, Macquarie Park, NSW 2113;* (ref: 600184_0301-2019; 6 April 2021) (Enviroview, 2021a).

- Enviroview Pty Ltd (2021b) – *NSW EPA Site Auditor Scheme, Site Audit Statement, Ivanhoe Estate, Macquarie Park, NSW 2113;* (ref: 600184_0301-2019; 6 April 2021) (Enviroview, 2021b).

Following review of the abovementioned reports and reports listed in Section 3.1 there was one exceedance of the applicable health screening level (HSL) for residential land use (HSL A/B) (110 mg/kg) for total recoverable hydrocarbon (TRH) (Fraction $>C_{10} – C_{16}$) (F2) (250 mg/kg) at soil sample location 'BH8_0.0-0.4m' (DLA, 2018a).

A RAP (DLA, 2018b) was subsequently prepared to manage this contamination to make the site suitable in a low-density residential land use scenario 'Setting A' in accordance with ASC NEPM (2013).

Based upon laboratory results 31 tonnes of *ex situ* material from the vicinity of BH8 was excavated and disposed offsite at a suitably licensed waste facility. The material was classified as **GSW (non-putrescible)** in accordance with the Waste Guidelines (Environmental Earth Sciences, 2021g).

Following remediation, residual soil quality for contamination within the 'BH8' area no longer presented 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 (DLA, 2018b) and RAP Addendum (Environmental Earth Sciences, 2021f) have been achieved and there is no further investigation required in this area and this portion is suitable for redevelopment (Environmental Earth Sciences, 2021h).

Following the remediation of BH8, the NSW EPA accredited Site Auditor (James Davis of Enviroview) issued a Site Audit Report (Enviroview, 2021a) and Site Audit Statement (Enviroview, 2021b) declaring that:

> *'the soil remediation and validation works have been appropriately undertaken and that it is considered that the soils at the site are suitable for the proposed land use'*.

3.3 Unexpected findings (asbestos)

An additional assessment was undertaken by Environmental Earth Sciences NSW on 2 February 2021, following the discovery of an unexpected find of asbestos containing material (ACM) in the subsurface (Environmental Earth Sciences, 2021i). It was estimated that 400 – 500 m^3 of GSW 'Special Waste Asbestos' material was remediated and disposed offsite from Stockpiles # 2, # 3 and # 5 and 'Pipe 1'. The material was excavated and disposed of as **GSW (Special Waste: Asbestos (Bonded))** at a suitably licensed waste facility.

3.3.1 Clearance certificates

On 27 February and 3 March 2021, following the removal of the stockpiles of bonded asbestos impacted material from Stockpiles # 2, # 3 and # 5 and 'Pipe 1', Environmental Earth Sciences NSW conducted a visual inspection of the excavation footprints and their surroundings to assess for any potential ACM remaining on the ground surface.

Based on the findings of the visual clearance inspection undertaken by Environmental Earth Sciences NSW, it was verified that no ACM was visible on the ground surface of the excavation and stockpile footprints (Environmental Earth Sciences, 2021k).

3.3.2 Pipe 2

During redevelopment works, further asbestos was encountered in the area known as 'Pipe #2'. Refer to Environmental Earth Sciences (2021l and 2021m) for details of the offsite disposal of this asbestos pipe.

3.3.3 Further investigations and clearances

Below are the reports summarised the categorisation and validation of the site due to the presence of asbestos impacted material:

- Environmental Earth Sciences (2021i) – *Report on Management of Unexpected Finding – Ivanhoe Estate, Cnr Herring Road and Epping Road, Macquarie Park NSW* (ref: 120077_UXF_V2; 11 February 2021) (Environmental Earth Sciences, 2021i).

- Environmental Earth Sciences (2021j) – *Clearance Certificate for footprints of asbestos pipe #1 at Ivanhoe Estate, corner of Herring Road and Epping Road, Macquarie Park, NSW* (ref: 120077_CC1_No1_V1; 12 March 2021) (Environmental Earth Sciences, 2021j).

- Environmental Earth Sciences (2021k) – *Asbestos Clearance Certificate of Footprints of Stockpiles #2, #3 and #5 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120077_ACC_V1; 3 March 2021) (Environmental Earth Sciences, 2021k).
- Environmental Earth Sciences (2021l) – *Asbestos Clearance Certificate for Footprint at Pipe #2 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120077_ CC_No.2_V1; 16 March 2021) (Environmental Earth Sciences, 2021l).
- Environmental Earth Sciences (2021m) – *Asbestos Clearance Certificate for Footprint at Pipe #2 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120077_ CC_No.3_V1; 14 May 2021) (Environmental Earth Sciences, 2021m).

4 Conclusion and recommendations

Environmental Earth Sciences NSW concludes that Stage 2 is deemed suitable for the proposed development of Building C2, C3 and C4.

Due to remediation and validation works conducted at the site, a preliminary long-term environmental management plan is not required for Stage 2 Ivanhoe Estate.

5 Limitations

This report has been prepared by Environmental Earth Sciences NSW ACN 109 404 006 in response to and subject to the following limitations:

1. The specific instructions received from Frasers Property Australia;
2. The specific scope of works set out in PO120125 issued by Environmental Earth Sciences NSW for and on behalf of Frasers Property Australia, is included in Section 3 (Scope of Work) of this report;
3. May not be relied upon by any third party not named in this report for any purpose except with the prior written consent of Environmental Earth Sciences NSW (which consent may or may not be given at the discretion of Environmental Earth Sciences NSW);
4. This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason;
5. The report only relates to the site referred to in the scope of works being located at Ivanhoe Estate, located at the corner of Herring Road and Epping Road, Macquarie Park NSW (“the site”);

6. The report relates to the site as at the date of the report as conditions may change thereafter due to natural processes and/or site activities;

7. No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the depth tested and reported in this report;

8. Fill, soil, groundwater and rock to the depth tested on the site may be fit for the use specified in this report. Unless it is expressly stated in this report, the fill, soil and/or rock may not be suitable for classification as clean fill, ENM or VENM if deposited off site;

9. This report is not a geotechnical or planning report suitable for planning or zoning purposes; and

10. Our General Limitations set out at the back of the body of this report.

Should you have any queries, please do not hesitate to contact us on (02) 9922 1777.

For and on behalf of
Environmental Earth Sciences NSW

Project Manager
Linda Lenihan
Senior Environmental Scientist

Project Director
James Barwood
Manager NSW

Technical Reviewer
Mark Stuckey
Senior Principal / Certified Professional Soil Scientist, Contaminated Site Assessment and Management (CPSS CSAM)

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6 References

Douglas Partners Pty Ltd (2017) – Report on Preliminary Waste Classification, Proposed Residential Development, Ivanhoe Estate, Macquarie Park, Prepared for Frasers Property Ivanhoe Pty Ltd (ref: 86043.01.R.004; Rev 0; December 2017) (DP, 2017).

David Lane & Associates Environmental Services Pty Ltd (DLA) (2018a) – *Supplementary Site Investigation, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road NSW 2113* (ref: DL3953_S006887; June 2017) (DLA, 2018a).

DLA (2018b) – Remediation Action Plan, Ivanhoe Estate, Corner Herring Road and Epping Road, Macquarie Road NSW 2113 (ref: 0448889 Version 1.2; March 2018) (the "RAP").

Environmental Earth Sciences (2021a) – *Waste Classification of Material at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW* (ref: 120120_WC_V3; 31 March 2021) (Environmental Earth Sciences, 2021a).

Environmental Earth Sciences (2021b) Virgin Excavated Natural Material Characterisation Assessment – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW (ref: 120120_ENM_No.1_V3; 1 April 2021) (Environmental Earth Sciences, 2021b).

Environmental Earth Sciences (2021c) – Waste Classification Advice for Stockpile Nos. #2, #3 and #5 and Pipe #1 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW (ref: 120120_WC_No.2_V2; 3 March 2021) (Environmental Earth Sciences, 2021c).

Environmental Earth Sciences (2021d) – Virgin Excavated Natural Material (VENM) Characterisation Assessment (TP1 Area) - Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW (ref: 120120_ENM_No.2_V1; 12 February 2021) (Environmental Earth Sciences, 2021d).

Environmental Earth Sciences (2021e) – Waste Classification No.3 for Fill Material at Ivanhoe Estate – Corner of Herring Road and Epping Road, Macquarie Park NSW (ref: 120120_WASTE_No.3_V1; 5 March 2021) (Environmental Earth Sciences, 2021e).

Environmental Earth Sciences (2021f) – Technical Memorandum: Addendum to Remediation Action Plan at Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park, NSW (ref: 120077_RAP Addendum_V1; 29 January 2021) (Environmental Earth Sciences, 2021f).

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Environmental Earth Sciences (2021h) – Validation Report for Ivanhoe Estate (Location BH8) – Corner of Herring Road and Epping Road, Macquarie Park, NSW (ref: 120077_VAL_BH8_V1; 12 March 2021) (Environmental Earth Sciences, 2021h).

Environmental Earth Sciences (2021i) – Report on Management of Unexpected Finding – Ivanhoe Estate, Cnr Herring Road and Epping Road, Macquarie Park NSW (ref: 120077_UXF_V2; 11 February 2021) (Environmental Earth Sciences, 2021i).

Environmental Earth Sciences (2021j) – Clearance Certificate for footprints of asbestos pipe #1 at Ivanhoe Estate, corner of Herring Road and Epping Road, Macquarie Park, NSW (ref: 120077_CC1_No1_V1; 12 March 2021) (Environmental Earth Sciences, 2021j).

Environmental Earth Sciences (2021k) – Asbestos Clearance Certificate of Footprints of Stockpiles #2, #3 and #5 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW (ref: 120077_ACC_V1; 3 March 2021) (Environmental Earth Sciences, 2021k).

Environmental Earth Sciences (2021l) – Asbestos Clearance Certificate for Footprint at Pipe #2 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW (ref: 120077_ CC_No.2_V1; 16 March 2021) (Environmental Earth Sciences, 2021l).

Environmental Earth Sciences (2021m) – Asbestos Clearance Certificate for Footprint at Pipe #2 – Ivanhoe Estate, Corner of Herring Road and Epping Road, Macquarie Park NSW (ref: 120077_ CC_No.2_V1; 14 May 2021) (Environmental Earth Sciences, 2021m).

Enviroview (2021a) – Site Audit Report, Ivanhoe Estate, Macquarie Park, NSW 2113; (ref: 600184_0301-2019; 6 April 2021) (Enviroview, 2021a).

Enviroview (2021b) – NSW EPA Site Auditor Scheme, Site Audit Statement, Ivanhoe Estate, Macquarie Park, NSW 2113; (ref: 600184_0301-2019; 6 April 2021) (Enviroview, 2021b).

Mainland Civil Pty Ltd (2020), Asbestos Management Plan, Ivanhoe Estate – Stage 1, Ivanhoe Place, Macquarie Park, Frasers Property Pty Ltd (dated 11 December 2020, Revision A) (the 'AMP').

National Environment Protection Council (NEPC), 2013 – National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amended 2013) (ASC NEPM, 2013).

NSW EPA (2014) – Waste classification guidelines: Part 1: Classifying waste (the 'Waste guidelines').

Safe Work Australia (2019a) – How to Manage and Control Asbestos in the Workplace.

Safe Work Australia (2019b) – How to Safely Remove Asbestos Code of Practice

Western Australia Department of Health (WA DoH) (2009) – Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DoH, 2009).

WA DoH (2018) – Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia – Summary Update (WA DoH, 2018).

WorkCover NSW (2014) – Managing Asbestos in or on Soil.

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ENVIRONMENTAL EARTH SCIENCES GENERAL LIMITATIONS

Scope of services
The work presented in this report is Environmental Earth Sciences response to the specific scope of works requested by, planned with and approved by the client. It cannot be relied on by any other third party for any purpose except with our prior written consent. Client may distribute this report to other parties and in doing so warrants that the report is suitable for the purpose it was intended for. However, any party wishing to rely on this report should contact us to determine the suitability of this report for their specific purpose.

Data should not be separated from the report
A report is provided inclusive of all documentation sections, limitations, tables, figures and appendices and should not be provided or copied in part without all supporting documentation for any reason, because misinterpretation may occur.

Subsurface conditions change
Understanding an environmental study will reduce exposure to the risk of the presence of contaminated soil and or groundwater. However, contaminants may be present in areas that were not investigated, or may migrate to other areas. Analysis cannot cover every type of contaminant that could possibly be present. When combined with field observations, field measurements and professional judgement, this approach increases the probability of identifying contaminated soil and or groundwater. Under no circumstances can it be considered that these findings represent the actual condition of the site at all points.

Environmental studies identify actual sub-surface conditions only at those points where samples are taken, when they are taken. Actual conditions between sampling locations differ from those inferred because no professional, no matter how qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden below the ground surface. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated. However, steps can be taken to help minimize the impact. For this reason, site owners should retain our services.

Problems with interpretation by others
Advice and interpretation is provided on the basis that subsequent work will be undertaken by Environmental Earth Sciences NSW. This will identify variances, maintain consistency in how data is interpreted, conduct additional tests that may be necessary and recommend solutions to problems encountered on site. Other parties may misinterpret our work and we cannot be responsible for how the information in this report is used. If further data is collected or comes to light we reserve the right to alter their conclusions.

Obtain regulatory approval
The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.

Limit of liability
This study has been carried out to a particular scope of works at a specified site and should not be used for any other purpose. This report is provided on the condition that Environmental Earth Sciences NSW disclaims all liability to any person or entity other than the client in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or in part, on the contents of this report. Furthermore, Environmental Earth Sciences NSW disclaims all liability in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by the client, or any such person in reliance, whether in whole or any part of the contents of this report of all matters not stated in the brief outlined in Environmental Earth Sciences NSW's proposal number and according to Environmental Earth Sciences general terms and conditions and special terms and conditions for contaminated sites.

To the maximum extent permitted by law, we exclude all liability of whatever nature, whether in contract, tort or otherwise, for the acts, omissions or default, whether negligent or otherwise for any loss or damage whatsoever that may arise in any way in connection with the supply of services. Under circumstances where liability cannot be excluded, such liability is limited to the value of the purchased service.