

Contamination and Remediation

132 McCredie Road, Guildford West NSW 2161

11-Feb-2025

Doc No. 60735340_ContaminationRemediation_20250211

Contamination and Remediation

132 McCredie Road, Guildford West NSW 2161

Client: Goodman Property Services (Aust) Pty Ltd

ABN: 40 088 981 793

Prepared by

AECOM Australia Pty Ltd

Gadigal Country, Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia

T +61 1800 868 654 www.aecom.com

ABN 20 093 846 925

11-Feb-2025

Job No.: 60735340

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 and ISO45001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

Quality Information

Document Contamination and Remediation
Ref 60735340
\\na.aecomnet.com\lfs\apac\sydney-
ausyd1\secure\projects\607x\60735340__mccredierd\500_deliverables\503_contamre
mediationrpt\60735340_contaminationremediation_20250211_0.docx
Date 11-Feb-2025
Originator Brad Eismen
Checker/s
Verifier/s Sedat Tasdemir

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
A	06-Sep-2024	DRAFT	Brad Eismen Industry Director	
B	20-Jan-2025	FINAL DRAFT	Brad Eismen Industry Director	
0	11-Feb-2025	FINAL	Brad Eismen Industry Director	

Table of Contents

Executive Summary	i
1.0 Introduction	1
2.0 The Site	2
3.0 Staging	4
4.0 NSW Site Audit MP165 & MP165_B	5
5.0 Contamination Investigations and Remedial Planning	7
6.0 Remediation and Validation	9
7.0 Acid Sulfate Soil	10
8.0 Conclusions and Recommendations	11
8.1 Conclusions	11
8.2 Recommendations/Mitigation Measures	11
9.0 References	12
Appendix A	
MP165_B SAS & SAR	A

List of Tables

Table 1	SEARs requirements addressed in the report	1
---------	--	---

List of Figures

Figure 1	Site Aerial	2
Figure 2	Local Context	3
Figure 3	Acid sulfate soil mapping closest to the site (2.3 km south and 4.7 km east)	10

Executive Summary

This Contamination and Remediation Report has been prepared by AECOM Australia Pty Ltd to accompany a State Significant Development Application (SSDA) for the construction and ongoing operation of a data centre facility at 132 McCredie Road, Guildford West NSW 2161, (the site) in the Cumberland Council Local Government Area (LGA). The site is legally described as Lot 1 in DP596315.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the Project Pluto Data Centre (SSD-69223466) dated 4 April 2024

This report concludes that the proposed data centre is suitable and warrants approval subject to the implementation of the following mitigation measures:

- Development and implementation of a Construction Environmental Management Plan (CEMP) during redevelopment activities.
- Development and Implementation of an Unexpected Finds Protocol (UFP) during redevelopment activities.
- Development and implementation of a Fill Importation Protocol (FIP) during redevelopment activities.
- Revision/update of the Long-Term Environmental Management Plan (LTEMP) following redevelopment activities.

Following the implementation of the above mitigation measures, the remaining impacts are appropriate.

1.0 Introduction

A State Significant Development Application (SSDA) has been prepared in support of a proposed data centre at 132 McCredie Road, Guildford West NSW 2161 (the site). The site is zoned E4 General Industrial and has a road frontage to McCredie Road. The developable site area is 71,710 sq.m.

The proposed development comprises:

- Site preparation works including demolition, bulk excavation and removal of existing hard standing and structures on the site, tree and vegetation clearing, and bulk earthworks;
- Construction, fit out and operation of a 100 MVA data centre with a maximum building height of 25.67m (RL 45,269) and total gross floor area of 29,444 m² comprising:
 - At-grade parking for 51 car parking spaces and 2 accessible car parking spaces
 - Three (3) loading dock spaces.
 - Two (2) levels of technical data hall floor space with incorporating a total of nine (9) data halls
 - Ancillary office space located on the ground floor
- Provision of required utilities, including:
 - Underground fuel storage
 - Two (2) Switch-rooms
 - Four (4) 1,350kL industrial water storage tanks
- Vehicle entry and egress driveways located along McCredie Road
- Internal access road
- Associated landscaping and site servicing
- Installation of services and drainage infrastructure.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) and accompanying cover letter issued for the Project Pluto Data Centre (SSD-69223466) dated 4 April 2024

Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 1 SEARs requirements addressed in the report

Item	Description of requirement	Section reference
13. Ground and Water Conditions	Assess potential impacts on ... acid sulfate soils. ¹	7.0
17. Contamination and Remediation	In accordance with Chapter 4 of SEPP (Resilience and Hazards) 2021, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development.	4.0, 5.0 and 6.0

¹ This report only addresses acid sulfate soils.

2.0 The Site

The site is located on Gandangara Land and is in the Smithfield Industrial Area within the Cumberland Local Government Area (LGA). It is bounded by McCredie Road to the north.

The front part of the site adjoins the Guildford Transmission Substation, which is located immediately to the east and fronts onto McCredie Road. Other industrial uses are located further east, with residential properties beyond.

The Guildford West Sports Ground, which comprises several playing fields, is located to the south of the Guildford Transmission Substation. The playing fields bound the southern part of the site to the east. The playing fields / public recreation area also abut the southern boundary of the site.

Prospect Creek is located to the south of the public recreation area and is zoned C2 Environmental Protection. The area to the south of Prospect Creek is predominately characterised by low density single storey residential housing.

The site is located in the south eastern corner of the Smithfield Industrial Estate and is within close proximity of the Cumberland Highway (A28) and M4 and M7 motorways, which provide access to Sydney CBD, western Sydney and the south. A range of large format industrial uses are located to the west and north west of the site. The Smithfield Industrial Estate extends across the A28 to Gipps Road (approximately 3km west of the site). It forms part of the broader Smithfield Wetherill Park industrial area, which is one of the largest of its kind in the Southern Hemisphere and makes a significant contribution to the New South Wales and Australian economies.

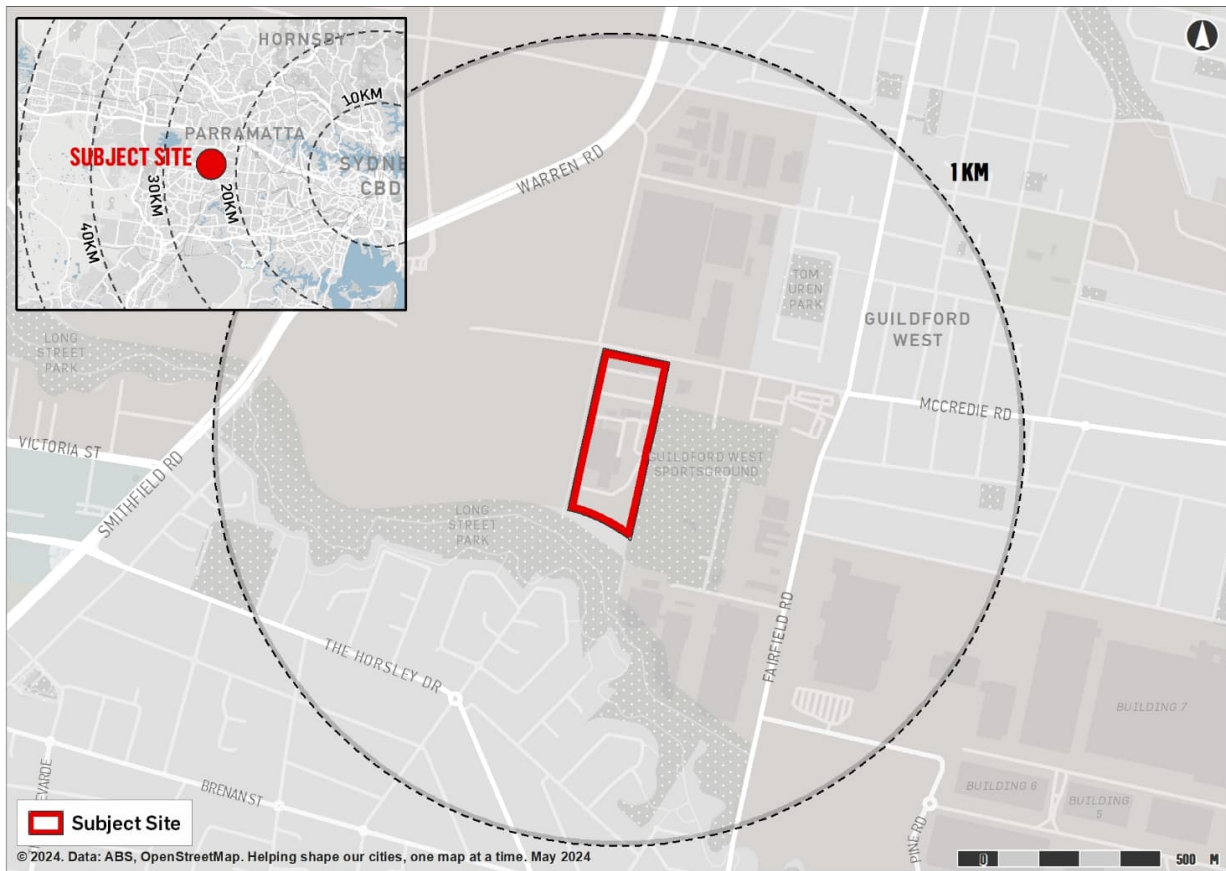
The site has a net developable area of 71,710 sqm and is currently vacant. It previously operated as a Castrol Lubricants facility. However, the majority of the site has now been cleared and subject to category 1 remediation works. A single storey office building is located on the northern portion of the site fronting McCredie Road. The building is vacant.

Figure 1 Site Aerial



Source: Urbis, 2024

Figure 2 Local Context



Source: Urbis, 2024

3.0 Staging

The proposal seeks consent for development to be constructed and operated in two phases to reflect the staged availability power supply. The proposed stages involve the following:

Stage 1: Demolition of existing structures and construction of the main data centre building as well as the car park, perimeter access road, site access/exit driveways and landscaping. Stage one will involve the fit-out and operation of five of the 9 proposed data halls at levels 1 and 2 as well as the associated electrical rooms, generators, storage and office rooms.

Stage 2: Completion of the ultimate development scheme involving the extension of the building to the south with an additional four data halls, associated electrical rooms and generators, and associated landscaping and external works. The electrical substations will also be constructed in the north of the site during this phase.

The works are to be completed in five (5) construction stages, as per below:

Stage 1:

- CC1 – Demolition
- CC2 – Site Preparation works (including but not limited to vegetation removal, earthworks & piling, installation of footings, retaining walls)
- CC3 – Inground services installation, structural works
- CC4 – Façade construction, installation of services, fit out
- CC5 – Landscaping and external works

Stage 2:

- CC1 – Site Preparation works (earthworks & piling, installation of footings)
- CC2 – Inground services installation, structural works
- CC3 – Façade construction, installation of services, fit out
- CC4 – Landscaping and external works

The information provided in this Contamination and Remediation report is relevant to subsurface construction activities, as captured in the recommendations/mitigation measures (Section 8.2).

4.0 NSW Site Audit MP165 & MP165_B

All contamination related investigation and remediation work conducted from 2021 through 2023 was subject to a non-statutory (MP165 – pre-remediation) site audit and statutory (MP165_B – remediation and validation) site audit under the Contaminated Land Management Act (1997). The documentation listed in Sections 5.0 and 6.0 was reviewed by a NSW Site Auditor (Melissa Porter of Senversa Pty Ltd), culminating in the issuance of the following Site Audit Reports (SAR) and Site Audit Statements (SAS):

- Senversa, 2021a. Site Audit Report, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford. 19 February.
- Senversa, 2021b. Site Audit Statement MP165, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford. 19 February. Section B5 (non-statutory).
- Senversa, 2023a. Site Audit Report, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford, 17 October.
- Senversa, 2023b. Site Audit Statement MP165_B, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford. 17 October. Section A2 (statutory).

Conclusions and comments by the auditor on the documents listed in Sections 5.0 and 6.0 are provided in the relevant sections below. Senversa (2023a) provided the following overall conclusions and recommendations:

JBS&G considered that 'The site has been remediated in general accordance with the Remedial Action Plan and the Remedial Work Plan' and that 'The site is considered suitable for a future commercial / industrial use, excluding basements, subject to the ongoing implementation of the LTEMP² prepared for the site'.

Based on the information presented in JBS&G reports and observations made on site, and following the Decision-Making Process for Assessing Urban Redevelopment Sites in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme, the auditor concludes that the site is suitable for the purposes of commercial industrial land use with no basements, subject to compliance with the following environmental management plan:

- *Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW, 13 August 2023 by JBS&G.*

Remediation included cap and containment of ACM impacted soil on-site with the risk that asbestos impacted soil may also be retained in-situ at the southern boundary below existing trees. The management of the asbestos on-site is detailed in the LTEMP.

The soil remediation also included the excavation of petroleum and chlorinated hydrocarbons and PFAS, successful validation of those excavations and stabilisation of PFAS impacted soil with PAC, and bioremediation of soil impacted petroleum and chlorinated hydrocarbon. Following successful validation, the stabilised and bioremediated soils were reinstated at the site. Excavations in remediated areas may result in odours or discoloured soil.

Senversa (2023b) provided the following regarding the JBS&G (2023c) Long Term Environmental Management Plan:

Purpose of the EMP:

To manage asbestos impacted fill material that are retained on site under a cap and contain strategy as well as manage the possible residual asbestos containing material in fill on the southern portion. There is also the possibility of redundant asbestos pipes in the northern portion of the site that may be discovered during excavation.

² Long Term Environmental Management Plan

Description of the nature of the residual contamination:

Fill remains beneath the mature trees along the southern site boundary. While no asbestos was identified in this residual fill, no samples have been collected so the possibility of asbestos containing material could not be discounted.

An asbestos containment area is located on-site in a former remediation excavation. The asbestos containing material has been placed beneath a marker layer and covered with 2.5-3.0 m of validated material.

Summary of the actions required by the EMP:

The LTEMP requires appropriate controls to be instigated when intrusive works are performed within the areas identified as containing possible asbestos containing material. The LTEMP identifies the use of an exclusion zone, appropriate PPE, asbestos air monitoring and when surface covering reinstatement is required.

How the EMP can reasonably be made to be legally enforceable:

The LTEMP is legally enforceable through the inclusion of the Site Audit Statement as required for the development consent for the site remediation. The LTEMP will apply indefinitely for future site operations or until asbestos remediation/removal works are completed and validated to show that there is no residual asbestos at the site.

How there will be appropriate public notification:

The Site Audit Statement will be provided to the Cumberland City Council as required for the development consent for the site remediation.

Senversa (2023a) noted the following regarding the LTEMP

The LTEMP has been reviewed by the auditor.

- *The provisions of the LTEMP can be made to be legally enforceable via the Development Consent conditions in site redevelopment.*
- *There will be appropriate public notification of restrictions applying to the site through a notification on the Planning Certificate for the site.*
- *The remnant contamination is not considered to pose an unacceptable risk to onsite or offsite environments.*

Based on the above, the auditor considers that the LTEMP provides an adequate framework for the maintenance of the remediation works undertaken with respect to asbestos. The LTEMP is regarded as a passive as it requires minimal management and maintenance and does not incorporate mechanical components.

Senversa (2023b) certified the site is suitable for “Commercial/industrial use with no basement.”

5.0 Contamination Investigations and Remedial Planning

The following site investigation and remedial planning documents were reviewed by the auditor (see Section 4.0):

- BP Australia, 2001. Environmental Site Assessment BP Guildford Terminal 132 McCredie Road, Guildford, NSW. August.
- Kleinfelder, 2021a. Environmental Site Assessment BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716. 5 February.
- Kleinfelder, 2021b. Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716. 19 February.
- Kleinfelder, 2021c. Pre-remediation Environmental Assessment, BP Guildford Terminal – Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716. 27 August.
- enRisks, 2021. Human Health and Ecological Risk Assessment: 132 McCredie Road, Guildford, NSW. 9 December. (the HHERA)
- JBS&G, 2021a. Pre-Remediation Investigation Castrol Guildford Terminal. 16 December.
- JBS&G, 2021b. Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal. 16 December. (the RWP and VSAQP).

Based on the auditor's review of BP (2001) and Kleinfelder (2021a and 2021b) as part of Site Audit MP165 (pre-remediation), the following conclusions were made in Senversa (2021a):

The remediation approach outlined by Kleinfelder is appropriate and should be able to ensure that the site is suitable for the proposed land uses through the removal of the of contaminated soil material. Successful validation will be required to confirm this. Confirmation that the site can be made suitable will also rely on confirmation that all data gaps have been addressed and that the results obtained are consistent with the assumptions made in the RAP.

Following demolition works, additional investigation works are required to be completed and will inform the remedial and validation works to be detailed in the RWP, CEMP and a VSAQP. Auditor review and approval is required for these documents prior to implementation.

Kleinfelder considers that "should Site remediation works be completed in accordance with the guidance provided in this RAP, the Site can be made suitable for an ongoing commercial/industrial land use." Based on the information presented in the reports prepared by Kleinfelder and observations made on-site, and following the Decision-Making Process for Assessing Urban Redevelopment Sites in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme, the Auditor concludes that the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Based on the auditor's review of enRisks (2021) and JBS&G (2021a and 2021b) as part of Site Audit MP165_B, the following conclusions were made (Senversa 2021c, Interim Audit Advice No. 7):

The auditor has completed a review of the HHERA, RWP and VSAQP and investigation report against:

- *The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).*
- *Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (NSW EPA 2020).*
- *National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (NEPC 2013).*
- *PFAS National Environmental Management Plan (NEMP), Version 2.0 (HEPA 2020).*

Previous comments provided on the draft reports in the Interim Audit Advice Letters have been addressed.

6.0 Remediation and Validation

The following site remediation and validation documents were produced and reviewed by the auditor (see Section 4.0). A Long-Term Environmental Management Plan (LTEMP) was also developed by JBS&G and reviewed by the auditor following remediation and validation of the site:

- JBS&G, 2023a. Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW. 28 February.
- JBS&G, 2023b. Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW. 10 May.
- JBS&G, 2023c. Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW. 13 August.

Based on the auditor's review of investigation and remediation documentation, Senversa (2023b) provided the following overall comments in the Site Audit Statement:

Remediation on site included:

- *Excavation for off-site treatment and disposal of soil with high concentrations of per-and polyfluoroalkyl substances (PFAS) as well as soil with elevated concentrations of petroleum or chlorinated hydrocarbons.*
- *Stabilisation of low concentration PFAS contaminated soil with powdered activated carbon (PAC). Some dark staining of the soil may be encountered if the PAC treated soil is excavated. No additional management is needed for the treated PFAS contaminated soil.*
- *Soil contaminated with petroleum and chlorinated hydrocarbons was treated on site through bioremediation and the treated soil validated and reused on site. Some odours may be encountered if the bioremediated soil is excavated.*
- *The on-site containment of asbestos impacted soil and residual asbestos is managed through passive measures under the long-term environmental management plan.*

As noted in Section 4.0, the auditor ultimately certified the site for "Commercial/industrial use with no basement" land use.

7.0 Acid Sulfate Soil

Based on a review of the investigations conducted and observations during remediation, Senversa (2023a) provided the following regarding compliance with DA Condition 25, regarding the presence of Acid Sulfate Soil (ASS):

JBS&G state that "All excavations were undertaken under constant JBS&G supervision. No indicators of actual or potential acid sulphate soils were observed"

The auditor notes that no notifications were received during the works of the signs of potential or actual acid sulphate soil.

Field sheets included in the validation reports also confirm that there was a lack of indicators.

Based on a review of <https://www.environment.nsw.gov.au/eSpade2Webapp#> on 5 September 2024 (see Figure 3 below), the site is not subject to acid sulfate soil.

Given the above, the site does not require an ASS management plan for redevelopment activities or during operation and maintenance following redevelopment.



Figure 3 Acid sulfate soil mapping closest to the site (2.3 km south and 4.7 km east)

8.0 Conclusions and Recommendations

8.1 Conclusions

Based on the contamination investigations, remedial planning documentation, remedial action implementation and validation, which were reviewed and accepted by the auditor as documented in Senversa (2023a and 2023b), the site is suitable for commercial/industrial (without basement) land use.

It is understood that a cable tunnel may be installed in the northern portion of the site as part of the redevelopment and is not considered as “basement” in the context of Senversa (2023a and 2023b) given there will be limited access following construction.

This report concludes that the proposed data centre is suitable and warrants approval subject to the implementation of the following mitigation measures listed in Section 8.2 below.

Following the implementation of the recommended mitigation measures, the remaining impacts are appropriate.

8.2 Recommendations/Mitigation Measures

Because “the LTEMP does not apply to major intrusive works which will instead require a task specific management plan” (Senverson 2023a), the following is recommended:

- Development and implementation of a Construction Environmental Management Plan (CEMP) during redevelopment activities.
- Development and Implementation of an Unexpected Finds Protocol (UFP) during redevelopment activities. This document can be incorporated into the CEMP.
- Development and implementation of a Fill Importation Protocol (FIP) during redevelopment activities. This document can be incorporated into the CEMP.
- Revision/update of the LTEMP following redevelopment activities.

9.0 References

BP Australia, 2001. Environmental Site Assessment BP Guildford Terminal 132 McCredie Road, Guildford, NSW. August.

enRisks, 2021. Human Health and Ecological Risk Assessment: 132 McCredie Road, Guildford, NSW. 9 December. (the HHERA)

JBS&G, 2021a. Pre-Remediation Investigation Castrol Guildford Terminal. 16 December.

JBS&G, 2021b. Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal. 16 December. (the RWP and VSAQP).

JBS&G, 2023a. Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW. 28 February 2023 by JBS&G (Stage 1 Validation).

JBS&G, 2023b. Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW. 10 May 2023 by JBS&G (Stage 2 Validation).

JBS&G, 2023c. Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW. 13 August.

Kleinfelder, 2021a. Environmental Site Assessment BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716. 5 February.

Kleinfelder, 2021b. Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716. 19 February.

Kleinfelder, 2021c. Pre-remediation Environmental Assessment, BP Guildford Terminal – Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716. 27 August.

Senversa, 2021a. Site Audit Report, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford. 19 February. Site Audit MP165.

Senversa, 2021b. Site Audit Statement MP165, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford. 19 February.

Senversa, 2021c. Re: Interim Audit Advice No. 7: Review of HHERA, RWP and VSAQP and Pre-Remediation Investigation, Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW. 16 December.

Senversa, 2023a. Site Audit Report, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford, 17 October.

Senversa, 2023b. Site Audit Statement MP165_B, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford. 17 October.

Appendix A

MP165_B SAS & SAR



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. MP165_B

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: Melissa Porter

Company: Senversa Pty Ltd

Address: Level 24, 1 Market Street

Sydney NSW

Postcode: 2000

Phone: 02 8252 0000

Email: Melissa.Porter@senversa.com.au

Site details

Address: 132 McCredie Road, Guildford, NSW

Postcode: 2716

Property description

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

Lot 1 DP 596315

Local government area: Cumberland City Council

Area of site (include units, e.g. hectares): Approximately 71,619 m²

Current zoning: IN1 (General Industrial)

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.~~ MP165

☒ **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: David Pepplinkhouse

Company: BP Australia Pty Ltd

Address: Level 17, 717 Bourke Street, Docklands, Melbourne, VIC

Postcode: 3008

Phone: (03) 9268 4111

Email: David.Pepplinkhouse@se1.bp.com

Contact details for contact person (if different from above)

Name:

Phone:

Email:

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



☐ 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)
Development consent was granted on the 14th April 2022 by the Cumberland City Council (DA A2022/0085)

☐ 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:~~

OR

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

Intended uses of the land: Commercial/Industrial with no basements.

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.~~

~~Intended uses of the land:~~

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

JPS&G Australia Pty Ltd (JBS&G), Environmental Risk Sciences Pty Ltd (enRisks) and Kleinfelder Australia Pty Ltd (Kleinfelder).

Titles of reports reviewed:

- 'Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW' dated 10 May 2023 by JBS&G.
- 'Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW' dated 28 February 2023 by JBS&G.
- 'Human Health and Ecological Risk Assessment' dated 9 December 2021 by enRisks.

- *'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal'* dated 16 December 2021 by JBS&G.
- *'Pre-Remediation Investigation Castrol Guildford Terminal'* dated 16 December 2021 by JBS&G.
- *'Pre-remediation Environmental Assessment, BP Guildford Terminal – Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716'*, 27 August 2021 by Kleinfelder.

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

Section B Site Audit Statement (MP 165) and 'Site Audit Report – Former Lubricant Facility, 132 McCredie Road, Guildford' dated 19 February 2021.

Site audit report details

Title: Site Audit Report – Former Lubricant Facility, 132 McCredie Road, Guildford

Report no. MP165_B (Senversa Ref: S18505)

Date 17 October 2023

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 plan¹, 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 plan² (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):

Development consent (DA A2022/0085, issued on 14 April 2022).
Commercial/industrial use with no basement.

EMP details

Title: Former Castrol Lubricants Facility

Author: JBS&G Australia Pty Ltd

Date: 6 September 2023

No. of pages: 42

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 systems³~~
- ☒ requires maintenance of **passive** control systems only³.

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.

Purpose of the EMP:

To manage asbestos impacted fill material that are retained on site under a cap and contain strategy as well as manage the possible residual asbestos containing material in fill on the southern portion. There is also the possibility of redundant asbestos pipes in the northern portion of the site that may be discovered during excavation.

Description of the nature of the residual contamination:

Fill remains beneath the mature trees along the southern site boundary. While no asbestos was identified in this residual fill, no samples have been collected so the possibility of asbestos containing material could not be discounted.

An asbestos containment area is located on-site in a former remediation excavation. The asbestos containing material has been placed beneath a marker layer and covered with 2.5-3.0 m of validated material.

Summary of the actions required by the EMP:

The LTEMP requires appropriate controls to be instigated when intrusive works are performed within the areas identified as containing possible asbestos containing material. The LTEMP identifies the use of an exclusion zone, appropriate PPE, asbestos air monitoring and when surface covering reinstatement is required.

How the EMP can reasonably be made to be legally enforceable:

The LTEMP is legally enforceable through the inclusion of the Site Audit Statement as required for the development consent for the site remediation. The LTEMP will apply indefinitely for future site operations or until asbestos remediation/removal works are completed and validated to show that there is no residual asbestos at the site.

How there will be appropriate public notification:

The Site Audit Statement will be provided to the Cumberland City Council as required for the development consent for the site remediation.

Overall comments:

Remediation on site included:

- Excavation for off-site treatment and disposal of soil with high concentrations of per- and polyfluoroalkyl substances (PFAS) as well as soil with elevated concentrations of petroleum or chlorinated hydrocarbons.
 - Stabilisation of low concentration PFAS contaminated soil with powdered activated carbon (PAC). Some dark staining of the soil may be encountered if the PAC treated soil is excavated. No additional management is needed for the treated PFAS contaminated soil.
 - Soil contaminated with petroleum and chlorinated hydrocarbons was treated on site through bioremediation and the treated soil validated and reused on site. Some odours may be encountered if the bioremediated soil is excavated.
 - The on-site containment of asbestos impacted soil and residual asbestos is managed through passive measures under the long-term environmental management plan.
-

Section B

Purpose of the plan⁴ 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:

~~SUBJECT to compliance with the following condition(s):~~

Overall comments:

Part III: Auditor's declaration

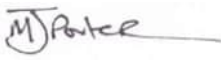
I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997*.

Accreditation no. _____

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: 17/10/2023 _____

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.



BP Australia Pty Ltd
Long-Term Environmental Management Plan

Former Castrol Lubricants Facility
132 McCredie Road, Guildford NSW

6 September 2023
59279/154,264 (Rev 0)
JBS&G Australia Pty Ltd

BP Australia Pty Ltd
Long-Term Environmental Management Plan

Former Castrol Refinery
132 McCredie Rd
Former Castrol Lubricants Facility
132 McCredie Road, Guildford NSW

6 September 2023
59279/154,264 (Rev 0)
JBS&G Australia Pty Ltd

Table of Contents

Abbreviations.....	v
1. Introduction.....	1
1.1 Background.....	1
1.2 Objectives.....	2
2. Summary of Site Conditions	3
2.1 Site Identification	3
2.2 Site Description	3
2.3 Surrounding Land Uses.....	4
2.4 Summary of Identified Asbestos Contamination	4
2.5 Other Aesthetic Indicators	6
3. Application and Enforcement of LTEMP and Responsibilities.....	7
3.1 Application of LTEMP	7
3.2 Site Owner	7
3.3 Persons with Management or Control of the Workplace	8
3.4 Summary of Provisions of this LTEMP	8
3.5 Legal Enforceability	8
4. Asbestos Management Strategy.....	9
4.1 General Site LTEMP Operational Requirements	9
4.1.1 Asbestos Register	9
4.2 Minor Intrusive Earthworks in Areas of Asbestos Impact	9
4.2.1 Excavation in Areas Surrounding Waterpipes Constructed of Asbestos Cement	10
4.2.2 Excavation in Asbestos Impacted Area at Southern Site Boundary...	10
4.2.3 Excavation above Containment Cell	11
4.3 Specific Requirements for Those Working in Areas of Asbestos Impact	11
4.4 Major Intrusive Works in Areas of Asbestos Impact	12
4.5 Soil Management in Areas of Asbestos Impact.....	13
4.6 Dust Management in Areas of Asbestos Impact	13
4.7 Vegetation Management at South of Site.....	13
4.8 Off-Site Disposal and Waste Management	13
4.9 Emergency Preparedness and Response.....	13
5. Health and Safety Management.....	15
6. Revision of the LTEMP	16
7. Limitations	17

List of Tables

Table 2.1: Summary Site Details	3
Table 4.1: Asbestos Impacted Areas and Controls Summary	9
Table 6.1: Register of LTEMP Revisions and Updates	16

List of Figures

Figure 1	Site Location
Figure 2a	Pre-Remediation Site Layout
Figure 2b	Pre-Remediation Site Survey
Figure 2c	Post Remediation Site Layout
Figure 3	Residual Asbestos Impacted Areas

Appendices

Appendix A	LTEMP Record of Induction Form
Appendix B	Asbestos Related Works Record
Appendix C	Site South Boundary Inspection Records
Appendix D	Excavation 13 Marker Layer Survey Plan

Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AF	Asbestos Fines
bgs	Below ground surface
DP	Deposited Plan
EPA	Environment Protection Authority
FA	Fibrous Asbestos
JBS&G	JBS&G Australia Pty Ltd
JSRA	Job Safety Risk Assessment
LAA	Licensed Asbestos Assessor
LTEMP	Long Term Environmental Management Plan
NOHSC	National Occupational Health and Safety Commission
NSW	New South Wales
PPE	Personal Protective Equipment
RAP	Remedial Action Plan
SWMS	Safe Work Method Statement
WHS	Work Health and Safety

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by BP Australia Limited (BP, the client) to prepare a Long-Term Environmental Management Plan (LTEMP) for the future management of asbestos impacted fill materials at the former Castrol Lubricants blending and manufacturing facility located at 132 McCredie Road Smithfield NSW (herein referred to as 'the site'). The site is legally identified as Lot 1 DP 596315. The site location and site layout are presented on **Figure 1** and **Figure 2** respectively.

A substantial program of remediation works was conducted at the site between 2021 and 2023, to address the presence of:

- Petroleum based products on the site. This has included underground storage tanks (USTs), above ground storage tanks (ASTs) and a range of blending activities. Petroleum hydrocarbon impacts were reported in soils, groundwater and soil vapour;
- Volatile organic compounds (VOCs) and semi-volatile organic compounds specifically inclusive of a range of chlorinated hydrocarbons. These solvents are understood to have been historically used in site cleaning activities. This includes point source style activities such as equipment maintenance and a potential that solvents were used to clean large floor areas. Impacts have been identified in soils and soil vapour;
- Per- and poly-fluoroalkyl substances (PFAS) as associated with the historical storage of aqueous film forming foams (AFFF). Limited use of these products would have occurred in proximity of the AFFF storage as associated with fire training activities / AFFF storage maintenance. No recorded fires / major spill events have been reported as having occurred on the site as would have otherwise substantiated an application of AFFF. Impacts have been identified in site soils and groundwater; and
- Asbestos on the site from a variety of sources such as asbestos containing pipes, residual asbestos from the demolition and removal of building materials, and asbestos presence in site soils as both friable and non-friable asbestos containing materials (ACM), and likely consequent of historical uncontrolled disposal of asbestos building materials from at the time of construction of the former Oil Terminal and also associated with an area of potential impacted fill materials as having been imported to the site and identified as stockpiled at the southern portion of the site.

An asbestos management plan (AMP) (JBS&G 2021¹) was prepared for the site to assist with the management of the identified asbestos hazards during the soil and groundwater remediation works. The remediation works included the removal of fuel tanks, pumps, fuel lines, fill points, canopy and concrete, and removal of hydrocarbon, asbestos and per- and poly-fluoroalkyl substances (PFAS) impacted fill materials surrounding the petroleum infrastructure. The remedial works also included on site treatment of some impacted soils and groundwater and also the on-site encapsulation of ACM impacted fill.

Two validation reports²³ have been prepared to document the completed remedial works at the site, and the extent of the removal works is shown on **Figure 2c**.

¹ "Asbestos Management Plan, Castrol Lubricants Facility, 132 McCredie Road, GUILDFORD, NSW" 6 September 2021, 59279-139897 (Rev A) 6 April 2021 (JBS&G 2021)

² "Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, GUILDFORD NSW" 28 February 2023, 59279-150402/Rev A (JBS&G 2023a)

³ Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, GUILDFORD NSW" 8 May 2023, 59279-150402/Rev A (JBS&G 2023b) DRAFT

This LTEMP is required to ensure that the ACM remaining on site on completion of remediation works at the site are appropriately managed during the future operations to ensure continued protection of human health for future site users, workers and contractors engaged to undertake work at the site.

This LTEMP has been prepared in accordance with Clause 429 of the *Work Health and Safety Regulation* (2017) that states, *"If asbestos or ACM is identified at a workplace under clause 422, or likely to be present at a work place from time to time, a person with management or control of the workplace must ensure a written plan (an asbestos management plan) for the workplace is prepared"*.

This LTEMP applies only to the asbestos hazards identified and does not apply to other contaminants that may be present at the site. It is not intended to apply to any major excavations, earthworks or construction activities that may occur in the future or serve as any form of remediation plan for residual occurrences of identified and/or potential asbestos contamination.

In the event that major excavation, earthworks or construction activities are proposed at the site, a separate asbestos management plan (or similar work plan) should be prepared by a suitably experienced asbestos consultant to appropriately manage the potential asbestos exposure hazards that may be encountered.

1.2 Objectives

The objectives of this LTEMP are to:

- Protect the health of current and future site users, workers and contractors from the identified non-friable asbestos hazards at the site;
- Outline ongoing management requirements to ensure that the risk posed by asbestos impacted soils identified at the site is properly managed and maintained;
- Provide guidance on the responsibilities of maintaining the requirements of this LTEMP;
- Provide guidance on the appropriate control measures to be implemented in the event that any intrusive works require to be completed at the site; and
- Provide guidance on the appropriate procedures to manage works within asbestos impacted materials.

2. Summary of Site Conditions

2.1 Site Identification

The location of the site is shown in **Figure 1**. The site details are summarised in **Table 2.1** and described in detail in the following sections.

Table 2.1: Summary Site Details

Lot/DP	Lot 1 DP 596315
Owner	BP Australia Pty Ltd
Address	132 McCredie Road, Smithfield, NSW 2716
Local Government Authority	Cumberland City Council
Approximate co-ordinates (GDA 2020 MGA 56) centre of site	E: 310818.81 N: 6252421.328
Past Use	Agricultural followed by operational fuel terminal
Most Recent Use	Operational Castrol Lubricants Plant (operated until 2 nd half of 2021)
Intended Future Use	Commercial/ industrial land use with no basement
Current Land Zoning	IN1 General Industrial under the Cumberland Local Environment Plan 2021
Site Area	Approximately 71,619 m ²

2.2 Site Description

The site is rectangular in shape and was operating as a Castrol Lubrication storage and distribution facility until late 2021. The perimeter of the site is secured with fencing, with access from McCredie Rd in the north. Prior to remediation works the site consisted of three main sections, which, from north to south, could be described as the:

- North portion: Former administration complex fronting McCredie Rd, carpark and grassed area with overhead transmission lines heading to the electrical substation to the east;
- Central portion: Former terminal operations area which until recently has operated as an oil distribution centre; and
- South portion: Former cleared area including a settlement pond where site drainage water discharges, before being directed into Prospect Creek via a stormwater network.

An access road loops around the site via a gate house and amenities building in the central portion, on the eastern boundary, which provided truck access to despatch areas and the loading gantry. Some sections of the site are grassed with landscaping, particularly in the south where historical filling has reportedly occurred.

This former site layout is shown on **Figure 2a** and a survey plan on **Figure 2b**.

This current site layout, post-remediation is shown on **Figure 2c**.

A survey plan of the marker layer lateral extent is shown in **Appendix D**.

2.3 Surrounding Land Uses

The current land use on adjacent properties as observed from the site boundary is summarised below.

- North of the site is McCredie Road with a large former industrial site, currently undergoing redevelopment, located directly north of McCredie Road and zoned Light Industrial (IN2). Approximately 650 m north is a mixture of residential and commercial sites properties zoned low density residential (R2) and mixed business (B5).
- West of the site is listed as being occupied by Bakers Extra, likely a food producer (zoned IN1). A Visy packaging and recycling centre is located 360 m to the west.
- To the south of the site is a grassed, open space area with a bicycle track (approximately 100 m from site) running east to west, zoned public recreation (RE1). Prospect Creek is located approximately 120 m south of the site's southern boundary, with residential properties (zoned R2) located 170 m from site on the south side of Prospect Creek.
- To the east the Guildford Transmission Station (zoned IN2) is located directly adjacent to the northern end of the site (administration/office complex), with commercial/industrial properties and the Guildford Hotel approximately 275 m beyond. To the east of the southern half of the site is the Guildford West Sportsground (110m), a baseball field (85m) and the Guildford Tennis Centre (120 m) zoned RE1. Land more than 440 m east of the site is predominately residential properties zoned R2 and R3 (medium density residential).

2.4 Summary of Identified Asbestos Contamination

Friable asbestos is defined in the Safe Work Australia *Code of Practice How to Manage and Control Asbestos in the Workplace* (SWA 2018a) as being “...material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos”. Further to this, NEPC (2013) classifies friable asbestos as being asbestos forms that are fibrous in nature, such as insulation material and severely weathered ACM (FA), and asbestos fines, such as loose asbestos fibres, asbestos fibre bundles and ACM fragments that pass through a 7mm x 7mm sieve (AF).

Non-friable ACM is defined by SWA (2018a) as being “...material containing asbestos that is not friable asbestos. Including materials containing asbestos fibres reinforced with a bonding compound”. NEPC (2013) classifies non-friable ACM as ACM that is in sound condition, cannot pass through a 7mm x 7mm sieve and does not meet the definition of friable asbestos.

As part of the remediation program marker and capping layers were installed above an asbestos containment cell constructed in the centre of the site, as pictured in **Photo 1** below. The vast majority of ACM and asbestos impacted fill present on the site has been relocated into, and capped within, the containment cell. Detail of the capping layers are shown on the site survey (**Figure 3**), which comprised (in descending order):

- 3.0 m of natural soil; and
- An orange, mesh geotextile marker layer.



Photo 1: Orange, Mesh Geotextile Marker Layer Present Overlaying Asbestos Containment Cell

However, some areas of asbestos impacts on the site were unable to be relocated into the containment cell and currently remain in-situ on completion of the remediation works. These areas are:

- Land at the southern boundary of the site, currently occupied by established stand of mature trees, where asbestos (non-friable, and possibly friable) impacted soil remains in-situ beneath the surface vegetation. Land adjacent to, and north of, this tree stand was the location of a former stockpile containing ACM impacted material. Small amounts of ACM may still remain in this area. Asbestos, if present is anticipated to be in a bonded form; and
- Sections of below ground pipe-work present in the mid-section of the site and typically running in a north-south direction. In their current undisturbed condition the pipes are considered to be non-friable ACM. The pipe is typically encountered at a depth of 1 to 1.5 m bgs and is approximately 200 mm in diameter and a light grey colour.

All areas where asbestos impacts are known to remain on site following completion of the remediation program are shown on **Figure 3**.

Mechanical disturbance of ACM fragments and disturbance of soils may result in the release of fibres and therefore, such activities should be managed to prevent any fibres becoming airborne. The health effects of asbestos are detailed in enHealth (2005) *Management of Asbestos in the Non-Occupational Environment*.

The primary issue associated with remaining asbestos hazards at the site is managing the risk of inhalation of respirable fibres if the residual asbestos impacted materials were to be disturbed.

A secondary issue with the presence of asbestos hazards remaining at the site is disposal of excess spoil that may be impacted with asbestos in the event that excavation of any materials is required.

2.5 Other Aesthetic Indicators

The site historically operated as an oils and lubricants manufacturing facility. All soils with levels of petroleum hydrocarbons, chlorinated hydrocarbons and/or per- and poly-fluoroalkyl substances (PFAS) that posed a potential health or ecological risk have been previously remediated by excavation and off-site disposal, or otherwise treatment on-site. There is a potential that localised areas of soils may be present on-site that have low to moderate petroleum odours present. The impacts to these soils are aesthetic only – they have been confirmed by extensive site validation sampling to not pose a potential risk.

3. Application and Enforcement of LTEMP and Responsibilities

3.1 Application of LTEMP

This LTEMP will apply indefinitely for future site operations or until appropriate asbestos remediation/removal works are completed and validated to show that there is no residual asbestos hazard remaining at the site.

The requirements of this LTEMP are intended to apply to any routine activities within the site by current and future site workers, visitors or engaged contractors which could involve disturbance or exposure of asbestos impacted soils.

It is not intended that the LTEMP apply to major excavations, earthworks or construction activities. A task specific management plan should be prepared if major works are proposed for any area of the site.

In the event that additional remediation of asbestos impacted fill materials is proposed at any stage, this shall be undertaken in accordance with the requirements of State Environmental Planning Policy No. 55 (SEPP 55), or other relevant planning instruments enforceable at the time, including preparation of a suitable Remedial Action Plan by a Certified Environmental Practitioner (CEnvP) and notification to the local government authority of the proposed remediation works.

3.2 Site Owner

It is the responsibility of the Site Owner to ensure that:

- A copy of this LTEMP must be provided to all persons acquiring ownership of all or part of the site (Site Owners).
- A site owner must provide a copy of this LTEMP to any successor in Title.
- A site owner must ensure that a copy of this LTEMP is provided to all persons with management or control of a workplace at the site.
- A person/s with management or control of the workplace is made responsible for the implementation and maintenance of the provisions of this LTEMP.
- A person in a senior management position in the organisation is appointed as Site Environmental Manager and given the responsibility for ensuring the maintenance of the provisions of this LTEMP. The Site Environmental Manager may appoint appropriate personnel to implement the LTEMP day to day but will remain the responsible manager to whom the appointed personnel must report.
- Site personnel or contractors that must conduct intrusive works at the site are inducted into the LTEMP and are aware of their responsibilities with regard to health and safety and protection of the environment.
- A copy of this LTEMP is supplied to anyone conducting intrusive works on the site.
- The health and safety and environmental requirements specific to the contamination issues on the site, as outlined in this LTEMP, are complied with.
- Environmental incidents are reported in a timely manner to the appropriate statutory authorities, as necessary in accordance with legislation.

3.3 Persons with Management or Control of the Workplace

The person/s with management or control of the workplace shall be responsible for the implementation and maintenance of the provisions of this LTEMP.

Specifically, the persons/s with management or control of the workplace shall be responsible for:

- Ensuring the site asbestos register (**Section 4.1.1**) is managed and updated appropriately;
- Organising appropriate works in the event that unexpected asbestos finds are encountered at any time;
- Inducting relevant personnel, contractors and visitors into the requirements of this LTEMP. Detailed records of personnel inducted into the conditions of this LTEMP shall be kept (**Appendix A**);
- Ensuring any personnel or engaged contractors undertaking intrusive works of any kind are aware of their responsibilities in relation to the identified and potential non-friable asbestos impacted materials;
- Ensuring any disturbance to overlying concrete, vegetation or other surface covers are appropriately reinstated in accordance with the requirements of this LTEMP; and
- Documenting and updating the site asbestos register and site documentation records to reflect any works completed within the site area that may have altered the current and documented site conditions (**Appendix B**).

3.4 Summary of Provisions of this LTEMP

The provisions of this LTEMP are summarised as follows:

- Site personnel or contractors required to conduct intrusive works at the site must be inducted into the LTEMP and must be aware of their responsibilities with regard to health and safety and protection of the environment;
- A copy of this LTEMP is to be supplied to all persons conducting intrusive works on the site;
- Vegetation and other surface coverings shall be maintained at all times, inclusive of the southern boundary of the site in particular; and
- The health and safety and environmental requirements specific to the identified non-friable asbestos hazards within sub surface soils as outlined in this LTEMP must be complied with.

3.5 Legal Enforceability

The LTEMP is made legally enforceable through inclusion to the Site Audit Statement as required for the development consent for the site remediation.

4. Asbestos Management Strategy

4.1 General Site LTEMP Operational Requirements

For the purposes of this LTEMP, potentially asbestos impacted fill materials are deemed to exist in the areas of the site identified on **Figure 3**.

All other areas of the site are deemed to have been appropriately cleared during the previous remediation works with the subsequent validation reports (JBS&G 2023a and 2023b) produced confirming the satisfactory completion of these works (refer **Figure 3**).

For the sites ongoing operation, the following requirements must be implemented when works are proposed in any area containing asbestos impacted fill (as shown on **Figure 3**) and maintained to ensure any potential asbestos exposure hazard is minimised.

4.1.1 Asbestos Register

An asbestos register shall be prepared and maintained for the site in accordance with Clause 425 of the *Work Health and Safety Regulation* (WHS 2017).

The asbestos register shall identify the type, locations and condition of any occurrences of known asbestos at the site and shall be maintained for the site's future operation with any changes to site conditions updated within the register.

4.2 Minor Intrusive Earthworks in Areas of Asbestos Impact

Any minor intrusive earthworks that are proposed to be completed at the site in any area containing asbestos impacted fill (as shown on **Figure 3**) will require asbestos management procedures to be implemented given the potential for asbestos impacted soils to be encountered.

There are three different asbestos impacted areas which will require asbestos management procedures:

- Areas surrounding waterpipes constructed of asbestos cement;
- Asbestos impacted areas at southern site boundary; and
- Areas above the asbestos containment cell.

These works exclude the potential disturbance of the asbestos containment cell – which by its depth being 2.5 - 3 m below ground surface, is not described as a minor intrusive earthwork.

Each area of asbestos impact and associated controls are summarised in **Table 4.1** below.

Table 4.1: Asbestos Impacted Areas and Controls Summary

Area	Location	Summary of Controls
Area surrounding ACM waterpipe	Central North portion of site	Compliance with LTEMP, exclusion zone, appropriate PPE, asbestos air monitoring recommended and surface covering reinstatement required (Refer to Section 4.2.1)
Asbestos in fill impacted area	Mid-section of site running north-south	Compliance with LTEMP, exclusion zone, appropriate PPE, asbestos air monitoring, material management and surface covering reinstatement required (Refer to Section 4.2.2)
Above Containment Cell	Central portion of site	No controls / provisions required for minor excavations up to 2 m below ground surface (Refer to Section 4.2.3)

4.2.1 Excavation in Areas Surrounding Waterpipes Constructed of Asbestos Cement

The following management measures will apply when minor intrusive works are required in any area where waterpipes constructed of asbestos cement are present (as shown on **Figure 3**):

- Prior to any intrusive work commencing, approval for the works must be sought from the person/s with management or control of the workplace who is responsible for the enforcement of the LTEMP (**Section 3.3**) who will assess whether the works are necessary or if there is an alternative that will not result in potential disturbance of the below ground ACM and whether the works are required to be carried out by a specialist contractor. The person/s with management or control of the workplace must also review and approve the Job Safety Risk Assessment (JSRA) and Safe Work Method Statement (SWMS) for the works and ensure that site personnel and/or contractors who will undertake the works understand the requirements of the LTEMP.
- Site personnel or contractors required to conduct intrusive works at the site must be inducted into the LTEMP and must be aware of their responsibilities with regard to health and safety, including those noted in **Section 4.3** below.
- A copy of this LTEMP is to be supplied, or be available upon request, to all persons conducting intrusive works on the site.
- The works area must be isolated from casual entry using temporary barriers and only personnel inducted in the requirements of the site LTEMP will be permitted to enter the works area.
- Personnel entering the works area must wear appropriate PPE in accordance with **Section 4.3**.
- Decontamination procedures must be undertaken in accordance with **Section 4.3**.
- Air monitoring is recommended to be undertaken in accordance with **Section 4.3**.
- Suitable surface coverings should be reinstated to ensure that any uncovered ACM are not exposed to the ground surface.
- Any changes to current site conditions, or completed asbestos removal works completed in conjunction with the intrusive works shall be recorded and updates made to the site asbestos register, if required.

4.2.2 Excavation in Asbestos Impacted Area at Southern Site Boundary

The following management measures will apply when minor intrusive works are required in any area containing asbestos impacted fill at the southern site boundary (as shown on **Figure 3**):

- Prior to any intrusive work commencing, approval for the works must be sought from the person/s with management or control of the workplace who is responsible for the enforcement of the LTEMP (**Section 3.3**) who will assess whether the works are necessary or if there is an alternative that will not result in exposure of asbestos impacted soil and whether the works are required to be carried out by a specialist contractor. The person/s with management or control of the workplace must also review and approve the Job Safety Risk Assessment (JSRA) and Safe Work Method Statement (SWMS) for the works and ensure that site personnel and/or contractors who will undertake the works understand the requirements of the LTEMP.
- Site personnel or contractors required to conduct intrusive works at the site must be inducted into the LTEMP and must be aware of their responsibilities with regard to health and safety, including those noted in **Section 4.3** below.

- Site personnel or contractors required to conduct intrusive works at the site must be inducted into the LTEMP and must be aware of the potential for encountering malodorous soils below the surface on the site. Their responsibilities with regard to health and safety management of this issue are noted in **Section 4.3** below.
- A copy of this LTEMP is to be supplied, or be available upon request, to all persons conducting intrusive works on the site.
- The works area must be isolated from casual entry using temporary barriers and only personnel inducted in the requirements of the site LTEMP will be permitted to enter the works area.
- Sufficient space must be provided within the works area to allow stockpiling of spoil from excavations, if required, in accordance with **Section 4.5**.
- A water supply must be provided to the works area for the purpose of maintaining potential asbestos impacted soil in the excavations and stockpiles in a damp state.
- Personnel entering the works area must wear appropriate PPE in accordance with **Section 4.3**.
- Decontamination procedures must be undertaken in accordance with **Section 4.3**.
- Stockpiles of excavated spoil must be managed in accordance with **Section 4.5**.
- Air monitoring to be undertaken in accordance with **Section 4.3**.
- Once the works are complete, any excavated materials shall be reinstated, with any excess spoil disposed off site and managed in accordance with **Section 4.8**.
- Suitable surface covering, including affected sections of the containment cell capping layers, should be reinstated to ensure that potentially asbestos impacted soils are not exposed to the ground surface.
- Any changes to current site conditions, or completed asbestos removal works completed in conjunction with the intrusive works shall be recorded and updates made to the site asbestos register, if required.

The asbestos impacted area at the southern site boundary will require periodic inspection of the surface cover to ensure that adequate coverage is maintained in the area. Records of the inspections will be maintained (**Appendix C**).

4.2.3 Excavation above Containment Cell

The location of the asbestos containment cell is shown on **Figure 3**. A thickness of 2.5 - 3 m of non-impacted soils overlying a high visibility marker layer has been used to contain the soils. There are no controls / provisions required for minor excavations into these soils (i.e. to 2 m below ground surface). Potential major excavations here should consider **Section 4.4**.

4.3 Specific Requirements for Those Working in Areas of Asbestos Impact

Personnel who are required to complete any works where there may be the potential for exposure to asbestos impacted soils (as shown on **Figure 3**) shall undergo appropriate asbestos awareness training and be supervised by an appropriate asbestos trained professional (Class A or B asbestos removal licensed contractor or LAA).

Minor intrusive works are considered to be 'asbestos related works' in accordance with Clause 478 to 484 of WHS 2017 and are suitable to be completed without the engagement of a Class A or B asbestos removal contractor, or submission of notification to SafeWork NSW about the proposed work.

The works will be undertaken using the procedures described in the *SWA Code of Practice How To Safely Remove Asbestos* (SWA 2018b) and the following site-specific procedures:

- All site workers shall be inducted to the site and made aware of the procedures outlined in this LTEMP.
- Workers in the proposed works area will be made aware of the non-friable asbestos contamination during site inductions and tool box meetings and only authorised people shall enter the work area, which must contain a perimeter barrier to restrict entry.
- An asbestos work area shall be defined and clearly marked.
- Preference should be given to undertake any intrusive works during non-peak use times of the site, or – if possible – outside of operational hours, to minimise impacts to members of the community and public using the site facilities (service station).
- All personnel working within the asbestos work area shall wear P2 (or higher) class half face respirators, disposable gloves and coveralls made from materials which provide adequate protection against fibre penetration whilst completing works and whilst within the asbestos work area.
- A 10 m wide exclusion zone shall be established around the perimeter of the asbestos work area. The dimensions of the exclusion zone may be varied by the person/s with management or control of the workplace, if necessary (e.g. for restricted spaces available).
- Asbestos warning signs shall be placed surrounding the asbestos work area and at entry/egress points.
- A decontamination area shall be marked out within the asbestos work area for the removal and disposal of PPE before site workers leave the asbestos work area. Personal decontamination must be undertaken each time a site worker leaves the asbestos works area and at the completion of the works. All disposable PPE shall be disposed of as asbestos waste in accordance with NSW EPA 2014.
- Static air monitoring surrounding each asbestos work area and with consideration to neighbouring receptors shall be undertaken in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition* [NOHSC: 3003(2005)] for the duration of the work.
- If the containment cell is breached, the marker layer and capping need to be replaced and resurveyed. Documentation confirming this needs to be maintained.
- An inspection of the asbestos related works area shall be undertaken by the person in control of the workplace, or a representative of theirs (e.g. an LAA) to confirm that the work area is suitable to be re-occupied under normal conditions.
- Any changes to site conditions, records of materials removed from site and final surface inspections shall be detailed in the site asbestos register and register of site works as included as **Appendix B**.

4.4 Major Intrusive Works in Areas of Asbestos Impact

Major works or large scale intrusive works within any area containing asbestos impacted fill (as shown on **Figure 3**) will require specific management controls and a specific task management plan shall be required to be prepared and must make personnel aware of the potential for encountering malodorous soils below the surface on the site. This is inclusive of potential excavations into the asbestos containment cell below a depth of 2.5 - 3 m to the south of the central portion of the site.

This LTEMP is not considered suitable to serve as a management plan for major intrusive works.

4.5 Soil Management in Areas of Asbestos Impact

Any fill excavated during intrusive works within an area containing asbestos impacted fill (as shown on **Figure 3**) must be securely stockpiled. Stockpiles must be placed on a sealed surface or on plastic sheeting to prevent cross contamination of unsealed surfaces.

Stockpiles must be placed in a secure location onsite and covered if they are to remain for more than 24 hours.

Spoil generated from on-site excavations shall be re-instated where possible. Excess spoil must be disposed off site following appropriate waste classification in accordance with **Section 4.8**.

4.6 Dust Management in Areas of Asbestos Impact

During any intrusive works within an area containing asbestos impacted fill (as shown on **Figure 3**), excavations and stockpiles of spoil should be kept damp to prevent the generation of dust from these sources. Care should be taken to not over-wet excavations and/or stockpiles such that excess runoff is generated.

4.7 Vegetation Management at South of Site

There is a low potential of ACM being present near to the site surface in the area of the established vegetation at the southern boundary of the site. This area requires to be managed to main the existing established / mature vegetation and ground cover to mitigate the potential for soils being exposed here.

Where areas of exposed soils are observed at this area of the site during site maintenance / landscaping activities, then mulch material shall be placed overlying these areas.

4.8 Off-Site Disposal and Waste Management

If any material is to be excavated for off-site disposal it should be classified in accordance with EPA waste classification guidelines (NSW EPA 2014⁴) or guidelines that may be in force at that time. Waste must be managed in accordance with the provisions of the *Protection of the Environment Operations (Waste) Regulation 2014* or successor instruments.

This applies to material generated from all areas of the site.

4.9 Emergency Preparedness and Response

The following procedure will be followed in the event that asbestos impacted soils at the site are unintentionally exposed for any reason:

- Stop the activity or process that has exposed the impacted soil;
- Assess the hazards associated with the exposure of the impacted material and implement appropriate procedures to address the hazards;
- Repair the ground surface covering such that the impacted soils are once again isolated;
- Collect and secure any impacted soil that may remain exposed and stockpile securely so that it is protected from casual access;
- Review the activity or process that led to the exposure of the impacted soil and revise procedures or actions accordingly to prevent a reoccurrence;
- Complete an environmental incident/corrective action report in accordance with the current quality procedure;

⁴ Waste Classification Guidelines, Part 1: Classifying Waste, NSW Environment Protection Authority, November 2014 (EPA 2014)

- Engage a LAA to inspect the occurrence of the unintentional contaminated soil exposure and provide an inspection clearance report to confirm the area is suitable for re-occupation; and
- Review and revise the LTEMP to reflect any changes that have to be made to prevent a reoccurrence.

5. Health and Safety Management

It is the responsibility of persons with management or control of workplaces at the site to ensure that comprehensive health and safety programmes that comply with the requirements of the WHS Regulation and are appropriate for the activities undertaken at the site are implemented. Given the presence of asbestos at the site, additional protocols and procedures that address the specific hazards posed by the asbestos must be included in the overall health and safety plans implemented.

The only significant exposure pathway that can lead to health effects from asbestos fibres is inhalation of respirable fibres. Consequently, workers who may be exposed to dust that has the potential to contain asbestos fibres must wear appropriate respiratory protection. Furthermore, measures must be taken to ensure that dust or other material that may contain asbestos fibres is not carried out of the work area to areas where breathing protection would not ordinarily be considered a requirement.

With regard to the site, there is a risk that *in-situ* soils may release asbestos fibres if disturbed. Consequently, any intrusive works conducted within an area containing asbestos impacted fill (as shown on **Figure 3**) should be supervised by a suitably experienced person with training in the safe handling of asbestos and the requirements of working with asbestos. The supervising personnel shall prepare or review existing Job Safety Risk Assessments (JSRA) and Safe Work Method Statements (SWMS) relating to the potential for asbestos to be present and shall ensure that the minor intrusive works are carried out in accordance with the JSRAs and SWMS and requirements identified in **Sections 3 and 4** of this LTEMP.

6. Revision of the LTEMP

It may, from time to time, be necessary to revise this LTEMP to reflect changes to legislation, changes on site and/or improvements in technologies or knowledge. In the case where the site ground levels change over the asbestos management areas, particularly the containment cell area, the LTEMP will be required to be revised in order to reflect the changes in the site conditions.

Revision of the LTEMP should be undertaken by an appropriately qualified and experienced environmental consultant or Licensed Asbestos Assessor. Copies of the revised LTEMP should be distributed to the current site owners, person/s with management or control of the workplace and regular site workers for on-going implementation.

A register of updates with each revision of the LTEMP shall be completed as follows in **Table 6.1**.

Table 6.1: Register of LTEMP Revisions and Updates

Rev 0	11/8/23, Initial LTEMP Issues
Rev 1	
Rev 2	
Rev 3	
Rev 4	

7. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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

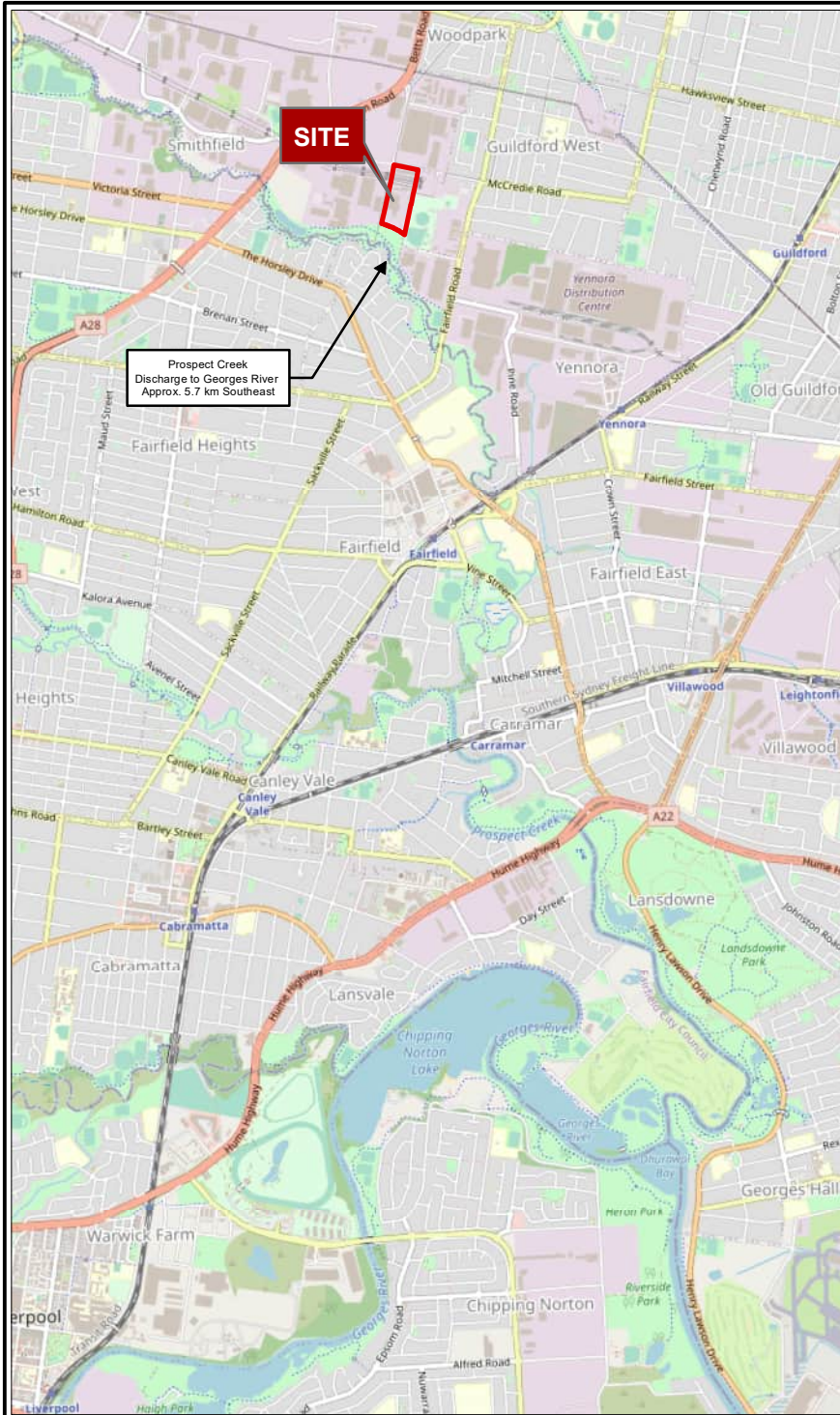
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the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

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

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

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

Figures



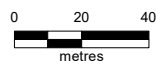
Legend Approximate Site Boundary NSW Cadastre (2022)	
Job No: 59279	
Client: BP Australia	
Version: R12 Rev B	Date 25/07/2023
Drawn By: RF	Checked By: JDC
Scale 1:10,000 	
Coord. Sys. GDA 1994 MGA Zone 56	
BP Castrol Facility 132 McCredie St Guildford, NSW SITE LOCATION	
FIGURE 1	



Legend:

Approximate Site Boundary

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R12 Rev B

Drawn By: RF

Date 25/07/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

PRE-REMEDIATION SITE SURVEY

FIGURE 2B

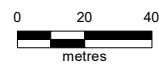




Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R12 Rev C

Date 25/07/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**POST-REMEDATION SITE
LAYOUT AND SURVEY**

FIGURE 2C

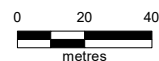




Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Residual Asbestos Areas

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R12 Rev B

Date 25/07/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**RESIDUAL ASBESTOS AREAS
AND MARKER LAYER
RELATIVE LEVELS**

FIGURE 3



Appendix A LTEMP Record of Induction Form

LTEMP Record of Induction Form

Date	Name	Signature

Date	Name	Signature

Appendix B Asbestos Related Work Records

Asbestos Related Works Record

DATE	COMPANY NAME	CONTACT NUMBER	LOCATION OF WORKS	WORKS COMPLETED	ASBESTOS RELATED WORKS COMPLETED BY	CLEARANCE INSPECTION AND CERTIFICATE ISSUED?	ISSUER OF CLEARANCE CERTIFICATE	SITE LTEMP MANAGER SIGNATURE

DATE	COMPANY NAME	CONTACT NUMBER	LOCATION OF WORKS	WORKS COMPLETED	ASBESTOS RELATED WORKS COMPLETED BY	CLEARANCE INSPECTION AND CERTIFICATE ISSUED?	ISSUER OF CLEARANCE CERTIFICATE	SITE LTEMP MANAGER SIGNATURE

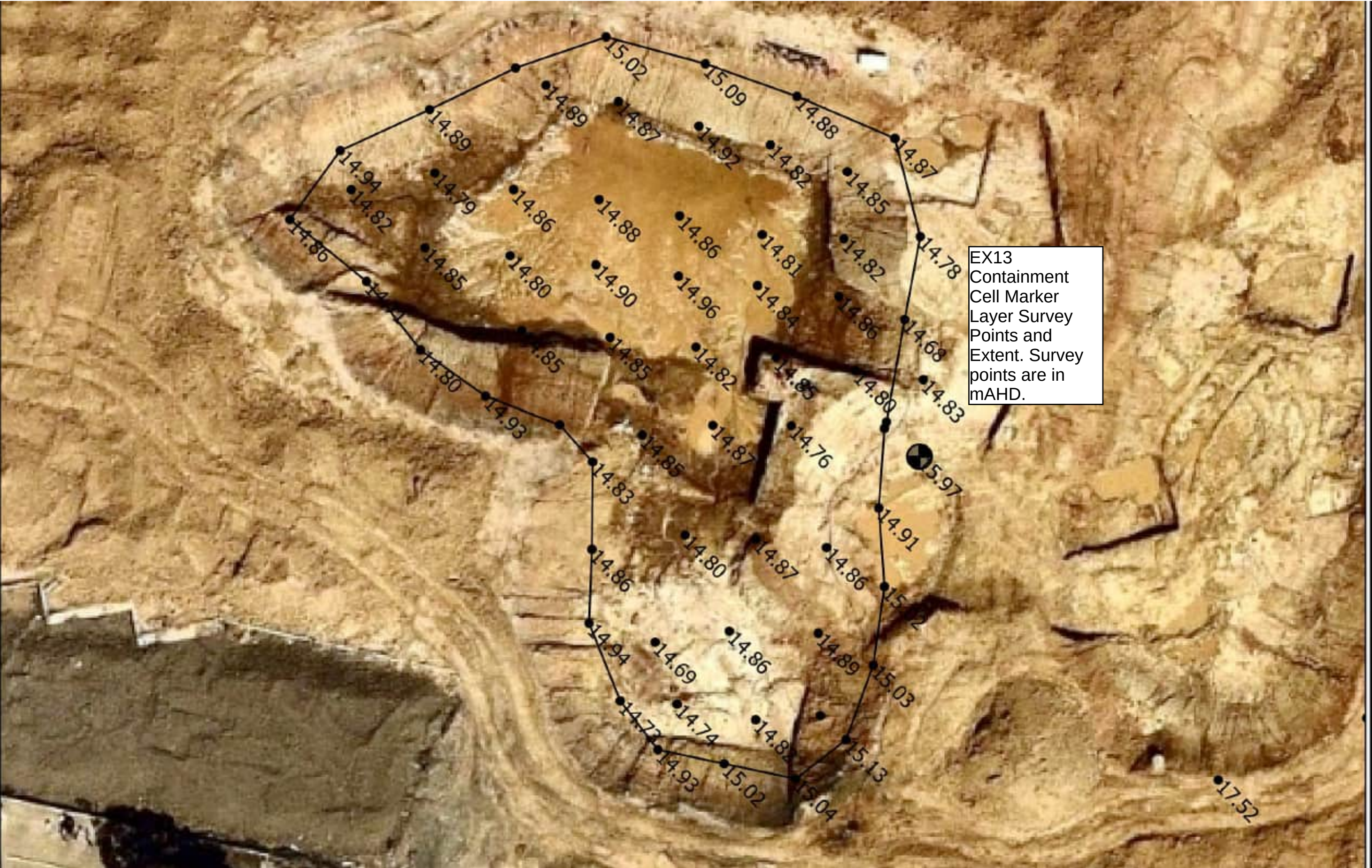
Appendix C South Site Boundary Inspection Records

South Site Boundary Inspection Record

DATE	SURFACE COVERING CONDITION	CORRECTIVE ACTIONS TAKEN	INSPECTION COMPLETED BY	CLEARANCE INSPECTION AND CERTIFICATE ISSUED?	ISSUER OF CLEARANCE CERTIFICATE	SITE LTEMP MANAGER SIGNATURE

DATE	SURFACE COVERING CONDITION	CORRECTIVE ACTIONS TAKEN	INSPECTION COMPLETED BY	CLEARANCE INSPECTION AND CERTIFICATE ISSUED?	ISSUER OF CLEARANCE CERTIFICATE	SITE LTEMP MANAGER SIGNATURE

Appendix D Excavation 13 Marker Layer Survey Plan



Description		Line Style	Description		Line Style	Description		Line Style	Scale		Drawn		Title		Dwg. No.	
U/G Power			Fence			EA Pillar			HORZ 1:1000		GW		SMITHFIELD - 132 MCCREDIE AVE		1	
U/G Comms			Stop Valve			Lightpole					GW		SURVEY PICK UP AREA 15/03/22		Job No.	
Water Main			Hydrant			Comms Pit					GW				Issue Date	
Sewer Main			I/O Sewer			Comms Pillar					GW				29/08/23	
Fuel Line			Air/Scour Valve			Redundant Service					Project					
Over Head Power			Manhole			Survey Point (m AHd)										
Drainage Line			Traffic Signal													

Onsite Surveying Pty Ltd
Tel: 0414 913 944
Office: 02 9372 1580
Email: glen@onsitesurveying.com.au

ABN 33149242419

MGA 2020



Description	Line Style	Description	Line Style	Description	Line Style
U/G Power		Fence		EA Pillar	
U/G Comms		Stop Valve		Lightpole	
Water Main		Hydrant		Comms Pit	
Sewer Main		I/O Sewer		Comms Pillar	
Fuel Line		Air/Scour Valve		Redundant Service	
Over Head Power		Manhole			
Drainage Line		Traffic Signal			

Scale	HORZ 1:1000
Drawn	GW
Designed	GW
Modelled	GW
Project	

Drawn	GW
Designed	GW
Modelled	GW
Project	

Onsite Surveying Pty Ltd
Tel: 0414 913 944
Office: 02 9372 1580
Email: glen@onsitesurveying.com.au

ABN 33149242419

Title 132 McCredie Ave Smithfield Final Spot Levels MGA2020/AHD	Dwg. No.
	1
	Job No.
	SMITH
	Issue Date
	06/09/23

© JBS&G

This document is and shall remain the property of JBS&G. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Document Distribution

Rev No.	Copies	Recipient	Date
0	1 x Electronic	David Peplinkhouse	6 September 2023

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Sumi Dorairaj	Michael Samuel	DRAFT for stakeholder review	DRAFT for stakeholder review	8 May 2023
B	Matt Parkinson	Matt Parkinson	Draft for Site Auditor / Client review	Draft for Site Auditor / Client review	25 July 2023
0	Marika Darley	Matt Parkinson	Matt Parkinson		6 September 2023





Site Audit Report

Former Castrol Lubricant Facility, 132 McCredie Road, Guildford
MP165_B

17 October 2023



Document Information

Site Audit Report, Former Castrol Lubricant Facility, 132 McCredie Road, Guildford

Prepared by:

Senversa Pty Ltd

ABN: 89 132 231 380

Level 24, 1 Market St, Sydney, NSW 2000

tel: + 61 3 9606 0070

www.senversa.com.au

Prepared for:

BP Australia Pty Ltd

Level 17, 717 Bourke Street - Docklands

Melbourne VIC 3008

Disclaimer and Limitations:

This document is confidential and has been prepared by Senversa for use only by its client and for the specific purpose described in our proposal which is subject to limitations. No party other than Senversa's client may rely on this document without the prior written consent of Senversa, and no responsibility is accepted for any damages suffered by any third party arising from decisions or actions based on this document. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and the use of professional judgement for the purposes of Senversa's work means that matters may have existed that would have been assessed differently on behalf of third parties.

Senversa prepared this document in a manner consistent with the level of care and skill ordinarily exercised by members of Senversa's profession practising in the same locality under similar circumstances at the time the services were performed.

Permission should be sought before any reference (written or otherwise) is made public that identifies any people, person, address or location named within or involved in the preparation of this report. Senversa requires that this document be considered only in its entirety and reserves the right to amend this report if further information becomes available. This document is issued subject to the technical principles, limitations and assumptions provided herein in **Section 18.0**

©2023 Senversa Pty Ltd

Senversa acknowledges the traditional custodians of the land on which this work was created and pay our respect to Elders past and present.



Contents

List of Acronyms	vii
1.0 Introduction and Objectives	1
1.1 Scope of the Audit.....	1
1.2 Previous Audit.....	2
1.3 Interim Audit Advice letters.....	3
2.0 Site Details.....	4
2.1 Location.....	4
2.2 Zoning.....	4
2.3 Adjacent Uses.....	4
2.4 Site Condition.....	5
2.5 Proposed Development.....	6
3.0 Site History	7
4.0 Contaminants of Concern.....	8
5.0 Stratigraphy and Hydrogeology	9
6.0 Evaluation of Quality Assurance and Quality Control	10
7.0 Environmental Quality Criteria.....	11
8.0 Evaluation of Soil Analytical Results	14
9.0 Evaluation of Soil Vapour	15
10.0 Evaluation of Groundwater Analytical Results	16
11.1 Objective of HHERA.....	17
11.2 Issue Identification and Data Assessment	17
11.2.1 Soil	17
11.2.2 Groundwater.....	18
11.2.3 Vapour.....	19
11.2.4 Sediment	20
11.2.5 Surface Water	20
11.3 Exposure Assessment	20
11.4 Toxicological Information.....	21
11.5 Acceptable Levels of Risk.....	21
11.6 Modelling and Risk Estimation.....	21



11.7	Ecological Risk Assessment for PFAS.....	22
11.7.1	On-site Terrestrial Risk.....	23
11.7.2	Off-site Aquatic Assessment for Prospect Creek.....	23
11.8	Risk Based Screening Levels (RBSL).....	24
11.8.1	RBSL for Soil Vapour.....	24
11.8.2	RBSL for Groundwater.....	24
11.8.3	TRH for Inhalation Pathway.....	25
11.8.4	Ecological Assessment On-site.....	25
11.9	Overall Assessment.....	26
11.10	Auditor's Opinion.....	26
12.0	Evaluation of Pre-Remediation Data Gap Investigation – Various Media.....	27
12.1	Soil Sampling – Non-operational Areas, Administration Building, Sub-Pavement and Southern Area Stockpile.....	27
12.1.1	Southern Stockpile.....	29
12.1.2	Soil Vapour Sampling- Administration Building.....	29
12.2	Surface Water Sampling – PFAS.....	30
12.2.1	Prospect Creek.....	30
12.2.2	On-site Assessment.....	31
12.3	Sediment Sampling – PFAS, TRH and Asbestos Fibres.....	32
12.4	Groundwater Sampling.....	32
12.5	Pavement Sampling – PFAS and other Analytes.....	32
12.6	Soil Sampling – Baseline of Bioremediation Area.....	34
12.7	Auditors' Opinion.....	34
13.0	Evaluation of Remediation.....	35
13.1	Remediation Activities Undertaken.....	35
13.2	Deviations from the RAP/RWP – Remediation Works Undertaken.....	37
13.3	Site Infrastructure Removal.....	38
13.4	Review of Remediation Activities.....	40
14.0	Validation Activities.....	48
14.1	Validation Activities Undertaken.....	48
14.2	Validation Environmental Quality Criteria.....	49
14.3	Quality Assurance and Quality Control.....	50
14.4	Petroleum and Chlorinated Hydrocarbon Remediation Excavation - Validation.....	51
14.4.1	Excavation – Soil Validation Results.....	51
14.4.2	Excavation, Settlement Basin and Post Backfilling - Soil Vapour Validation Results.....	53



14.4.3	Excavation – Water Validation Results.....	54
14.5	PFAS Excavation – Soil Validation.....	55
14.6	Bioremediated Soil and Gravel Validation for Re-Use.....	58
14.6.1	Bioremediated Soil Validation	58
14.6.2	Bioremediated Gravel Validation.....	60
14.6.3	Gravel Leachability.....	61
14.7	PFAS Treated Soil – Soil Validation for Re-Use.....	62
14.8	Soil Validation Beneath the Bioremediation and PFAS Treatment Area.....	63
14.9	Validation Beneath the Southern Stockpile.....	64
14.10	Validation Following Asbestos Gravel and Concrete	65
14.11	Validation Beneath Roadways, Settlement Pond, WTP and Remaining Buildings	65
14.12	Validation Beneath Drains.....	67
14.13	Removal of Pavement.....	69
14.14	Asbestos Containment.....	69
14.15	Groundwater – Monitoring.....	70
14.16	Imported Material.....	72
15.0	Ongoing Site Management	73
16.0	Compliance with Regulatory Guidelines and Directions	76
16.1	Development Approvals.....	76
16.2	Waste Disposal	78
16.3	Water Treatment.....	80
16.4	Licenses.....	81
18.0	Other Relevant Information	83



Tables in Text

Table 4.1: Contaminants of Concern	8
Table 6.1: Summary of Investigations.....	10
Table 7.1 : Environmental Quality Criteria	11
Table 12.1: Non-operational Area Sampling in mg/kg.....	27
Table 12.2 Asbestos quantification at the Southern Stockpile	29
Table 12.3 Soil Vapour Samples from Administration Building in mg/m ³	29
Table 12.4 Kleinfelder surface water results in µg/L.....	31
Table 12.5 JBS&G surface water results in µg/L.....	31
Table 12.6 Summary of Concrete PFAS Analysis in mg/kg and mg/L	33
Table 13.1: Remediation Activities Undertaken	36
Table 13.2: Deviations from the RAP and RWP	37
Table 13.3: UST Removal	38
Table 13.4 Review of Remediation and Validation Activities	41
Table 14.1: Deviations from the RAP and RWP – Validation Works.....	48
Table 14.2: Validation Activities Undertaken	48
Table 14.3: Soil Vapour Validation Criteria for TRH in mg/m ³	49
Table 14.4: Soil Validation Criteria for TRH in mg/kg.....	49
Table 14.5: Validation Sampling for EX1-EX7, EX9/EX9A - EX13 in mg/kg.....	51
Table 14.6: Adjusted TRH criteria and TRH results mg/kg.....	52
Table 14.7: Soil Vapour Validation Summary in mg/m ³	53
Table 14.8: Validation Sampling EX8 in mg/kg.....	55
Table 14.9: Validation Sampling EX8A in mg/kg and mg/L.....	55
Table 14.10: Additional Validation Sampling EX8A – PFOS Leach (mg/L)	56
Table 14.11: Validation Results for Bioremediated Soil in mg/kg	58
Table 14.12: Adjusted TRH F2 Criteria for Bioremediated Soil in mg/kg.....	59
Table 14.13 Validation Results for Bioremediated Gravels in mg/kg.....	60
Table 14.14 Adjusted TRH Criteria for Bioremediated Gravels in mg/kg.....	61
Table 14.15 Gravel Leachability Validation in mg/L.....	61
Table 14.16 PFAS Concentrations in Soil for Re-use in mg/kg.....	62
Table 14.17 Validation Beneath the Bioremediation Area in mg/kg.....	63
Table 14.18 Validation beneath the PFAS Stabilisation Area	64
Table 14.19 Asbestos Quantification Beneath the Southern Stockpile	64



Table 14.20 Asbestos Quantification Following Removal of Asbestos Gravels, Concrete and Hot Spots.....	65
Table 14.21 Validation Results Beneath the Roadway, Settlement Pond, WTP and Remaining Buildings in mg/kg (excluding PFAS).....	66
Table 14.22 Summary of PFAS Validation Results for Roadways, Settlement Pond, WTP and Remaining Buildings...	66
Table 14.23 Summary of Validation Results (excluding PFAS) from Drainage Lines and Pits (EX16 to EX18) in mg/kg	67
Table 14.24 Summary of PFAS Validation in Drainage Lines and Pits (EX16 to EX18).....	68
Table 14.2525: Groundwater Results in µg/L.....	70
Table 14.2626: Imported Material.....	72
Table 15.1: Assessment of the LTEMP.....	73
Table 16.1: Development Conditions	76
Table 16.2: Exported Material	79

Appendices

Appendix A: Figures/Attachments

Appendix B: Interim Audit Advice

Appendix C: EPA Guidelines



List of Acronyms

Acronym	Definition
Measures	
%	per cent
µg/L	Micrograms per Litre
µg/m ³	Micrograms per Cubic Metre
ha	Hectare
km	Kilometres
m	Metre
m ²	Square metre
mAHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
mg/m ³	Milligrams per Cubic Metre
mm	Millimetre
General	
6:2FtS	6:2 fluorotelomer sulfonate or 6:2 Fluorotelomer sulfonic acid
4:2FtS	4:2 Fluorotelomer sulfonic acid
8:2FtS	8:2 Fluorotelomer sulfonic acid
10:2 FtS	10:2 Fluorotelomer sulfonic acid
ABC	Added Background Concentrations

Acronym	Definition
ACL	Added Contaminant Limit
ACM	Asbestos Containing Material
ADWG	Australian Drinking Water Guidelines
AEC	Area of Environmental Concern
AF	Asbestos Fines
AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ASLP	Australian Standard Leaching Procedure
AST	Aboveground Storage Tank
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
BaP	Benzo(a)pyrene
BGL	Below Ground Level
BGS	Below Ground Surface
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene
CH ₄	Methane
CLM Act	NSW Contaminated Land Management Act 1997
CO ₂	Carbon Dioxide
COC	Chain of Custody



Acronym	Definition
COPCs	Contaminants of Potential Concern
Council	Cumberland Council
CT	Certificate of Title
DA	Development Application
1-1- DCA	1,1- dichloroethane (DCA.)
cis and trans-1,2 DCE	cis- and trans-1,2 dichloroethene
DGV	Default Guideline Value
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EDC	1,2-Dichloroethane
EIL	Ecological Investigation Level
EMP	Environmental Management Plan
Envirolab	Envirolab Services Pty Ltd
EPA	Environment Protection Authority (NSW)
EPL	Environment Protection Licence
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
FA	Fibrous Asbestos
GIL	Groundwater Investigation Level
GV/GL	Guideline Value / Guideline Level
GME	Groundwater Monitoring Event

Acronym	Definition
HIL	Health Investigation Level
HSL	Health Screening Level
IAA	Interim Audit Advice
IBCs	Intermediate Bulk Containers
LCS	Laboratory Control Sample
LEP	Local Environment Plan
LNAPL	Light Non-Aqueous Phase Liquid
LPG	Liquified Petroleum Gas
MAH	Monocyclic Aromatic Hydrocarbons
Mercury	Inorganic mercury unless noted otherwise
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
ML	Management Limits
MS	Matrix Spike
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting
n	Number of Samples
O₂	Oxygen



Acronym	Definition
OCPs	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
pH	A measure of acidity, hydrogen ion activity
PID	Photoionization Detector
PQL	Practical Quantitation Limit
PFAS	Per- and poly-fluoroalkyl substances
PSI	Preliminary site investigation
PFHxS	Perfluorohexane sulfonate (also known as Perfluorooctane sulfonic acid)
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate (also known as Perfluorohexane sulfonic acid)
QA/QC	Quality Assurance/Quality Control
RAP	Remediation Action Plan
RPD	Relative Percent Difference
RSL	Regional Screening Level
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement

Acronym	Definition
LTEMP	Long Term Environmental Plan
RWP	Remedial Works Plan
SVOCs	Semi Volatile Organic Compounds
SWL	Standing Water Level
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TPHs	Total Petroleum Hydrocarbons
TRHs	Total Recoverable Hydrocarbons
TV	Trigger Value
UCL	Upper Confidence Limit
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VC	Vinyl Chloride
VCH	Volatile Chlorinated Hydrocarbons
VENM	virgin excavated natural material
VOCs	Volatile Organic Compounds
VSAQP	Validation Sample analysis and Quality Plan
-	On tables is "not calculated", "no criteria" or "not applicable"
Rev	Revision
WHS	Work Health and Safety
HHERA	Human Health Environmental Ecological Risk Assessment



1.0 Introduction and Objectives

A site contamination audit has been conducted in relation to the site at 132 McCredie Road, Guildford, NSW 2161 (the site) (**Attachment 1, Appendix A**).

The audit was conducted to provide an independent review by an EPA Accredited Auditor of whether the land is suitable for commercial/industrial uses without basements i.e., a “Site Audit” as defined in Section 4.0 (1) (b) (iii) of the NSW Contaminated Land Management Act 1997 (the CLM Act).

Development consent (DA A2022/0085, issued on 14 April 2022) was granted by Cumberland City Council. The audit was initiated to comply with a number of conditions of the DA approval and is therefore a statutory audit. Notification of the site audit (MP 165) was forwarded to the EPA (EPA Ref: DOC23/637988). The main condition relating to the audit was as follows:

Condition 17. A Site Audit Statement (SAS) must be obtained from a NSW EPA Accredited Site Auditor.

The SAS must confirm that the site has been remediated in accordance with the approved Remedial Action Plan and clearly state that the site is suitable for the proposed use.

The DA was subject to numerous other conditions relating to contamination which are listed and considered further by the auditor in **Section 16.0**.

1.1 Scope of the Audit

Details of the Audit are:

Requested by: David Pepplinkhouse on behalf of BP Australia Pty Ltd

Request/Commencement Date: 12 December 2020

Auditor: Melissa Porter

Accreditation No.: 0803

The scope of the Audit included:

- Review of the following reports:
 - ‘Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW’ dated 28 February 2023 by JBS&G (Stage 1 Validation).
 - ‘Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW’ dated 10 May 2023 by JBS&G (Stage 2 Validation).
 - ‘Human Health and Ecological Risk Assessment’ dated 9 December 2021 by enRisks (the HHERA).
 - ‘Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal’ dated 16 December 2021 by JBS&G (the RWP and VSAQP).
 - ‘Pre-Remediation Investigation Castrol Guildford Terminal’ dated 16 December 2021 by JBS&G (the investigation report).
 - ‘Pre-remediation Environmental Assessment, BP Guildford Terminal – Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716’, 27 August 2021, Kleinfelder Australia Pty Ltd (KLF Pre remediation Report).
- Site visits by the auditor on 21 March 2022, 23 May 2022, 18 August 2022, and 8 February 2023 and 24 July 2023.
- Discussions with BP and JBS&G who undertook the investigation.



1.2 Previous Audit

Site Audit Statement (SAS) MP165 and Site Audit Report (SAR) for the site was issued in 2021 by Melissa Porter on behalf of Senversa. The audit was commissioned to review the appropriateness of the remediation action plan (RAP) referred to as 'Section B Audit'. The Section B Audit included the review of the following reports:

- *'Environmental Site Assessment BP Guildford Terminal 132 McCredie Road, Guildford, NSW 2001'* dated August 2001 by BP Australia Limited (limited ESA).
- *'Environmental Site Assessment BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716'* dated 5 February 2021 by Kleinfelder (the ESA).
- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716'* dated 19 February 2021 by Kleinfelder (the RAP).

The following two groundwater monitoring events were completed by BP prior to the auditor's engagement:

- Groundwater monitoring event BP 2008.
- Limited GME letter Report for Castrol Guildford BP 2016.

The report/results were not provided to the auditor however they were summarised by Kleinfelder in the ESA.

Two Interim Audit Advice (IAA) letters were included in MP165:

- *'Interim Audit Advice No.1: Review of Environmental Site Assessment Castrol Lubricant Facility, 132 McCredie Road, Guildford, NSW'* dated 29 January 2021.
- *'Interim Audit Advice No.2: Review of remediation Action Plan Castrol Lubricant Facility, 132 McCredie Road, Guildford, NSW'* dated 11 February 2021.

The SAR (Senversa 2021) concluded:

'the remediation approach outlined by Kleinfelder is appropriate and should be able to ensure that the site is suitable for the proposed land uses through the removal of the of contaminated soil material. Successful validation will be required to confirm this. Confirmation that the site can be made suitable will also rely on confirmation that all data gaps have been addressed and that the results obtained are consistent with the assumptions made in the RAP.'

Following demolition works, additional investigation works are required to be completed and will inform the remedial and validation works to be detailed in the RWP, CEMP and a VSAQP. Auditor review and approval is required for these documents prior to implementation.

Kleinfelder considers that "should Site remediation works be completed in accordance with the guidance provided in this RAP, the Site can be made suitable for an ongoing commercial/industrial land use." Based on the information presented in the reports prepared by Kleinfelder and observations made on-site, and following the Decision-Making Process for Assessing Urban Redevelopment Sites in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme, the Auditor concludes that the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716'* by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'



1.3 Interim Audit Advice letters

Several interim Audit Advice (IAA) letters have been issued over the course of the audit. Letters IAA No. 1 and IAA No. 2 were included in the SAR (Senversa 2021). IAA No. 4¹ to IAA No. 19 are included in **Appendix B**, and outline the review undertaken during the ongoing audit of the remediation works. The relevant IAA's, are listed as follows:

- *'Interim Audit Advice No. 4: Review of Human Health and Environmental Risk Assessment, 132 McCredie Road, Guildford NSW' dated 18 November 2021.*
- *'Interim Audit Advice No. 5 Rev 1: Review of RWP and VSAQP and Pre Remediation Investigation Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 24 November 2021.*
- *'Interim Audit Advice No. 6: Review of HHERA Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 7 December 2021.*
- *'Interim Audit Advice No. 7: Review of HHERA, RWP and VSAQP and Pre-Remediation Investigation Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 16 December 2021.*
- *'Interim Audit Advice No. 8: Asbestos Unexpected Find Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 7 June 2022.*
- *'Interim Audit Advice No. 9: Review of Site Wide Pavement Assessment, Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 9 June 2022.*
- *'Interim Audit Advice No. 10: Review of Waste Classification of PFAS Affected Concrete / Pavement, Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 9 June 2022.*
- *'Interim Audit Advice No. 11: Review of Derivation of Site-Specific TRH Criteria Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 9 June 2022.*
- *'Interim Audit Advice No. 12: Review of PFAS Impacted Soil Treatment Trial Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 9 June 2022.*
- *'Interim Audit Advice No. 13: Characterisation of PFAS concentrations in concrete Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 26 August 2022.*
- *'Interim Audit Advice No. 14: Proposed Retention of Pavement Adjoining Site Boundary Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 13 October 2022.*
- *'Interim Audit Advice No. 15: Characterisation of PFAS concentrations in concrete Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 13 October 2022.*
- *'Interim Audit Advice No. 16: Stage 1 and Stage 2 Validation Assessments Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 30 June 2023.*
- *'Interim Audit Advice No. 17: Review of the Long-Term Environmental Management Plan Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 6 July.*
- *'Interim Audit Advice No. 18: Stage 1 and Stage 2 Validation Assessments Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 4 August.*
- *'Interim Audit Advice No. 19: Review of the Long-Term Environmental Management Plan Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW' dated 4 August.*

¹ IAA No3 was not issued.



2.0 Site Details

2.1 Location

The site locality is shown on **Attachment 1, Appendix A**.

The site details are as follows:

Street address: 132 McCredie Road Guildford, NSW 2716

Identifier: Lot 1 DP 596315

Local Government: Cumberland Council

Site Area: Approximately 71,619 m²

The boundaries of the site are well defined by adjoining properties and streets to the north, east and west. The southern boundary of the site is marked by a fence.

2.2 Zoning

The current zoning of the site is IN1 General Industrial under Cumberland Council Holroyd Local Environment Plan 2013.

2.3 Adjacent Uses

The site is located within an area of open space/ commercial/industrial. The surrounding site use includes:

- North: McCredie Road runs along the northern boundary of the Site, directly beyond which are recently developed warehouses.
- East: The Guildford Transmission Station (zoned IN2) is located on the northern portion of the eastern boundary, with commercial/industrial properties beyond. On the southern portion of the eastern boundary is the Guildford West Sportsground (110m), a baseball field (85m) and the Guildford Tennis Centre (120m) zoned RE1.
- South: Open space area with a bicycle track (approximately 100m from site), zoned public recreation (RE1). Prospect Creek is located approximately 120 m to the south.
- West: On the western boundary is Bakers Extra (zoned IN1). The Visy packaging and recycling centre (former TetraPak Site) is located 360m to the west.

The TetraPak site was declared 'Significantly Contaminated Land' on 29 June 2012, due to the presence of chlorinated hydrocarbons. A notice to end significantly contaminated land declaration was issued 16 December 2015 that stated that "*The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.*"

Prospect Creek is part of the Georges River Catchment. The catchment area of the creek is largely urbanised with industrial land uses, residential and open space for recreation.



2.4 Site Condition

The site is rectangular in shape and was previously a Castrol Lubrication storage and distribution facility. Kleinfelder noted the site was comprised of three main zones as shown on **Attachment 2, Appendix A:**

- The Castrol administration and office complex in the northern portion of the Site.
- The former terminal operations area which operated as an oil distribution centre in the central portion.
- A cleared area of approximately 10,000m² in the southern portion of the Site.

The administration and office complex included an administration building fronting McCredie Road and maintained gardens and grassed areas as well as staff carparks and associated road access. The grassed area directly to the south of the office building also formed an easement for high voltage powerlines from the adjacent substation to the east. The administration building included a former laboratory. A concrete underground storage tank (UST) used to store laboratory waste was located beneath the access road to the south of the administration building.

The former terminal operations / oil distribution centre was the largest part of the site. The area included the production oil plant, the Filling Hall Warehouse, former laboratory, raw material tank farm, finished oil tank farm and base oil tank farm, drum store areas, hazardous chemical stores and the laboratory. A settlement pond and triple interceptor trap were also located in the south-eastern portion of this zone. An access road looped around the operational area of the site and connected to the gate house and amenities building on the northeastern side.

The open area on the southern portion of the site was grassed however Kleinfelder indicated the area had been used for historical filling. This area is referred to as the Southern Stockpile in the remediation and validation sections of this report (**Sections 12.0, 13.0 and 14.0**)

The following was noted by the auditor during the site visit on 11 February 2021 as part of the Section B audit:

- An additional above ground storage tank (AST) was identified to have possibly been located adjacent to the administration building.
- Three decommissioned ASTs from other BP sites have been temporarily stored in the grassed area to the south of the site. Historically other decommissioned ASTs are likely to have been stored in this open area.
- The grassed area to the south of the site is approximately 1.5 m higher than the rest of the site indicating that fill has been placed in this area (referred to as the Southern Stockpile).
- Additional concrete USTs (use unknown) were identified to be located to the north of the Production Oil Building.
- Site personnel indicated a fire had historically occurred in the administration building (unknown date). The method of fire containment is not known.

The auditor visited the site at various points (21 March 2022, 23 May 2022, 18 August 2022, and 8 February 2023). The following was noted by the auditor during the final site visit on 31 July 2023:

- Excavations were complete and the site had been reinstated up to ground level. Some soil treated with carbon was evident at the surface, that had a slightly dark colour consistent with the expectations of a commercial/industrial site. Sediment pond concrete had been removed with some slightly dark coloured soil where excess carbon had been applied.
- The location of an asbestos water pipe that extends to the administration building was evident in a small open excavation.
- At the southern boundary, trees and long grass were present with no visibility to the underlying soil.



2.5 Proposed Development

It is understood that the site has been divested by BP to Goodman. For the purposes of the audit, it has been assumed the site will be developed for commercial /industrial uses with no basement. At the time of issue of this Site Audit Report and Site Audit Statement, only the administration centre is occupied with the remainder of the site undeveloped.

For the purposes of this audit, the 'commercial/industrial' land use scenario with no basements is assumed.



3.0 Site History

An evaluation of the site history was undertaken and outlined in SAR (Senversa 2021). The conclusions of the review undertaken by the auditor was as follows:

'The Auditor considers that the site history is broadly understood. There is uncertainty on the type of AFFF stored on site and the frequency of testing of the deluge system in the Production Oil Plant building. Given the long history of chemical use and storage on site there is also uncertainty regarding other potential products stored on site, however, the Auditor considers that these uncertainties have been compensated for by the investigation and the RAP/RWP.'

Previous site uses with the most significant potential to cause contamination include:

- The storage of petrol, diesel, white spirits and laboratory waste in USTs.
- The storage of oils and solvents and other chemicals in ASTs.
- The production and blending of oils.
- The use of solvents as cleaning, particularly in the Filling Hall Warehouse.
- The storage of AFFF and testing of the deluge system'.



4.0 Contaminants of Concern

The Kleinfelder RAP provided a list of the contaminants of concern/ contaminants of potential concern (CoPC) and potentially contaminating activities that was evaluated as part of the SAR (Senversa 2021).

The auditor concluded that: 'the analyte list used by Kleinfelder adequately reflects the site history and condition and is appropriate.'

The JBS&G RWP subsequently provided an update to the CoPC based on additional information included in the Investigation Report and the RWP. The updated contaminants of concern have been considered by the auditor and are summarised in **Table 4.1** A figure identifying the relevant areas of concern is shown as **Attachment 3, Appendix A**.

Table 4.1: Contaminants of Concern

Sources	Mechanisms	CoPC
Bulk storage and use of petroleum and chlorinated hydrocarbons and other dangerous goods.	Leakages of tanks, fuel lines and storage drums. Leakages during handling activities. Leaching of contaminants in soil and accumulation of vapours.	Petroleum hydrocarbons Benzene, toluene, ethylbenzene and naphthalene (BTEXN), total reportable hydrocarbons (TRH), volatile organic chemicals (VOC) Hazardous ground gases following sub-surface degradation
Use and storage of AFFF.	Leakage from storage tank and leaching into soil during use. Seepage through pavements. Migration onsite and offsite via leaching through surface water.	Per- and poly-fluoroalkyl substances (PFAS) (28 analytes)
Cleaning of spills using white spirits.	Seepage of chemicals through gaps and cracks in pavement and leaching through underlying soil. Accumulation of vapour.	VOC/volatile TRH
Asbestos building material.	Fibre release into drainage network and catchment into settlement pond area. Present in fill near building drip lines or relating to original fill quality.	Asbestos (friable and non-friable)
Contaminated sediment within and likely below the settlement pond. Waste oil storage.	Accumulation of contaminants via drains. Leaching of PFAS through concrete below pond. Overflow of pond onto surrounding grassland and possible surface water leaching.	PFAS/TRH/BTEX/VOC Hazardous ground gases following sub-surface degradation

The Auditor considers that the analyte list used by Kleinfelder and JBS&G adequately reflects the site history and the identified contaminants of concern.



5.0 Stratigraphy and Hydrogeology

Following a review of the reports provided, a summary of the site stratigraphy and hydrogeology was compiled in the SAR (Senversa 2021). The conclusions of the review undertaken by the auditor was as follows:

- 'depth of fill and underlying stratigraphy have been adequately characterised for the purposes of preparation of a remedial strategy'.
- 'stratigraphy and hydrogeology have been adequately characterised for remediation purposes'.

Detailed review can be found in that SAR (Senversa 2021), with a brief summary of the stratigraphy and hydrogeology relevant to the current audit, encountered prior to the remediation works as follows:

- The sub-surface profile prior to remediation included fill overlying intermittent layers of alluvial substrate comprised of intermixed clay, silty clay, sandy silt, clayey silt with various sand beddings and ironstone gravel. Beyond approximately 12.5 m shale bedrock had been encountered.
- The closest surface water body is Prospect Creek located approximately 120 m south of the Site. The creek flows in a south easterly direct from its origin at the Prospect Reservoir (5 km to the northwest of the Site), into the Georges River. Kleinfelder considered the creek to be a moderately disturbed, freshwater urban watercourse.
- Surface water discharged into a settlement pond located in the southeastern corner of the site that is understood to have discharged to Prospect Creek during heavy precipitation events.
- Prior to remediation three groundwater units were known to exist on site with perched water in fill (0.2-0.4m bgl), discontinuous perched groundwater (soft alluvial layer from approximately 3.0 m to 6.0 m bgl) and regional groundwater (typically confined within water bearing sandy horizons in the underlying hard clay deposit, ranging from 6.0 m to the bedrock interface estimated to be located at 13.0m bgl).



6.0 Evaluation of Quality Assurance and Quality Control

An assessment of the overall quality of the investigation data obtained prior to preparation of the RAP was included in the SAR (Senversa 2021). The SAR included review of the information presented in the reports listed in **Table 6.1**, supplemented by field observations. The results obtained are discussed in **Sections 8.0 to Section 10.0**.

Table 6.1: Summary of Investigations

Investigations	Field Investigations	Analytical Data Obtained
BP (2001)	Soil and groundwater	Metals, PAHs, OCs, OPs, TRH/BTEXN, VOCs, PCBs and phenols
Kleinfelder (2021)	Across the site. Focussed on areas of site identified as likely to be contaminated – Soil, groundwater and soil vapour	Metals, PAHs, OCPs, TRH/BTEXN, VOCs/SVOCs, PCBs, asbestos and total phenols

The auditor review stated that site characterisation and remediation planning was primarily based on data presented in Kleinfelder (2021), as the BP data was collected over 20 years ago and as the document was missing the analytical laboratory reports and field records.

The evaluation of quality assurance and quality control in the SAR (Senversa 2021) concluded:

‘In considering the data as a whole, the Auditor concludes that:

- The data is likely to be representative of the overall conditions on the site. While the sub slab vapour samples are unlikely to be representative of the conditions post development, the results provide sufficient data on which to base the remedial strategy and the proposed validation soil vapour sampling is likely to provide representative results.
- The data is mostly complete. The previous reports (prior to 2021) were not complete or not provided to the Auditor however the most recent investigation is considered to supersede the previous data for this. Confirmation of PFOS concentrations below the PQL is proposed during the additional characterisation works to ensure overall completeness.
- There is a high degree of confidence that data provided in the Kleinfelder report is comparable for each sampling and analytical event.
- The primary laboratory provided sufficient information to conclude that data is sufficient precision.

Most of the data is likely to be accurate, however there is some doubt regarding possible loss of volatiles from sampling of the solid stem auger and samples analysed outside of holding times for some samples. The concentrations of volatiles in the soil samples were consistent with site observations and site history. In addition, the soil vapour sampling provided accuracy and compensated for the possible loss of volatiles in the soil samples.’

Site remediation and validation works have since been undertaken and discussion of the quality assurance and quality control of the validation data is included in **Section 12.0, 13.0 and 14.0**.



7.0 Environmental Quality Criteria

The Auditor assessed the investigation results against Tier 1 criteria from National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure 1999, as Amended 2013 (NEPM, 2013). Other guidance has been adopted where NEPM (2013) is not applicable, or criteria are not provided. The criteria used in the investigation is detailed in **Table 7.1**. A list of the guidelines made and approved by the NSW EPA is provided in **Appendix C**.

Table 7.1 : Environmental Quality Criteria

Concern	Environmental Quality Criteria
Human Health Risk	Soil - HSL- D (depth based) for clay soil. While the HSLs are derived based on a petroleum source rather than diesel/oils and solvents, the HSLs for BTEXN are considered relevant as long as the HSL value is not non-limiting (NL). If a value is NL, then the pure substance HSL from CRC Care (2011) is used. For TRH, the HSLs are not relevant and the PQL has been used as a tier 1 screening. - CRC CARE (2011) Direct Contact (HSL D) The HSLD is considered adequately protective of the intrusive maintenance worker exposure. - HEPA (2020) PFAS National Environmental Management Plan (NEMP) released by the National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA). Values for HIL D. - US EPA Regional Screening Levels (RSL) (online) for industrial use. When NEPM values are not available. Where a carcinogenic assessment is relevant the values were adjusted by 10 to be consistent with NEPM acceptable risk level of 1×10^{-5}. Soil Vapour (VOCs): - - HSL D clay, 1 m to <2 m. While the HSLs are derived based on a petroleum source rather than solvents the HSLs for BTEXN are considered relevant as long as the HSL value is not NL. If a value is NL, then the pure substance HSL from CRC Care (2011) is used. For TRH the HSLs are not relevant. - HIL D for volatile organic chlorinated compounds. - USEPA RSLs (Accessed online 2021) when NEPM values are not available. Where carcinogenic assessment is relevant the values were adjusted by 10 to be consistent with NEPM acceptable risk level of 1×10^{-5}. Groundwater and Surface Water - HSL D clay, 2 to <4 m. While the HSLs are derived based on a petroleum source rather than diesel/oils and solvents the HSLs for BTEXN are considered relevant as long as the HSL value is not non-limiting (NL). If a value is NL, then the pure substance HSL from CRC Care (2011) is used. For TRH the HSLs are not relevant. - ADWG (2011) criteria amended by a factor of 10 for recreational use (for non-volatiles) consistent with the National Health and Medical Research Council (NHMRC) (2008) 'Guidelines for Managing Risks in Recreational Water' (GMRRW). The GMRRW (NHMRC 2008) indicates that a qualitative assessment of recreational use can be undertaken using 10 times the concentrations of chemicals stipulated in the ADWG. This is based on an assumed contribution for swimming equivalent to 10% of drinking water consumption. - WHO (2008) Petroleum Products in Drinking-water criteria amended by a factor of 10 for recreational use for TRH. - USEPA RSL (Accessed online 2021) Tap Water Criteria applicable when NEPM values are not available. Where carcinogenic assessment is relevant the values were adjusted by 10 to be consistent with NEPM acceptable risk level of 1×10^{-5}. Values were also amended by a factor of 10 for recreational exposure. - HEPA (2020). NEMP values for recreational exposure. For chemicals where a guideline was not available from these sources, the PQL was used for screening. Aesthetics: The Auditor has considered the need for remediation based on the 'aesthetic' contamination as outlined in the NEPM (2013).



Concern Environmental Quality Criteria

Ecological assessment

Soil

- Ecological Screening Levels (ESL Commercial and Industrial) assuming fine soil.
- Ecological Investigation Levels (EIL Commercial and Industrial). In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations in fill, the EILs were calculated using the most conservative soil-specific added contaminant limits (ACL) for aged contaminants.
- Management Limits (ML Commercial and Industrial) assuming fine soil.
- HEPA (2020). The ecological direct exposure and ecological indirect exposure guideline has been applied to the site. Indirect guideline is only available for PFOS, and the value of 0.14 mg/kg has been used based on the lack of secondary consumers and commercial industrial nature of the site.

Groundwater and Surface Water

- Groundwater Investigation Levels (GILs) listed in NEPM (2013) for protection of aquatic ecosystems referenced in ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. The ANZECC (2000) guidelines have been updated in ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. (Available at www.waterquality.gov.au/anz-guidelines). The Default Guideline Values (DGV) provided are concentrations of toxicants that should have no significant adverse effects on the aquatic ecosystem. The fresh water 95% level of protection was adopted. Some have been modified based on bioaccumulation or acute-toxicity or potential toxicity to particular species.
- HEPA (2020). PFAS NEMP the guideline value (GV) for 95 % level of protection was adopted for assessing direct toxicity and the 99 % value is adopted to assess bioaccumulation. For early stages of the investigation the PQL was above the 99% species protection level and the PQL has been used as a tier 1 screening level.
- For TPH/TRH, no default guideline values are available from ANZG (2018). Aquatic habitat screening levels recommended by the California Regional Water Quality Board (CRWB, 2016) have therefore been adopted. The CRWB (2016) screening levels are those derived for use at San Francisco Airport and the Presidio and are based on chronic aquatic toxicity tests of petrol and jet fuel mixtures. For each TPH/TRH fraction, the lowest value derived for petroleum mixtures within the fraction has been adopted. It is noted that these values are adopted by other United States jurisdictions (e.g., Hawaii Department of Health) and are comparable to the current Dutch intervention value for mineral oil (600 µg/L; VROM, 2013).

Aesthetics – visual and olfactory. Included in confirmation of remedial extent are visual and olfactory observations particularly at investigation locations without analytical data.

The SAR (Senversa 2021) concluded that *‘the adopted criteria were generally adequate to provide an estimate of the likely remedial extent’*.

Additional investigations completed post the SAR (Senversa 2021) included sampling of additional media and included the identification of additional criteria as described below.

Hazardous ground gas measurements (carbon dioxide and methane) were collected during the soil vapour sampling. In the absence of other criteria, JBS&G compared these levels to screening criteria in Assessment and Management of Hazardous Ground Gases, May 2020, NSW EPA (EPA 2020) as follows:

- Methane – 1 % v/v.
- Carbon dioxide – 5% v/v.

The auditor considers these values to be reasonable.



There are no criteria available to assess the PFAS concentrations in pavement, so JBS&G adopted the PFAS soil criteria for assessment of the concrete pavement. JBS&G acknowledged pavement will interface differently with site fate and transport processes than the soil. However, the application of a soil criteria to concrete pavement results is considered to be conservative for the following reasons:

- The potential significance of contamination within a media is a function of the available surface area from which the contaminant may be contacted, which is substantially reduced for in-situ pavement in comparison to soil. This reduction is not accounted for during the analysis of the concrete pavement which includes a step of disaggregation prior to analysis. This causes the pavement as presented for analysis to have contaminants substantially more available in the lab setting as compared to the field environment where the derived criteria are to be applied. This results in a substantial degree of conservatism to application of the pavement-based analysis results when assessed to soil-based criteria.
- The potential exposure pathways for soil and pavement are similar. However, the opportunity for contaminant uptake from pavement is substantially reduced in comparison to soil. The actual pavement media is retained in a cemented matrix.
- The most significant criterion for the assessment of pavement has been to measure the potential leachability of PFOS. As consistent with the first point, the processing of the pavement sample prior to analysis causes the pavement leach result to be substantially higher than what would otherwise occur in the site setting. This extent of over-conservatism is more than sufficient to address any potential absence of conservatism in the application of the soil criteria to pavement – in respect of the potential increased relative rate of leachate that may be released / migrate from pavement relative to soils (where leachate is more likely retained / slowed / infiltrate).

The auditor considers that application of the soil criteria directly to the concrete pavement to be suitable.

Criteria for PFAS in sediment is limited the following guideline values that have been identified for PFOA and PFOS as follows:

- For PFOA, the soil guideline of 10 mg/kg was adopted in the absence of sediment specific values. The value of 10 mg/kg is identified in the PFAS NEMP as relevant for recreational exposure as public open space and ecological exposure.
- For PFOS, the sediment screening criteria derived by Simpson et al (2021) for bioaccumulation of 0.06 mg/kg and 95% spp value (relevant for direct contact) of 0.25 mg/kg has been referenced.

The auditor considers these values to be suitable for screening purposes.



8.0 Evaluation of Soil Analytical Results

A review of the investigation results prior to the RAP development was provided in the SAR (Senversa 2021) with the following key observations:

- Elevated concentrations of TRH, predominately heavy end (T3 and T4) and some chlorinated compounds (including trichloroethene (TCE)) were identified in the centre of the site associated with site infrastructure. Additional elevated concentrations of these contaminants were expected in areas where site infrastructure prevented investigation, which was considered in the proposed remediation extent.
- Elevated PFOS and PFOS+PFHxS concentrations were identified, particularly in the vicinity of the Production Oil Building where the AFFF deluge system was located. PFOA concentrations were below the relevant criteria. The concentrations generally showed decreasing concentrations with depth suggesting top-down impact from the surface. Concentrations of PFAS below criteria were also identified in soil in the southern portion of the site.
- The total PFAS concentrations were similar or equal to the PFOS+PFHxS concentrations and the criteria provided in the NEMP is therefore considered adequately protective of exposure.
- Asbestos was detected on site at one location in soil (SB27), asbestos was also identified associated with building materials however the auditor noted that the sampling method (boreholes) may have led to an under representation of asbestos and additional asbestos is expected to be identified in soil following removal of site equipment and buildings.

The auditor concluded that *'the soil analytical results are consistent with the site history and field observations. The results indicate that soil is contaminated with PFOS, PFOS+PFHxS and heavy end TRH and to a less volatile petroleum hydrocarbons'*.

Remediation and further work to close the data gaps have since been completed and are discussed further in **Section 12.0**.



9.0 Evaluation of Soil Vapour

A review of the investigation results obtained prior to RAP development was provided in the SAR (Senversa 2021) with the following key observations:

- Concentrations of chlorinated hydrocarbons exceeded the nominated screening levels in several samples located in the Filling Hall Warehouse and in the Production Oil building. Kleinfelder attributed the concentrations to the historical use of solvents to wash the floors in these two buildings.
- Low concentrations of BTEXN in the soil vapour were consistent with the limited volatile petroleum hydrocarbons detected in soil and groundwater.
- Chlorinated hydrocarbons and petroleum hydrocarbons present at elevated concentrations in the soil vapour above the screening criteria for commercial/industrial site uses, required further remediation.

The SAR (Senversa 2021) concluded that 'the nature and extent of the soil vapour plume was considered sufficiently understood'. Methane was identified in soil vapour under the Filling Hall Warehouse associated with the petroleum and chlorinated hydrocarbon impact during the investigation by Kleinfelder. No substantial vapours were assessed in drains, sumps and pits across the operational area of the site. The methane was attributed anaerobic degradation of petroleum hydrocarbons and typically has a very limited advective movement potential and this is discussed further in **Section 11.0**.

Remediation has been completed to reduce the risk to human health as discussed in **Section 12.0**.



10.0 Evaluation of Groundwater Analytical Results

A review of the investigation results obtained prior to RAP development were provided in the SAR (Senversa 2021) with the following conclusions:

- 'The analytical results are consistent with the site history and field observations.
- The data collected is considered sufficient for remediation planning.
- Some uncertainty remains on the extent of PFAS contamination to the southwest, however the concentrations on the down gradient boundary are similar to those on the upgradient boundary.
- The concentrations of chlorinated hydrocarbons and petroleum hydrocarbons located in the central portion of the site in the fill and perched groundwater require remediation'.

Some key observations in the SAR (Senversa 2021) relevant to the remediation requirements are as follows:

- Chlorinated compounds and petroleum hydrocarbons in groundwater were encountered in fill and perched groundwater with the regional groundwater indicating limited chlorinated/hydrocarbon impact.
- Concentrations of PFOS in groundwater, while elevated in the central portion of the site, were not considered to be migrating down-gradient or off-site at significant concentrations. The concentrations in groundwater migrating off-site were similar to those entering the site from up-gradient. Some uncertainty remained at that time regarding the extent of the PFOS contamination to the southwest with additional groundwater sampling required as part of the remedial works.

Remediation and further work to close the data gaps have since been completed and are discussed further in **Section 12.0** and **Section 13.0**.



11.0 Assessment of Risk

EnRisks completed an “Human Health and Ecological Risk Assessment: 132 McCredie Road Guildford, NSW” (HHERA) in December 2021. The RAP identified the need for a HHERA prior to remediation to assess the risk associated with the contamination on site.

The checklist provided in Appendix E of the Guidelines for the NSW Site Auditor Scheme (3rd edition) NSW EPA 2017) was used to review the HHERA.

11.1 Objective of HHERA

EnRisks state the objectives of the HHERA were to:

- ‘Undertake an assessment of risks to human health associated with the presence of petroleum hydrocarbons (including methane), chlorinated hydrocarbon compounds (CHCs) and PFAS in environmental media onsite, where the site continues to be used for commercial/industrial purposes.
- Undertake an assessment of ecological risks associated with the presence of PFAS onsite, and where required, off-site.
- Identify any additional data that may be required to assist in refining the assessment of risk or in considering additional risk management measures that may be needed.’

The risk assessment was limited to non-sensitive commercial/industrial landuses (not including childcare, educational, healthcare facility or residential use) excluding a basement. The assessment of off-site and ecological risk issues was limited to PFAS only.

The HHERA included the derivation of site-specific criteria for PFAS in groundwater protective of the off-site environment (Prospect Creek).

The HHERA considered workplace exposures (prior to remediation) to chlorinated hydrocarbons and methane (from degradation of hydrocarbons) in soil vapour on-site focused on use of buildings. The workplace exposure contemplated is no longer relevant to the site as the buildings have since been demolished and has not been considered by the auditor any further.

The auditor considers that the objectives and scope of the HHERA are appropriate.

11.2 Issue Identification and Data Assessment

The HHERA reviewed the available soil, groundwater, soil vapour, sediment and surface water data provided in the ESA, the RAP and the Pre-Remediation Report.

11.2.1 Soil

Petroleum, chlorinated hydrocarbon impacts and PFAS impacts were identified in soil at the site associated with areas of environmental concern (AEC) identified in the RAP. The petroleum and chlorinated hydrocarbons were associated with the Production Oil Building (AEC3) and with the Filling Hall Warehouse (AEC4). PFAS impacts were present in surface soil to the north of the Production Oil Building (AEC3). CoPC were selected by comparing the maximum concentrations to appropriate Tier 1 screening levels as identified in **Section 7.0**. One chemical (indomethane) which was detected in two locations the screening assessment also considered the average concentration. The following CoPC were identified in the HHERA for soil:

**Vapour intrusion:**

- TRH F1 and TRH F2.
- 1,2,4- and 1,3,5-trimethylbenzene.
- 2-hexanone.

Direct contact:

- TRH F3 and TRH F4.
- PFOS + PFHxS and total PFAS.

In considering the soil exposures and CoPC, the HHERA considered the following:

- Risk from vapour intrusion can be accessed via consideration of the soil vapour sampling data.
- Risks from direct contact exceedances for TRH and PFAS, do not need further consideration as the locations of impact were already earmarked for remediation or management in the RAP. These risks were not considered any further in the HHERA.
- Asbestos containing materials (ACM) and friable asbestos were encountered in soil on-site. The HHERA assumes that asbestos will be adequately addressed during the implementation of the RAP. These risks were not considered any further in the HHERA.

The auditor considers the approach taken to soil exposures is reasonable.

11.2.2 Groundwater

Petroleum and chlorinated hydrocarbon impacts were present in the shallow perched water encountered in the fill and in the discontinuous perched groundwater. The impacts to the perched and discontinuous groundwater include light non-aqueous phase liquids (LNAPL) and dissolved phase VOCs. Low concentrations of petroleum hydrocarbons and PFAS were reported in regional groundwater.

In considering the CoPC and groundwater exposures, the HHERA identified that:

- Impacts to the perched and discontinuous groundwater can be addressed through the proposed remedial works outlined in the RAP. No further consideration of these impacts was undertaken in the HHERA.
- CoPC in regional groundwater were selected by comparing the maximum concentrations in consideration of the appropriate Tier 1 screening levels. The identified CoPC to be considered further in the HHERA include PFAS, TCE and 1,1,2-trichloroethane (1,1,2-TCA). The magnitude and extent of TCE and 1,1,2-TCA impacts have generally been characterised in soil vapour and the inhalation risks were assessed through the soil vapour evaluation.
- TCE was detected in groundwater at one well located on the southern portion of the site. As no soil vapor bores had been installed in this area of the site, further assessment of TCE concentrations in groundwater were included in the HHERA to assess the risk with respect to soil vapour. 1,1,2-TCA was included for completeness.
- PFAS is non-volatile at environmental or neutral pH and the depth to groundwater at this site would prevent direct contact. No further evaluation of the health risks was undertaken.

The auditor considers that the approach taken to the groundwater assessment in the HHERA is reasonable.



11.2.3 Vapour

11.2.3.1 Petroleum and chlorinated hydrocarbons

Petroleum and chlorinated hydrocarbon impacts were encountered in sub-slab soil vapour beneath the Production Oil Building (AEC3) and the northern portion of the Filling Hall Warehouse (AEC4). Elevated concentrations of methane were also reported at three bore locations.

CoPC in soil vapour were selected by comparing the maximum concentrations to appropriate Tier 1 screening levels. The identified CoPC are:

- Tetrachloroethene (PCE), TCE and vinyl chloride (VC).
- *cis*- and *trans*-1,2 Dichloroethene (DCE).
- 1,1- Dichloroethane (DCA).

In reviewing the soil vapour data, the HHERA considered that soil vapour impacts are generally confined to the Production Oil Plant (AEC3) and the northern portion of the Filling Hall Warehouse (AEC4), extending south to the location where LNAPL was previously identified.

The auditor considers that approach to selection of soil vapour CoPC is appropriate and agrees with the soil vapour CoPC identified.

11.2.3.2 Methane

Methane was identified in three locations on-site. The HHERA provided a review of the risks potentially associated with the methane concentrations based on the following:

- Flow rate and the likely source of the methane i.e., anaerobic biodegradation of hydrocarbons. The HHERA concluded that methane is not present under pressure and there is no pressure driven flow.
- The provisional soil vapour guideline of 30% methane derived by Eklund (2011) for sources of methane that do not have pressure driven flows i.e., anaerobic biodegradation of hydrocarbon. Methane field measurements at the site were generally less than 30%, with the exception of one location with methane reported at 40.5% (no pressure driven flows). HHERA notes that Eklund (2011) indicates that methane concentrations do not warrant further consideration unless concentrations >40%. The average concentration across the three sampling rounds (September to December 2020) of methane at that location is less than 40%.
- Interference from other contaminants during field measurements. Laboratory concentrations of methane, from the same sample reporting elevated methane in the field, ranged from 22 to 34%. Methane concentrations in all other soil vapour bores were at or below 13%.
- Field instrument results (PID, GA5000 and Inspectra laser methane analyser) obtained by Kleinfelder from two vapour surveys in service pits, open drains and accessible building areas at the site using field instruments. No elevated readings were obtained for methane, oxygen, carbon dioxide or LEL (methane was recorded at 0%, oxygen was recorded at 21% and carbon dioxide was recorded at 0.1%).

The HHERA concluded '*there are no methane risk issues of concern in relation to future slab on ground buildings at the site.*'

The HHERA also considered that the proposed remediation works (AEC3) would remove hydrocarbon contamination resulting in reduced methane concentrations.

The auditor considers that the approach taken to the soil vapour and methane assessment is reasonable.



11.2.4 Sediment

Sediment samples were collected on-site from the settlement pond and off-site from Prospect Creek.

Elevated concentrations of TRH and asbestos fibres were identified in the settlement pond. Given that the settlement pond and the sediments within, were to be removed during the remediation works, the HHERA did not consider the risk from the sediment in the settlement pond further.

PFAS compounds were identified in the sediment collected from the creek bed however the concentrations were below the nominated Tier 1 guidelines human health, as there are no sediment specific guidelines for PFAS the soil guidelines relevant for open space (HIL-C) from the PFAS NEMP have been used. The HHERA did not consider the risk to human health from the sediment at Prospect Creek further.

The auditor considers that the approach taken to sediment is reasonable.

11.2.5 Surface Water

Surface water samples were collected from Prospect Creek following issue of SAR (Senversa 2022) adjacent to the site (see **Section 12.2**), upgradient and down gradient. Low concentrations of PFAS were reported in all surface water samples. The concentrations reported were below the human health Tier 1 screening levels associated with recreational contact. The HHERA did not consider the risk to human health from PFAS in the surface water any further.

The auditor considers that the approach taken to surface water assessment is reasonable.

Note that the screening criteria do not evaluate the consumption of recreational caught fish from Prospect Creek, a discussion on consumption of recreationally caught fish is included in the HHERA.

Based on the assessment provided in the HHERA, the auditor considers that the overall the risk associated with the consumption of fish from site related PFAS, is low due to the following:

- The location of the creek in the urban environment with the limited availability of recreation fishing spots and limited fish suitable for human consumption expected in the area.
- The limited contribution the site is making to the overall PFAS concentrations in Prospect Creek (See **Section 11.7.2**).

11.3 Exposure Assessment

EnRisks identified the following receptors and exposure pathways:

- On-site workers comprising commercial/industrial workers and intrusive maintenance workers in a shallow trench (adults) (all potential contaminants).
- Off-site recreational users of Prospect Creek (adults and children) (PFAS only).

The key exposure pathway on-site is the inhalation indoors of volatile CoPC, in soil and groundwater following vapour intrusion into a future on-grade building on site.

The key off-site receptor identified is a recreational user of Prospect Creek that may come into contact with PFAS in water. The evaluation assumed that water from Prospect Creek is not extracted for use. It is noted however, that discussion on consumption of recreationally caught fish is included in the HHERA.

The auditor has reviewed the exposure assumptions selected by EnRisks including exposure duration, exposure time, averaging time for a commercial worker in a slab on grade building and a maintenance worker. The auditor considers that the exposure assessment is consistent with NEPM/CRC Care guidance.



11.4 Toxicological Information

The toxicity assessment provided by EnRisks includes:

- Evaluation of the dose-response relationship.
- Appropriate level of detail on the toxicological effects of the CoPC and different toxicity reference values available.
- Evaluation of the background concentrations for relevant CoPC.
- Evaluation of uncertainties associated with the toxicity information.

The auditor considered the toxicity reference values and background concentrations identified by EnRisks are appropriate and justified.

11.5 Acceptable Levels of Risk

For threshold risks the hazard index (HI) is used to assess if a risk is acceptable, for the HHERA EnRisks state that:

- A HI less than or equal to a value of 1 (where intake or exposure is less than or equal to the threshold) represents no cause for concern (as per risk assessment industry practice, supported by protocols outlined in EnHealth and ASC NEPM (EnHealth 2012a; NEPC 1999 amended 2013b)).
- A HI greater than 1 requires further consideration within the context of the assessment undertaken, particularly with respect to the level of conservatism in the assumptions adopted for the quantification of exposure and the level of uncertainty within the toxicity (threshold) values adopted (EnHealth 2012a; NEPC 1999 amended 2013b)).

For non-threshold risks EnRisks state:

'a total Target Risk value of $>1 \times 10^{-5}$ has been adopted as indicating conditions that would warrant further assessment. Risks values $\leq 1 \times 10^{-5}$ are considered to be representative of acceptable risks (EnHealth 2012a; NEPC 1999 amended 2013b).'

The auditor considers the acceptable levels of risk as defined in the HHERA are reasonable.

11.6 Modelling and Risk Estimation

The exposure concentrations associated with the vapour inhalation route were estimated by EnRisks using the RAGS F approach (USEPA 2009), consistent with that described in CRC Care (2011), noting the following assumptions:

- Future buildings constructed slab on ground: Air concentrations were estimated using the Johnson & Ettinger Vapour Intrusion Model (USEPA 2004a).
- Excavations: Air concentrations were estimated using the ASTM RBCA Model (ASTM 2002)².

The auditor review of the modelling and exposure assumptions used in the inhalation exposure assessment indicates that:

- The exposure parameters (exposure duration, exposure frequency, and time per day of exposure) adopted by EnRisks for the inhalation assessment are considered appropriate and consistent with NEPM guidance.
- The building parameters are based on NEPM/CRC Care guidance or professional opinion and are considered appropriate given the lack of development plans available for future buildings.

² ASTM 2002, *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*. ASTM E1739-95.



- The sub surface parameters are based on NEPM/CRC Care guidance, relevant site-specific considerations or professional opinion and are considered appropriate.
- The trench parameters are consistent with guidance in the NEPM/CRC Care and are considered appropriate.

Modelling scenarios evaluated in the HHERA include vapour intrusion into a slab on grade commercial building (no basement) from:

- Soil Vapour:
 - AEC3 from TCE, PCE, cis-1,2-DCE, trans-DCE, VC, 1,1-DCA.
 - AEC4 from TCE, cis-1,2-DCE, trans-DCE, VC, 1,1-DCA.
- Groundwater:
 - MW08 In AEC3 from 1,1,2-TCA.
 - MW14 in AEC5 from TCE.

The modelling inputs and scenarios are considered appropriate.

11.7 Ecological Risk Assessment for PFAS

EnRisks provided a tier 1 screening assessment of PFAS (PFOA and PFOS) for the on-site terrestrial environment and off-site aquatic environment of Prospect Creek, including a discussion on toxicity of PFAS to the environment. The assessment also included a qualitative assessment of the off-site aquatic risks.

EnRisks considered the following Tier 1 ecological guidelines:

- Soil: HEPA (2020). PFAS NEMP ecological direct exposure values for PFOA of 10 mg/kg and PFOS of 1 mg/kg. The ecological indirect exposure guideline for PFOS, a value of 0.14 mg/kg was selected based on the lack of secondary consumers and the proposed commercial industrial uses. No indirect value is available for PFOA.
- Groundwater: HEPA (2020). PFAS NEMP guideline value (GV) for 95 % level of protection was adopted for assessing direct toxicity and the 99 % value was adopted to assess bioaccumulation.
- Sediment: Simpson et. al. (2021)³ sediment guidelines for the protection of sediment based aquatic ecosystems in Prospect Creek were sourced from Simpson et al (2021). The 95% species protection guideline for PFOS is 0.25 mg/kg and the 99% species protection guideline is 0.06 mg/kg. It is acknowledged that these guidelines were derived for estuarine/marine environments, however, they were adopted in the absence of appropriate alternative values. No sediment value for PFOA is identified and the soil value of 10 mg/kg has been used.

The auditor considers that the HHERA approach to the ecological screening assessment is reasonable.

³ Simpson et. al. 2021, *Chronic effects and thresholds for estuarine and marine benthic organism exposure to perfluorooctane sulfonic acid (PFOS)-contaminated sediments: Influence of organic carbon and exposure routes*, Science of the Total Environment 776 (2021)



11.7.1 On-site Terrestrial Risk

EnRisks compared the direct and indirect guideline maximum soil concentrations from each of the AEC identified in the RAP to the direct and indirect criteria and identified the following:

- PFOA concentrations were below the nominated criteria of 10 mg/kg in all samples. EnRisks concluded *'there are no ecological risk issues of concern in relation to PFOA in soil'*.
- PFOS concentrations were reported as follows:
 - Below the criteria in AEC 1, AEC2 (soil), AEC4 and AEC5.
 - Above the criteria in AEC2 (settlement pond) and AEC3 (Production Oil Building).

EnRisks concluded *'the remediation PFOS impacted soil (in AEC3) and sediment (in the settlement pond in AEC2), as recommended in the RAP, is supported.'*

The auditor agrees with the enRisk conclusions and considers that the ecological risk associated with PFAS in soil is low, outside of the remediation areas in AEC2 (settlement pond) and AEC3 (Production Oil Building).

11.7.2 Off-site Aquatic Assessment for Prospect Creek

The Tier 1 assessment identified that the risk to the aquatic environment was low for PFOA as the surface water concentrations of PFOA were reported below the Tier 1 guidelines suitable for direct toxicity and bioaccumulation risk.

The Tier 1 assessment identified that the risk to the aquatic environment was low for PFOS as the surface water concentrations of PFOS were reported below the Tier 1 guidelines suitable for direct toxicity however the concentrations were above the bioaccumulation guideline (99% species protection level). A multiple lines of evidence approach was used by EnRisks to evaluate the risks associated with PFOS in the surface water as follows:

- The criteria used to assess bioaccumulation risk (99% protection level) is conservative for Prospect Creek given the current condition of the creek. Criteria for bioaccumulation risk (95% protection level) and direct contact risk (90% protection level) were considered as these are more appropriate for the current condition of the creek, while still providing a conservative protection level. The surface water concentrations reported are below the newly adopted criteria.
- The criteria used to assess bioaccumulation risk (99% protection level) are considered to be below the background concentrations reported for urban waterways. This is the case in Prospect Creek as concentrations of PFOS upstream of the site are above the current 99% protection level.
- Concentrations of PFOS are the same upstream and downstream of the site. This indicates that the site is not contributing PFOS to Prospect Creek above the background levels already present in the creek.
- Although a full ecological survey has not been undertaken, Prospect Creek is understood to have a limited extent of aquatic vegetation and sediment with no large aquatic biota, based on observations reported by Kleinfelder during sediment and surface water sampling. Given this, it is considered highly unlikely that a higher order predator (e.g., bird) could source a large proportion of its diet from Prospect Creek, where significant bioaccumulation risks could occur.

EnRisks concluded *'no significant ecological risk issues are identified in relation to PFAS in surface water in Prospect Creek. Remediation of PFAS in groundwater is not considered necessary.'*

The auditor agrees that the regional groundwater does not require remediation for PFAS. The shallow perched groundwater is to be remediated (via excavation of soil and extraction of water in excavation) due to the presence of chlorinated and petroleum hydrocarbons.



11.8 Risk Based Screening Levels (RBSL)

EnRisks derived risk-based screening levels (RBSL) to assist in remediation, with RBSL derived for:

- Soil vapour to be protective of future onsite workers.
- Groundwater to be protective of the off-site aquatic environment of Prospect Creek.
- TRH to be protective of the inhalation pathway for commercial workers.

11.8.1 RBSL for Soil Vapour

The RBSL for soil vapour have been derived for the vapour risk driving chemicals of TCE and *cis*-1,2-DCE. The values are protective of future workers in a slab on grade commercial building with no basement:

- TCE = 10 mg/m³.
- *cis*-1,2-DCE = 35 mg/m³.

Cumulative risks requiring consideration included concentrations of TCE and/or *cis*-1,2-DCE in soil vapour exceed 8 mg/m³.

The auditor considers the RBSL for soil vapour area appropriate for remediation planning.

11.8.2 RBSL for Groundwater

The groundwater RBSL is protective of the off-site aquatic environment of Prospect Creek and was derived using a dilution/attenuation factor (DAF) and a value identified by EnRisks as protective of the aquatic environment.

11.8.2.1 Aquatic Guideline.

EnRisks identified a value of 0.05 µg/L relevant to the bioaccumulation pathway for Prospect Creek. The value is sourced from a scientific publication (Page et. Al. 2019⁴) which presented a revised 99% species protection level of 0.05 µg/L. This value has not been accepted by regulators however the background concentration in Prospect Creek is similar (0.04 µg/L). As such this value is considered suitable for deriving a groundwater screening value protective of the off-site Prospect creek.

11.8.2.2 DAF

The USEPA in development of their soil screening guidance (USEPA 1996) identified a default DAF of 20 for a source area of 0.5 acres (0.2 hectares or 2,000 m²) in size based on a review of data from a range of uncontrolled sites with varying source sizes, soil types and depths to groundwater. An uncontrolled site where the chemical is present in soil without any capping of any type. The selection of the default of 20 appears to be based on USEPA's professional judgement rather than a statistical measure of the available data.

The default DAF of 20 was then adopted by the 2013 NEPM in the derivation of soil ecological guidelines (Schedule B5C). The 2013 NEPM remains the overarching guideline in Australia for the assessment of contaminants (including PFAS). Hence, EnRisks considered a DAF of 20 appropriate for use in the HHERA. Although the DAF of 20 is noted to be derived based on the migration of chemicals to groundwater, it is also considered protective of direct run-off to surface water in Prospect Creek.

⁴ Page et. al. 2019, Risks of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) for Sustainable Water Recycling via Aquifers, Water 2019, 11, 1737; doi:10.3390/w11081737.



11.8.2.3 RBSL Calculation

A RBSL for the protection of the Prospect Creek can subsequently be determined using a back calculation based on the adopted guideline value (i.e., 0.05 µg/L) and dilution/attenuation factors (DAF). The DAF represents the reduction of the chemical in soil leachate by mixing in groundwater (also relevant to other water sources), expressed as the ratio of leachate concentrations to receptor point concentrations. The equation was used for deriving RBSL is as follows:

$$C_{\text{water}} (\text{RBSL}) = C_{\text{protection}} \times \text{DAF}$$

where:

C_{water} = concentration in soil leachate using Australian Standards Leaching Procedure (ASLP) testing (µg/L).

$C_{\text{protection}}$ = target guideline value for the protection of Prospect Creek (0.05 µg/L).

DAF = dilution/attenuation factor.

A RBSL of 1 µg/L was derived based on a target guideline for Prospect Creek of 0.05 µg/L and a DAF of 20. EnRisks also note that a value of 1 µg/L would also be derived based on a target guideline of 0.042 µg/L (i.e. background) and a DAF of 20, with appropriate rounding.

The auditor considers that the RBSL of 1 µg/L, derived to be protective of Prospect Creek, is appropriate for groundwater remediation.

11.8.3 TRH for Inhalation Pathway

The standard HSLs for TRH are not relevant for the site as the source of the hydrocarbon contamination is not consistent with the petrol/ diesel mix assumed in the generation of the HSLs.

EnRisks identify where the TRH aliphatic/aromatic split is known, site-specific TRH criteria can be derived using the process outlined in CRC CARE Technical Report No. 10, Part 4 (CRC CARE 2011b) or using the HSL Extension Model. The site-specific aliphatic/aromatic proportions replace the weighting fractions adopted during the derivation of the HSLs, and the HSLs for each fraction can be found in Appendix F of Part 1 of the technical report.

The auditor agrees that where the aliphatic aromatic split of TRH is available, RBSLs can be derived for remediation purposes.

11.8.4 Ecological Assessment On-site

EnRisks identified that ecological criteria are not relevant for the ongoing use of the site for commercial/industrial land based on the following lines of evidence:

- Guidelines protective of terrestrial environments are not applicable for soil beneath buildings, paved or other artificial surfaces.
- For landscape or other garden areas that may remain, these areas do not provide environments relevant to higher level predators as the potential for these species to consume any significant amount of food from these small areas is very low.
- In relation to plant species in garden areas, these areas would be small and likely to include clean topsoil. Even where clean topsoil is not used it is unlikely that sensitive plant species would be grown in these areas.

The auditor agrees that the ecological assessment for soil is less relevant for the commercial industrial site and remediation should be driven primarily by human health considerations. The ecological assessment for PFOS in soil should be driven by the potential for leaching to groundwater.



11.9 Overall Assessment

EnRisks identified:

- Potentially unacceptable risks for future workers in AEC3 and AEC4 from vapour intrusion and direct contact with perched water and soil.
- Low and acceptable risks from vapour intrusion associated with the deeper regional groundwater.
- Low and acceptable risks from PFAS in surface water and sediment in Prospect Creek associated with recreational use.
- Low and acceptable ecological risks from PFAS in the surface water and sediment of Prospect Creek.

EnRisks indicate that the remediation strategy described in the RAP is likely to address the risks (vapour intrusion and direct contact) associated with shallow groundwater and soil impact in AEC3 and AEC4.

To assist with remediation RBSL for soil vapour and groundwater were derived as follows:

- A soil vapour RBSL for TCE of 10 mg/m³) and for *cis*-1,2-DCE of 35 mg/m³). EnRisks identify if concentrations of TCE and/or *cis*-1,2-DCE in soil vapour exceed 8 mg/m³ then cumulative exposure will need to be considered.
- A RBSL for groundwater of 1 µg/L was derived based on protection of the Prospect Creek environment.
- Site specific TRH criteria can be derived if the aliphatic aromatic split is known.

11.10 Auditor's Opinion

Overall, the auditor considers that the inputs and assumptions used in the HHERA, to assess risk and generate the RBSL, are appropriate. The auditor agrees with the following conclusions:

- Low and acceptable risks from vapour intrusion associated with the deeper regional groundwater.
- Low and acceptable risks from PFAS in surface water and sediment in Prospect Creek associated with recreational use.
- Low and acceptable ecological risks from PFAS in the surface water and sediment of Prospect Creek.
- There are potentially unacceptable risks for future workers in AEC3 and AEC4 from vapour intrusion and direct contact with perched water and soil. It is considered that these risks can be addressed through the remedial works described in the RAP and RWP (**Section 13.0**).

Taking into consideration the conclusions of the HHERA and the scope of remediation identified in the RAP and RWP, the following site-specific criteria are considered appropriate for remediation and validation:

- A RBSL for TCE and/or *cis*-1,2-DCE in soil vapour of 8 mg/m³ to account for cumulative exposure.
- A RBSL for groundwater of 1 µg/L based on protection of the Prospect Creek environment.
- Site specific TRH criteria can be derived if the aliphatic aromatic split is known.

The auditor agrees that the ecological assessment for soil is less relevant for the commercial industrial site and that remediation should be driven primarily by human health considerations. The ecological assessment for PFOS in soil should be driven by the potential for leaching to groundwater.



12.0 Evaluation of Pre-Remediation Data Gap Investigation – Various Media

Following the demolition works, investigations were undertaken which included addressing data gaps identified in the RAP and the previous SAR (Senversa 2021), the results of which are discussed below. Waste classification was further confirmed as discussed in **Section 16.2**.

12.1 Soil Sampling – Non-operational Areas, Administration Building, Sub-Pavement and Southern Area Stockpile

Additional sampling to close out data gaps for two main areas, anticipated to be external to the proposed remediation extent, were undertaken as follows:

- 44 soil sampling locations were targeted to the unsealed non-operational areas of the site with samples collected via hand auger from a depth of 0-1 m bgl. Samples were analysed for metals, TRH, BTEXN, PAHs, OCPs, OPPs VOCs, PCBs, phenols, PFAS and asbestos.
- 21 soil sampling locations were targeted in and around the administration building samples and were collected via hand auger from a depth of 0-1 m bgl. Samples were analysed for metals, TRH, BTEXN, PAHs, OCPs, OPPs VOCs, PCBs, phenols, PFAS and asbestos.
- 21 test pit/soil sampling locations were targeted to soil below the concrete (to be potentially retained) by sawing 1 x 1 m area of pavement. The samples were collected from immediately beneath the pavement to a depth of approximately 0.5 m bgs. Samples were analysed for metals, TRH, BTEXN, PAHs, OCPs, OPPs VOCs, PCBs, phenols, PFAS and asbestos.

The depth and distribution of the soil samples are considered adequate to provide a representative data set. A summary of the concentrations compared to the human health criteria is provided in **Table 12.1** below. The HHERA, summarised in **Section 11.0**, did not identify a risk to the environment associated with soil on site and the evaluation of soil is therefore focused on human health.

Table 12.1: Non-operational Area Sampling in mg/kg

Analyte	n	Detects	GL	Reference	n>GL	Max. Conc.
Arsenic	146	56	3000	HIL D	0	28
Cadmium	146	0	900	HIL D	0	<1
Copper	146	134	240000	HIL D	0	936
Lead	146	122	1500	HIL D	0	180
Mercury	146	1	730	HIL D	0	0.1
Nickel	146	133	6000	HIL D	0	116
Zinc	146	139	400000	HIL D	0	447
Chromium	146	145	3600	HIL D	0	79



Analyte	n	Detects	GL	Reference	n>GL	Max. Conc.
BTEXN	144	0	Various	HSL-D Sand (0 to 1)	0	<0.2
TRH F1	144	0	190	Site Specific	0	<10
TRH F2	144	0	380	Site Specific	0	<50
TRH F3	144	11	7600	Site Specific	0	1200
TRH F4	144	1	7600	Site Specific	0	490
B(a)P TEQ	144	144	40	HIL D	0	1
B(a)P	144	2	1.4	EIL	0	0.8
Total PAHs	144	3	4000	HIL D	0	9
PFOA	75	23	10	Eco direct exposure	0	0
PFOA	75	23	50	HIL D	0	0
PFOS	75	54	1	Eco, direct exposure	0	0.2
PFOS	75	54	0.14	Eco indirect exposure	2	0.2
PFOS + PFHxS	75	54	20	HIL D	0	0.2
Asbestos ACM	69	1	0.05%	HIL-D	1	Visible asbestos
Asbestos FA/AF	69	0	0.001%	HIL-D	0	<PQL

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg and mg/L)

The soil concentrations in the non-operational areas are consistent with the Kleinfelder investigations. Only location (HA03, 2 samples) located close to the Production Oil Plant reported PFAS in exceedance of the health-based criteria. The soil at this location is included in the remediation extent.

Visible ACM was identified in one location (HA18) with no FA/AF identified. Further remediation is required with the works discussed in **Section 13.0**.



12.1.1 Southern Stockpile

The southern portion of the site, which had been built up with fill to form a large mound and referred to as the 'southern stockpile' by JBS&G, had been investigated by Kleinfelder as discussed in the SAR (Senversa 2021). The southern stockpile reported no significant chemical contamination however the potential for asbestos was identified. 32 test pits were excavated into the Southern stockpile (approximately 8000 m³), sampling was limited to asbestos quantification. Bonded asbestos was identified in several test and the following characterisation works were completed.

Following removal of surface vegetation, the existing soil stockpile was subdivided by excavator into 360 smaller stockpiles each approximately 22 m³ in volume (as discussed in **Section 13.0 Table 13.4**). Each smaller stockpile was spread by excavator into a 10 cm thick pad and inspected/sampled for asbestos. Results of the asbestos quantification works are presented in **Table 12.2**.

Table 12.2 Asbestos quantification at the Southern Stockpile

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Asbestos ACM	0.05%	HIL-D	454	2 8 visible ACM	2	0.08
Asbestos FA/AF	0.001%	HIL-D	454	1	1	0.009

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
- No criteria available/used or not analysed
GL Guideline (%)

A total of 40 smaller stockpiles (total of approximately 1000 m³) were found to visually contain asbestos and were segregated from the remaining soils. To address the detections of asbestos, remediation works were undertaken for the stockpile (discussed in **Section 13.0 and 14.0**).

12.1.2 Soil Vapour Sampling- Administration Building

Thirteen soil vapour locations (sub slab) in and around the administration building were undertaken. Vapour samples were collected by purging of 7 L of soil vapour through a carbon adsorbent tube using low flow air pumps. Field parameters collected included methane, carbon monoxide, LEL and carbon dioxide. Each vapour sample was completed under an isopropanol shroud as a leak detection method. The auditor considers that the vapour samples were collected appropriately, and that the distribution of the vapour sample locations is adequate to provide a representative data set. A summary of the concentrations compared to vapour criteria is provided in **Table 12.3** below.

Table 12.3 Soil Vapour Samples from Administration Building in mg/m³

Analyte	GL	Reference	n	Detects	>GL	Max. Conc.
Benzene	5	HSL -D clay (0 to 1)	13	0	0	<0.07
Ethylbenzene	1800	HSL -D clay (0 to 1)	13	0	0	<0.07
Toluene	6500	HSL -D clay (0 to 1)	13	4	0	0.23
Total Xylene	1200	HSL -D clay (0 to 1)	13	0	0	<0.07
Naphthalene	4	HSL -D clay (0 to 1)	13	0	0	<0.07



Analyte	GL	Reference	n	Detects	>GL	Max. Conc.
TRH F1	250	Site specific	13	0	0	<2.9
TRH F2	270	Site specific	13	0	0	<2.9
VOC		Various	13	0	0	<0.07
Nonane	88	USEPA RSL	13	1	0	0.01
Heptane	1800	USEPA RSL	13	4	0	0.36
Hexane	3100	USEPA RSL	13	4	0	0.36
Octane	170	USEPA RSL	13	4	0	0.24

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/m³)

In reviewing the information in **Table 12.3** the auditor considers:

- The concentrations of all analytes are below the PQL or below nominated criteria.
- The analytical soil vapour results are consistent with the soil sampling results for the administration building and with the known history which does not identify a significant source of contamination in this area.

The auditor is satisfied that the soil vapour and soil sampling confirm that no additional remediation is required in the non-operational areas including the administration building.

12.2 Surface Water Sampling – PFAS

12.2.1 Prospect Creek

Surface water samples from Prospect Creek were collected on two occasions prior to remediation to characterise the concentrations of PFAS (**Attachment 4, Appendix A**):

- Six surface water samples (SW01-SW06) were collected by Kleinfelder in June 2021 as part of the pre-remediation investigation. Samples were collected upstream, adjacent, and downstream of the site.
- Four surface water samples (PC01-PC04) were collected by JBS&G in September 2021 from the surface water drain, discharge points into Prospect creek and from upstream and downstream of the discharge point.



The sample locations and sample collection points are considered by the auditor to be appropriate. Low concentrations of PFAS were reported in all surface water samples. Concentrations of PFOA were below the nominated guidelines. A summary of the surface water PFOS concentrations are provided in **Table 12.4.** and **Table 12.5.**

Table 12.4 Kleinfelder surface water results in µg/L

Kleinfelder	Upstream		Adjacent to Site		Downstream of Site	
June 2021	SW01	SW02	SW03	SW04	SW05	SW06
PFOS	0.42	0.02	0.05	0.28	0.26	0.50

Table 12.5 JBS&G surface water results in µg/L

JBS&G	Surface Water Drain	Discharge to Prospect Creek	Upstream from Discharge Point	Downstream of Discharge Point
September 2021	PC1	PC2	PC3	PC4
PFOS	0.06	0.06	0.04	0.04

JBS&G conclude that PFOS concentrations upstream and downstream of the site (discharge point) are similar and suggest that the site is not contributing a significant PFOS/PFAS load into the surface water. JBS&G also consider the PFAS concentrations are consistent with levels of impact anticipated in an urbanised area. Following a review of the results and supporting discussion, the auditor agrees with this conclusion and considers that no additional remediation is required beyond that proposed remediation works (removal of impacted concrete and soil discussed in **Section 13.0**) to address impacts to surface water.

12.2.2 On-site Assessment

Multiple surface water assessments were undertaken across the site between February and December 2022 to assess PFAS levels across the site generally during rainfall events. The initial sampling was triggered by visible foaming on the concrete around PFAS remediation area in February 2022. Samples were generally distributed around the site and targeted to drains extending from the PFAS remediation area towards the retention basin/ water treatment pond (WTP). The distribution of the surface water sampling and frequency are considered adequate to provide a representative data set to inform the remedial strategy.

PFAS concentrations were detected in numerous samples and the WTP was upgraded to reflect the need for additional capacity. The auditor considers that this was an appropriate measure and given the remedial works undertaken, that no further surface water sampling was required prior to the remedial works.



12.3 Sediment Sampling – PFAS, TRH and Asbestos Fibres

Sediment samples were collected from Prospect Creek by Kleinfelder. Samples were collected at six locations consistent with the surface water samples and analysed for PFAS and total organic carbon.

PFAS compounds were identified in the sediment collected from the creek bed as follows:

- The concentrations of PFOA ranged from <0.0002 to 0.0012 mg/kg. As all concentrations are below the adopted health and ecological based site screening criteria (Identified in **Section 7.0**) the auditor considers that no further evaluation of PFOA in sediment is required.
- The concentrations of PFOS ranged from <0.0002 to 0.0177. All PFOS concentrations are below the adopted health and ecological based site screening criteria (Identified in **Section 7.0**) the auditor considers that no further evaluation of PFOS in sediment is required.

JBS&G also collected sediment samples from the on-site settlement pond and submitted these for PFAS, TRH and asbestos fibres. Elevated concentrations of TRH and asbestos fibres were identified in the settlement pond and as such the settlement pond sediments were identified as requiring remediation as discussed in **Section 13.014.0**.

The sediment evaluation is considered adequate to provide a representative data set to inform the remedial strategy.

12.4 Groundwater Sampling

Groundwater wells (all those accessible, i.e., MW01 to MW24, MW26 and P1 to P4) were sampled on the 21st and 22nd September 2021 with groundwater samples submitted for heavy metal, TRH, VOCs and PFAS analysis. Samples were collected using hydrosleaves for PFAS analysis and low flow for other analytes.

The auditor considers that the results obtained are consistent with those obtained during the earlier groundwater sampling undertaken by Kleinfelder as follows:

- Detections of chlorinated compounds and petroleum hydrocarbons were encountered in fill and perched groundwater, while the regional groundwater had limited chlorinated/hydrocarbon impact.
- Concentrations of PFOS in groundwater, were found to be elevated in the central portion of the site but decreased further down gradient to below the PQL (PQL was below the identified criteria).

The results have been considered further by the auditor in the context of the remedial works and post-groundwater sampling undertaken in December 2022 in **Section 14.15**

12.5 Pavement Sampling – PFAS and other Analytes

Assessment of the concrete pavement was undertaken to inform remediation extents as follows:

- February 2022. 14 samples of concrete were collected from the major operational areas of the site (Filling Hall, Production Oil Plant, Base Oil Tank Farm and nearby locations). Samples were analysed for total PFAS and leachable PFAS.
- May 2022. 5 concrete locations were collected within the Production Oil Plant and adjacent drum platform, which involved concrete coring and collection of samples from the surface, middle and base of each core to profile potential levels of PFAS and leachable PFAS. Samples were analysed for total PFAS and leachable PFAS.



- June 2022.31 locations from various regions of the site where pavements were anticipated to be removed, including the Base Oil Tank Farm, roadways and drum laydowns surrounding and south of the Raw Oil Tank Farm, laboratory building and gatehouse and a portion of the bitumen carpark located north of the PFAS remediation area. Samples were collected between the surface and middle of each concrete core. Samples were analysed for total PFAS and leachable PFAS.
- Several stockpiles of concrete were sampled between August and November 2022. Concrete samples were generally analysed for PFAS, leachable PFAS (via TCLP and/or ASLP) or for a wider waste classification suite including heavy metals (totals and TCLP), petroleum and chlorinated hydrocarbons (TRH, VOC, PAH and TCLP PAH), pesticides, phenols and PCBs. Concrete samples were crushed using a mallet on layers of plastic sheeting and transferred to laboratory jars for analysis.

The distribution of the pavement samples is considered adequate to provide a representative data set to inform the remedial strategy. A summary of the PFAS concentrations of the concrete samples compared to the nominated validation criteria (**See 14.2.1**) and the concentrations of TRH compared to the soil guidelines is provided in **Table 12.6 Summary of Concrete PFAS Analysis**.

Table 12.6 Summary of Concrete PFAS Analysis in mg/kg and mg/L

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOA mg/kg	10/50	Eco, direct exposure/ HIL D	89	33	0	0.02
PFOS mg/kg	0.14	Eco, indirect exposure	89	73	13	2
PFOS + PFHxS mg/kg	20	HIL D	89	73	0	2
PFOS (leached) mg/L	0.001	Leaching to groundwater	89	63	21	0.11
TRH F1 mg/kg	190	Site Specific	19	5	0	79
TRH F2 mg/kg	380	Site Specific	19	6	5	790
TRH F3 mg/kg	7600	Site Specific	19	11	0	5640
TRH F4 mg/kg	7600	Site Specific	19	8	0	2830

The auditor notes the following based on the data provided in **Table 12.6 Summary of Concrete PFAS Analysis**:

- Elevated concentrations of PFOS were detected in the concrete pavement around the former Production Oil Plant. This concrete is not considered suitable for retainment on site. The identification of PFAS around the former Production Oil Plant is consistent with the elevated concentrations in soil that require remediation (discussed in **Section 13.0**).
- Concentrations of TRH were elevated around the Finished Oil Tankfarm. This concrete is not considered suitable for retainment on site. The identification of TRH around the former Finished Oil Tankfarm is consistent with the elevated concentrations in soil that require remediation (discussed in **Section 13.0**).
- Pavement outside of the areas already proposed for remediation due to soil impact was found to be suitable for retention on-site.



12.6 Soil Sampling – Baseline of Bioremediation Area

A substantial area of the eastern and southern portion of the site was characterised prior to being used as an area for bioremediation of soil, as follows:

- Following removal of pavement in these areas, a total of 45 test pits were advanced within the drum laydown area (AEC7 as per JBS&G 2021b) and along the roadway between the Raw Oil Tank Farm and Finished Oil (Base Oil) Tank Farm.
- Test pits were completed on a 5 m grid, with 80 soil samples collected from the centre of an excavator bucket and analysed for PFAS. Two small areas of PFAS impact were identified with impact restricted to near surface depths only. The 10 x 10 x 0.5 m areas were blended with 1 % (v/v) PAC in-situ using the excavator prior to use as a bioremediation area (see **Section 13.0**). 10 samples were analysed for petroleum and chlorinated hydrocarbons following PID screening, no indicators of contamination were identified with all concentrations below the practical quantification limit (PQL) with the exception of TRH (concentrations below guideline).

The auditor considers that the baseline was adequately established and discussion of the validation following the bioremediation works is provided in **Section 14.8**.

12.7 Auditors' Opinion

The data gaps identified in the RAP and RWP are considered by the auditor to have been sufficiently addressed. Overall, the auditor considers that the results for soil are consistent with the earlier findings and the site history that indicated that impacts to soil appear to be limited to the areas already earmarked for remediation in the RAP and RWP. Additional remediation work required, includes the stockpile in the southern portion of the site (ACM), removal of the sediments from the sediment pond (TRH and asbestos fibres) and removal of pavement around the former Production Oil Plant. These are further discussed in **Section 13.0**.



13.0 Evaluation of Remediation

The overarching objective of the remedial works was to ensure that the site could be made suitable for commercial industrial uses excluding basements. JBS&G were engaged by BP as the environmental consultants responsible as the principal contractor for the environmental assessment works, remedial planning, demolition and remediation works on site. Figures relating to remediation are included in **Attachment 5, Appendix A**.

The contaminant sources that required remediation based on the characterisation works conducted to date (including the pre-remediation investigations described in **Section 12.0**), include:

- Infrastructure consisting of ASTs, USTs, associated pipework, settlement pond (including the sediments), WTP and stormwater pipes.
- Chlorinated compounds and petroleum hydrocarbon impacts to soil and perched water in the fill and discontinuous perched groundwater due to the previous bulk material storage and use of solvents (petroleum hydrocarbons and chlorinated hydrocarbons). Source removal is the focus of the remediation.
- PFAS impacts to soil and perched shallow groundwater due to the use and storage of AFF on-site noting that while there is a source of PFAS on-site, given that the up-gradient and down-gradient groundwater concentrations are consistent, the site is not considered to be providing a significant contribution of PFAS to the surrounding environment.
- Contaminated sediments in the settlement pond to manage the main pathway to the off-site environment i.e., surface water drainage from the settlement pond. Sediments also impacted with asbestos fibres and TRH.
- Asbestos impacted fill located in southern stockpile (stockpile and potentially in-situ at the southern boundary where investigations did not extend under the trees), one isolated asbestos impact to soil and asbestos impacted mastic pavement joints.
- Pavement around the former Production Oil Plant impacted by PFAS.

Demolition works were completed at the site between November 2021 and March 2022 and included the removal of all above ground infrastructure with the exception of the Export Office, Fire Water Tank and a Storage Shed (**Attachment 6, Appendix A**). The remedial activities completed by JBS&G from December 2021 to April 2023 are discussed below.

13.1 Remediation Activities Undertaken

Remediation was required to address soil, sediment, concrete (pavement) and groundwater impacted by various contaminants including PFAS, petroleum hydrocarbons, chlorinated hydrocarbons, and/or asbestos. The RAP, which was the subject of SAS MP165 and SAR (Senversa 2021), identified the following preferred remedial works:

- Excavation and off-site disposal of site infrastructure.
- Excavation and off-site disposal of soil contaminated by petroleum and chlorinated hydrocarbons.
- Excavation and off-site disposal of asbestos impacted soil.
- Excavation and thermal treatment of PFAS impacted soil.

SAR (Senversa 2021) concluded *'that the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:*

- Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).'



The remedial approach was subsequently refined in the RWP with the following remedial measures identified:

- Excavation and off-site disposal of site infrastructure.
- Excavation and thermal treatment of PFAS impacted soil where PFOS concentrations are reported above the human health guideline of 20 mg/kg.
- On-site stabilisation with powdered activated charcoal (PAC) of soil impacted with PFOS below the human health guideline. The treatment with PAC was to reduce the ecological risk associated with leaching to groundwater.
- On-site bioremediation of petroleum and chlorinated hydrocarbon impacted soil.
- Excavation and off-site disposal of asbestos impacted soil.
- Extraction and off-site disposal of shallow groundwater impacted with LNAPL.

A list of the main remediation activities completed under the supervision of JBS&G and the timing are provided in **Table 13.1** below to provide context for the discussion provided in **Section 13.3** and **Section 13.4**.

Table 13.1: Remediation Activities Undertaken

Stages	Activity	Timing
Pre remediation works, trials or assessments to support remedial extent in addition to works discussed in Section 12.0.	Site Infrastructure Removal - Demolition and removal of above ground equipment (including ASTs) and USTs (Section 13.3). PFAS remediation trial (Section 13.4). Bioremediation trial (Section 13.2 and Section 13.4). Pavement mastic assessment (Section 13.2).	November 2021 to April 2022
Remediation	Excavation of USTs (Section 13.3 and Section 13.4). Note that additional USTs were identified on -site during remediation excavations. Excavation of USTs discussed in Sections 13.3 and 13.4 in conjunction with the other USTs. Excavation of impacted soil – petroleum and chlorinated hydrocarbons – Excavation (EX) EX1 -EX7, EX9 - EX13, raw oil tank farm, base oil tank (Section 13.4). Perched water extraction from EX13 (LNAPL area) (Section 13.4). Bioremediation of soil excavated from EX2, EX3, EX9A, EX11 and EX13 and bioremediation of gravels that contained asbestos prior to remediation to address asbestos (Section 13.4). Excavation of PFAS impacted soil – EX8/EX8a, EX14 and EX15 (Section 13.4). Stockpiling of soil during stabilisation or prior to off-site disposal. Stabilisation of soil impacted by PFAS from EX8/8a, EX14 and EX15 (Section 13.4). Removal of concrete and sediment from the settlement pond and WTP and removal of the drainage network (Section 13.4). Excavation or removal of asbestos from gravels, mastic, hot spots and the stockpile in the southern section of the site. Note the following unexpected finds: • Mastic joints in concrete slabs in the Filling Hall Warehouse identified to contain asbestos (encountered following demolition works). The joints were cut from the concrete slab and disposed off-site (Section 13.4). • Gravels beneath the Filling Hall Warehouse were identified to be contaminated with bonded asbestos and hydrocarbon (encountered following removal of concrete) these gravels were bioremediated and then placed in the asbestos containment cell (Section 13.4). • Fill in the southern stockpile. • The fill from the southern stockpile extended beneath the trees on the boundary and was unable to be excavated. Placement of asbestos impacted material (gravels and southern stockpile) in a containment cell	April 2022 to February 2023
Post Remediation Works	Removal of pavement. Removal of PFAS treatment area. Removal of drainage network, settlement pond and water treatment plant. Groundwater sampling.	April 2022 to April 2023



Stages	Activity	Timing
Monitoring During Remediation as per CEMP.	WTP monitoring. Asbestos air monitoring.	November 2021 to January 2023

13.2 Deviations from the RAP/RWP – Remediation Works Undertaken

The main deviations in the implemented remedial works from those outlined in the RAP and RWP were identified by JBS&G and are discussed in **Table 13.2**.

Table 13.2: Deviations from the RAP and RWP

Deviation from the RAP/RWP	Auditor Opinion
Bioremediation trial including micro biological profiling and testing of s200OilGone product was inconclusive. The bioremediation method using fertiliser and EN2000 first response® was not trailed prior to implementation	Not considered significant. Validation of the bioremediated soil and the post remediation soil vapour sampling was completed to demonstrate the effectiveness of the method. Soil with strong solvent/hydrocarbon odours was removed off-site rather than bioremediated on-site.
Soil with strong solvent/hydrocarbon odours from EX6 and EX7 were disposed of off-site to the RENEX facility rather than being subject to bioremediation on-site.	Off-site disposal is considered an adequate alternative to onsite remediation in terms of ensuring site suitability.
Minor deviations in the PAC application rate during the treatment trial – with 1% application of PAC considered appropriate. Additional PAC added to some soil due to oversupply of PAC.	Not considered significant. Validation of the PAC treated soil was completed to demonstrate the effectiveness of the method.
Additional asbestos was identified as follows: - Concrete slab mastic joints across the Filling Hall Warehouse contained asbestos. JBS&G estimated that the asbestos is likely to be associated with the demolition of the former asbestos cement sheet roof of the Filling Hall Warehouse, and the entrainment of the fibres within the pliable mastic. The joints were cut from the concrete slab and disposed off-site. - Gravel beneath the Filling Hall Warehouse (bonded asbestos) was found to contain asbestos. JBS&G considered that the asbestos is likely to be present as a result of demolition of the former asbestos cement sheet roof to the Filling Hall Warehouse. This material was included in the containment cell on site. - Fill in the southern stockpile, the majority of this material was included in the containment cell on site. - The fill from the southern stockpile extended beneath the trees on the boundary and was unable to be excavated. This material was retained in-situ on-site. On-site containment was identified in the RWP as a possible strategy to remediate asbestos impacts however significantly greater quantities of asbestos were identified that were not anticipated in the RAP/RWP.	On-site containment is considered a suitable approach to manage asbestos impacted soil identified on-site (gravels below concrete and in-situ asbestos in fill at the southern boundary). The containment cell and validation works are discussed in Section 13.4. Asbestos mastic joints were removed from the concrete and disposed off-site which is considered an appropriate remediation method.
Due to the above average rainfall during 2022, additional collection of runoff water into the site stormwater system was recorded. A water treatment system for PFAS including granulated activated carbon (GAC) was put in place to allow discharge into the Creek.	The management of site run off via the site stormwater system including the settlement pond and additional GAC filter is considered suitable. Sampling of the discharge water and in the Creek was completed to confirm the treatment was successful. See Section 16.3 .

Note that the proposed thermal treatment of all PFAS impacted soil outlined in the RAP was superseded by the proposed works in the RWP which included the off-site disposal of soil impacted with high concentrations of PFOS (above the human health guideline of 20 mg/kg) and identified on-site stabilisation of low concentrations of PFAS with PAC. This was considered a realistic remedial option.



Overall, the auditor considers that the deviations to the RAP/RWP were either not significant or were suitable adaptations that were consistent with the overall objective to ensure that the site could be made suitable for the proposed commercial/industrial landuses with no basement.

13.3 Site Infrastructure Removal

The following 61 ASTs were removed from site as part of site demolition:

- Raw Material Tank Farm - eight ASTs.
- The Finished Oil Storage Tank and Base Oil Tank Farm –37 ASTs.
- The Filling Hall Warehouse – 13 ASTs.
- The Production Oil Plant - three ASTs.

Prior to remediation, eight USTs were known to be on-site, additional USTs beneath the various operational areas/buildings on site were known to be present, but the final number of USTs was unknown.

In addition to the eight USTs identified prior to the remedial works, a further 16 USTs were encountered during the remedial excavations, such that in total, 24 USTs were removed from site.

JBS&G state that prior to UST removal, each vessel was opened, gas tested, and the contents inspected. Where USTs were water filled, the contents were pumped out and transferred to the onsite water treatment plant. Where foam filling was present, foam was disposed appropriately in a skip bin. Where oily residue was present, degreaser was applied, and the oily contents disposed via liquid waste removal tanker. Emptied USTs were destroyed onsite in a bunded area, and the material was disposed appropriately offsite.

The condition, content and nature of disposal of the USTs are summarised in **Table 13.3**.

Table 13.3: UST Removal

Excavation ID	UST(s) and size	UST condition	Contents and Disposal	UST Disposal
EX1	2 x concrete waste oil USTs (10 kL each)	No defects observed.	Empty.	UST crushed and disposed offsite.
EX2	1 x steel diesel UST (3 kL)	No defects observed.	Empty.	UST disposed offsite.
EX3	2 x concrete lab waste USTs (15 kL each)	No defects observed.	Empty.	UST crushed and disposed offsite.
EX4	2 x steel petrol USTs (10 kL each)	Abandoned with sand.	Water, removed by liquid tanker.	UST disposed offsite.
EX5	1 x steel diesel UST (15 kL)	Abandoned with foam filling.	Foam disposed offsite.	Foam and UST disposed offsite.
EX6	1 x steel diesel UST (15 kL)	Abandoned with foam filling.	Foam disposed offsite.	Foam and UST disposed offsite.
EX7	2 x steel white spirit USTs (20 kL each)	Abandoned with foam filling.	Foam disposed offsite.	Foam and USTs disposed offsite.



Excavation ID	UST(s) and size	UST condition	Contents and Disposal	UST Disposal
EX9	Area 1 6 x steel USTs (12 kL each)	No defects or rust observed.	Oily rainwater with NAPL film and viscous product on surface. degreased, pressure hosed, and oily contents disposed via liquid tanker.	UST and pipework degreased, pressure washed and disposed offsite.
	Area 2 1 x concrete/brick UST (15 kL)	No defects observed.	Oily rainwater with NAPL film and viscous product on surface. degreased, pressure hosed, and oily contents disposed via liquid tanker.	UST degreased and disposed offsite.
	Area 3 1 x concrete (15 kL), 1 x steel UST (12 kL)	None except small cracks in concrete UST with infiltrating seepage.	Oily rainwater with NAPL film and viscous product on surface. degreased, pressure hosed, and oily contents disposed via liquid tanker.	UST degreased and disposed offsite.
	Area 4 1 x concrete UST (15 kL)	Abandoned with concrete cap, historically ruptured along the wall.	Contents were isolated as a soil stockpile with oily residue (SP04(EX9)). Oily film removed from excavation via liquid tanker. Entire stockpile disposed to RENEX.	UST degreased and disposed offsite.
	Area 5 1 x concrete UST (5 kL)	No ruptures. Abandoned with concrete cap.	Empty. Residual oil pressure hosed and disposed via liquid tanker.	UST degreased and disposed offsite.
EX10	1 x steel UST (5 kL)	No defects or rust observed.	Small amount liquid contents removed via liquid tanker.	UST disposed offsite.
EX11	1 x brick UST (3 kL)	No defects observed.	Rainwater.	UST degreased and disposed offsite.
EX14	1 x brick UST (10 kL)	Could not be observed.	Demolition waste (purpose unknown).	UST crushed and disposed offsite.

Following UST removal, soil impact was progressively excavated based on field indicators such as staining, odours and PID measurements. Validation samples were collected on the walls and base of the excavations once the field indicators suggested the soil impact had been removed. Excavated soil was transferred to the onsite bioremediation area, where it was treated, and following validation for re-use, the soil was used to progressively backfill the excavations.

Overall, the auditor considers that nature of the UST's was adequately observed to inform the remedial extent and validation requirements and that the AST's and UST's and associated pipework were removed.

Due to the extent of the excavation across the operational areas, the likelihood of additional USTs /buried infrastructure remaining in the former operational areas on site is considered low.



The non-operational area to the north includes the administration building and a large, grassed area that is unable to be built on due to the overhead high voltage electrical powerlines. Three USTs adjacent to the administration building (EX2 and EX3) were identified and removed from the site. Additional sampling around the non-operational areas did not identify any significant contamination that would suggest the presence of USTs (See **Section 12.0**). As such the auditor considers that there is a low likelihood of there being additional USTs in the non-operational area to the north of the site.

13.4 Review of Remediation Activities

The remediation on-site was completed by JBS&G and the auditor's evaluation is provided in **Table 13.4**.

**Table 13.4 Review of Remediation and Validation Activities**

Strategy	Activities	Auditor Opinion
PFAS Remediation- Soil Remediation of PFAS impacted soil included: <i>Excavation of PFAS Impacted Soil</i> - Highly impacted soil was excavated and transported off-site for thermal treatment at the RENEX facility. <i>Stabilisation of Soil Impacted by PFAS</i> - Less impacted soil was treated on-site using PAC. Treated soil was reused on site. EX8/8A, EX14 and EX15. EX10 were included in the EX8 extent.	PFAS Remediation Trial - The trial assessed the likely effectiveness of the proposed PFAS remediation method adopted for soil impacted by PFAS at levels less than the health criterion (PFOS + PFHxS less than 20 mg/kg). The trial involved excavation of 1.3 m³ (in-situ volume) of PFAS impacted soil, placement in a plastic lined skip bin and raking through with 15 L PAC (approximately 1 % v/v). Soil samples were collected before and after PAC addition to assess the change in leachable levels of PFAS. Excavation and Offsite Disposal - Excavation of highly impacted soil (PFAS), off-site treatment and then disposal at the RENEX facility in Victoria (from EX8) was undertaken. The RWP proposed that soil with PFOS+PFHxS concentrations greater than 20 mg/kg, would be disposed off-site (original estimate of 450 m³). Only limited sampling was completed. Note that substantially more soil was sent to RENEX (approx. 2100 m³) due to BP contractual arrangements with RENEX. Onsite Treatment / Stabilisation of PFAS Impacted Soil - PFAS impacted soil was excavated from the remedial area in proximity of the former Production Oil Plant, referred to as EX8a. Approximately 3000 m³ of PFAS impacted soil was excavated and transferred to the PFAS remediation area and treated with PAC. - The PFAS treatment was completed on a hardstand blending pad. Approximately 3000m³ of treated soil was segregated into 150 small individual piles and then mixed with 1 % (v/v) PAC using an excavator rake bucket. Each pile was blended twice, with a 0.5 % addition ratio, each time. The PAC was added by hand distribution to ensure even coverage. If validation criteria were not met, then the soil was re-treated until validation was achieved. - During excavation, PFAS impacts were identified in backfill soil or base at the pipe excavations, beneath the area used PFAS stabilisation at eight distinct locations on the site. Impacted soil was mixed with PAC in-situ at each location to immobilise the PFAS impact. This was undertaken by using an excavator to blend the PAC with the soil. JBS&G state that due to an oversupply of PAC on-site in anticipation of a substantially greater volume of soil requiring treatment, PAC was added at rates typically exceeding 5% and approaching 10%. Trenches were backfilled following the PAC treatment. - Following validation, the final walls and base of EX8a were covered with approximately 3 m³ PAC. Further, the excavation extents, near the drum laydown and treated piles were each similarly covered with PAC. Treated soil was re-instated within the original excavation extent as 0.5 m layers, each compacted via excavator track rolling to near ground surface level. - Following completion of the bulk excavation works at EX8a, a total of 20 test pits were advanced by excavator to total depths of 2 m, distributed outside the perimeter of EX8a at distances of 5 and 10 m from the excavation to confirm that no further significant PFAS impact was present. Soil samples were collected from the centre of an excavator bucket at depths of 0.5 m, 1 m and 2 m to characterise levels of PFAS outside the excavation. The test pit program identified a minor hot spot of PFAS contamination adjoining the larger excavation, as associated with a historical sump. A small excavation was undertaken east from EX8a to target this hot spot, referred to as EX15. The impacted soil was removed, treated, and the excavation reinstated with PFAS treated soil. - PFAS treatment was conducted at EX14 associated with the removal of a single brick UST near the site south boundary. Soil was excavated and treated with PAC and then re-instated within the excavation void following confirmation of PFAS immobilisation. - Two small areas of PFAS impact were identified in the soil bioremediation areas, with impact restricted to near surface depths only. The 10 x 10 x 0.5 m areas were blended with 1 % (v/v) PAC in-situ using the excavator prior to establishment of a landfarm in this part of the site.	The PFAS remediation strategy was generally completed in accordance with the RAP/RWP noting that the deviations to the RAP/RWP including 1% addition of PAC are considered suitable. While limited samples were collected from the material taken off-site (to the RENEX facility), it is noted that a much greater volume of PFAS contaminated material was taken for off-site for treatment and disposal than originally anticipated due to BP contractual arrangements. The increased volume is considered a suitable and conservative variation to on-site treatment. Validation sampling is discussed in Section 14.0.



Strategy	Activities	Auditor Opinion
<u>Petroleum and Chlorinated Hydrocarbon Remediation – Soil, LNAPL and Perched Water in Fill</u> <i>Excavation of Impacted Soil – Petroleum and Chlorinated Hydrocarbons</i> - Soil with strong solvent/hydrocarbon odours from EX6 and EX7 were disposed off-site to the RENEX facility rather than being bioremediated on-site. <i>Excavation of Impacted Soil – Petroleum and Chlorinated hydrocarbons and Bioremediation of Soil Excavated</i> - Soil and gravel were excavated for onsite bioremediation and then reused on site. EX2, EX3 and EX9, EX11 and EX13 <i>Perched Water Extraction</i> - Removal of LNAPL/ Perched water from MW17 (Filling Hall Warehouse) EX13. <i>Excavations</i> - Soil from EX1, EX4 and EX5 was excavated, sampled and reinstated into excavation.	<u>Excavation of Impacted Soil and Off-Site Disposal</u> The excavation associated with PFAS remediation EX8/EX8A extended into EX6 and EX7. The excavated soil from EX6 and EX7 was noted to have solvent odours and elevated PID measurement (up to 1286 ppm), this material was disposed off-site to the RENEX facility rather than being bioremediated on-site. <u>Excavation of Impacted Soil for Bioremediation</u> Excavation and bioremediation of petroleum and chlorinated hydrocarbon contaminated soil was completed across the site and included EX2, EX3 and EX9, EX11 and EX13. - Approximately 12 m³ of impacted soil was excavated from EX2 and bioremediated. The excavation was associated with the diesel UST, south of the administration building. - Approximately 20 m³ of impacted soil was excavated from EX3 and bioremediated. The excavation was associated with a concrete UST, south of the administration building. - Approximately 1100 m³ gravel from below the Filling Hall and 300 m³ gravel from below the Base Oil Tank Farm impacted with bonded asbestos and hydrocarbons was scraped and stockpiled by excavator. - A further 300 m³ gravel was scraped from the Raw Oil Tank Farm base which was not impacted by asbestos. This material was kept separate from the asbestos impacted gravel. - Soil impacted with petroleum hydrocarbons were historically identified at the near surface within the extent of the Raw Oil Tank Farm. The infrastructure removal works at EX11 were extended to include a shallow excavation of contaminated soil over the extent of the Raw Oil Tank Farm Bund. Impacted soil was transferred for on-site bioremediation. - Approximately 10 m³ of soil was excavated from EX11 and bioremediated. - Five excavations were formed following the removal of 11 concrete / steel blending tanks in the northern portion of the Filling Hall (EX9 Area 1 to EX9 Area 5). - The excavation extents were further extended / combined to form a larger excavation "EX9a" and the walls battered at a 45° angle to the base depth. The base depth was extended in certain regions following analysis of soil and vapour data during the progression of excavation works. Selected samples were further analysed for aliphatic / aromatic speciation to calculate criteria specific for the composition of soil TRH impacts occurring from the blending tanks. - Approximately 2440 m³ of soil was excavated from EX9/EX9A and bioremediated. - A large excavation (EX12/EX13) was undertaken commencing from MW17 (LNAPL impacted monitoring well). The excavation was intended to target LNAPL impacted perched water in fill. By a process of excavating in an in-side-out manner, the extent of contaminated soil led to a historical drainage line passing in a north-south direction underlying the central portion of the Filling Hall. A historical repair to the line as observed in proximity of MW17 was identified as the likely source of impact reported at MW17. - The drainage line was removed along the length of the Filling Hall Warehouse, and the overall excavation progressed generally outwards from the alignment of the drainage line in multiple stages. The excavation extended to the east where multiple building pier footings were identified to be contributing to soil impacts. The excavation was terminated at the depth of groundwater (around 6 m) to allow removal of LNAPL. The excavation walls were battered at a 45° angle to the base depth. - Approximately 5700 m³ of soil impacted with petroleum and chlorinated hydrocarbons was removed and transferred to the onsite bioremediation area from EX13. Following validation, the excavation was subsequently enlarged to accommodate containment of asbestos contaminated soil.	The petroleum and chlorinated hydrocarbon remediation strategy was generally completed in accordance with the RAP/RWP. The off-site disposal of soil with strong solvent/hydrocarbon odours from EX6 and EX7 is considered a suitable and appropriate alternative to on-site remediation. Validation sampling is discussed in Section 14.0.



Strategy	Activities	Auditor Opinion
	<u>Bioremediation</u> Bioremediation trial, that included the microbiological profiling and testing of s200OilGone product, was inconclusive and so the following strategy was adopted: Soil: Fertiliser was blended with the soil at a ratio of 0.5 % (v/v), with the soil periodically turned via excavator during the period July to December 2022 to allow aeration and to control of moisture content. Validation sampling of the treated material was completed prior to reuse on site. Gravel: The material was combined and transferred to a portion of the site where the material was sprayed with "EN2000 first response®" biodegradation liquid at a ratio advised by the manufacturer. The gravels were then distributed to ensure the amendment was distributed through the gravels. The biodegradation amendment was advised as being effective to address heavy end petroleum hydrocarbon products as adhered to gravels / ballast. <u>Additional Excavation</u> Soil from around UST excavations in 3 locations did not require bioremediation prior to re-use on site: • 18 m³ of soil from EX01 was excavated and stockpiled as SP01. No indications of contamination or breaches of the tank were identified. The material was analysed and considered suitable for re-instatement into EX01. • 90 m³ of soil from EX04 was excavated and stockpiled (12 m³ SP01(EX4), 24m³ SP02(EX4), 54 m³ SP03(EX4)). No indications of contamination or breaches of the tank were identified. The material was analysed and considered suitable for re-instatement into EX04. • 46 m³ of soil from EX04 was excavated and stockpiled (13 m³ SP01(EX5), 25m³ SP02(EX5), 8 m³ SP03(EX5)). No indications of contamination or breaches of the tank were identified. The material was analysed and considered suitable for re-instatement into EX05. <u>Removal of LNAPL/ Perched Water</u> Perched water accumulating at the base of the excavation (EX13) was continuously dewatered using a submersible pump and transferred to the onsite water treatment plant. Eight water samples were collected using a disposable bailer from the excavation water across 18th August (when dewatering commenced) to 2nd December 2022 (a few weeks subsequent to the dewatering undertaken for the purposes of remediation). No odours or sheen was observed on the water post dewatering.	



Strategy	Activities	Auditor Opinion
Asbestos - Excavations <i>Mastic joints in concrete slabs</i> – Off-site disposal. <i>Gravels beneath the Filling Hall Warehouse</i> – Excavation and placement in containment cell. <i>Fill Stockpiles in South of the Site</i> – Systematic segregation, re-use on-site or placement in containment cell. <i>Historical Asbestos Hot Spot</i> - Excavation and placement in containment cell.	<u>Concrete Mastic (Unexpected Find)</u> A hazardous material building survey completed during the demolition works identified mastic in the pavement joints in the area of the Filling Hall, Warehouse and the pavement adjoining. The mastic was identified to contain asbestos. The pavement joints were saw cut to allow the segregation of the asbestos containing mastic from the pavement. The mastic portions of the concrete slabs were removed for off-site disposal as asbestos waste. <u>Asbestos Gravels (Unexpected Find)</u> Following removal of concrete pavement from the Filling Hall and the pavement adjoining the Base Oil Tank Farm, it was identified that the underlying gravel was impacted with bonded asbestos. Approximately 1100 m³ gravel from below the Filling Hall and 300 m³ gravel from below the Base Oil Tank Farm impacted with bonded asbestos and hydrocarbons was excavated. The material was bioremediated prior to placement in the containment cell within EX13. <u>Southern Stockpile</u> Bonded asbestos impacted fill material stockpiled in the southern portion of the site was segregated into asbestos and non-asbestos impacted portions to facilitate the remedial works as follows: - All soil stockpiles were subdivided by excavator into 360 smaller stockpiles each approximately 22 m³ in volume. Each smaller stockpile was spread by excavator into a 10 cm thick pad and visually inspected for asbestos. A total of 40 smaller stockpiles (total of approximately 1000 m³) were found to visually contain asbestos and were segregated from the remaining stockpiles. - Asbestos quantification (320 samples) was undertaken on each smaller stockpile where no visible asbestos was identified to confirm there was no asbestos present. The soil impacted with asbestos containing material was placed in the containment cell within EX13. Following that process, the soil deemed to be 'non asbestos containing material' was processed using a grid bucket to remove oversized anthropogenic material (typically concrete, steel and similar building and demolition waste) and reused on site. The concrete component was sampled for PFAS. The anthropogenic material was disposed offsite. Asbestos containing soil is likely to extend to the southern boundary of the site as the excavation was not continued due to the presence of trees. The material is retained in-situ where there is currently undergrowth and tree cover with limited exposed soil. <u>Asbestos Hot Spots</u> The area around the historical hotspot "SB27 and HA18" was excavated and asbestos quantification sampling was undertaken. The small amount of excavated soil reporting the presence of asbestos was transferred to the containment cell.	Appropriate. Further information on the asbestos containment on site is provided below. A long-term management plan has been developed (See Section 15.0) to manage asbestos impacted material retained on site which includes: - Asbestos impacted material placed within the containment cell. - Asbestos impacted material retained in-situ at the southern boundary of the site.



Strategy	Activities	Auditor Opinion
<u>Asbestos – Containment / Retention</u> <i>Asbestos Impacted Soil (excluding mastic from joints) – Placement in Containment Cell.</i> <i>Southern Section of The Site - In-situ Retention</i>	<u>Containment Cell</u> The excavation EX13 has been used as an asbestos containment area to manage asbestos identified on-site beneath the Filling Hall Warehouse and located as asbestos impacted fill in the southern portion of the site. The asbestos containment area was constructed as follows: - Excavation of an additional 3000 m³ of clean material from EX13 and stockpiling of the material to be reused as cover material. - Dewatering / pumping to remove loose / soft sediment from the base of the excavation and transfer to the Settlement Pond. - Survey completed of the extent of the excavation prior to backfilling. 1,100 m³ of asbestos impacted gravels were backfilled in typical 300 mm layers with compaction testing / certification following the placement of each layer. 1,000 m³ of asbestos impacted soil from the southern stockpile was placed in the same manner. - A high visibility marker layer was placed across the extent of the asbestos impacted soil and the level surveyed. - A 2.5-3 m capping layer was completed using available treated soils / stockpiled non-impacted soils. The cover layer was placed in 0.3 m layers with geotechnical testing to confirm compaction. Approximately 6,500 m³ of soil was used to complete EX13 to ground level. - The backfilled excavation was surveyed. <u>In-situ Retention</u> JBS&G indicate that some fill remains in the southern portion of the site as the mature trees on the southern boundary prevented excavation. No asbestos was observed by JBS&G in the southern excavation walls however as no asbestos sampling was completed in this area. The presence of asbestos in the remaining fill cannot be ruled out. JBS&G also identify that a water main, constructed of asbestos cement, was identified during the remedial works. There is the potential for additional asbestos piping to remain in the non-operational areas of the site. The known location of one water main has been identified running through the centre of the non-operational area. A figure showing the residual asbestos and the containment area is provided in Attachment 6, Appendix A. A long-term environmental management plan (LTEMP) has been prepared to manage the residual asbestos on site (Section 15.0).	The auditor considers that the containment and retention are appropriate and a review of the LTEMP is provided in Section 15.0.



Post Remediation Works

- Removal of concrete pavement.
- Removal of PFAS treatment area.
- Removal of drainage network, settlement pond and water treatment plant.
- Groundwater sampling.

Removal of PFAS Impacted Concrete Pavement.

Concrete pavement around the former Production Oil Plant, found to be contaminated with PFAS (levels of PFOS, PFHxS or PFOA exceeding 0.005 mg/kg) was disposed off-site as discussed in **Section 14.13** and **Section 16.2**.

Removal of Concrete from PFAS Treatment Area

Concrete pavement adjoining Excavation EX8/8A that was used as the PAC treatment area was removed due to decolouration (by the PAC) and disposed off-site as general solid waste (**Section 16.2**).

Removal of Drainage Network

A substantial network of stormwater pipes was present throughout the former operational areas of the site, directing surface water from across the site to the Settlement Pond, located at the south-eastern corner of the site. The stormwater pipes, potentially inclusive of flows sourced from the proximity of the former AFFF storage on the site were identified as:

- A network of pipes as located between the areas of EX8/8A and EX9/9A and in proximity of EX8A.
- A stormwater main line that passed through the central portion of the site, adjoining the west of the Export Office, and then travelled in a south-east direction towards the Settlement Pond.
- A stormwater main line that passed along the western boundary of the site, turned in an easterly direction as consistent with the alignment of the site ring road and discharged into the south-western corner of the Settlement Pond.
- A minor stormwater line from underlying the proximity of the WTP adjoining the south-western corner of the Settlement Pond and discharging through the south-western corner of the Settlement Pond.

Some of the pipes were removed as part of the remedial soil excavations.

Stormwater pipes not removed as part of the remedial excavations were removed from site as follows:

- Hammering / break-up of overlying pavement.
- Excavation to uncover the top of the stormwater / drainage pipe.
- Excavation to remove the stormwater / drainage pipe. The pipes were of masonry construction and were generally removed section by section.
- Additional excavation to clean the trench, allow inspection of the base of the trench and backfill.

The primary stormwater line passing along the eastern boundary of the site was not considered to have been affected by surface water flows from the former area of AFFF storage. This stormwater pipe remains in place.

Validation sampling was undertaken at the base of the pipeline trench and from the backfill material to determine whether PFAS impact was present. No aesthetic indicators of hydrocarbon impact were observed. Several hot spots of PFAS, identified in the base samples associated with the drainage line, were treated as discussed in the PFAS section above.

The post remediation works are appropriate.

The contaminated perched water was removed as part of the EX13 remediation excavation (see section above) and samples were collected of the water within the excavation. No further sampling of the shallow aquifer is required.

The deeper regional aquifer did not require remediation and the post remediation sampling of the existing wells is considered adequate for monitoring the regional aquifer.



Strategy	Activities	Auditor Opinion
	<u>Removal of Settlement Pond and WTP</u> The WTP and Settlement Pond were decommissioned in late April 2023 after all remedial works 'upstream' had been completed. The works included: • Scraping of sediment, which accumulated over several years within the Settlement Pond and placement into intermediate bulk containers (IBCs). The sediments were disposed off-site with the IBCs. • Saturated soil from the validated base of EX12/EX13 (approximately 600 m³) that had been excavated and spread for drying across the settlement pond was removed from the settlement pond in April and reused on site. • Transfer of the operational infrastructure of the WTP to Metropolitan Demolitions for the purpose of re-use / operation at their St Peters yard. • Disposal of 72 IBCs of spent GAC filter media off-site (Section 16.2 16.2). • Removal of pavement from the area underlying the WTP and from the extent of the Settlement Pond. Disposal of pavement off-site. • Removal of large triple interceptor trap (TIT) at south-eastern corner of Settlement Pond. Disposal of pavement off-site. • Use of remaining 1,000 m³ of site sourced treated / stockpiled soil to partially reinstate the void formed by the removal of the Settlement Pond. Decommissioning of stormwater outlet from the Settlement Pond.	
<u>Monitoring During Remediation Works</u> Asbestos air monitoring Water treatment plant discharge monitoring	<u>Asbestos Air Monitoring</u> JBS&G state that asbestos air monitoring (respirable fibre) was conducted during demolition and remediation activities where there was potential to disturb asbestos as instructed by a Licensed Asbestos Assessor and undertaken by Asbestos Competent Person. <u>Water Treatment Plant Discharge Monitoring</u> Assessment of stormwater discharge from the onsite water treatment plant modified with granular activated carbon (GAC) filters prior to the commencement of remediation earthworks, to confirm acceptable discharge levels in accordance with the adopted criteria. Collection of samples: • Prior to treatment (influent). • Following treatment with one row of GAC filters (inter). • Following treatment by the second of two rows of GAC filters (effluent). • At Prospect Creek slightly downgradient from the discharge point. Analysis of all samples for the complete extent of site COPCs which were TRH, VOC, PAH and PFAS.	Monitoring is considered appropriate.



14.0 Validation Activities

14.1 Validation Activities Undertaken

Validation works were required to confirm successful remediation of soil, sediment, concrete (pavement) and groundwater impacted by various contaminants including PFAS, petroleum hydrocarbons, chlorinated hydrocarbons, and/or asbestos.

The validation approach outlined in the RAP was refined in the RWP in consideration of the changes to the remedial activities with deviations discussed in **Table 14.1**.

Table 14.1: Deviations from the RAP and RWP – Validation Works

Deviation from the RAP/RWP	Auditor opinion
PFAS validation: - The vertical extent of the PFAS validation in EX8/EX8A was amended to 3 m bgl. - The wall validation sampling strategy was amended to incorporate the average PFAS concentrations for soil samples and leachate for EX8/EX8A. - The total PFAS/leachate analysis was not completed for every validation sample due to the laboratory not being able to process the large number of leachate samples. A relationship between the leachate and total concentration was developed to inform the validation sampling.	The overall validation strategy for PFAS is considered suitable.

A list of the main validation activities completed under the supervision of JBS&G and the timing are provided in **Table 14.2** below to provide context for the discussion provided further below. A selection of figures from the JBS&G validation reports indicating the excavation extents and validation sample locations are provided in **Attachment 5, Appendix A**. Due to the volume of samples, not all validation figures/ samples are attached to this SAR.

Table 14.2: Validation Activities Undertaken

Stages	Activity	Timing
Validation	Validation of excavations (soil, soil vapour and excavation water) for petroleum hydrocarbons and chlorinated hydrocarbons (Section 14.4) and PFAS (Section 14.5). Validation of bioremediated soil reused on site (Section 14.8). Validation of PFAS treated soil (Section 14.6). Soil vapour validation, post backfilling, where bioremediated soil was used to backfill excavations (EX8a, EX9a, EX13 and settlement pond) (Section 14.4.1). Validation beneath Southern stockpile areas (Section 14.9). Validation beneath settlement pond (vapour) (Section 14.4.1). Validation beneath WTP, shed and drainage lines (EX16-EX18) (Section 14.11). Validation around historical asbestos hot spots SB27 and A18 (Section 14.10).	April 2022 to February 2023
Other	Groundwater (Section Groundwater – Monitoring 14.15) Imported Material (Section 14.16)	December 2022



14.2 Validation Environmental Quality Criteria

Validation environmental quality criteria is consistent with the investigation criteria identified in **Section 7.0** with the following exceptions:

- Groundwater: PFOS a value of 1 µg/L based on protection of the Prospect Creek environment.
- Surface water: PFOS a value of 0.05 µg/L based on protection of the Prospect Creek environment.
- Soil vapour: TCE and/or *cis*-1,2-DCE a value of 8 mg/m³ was adopted to account for cumulative exposure.
- Soil vapour: The minimum value from CRC Care 2012 of the aliphatic/aromatic fraction for clay soil as provided in **Table 14.3**.
- Soil Vapour: JBS&G also provided site-specific criteria for 1,2-dibromo-3-chloropropene levels (DBCP) of 1.1 mg/m³ and chlorotoluene 320 mg/m³ in the Stage 1 Validation Report. These criteria were derived using methodology consistent with those derived in the HHERA and the auditor considers then suitable for remediation purposes considering the limited detection in the soil vapour.
- Soil: Where a PFOS leachate sample was unable to be analysed a PFOS criteria of 0.024 mg/kg was used as an indicator that leachate would exceed the leach-based criterion of 1 µg/L. This value was calculated based on the identified relationship between PFOS total in soil and measured PFOS leachate concentrations.
- Soil: The minimum value from CRC Care 2012 of the aliphatic/aromatic fraction for clay soil as provided in **Table 14.4**. If the aliphatic aromatic split is known, the TRH criteria can be adjusted (In accordance with CRC Care 2012) and additional site-specific TRH criteria derived, this adjustment was used for validation of parts of EX9A and 16 samples of the bioremediated soil.

Table 14.3: Soil Vapour Validation Criteria for TRH in mg/m³

TRH Fraction	Criteria	Exposure Pathway
F1	250	Inhalation
F2	270	Inhalation

Table 14.4: Soil Validation Criteria for TRH in mg/kg

TRH Fraction	Criteria	Exposure Pathway
F1	190	Inhalation and direct contact
F2	380	Inhalation and direct contact
F3	7600	Direct contact
F4	7600	Direct contact

An assessment for soil in reference to ecological criteria is less relevant for the site given the proposed commercial industrial uses and remediation was primarily by human health considerations. The ecological assessment for PFOS of the validation data in soil was driven by the potential for the PFOS to leach.



The NEMP also includes Management Limits for TRH which are sourced from CCME 2008⁵. The Management Limits are derived for petroleum hydrocarbons by CCME to reflect a number of policy factors including the avoidance or minimization of ignition or explosive hazard, non-aqueous phase liquids (NAPL) or free product, effects on buried infrastructure, aesthetic considerations, and potential exposure of workers in trenches excavated in PHC-impacted soils. The management limits have not been used as validation criteria as these considerations have been addressed through:

- Soil vapour sampling and field screening of methane and CO₂.
- PID screening and other aesthetic assessments (including staining and odours) during sampling to identify NAPL and aesthetic issues.

It is also noted that the TRH at the site is a combination of petroleum and chlorinated hydrocarbons so the Management Limits derived on the basis of petroleum hydrocarbons (from petrol and diesel) are unlikely to be representative of the conditions at the site.

The PAC treated soil was considered suitable for re-use when the following were met:

- PFOS leachate was below 0.001mg/L (protective of the off-site Prospect creek).
- PFOS total concentration was below 20 mg/kg (protective of on-site human health risk).
- JBS&G identified that gravels excavated during the remediation and treated to reduce hydrocarbon concentrations via bioremediation could potentially be re-used on-site below the groundwater. To assess if the gravel was suitable for re-use below the groundwater, JBS&G identified criteria for gravel leachate as measured by ASLP.

The auditor considers that the criteria is protective of the receptors at Prospect Creek as the critical receptor. The criteria considers both human health associated with recreational contact and the protection of the aquatic environment. The lowest of the human health (recreational contact) or ecological criteria identified for surface water in **Section 7.0** has been amended by a DAF of 5. JBS&G state that the factor of '5' is estimated by the relative lateral extent of the potential petroleum hydrocarbon / chlorinated ethene affected soil to the lateral extent of a catchment that may be measured between the containment and the receiving water body of Prospect Creek. The auditor considers the use of a DAF of 5 and the subsequent criteria to be appropriate and conservative based on the following:

- A factor of 5 is lower than the default DAF identified in USEPA 1996⁶ and CSIRO 2009⁷ and NEPM 2013.
- The ASLP analysis is likely to overestimate the leachable concentrations from the gravel.

14.3 Quality Assurance and Quality Control

An assessment of the quality assurance and quality control (QA/QC) was completed by the auditor and overall, the assessment did not identify any significant concerns in the QA/QC field and laboratory procedures adopted during the sampling and the auditor considers the quality assurance and quality control are acceptable for the remediation and validation undertaken.

In considering the data, the auditor concludes that the remediation and validation data is reliable and usable for the purpose of this audit and is representative of the post-remediation condition.

⁵ CCME 2008 Canadian Council of Ministers of the Environment, Canada Wide Standard for Petroleum Hydrocarbons (PHC) in Soil, 2008

⁶ US EPA 1996, *Soil Screening Guidance: Technical Background Document*, Office of Emergency and Remedial Response, 1996, United States Environmental Protection Agency

⁷ CSIRO, 2009, *The Australian Methodology to Derive Ecological Investigation Levels in Contaminated Soils*, October 2009, Heemsbergen D, Warne M, McLaughlin M and Kookana R CSIRO



14.4 Petroleum and Chlorinated Hydrocarbon Remediation Excavation - Validation

As discussed in **Section 13.0** several areas were excavated (EX1-EX7 and EX9 to EX13) for petroleum and chlorinated hydrocarbon remediation. Validation activities included:

- Collection of soil samples along the walls and base of the excavation.
- Collection of a water sample from excavation EX13 to confirm the shallow /perched groundwater had essentially been removed.
- Validation sampling beneath the Finished Oil and Raw Oil tank farm following removal of asbestos and hydrocarbon impacted gravels.
- Sampling of soil vapour around the excavation to confirm the soil vapour impacts do not extend beyond the excavation above the adopted criteria.
- Collection of soil vapour samples from the backfilled excavation to confirm that the petroleum and chlorinated vapour concentrations were below the adopted criteria.

The validation data for the key contaminants of concern are summarised in **Table 14.5 to Table 14.7**. No significant exceedances of other analytes (not listed in the tables) were identified.

14.4.1 Excavation – Soil Validation Results

Samples were collected along the walls and base of the excavations undertaken to address petroleum and chlorinated hydrocarbon impacts. The sampling locations and density are considered appropriate. Validation results summarised below do not include those sample results that have subsequently been excavated and only include VOCs detected above the PQLs. Following a review of the results, the auditor is satisfied that the areas that had failed the criteria have been excavated and adequately validated.

Table 14.5: Validation Sampling for EX1-EX7, EX9/EX9A - EX13 in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	3	HSL -D clay (0 to 1)	350	0	0	<0.2
Ethylbenzene	340	HSL -D clay (0 to 1)	350	0	0	<0.2
Toluene	950	HSL -D clay (0 to 1)	350	0	0	<0.2
Total Xylene	230	HSL -D clay (0 to 1)	350	5	0	4.2
TRH F1	190	Site specific	350	20	1	217
TRH F2	380	Site specific	350	62	8	2000
TRH F3	7600	Site specific	350	350	4	18800
TRH F4	7600	Site specific	350	350	0	580
1,1,2-trichloroethane	PQL	-	350	1	1	0.9
VOCs	LOR	Various	350	362	0	<0.5

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg)



The auditor notes the following based on the data provided in **Table 14.5**:

- The analytical results are generally consistent with the low PID readings and aesthetic assessment of odour and staining provided by JBS&G.
- Concentrations of BTEX, and VOCs were low, either below the limit of reporting or below the site criteria. One detection of 1,1,2 trichloroethane was identified however this is not considered significant given the isolated detection. The soil vapour results, that are more appropriate to assess inhalation exposure, are discussed in **Section 14.4.2**, with concentrations of 1,1,2 trichloroethane in soil vapour reported below site criteria.
- One exceedance of TRH F1 is identified with the concentration marginally above the nominated criteria, however this is not considered significant given the isolated detection. The soil vapour results, that are more appropriate to assess inhalation exposure, are discussed in **Section 14.4.2**, with the concentrations of TRH F1 in soil vapour, reported below site criteria.
- Elevated concentrations of the TRH F2 fraction (8 samples) and TRH F3 fraction (4 samples) above the adopted criteria were identified in one of the excavations (EX9A). Aliphatic/aromatic speciation undertaken (8 of these 10 samples) allowed the criteria to be adjusted for each sample. The auditor notes that the derivation of the criteria is considered appropriate and was consistent with that discussed in the HHERA and **Section 14.2**. **Table 14.6** below presents the TRH results compared to the adjusted criteria.

Table 14.6: Adjusted TRH criteria and TRH results mg/kg

Sample	TRH Fraction	Sample concentration mg/kg	Adjusted site-specific criteria mg/kg
EX9A_B33_4	TRH C10-16	1060	2000
EX9A_B33_4	TRH C16-C34	9470	66 900
EX9A_W4a_2	TRH C10-16	570	-
EX9A_W7B_4	TRH C10-16	450	1700
EX9A_W16a_2	TRH C10-16	510	830
EX9A_W16a_2	TRH C16-C34	18 800	30 800
EX9A_W21a_2	TRH C16-C34	7650	-
EX9A_W51a_3	TRH C10-16	600	1590
EX9A_W53_4	TRH C10-16	1850	1700
EX9A_W53_4	TRH C16-C34	18 800	35 400

- Speciated TRH not available

Table 14.6 indicates the F2 and F3 results were below the adjusted criteria with the exception of one sample. The exceedance is not considered significant as it was reported marginally above the criteria with the adjoining soil samples reporting concentrations below the criteria indicating that the exceedance is limited to a small area. In addition, the soil vapour criteria related to vapour intrusion and soil vapour sampling is more appropriate for assessing this exposure with results discussed in **Section 14.4.2** (noting that the concentrations were below site criteria).

The auditor considers that the soil results obtained are consistent with the PID measurements, and aesthetic assessment of odour and staining provided by JBS&G.



14.4.2 Excavation, Settlement Basin and Post Backfilling - Soil Vapour Validation Results

Soil vapour validation samples are discussed as follows:

- Soil vapour samples were collected around the excavation EX8/8A, EX9/9A and EX13 to confirm that the soil impacted with chlorinated hydrocarbons had been adequately removed. The vapour samples around the excavations were collected at a wall spacing of 10 m and at 1.5 m depth. Where the base of an excavation was saturated, soil vapour samples were not collected.
- Soil vapour samples were collected beneath the settlement basin/pond remediation to confirm the soil impacted with chlorinated hydrocarbons had been removed. Vapour probes were installed on a 10 m grid across the surface of the backfilled area, generally to a depth of 1 m bgs.
- Soil vapour samples were collected across the site, post backfilling of excavations with bioremediated soil, to confirm that the material reused does not pose a vapour risk. Vapour probes were installed on a 10 m grid across the surface of the backfilled area, generally to a depth of 1 mbgs.

The sampling included leak detection as well as vapour parameters (oxygen, carbon dioxide, carbon monoxide, methane, hydrogen sulfide and PID). Approximately 270 samples were collected across the site (inclusive of sediment basin and around the excavation). The auditor considers that the sampling locations and density are appropriate.

A summary of the validation soil vapour sampling results over the site compared to criteria is provided in **Table 14.7**.

Table 14.7: Soil Vapour Validation Summary in mg/m³

Analyte	GL	Reference	n	Detects	>GL	Max. Conc.
Benzene	5	HSL -D clay (0 to 1)	271	5	0	2.86
Ethylbenzene	1800	HSL -D clay (0 to 1)	271	9	0	2.86
Toluene	6500	HSL -D clay (0 to 1)	271	9	0	2.86
Total Xylene	1200	HSL -D clay (0 to 1)	271	9	0	6.09
Naphthalene	4	HSL -D clay (0 to 1)	271	3	0	0.24
TRH F1	250	Site specific	271	51	3	515
TRH F2	270	Site specific	271	47	1	335
PCE	8	HIL-D	271	1	0	0.16
TCE	8	Site specific	271	21	0	2.71
1,1,1TCA	230	HIL-D	271	15	0	2.14
Cis 1,2-DCE	8	Site specific	271	18	0	2.86
VC	0.1	HIL-D	271	1	1	0.13
1,1,2-trichloroethane	LOR	-	271	0	0	<0.07



Analyte	GL	Reference	n	Detects	>GL	Max. Conc.
Chloroform	5.3	USEPA RSL	271	29	0	0.089
DBCP	1.1	Site Specific	271	3	0	0.21
chlorotoluene	350	Site Specific	271	2	0	1.41

Samples and exceedances are counted manually and minor inconsistencies with sample number and laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/m³)

The concentrations were all below the adopted criteria with the exception of TRH F1 at 3 locations, TRH F2 at 1 location and one detection of VC. Given the large number of samples collected (271) the small number of elevated concentrations (<5) are not considered significant. The TRH exceedances were collected during validation of the excavation however it is noted that the samples collected post backfill from these same locations reported concentrations below the adopted site criteria. Given the post backfilled results JBS&G did not consider the exceedances of TRH or VC to be significant. The auditor agrees with this conclusion.

Methane, reported in some of the excavation validation samples, was found to be associated mostly with locations that also reported detections of petroleum hydrocarbons. JBS&G attributed the methane to the anaerobic decomposition of the petroleum hydrocarbons (with one exception in EX8A). JBS&G note that methane from petroleum hydrocarbon degradation is considered to have a negligible advective migration potential and the absence of a significant source of methane was confirmed with the subsequent soil vapour survey following backfill of the excavation. The auditor agrees with this conclusion.

14.4.3 Excavation – Water Validation Results

The RWP identified that validation of the remediation of the shallow perched water included a minimum of 200kL dewatered and treated or insignificant recharge and recharge had no aesthetic indicators of NAPL.

Perched water accumulating at the base of the excavation was continuously dewatered using a submersible pump and transferred to the onsite water treatment plant. JBS&G collected eight water samples using a disposable bailer from the excavation water from 18th August (when dewatering commenced) to 2nd December 2022, a few weeks post dewatering for the purposes of remediation. Samples were analysed for TRH and VOCs. JBS&G identify that on the 2 December, the concentration was below then limit of reporting.

The auditor notes:

- The continuous dewatering from August to December resulted in more than 200kL of water removed.
- The first sampling round in August returned a TRH C10-C40 concentration of 37.8 mg/L which is consistent with the presence of LNAPL.
- The TRH concentrations showed decrease over the sampling period with the final sampling on the 2 December returning concentrations of TRH and VOCs below the limit of reporting.

Given the above, the auditor agrees that the excavation water in EX13, and therefore the shallow/perched aquifer, has been remediated and successfully validated.

Overall, based on multiple lines of evidence provided by the soil, soil vapour and excavation water the petroleum and chlorinated hydrocarbon remediation represented by excavations EX1-EX7 and EX9 to EX11 have been appropriately validated.



14.5 PFAS Excavation – Soil Validation

The PFAS excavations were progressively extended with validation of EX8 completed following the excavation for off -site disposal to RENEX, the validation samples are summarised in **Table 14.8**. Noting that the summary validation tables present the data for the key CoC for the excavation, sampling was conducted for a wide suite of analysis, no significant exceedances of other analytes were identified.

Table 14.8: Validation Sampling EX8 in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOA	10	Eco, direct exposure	66	66	0	0.7
PFOA	50	HIL D	66	66	0	0.7
PFOS	0.14	Eco, indirect exposure	66	66	40	15
PFOS + PFHxS	20	HIL D	66	66	0	18

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg)

The excavation was then extended (EX8A) to validate for ecological exposures using total PFOS and leachable PFOS, the validation samples are summarised in **Table 14.9**. Validation results summarised below do not include those that were subsequently excavated. Following a review of the results, the auditor is satisfied that the areas that had failed the criteria have been excavated and adequately validated.

Table 14.9: Validation Sampling EX8A in mg/kg and mg/L

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOA mg/kg	10/ 50	Eco, direct exposure/ HIL-D	191	70	0	0.24
PFOS mg/kg	0.14	Eco, indirect exposure	191	151	7	1.26
PFOS + PFHxS mg/kg	20	HIL D	191	155	0	3.12
PFOS (leached) mg/L	0.001	Leaching to groundwater	191	134	22	0.06

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg and mg/L)



Due to some repeated minor exceedences of the validation criteria, JBS&G proposed an amended validation strategy to include an incremental sampling method⁸ (ISM). The ISM method is included in the most recent revision of the NSW EPA Sampling Design Guidelines (NSW EPA 2022) and includes identifying relevant sampling units and collecting composite samples within each designated sampling unit. For EX8A the following sampling strategy was employed:

- Each excavation wall (north, east, south and west walls) considered a sampling unit.
- 50 samples were collected from each sampling unit using a systematic random sampling pattern (i.e., each wall was divided into 50 grid-based nodes with a sample removed from each node), these samples were combined into a composite sample.
- A total of five composite samples were submitted for each sampling unit/wall (north, south, east and west).

A summary of the results is presented in **Table 14.10**.

Table 14.10: Additional Validation Sampling EX8A – PFOS Leach (mg/L)

Excavation	PFOS Leach mg/L	Average Leach mg/L	GL mg/L
EX8A North Wall	N-1 = 0.00207 N-2 = 0.0012 N-3 = 0.0016 N-4 = 0.0014 N-5 = 0.00061	0.0013	0.001 (Ecological)
EX8A South Wall	S-1 = 0.0003 S-2 = 0.0004 S-3 = 0.0005 S-4 = 0.0004 S-5 = 0.0008	0.0005	0.001 (Ecological)
EX8A East Wall	E-1 = 0.0018 E-2 = 0.0023 E-3 = 0.0029 E-4 = 0.00434 E-5 = 0.0024	0.0028	0.001 (Ecological)
EX8A West Wall	W-1 = 0.0012 W-2 = 0.0019 W-3 = 0.0016 W-4 = 0.0028 W-5 = 0.0012	0.0017	0.001 (Ecological)
GL	Guideline (mg/kg and mg/L)		

⁸ *Incremental Sampling Methodology*, February 2012, Interstate Technical and Regulatory Council (ISM, ITRC 2012).



Three out of the four excavation walls reported an average PFOS leaching level that was slightly above the adopted criteria. The average total PFOS in soil was below the indirect ecological value of 0.14 mg/kg.

JBS&G provided further evaluation of the leachate concentrations by adjusting the PFOS leachate criteria by amending the DAF used to generate the value (See **Section 11.8.2**).

The adopted criteria considered in **Table 14.10** as derived by enRisks based on a generic DAF of 20. Given the exceedences of that adopted criteria, JBS&G proposed that a revised criteria be considered using a DAF of 50. In accordance with CSIRO (2009)⁹ JBS&G calculated the DAF based on the amount of PFAS contaminated material compared to the total size of the catchment (which is assumed to be the site plus the reserve between the site and Prospect Creek). JBS&G estimate that 2% of the site soil may be impacted with PFAS, based on the size of the PFAS excavation plus an additional 10 m beyond each of the existing excavation walls. This provides a DAF of 50 and a corresponding PFOS leachate criterion of 0.0025 mg/L. The auditor considers this to be reasonable.

The combined average PFOS leaching of all four excavation walls is 0.0016 mg/L, which is less than the JBS&G adjusted criteria of 0.0025 mg/L. JBS&G consider that the excavation had been appropriately validated with regard to PFOS leaching. The auditor agrees with this conclusion.

To confirm that the PFAS concentrations did not extend significantly beyond the extent of the excavation JBS&G collected soil samples from 20 test pits around EX8a at distances of 5 and 10 m from the perimeter of EX8A. Note that soil samples were collected from the centre of an excavator bucket at depths of 0.5 m, 1 m and 2 m. With the exception of TP20 (discussed below) and one quality control sample from TP07 (discussed below) the soil concentrations were reported below the calculated criterion of 0.024 mg/kg (for when leachate samples not analysed).

As the concentrations of PFOS in soil at TP20 exceeded the calculated criterion of 0.024 mg/kg at all depths, it was considered that concentrations of leachable PFOS were likely to be present above 1 µg/L. The impacted soil (referred to as EX15) was excavated, validated and the treated/stabilised soil used to reinstate the excavation.

The triplicate sample at 1m depth in TP07 that exceeded the adopted criteria of 0.024 mg/kg was located between two samples, overlying at 0.5 m and underlying at 1 m, where the samples each reported 'non-detect' for PFOS. The surrounding test pits also had concentrations below the criteria. JBS&G considered that the limited extent of impacted soil would present a minor potential leaching risk. The auditor agrees with this conclusion.

Overall, the auditor considers that the PFAS remediation excavation was appropriately validated based on the following:

- The PFOA and PFOS+PFHxS concentrations in validation samples are below the relevant human health guidelines.
- The total PFOS concentrations in the validation samples are below the indirect ecological soil criteria of 0.14 mg/kg.
- The average PFOS concentrations in soil leachate samples are below the adjusted criteria protective of the off-site Prospect Creek.

Overall, the auditor considers that the remediation has resulted in a significant reduction in the mass of PFAS in soil.

⁹ *The Australian Methodology to Derive Ecological Investigation Levels in Contaminated Soils*, October 2009, Heemsbergen D, Warne M, McLaughlin M and Kookana R CSIRO (CSIRO, 2009)



14.6 Bioremediated Soil and Gravel Validation for Re-Use

Generally following infrastructure removal, or as impacted soils or gravel were excavated, material with evident odour and / or staining was transferred to the onsite bioremediation area. Volumes of transferred soil include:

- 2440 m³ of soil from the Blending Tanks (EX9/9A) at the north of the Filling Hall.
- 5700 m³ of soil from the large excavation at the Filling Hall and Warehouse which commenced at MW17.
- 10 m³ soil from EX11 formed around a UST within the Raw Oil Tankfarm.
- 12 m³ soil EX2 formed around a diesel UST south of the administration building.
- 20 m³ soil EX3 formed around concrete USTs south of the administration building.

Volumes of excavated gravel include:

- 60 m³ gravel from below the roadway south of the production oil building.
- 300 m³ asbestos containing gravel fill from finished oil tankfarm.
- 1100 m³ asbestos containing gravel fill from the Filling Hall Warehouse.
- 300 m³ gravel fill from raw oil tankfarm.

Bioremediated material was generally segregated by the excavation areas from where they were exhumed. The asbestos containing gravels were kept separate from the non-asbestos impacted material.

At the completion of bioremediation works, a comprehensive assessment was completed to assess the bioremediated soil/gravel by collecting validation samples at a rate of 4 samples per 100 m³, screened with a PID with the sample of each subset of 4 that reported the highest levels on the PID selected for analysis for TRH and VOCs. The results compared to the validation criteria in **Table 14.11** to **Table 14.14**.

14.6.1 Bioremediated Soil Validation

Approximately 8200m³ of soil was bioremediated on site and was sampled at a frequency of 1 in 54 m³, which exceeds that specified in the RWP (1 in 100 m³). The frequency is considered suitable by the auditor. Limited hydrocarbon odours were reported by JBS&G which was consistent with low PID readings. The analytical results compared to the validation criteria are presented in **Table 14.11**.

Table 14.11: Validation Results for Bioremediated Soil in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	3	HSL -D clay (0 to 1)	150	0	0	<0.5
Ethylbenzene	340	HSL -D clay (0 to 1)	150	0	0	<0.5
Toluene	950	HSL -D clay (0 to 1)	150	0	0	<0.5
Total Xylene	230	HSL -D clay (0 to 1)	150	0	0	<0.5
TRH F1	190	Site specific	150	35	0	<10
TRH F2	380	Site specific	150	128	14	1130
TRH F3	7600	Site specific	150	149	0	6920



Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
TRH F4	7600	Site specific	150	147	0	1920
VOCs	LOR	Various	150	0	0	<0.5

n number of samples

- No criteria available/used or not analysed

GL Guideline (mg/kg and mg/L)

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

The auditor notes the following based on the data provided in **Table 14.11**:

- All results were reported below the limit of reporting for BTEX and other VOCs.
- All results were reported below the guideline value for TRH F1, TRH F3 and TRH F4
- 14 samples exceeded the guideline value for TRH F3. Minor hydrocarbon odours were identified associated with 11 of the samples that exceeded the TRH criteria.
- Aliphatic/aromatic speciation completed for the samples that exceeded the TRH criteria to derive site specific criteria.

Table 14.12: Adjusted TRH F2 Criteria for Bioremediated Soil in mg/kg

Sample	Sample concentration mg/kg	Adjusted site-specific criteria mg/kg
LFBV16	550	1420
LFBV20	630	1260
LFBV21	480	1280
LFBV22	400	1420
LFBV40	440	1610
LFBV80	1130	1400
LFBV94	420	-
LFBV95	430	1270
LFBV97	390	1300
LFBV99	440	-
LFBV101	460	-
LFBV103	400	1250
LFBV106	430	1170

- Speciated TRH not available



The auditor notes the following based on the data provided in **Table 14.12**:

- The derivation of criteria is considered appropriate and is consistent with that discussed in the HHERA and **Section 14.2**.
- All concentrations were below the adjusted criteria.
- The auditor notes three of the 14 samples did not have speciated TRH results, the TRH F2 results for these samples ranged from 420-460 mg/kg. The adjusted criteria for other samples with concentrations of a similar range (400 – 480 mg/kg) had adjusted criteria ranging from 1170 – 1420 mg/kg. The lowest adjusted criteria for the TRH F2 fractions (1170 mg/kg) is considered suitable to apply to the samples without speciated results. All TRH F2 concentrations are below this value.

JBS&G state '*The treated soils were confirmed as free of any significant aesthetic impacts as associated with hydrocarbon based contaminants. The soils were further free of any significant anthropogenic inclusions*'.

The auditor agrees the bioremediated soil material is suitable for re-use on site.

14.6.2 Bioremediated Gravel Validation

Approximately 1760m³ of gravel was bioremediated on site and was sampled at a frequency of 1 in 53 m³, which exceeds that specified in the RWP (1 in 100 m³). The frequency is considered suitable by the auditor. Limited hydrocarbon odours were reported by JBS&G which is consistent with low PID readings. Validation results for the gravel compared to remediation criteria are presented in **Table 14.3**.

Table 14.13 Validation Results for Bioremediated Gravels in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	3	HSL -D clay (0 to 1)	33	0	0	<0.5
Ethylbenzene	340	HSL -D clay (0 to 1)	33	0	0	<0.5
Toluene	950	HSL -D clay (0 to 1)	33	0	0	<0.5
Total Xylene	230	HSL -D clay (0 to 1)	33	0	0	<0.5
TRH F1	190	Site specific	33	2	0	41
TRH F2	380	Site specific	33		1	700
TRH F3	7600	Site specific	33	33	1	7830
TRH F4	7600	Site specific	33	33	0	2600
TCE	0.5	US EPA RSL	33	1	1	1.2
VOCs	PQL	Various	33	0		<0.5

n number of samples

- No criteria available/used or not analysed

GL Guideline (mg/kg and mg/L)

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.



The auditor notes the following based on the data provided in **Table 14.13**:

- All results were below PQL for BTEX and below the guideline value for TRH F1, and TRH F4.
- One sample result exceeded the guideline value for TRH F2 and one sample result for F3. Aliphatic/aromatic speciation was completed for these samples to derive site specific criteria, which is discussed below (**Table 14.4**).
- All results were below the limit of reporting for other VOCs with the exception of a single detection of TCE (1.2 mg/kg) from the asbestos impacted gravels. The gravel is to be placed within the asbestos containment cell, below the groundwater and below at least 3 m of compacted clay-based soil. Soil vapour data validation of the backfilled excavation has been used to provide final vapour validation (See **Section 14.4.1**) and no detections of TCE were identified in the backfilled excavation. As such this single detection is not considered to be significant.

Table 14.14 Adjusted TRH Criteria for Bioremediated Gravels in mg/kg

Sample	TRH Fraction	Sample concentration mg/kg	Adjusted site-specific criteria mg/kg
LFV31	TRH F2	700	1390
LFV163	TRH F4	7830	-

- Speciated TRH not available

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

Speciated TRH was not available for LF163 to adjust the TRH F4 criteria. JBS&G calculated a range of adjusted criteria based on the speciated results from the 33 soil and gravel samples available. The calculated criteria ranged from 22 100 to 51 300 mg/kg. The measured concentration of 7830 mg/kg is substantially below the calculated TRH F4 criteria, and the auditor does not consider the exceedance of TRH F4 to be significant.

14.6.3 Gravel Leachability

A total of 17 gravel samples were analysed for ASLP to confirm that the gravel was suitable for placement below the groundwater. The samples were analysed for TRH, BTEX and VOCs and compared to the validation criteria as summarised in **Table 14.15**. below.

Table 14.15 Gravel Leachability Validation in mg/L

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	0.005	ADWG and a DAF of 5	17	0	0	<0.001
Ethylbenzene	0.4	ANZG and a DAF of 5	17	0	0	<0.002
Toluene	0.9	ANZG and a DAF of 5	17	0	0	<0.002
Total Xylene	1	ANZG and a DAF of 5	17	0	0	<0.002
TRH F1	2.2	CRWB (2016) and a DAF of 5	17	0	0	<0.02
TRH F2	2.2	CRWB (2016) and a DAF of 5	17	0	0	<0.1
TRH F3	3.2	CRWB (2016) and a DAF of 5	17	17	0	1.18



Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
TRH F4	3.2	CRWB (2016)	17	0	0	<0.1
VOCs	PQL	Various and a DAF of 5	17	0	0	<0.005

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/L)

The auditor notes the following based on the data provided in **Table 14.15**:

All ASLP results are below the validation criteria. JBS&G identified that the triplicate QAQC sample exceeded the validation criteria for TRH F3 and F4. However following investigation into the results JBS&G concluded the triplicate result was anomalous and likely due to a laboratory error and not representative of the gravel leachate. The auditor considers this reasonable based on:

- The primary and duplicate results for this sample were consistent.
- The results for the primary/duplicate sample were consistent with the remainder of the data set.
- The concentration of TRH identified in the triplicate sample (21.9 mg/L) is representative of free phase product and this is not consistent with the field observations for this sample which stated no odour and low PID reading (23 ppm).

JBS&G conclude that the bioremediated '*soils and gravels were considered to be appropriate for onsite re-use.*' The auditor agrees with this conclusion.

14.7 PFAS Treated Soil – Soil Validation for Re-Use

Approximately 3000 m³ of PFAS impacted soil was excavated and transferred to a nearby hardstand blending pad where 150 small individual piles were mixed with 1 % (v/v) PAC using excavator rake bucket. Generally, the PAC treatment works occurred at the same time as the EX8a excavation works, to avoid potential scenarios of stockpiling significant quantities of (untreated) PFAS impacted soil.

Table 14.16 PFAS Concentrations in Soil for Re-use in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOS+PFHxS mg/kg	20	Human Health Risk	157	135	2	70
PFOS (leached) mg/L	0.001	Leaching to groundwater	157	122	6	0.01

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg and mg/L)

Two locations exceeded the human health guideline for PFOS+PFHxS, one location with a concentration of 70 mg/kg and one location with a concentrations of 24 mg/kg. JBS&G did not comment on these exceedances however the auditor notes this represents a small amount (approximately 1%) of the treated soil. The auditor also notes these was sampled at start of the stabilisation treatment and this soil was placed back in the excavation at depths greater than 2 m bgl and above the water table. As such, these 2 exceedances are not considered to represent a risk to human health.



Six leachate samples exceeded the PFOS criteria JBS&G that that 'Treatment piles which failed the validation criteria were re-treated by the identical process and reassessed'.

Overall JBS&G conclude that 'The validation of the PFAS affected soils is complete and has met the appropriate validation criteria- and the soils are considered appropriate to be re-used on the site'.

The auditor agrees with this conclusion, noting that the small amount of soil that exceeded the human health criteria is not considered to represent a risk to human health as:

- This represents a small amount (approximately 1%) of the treated soil.
- The material was placed below 2 mbgl and as such is not expected to be available for direct contact with commercial workers or intrusive maintenance workers on site.

14.8 Soil Validation Beneath the Bioremediation and PFAS Treatment Area

Soil samples were collected from beneath the areas used for on-site treatment:

- 118 samples were collected from across the surface of the area used for bioremediation and analysed for TRH, BTEX and VOCs.
- 26 samples were collected for asbestos quantification beneath the area used to bioremediate gravels with asbestos and beneath a temporary stockpile area.
- 37 samples were collected from across the surface of the unsealed portion of the area used for PFAS stabilisation. Samples were analysed for total PFAS and leachable PFAS.

The sampling was considered appropriate and a summary of the results compared to relevant criteria is provided in **Table 14.17** and **Table 14.18**.

Table 14.17 Validation Beneath the Bioremediation Area in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	3	HSL -D clay (0 to 1)	118	0	0	<0.2
Ethylbenzene	340	HSL -D clay (0 to 1)	118	0	0	<0.2
Toluene	950	HSL -D clay (0 to 1)	118	0	0	<0.2
Total Xylene	230	HSL -D clay (0 to 1)	118	0	0	<0.5
TRH F1	190	Site specific	118	0	0	<20
TRH F2	380	Site specific	118	20	0	170
TRH F3	7600	Site specific	118	110	0	4880
TRH F4	7600	Site specific	118	97	0	1470
VOCs	LOR	Various	118	0	0	<0.2
Asbestos ACM	0.05%	HIL-D	26	0	0	<0.05 no visible ACM
Asbestos FA/AF	0.001%	HIL-D	26	0	0	<0.001

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg)



Table 14.17. indicates all concentrations were below the site validation criteria and the auditor notes analytical results are consistent with the aesthetic indicators, odour and PID readings reported by JBS&G.

Table 14.18 Validation beneath the PFAS Stabilisation Area

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOA mg/kg	10/ 50	Eco, direct exposure/ HIL-D	37	3	0	0.1
PFOS mg/kg	0.14	Eco, indirect exposure	37	26	8	1
PFOS + PFHxS mg/kg	20	HIL D	37	26	0	2.5
PFOS (leached) mg/L	0.001	Leaching to groundwater	37	31	3	0.016

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
- No criteria available/used or not analysed
GL Guideline (mg/kg and mg/L)

The auditor notes the following based on the data provided in **Table 14.17**:

- There were no exceedances of the human health direct contact guideline.
- Exceedances of the ecological indirect guideline and leachable PFOS were identified, JBS&G note the exceedances were in two areas (Near PSB-04 and PSB-12). To address these exceedances, soil at these two areas was mixed with PAC in-situ to a depth of 0.5 m and six validation samples were collected for leachate analysis. The validation sample results are below the leachate guideline in four of the six validation samples.
- JBS&G identified that the average total level of PFOS for the area is 0.19 mg/kg which is similar to the estimated indirect criterion (0.14 mg/kg).

When taking into consideration the remainder of the site soil, which typically had negligible levels of PFAS, JBS&G concluded that this small area of soil would not pose a potentially unacceptable indirect ecological risk. The auditor agrees with this conclusion.

14.9 Validation Beneath the Southern Stockpile

Approximately 22 samples were collected from the surface and analysed for asbestos beneath the southern stockpile. Asbestos was identified in one location and JBS&G state this was excavated, validated and the asbestos material included in the on-site containment. The sampling locations and density are considered appropriate.

Validation results summarised in **Table 14.19** below do not include those sample results that have subsequently been excavated. Following a review of the results, the auditor is satisfied that the areas that had failed the criteria have been excavated and adequately validated.

Table 14.19 Asbestos Quantification Beneath the Southern Stockpile

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Asbestos ACM	0.05%	HIL-D	18	0	0	<0.05 no visible ACM
Asbestos FA/AF	0.001%	HIL-D	18	0	0	<0.001

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
- No criteria available/used or not analysed
GL Guideline (%)



The auditor notes that based on the data provided in **Table 14.19**, no exceedances of the asbestos criteria are identified in the final validation samples.

JBS&G note that some fill material remains beneath the trees on the southern boundary. While no asbestos was observed in the fill, this area has not been sampled and it cannot be confirmed that the area beneath the trees is free of asbestos. JBS&G indicate this area will be managed under the LTEMP for the site. The auditor agrees with this conclusion and a review of the LTEMP is provided in **Section 15.0**.

14.10 Validation Following Asbestos Gravel and Concrete

Following scraping of asbestos and hydrocarbon impacted gravel and transfer to the bioremediation area, soil validation samples were collected from the clay tankfarm based on a 5 m grid. Each sample was collected by hand auger and analysed for TRH, VOCs and asbestos. Additional samples were analysed for TRH and VOCs beneath the gravel identified to be impacted by hydrocarbons. The TRH and VOC results are included in the validation **Section 14.4**.

Validation sampling following removal of asbestos hot spots was also completed following excavation and inclusion of the soil in the asbestos containment area.

The auditor considers the sampling frequency to be appropriate. It is acknowledged that test pits are the preferred method for asbestos identification, however given the extensive asbestos sampling and occurrence of the asbestos in concrete joints and underlying gravels, which were excavated down to the natural clays the sampling approach is considered sufficient. A summary of the asbestos results is provided in **Table 14.20**.

Table 14.20 Asbestos Quantification Following Removal of Asbestos Gravels, Concrete and Hot Spots

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Asbestos ACM	0.05%	HIL-D	117	0	0	<0.05 no visible ACM
Asbestos FA/AF	0.001%	HIL-D	1174	0	0	<0.001

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
- No criteria available/used or not analysed
GL Guideline (%)

The auditor notes that based on the data provided in **Table 14.20** that no exceedances of the asbestos criteria were identified in the final validation samples.

14.11 Validation Beneath Roadways, Settlement Pond, WTP and Remaining Buildings

Following completion of the remediation of the main excavations, sampling in areas that were previously inaccessible due to access requirement was completed. Validation samples were collected as follows:

- Beneath the settlement pond and WTP.
- Beneath the remaining roadways and site buildings, Export Office (5 samples), Inflammables Store (6 samples) and Fire Water Pump House (22 Samples).

A summary of the validation samples for key chemicals of concern compared to criteria is provided in **Table 14.21** and **Table 14.22** below.


Table 14.21 Validation Results Beneath the Roadway, Settlement Pond, WTP and Remaining Buildings in mg/kg (excluding PFAS)

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	3	HSL -D clay (0 to 1)	76	0	0	<0.1
Ethylbenzene	340	HSL -D clay (0 to 1)	76	0	0	<0.1
Toluene	950	HSL -D clay (0 to 1)	76	0	0	<0.1
Total Xylene	230	HSL -D clay (0 to 1)	76	0	0	<0.3
TRH F1	190	Site specific	76	1	0	22
TRH F2	380	Site specific	76	15	0	220
TRH F3	7600	Site specific	76	23	0	2900
TRH F4	7600	Site specific	76	20	0	1200
VOCs	PQL	Various	76	0	0	<0.5
Dichlormethane	PQL (0.5)		76	1	1	0.8
Asbestos ACM	0.05%	HIL-D	78	0	0	<0.05 no visible ACM
Asbestos FA/AF	0.001%	HIL-D	78	0	0	<0.001

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples

- No criteria available/used or not analysed

GL Guideline (mg/kg)

Table 14.22 Summary of PFAS Validation Results for Roadways, Settlement Pond, WTP and Remaining Buildings

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOA mg/kg	10/ 50	Eco, direct exposure/ HIL-D	66	3	0	0.0004
PFOS mg/kg	0.14	Eco, indirect exposure	66	35	0	0.048
PFOS mg/kg	0.024	Protective of leachate to 0.001mg/L	66	35	1	0.048
PFOS + PFHxS mg/kg	20	HIL D	66	35	0	0.059
PFOS (leached) mg/L	0.001	Site Specific	32	26	0	0.00061

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples

- No criteria available/used or not analysed

GL Guideline (mg/kg and mg/L)

In reviewing the data in **Table 14.21** and **Table 14.22** the auditor notes:

- The soil beneath the Settlement Pond and WTP, roadways and site buildings, (Export Office, Inflammables Store and Fire Water Pump House) reported detections below the validation criteria. JBS&G also note the samples were free of aesthetic indicators of hydrocarbon impact.
- One detection of dichloromethane was identified, the isolated detection just above the PQL is not considered significant give the lack of indicators of other impact, no odours, staining or elevated PID readings.



- An exceedance of the total PFOS criteria protective of leaching was identified at one location adjoining the Fire Water Pump House. JBS&G note that no action was required in response to this marginal exceedance of PFOS as the sample location was highly localised and the average level of PFOS underlying / adjoining the Fire Water Pump House is well below the adopted criterion. It is noted that no AFFF, or otherwise PFAS containing products were used / stored / processed at the Fire Water Pump House. The facility simply pumped clean potable water from a former adjoining Fire Water Tank. The auditor agrees with this conclusion and these areas are considered validated.

14.12 Validation Beneath Drains

Validation sampling associated with the drainage network was completed as follows:

- From the walls and base of the excavation following the removal of the drainage pits (EX16 to EX18).
- The base of the pipeline trenches following removal of the stormwater network and concrete pipes from the remediation areas on site. Samples along the drainage lines were collected every 5m.
- The backfill material generated by excavation of the pipeline trench and of the concrete pipes from the removal of the trench to determine whether PFAS impact was present.

The frequency and depth of sampling is considered appropriate. A summary of the validation sampling and validation criteria is provided in **Table 14.23** and **Table 14.24**.

Table 14.23 Summary of Validation Results (excluding PFAS) from Drainage Lines and Pits (EX16 to EX18) in mg/kg

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
Benzene	3	HSL -D clay (0 to 1)	345	0	0	<0.2
Ethylbenzene	340	HSL -D clay (0 to 1)	345	0	0	<0.2
Toluene	950	HSL -D clay (0 to 1)	345	0	0	<0.2
Total Xylene	230	HSL -D clay (0 to 1)	345	0	0	<0.5
TRH F1	190	Site specific	345	2	0	65
TRH F2	380	Site specific	345	7	2	1720
TRH F3	7600	Site specific	345	53	0	6700
TRH F4	7600	Site specific	345	28	0	1500
VOCs	LOR	Various	345	0	0	<0.2
PCE	0.5	USEPA RSL	345	1	1	0.6

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (mg/kg)

**Table 14.24 Summary of PFAS Validation in Drainage Lines and Pits (EX16 to EX18)**

Analyte	GL	Reference	n	Detects	n>GL	Max. Conc.
PFOA mg/kg	10/ 50	Eco, direct exposure/ HIL-D	400	14	0	0.002
PFOS mg/kg	0.14	Eco, indirect exposure	400	134	3	0.21
PFOS mg/kg	0.024	Protective of leachate to 0.001mg/L	400	134	32	0.21
PFOS + PFHxS mg/kg	20	HIL D	400	143	0	0.22
PFOS (leached) mg/L	0.001		9	4	0	0.00003

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples

- No criteria available/used or not analysed

GL Guideline (mg/kg and mg/L)

In reviewing the data presented in **Table 14.23** and **Table 14.24** the auditor notes:

- JBS&G note that no aesthetic indicators of hydrocarbon impact were observed in the areas sampled.
- Exceedance of the TRH F2 criteria was identified in EX17 at one location. JBS&G note that the principal risk posed by elevated levels of TRH C10-C16 relates to potential vapour intrusion / inhalation risk. This is more appropriately assessed by soil vapour data. A soil sample was collected from this location post backfill and the concentrations of TRH F2 were below the validation criteria confirming this location did not present a vapour intrusion risk. The auditor agrees with this conclusion. The excavations at EX16-EX18 are considered to have been successfully validated.
- An exceedance of the TRH F2 criteria was also reported at one sample beneath the drainage lines. A site-specific guideline based on aliphatic and aromatic speciation of the sample was calculated and the results were below the site-specific TRH criteria.
- Some localised exceedances of the PFOS criteria protective of leaching were identified in soil samples collected from drainage trench base or stockpiled backfill soil generated by the works. The following activities were completed to address these exceedances:
- Additional deeper validation samples were collected to confirm the depth of PFAS impacts underlying sample locations. The results confirm that impacted soil was restricted to shallow depths underlying the pipeline at each location only.
- PAC treatment of soil was undertaken at each of these locations to immobilise the PFAS. Treatment was undertaken in-situ for trench bases and ex-situ for associated backfill soil. The in-situ method consisted of excavation of soil at the base of the trench, placement of PAC not the disaggregated soils, and mixing of the PAC through the soil. Excavation depths were 0.5 m in most locations.
- Validation of PAC treatment confirmed that PFOS levels had been sufficiently immobilised.
- A detection of PCE was reported in one soil sample location associated with the drainage lines. JBS&G did not consider this significant as an installation of a soil vapour probe and assessment of soil vapour confirmed the soil vapour at the location did not to pose a potential inhalation risk. The auditor notes an isolated detection of PCE just above the PQL in soil is not considered significant when the soil vapour sampling does not identify a vapour intrusion risk.

Overall considering the validation data, aesthetic indicators and additional stabilisation of PFOS, the auditor concludes the areas beneath the drainage lines and drainage pits have been adequately remediated and validated.



14.13 Removal of Pavement

Concrete from the following areas were excavated and disposed off-site to allow access to the underlying soil for remediation. Pavement with elevated levels of PFAS were disposed to waste facilities for disposal. The remainder of the pavement, inclusive of pavement with elevated levels of petroleum hydrocarbons were disposed off-site for recycling. Levels of petroleum hydrocarbons were consistent with receiving facility Environment Protection Licence limits. These pavements were generally cleaned to ensure that they were free of aesthetic indicators of impact prior to transport from the site. Key areas of interest for the concrete assessment are:

- Areas of pavement near the Production Oil Plant and historical AFFF storage were identified as having elevated levels of PFAS such that the material was unsuitable for the site and also unsuitable for recycling and the pavement was disposed off-site to landfill.
- Areas of pavement in proximity of the operational areas at the north of the finished Oil Tankfarm and Filling Hall / Base Oil Tank Farm were identified as having elevated levels of petroleum hydrocarbons, these were unsuitable for site and were disposed off-site for recycling.
- The upper depth of pavement to the Settlement Pond walls was confirmed as being free of levels of PFAS that would nominate the material as unsuitable for recycling as per the EPA criteria discussed earlier. The lower depths of the walls and the base of the Settlement Pond were impacted with levels of PFOS such that the material was unsuitable for recycling and the pavement was disposed off-site to landfill.
- Elevated levels of PFOS were measured in pavement underlying the former oil / water separators of the WTP, immediately adjoining the south-western corner of the Settlement Pond. The remaining area used for the WTP by the expansion of the plant for the remedial works was free of significant levels of PFAS.
- The concentrations of PFOS, PFHxS and PFOA in the concrete drainage pipes were generally reported below the PQL. Five samples from the concrete pipes had detectable levels of PFAS requiring landfill disposal.

Additional information on off-site disposal of concrete is provided in **Section 16.2**. A figure showing the extent of pavements remaining on site is provided in **Attachment 6 Appendix A**. Overall, the auditor considers that the concrete was adequately assessed and remediated.

14.14 Asbestos Containment

The excavation EX13 has been used as an asbestos containment area to manage asbestos identified on-site beneath the Filling Hall Warehouse and located as asbestos impacted fill in the southern portion of the site. Validation of the asbestos containment are on site included:

- Survey completed of the extent of the excavation prior to backfilling.
- Photo log of the placement of the high visibility marker layer across the lateral extent of the asbestos impacted soil and the level surveyed.
- Survey of the backfilled excavation, final site levels.

The survey figures showing the relative levels of the excavation, marker layer and final site layer are provided in **Attachment 6 Appendix A**. The auditor is satisfied that the marker layer was applied appropriately, and that a 2.5-3 m capping layer was completed using available treated soils / stockpiled non-impacted soils.



14.15 Groundwater – Monitoring

The remediation of the groundwater involved the extraction of perched groundwater and the validation as discussed in **Section 14.4.3**. Groundwater samples from the deeper regional aquifer were collected from six wells in December 2022 (MW02, MW03, MW12, MW22, MW23 and MW24) (See **Attachment 7, Appendix A**) which were close to the major remediation areas. The results have been summarised of in **Table 14.25** along with the results from the pre remediation investigation in September 2021 which included sampling from 30 on-site monitoring wells.

Table 14.2525: Groundwater Results in µg/L

Analyte	Guidelines (GL)		September 2021				December 2022			
	Ecological DGV	HH GV	n	Detect	Max	n > GL	n	Detect	Max	n > GL
TRH F1	440 ^(a)	900	30 ^(g)	2	620	1 > DGV 0 > HH GL	6	1	50	0
TRH F2	440 ^(a)	900	30	1	1130	1 > DGV 1 > HH GL	6	0	<PQL ₁	0
TRH F3	640 ^(a)	900	30	1	2140	1 > DGV 1 > HH GL	6	0	<PQL ₁	0
TRH F4	640 ^(a)	900 ^(c)	30	1	540	1 > DGV 1 > HH GL	6	0	<PQL ₁	0
Benzene	950	30 000 (inhalation) 1 (ADWG)	30	1	1.0	0 > GL 0 > HH GL	6	0	<PQL	0
Toluene	180	NL (inhalation) 800 (ADWG)	30	1	42	0 > GL	6	0	<PQL	0
Ethylbenzene	80	NL (inhalation) 300 (ADWG)	30	1	39	0 > GL	6	0	<PQL	0
Total Xylenes	200 (p-xylenes)	NL (inhalation) 600 (ADWG)	30	1	344	1 > DGV 0 > HH GL	6	0	<PQL	0
Naphthalene	16	NL (inhalation) 6 ⁽ⁱ⁾	30	1	143	1 > DGV 1 > HH GL	6	0	<PQL	0
TCE	330	2.8 ^(c)	30	2	93	1 > HH GL	6	0	<PQL	0



Analyte	Guidelines (GL)		September 2021				December 2022			
	Ecological DGV	HH GV	n	Detect	Max	n > GL	n	Detect	Max	n > GL
1,1,1-TCA	270	8,000	30	1	355	1 > DGV 0 > HH GL	6	0	<PQL	0
PCE	70	50	30	0	<PQL	0 > GL	6	0	<PQL	0
Cis-1,2 DCE	-	60	30	1	28	0 > GL	6	0	<PQL	0
VC (Chloroethene)	100	0.3 ¹	30	0	<PQL (<50)	0 > GL	6	0	<PQL	0
1,1-DCA		28	30	1	361	1 > HH GL	6	0	<PQL	0
1,1-DCE	700	30	30	1	91	1 > HH GL	6	0	<PQL	0
PFOS	0.13 Direct Toxicity ^(f) 0.05 bioaccumulation	-	30	18	1.78	1 > DGV for direct toxicity 1 > DGV for bioaccumulation	-			
PFOA	220 Direct Toxic ^(e) 19 bioaccumulation ^(f)	10	30	4	0.08	0 > GL	-			
Sum of PFOS + PFHxS	-	2.0	30	22	2.77	1 > GL	-			

Samples and exceedances are counted manually and minor inconsistencies with laboratory results are not considered to materially impact the audit.

n number of samples
 - No criteria available/used or not analysed
 GL Guideline (µg/L)
 Eco Ecological See **Section 7.0I**
 HH Human-health See **Section 7.0**
 < PQL Less than the practical quantification limit
¹ TRH result from silica gel clean up analysis.



Based on the data provided in **Table 14.25** the auditor notes that groundwater sampling post-remediation did not indicate any further concerns.

The silica gel clean-up TRH results have been used in the evaluation of groundwater. The non-silica gel clean-up results showed elevated concentrations of TRH in the 6 samples. With no TRH detected in the triplicate result. Following investigation into the results JBS&G concluded the pre silica gel clean up results were anomalous and likely due to a laboratory error and not representative of the groundwater. The auditor considers this reasonable based on the following:

- The silica gel clean-up results are consistent with the TRH results in the triplicate sample (<PQL).
- The concentration of TRH identified in the groundwater samples pre silica gel clean up (up to 28 mg/L) is representative of free phase product and this is not consistent with the field observations for the groundwater samples which did not identify product or strong odours.

14.16 Imported Material

Approximately 441 m³ of VENM and crushed concrete was imported and is summarised in **Table 14.2626**. No material was imported for Stage 2. A summary of imported material is presented in **Table 14.26**.

Table 14.2626: Imported Material

Source Site / Supplier	Volume Imported (T)	Material Description (Consultant)	Placement Onsite	Summary of Validation Data	Auditor Comments
9 Gray St, Bondi Junction, NSW / Unknown	119.6	VENM (crushed sandstone)	Backfill excavation (EX2 and EX3)	JBS&G inspected the material at the source site and upon arrival to site and stated the material was free of impacts and consistent with VENM. The supplier provided waste classification documentation. Seven samples were collected by another consultant. Concentrations were low for metals, and were below the LOR for petroleum hydrocarbons, OCPs, OPPs, PCBs, and asbestos.	Given the material was inspected at the source site and upon arrival to site, and analytical results are considered acceptable, the auditor considers this material and validation activities are adequate.
Unknown source	321.38	Recycled concrete aggregate 40-70 mm (engineered material for geotechnical purposes)	Bridging layer within EX13 beneath marker and capping layers	JBS&G inspected the material upon import and stated it was free from asbestos impacts. JBS&G collected 9 samples of the imported material upon arrival to site. The samples were analysed for asbestos, metals, petroleum hydrocarbons, OCPs, and OPPs. Concentrations of metals were low, and all other analytes were below the LOR.	Given the material is for geotechnical purposes, and the material was inspected and sampled upon arrival to site with analytical results considered acceptable, the auditor does not consider that the unknown source of the material is significant. The material and validation activities are considered adequate.

Based on the information provided, the auditor is of the opinion that the material imported to the site is consistent with VENM. Recycled material was imported for use at the site. The results of analysis for this material are below the relevant criteria identified within the relevant Resource Recovery Order (RRO).



15.0 Ongoing Site Management

JBS&G propose the ongoing management of remnant contamination at the site through implementation of a passive long-term Environmental Management Plan, as defined below:

'Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW' 13 August 2023 by JBS&G.

Table 15.1 below presents an assessment of the LTEMP. A copy of the LTEMP is provided as an attachment to the Site Audit Statement.

Table 15.1: Assessment of the LTEMP

Item	Auditor Comments
Site Specific Stand-alone Document	The site is legally defined as Lot 1 DP 596315 located at 132 McCredie Road, Smithfield, NSW 2716 and occupies an area of approximately 71,619 m². The LTEMP states that it was prepared in response to remediation previously carried out at the site, and that the purpose is to manage asbestos impacted material in relation to future site activities and any minor intrusive works within the asbestos impacted areas. The LTEMP does not cover major intrusive works which will require a specific task management plan instead. The LTEMP may also need to be revised in response to onsite changes (including if site ground levels change over the asbestos management areas) or updated legislation, or if new technology or information becomes available. The auditor considers that the LTEMP is site specific.
Plan Objectives	The objectives of the LTEMP are to protect the current and future site users, workers and contractors from the asbestos hazards identified onsite and outline the management procedures required to protect human health. The LTEMP summarises the remaining asbestos contamination present and clearly provides guidance to minimise and manage potential risks from asbestos, as well as provides adequate control measures and procedures for intrusive works within asbestos impacted areas. The auditor considers the objectives to be appropriate.
When does the LTEMP apply?	The LTEMP applies from the date of issue and will apply indefinitely or until remediation and validation works prove there are no residual hazards remaining onsite. The LTEMP is intended to apply to any activities within the site which could involve the disturbance or exposure of asbestos impacted soils. The LTEMP does not apply to major intrusive works which will instead require a task specific management plan. In the auditor's opinion, this application is considered adequate.
Contamination Issues	The LTEMP provides an overview of contamination issues remaining onsite and are summarised as follows: - Friable and non-friable asbestos impacted soil are situated in the containment cell within the central portion of the site. The containment cell is beneath 2.5- 3 m of validated soil followed by an orange mesh geotextile marker layer. - Bonded asbestos is potentially present towards the southern boundary where a former stockpile containing ACM impacted material was located. - An asbestos pipe is present approximately 1 to 1.5 mbgl in the mid-section of the site running in a north-south direction. The pipe is considered to be non-friable ACM if left undisturbed. The pipe is light grey in colour and is approximately 200 mm in diameter. Locations of residual asbestos impacts are presented in the LTEMP. and included as Attachment 6 Appendix A to this SAR. The LTEMP identified a potential contaminant exposure pathway of inhalation of respirable asbestos fibres if disturbance of residual asbestos impacted materials is to occur. Detailed procedures have been outlined in the LTEMP to minimise these risks. In the auditor's opinion this is adequate.



Item	Auditor Comments
Actions Required	No active monitoring or management of subsurface soil contaminant conditions is required during everyday operation of the site. The LTEMP will only be needed in the event of minor intrusive works in areas of asbestos impacts. An asbestos register has been prepared as required by law and will need to be updated with any known occurrences of asbestos and changes to site conditions.
Extent of Capping and Specification of the Cap	Details of the capping layer are provided in the LTEMP, and a cross-section of the capping profile is provided in Figure 23 of the LTEMP. The containment cell is located in the central portion of the site, and the capping layer comprises up to 3 m of natural soil, followed by an orange mesh geotextile marker layer, then the asbestos impacted soil. The auditor considers that sufficient information has been provided to highlight the expected encountered conditions onsite.
Responsibilities	The LTEMP states that the site owner and person/s with management or control of the workplace will be responsible for the ongoing implementation of the LTEMP. The site owner is responsible for ensuring that any new site owners, people who manage or have control of the site, and any personnel undertaking intrusive works have been provided the LTEMP, and for appointing a Site Environmental Manager to implement the LTEMP. The LTEMP includes the key responsibilities for specific personnel (including the site owner, persons with management or control of the site, the Site Environmental Manager and site personnel or contractors). The LTEMP has been provided and approved by Council.
Timeframe	There is no defined timeframe for the use of this LTEMP which is to be implemented for an indefinite period of time or until appropriate remediation and removal works are completed and validated to prove there are no residual asbestos hazards remaining onsite. The auditor considers this to be adequate.
Long-term engineering security of works	No active monitoring or management of subsurface soil contaminant conditions is required during everyday operation of the site. This LTEMP describes the procedures required to mitigate the potential risks that have been identified based on the residual asbestos impacts onsite. In the event that minor intrusive works are required, the procedures documented in the LTEMP are required to be implemented to manage potential pathways of exposure and linkages to receptors. The proposed controls and processes are considered by the auditor to be adequate.
Compliant with Relevant Documentation?	The LTEMP has been prepared in accordance with the requirements outlined in the <i>NSW EPA Contaminated Land Management: Guidelines for the NSW Site Auditor ^{Scheme} (3rd edition)</i>, as referenced in the RAP. Implementation of the LTEMP is also required by way of condition 17 of the Development Consent (DA2022/0085) for remediation of the site, which is enforceable under the provisions of the NSW Environmental Planning and Assessment Act 1979. The auditor considers that the LTEMP meets these requirements.
Occupational Health and Safety (OH&S)	Any subsurface or intrusive work that disturbs soil at the site must be completed in accordance with appropriate health and safety protocols, including (where relevant) NSW Work Health and Safety Regulation (2017) requirements or subsequent regulatory safety updates. Personnel who carry out intrusive works must complete a job safety risk assessment and safe work method statement prior to commencing disturbance of the soils to ensure that appropriate risks have been identified and mitigation measures are in place. A number of procedures have been provided in the LTEMP to guide the implementation of this LTEMP. In the auditor's opinion, this is adequate.



Item

Auditor Comments

Public notification mechanisms to ensure potential purchasers or other interested parties are aware of the restrictions i.e., Planning Certificate or placing a covenant on the title of land under the CLM Act to require maintenance of remediation under the Act.

The LTEMP forms part of the validation of the remediation activities approved by Council under Development Application DA2022/0085 granted 14 April 2022. The SAS with the LTEMP attached, are to be submitted to Council and will form part of the publicly available records for the site, including notation on the property planning certificate under Section 10.7 of the NSW Environmental Planning and Assessment Act 1979.

Will be or can reasonably be made to be legally enforceable?

The LTEMP is legally enforceable through inclusion to the SAS as required for the development consent for the site remediation.
In the auditor's opinion this is adequate.

Are the Council in agreement with the EMP?

The LTEMP was provided to the Council. Council has advised that they are satisfied that the SAR and SAS would be conditional on the LTEMP.
The LTEMP will form an attachment to the final SAS prepared in satisfaction of Development Consent (DA2022/0085) conditions.

The appropriate conditions for the implementation of an LTEMP stated under Section 3.4.6 of *NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (2nd Ed.)* have been met, namely:

The LTEMP has been reviewed by the auditor.

- The provisions of the LTEMP can be made to be legally enforceable via the Development Consent conditions in site redevelopment.
- There will be appropriate public notification of restrictions applying to the site through a notification on the Planning Certificate for the site.
- The remnant contamination is not considered to pose an unacceptable risk to onsite or offsite environments.

Based on the above, the auditor considers that the LTEMP provides an adequate framework for the maintenance of the remediation works undertaken with respect to asbestos. The LTEMP is regarded as a passive as it requires minimal management and maintenance and does not incorporate mechanical components.



16.0 Compliance with Regulatory Guidelines and Directions

The auditor has used guidelines currently approved by the EPA under Section 105 of the NSW Contaminated Land Management Act 1997 (**Appendix C**).

The investigation was generally conducted in accordance with SEPP (Resilience and Hazards) 2021 and reported in accordance with the NSW EPA (2020) Consultants Reporting on Contaminated Sites Contaminated Land Guidelines. The checklist included in that document has been referred to. The EPA's Checklist for Site Auditors using the EPA Guidelines for the NSW Site Auditor Scheme 2017 (October 2017) has also been referred to.

16.1 Development Approvals

As the remediation is classed as Category 1 under the SEPP 55, JBS&G lodged a development application for the works (DA2022/0085) with Cumberland City Council. Cumberland City Council issued a development consent on 14/2/2022 for the remediation. The following conditions relevant to the audit are addressed in **Table 16.1**.

Table 16.1: Development Conditions

Condition	Auditor response
17. A Site Audit Statement (SAS) must be obtained from a NSW EPA Accredited Site Auditor. The SAS must confirm that the site has been remediated in accordance with the approved Remedial Action Plan and clearly state that the site is suitable for the proposed use. In circumstances where the Site Audit Statement conditions (if applicable) are not consistent with the consent, the development must not proceed until the inconsistency has been resolved to the satisfaction of Council (such as via a s4.55 modification of the consent pursuant to the provisions of the Environmental Planning & Assessment Act 1979).	The auditor notes that the SAR and SAS were prepared to confirm whether the site is suitable for the proposed uses subject to a long-term environmental management plan consistent with the requirements of this condition. No additional conditions are listed on the SAS.



Condition

Auditor response

22. If it becomes necessary to undertake dewatering activities at the site, prior to the commencement of dewatering, the following actions must be completed to the satisfaction of the Site Auditor.

a) Any required approval to dewater must be obtained from Water NSW and adhered to, with a copy of the approval to be kept on site at all times and made available to the Site Auditor and the Council upon request.

b) A Dewatering Management Plan (DMP) must be prepared by a qualified water quality expert with a copy submitted to Council. The DMP must:

- State why de-watering is necessary and confirm any required approvals;
- Clearly state that the DMP will be used as the basis for approval to enable connection and discharge to the stormwater system;
- Detail the proposed dewatering technique;
- Outline anticipated dewatering flow rate and total dewatering duration;
- Detail the controls (e.g. settling tank, turbidity curtain etc) and the method of discharge to ensure compliance with any conditions of approval and requirements of the Protection of the Environment Operations Act 1997;
- Explain the measures and techniques to monitor and record groundwater and tailwater quality, water discharges, and monitoring results. Groundwater must be discharged directly to the nearest stormwater pit and not spread over any road or footpath areas. Safe passage for pedestrians must be maintained;
- Include a requirement that records be kept on site at all times and be available to the Site Auditor, Council or other appropriate regulatory authority upon request;
- Provide a contingency plan in case of an emergency situation;
- Provide details of water quality analysis and testing that has been undertaken by a NATA accredited laboratory, and demonstrate compliance against relevant water quality criteria including the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ 2018). Where the ANZECC/ARMAC 2018 guidelines are silent on any elements or chemicals identified in testing, the water discharge is to comply with relevant endorsed guidelines and recommendations issued by the NSW.

JBS&G state that 'at least bi-weekly of influent and effluent at all times that the WTP operated from 15 February 2023 onwards. Records were maintained on-site and available for Council inspection (if required).

The auditor notes:

- The dewatering activities were described in the RWP.
- All dewater was transferred to the Settlement Pond present at the south-east of the site and treated through the site WTP.
- The WTP results were included in the validation reports.
- Analysis was completed by a NATA accredited laboratory and compared to appropriate guidelines.

25. Any excavation works carried out on site shall be closely monitored to ensure no signs of potential or actual acid sulfate soil are observed. Indicators may include grey to greenish blue clays, unusual gold-yellow mottling or 'rotten egg' odours. If any of these indicators are observed, excavation of the site is to be stopped immediately, the Site Auditor is to be notified and a suitably qualified environmental scientist shall be contracted to further assess the site.

JBS&G state that "All excavations were undertaken under constant JBS&G supervision. No indicators of actual or potential acid sulphate soils were observed '.

The auditor notes that no notifications were received during the works of the signs of potential or actual acid sulphate soil.

Field sheets included in the validation reports also confirm that there was a lack of indicators.

32. The site is to be remediated and validated in accordance with the Remedial Action Plan prepared by Kleinfelder Australia Pty Ltd (ref: 20211252.001A Version 1.3) dated 18 February 2021 and the Letter of Interim Advice or Section B Site Audit Statement prepared by NSW Environment Protection Authority Accredited Site Auditor Melissa Porter of Senversa Pty Ltd dated 16 December 2021. All remediation work carried out shall be conducted in accordance with the guidelines in force from time to time under the Contaminated Land Management Act 1997. Any new information which comes to light during remediation, demolition or construction works which has the potential to alter previous conclusions about site contamination must be immediately notified to the Principal Certifier. Any variations to the approved Remedial Action Plan shall be approved in writing by the Site Auditor prior to the commencement of such work.

The auditor notes that the RWP, which included updates to the RAP, was reviewed and approved by the auditor prior to remediation.

Additional deviations from the RAP, relating mainly to the increased extent of impacts, were discussed with the auditor during the demolition and remedial works. The new information did not alter the conclusions of SAS Section B MP165.



Condition

Auditor response

33. Construction works which has the potential to alter previous conclusions 'about site suitability and contamination must be notified to the Principal Certifier and Council. Council may require a NSW accredited site auditor to be engaged to review the contamination assessment and remediation/validation process (where applicable). If appropriate, Council may also require a new Remedial Action Plan (RAP) to be prepared and implemented to ensure the site can be made suitable for the approved use in light of the new information. Where a NSW accredited Site Auditor is engaged in compliance with part (b) above, an occupation certificate must not be issued until a Section A Site Audit Statement has been submitted to Council by the Auditor confirming the site is now suitable for the proposed use.

The auditor notes that the SAR and SAS were prepared to confirm whether the site is suitable for the proposed uses subject to a long-term environmental management plan consistent with the requirements of this condition.

42. A site audit statement must be submitted to the Council that shows the following:-

- a) The Section A Site Audit Statement must be obtained from a NSW Environment Protection Authority accredited Site Auditor who has considered all aspects of the site investigation, remediation and validation works.
- b) The Site Audit Statement must confirm that the site has been remediated in accordance with the approved Remedial Action Plan submitted with this application and clearly state that site is suitable for the proposed use.
- c) Where the Site Audit statement will be subject to conditions that require ongoing review by Cumberland Council, these must be reviewed and approved in writing by Council before the Site Audit Statement is issued.
- d) In circumstances where the Site Audit Statement conditions (if applicable) are not consistent with the consent, the development must not proceed until the inconsistency has been resolved to the satisfaction of Council (such as via a s4.55 modification of the consent pursuant to the provisions of the Environmental Planning & Assessment Act 1979).

The auditor notes that the SAS Section A2, that will be issued concurrently with this SAR, has considered the investigation, remediation and validation works and confirms whether the site has been remediated in accordance with the approved Remedial Action Plan, any deviations that are outlined in this SAR such that it is suitable for the proposed use. Although the SAS is subject to implementation of a LTEMP, no other conditions are listed and as such do not require ongoing review by Cumberland Council.

43. Where the Section A Site Audit Statement (SAS) will be dependent upon the implementation of an Environmental Management Plan (EMP), the EMP must be approved by the Site Auditor and Council prior to the issue of the SAS. The owner of the land is required to comply with all ongoing obligations of the EMP, which form part of the SAS for the site.

The auditor has reviewed a LTEMP and Council provided email correspondence confirming approval of the LTEMP.

16.2 Waste Disposal

The auditor assessed the overall waste management process by review of the information presented in the referenced reports, supplemented by field observations. The key documents provided relating to waste include:

- Waste classification assessments prepared by JBS&G between 2 March 2022 and 28 April 2023.
- Waste disposal tracking register which includes the date exported from site, quantity, weighbridge docket number, EPA waste locate details, receiving facility, classification, source locations and JSB&G waste classification reference.
- Weighbridge receipt dockets.

Concrete from the site was assessed for levels of PFAS to determine if the material could be retained on site, removed from site and sent to recycling facility or disposed off-site to a licenced waste facility.



As there is limited advice on the assessment of PFAS in concrete in relation to recycling, the auditor sought advice from the EPA on this matter and was provided the following advice by email on 23/8/2022 from Alan Lye, Senior Project Officer and Resource Recovery Innovation – Environmental Solutions CLR, EPA:

'The EPA does not support the reuse of waste containing PFAS. If you suspect concrete waste [is] contaminated by PFAS, it must not be recycled, or taken to a recycler. If you propose to demonstrate that the concrete waste does not contain PFAS so that you can supply to a recycler, then you may want to consider a multiple lines of evidence approach, which may include site history assessment of the waste, site inspection, and sampling and testing (to name a few). Sampling and testing for PFAS as a line of evidence, must show the concentrations of PFAS are less than the laboratory limit of reporting of 5 µg/kg for PFOA, and 5 µg/kg for PFOS + PFHxS. This laboratory limit of reporting comes from the National Environment Management Plan, HEPA 2020.' For any concrete to be recycled, please ensure that a multiple lines of evidence approach considering the leachate levels can be demonstrated and that the total levels of PFOS+PFHxS and PFOA are less than 0.005 mg/kg'.

This advice was provided to BP in IAA No.13. and was used by JBS&G to determine concrete that was unsuitable to be sent to a recycling facility.

Approximately 12,010 T of material and 17 kl of liquid waste for Stage 1 and Stage 2, 100.2 T of material for Stage 2 was disposed offsite as discussed in **Table 16.2**.

Table 16.2: Exported Material

Receiving Facility	Approximate volume exported (tonnes)	Waste Classification	Material Description
Bingo 1 Kangaroo Avenue, Eastern Creek, NSW 2766 EPL: 13426	Stage 2: 29.06	General solid waste (non-putrescible) with special waste (asbestos)	Vegetation (grass) with silty topsoil
	Stage 1: 172.66*	Special waste (asbestos)	Asbestos waste – skip bin
	Stage 1: 457.3	General solid waste (non-putrescible) with special waste (asbestos)	Asbestos soils
Cleanaway 42-46 Charles Street, St Marys, NSW 2760 EPL: 20271	Stage 2: 10.5	Hazardous waste with special waste (asbestos)	Vegetation (grass) with silty topsoil
	Stage 2: 46.7	Hazardous waste	Granular activated carbon
	Stage 1: 17.38 kL	Liquid waste (J120)	Waste oil/water
Cleanaway 85-87 Quarry Road, Erskine Park, NSW 2759 EPL: 20986	Stage 2: 120.6	Hazardous waste with special waste (asbestos)	Sediment from the retention basin
RENEX 109-131 Ordish Road, Dandenong South, VIC 3175 Permission ID: OL000127068	Stage 1: 4008.50*	Hazardous waste	Highly impacted PFAS, chlorinated hydrocarbon and petroleum hydrocarbon soils for treatment.
Rock and Dirt Recycling	Stage 1: 6,550.14 Stage 2: 478.86	General solid waste (non-putrescible)	Building and demolition waste from the former finished oil tank farm, areas outside where storage and



Receiving Facility	Approximate volume exported (tonnes)	Waste Classification	Material Description
306 Racecourse Road, South Windsor, NSW 2756 EPL: 4849			handling of petroleum and AFFF products occurred.
SCE Mt St Thomas Lot 1 Shellharbour Rd Port Kembla EPL: 1265	Stage 1: 492.54	General solid waste (non-putrescible)	Concrete pavement from the former Production Oil Plant
Sell & Parker 23-43 and 45 Tattersall Rad, Kings Park, NSW 2148 EPL: 11555	Stage 1: 33.04	General solid waste (non-putrescible)	Steel
Sydney Recycling Park 16-23 Clifton Avenue, Kemps Creek, NSW 2178 EPL: 12901	Stage 1: 295.76 Stage 2: 414.48	General solid waste (non-putrescible)	Crushed concrete from the retention basin and site drainage network

* - Quantities vary between supplier documentation and those reported by JBS&G. The slight discrepancies between quantities are not considered significant.

An assessment of the waste classification process in consideration of Waste Classification Guidelines, Part 1: Classifying Waste (EPA 2014) was undertaken. The Consultant indicated wastes were classified and managed in accordance with the Waste Classification Guidelines, Part 1: Classifying Waste (EPA 2014).

Based on the information provided in the validation reports the auditor is satisfied:

- With the classification of the waste.
- That the waste was moved off-site.
- That the waste was taken to lawful facilities.

16.3 Water Treatment

Samples of water from the WTP were collected during periods of discharge to the stormwater drain off-site. Over the course of the remediation works 64 monitoring events were conducted. Monitoring consisted of collection of a samples from:

- The influent to the WTP.
- Intermediate sample from the WTP.
- The effluent from the WTP.
- A sample from Prospect Creek where the stormwater drain discharges.

Samples were analysed for PFAS, TRH, BTEX, PAHs, VOCs and phenols and compared to human health and ecological guidelines relevant for Prospect Creek.

Concentrations were generally noted to be below the nominated criteria. PFOS, TRH and chloroform exceedances were identified in the effluent samples on approximately 10 occasions, however the corresponding Creek sample had concentrations below the relevant criteria.

On one occasion, the creek sample showed elevated concentrations of TRH however the corresponding effluent sample had concentrations below the PQL, indicating the TRH was not related to the discharge.



JBS&G conclude that that *'no discharge of surface water from the site can be considered to have caused pollution'*. Overall, the auditor agrees that the WTP was effective in treating the site surface water so the discharge did not cause elevated levels in the off-site Prospect Creek.

16.4 Licenses

It is understood that an Environment Protection Licence (EPL) (2822) is currently held for the site by Silk Contract Logistics Pty Ltd, for the storage of petroleum products (0 – 5,000kL). BP have indicated this will be relinquished following the completion of this audit.

A site walkover was further completed as part of validation by Matthew Linz, Licensed Asbestos Assessor LAA002049 on the 9 May 2023. The site was confirmed as free of any visible asbestos containing materials and aesthetic indicators of potential contamination.



17.0 Conclusions and Recommendations

JBS&G considered that *'The site has been remediated in general accordance with the Remedial Action Plan and the Remedial Work Plan'* and that *'The site is considered suitable for a future commercial / industrial use, excluding basements, subject to the ongoing implementation of the LTEMP prepared for the site'*.

Based on the information presented in JBS&G reports and observations made on site, and following the Decision-Making Process for Assessing Urban Redevelopment Sites in NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme, the auditor concludes that the site is suitable for the purposes of commercial industrial land use with no basements, subject to compliance with the following environmental management plan:

- 'Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW, 13 August 2023 by JBS&G.

Remediation included cap and containment of ACM impacted soil on-site with the risk that asbestos impacted soil may also be retained in-situ at the southern boundary below existing trees. The management of the asbestos on-site is detailed in the LTEMP.

The soil remediation also included the excavation of petroleum and chlorinated hydrocarbons and PFAS, successful validation of those excavations and stabilisation of PFAS impacted soil with PAC, and bioremediation of soil impacted petroleum and chlorinated hydrocarbon. Following successful validation, the stabilised and bioremediated soils were reinstated at the site. Excavations in remediated areas may result in odours or discoloured soil.



18.0 Other Relevant Information

This Audit was conducted on the behalf of BP for the purpose of assessing the suitability and appropriateness of a remedial action plan (RAP) i.e. a “Site Audit” as defined in Section 4 (1) (b) (v) of the NSW Contaminated Land Management Act 1997 (the CLM Act).

This summary report may not be suitable for other uses. Kleinfelder included limitations in their report. The Audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check.

In drawing conclusions, the auditor used reasonable care to avoid reliance upon data and information that may be inaccurate, however a degree of uncertainty is inherent in all subsurface investigations and there remains the possibility that variations may occur between sample locations. The Audit and this report are limited by and rely upon the scope of the review, and the information provided by the Client and their consultants and representatives through documents provided to the auditor. The Audit is based on a review of the subsurface condition of the site at the time of assessment, as described in the assessment reports attached to the Audit report and site inspections conducted by the auditor and their representatives. The auditor’s conclusions presented in this report are therefore based on the information made available to them and arising from their own observations conducted during the audit. If the auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

In reaching their conclusions about the site, the Client may use this audit report and Certificate or Statement of Environmental Audit. The scope of work performed as part of the audit process may not be appropriate to satisfy the needs of any other person. Any other person’s use of, or reliance on, the audit document and report, or the findings, conclusions, recommendations or any other material presented or made available to them, is at that person’s sole risk.



Appendix A: Figures/Attachments

Attachment 1 Site Location

Attachment 2 Site Layout and Areas of Environmental Concern (AEC) identified in the RAP

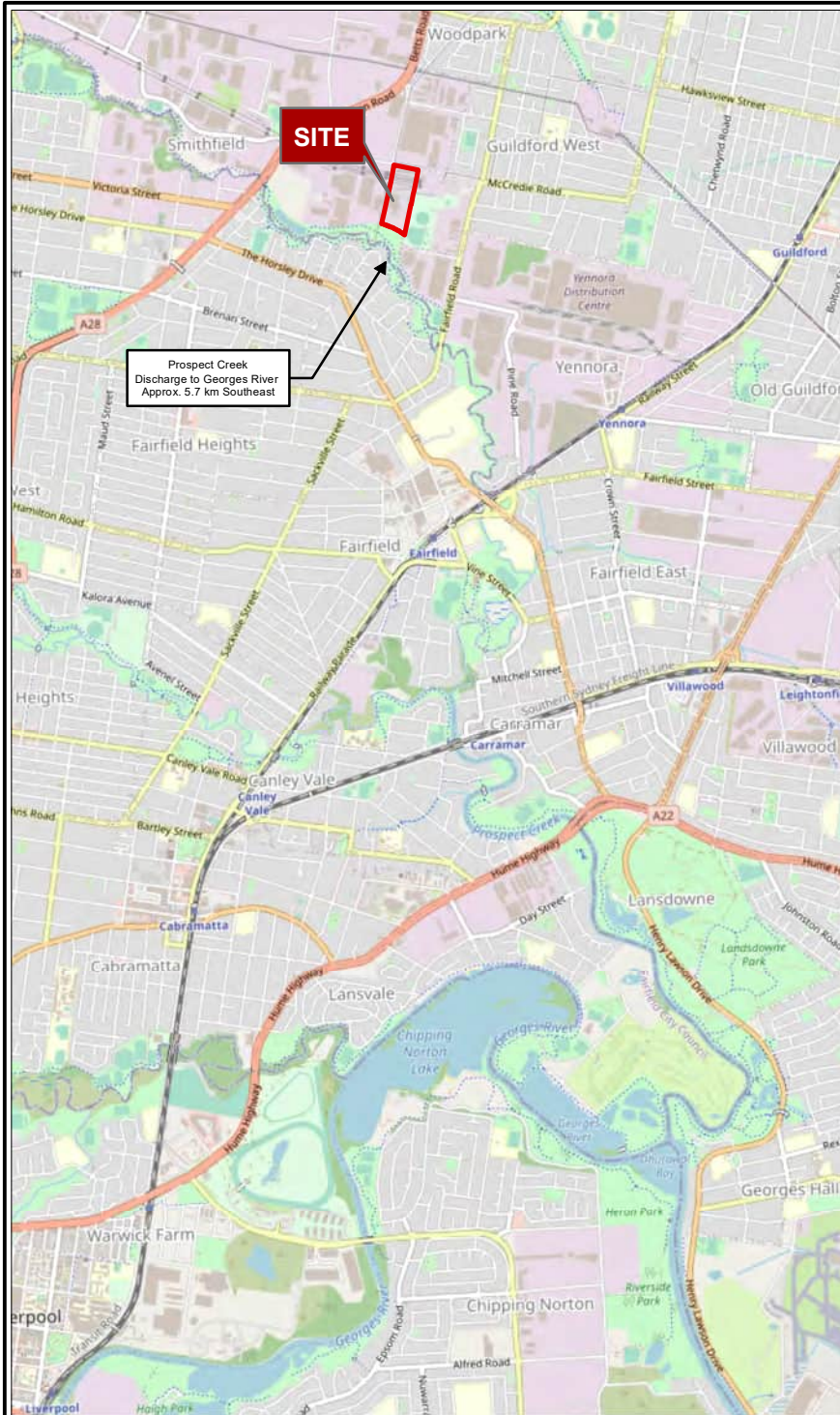
Attachment 3 Site features and Remediation Areas Identified in the RWP

Attachment 4 Surface Water Sampling Locations

Attachment 5 Remediation Figures

Attachment 6 Post Remediation Figures

Attachment 7 Groundwater Well Location



Legend
 Approximate Site Boundary
 NSW Cadastre (2022)



Job No: 59279

Client: BP Australia

Version: R13 Rev A Date 27/04/2023

Drawn By: RF Checked By: JDC

Scale 1:10,000



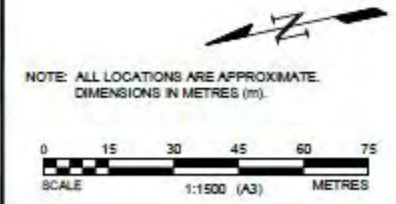
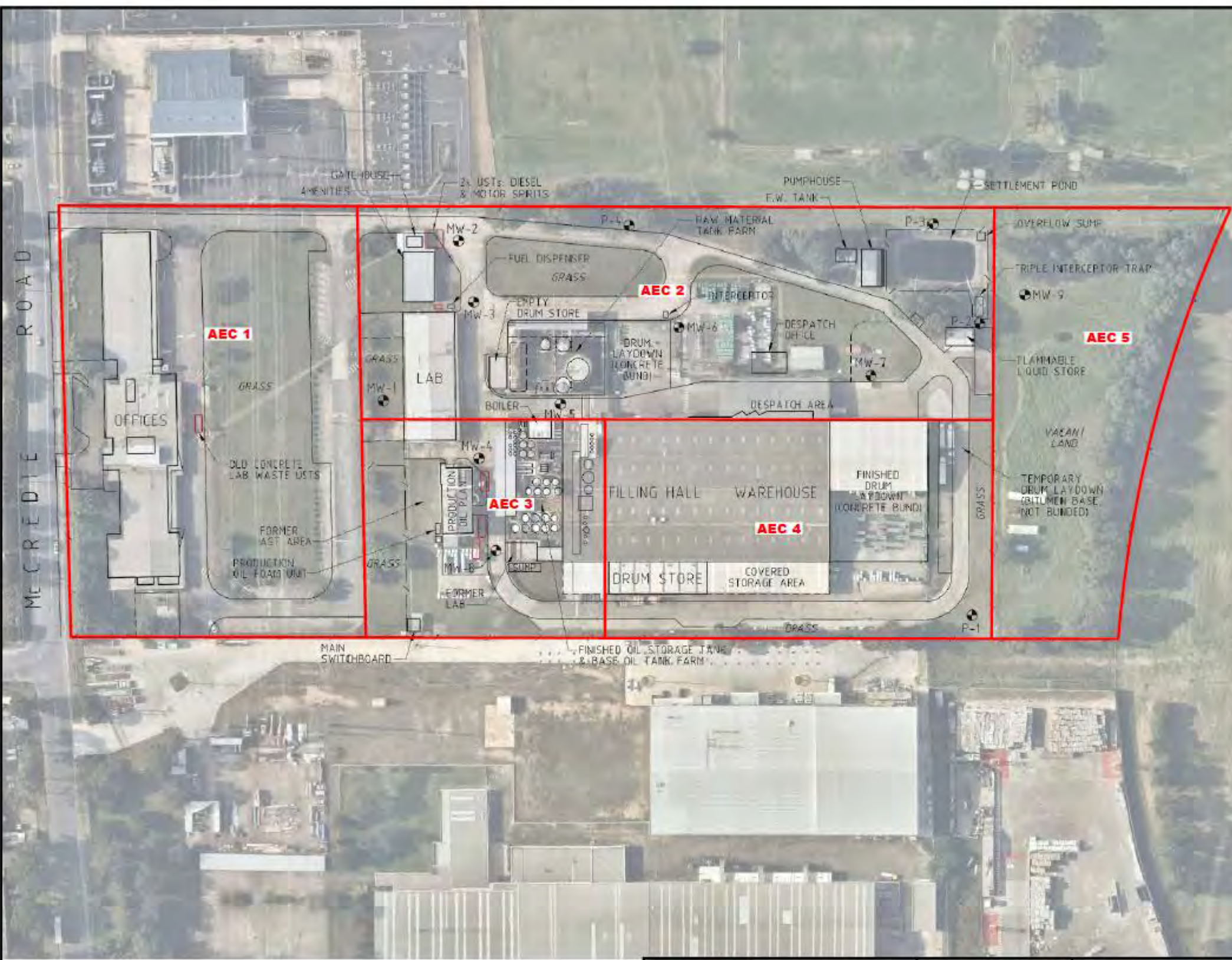
0 125 250
metres

Coord. Sys. GDA 1994 MGA Zone 56

BP Castrol Facility
132 McCredie St
Guildford, NSW

SITE LOCATION

FIGURE 1



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or reliance of the information contained on this graphic representation is at the sole risk of the party using or relying on the information.

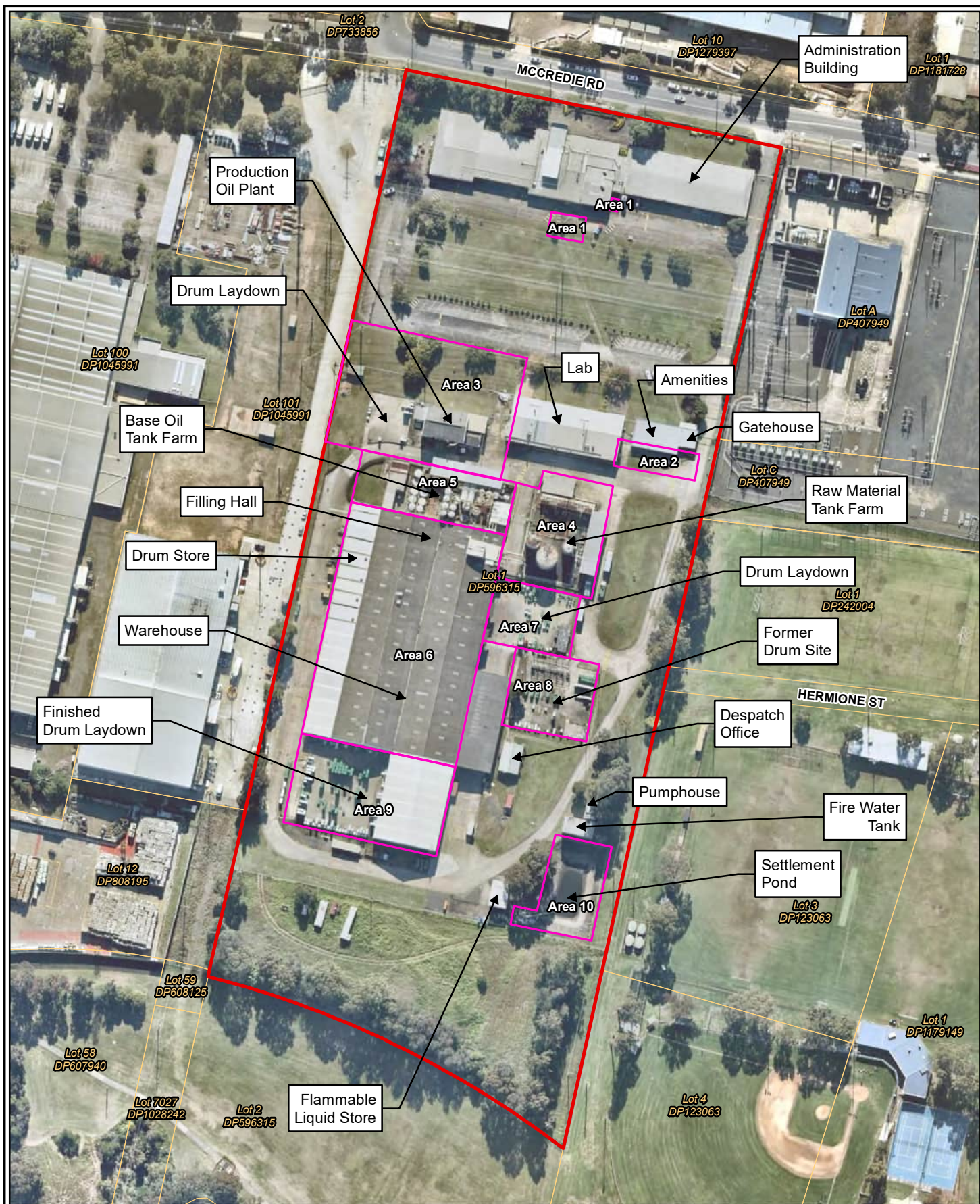


KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT:	20211252.001A
DATE DRAWN:	03.09.20
DRAWN BY:	LZ
CHECKED BY:	IS
FILE NAME:	20211252.001A-2.dwg

SITE INFRASTRUCTURE	
CASTROL GUILDFORD TERMINAL ENVIRONMENTAL SITE INVESTIGATION 132 MCCREDIE ROAD GUILDFORD, NSW	

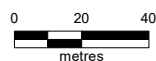
FIGURE
B



Legend:

- Approximate Site Boundary
- Areas of Environmental Concern (KLF RAP, 2021)
- NSW Cadastre (2022)

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Drawn By: RF

Date 27/04/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

PRE-REMEDIATION SITE LAYOUT

FIGURE 2A





Legend: Approximate Site Boundary Sample Location Surface Water, Kleinfelder 2020 - ESA Surface Water, JBS&G 2021 Settlement Pond Stormwater Pipe Network (Indicative)	Scale 1:10,000 Coord. Sys. GDA 1994 MGA Zone 56 Job No: 59279 Client: BP Australia Pty Ltd	BP Castrol Facility 132 McCredie Road Guildford, NSW PROSPECT CREEK PFAS BASELINE SAMPLE LOCATIONS
	Version: R07 Rev A Date 1/11/2021 Drawn By: RF/JZ Checked By: MP	FIGURE 6



Appendix A Attachment 5 Remediation Figures



Legend:

Approximate Site Boundary

NSW Cadastre (2022)

Historic Site Features

Excavation Features

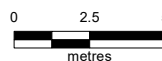
Excavation Areas

Excavation Area 1

Sample Location

● Sample Location – (No longer in-situ)

Scale 1:250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev A

Date 15/02/2023

Drawn By: RF

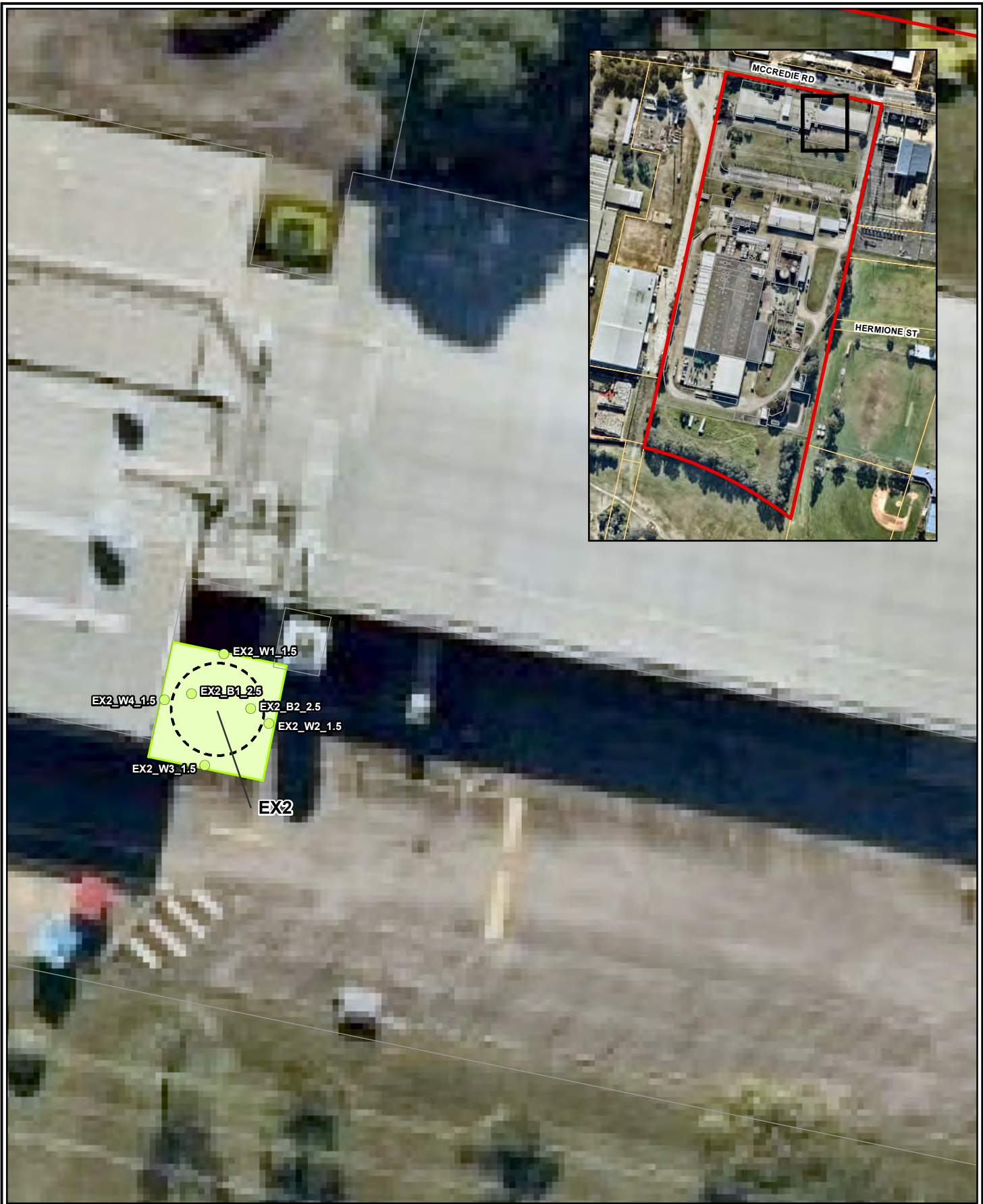
Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

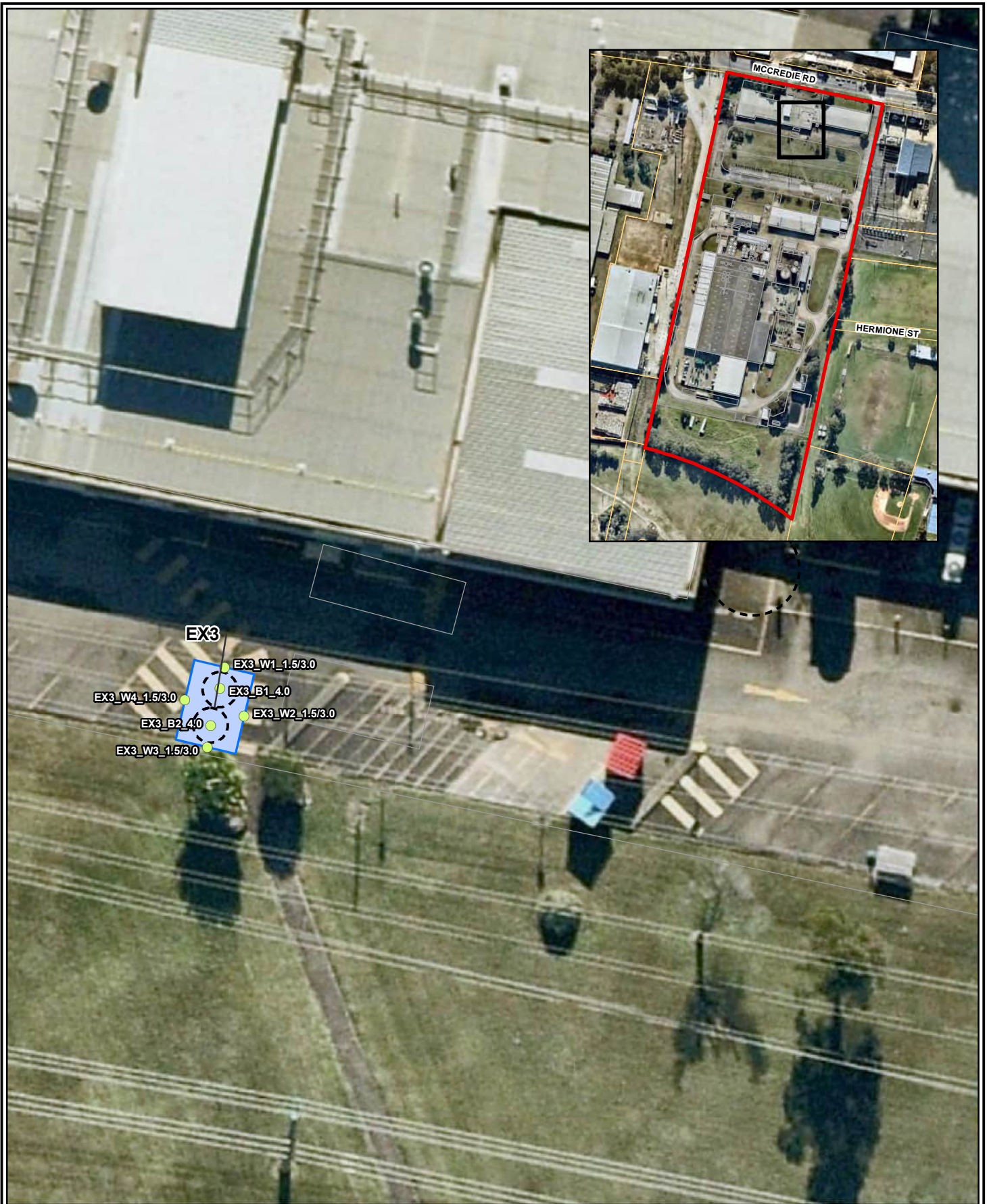
EXCAVATION 1 - SAMPLE LOCATIONS

FIGURE 7



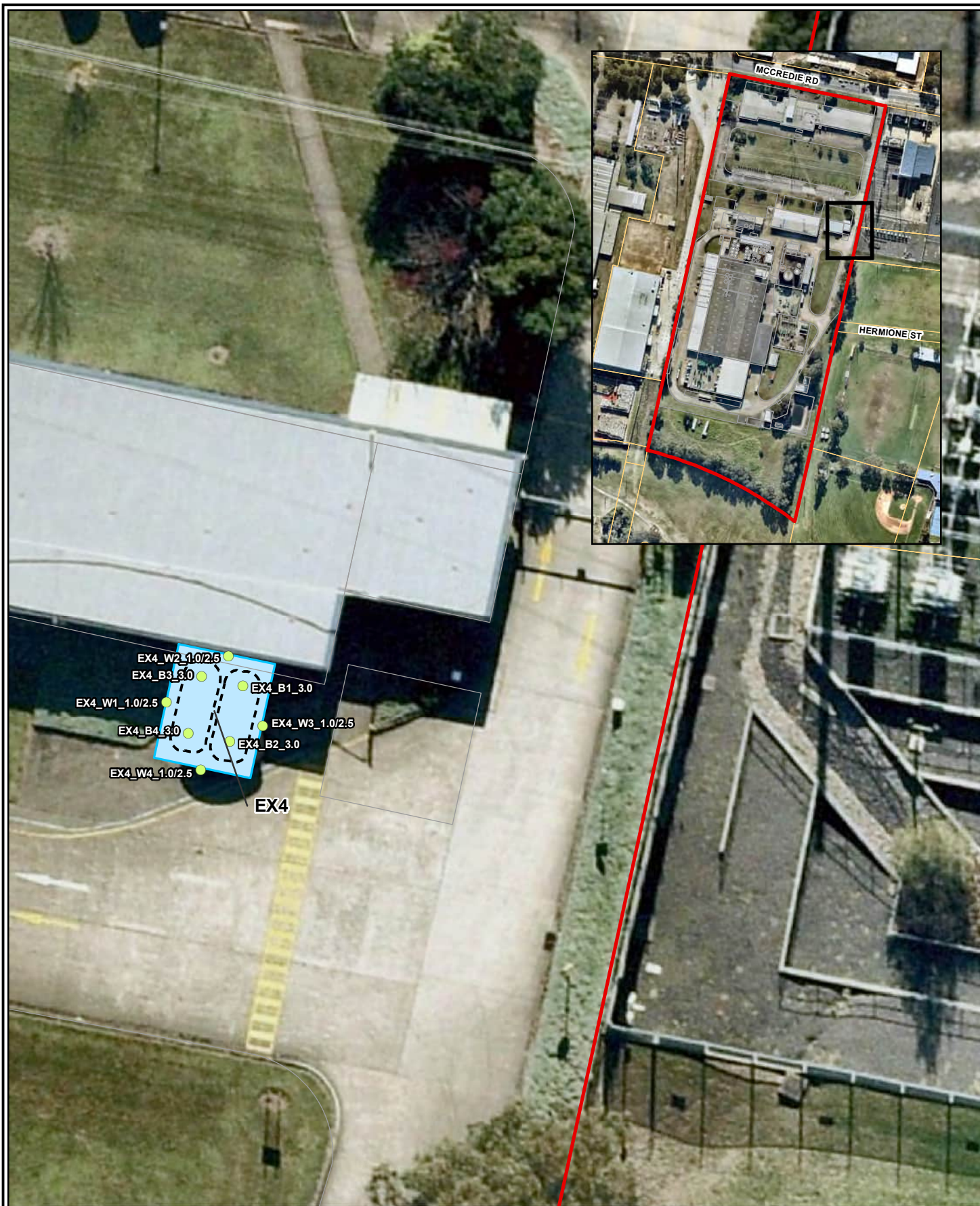


Legend: Approximate Site Boundary NSW Cadastre (2022) Historic Site Features Excavation Features Excavation Areas Excavation Area 2 (Base Depth 2.5m) Sample Location Sample Location – Passed	Scale 1:250		02.55 metres	BP Castrol Facility 132 McCredie Road Guildford, NSW
	Coord. Sys. GDA 1994 MGA Zone 56			EXCAVATION 2 - SAMPLE LOCATIONS
	Job No: 59279			
	Client: BP Australia Pty Ltd			FIGURE 8
	Version: R11 Rev A	Date 15/02/2023		JBS&G
	Drawn By: RF	Checked By: JDC		



Legend: Approximate Site Boundary NSW Cadastre (2022) Historic Site Features Excavation Features Excavation Areas Excavation Area 3 (Base Depth 4.0m) Sample Location Sample Location – Passed	Scale 1:250 02.55 metres		BP Castrol Facility 132 McCredie Road Guildford, NSW
	Coord. Sys. GDA 1994 MGA Zone 56		
	Job No: 59279		FIGURE 9
	Client: BP Australia Pty Ltd		
	Version: R11 Rev A	Date 15/02/2023	
	Drawn By: RF	Checked By: JDC	

JBS&G



Legend:

 Approximate Site Boundary

 NSW Cadastre (2022)

 Historic Site Features

 Excavation Features

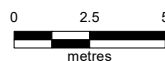
Excavation Areas

 Excavation Area 4 (Base Depth 3.0m)

Sample Location

● Sample Location – Passed

Scale 1:250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev A

Date 15/02/2023

Drawn By: RF

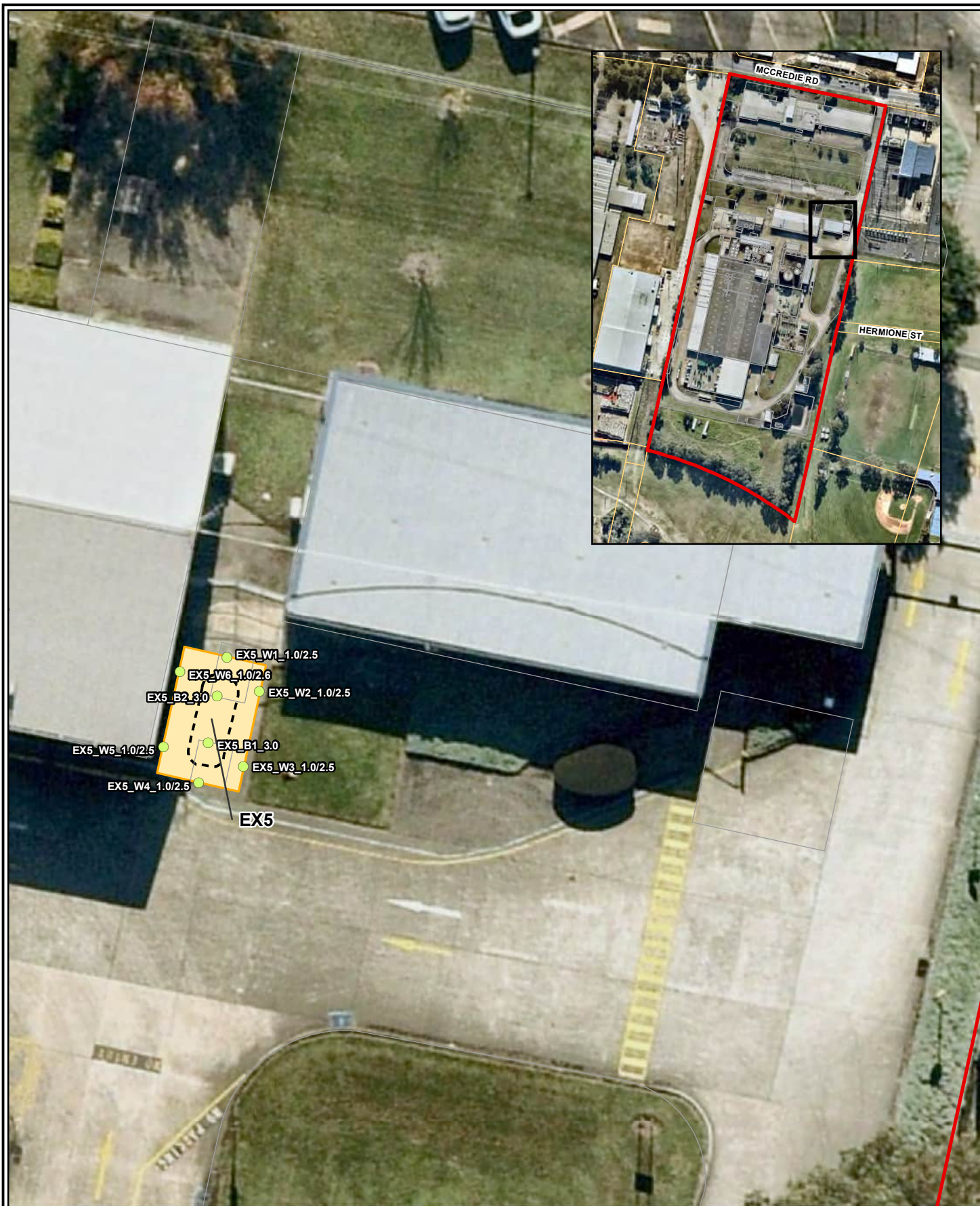
Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

EXCAVATION 4 - SAMPLE LOCATIONS

FIGURE 10





Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Historic Site Features

- Excavation Features

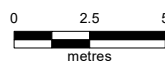
Excavation Areas

- Excavation Area 5 (Base Depth 3.0m)

Sample Location

- Sample Location – Passed

Scale 1:250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev A

Date 15/02/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

EXCAVATION 5 - SAMPLE LOCATIONS

FIGURE 11





Legend: Approximate Site Boundary NSW Cadastre (2022) Remediation Area Excavation Area 6 (Base Depth 3.5m) Excavation Features Fuel Lines Sample Location Sample Location – Passed Sample Location – (No longer in-situ) Sample Location – Health Exceedance (No longer in-situ)	Scale 1:150 		BP Castrol Facility 132 McCredie Road Guildford, NSW
	Coord. Sys. GDA 1994 MGA Zone 56 		EXCAVATION 6 - SAMPLE LOCATIONS AND HEALTH EXCEEDANCES
	Job No: 59279		FIGURE 12
	Client: BP Australia Pty Ltd		
	Version: R11 Rev B	Date 24/07/2023	
Drawn By: RF	Checked By: JDC		



Legend:

- ▬ Approximate Site Boundary
- ▬ NSW Cadastre (2022)
- ▬ Historic Site Features
- ▬ Excavation Features

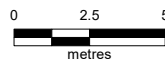
Excavation Areas

- ▬ Excavation Area 7 (Base Depth 4.0m)

Sample Location

- Sample Location – Passed
- Sample Location – (No longer in-situ)
- Sample Location – Health Exceedance (Still in-situ)

Scale 1:250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev A

Drawn By: RF

Date 27/02/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**EXCAVATION 7 - SAMPLE
LOCATIONS AND HEALTH
EXCEEDANCES**

FIGURE 13

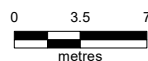




Legend:

- ▬ Approximate Site Boundary
- ▬ Excavation Areas 8A
- EX8a PFAS Soil Incremental Sampling Locations

Scale 1:400



Coord. Sys. GDA 1994 MGA Zone 56

Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev A

Drawn By: RF/YY

Date 17/02/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**EX8A - PFAS SOIL INCREMENTAL
SAMPLING METHOD PLAN
AND EXCEEDANCES**

FIGURE 24

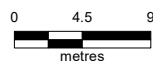




Legend:

- Approximate Site Boundary
- Excavation Areas 8A
- EX8 PFAS Test Pit Locations

Scale 1:500



Coord. Sys. GDA 1994 MGA Zone 56

Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev A

Drawn By: RF/YY

Date 17/02/2023

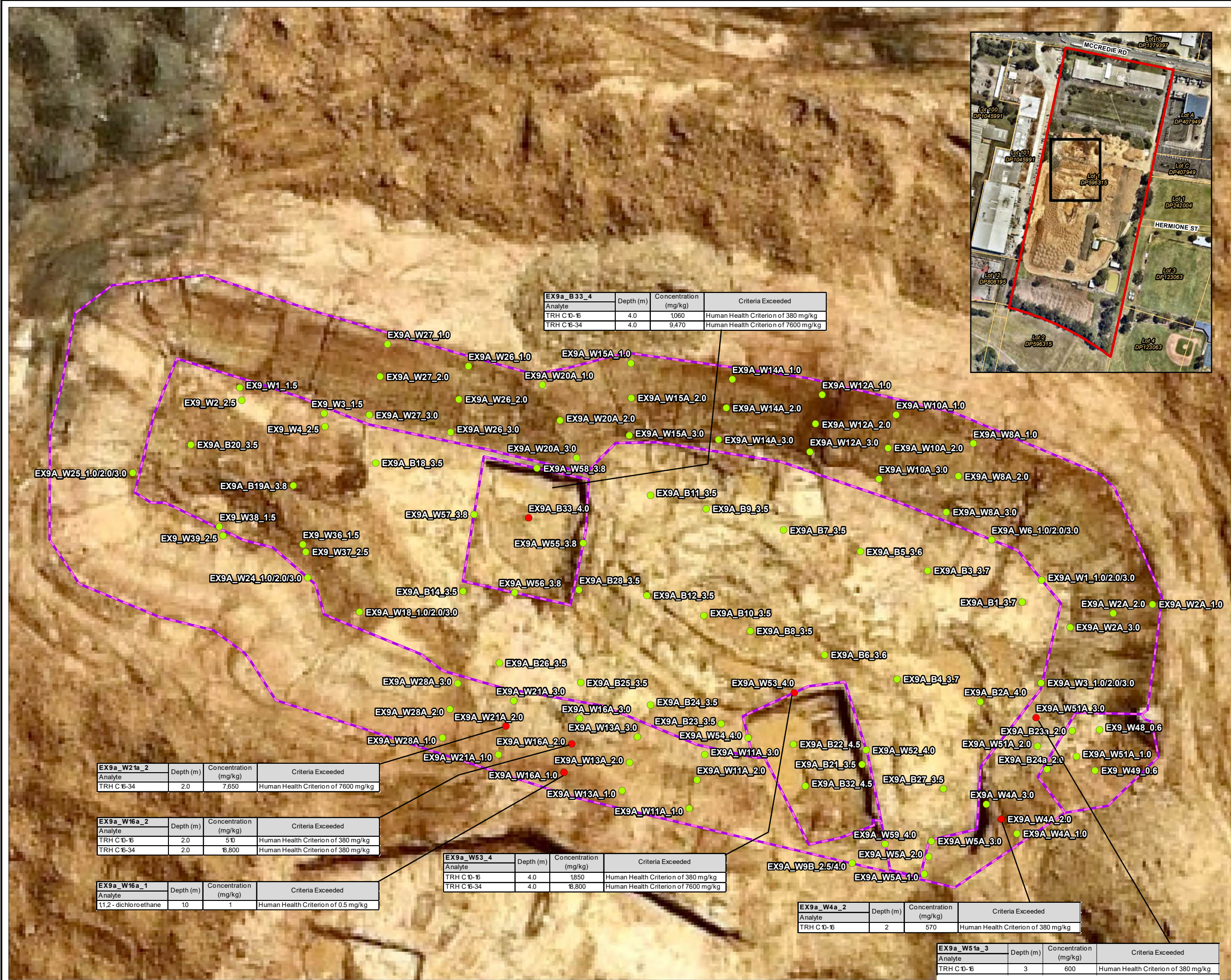
Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**EX8A - PFAS TEST PITS
AND EXCEEDANCES**

FIGURE 26

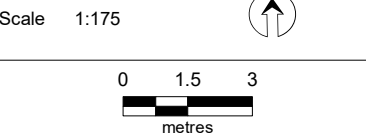




- Legend:
- Approximate Site Boundary
 - NSW Cadastre (2022)
 - Excavation Areas
 - Exc9A_FigD
 - Sample Location - Passed (Used to Validate Final Excavation)
 - Sample Location - Health Exceedance



Job No: 59279
Client: BP Australia
Version: R11
Date: 28-Feb-2023
Drawn By: RF/PA
Checked By: JDC

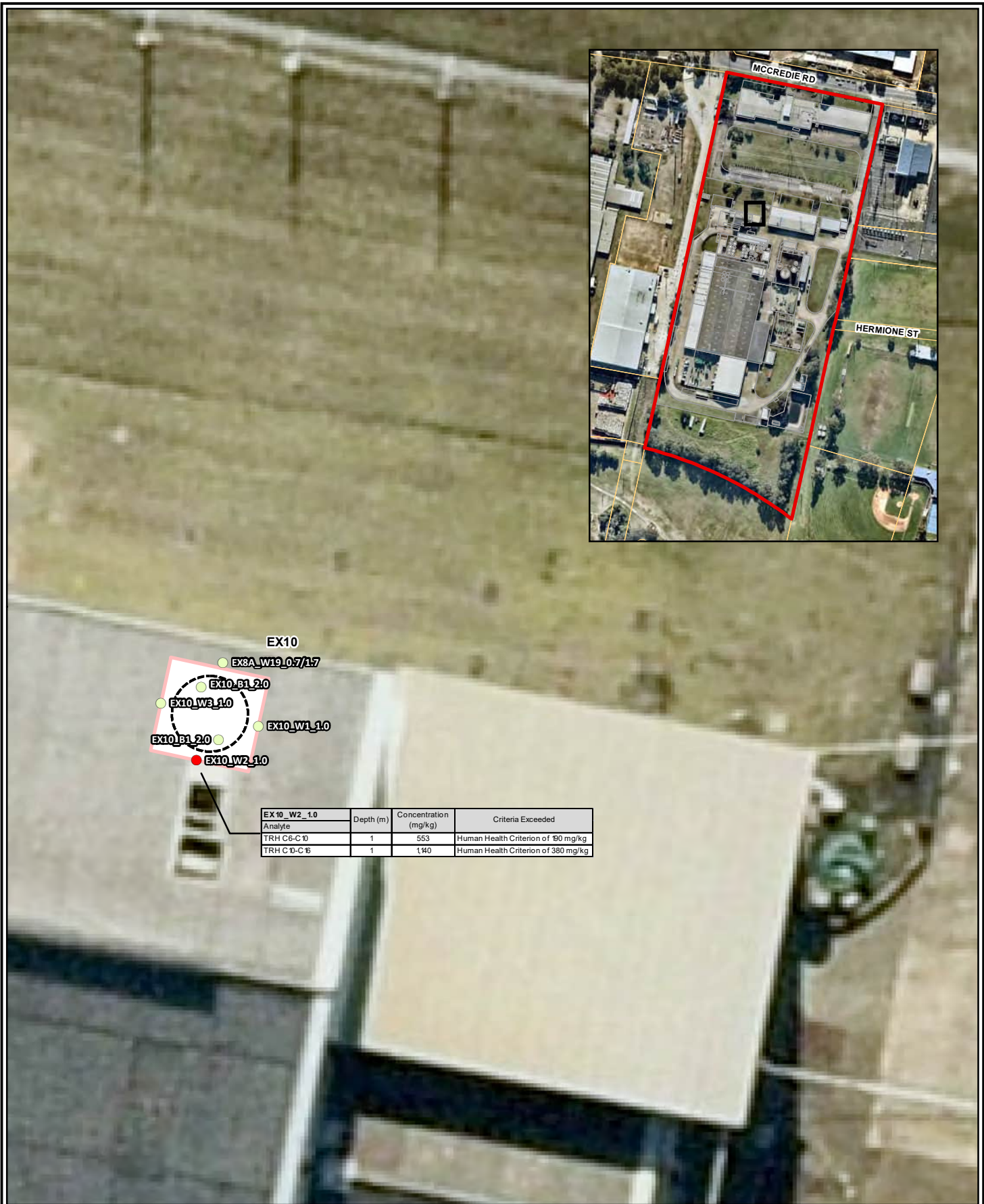


Coord. Sys. GDA 1994 MGA Zone 56

BP Castrol Facility
132 McCredie Road
Guildford, NSW

EXCAVATION 9A - SAMPLE LOCATIONS AND HEALTH EXCEEDANCES

FIGURE 21D



Legend:

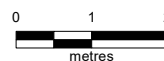
- Approximate Site Boundary
- NSW Cadastre (2022)
- Remediation Area**
- Excavation Area 10 (Base Depth 2.0m)
- Excavation Features

Sample Location

- Sample Location – (No longer in-situ)
- Sample Location – Health Exceedance (No longer in-situ)

NOTE: All samples no longer in-situ

Scale 1:100



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R11 Rev B

Date 24/07/2023

Drawn By: RF

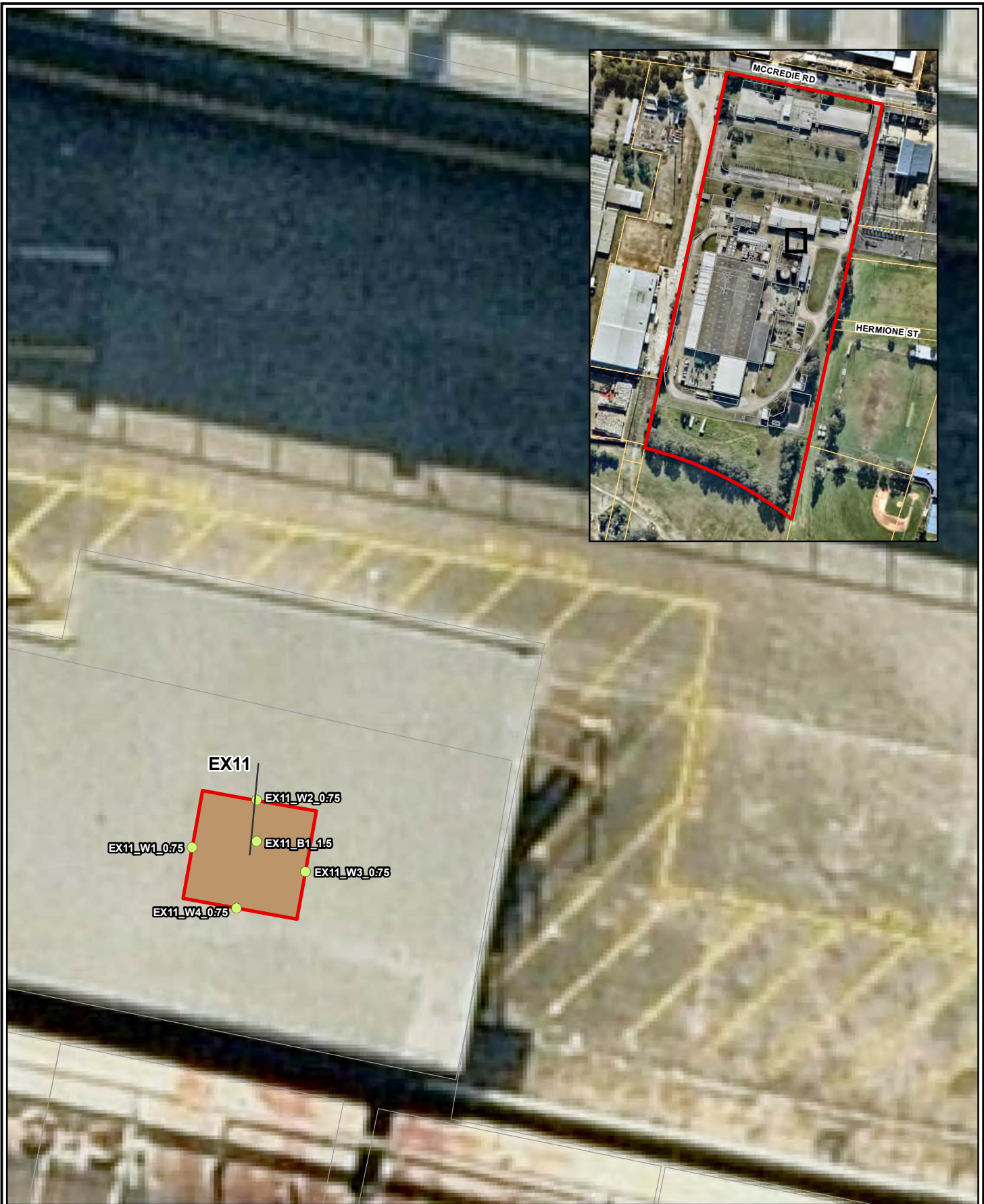
Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**EXCAVATION 10 - SAMPLE
LOCATIONS AND HEALTH**

FIGURE 14





Legend: Approximate Site Boundary NSW Cadastre (2022) Historic Site Features Excavation Features Excavation Areas Excavation Area 11 Sample Location Sample Location - Passed	Scale 1:100		012 metres	BP Castrol Facility 132 McCredie Road Guildford, NSW
	Coord. Sys. GDA 1994 MGA Zone 56			EXCAVATION 11 - SAMPLE LOCATIONS
	Job No: 59279			
	Client: BP Australia Pty Ltd			FIGURE 15
	Version: R11 Rev A	Date 15/02/2023	JBS&G	
	Drawn By: RF	Checked By: JDC		



Legend: Approximate Site Boundary NSW Cadastre (2022) Remediation Area Excavation Area 16 Sample Location Sample Location - Passed	Scale 1:150 01.53 metres		BP Castrol Facility 132 McCredie Road Guildford, NSW
	Coord. Sys. GDA 1994 MGA Zone 56		
	Job No: 59279		FIGURE 5 JBS&G
	Client: BP Australia Pty Ltd		
	Version: R13 Rev A	Date 5/05/2023	
	Drawn By: RF	Checked By: JDC	



Legend: Approximate Site Boundary NSW Cadastre (2022) Remediation Area Excavation 16 Sample Location Sample Location - Passed Sample Location - Health Exceedance	Scale 1:150		BP Castrol Facility 132 McCredie Road Guildford, NSW
	Coord. Sys. GDA 1994 MGA Zone 56		
	Job No: 59279		EXCAVATION EX17 SOIL SAMPLE LOCATIONS FIGURE 6
	Client: BP Australia Pty Ltd		
	Version: R13 Rev A	Date 8/05/2023	
	Drawn By: RF	Checked By: JDC	



Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)

Remediation Areas

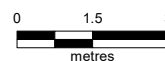
- Excavation Area 18

Sample Location

- Sample Location - Passed

Note: All excavation validation samples passed site criteria

Scale 1:150



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 5/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

EXCAVATION EX18 SOIL SAMPLE LOCATIONS

FIGURE 7





Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Remediation Area**
- Drain Trenches
- Excavation 16
- Trench and stockpile material mixed with PAC and backfilled. Concrete pipes affected by PFAS disposed to landfill
- Sample Location**
- Sample Location - Passed
- Sample Location - Health

(PFOS concentrations notated on figure labelled "Sample Code (PFOS mg/kg)")

PFOS Leaching Criteria = (0.024 mg/kg)



Job No: 59279	
Client: BP Australia	
Version: R13 Rev A	Date: 08-May-2023
Drawn By: RF	Checked By: JDC

Scale 1:550

0 5 10 metres

↑

Coord. Sys. GDA 1994 MGA Zone 56

BP Castrol Facility
132 McCredie Road
Guildford, NSW

DRAIN SAMPLE LOCATIONS (SOUTH PORTION)

FIGURE 4C



Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Remediation Area**
 - Drain Trenches
 - Excavation 16
 - Trench and stockpile material mixed with PAC and backfilled. Concrete pipes affected by PFAS disposed to landfill
- Sample Location**
 - Sample Location - Passed
 - Sample Location - Health

(PFOS concentrations noted on figure labelled "Sample Code (PFOS mg/kg)")

PFOS Leaching Criteria = (0.024 mg/kg)



Job No: 59279

Client: BP Australia

Version: R13 Rev A Date: 08-May-2023

Drawn By: RF Checked By: JDC

Scale 1:550

0 5 10
metres

Coord. Sys. GDA 1994 MGA Zone 56

BP Castrol Facility
132 McCredie Road
Guildford, NSW

DRAIN SAMPLE LOCATIONS
(NORTH PORTION)

FIGURE 4A

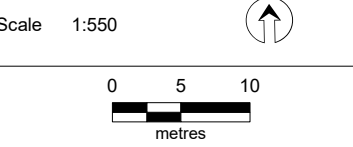


Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Remediation Area**
- Drain Trenches
- Excavation 16
- Trench and stockpile material mixed with PAC and backfilled. Concrete pipes affected by PFAS disposed to landfill
- Sample Location**
- Sample Location - Passed
- Sample Location - Health
- (PFOS concentrations noted on figure labelled "Sample Code (PFOS mg/kg)")
- PFOS Leaching Criteria = (0.024 mg/kg)**



Job No: 59279
Client: BP Australia
Version: R13 Rev A Date: 08-May-2023
Drawn By: RF Checked By: JDC



Coord. Sys. GDA 1994 MGA Zone 56

BP Castrol Facility
132 McCredie Road
Guildford, NSW

DRAIN SAMPLE LOCATIONS (CENTRAL PORTION)

FIGURE 4B



Legend:

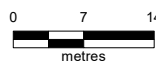
Approximate Site Boundary

NSW Cadastre (2022)

Sample Location

● Sample Location - Passed

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

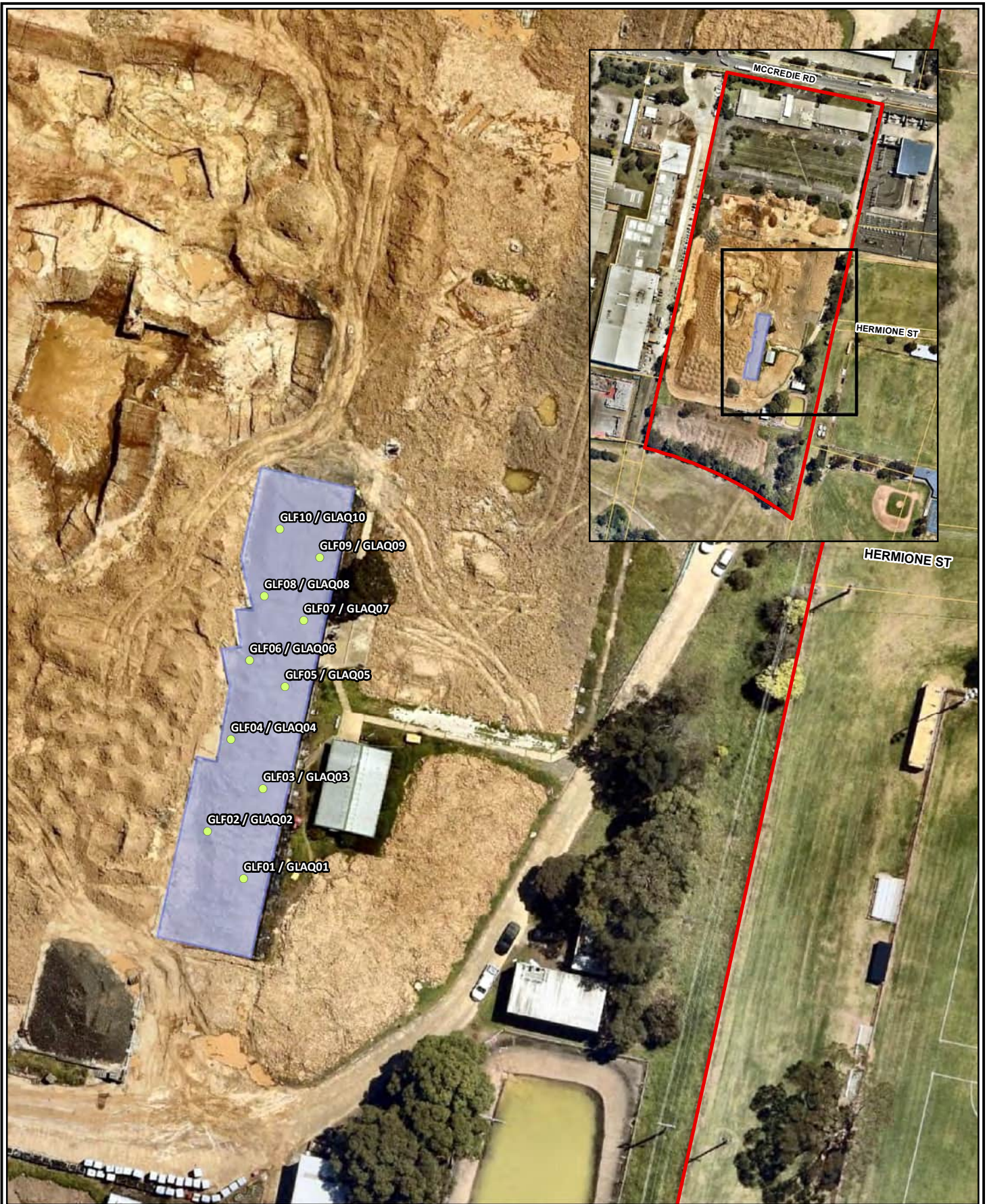
BP Castrol Facility
132 McCredie Road
Guildford, NSW

**ROADWAY AND BUILDING
ASSESSMENT
SOIL SAMPLE LOCATIONS**

FIGURE 13



All validation samples passed site criteria



Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)

Sample Location

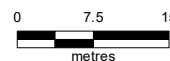
- Sample Location - Passed

Remediation Area

- Asbestos Gravel Landfarm

All validation samples passed site criteria

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**ASBESTOS GRAVEL LANDFARM
FOOTPRINT SOIL SAMPLE
LOCATIONS**

FIGURE 14A





Legend:

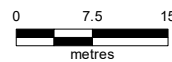
Approximate Site Boundary

NSW Cadastre (2022)

Sample Location

● Sample Location - Passed

Scale 1:750



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**TEMPORARY ASBESTOS GRAVEL
FOOTPRINT SOIL SAMPLE
LOCATIONS**

FIGURE 14B



All validation samples passed site criteria



Legend:

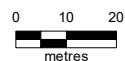
- Approximate Site Boundary
- NSW Cadastre (2022)

Sample Location

- Sample Location - Passed

All validation samples passed site criteria

Scale 1:1,500



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**SOIL LANDFARM
FOOTPRINT
SAMPLE LOCATIONS**

FIGURE 15



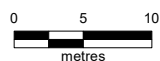


Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Treated PFAS Soil mixed with PAC in-situ
- Sample Location**
- Sample Location - Passed
- Sample Location - Ecological Exceedance

Shaded area around sample locations PSB-4 and PSB-12 was mixed with PAC in-situ, and re-validated by samples PSB-4P1, PSB-4P2, PSB-4P3, PSB-12P1, PSB-12P2, PSB-12P3

Scale 1:550



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Drawn By: RF

Date 8/05/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**TREATED PFAS SOIL
STACKPILE FOOTPRINT
SAMPLE LOCATIONS**

FIGURE 16





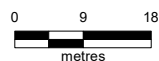
Legend: Approximate Site Boundary NSW Cadastre (2022) Sample Location Sample Location - Passed NOTE: "SB27 (Kleinfelder)" Historical ACM location (no longer in-situ) NOTE: All results below site criteria	Scale 1:550 0 5 10 metres		BP Castrol Facility 132 McCredie Road Guildford, NSW SB27 ASBESTOS SOIL VALIDATION SAMPLE LOCATIONS FIGURE 17 JBS&G
	Coord. Sys. GDA 1994 MGA Zone 56		
	Job No: 59279		
	Client: BP Australia Pty Ltd		
	Version: R13 Rev A	Date 8/05/2023	
	Drawn By: RF	Checked By: JDC	



Legend:

- Approximate Site Boundary
- Excavation Survey
- NSW Cadastre (2022)
- Sample Location**
- Sample Location - Passed

Scale 1:1,000



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**SOIL VAPOUR SURFACE
ASSESSMENT
SAMPLE LOCATION**

FIGURE 19





Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)

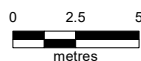
Remediation Area

- Basin

Sample Location

- Sample Location - Passed

Scale 1:300



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

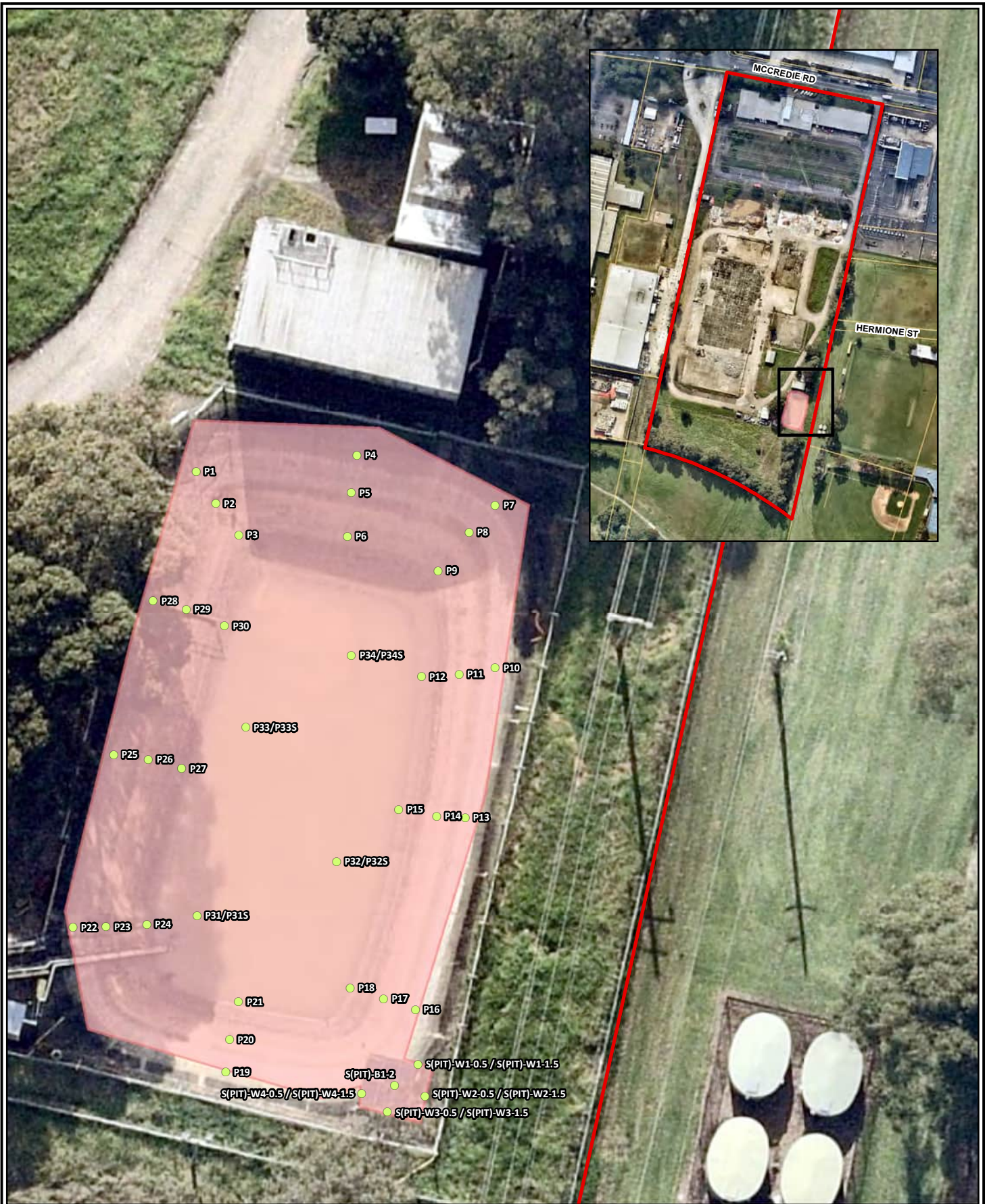
Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

SOIL VAPOUR BASIN
SURFACE SAMPLE LOCATIONS

FIGURE 20

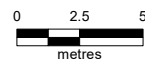




Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Remediation Area**
- Basin & Triple Interceptor Trap
- Sample Location**
- Sample Location - Passed

Scale 1:300



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**BASIN AND TRIPLE INTERCEPTOR
TRAP SAMPLE SOIL LOCATIONS**

FIGURE 10



All sample results were below site criteria



Legend:

Approximate Site Boundary

NSW Cadastre (2022)

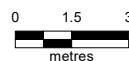
Remediation Area

Water Treatment Plant

Sample Location

● Sample Location - Passed

Scale 1:200



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Drawn By: RF

Date 5/05/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**WATER TREATMENT PLANT
SOIL SAMPLE LOCATIONS**

FIGURE 11



All validation samples passed site criteria



Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)

Remediation Areas

- Hazardous Materials Storage Shed and Firehouse

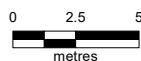
Sample Location

- Sample Location - Passed
 - Sample Location - Ecological Exceedance
- (PFOS concentrations noted on figure labelled "Sample Code (PFOS mg/kg)")

Ecological Criteria

PFOS (leaching) = 0.0024 mg/kg

Scale 1:300



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev A

Date 8/05/2023

Drawn By: RF

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**HAZARDOUS MATERIALS
STORAGE SHED AND FIREHOUSE
SOIL SAMPLE LOCATIONS**

FIGURE 12





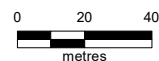
Appendix A Attachment 6 Post Remediation Figures



Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Remaining Buildings and Hardstand**
- Building
- Hardstand

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev B

Drawn By: RF

Date 25/07/2023

Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**REMAINING BUILDINGS AND
HARDSTAND AREAS**

FIGURE 26

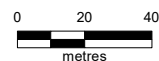




Legend:

- Approximate Site Boundary
- NSW Cadastre (2022)
- Residual Asbestos Areas

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: R13 Rev B

Date 25/07/2023

Drawn By: RF

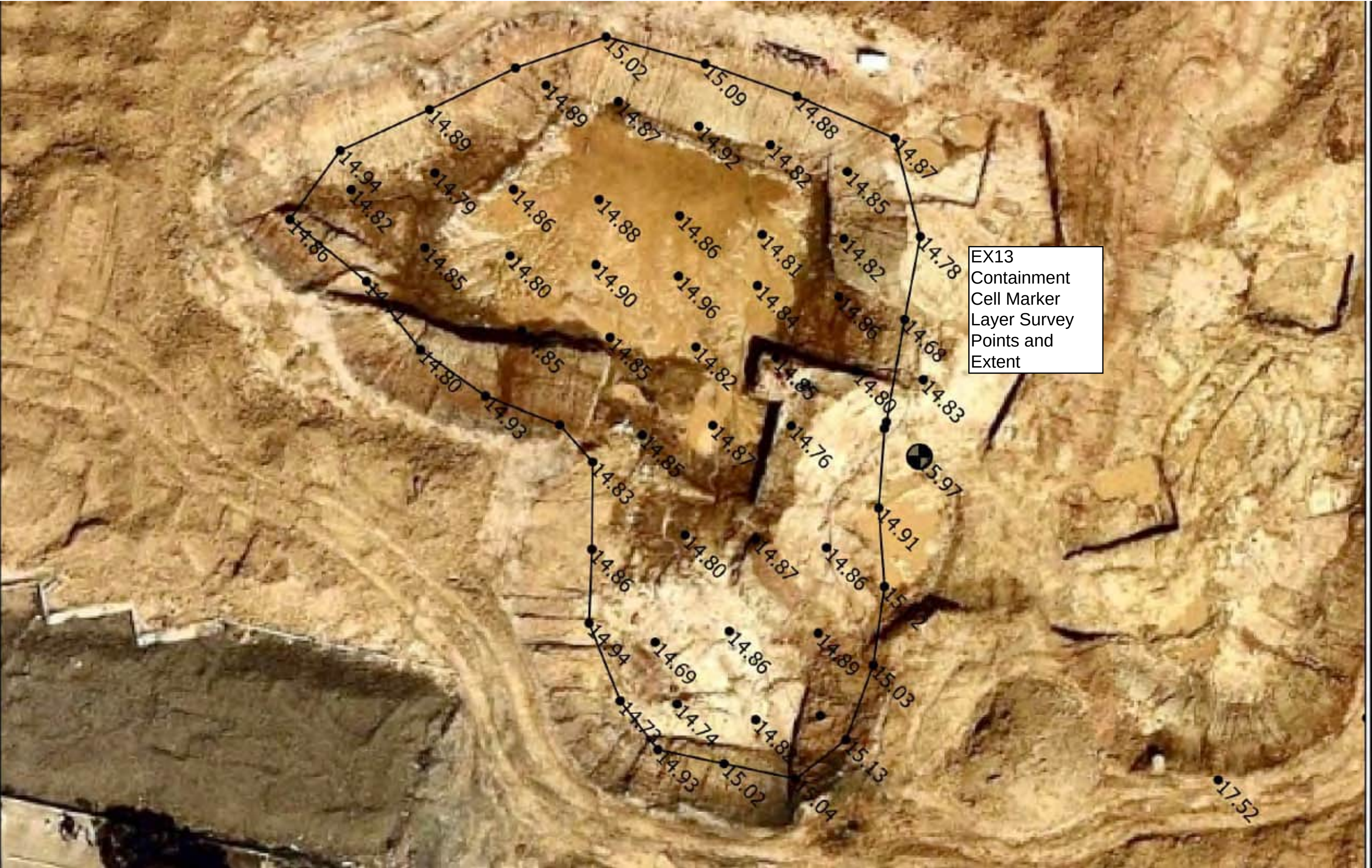
Checked By: JDC

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**ASBESTOS CONTAINMENT CELL
CROSS SECTION CONSTRUCTION**

FIGURE 23





Description		Line Style	Description		Line Style	Description		Line Style	Scale		Drawn		Title		Dwg. No.	
U/G Power			Fence			EA Pillar			HORZ 1:1000		GW		SMITHFIELD - 132 MCCREDIE AVE		1	
U/G Comms			Stop Valve			Lightpole					GW		SURVEY PICK UP AREA 15/03/22		Job No.	
Water Main			Hydrant			Comms Pnt					GW				Issue Date	
Sewer Main			I/O Sewer			Comms Pillar					GW				29/08/23	
Fuel Line			Air/Scour Valve			Redundant Service					Project					
Over Head Power			Manhole			Survey Point (m AHD)										
Drainage Line			Traffic Signal													

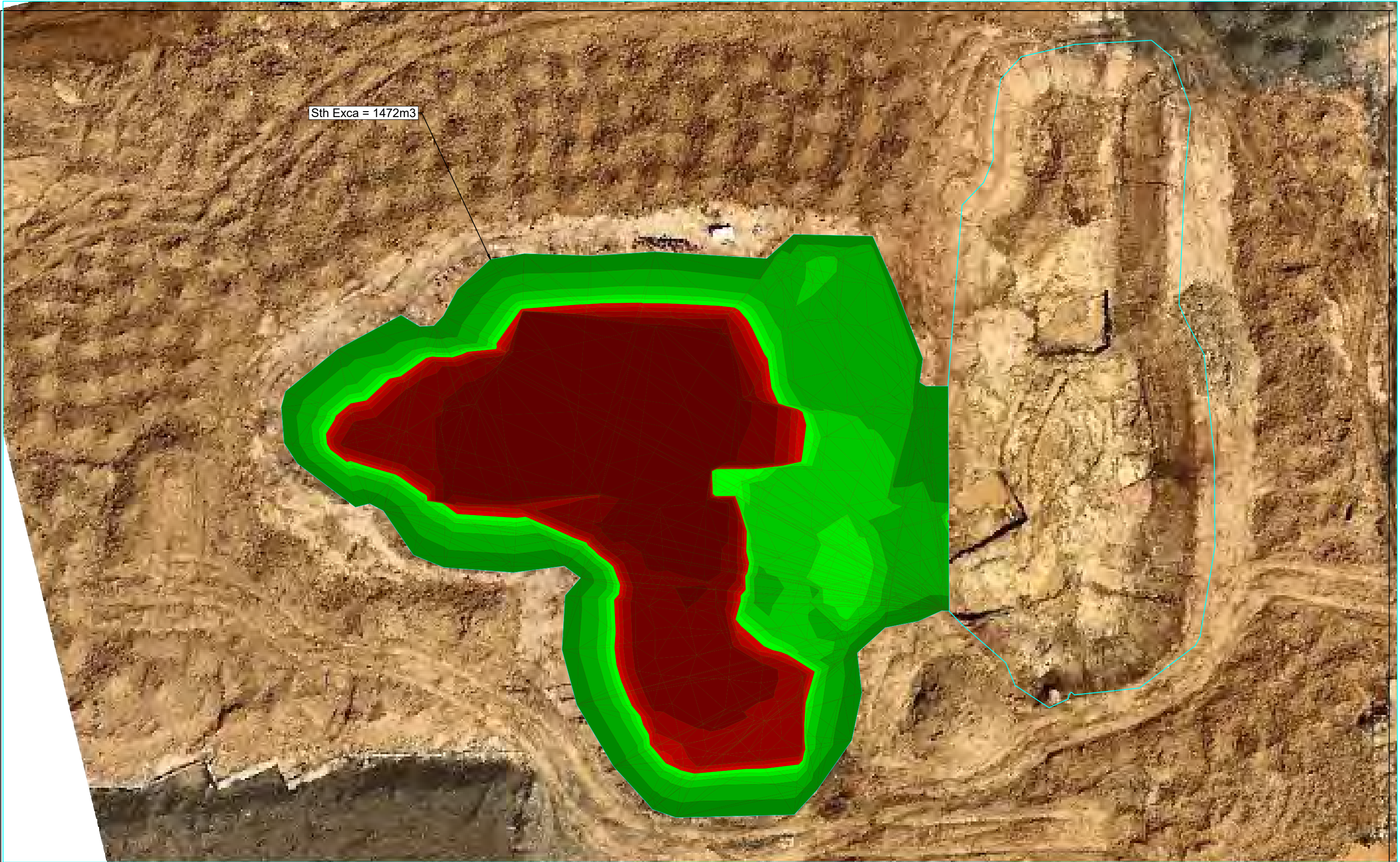
Onsite Surveying Pty Ltd
Tel: 0414 913 944
Office: 02 9372 1580
Email: glen@onsitesurveying.com.au

ABN 33149242419

MGA 2020



Description		Line Style	Description	Line Style	Description	Line Style	Scale	HORZ 1:500	Drawn	 Onsite Surveying Pty Ltd ABN 33149242419 Tel: 0414 913 944 Office: 02 9372 1580 Email: glen@onsitesurveying.com.au	Title	Dwg. No.	
U/G Power			Fence		EA Pillar				GW		132 MCCREDIE AVE SMITHFIELD EXCAVATION VOLUME	1	
U/G Comms			Stop Valve		Lightpole				Designed			GW	Job No.
Water Main			Hydrant		Comms Pit				Modelled			GW	0001
Sewer Main			I/O Sewer		Comms Pillar				GW		Issue Date		
Fuel Line			Air/Scour Valve		Redundant Service						19/01/23		
Over Head Power			Manhole										
Drainage Line			Traffic Signal										



Description		Line Style	Description		Line Style	Description		Line Style	Scale		Drawn		Title		Dwg. No.	
U/G Power			Fence			EA Pillar			HORZ 1:300		GW		132 MCCREDIE AVE SMITHFIELD		1	
U/G Comms			Stop Valve			Lightpole					GW		EXCAVATION VOLUME		Job No.	
Water Main			Hydrant			Comms Pit					GW		SURFACE LEVEL LESS 3M		0002	
Sewer Main			I/O Sewer			Comms Pillar					GW				Issue Date	
Fuel Line			Air/Scour Valve			Redundant Service									19/01/23	
Over Head Power			Manhole													
Drainage Line			Traffic Signal													

Onsite Surveying Pty Ltd
Tel: 0414 913 944
Office: 02 9372 1580
Email: glen@onsitesurveying.com.au

ABN 33149242419



Description		Line Style	Description		Line Style	Description		Line Style	Scale		Drawn		Title		Dwg. No.	
U/G Power			Fence			EA Pillar			HORZ 1:350		GW		132 MCCREDIE RD SMITHFILED		1	
U/G Comms			Stop Valve			Lightpole					GW		MGA2020 - AHD		0001	
Water Main			Hydrant			Comms Ptl					GW				21/12/22	
Sewer Main			I/O Sewer			Comms Pillar										
Fuel Line			Air/Scour Valve			Redundant Service										
Over Head Power			Manhole													
Drainage Line			Traffic Signal													

Onsite Surveying Pty Ltd
Tel: 0414 913 944
Office: 02 9372 1580
Email: glen@onsitesurveying.com.au

ABN 33149242419



Description		Line Style	Description		Line Style	Description		Line Style	Scale		Drawn		Title		Dwg. No.	
U/G Power		E	Fence			EA Pillar			HORZ 1:250		GW		132 MCCREDIE AVE SMITHFIELD		1	
U/G Comms		T	Stop Valve			Lightpole					GW		NTH EXCAVATION		Job No.	
Water Main		W	Hydrant		*	Comms Pnt		*			GW				0001	
Sewer Main			I/O Sewer		*	Comms Pillar		*			Project				Issue Date	
Fuel Line			Air/Scour Valve			Redundant Service									19/01/23	
Over Head Power		O/H	Manhole		•											
Drainage Line			Traffic Signal		•											

Onsite Surveying

Onsite Surveying Pty Ltd

ABN 33149242419

Tel: 0414 913 944

Office: 02 9372 1580

Email: glen@onsitesurveying.com.au

132 MCCREDIE AVE SMITHFIELD
NTH EXCAVATION



Description	Line Style	Description	Line Style	Description	Line Style
U/G Power		Fence		EA Pillar	
U/G Comms		Stop Valve		Lightpole	
Water Main		Hydrant		Comms Pit	
Sewer Main		I/O Sewer		Comms Pillar	
Fuel Line		Air/Scour Valve		Redundant Service	
Over Head Power		Manhole			
Drainage Line		Traffic Signal			

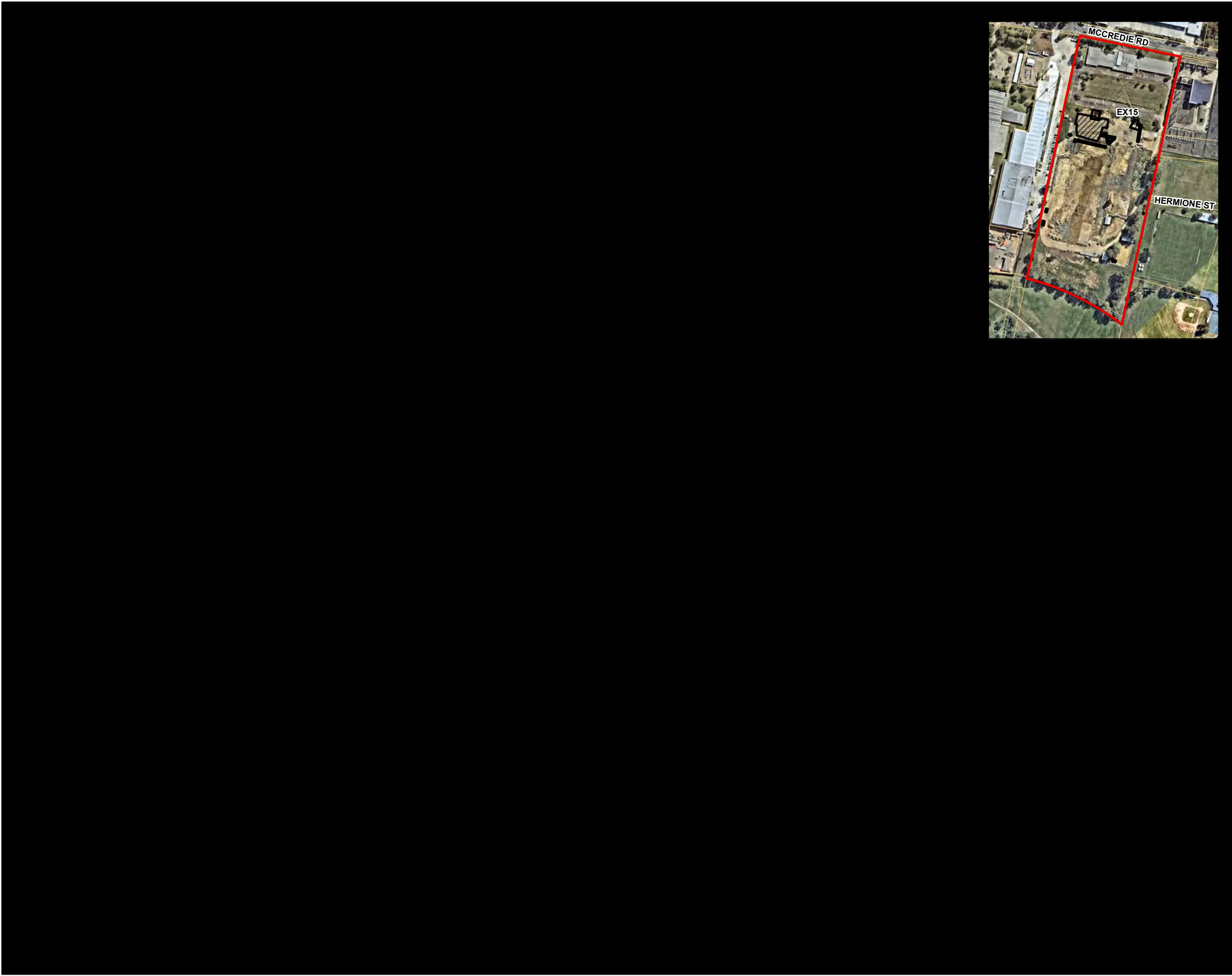
Scale HORZ 1:1000

Drawn	GW
Designed	GW
Modelled	GW
Project	

Onsite Surveying Pty Ltd
Tel: 0414 913 944
Office: 02 9372 1580
Email: glen@onsitesurveying.com.au

ABN 33149242419

Title 132 McCredie Ave Smithfield Final Spot Levels MGA2020/AHD	Dwg. No. 1
	Job No. SMITH
	Issue Date 06/09/23

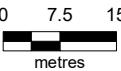


- Legend:**
- Approximate Site Boundary
 - NSW Cadastre (DFSI, 2021)
- Remediation Area**
- Powder Activated Carbon Treated Soils



Job No: 59279	
Client: BP Australia	
Version: R13 Rev B	Date: 25-Jul-2023
Drawn By: RF	Checked By: JDC

Scale 1:1,000



Coord. Sys. GDA 1994 MGA Zone 56

BP Castrol Facility
132 McCredie Road
Guildford, NSW

LOCATION OF POWDER
ACTIVATED
CARBON TREATED SOILS

FIGURE 24



Legend:

- ▭ Approximate Site Boundary
- ▭ NSW Cadastre (DPG, 2021)
- Sample Location**
 - Monitoring Well, Kleinfielder 2020 - EGA
 - Borehole / Monitoring Well, Kleinfielder 2020 - EGA
 - Monitoring Well, Kleinfielder 2021 - Pre. Rem. EGA
 - Groundwater Contour September 2021 (mAHD)
 - Inferred Groundwater Flow Direction

NSW Cadastre, 2021 (www.cadastre.nsw.gov.au)

Note: MW02, MW17 and MW18 are parked under wells and excluded from contouring.

Scale 1:2,250



Coord. Sys. GDA 1994 MGA Zone 56



Job No: 59279

Client: BP Australia Pty Ltd

Version: RD7 Rev A

Date 1/11/2021

Drawn By: RFIJZ

Checked By: MP

BP Castrol Facility
132 McCredie Road
Guildford, NSW

**GROUNDWATER WELL LOCATION
AND SEPTEMBER 2021
GROUNDWATER FLOW CONTOURS**

FIGURE 4



18 November 2021

David Peplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 4: Review of Human Health and Environmental Risk Assessment

132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, currently a Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded:

“...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.”

JBS&G Australia Pty Ltd (JBS&G) has been appointed for the remediation and pre remediation investigation works are planned to refine the remediation area. Ultimately, prior to the site's divestment, BP will be required to undertake demolition of all structures, remediation, bulk earthworks (as necessary) and validation works.

Upon completion of the works, BP requires a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use with the assumption that future redevelopment of building structures at the site will not have a basement.



2. Scope of Work

The auditor was provided with the following document prepared by enRisks for review:

- *Human Health and Ecological Risk Assessment: 132 McCredie Road Guildford*, dated 22 October 2021 ('the HHERA').

The HHERA has been prepared to support the Remedial Works Plan (JBS&G 2021) and the RAP (KLF 2021). The auditor has completed a review of the HHERA against:

- The requirements specified in the NSW EPA *Guidelines for the NSW Site Audit Scheme* (3rd Edition) (NSW EPA 2017).
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (NEPC 2013) (the 'NEPM').
- *PFAS National Environmental Management Plan* (NEMP), Version 2.0 (HEPA 2020).
- *Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards*. (enHealth 2012)

Review comments are provided below

3. Auditor's Comments

The HHERA is in general accordance with the requirements of the NEPM and enhealth 2012 however the following issues require clarification or amendment.

Overall, it is noted that the HHERA does not consider ecological endpoints on site due to the industrial nature of the site. While it is acknowledged that there is limited ecological value on-site, the site layout following the sale is not known and therefore a management plan will be required to manage the soil that exceed the commercial industrial EILs/ESLs.

- Section 2.6.2. Table 2.2 uses modified USEPA RSLs to screen the inhalation pathway from soil, the modification is stated to be based on an empirical relationship between the HSL-C and HSL-D. Given the difficulties of the soil partitioning with chlorinated compounds, this empirical relationship may not be protective of inhalation exposures. While it does not affect the outcomes of the HHERA as the inhalation pathway is further assessed through soil vapour, these values should not be used as unless they are shown to be protective of the inhalation exposures through risk-based modelling.
- Section 2.6.2. EnRisks identify that the inhalation exposures from soil are better assessed through the soil vapour sampling, which is a reasonable assumption, however, the soil vapour sampling did not include TRH, 1,2 dibromo-3-chloropropane, 1,4 dichloro-2-butene or idomethane. Are the areas where there are exceedences of inhalation guidelines included in the remediation area?
- Section 2.4 and 2.10. Fishing is allowed in Prospect Creek. While the area is unlikely to be a significant recreational fishing spot, the pathway associated with consumption of fish from recreational fishing needs to be acknowledged and discussed.
- Section 2.4 and 2.6.2. Include a comment/discussion on the inhalation of dust pathway.
- Section 2.7.2. Please include the vapour modelling of the 1,1,2-TCA from MW8 in the report for review. If vapour modelling is needed to discount the risk, then this chemical should be carried through as a COPC.
- Section 2.7.1. Please amend the discussion to acknowledge the risk associated with inhalation exposures from dissolved phase and /or LNAPL in the perched water identified at SB52, MW17, SB60 and SB61. The remediation will also need to target the dissolved phase.
- Section 2.7.2. The USEPA RSLs for tap water are not necessarily protective of inhalation exposures. It is noted that this does not affect the outcome of the assessment as soil vapour is used to assess vapour intrusion.



- Section 2.8.3. It would be helpful to discuss the analytical methane results which are likely to be more representative of actual methane concentrations in soil vapour than the field readings which can have interference from other contaminants. The analytical results show maximum methane of 34.5% at SSV1 December 2020.
- Table 2.10. Perched fill water – Please include the LNAPL and associated dissolved phase as COPC requiring further assessment.
- Section 3.2. The exposure parameters for an intrusive worker should be consistent with those used in the derivation of the HSLs, please amend and update modelling.
- Section 5.2/8.2.1. The modelling spreadsheets for the RBLs in the appendix do not seem to be complete, please provide the spreadsheets for review in the revised report.
- Section 6.5. Overall, the conclusion of low ecological risk from the site groundwater is supported. However, the discussion stating an absence of aquatic biota requires amendment. While no aquatic biota was noted during the surface water sampling, there has not been an ecological survey and there is likely to be aquatic biota in the creek and some higher order predators would access Prospect Creek. Please include additional discussion using a multiple lines of evidence
- Section 8.2.1. Soil vapour screening criteria will be required for the TO15 suite of analysis. If the values provided in Kleinfelder are not suitable, other values would be needed. The HILs and HSLs (amended for solubility) would be considered suitable for analytes other than TCE, cis 1,2-DCE. Indoor air USEPA RSLs amended for soil vapour would be suitable for additional analysis not covered by HILs/HSLs.
- Section 8.2.2. The amendment of the soil USEPA RSLs to account for inhalation is not supported, these values should not be used as validation criteria unless they are shown to be protective of the inhalation exposures through risk-based modelling.
- Section 8.2.1. Silica Gel Clean up amended TRH guidelines. The TRH is also influenced by the chlorinated compounds. Please provide additional information on why the proposed guideline is relevant for chlorinated sources as well as petroleum.
- Section 8.2.5. Include the exceedance of PFOS in sediment from the settlement pond in the discussion.
- Section 8.3. See the overall comment on site ecological end points.
- Section 8.4. The discounting of the bioaccumulation pathway in Prospect creek is not supported. The soil leachate guidelines will need to be amended to consider the indirect/bioaccumulation water quality guideline. Please include multiple lines of evidence approach that considers the site's PFOS contribution to the creek, the background concentrations in the risk, the current low environmental risk and the removal of source on site.



4. Closure

I trust this meets your current requirements. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

3 December 2021

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 5 Rev 1: Review of RWVP and VSAQP and Pre Remediation Investigation Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, currently a Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

“...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716’ by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.”

Pre remediation investigation works to refine the remediation area are proposed. Prior to the site's divestment, demolition of all structures, remediation, bulk earthworks (as necessary) and validation works will be undertaken. I have been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements.



2. Scope of Work

The auditor has undertaken a review of the following documents prepared by JBS&G:

- *Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal*, dated 3 November 2021. This is hereafter referred to as 'the RWP and VSAQP'.
- *Pre-Remediation Investigation Castrol Guildford Terminal*, dated 3 November 2021. This is hereafter referred to as 'the investigation report'

The purpose of this letter is to provide comments on the two documents.

3. Auditor's Comments

The auditor has completed a review of the RWP and VSAQP and investigation report against:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (NSW EPA 2020).
- National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (NEPC 2013).
- PFAS National Environmental Management Plan (NEMP), Version 2.0 (HEPA 2020).

Auditor overall comments are provided as follows:

1. The RWP and VSAQP does not present any information about the timing of remediation works. The remedial measures proposed take time and staging (e.g. bioremediation via landfarming, treatment of PFAS impacted soil). Please include a schedule/table outlining the estimated timing and duration of the works (see comment on Section 3.3.3).
2. There is also minimal information on the remediation strategies of bioremediation and stabilisation. Additional detail is needed on the remediation techniques to show they are technically feasible. In particular where PFAS and volatile contaminants co-occur and two remediation techniques are proposed i.e. landfarming and stabilisation, further detail is required on technical feasibility.
3. The remediation has not considered environmental end points. While remediation to meet the ecological guidelines may not be required due to the industrial nature of the site, the EILS/ESLs and management limits will need to be discussed in the validation report.
4. The RWP needs to include a contingency for failure of the remediation methods and soil vapour validation.
5. As the RWP includes numerous updated elements when compared to the RAP, please provide the RWP in report format rather than as a letter.

Specific comments on the two reports are provided below

3.1 Review of RWP and VSAQP

Auditor detailed comments on specific sections of the RWP and VSAQP are provided below:

6. Table 1: Update to reflect the site is no longer operational.
7. Section 2.1: Please provide a figure with building names.
8. Table 2 The Area 1 former laboratory waste UST area for remediation shown in Figure 2, 3, 4a and 4b (Attachment 2) does not cover the northern known UST, please amend. As sampling has not yet been undertaken beneath the buildings, the extent of remediation may need to be expanded following demolition and soil sampling.



9. Table 2: The information presented in Table 2 seems inconsistent with Table 5-3 of Kleinfelder's RAP dated 18 February 2021. For example:

- For Area 3 Former Production Plant, Table 5-3 of the RAP stated "excavation and validation of grossly impacted fill materials present beneath the former building slab and adjacent roads" and "excavation and validation of potential asbestos impacts from remnant underground infrastructure" be conducted, but these remedial requirements are not listed in Table 2.
- For Area 10 Settlement Pond, Table 5-3 of the RAP indicated the removal of "underground TIT infrastructure and subsequent remediation of potentially impacted soils beneath the TIT...", but the TIT is not mentioned in Table 2.

If remedial extents have changed these need to be discussed and justified.

10. Section 3.2.

- a. Please include the basis for the change in remediation extends in the RWP as they are different to those provided in the RAP.
- b. The remediation also needs to include above ground fuel infrastructure, please update Figure 3 to also include the above ground tanks (ASTs), triple interceptor trap (TIT), fuel lines and drainage lines.
- c. The asbestos requiring remediation also needs to be included in this section and identified on a figure.
- d. Update reference from Figure 4 to Figure 4a and 4b.

11. Section 3.3 and Section 8: The remedial strategy has significantly changed from that selected in the RAP, please provide the revised remedial strategy option assessment. It is noted that the remedial option assessment in the RAP identified that pilot trials would be needed to confirm the effectiveness of landfarming and immobilisation/solidification. Limited detail is provided on the remedial methods, and additional information is required on the methods to show they are technically feasible.

12. Section 3.3.1: Pavement. How will a representative sample be collected as it is indicated that only one bulk sample from Area 3 Production Plant and Area 10 Settlement Pond shall be collected and analysed for PFAS. Given that Area 3 and Area 10 are each bigger than 1,000 m², please provide more information on why this sample density is appropriate. Please state the actual criteria that will be used to assess the concrete and include these in Section 4.8.

13. Section 3.3.2. The above ground infrastructure will also need to be removed and the soil remediated/characterised. Please provide a figure that shows the expected excavation for the petroleum infrastructure including those in Area 1 and Area 2

14. Section 3.3.3:

- a. The criteria stated in this section does not correlate to that in Table 4. The criteria of 20 mg/kg should be for PFOS+PFHxS, and it is not clear where the PFOS criteria of 0.4 mg/kg is sourced from. PFOA will also need to be evaluated.
- b. Please revise and clearly explain how excavation extents shown in Figures 4a and 4b (Excavation Stage 1, 2a, 2b and 3) are related to Section 3.3.3. Please provide a table that outlines the remedial schedule and approach including: Excavation Stage Number, Description, CoPC, Estimated Excavation area (m²), depth (m) and volume (m³), Remedial approach (e.g. off-site disposal to Renex in Victoria; on-site treatment with PAC; on-site bioremediation treatment etc.), expected timing.

15. Section 3.3.4:

- a. The area for excavation on Figure 5 in Area 7 is not discussed.
- b. For consistency and to assist with tracking, it is recommended that the remediation/excavation area shown in Figure 5 (Attachment 2) be identified as Excavation Stage 4.



- c. The remediation/excavation area shown in Figure 5 (Attachment 2) overlaps with Excavation Stage 3 shown in Figure 4b (Attachment 2), which suggests that at the end, there will be one large excavation comprising Excavation Stage 1, 2a, 2b, 3 and 4. Please confirm the estimated volume in the overlap between Excavation Stage 3 and 4 has not been counted twice.
- d. The perched water “plume extent” is estimated to be 2 m thick and diameter of 20 m and therefore, a pore volume of 200 kL is proposed for dewatering. Please provide further information regarding how this extent was determined. The auditor notes that discontinuous perched groundwater is shown in Figure D of the RAP to be present in MW17 and MW19 (located approximately 40 m apart).
- e. If NAPL/sheen or evidence of contamination is observed during the dewatering after 200 kL, please state the proposed action. Sampling of the residual perched water to confirm the contaminated has been removed will be required as dissolved phase water may also require remediation.

16. Section 3.3.5:

- a. Please change “soils” to ‘sediment’ in this section.
- b. It seems like only the sediment within the Settlement Pond is remediated. The TIT and associated infrastructure, also need to be removed and validated.
- c. Section 3.3.5 and 3.3.6: It appears that soil and sediment impacted with petroleum hydrocarbon and ACM are to undergo bioremediation via landfarming. Confirm whether these will be land-farmed together (due to presence of ACM) or separately.

17. Section 3.3.6:

- a. Please provide a figure showing the location and extent of the mounded soils assumed to be contaminated with asbestos. It is noted that only 10 sampling locations are proposed which seems scarce for a volume of 8000 m³. Please provide additional justification on why this sample density is appropriate. The location of the Asbestos detections on site should also be shown on a figure and described in this section.
- b. Please confirm whether any off-site disposal is proposed or is all ACM identified during assessment/remediation proposed to be placed below 3 m depth on-site? The auditor notes that ACM is not discussed in Section 3.3.11 Off-site Disposal. The placement of the asbestos at 3 m depth is essentially a cap and contain remedial strategy and will require a long term EMP for the site.

18. Section 3.3.8: Limited information is provided on the treatment of PFAS through the application of pulverised activated carbon (PAC). Further information is required on the proposed method and why 2% will be adequate. In accordance with the RAP, a pilot trial will be needed to show that the remediation is appropriate.

19. Section 3.3.9: Given that the NSW EPA 2014 specifically advises against bioremediation of chlorinated hydrocarbons, further information is required to show that the remediation proposed is suitable. A pilot trail is identified in the RAP and a contingency for failure of the method should be discussed. Additional detail on the bioremediation is needed to show how bioremediation will be encouraged, such as volumes, dimensions and management of land farm stockpiles to ensure the material is evenly aerated. In addition, samples will need to be collected of the land farm to show the appropriate organisms are present to bioremediate the soil.

20. Section 3.3.10:

- a. The current information provided on the water treatment process is insufficient. The perched water is impacted with petroleum, VOCs and PFAS. Please provide additional information on why this treatment process will be suitable and able to reduce the concentrations to a suitable level. Will the use of the settlement pond to treat the perched water add additional contaminants to the sediments?



- b. The water from the treatment plant will need to be tested prior to discharge. Does BP currently have a discharge or trade waste licence for its disposal of treated water. The RAP identified the stormwater is discharged into Prospect Creek, please confirm the discharge point for the process water and what discharge limits apply. Noting that if the treated water is discharged to prospect creek through the stormwater system the aquatic criteria for the creek will need to be met.
21. Section 3.3.11. Are asbestos contaminated materials to be disposed off-site? Is concrete impacted with PFAS to be disposed off-site?
22. Section 3.4: Any treated site material will need to be shown to be suitable for reuse on site. The burial of asbestos at depth is identified in earlier sections and should be further discussed here.
23. Section 3.5: Only a Remediation Environmental Management Plan (REMP) is discussed. What about the Asbestos Management Plan stated in Section 3.3.5? If cap and containment of asbestos is planned a long term EMP will be required. Will the PFAS treated soils need to be managed?
24. Section 4.2:
- a. Consistent with the PFAS NEMP 2.0, the frequency of blind and split duplicates should be one duplicate per 10 primary samples for PFAS samples.
 - b. Evidence of calibration of field equipment used should also be included.
 - c. It is stated that rinsate blanks are not anticipated. However Section 4.6 and Section 4.7 identify reusable equipment (hand trowel and soil vapour equipment).
25. Section 4.3: Please use consistent terminology when discussing the site and confirm that 'north of the terminal portion' means north of Area 3 and Area 2. Sampling along the drainage lines will be required to confirm soil conditions in the northern portion of the site.
26. The destruction or decommission certificate for each UST should be provided as a measure of validation/disposal of the USTs.
27. Section 4.5:
- a. If any of the stockpiles are to be placed on unsealed ground, appropriate management measures will be required as well as validation of the footprint of the stockpiles post remediation.
 - b. Different PID lamps are required to detect chlorinated or petroleum hydrocarbons. Please discuss how will this be incorporated into the field screening.
 - c. Please provide additional information on the timing of remediation, how often the material will be tested and measures used to stimulate bioremediation.
 - d. The validation including sampling requirements of imported material also needs to be discussed.
28. Section 4.6: The aesthetic criteria is not sufficient. PID readings should also be used as odour may be present due to chlorinated compounds and not be immediately recognisable. Odour sensitivity can also be reduced through exposure. Soil should also be inspected for anthropogenic inclusions not only asbestos. Please revise this aesthetic assessment.
29. Section 4.7:
- a. Confirm that excavation soil vapour validation samples and backfilled excavations will be validated via field PID readings followed by collection of soil vapour samples.
 - b. The depth of the excavation soil vapour **wall** samples will need to target the depth of the excavation as well as consider the likely ingress of ambient air.
 - c. The depth of *backfilled excavation soil vapour wells* will also need to consider the depth of excavation.



- d. The PID lamp will need to be appropriate for detection of chlorinated compounds.
- e. Field screening for ground gasses should also be completed post sampling.
- f. Please confirm that the volume of sample specified will be suitable for the LOR required.

30. Section 4.8, Table 3: Given the complexities of the remediation and co-occurrence of the contaminants, please provide the analytical schedule for each excavation stage/remediation area. The soil treated for PFAS should also be tested for PFAS (totals) in soil as well as leachate. Consistent with Section 3.3.1, the validation of concrete media (for PFAS) should also be listed.

31. Section 4.9: The thickness of fill may be greater than 0.5 m, thus, it is recommended that the maximum depth of sampling be deeper than 0.5 m.

32. Section 4.10: Is an asbestos clearance certificate going to be issued for the site post-remediation? Soil sampling across the site needs to conform with the appropriate frequency for site suitability. A discussion of soil conditions following removal of concrete and demolition of the buildings is required in the validation report.

33. Section 4.11: The site surface should be free from any offensive odours and staining/dischouration, not just petroleum hydrocarbons. The aesthetic considerations as per NEPM need to be included.

34. Section 4.11: The source of the criteria in Table 4 should be clearly referenced. Noting that some of the criteria is from the HHERA which has not yet been approved and criteria may change. Given that the excavations will be backfilled following treatment and possibly with imported material, the HSLs relevant for sand will need to be considered as validation criteria. Please confirm the validation criteria will be used to assess the suitability of material to be re-used on site.

35. Section 4: The perched/fill water is to be remediated therefore validation of perched water will need to be discussed in this section.

36. Section 5.2-5.5.

- a. The materials classification form (MCF) needs to be more project specific and clearly identify if the material excavated is going off site, requires management for asbestos, treatment for chlorinated hydrocarbons/petroleum hydrocarbons and/or PFAS. Is it anticipated that a second MCF will be completed following treatment to indicate the material is suitable for re-use on site or for off-site disposal.
- b. Include depth of re-use in the MCF (ie <3m for asbestos and <1m for PFAS treatment)
- c. On the materials tracking sheet (MTS), is the source location the land farm/stockpile or the original excavation. Is the MCF reference number for the excavated MCF or a separate MCF? Please make this sheet project specific
- d. Photographs of the material will need to be taken and listed in the MCF.

37. Section 5.4.

Material import tracking summary sheet should include:

Material Source information	Classification	Quantity imported	Dates imported	Placement on site	Visual inspection details post arrival on site	Details of any samples collected
-----------------------------	----------------	-------------------	----------------	-------------------	--	----------------------------------

Material export should include

Stockpile/source ID	Date disposed	Classification	Quantity	Docket no.	Wastelocate no.	Waste classification report reference
---------------------	---------------	----------------	----------	------------	-----------------	---------------------------------------

The above information needs to be presented as summarised above to show how various material tracking data relates to each other.



Section 6: Section 3.3.3 stated that soil with PFOS exceeding 20 mg/kg is stated to be transported to Victoria for treatment. Does this require any permit/approval?

Attachment 3:

- Table 2 Study Question 1: This question seems to contradict Study Question 2 and 3 which discusses treatment of PFAS impacted soil exceeding the soil validation criteria. Please amend.
- Table 2 Study Question 8: Is there a word missing from the sentence (i.e. surface “water”)?

3.2 Review of Investigation report

Auditor detailed comments on specific sections of the Investigation report are provided below:

38. Section 2.1 Define how the COPC were identified i.e. Identified in the RAP.

39. Section 2.2.1. The ground to the south of the settlement pond is elevated compared to the pond and therefore unlikely to receive overflow, please amend discussion on PFAS concentrations south of the pond.

40. Section 2.3.3, 2.3.4 and 2.3.5

- a. Please specify what the contaminated media is L soil, groundwater /and or surface water.
- b. Workers and intrusive workers are not just limited to dermal direct contact. Note that incidental ingestion of soil may also occur and consider referring to the more general direct contact rather than limiting exposures to direct dermal contact.
- c. The indoor workers are also exposed to dust and limited direct contact.

41. Section 2.3.6. The exposure pathways from perched and true groundwater need to be discussed.

42. Section 2.3.7 Please discuss why the only off-site exposures to site contaminants are at Prospect Creek, i.e. discuss the offsite land uses and relevant pathways.

43. Section 3.2 The information presented is more of a background discussion. This section could be simplified as the problem to be resolved for this investigation is related to data gaps.

44. Section 3.3. Please revise the decisions. The RAP and SAR already identify that remediation is required to make the site suitable. The decisions for this Pre-remediation Investigation report are associated with data gaps and providing information for the RWP to help refine the remediation areas.

45. Section 4. Table 4.1 – Update the table to clearly identify the specific data gaps addressed in this investigation rather than what was identified in the SAQP, i.e. limited to DG14 and DG15.

46. Section 4.5. The field notes in Appendix B suggest that a 35 minute sample time would be adopted that would result in a 7L soil vapour sample. Please confirm the sample volume collected and include the calculation sheets for converting $\mu\text{g}/\text{tube}$ to $\mu\text{g}/\text{m}^3$.

47. Section 5.2.

- a. Table 5.1. Leachate criteria needs to be updated to the revised criteria in the HHERA.
- b. Please update the selection of soil type and HSLs to be consistent with the HHERA that specified the modified non-petroleum HSLs (as presented in the RAP) for silt or sand be used. Sand is likely to be the relevant criteria for validation in excavations where fill or disturbed material will be used. Please also specify the relevant depth used to select criteria.
- c. The modified soil RSLs should not be used to screen inhalation pathway.

48. Section 5.3

- a. Update for comments provided on Section 5.2.



- b. Specify the land use category identified is HSL/HIL-D.
- c. Update the referencing to clearly identify the source i.e., does USEPA 2021 mean the USEPA RSLs Industrial soil? Have these been modified for ILCR of 10^{-5} .

49. Section 5.4

- a. Update for comments provided on Section 5.2.
- Update the referencing to clearly identify the source ie does USEPA 2021 mean the USEPA RSLs Industrial indoor air? Have these been modified for ILCR of 10^{-5} .

50. Section 5.5

- a. Section 5.2 identifies drinking water will be used to screen perched water, are different criteria required for true groundwater?
- b. The criteria for BTEX are identified as inhalation criteria but seem to be drinking water criteria amended for direct contact? Inhalation criteria are also needed, see comments on Section 5.2 on non-petroleum HSLs presented in the RAP.
- c. Update the referencing to clearly identify the source i.e., does USEPA (2021) mean the USEPA RSLs Tap water? Have these been modified for ILCR of 10^{-5} for relevant compounds?
- d. The modification of the recreational value for PFAS requires additional discussion as the value presented in HEPA is not the drinking water value divided by 10.
- e. The PFAS criteria need to consider ecological end points

51. Section 5.6. See comments on RWP and VSAQP. The validation of aesthetics requires additional consideration, solvent odours and other anthropogenic inclusions will also need to be evaluated.

52. Section 6.

- a. The QA section needs to discuss the specific data validation required for soil vapour including shut in tests, leak detection (which is currently discussed in Rinsate Blanks) and if any of the carbon tubes had detects in the back section. A check of the laboratory reports indicates that SV27, SV28, SV38, had detectable concentrations of several analytes in the back section indicating a significant data quality breach that may result in underestimation of the soil vapour concentrations.
- b. In accordance with the NEMP, PFAS sampling requires additional duplicate/triplicate samples of 1/10, please provide justification of why the required frequency was not obtained.
- c. Please identify the relevant sample IDs for the QA/QC samples, rinsate blanks, trip spike, trip blanks, soil vapour equipment blank and field blank. The QA/QC sample results will also need to be tabulated.

53. Section 7.1

- a. Indications of hydrocarbon contamination should also identify the PID reading at MW15 of 91ppm as an indication of contamination.
- b. Identify that the surface water sampling was conducted in Prospect Creek.

54. Section 7.2 Groundwater

- a. Please discuss the results for the perched and true groundwater separately.
- b. The identification of PFAS criteria of 0.13 ug/L is an ecological criteria, which needs to be included in Section 5.5. The 0.13 ug/L is the 95% species protection level, the bioaccumulation pathways will also need to be considered.



55. Section 7.3 Surface Water Paragraph 1. Identify that the surface water samples were collected at the discharge point into Prospect Creek.

56. Section 7.4 Soil Vapour. Provide additional discussion on how the samples were selected for analysis and the number of samples analysed. Please identify the lamp used in the PID and if it was appropriate for chlorinated compounds and/ or petroleum.

57. Section 7.5

- a. Please update based on comments on criteria.
- b. The paragraph beneath Table 7.1 States 'As noted in the Table, it is likely that the soil remedial works will address the groundwater impact at MW17'. Which table does this refer to as Table 7.1 does not discuss how soil remediation will address LNAPL.
- c. PFAS leachate concentrations are notoriously difficult to correlate to total concentrations, the limited data set does not support using a guide of 0.4 mg/kg and then 1 mg/kg to identify additional remediation areas. Why was the settlement pond excluded?

58. Section 7.6

- a. The discussion that the soil impact at MW17 below 4m depth means that complete exposure pathways are unlikely cannot be supported given the LNAPL contamination and as the site is to be redeveloped and the final site levels are not known.
- b. The soil vapour discussion does not answer the question posed. This needs to identify that yes unacceptable impacts have been identified and then identify the areas. The likely source can be discussed however the first sentence should be amended, where the report has discussed the correlation between soil and soil vapour.
- c. The site-specific soil vapour criteria address potential mixtures, how has the other criteria addressed mixtures?

59. Appendix A. Tables will need to be updated based on comments provided on the criteria used.

60. Appendix B

- a. Please provide equipment calibration sheet from the supplier for the PID.
- b. Please provide the equipment calibration sheet for the air pumps.

61. Appendix D. The Site Specific Risk Assessment has been updated following auditor review. Does the whole report need to be appended?



4. Closure

I trust this meets your current requirements. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

7 December 2021

David Peplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 6: Review of HHERA Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, currently a Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

“...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.”

Pre remediation investigation works to refine the remediation area are proposed. Prior to the site's divestment, demolition of all structures, remediation, bulk earthworks (as necessary) and validation works will be undertaken. I have been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements.



2. Scope of Work

The auditor has undertaken a review of the following document prepared by JBS&G:

- *Human Health and Ecological Risk Assessment*, Rev B by enRisks dated 23 November 2021
Referred to as 'the HHERA'.

The Auditor has reviewed a previous version of the report and provided comments in IAA No.4.

3. Auditor's Comments

The comments provided in the IAA No.4 have been addressed with the exception of the following:

- Section 2.6.2. This section still discusses the use of the modified soil RSLs for screening the screening inhalation exposures. As reflected in the comments log this does not present a conservative screening assessment, please amend discussion.
- Section 8.4/Appendix H. Please provide some additional supporting discussion on the derivation of the aquatic bioaccumulation toxicity value used to derive the leachate criteria and why it is considered more relevant. The Page et al. (2019) paper quoted does not provide information on the derivation of the value. It would be useful if Appendix H could be expanded to discuss the derivation of this guideline and why it is considered acceptable and more appropriate value.

4. Closure

I trust this meets your current requirements. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

16 December 2021

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 7: Review of HHERA, RWP and VSAQP and Pre-Remediation Investigation Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

“...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.”

Pre remediation investigation works to refine the remediation area are proposed. Prior to the site's divestment, demolition of all structures, remediation, bulk earthworks (as necessary) and validation works will be undertaken. I have been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements.



2. Scope of Work

The auditor has undertaken a review of the following documents prepared by JBS&G:

- *Human Health and Ecological Risk Assessment*, Rev B by enRisks dated 9 December 2021. This is hereafter referred to as 'the HHERA'.
- *Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal*, Rev 0 dated 16 December 2021. This is hereafter referred to as 'the RWP and VSAQP'.
- *Pre-Remediation Investigation Castrol Guildford Terminal*, Rev 0 dated 16 December 2021. This is hereafter referred to as 'the investigation report'.

The Auditor has reviewed previous versions of these reports and has provided comments in Interim Audit Advice Letters (IAA No.4. to IAA No. 6).

The purpose of this letter is to provide comments on the final three documents.

3. Auditor's Comments

The auditor has completed a review of the HHERA, RWP and VSAQP and investigation report against:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (NSW EPA 2020).
- National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (NEPC 2013).
- PFAS National Environmental Management Plan (NEMP), Version 2.0 (HEPA 2020).

Previous comments provided on the draft reports in the Interim Audit Advice Letters have been addressed.

The Auditor considers that the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial works plan:

- *Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal*, dated 16 December 2021.

4. Closure

I trust this meets your current requirements. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP



Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

7 June 2022

David Peplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 8: Asbestos Unexpected Find Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Scope of Work

During remediation, an unexpected find of asbestos was encountered over gravel beneath the warehouse building. The northern section of the gravel was also found to be impacted with oil from the condensate underground storage tanks (USTs). A remediation strategy for this unexpected find is documented in the following letter:

- 'Preferred Remediation / Management Approach for Unexpected Asbestos Find Former Castrol Guildford Terminal, 132 McCredie St Guildford NSW', by JBS&G dated 23 May 2022.

The purpose of this IAA No.8 is to provide comments on this document.

3. Auditor's Comments

The auditor has completed a review of the letter considering the RWP and VSAQP as well as:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- Consultants Reporting on Contaminated Land, Contaminated Land Guidelines (NSW EPA 2020).
- National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 (NEPC 2013).

Overall, I agree that encapsulation of the gravel containing asbestos on site is an appropriate remediation strategy, however I note the following:

- Determining the extent of the oil impacted gravel will need to be confirmed with validation sampling not just aesthetic indications.
- PFAS will need to be considered a chemical of potential concern (CoPC) for the oil impacted gravels until it is ruled out through analytical testing.
- Please list the CoPC that will be analysed in soil and leachate for validation rather than referring back to a table in the RWP.
- Confirm the oil impacted gravels will be land farmed separately to the soil.
- Please provide information on the likely application rates of the Oil Gone product that will be needed as well as the application methods to ensure the product is evenly distributed.
- The treated oil impacted gravel should be placed above the groundwater in the encapsulation.
- Additional information is needed on the cap required, thickness, material etc. The encapsulation area top and bottom and thickness of the cap will need to be surveyed and detailed in the validation report.
- Validation criteria will need to be compared to soil guidelines relevant to sand not clay (ie Table 6.3 in the RWP).
- Please state the sample frequency for validation of the oil impacted gravels post treatment.
- Please include a table of the validation criteria for totals and leachate that will be used rather than just referring to the table in the RWP.
- The location of the asbestos impacted material and the management will need to be detailed in the long-term environmental management plan for the site.

Please provide a figure/s showing:

- Expected extent of the asbestos gravels.
- Expected extent of the oil impacted gravels.
- Expected location of the asbestos gravel encapsulation area.
- A cross section of the expected encapsulation showing clean gravels, oil impacted gravels, marker layer and cap groundwater level.
- Expected treatment area for the oily gravels.



4. Closure

I look forward to a revised letter. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

9 June 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 9: Review of Site Wide Pavement Assessment Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the 'RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Scope of Work

In accordance with the RWP pavement/concrete at the site is to be removed to facilitate remediation. The concrete is expected to be recycled however pavement/concrete impacted with per- and poly-fluoroalkyl substances (PFAS) is considered unsuitable for recycling and will need to be taken off-site as waste. JBS&G collected additional concrete samples and submitted these for PFAS analysis. The results are presented in the following document:

- 'Site Wide Pavement Assessment to Assess Presence of Per- and Poly-Fluoroalkyl Substances (PFAS) Former Castrol Guildford Terminal, 132 McCredie St Guildford NSW' by JBS&G dated 3 May 2022.

3. Auditor's Comments

The auditor has completed a review of the letter considering the RWP and VSAQP as well as:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- 'Consultants Reporting on Contaminated Land', Contaminated Land Guidelines (NSW EPA 2020).
- 'National Environment Protection (Assessment of Site Contamination) Measure 1999' as amended 2013 (NEPC 2013).
- 'PFAS National Environmental Management Plan Version 2.0', January 2020, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA 2020).
- 'Waste Classification Guidelines Part 1: Classifying waste' NSW EPA 2014.
- 'Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste' NSW EPA 2016.

Overall, I note that any material taken off-site must comply with the NSW Waste Classification Guidelines or be covered by an EPA exemption. The following specific comments are provided below:

- The adjustment factor of 20 discussed in the site-specific risk assessment (enRisks 2021¹) is not relevant to material taken off-site as there is no control over where the material will be placed.
- Pavement material expected to be impacted by PFAS will need to be stockpiled separately and not mixed (homogenised) with the non-contaminated pavement.
- The current data presented in the letter has not been considered from a data quality perspective. Please provide the quality assurance/ quality control (QA/QC) assessment of the sampling and analysis and consider the sample frequency required to adequately characterise the material.
- Please provide a figure showing the expected extent of the PFAS impacted pavement that will not be suitable for recycling.
- There is currently insufficient information to support the conclusion that the remainder of the concrete is free from PFAS contamination. Additional sampling is needed from:
 - Each remediation area to confirm it is PFAS free.
 - Under the settlement pond, within the surface water drains and from beneath the area that is currently used to treat the discharge surface water.
 - On the boundary between Area 3 and Area 5 to determine the extent of the PFAS impacted concrete in Area 3.
- I understand there has been additional sampling of the concrete i.e. surface, middle and base of the slab. These additional results should be considered as part of this assessment.

¹ 'Human Health and Ecological Risk Assessment 132 McCredie Road Guildford, NSW' by EnRisks dated 9 December 2021



4. Closure

I look forward to a revised letter. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

9 June 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 10: Review of Waste Classification of PFAS Affected Concrete / Pavement Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the 'RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Scope of Work

In accordance with the RWP, pavement/concrete at the site is to be removed to facilitate remediation. The concrete is expected to be recycled however pavement/concrete impacted with per- and poly-fluoroalkyl substances (PFAS) is considered unsuitable for recycling and will need to be taken off site as waste. JBS&G have provided a waste classification of a portion of the concrete in the following document:

- 'Waste Classification of PFAS Affected Concrete / Pavement Former Castrol Guildford Terminal, 132 McCredie St Guildford NSW' by JBS&G dated 19 May 2022.

3. Auditor's Comments

The auditor has completed a review of the letter considering the RWP and VSAQP as well as:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- 'Consultants Reporting on Contaminated Land', Contaminated Land Guidelines (NSW EPA 2020).
- 'National Environment Protection (Assessment of Site Contamination) Measure 1999' as amended 2013 (NEPC 2013).
- 'PFAS National Environmental Management Plan Version 2.0', January 2020, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA 2020).
- 'Waste Classification Guidelines Part 1: Classifying waste' NSW EPA 2014.
- 'Addendum to the Waste Classification Guidelines (2014) – Part 1: classifying waste' NSW EPA 2016.

Overall, I note that any material taken off-site must comply with the NSW Waste Classification Guidelines or be covered by an EPA exemption. The specific comments on the letter are provided below:

- The comments provided in IAA No.9 should be considered for this waste classification.
- The current data presented in the letter has not been considered from a data quality perspective. Please provide the quality assurance/ quality control (QA/QC) assessment of the sampling and analysis and consider the sample frequency required to adequately characterise the material.
- Please provide a figure showing the sample locations.
- Please tabulate the soil and leachate data and show comparison to the waste criteria.

4. Closure

I look forward to a revised letter. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter
NSW EPA Accredited Auditor 0803



JB/ /MPLimitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

9 June 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 11: Review of Derivation of Site-Specific TRH Criteria

Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the 'RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Scope of Work

The RWP and VSAQP and Human Health Risk Assessment (HHERA) (enRisks 2021¹) identified a process to amend the total recoverable hydrocarbon (TRH) soil criteria based on site specific speciation of the TRH. JBS&G have subsequently collected speciated TRH data and calculated site-specific soil criteria as detailed in the following document:

- 'Derivation of Site-Specific TRH Criteria, 132 McCredie St Guildford NSW' by JBS&G dated 19 May 2022.

3. Auditor's Comments

The auditor has completed a review of the letter considering the RWP and VSAQP as well as:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- 'Consultants Reporting on Contaminated Land', Contaminated Land Guidelines (NSW EPA 2020).
- 'National Environment Protection (Assessment of Site Contamination) Measure 1999' as amended 2013 (NEPC 2013).
- 'PFAS National Environmental Management Plan Version 2.0', January 2020, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA 2020).

Overall, I note that the process of deriving the site-specific TRH soil criteria generally follows that outlined in the HHERA (enRisks 2021). The following specific comments are provided below:

- The current data presented in the letter has not been considered from a data quality perspective. Please provide the quality assurance/ quality control (QA/QC) assessment of the sampling and analysis.
- In accordance with the RWP and VSAQP each remediation area impacted by TRH will need to be sampled to characterise the TRH. If the soil TRH breakdown is similar in all areas, it will be appropriate to average the fractions to calculate site-specific criteria.
- Please provide discussion regarding whether the samples collected for speciated TRH are consistent with and representative of the TRH concentrations identified in each remediation area, i.e., confirm the total TRH fractions compare to the previous range of TRH measured in the remediation areas.
- Please provide a figure showing the sample locations, building names and remediation areas.
- Please tabulate the analytical data rather than just providing the laboratory reports.
- Please provide a table which clearly shows the percentage of each fraction assumed in the calculation and then the calculated soil HSL for sand and clay as well as direct contact criteria. The calculations will be reviewed once the input values are clear.
- If site-specific soil vapour criteria for TRH is to be calculated then the soil vapour TRH should also be speciated rather than relying on the soil speciation.

4. Closure

I look forward to a revised letter. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@sensversa.com.au or via mobile on 0402 537 759.

¹ 'Human Health and Ecological Risk Assessment 132 McCredie Road Guildford, NSW' by EnRisks dated 9 December 2021



Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

9 June 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 12: Review of PFAS Impacted Soil Treatment Trial

Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the 'RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Scope of Work

The RWP and VSAQP identified that stabilisation of PFAS in soil to reduce the leaching potential was the preferred remediation option for concentrations of PFOS in soil between 20 mg/kg (as PFOS +PFHxS) and 0.4 mg/kg. The stabilisation method proposed includes the application of powdered activated carbon (PAC), a treatment trial has been completed and is detailed in the following document:

- 'PFAS Impacted Soil Treatment Trial, 132 McCredie St Guildford NSW' by JBS&G dated 19 May 2022.

3. Auditor's Comments

The auditor has completed a review of the letter considering the RWP and VSAQP as well as:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- 'Consultants Reporting on Contaminated Land', Contaminated Land Guidelines (NSW EPA 2020).
- 'National Environment Protection (Assessment of Site Contamination) Measure 1999' as amended 2013 (NEPC 2013).
- 'PFAS National Environmental Management Plan Version 2.0', January 2020, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA 2020).

Overall, the data suggests that application of PAC is reducing the PFAS concentrations in leachate samples. The specific comments on the letter are provided below:

- The current data presented in the letter has not been considered from a data quality perspective. Please provide the quality assurance/ quality control (QA/QC) assessment of the sampling and analysis.
- Please tabulate the analytical data rather than just providing the laboratory reports.
- Please provide a figure showing the sample locations and building names.
- Please provide the conversions to calculate the approximate 1% (v/v) addition rate as the application rate of 15 L of PAC to 1.3 m³ soil would not provide a 1% V/V, and is less than half that specified in the RWP of 33L PAC to 1.0m³ soil.
- Are the values presented in Table 3 maximums or averages?
- The RWP does not specify a maximum rate of 2 % PAC application, it does discuss trailing up to 5%, Please reword the discussion on the amount of PAC that will be applied as it is assumed that PAC will be applied until the validation criteria are achieved.

4. Closure

I look forward to a revised letter. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter
NSW EPA Accredited Auditor 0803



JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

26 August 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 13: Characterisation of PFAS concentrations in concrete Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Recent work and auditor comments

In accordance with the RWP pavement/concrete at the site was to be removed to facilitate remediation. The concrete was expected to be recycled however pavement/concrete impacted with per- and poly-fluoroalkyl substances (PFAS) is considered unsuitable for recycling and needs to be taken off-site as waste. Given this, JBS&G collected additional concrete samples and submitted these for PFAS analysis. The results are presented in the following document:

- 'Site Wide Pavement Assessment to Assess Presence of Per- and Poly-Fluoroalkyl Substances (PFAS) Former Castrol Guildford Terminal, 132 McCredie St Guildford NSW' by JBS&G dated 3 May 2022.

The letter (JBS&G 3 May 2022) was reviewed, and comments were provided in IAA No.9. JBS&G (3 May 2022) outlined a process for assessing whether the concrete is suitable to be recycled or should be taken off-site as waste. IAA No.9 identified that '*any material taken off-site must comply with the NSW Waste Classification Guidelines or be covered by an EPA exemption*'. The EPA has since provided the following information on PFAS levels in concrete.

'The EPA does not support the reuse of waste containing PFAS. If you suspect concrete waste [is] contaminated by PFAS, it must not be recycled, or taken to a recycler. If you propose to demonstrate that the concrete waste does not contain PFAS so that you can supply to a recycler, then you may want to consider a multiple lines of evidence approach, which may include site history assessment of the waste, site inspection, and sampling and testing (to name a few). Sampling and testing for PFAS as a line of evidence, must show the concentrations of PFAS are less than the laboratory limit of reporting of 5 µg/kg for PFOA, and 5 µg/kg for PFOS + PFHxS. This laboratory limit of reporting comes from the National Environment Management Plan, HEPA 2020.'

For any concrete to be recycled, please ensure that a multiple lines of evidence approach considering the leachate levels can be demonstrated and that the total levels of PFOS+PFHxS and PFOA are less than 0.005 mg/kg.

3. Closure

I look forward to a revised letter that outlines the assessment process for concrete that includes the concrete analysis results. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*



Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

13 October 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 14: Proposed Retention of Pavement Adjoining Site Boundary Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were undertaken to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Scope of work

As part of the remediation it was anticipated that the hard stand surfaces at the site would be removed and the material beneath characterised, however, BP have indicated that it is preferable for some hardstand to be retained. Sections that are proposed to be retained include the access roadway around the site and the slabs beneath the administration buildings. The process to confirm the nature and extent of impacts to soil under the hardstand has been provided in the following letter:

- 'Proposed Retention of Pavement Adjoining Site Boundary, 132 McCredie St Guildford NSW' by JBS&G dated 6 October 2022.

3. Auditor Comments

The auditor has completed a review of the letter considering the RWP and VSAQP as well as:

- The requirements specified in the NSW EPA Guidelines for the NSW Site Audit Scheme (3rd Edition) (NSW EPA 2017).
- 'Consultants Reporting on Contaminated Land', Contaminated Land Guidelines (NSW EPA 2020).
- 'National Environment Protection (Assessment of Site Contamination) Measure 1999' as amended 2013 (NEPC 2013).
- 'PFAS National Environmental Management Plan Version 2.0', January 2020, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA 2020).

A key aim of the investigation works is to confirm the nature and extent of impacts (if any) beneath the hardstand and confirm its suitability for retention on-site. The current proposed investigation is limited to the visual identification of asbestos fragments beneath the hardstand. The plan will also need to include:

- A photo log of the material beneath the pavement.
- If fill is present, then analytical sampling will be required, the depth of fill will need also need to be identified.
- Samples will need to be analysed for all chemicals of potential concern (CoPC) including asbestos, and for general characterisation of fill.
- Investigation beneath the hardstand of the access road in the northern portion of the site.

There is currently no information on what is beneath the administration building in the north. If this building is to remain on site and the material beneath the building cannot be sampled, then the likely presence of fill and contaminating activities in this section needs to be discussed.

Section 1 references six other documents with sampling and characterisation information, please include a summary of the data relevant to the hardstand areas to be retained to show it is free of PFAS and petroleum hydrocarbons.

The sampling report will need to make comment on the suitability of the pavement and underlying material to remain on site.



4. Closure

I look forward to a revised sampling plan. If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

13 October 2022

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 15: Characterisation of PFAS concentrations in concrete Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A Site Audit Statement (SAS) to confirm whether the site is suitable for commercial/industrial land use excluding basements. Several documents have been prepared and additional investigations were to refine the scope of the remediation required including:

- 'Remedial Work Plan and Validation Sampling, Analysis and Quality Plan, Former Castrol Guildford Terminal, Rev 0' dated 16 December 2021. This is hereafter referred to as the RWP and VSAQP'.

The RAP and VSAQP was reviewed in IAA No7.



2. Recent work and auditor comments

In accordance with the RWP pavement/concrete at the site was to be removed to facilitate remediation. The concrete was expected to be recycled however pavement/concrete impacted with per- and poly-fluoroalkyl substances (PFAS) is considered unsuitable for recycling and needs to be taken off-site as waste. Given this, JBS&G have provided a plan for assessing the suitability of concrete for off-site disposal and recycling in:

- 'Assessment and Management of PFAS Affected Pavements. Former Castrol Guildford Terminal, 132 McCredie St Guildford NSW' by JBS&G dated 30 August 2022.

Information on the PFAS concentrations in concrete have been provided in previous letter from JBS&G comments were provided in IAA No.9 and IAA No.13.

3. Auditor comments

It is understood that some concrete has already been taken off-site as solid waste or for recycling. The validation report will need to state the volume of material disposed of and provide correspondence received from the recycling facility to show the facility is legally allowed to accept the material for recycling. Where further removal of concrete/pavement is proposed, consider the following:

- JBS&S propose the health-based soil values presented in the NEMP be applied for retained concrete. The auditor notes that those *soil* criteria are not appropriate for retained concrete. PFAS concentrations should be shown to be below the limit of reporting and PFAS leachate levels below the site leachate criteria.
- For off-site concrete recycling, the criteria for leachate should include a criteria relevant for ecological receptors.
- The EPA advice for recycling concrete which identifies a value of 5 µg/kg for PFOS+PFHxS and PFOA needs to be considered.
- Please provide a figure which shows the areas of concrete to be retained on site, taken off site as solid waste and taken for recycling.



4. Closure

If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/ /MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

30 June 2023

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 16: Stage 1 and Stage 2 Validation Assessments

Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded:

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A SAS to confirm whether the site is suitable for commercial/industrial land uses excluding basements. Since the Section B SAS was issued, I have reviewed several additional investigation and remediation reports with comments provided in a series of Interim Audit Advice (IAA) letters. The remediation works have now been completed and I have been provided with the following reports for review:

- 'Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW' dated 28 February 2023 by JBS&G. (Stage 1 Validation)
- 'Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW' dated 10 May 2023 by JBS&G. (Stage 2 Validation)

Audit review comments are provided below.



2. Auditor Comments

Stage 1 Validation

- Section 1 – Please provide a summary overview of the works completed including an approximate timeline of events rather than a detailed identification of every sample collected. Details relating to site works should be incorporated into the relevant validation sections.
- Section 1.4.1 – Details regarding the water discharge sampling, particularly Table 1.1, should be moved to an appendix as the detail is not appropriate for inclusion in the scope of works section.
- Section 1.4.2 – Details regarding the respirable fibre monitoring, particularly Table 1.2, should be moved to an appendix as the detail is not appropriate for inclusion in the scope of works section and not material to the validation of the site.
- Section 1.4.3 - 1.4.5, Table 1.3, 1.4 and 1.5 - The long list of sample IDs and lab report numbers is not helpful to the understanding of the scope of works undertaken, please simplify the information provided by referring to the results tables and figures in the report. Once revised these tables should be moved to the validation section.
- Section 1.4.6-1.4.10 - Please provide an overview of works and timeline with relevant detail on sampling provided in validation sections. Deviations from the RAP/RWP also need to be identified.
- Section 3.3.7- The availability of reticulated water does not 'prevent' irrigation use water sourced from the creek. Please reword to indicate it is unlikely. Fishing in the immediate vicinity of the site is unlikely however fishing can occur in Prospect Creek, please revise the discussion. Off-site receptors downgradient of the site i.e., commercial workers or intrusive workers need to be appropriately discussed based on landuse, groundwater flow direction, depth of groundwater and concentrations of chemicals of potential concern (CoPC).
- Section 3.3.8 - Prospect Creek is more than an urban drain and will require appropriate levels of protection. Please reword to acknowledge Prospect Creek is a slightly to moderately disturbed environment.
- Section 4.3 - Table 4.2 Please also include an extra column with the Table number the samples results are reported in.
- Section 5.3 - Table 5.1 Please identify the disposal facilities to which the USTs and liquid wastes were taken to.
- Section 5.6 - Please include the details (location, volume and sample information) of the stockpiles that were taken off site.
- Section 5.16 - Why were groundwater samples not analysed for PFAS?
- Section 6, Table 6.4;
 - Identify the depth for criteria.
 - TRH criteria should be applied to the F1 T(RH C6-C10 minus BTEX) and F2 (TRH C>10-C16 minus naphthalene) fraction. Please update in Table 6.4 and in the soil vapour results tables.
 - The results tables also include values for clay-based soil, the use of the sand vs clay soil type should be identified and justified. If clay criteria are to be used, they will need to be included in Table 6.4.
- Section 7.1.1, 7.1.2;
 - Table 7.1 Frequency - Please include the actual number of QC samples / total number of samples analysed to confirm the required frequency was achieved.
 - The data validation discussion is focused on soil, please include relevant comments on water and soil vapour. Sample heterogeneity for fill does not explain high RPDs in water and soil vapour samples, please provide additional justification on why the high RPDs are not considered significant. Soil vapour QA/QC needs to include a comment on the front and back of tubes to confirm there was no breakthrough.
- Section 7.5 Table 7.3 – The 'results reported' column does not appear complete with several '????' showing, please update.
- Section 7.6 – Please confirm that where a high RPD was reported, that the maximum value from the original or duplicate/triplicate was used for characterisation.



- Section 8.1.1 - Include the sample densities to confirm the sampling across the site is consistent with the sample design guidelines.
- Section 8.3.7 - Please identify the soil vapour location near this exceedance and confirm that the soil vapour results were below the site criteria.
- Section 8.3.8 - Please include discussion of the resample results- where they below site criteria?
- Section 8.3.12 - Confirm that the other test pit samples had concentrations below site criteria. Were the samples submitted for total and leachate analysis? Please include discussion of the resample results in EX15- were they below site criteria?
- Section 8.3.16 - Include the volume of soil and gravel land farmed, where the soil was reused on site and confirm that the material was considered suitable for reuse on site.
- Section 8.3.17 - Table 8.9. Please include a column for the corresponding surface water sample collected in the Creek to show concentrations are below the screening criteria relevant to the Creek. The location of the creek sample also needs to be included in a figure. The 2nd June sampling event, where an exceedance of the TRH criteria was reported in water sourced from the creek, requires further discussion as the concentrations in the sample are very similar to the influent concentrations – is there a QC issue associated with labelling?
- Section 8.4 - No details have been provided regarding imported material. The following needs to be provided to the auditor for review: full details of source sites, material types, supplier documentation, a material import tracking register including material source information, VENM certificate, quantity imported, dates imported, placement location on site, validation activities undertaken by consultant (sampling or inspection of material prior to or after importation), and details of any samples collected. It is noted that Table 1.6 identifies that the imported material was VENM (crushed sandstone) Table 26 identifies the imported fill samples as 'crushed concrete'.
- The validation results section is focused on exceedances, please also include a summary section that identifies the areas that passed validation and are considered suitable and those that require completion in the Stage 2 report.
- The validation section needs to include a discussion of all the treated soil and the rationale as to whether why they are suitable for reuse on site.
- Section 9.0;
 - Please confirm that the waste tracking records correlate with the documented works and that the disposal records are considered representative of the material removed from site at their relevant classifications.
- Table 9.1;
 - Include a column specifying where the material was located onsite.
 - Provide address and EPL numbers of disposal facilities.
 - Re-check quantities for Rock and Dirt Recycling.
 - Provide the waste classification of each row (i.e., GSW).
 - 20/7/22: quantity should be 122.72 T.
 - 16/12/22: quantity should be 139.66 T.
- Section 10 Study Question 3;
 - Third paragraph please discuss the leaching results for the material that was treated and reused on site to confirm that the total and leachate criteria was met. Table 13c shows numerous exceedances of the total PFOS concentrations and of the PFOS leached that exceed the identified criteria – Where did this material end up or was it retreated.
 - The fourth paragraph on soil vapour sampling is not relevant to confirming the PFAS concentrations in backfill material.
- Appendix D - Please provide the inputs into the derivation equation - The HSLs for individual fractions and the proportion of each fraction.



- Appendix E - Please provide calibration certificates for;
 - Air pump.
 - IP.
 - WQM.
- Appendix F Please provide these missing items;
 - EN2110045 SRN (solid).
 - ES2220598 COC (soil).
 - ES2221105 COC (soil).
 - ES2305512 SRN (soil).
 - ES2220378 COC (soil).
 - ES2211137 COC and SRN (soil).
 - ES2211485 COC and SRN (soil).
 - ES2236194 COC (soil).
 - ES2142515 SRN (water).
- Appendix H;
 - Provide summary tables for WC2 and WC7.
 - Provide figures showing sample locations (including stockpiles) for all waste classifications.
 - Victoria EPA RENEX permit: *'You must have evidence that demonstrates that the originating State or Territory regulatory authority where the waste originated is satisfied with the movement of waste into Victoria.'* Please close out.
- Appendix I;
 - Please provide a material tracking spreadsheet summarising all material exported from the site including the following details: date, time, material source, truck ID, receiving facility, classification, weighbridge receipt/docket number, volume, EPA WasteLocate tracking details.
 - Provide details for 'DEL 23-FOAM', 'C/O 13', and 'P/UP 23-FOAM' for Bingo as this is not referenced elsewhere. Provide all docket numbers.
 - Delivery docket numbers for Bingo for asbestos disposal do not match the dockets provided in the pages following. Please revise.
 - Waste disposal dockets were only provided for asbestos waste/sheeting sent to Bingo. Provide waste disposal dockets for all material exported from the site including soil waste to Bingo, and all material to Rock and Dirt Recycling, Sell & Parker Blacktown, RENEX Dandenong Victoria, SCE Mt St Thomas, and Sydney Recycling Park.
 - Provide EPA WasteLocate tracking details for all asbestos disposal, including asbestos in soil.

Figures;

- Figure 12 and Figure 14– Include the CoPC and concentration that exceeded on the figure.
- Pg 181 – Extra unlabelled figure?
- Figure 25 –Figure legend needs to indicate that a green dot are locations that passed and red dot those that failed to show that all locations passed.
- Please include an additional summary figure that show the location of samples that exceeded criteria that remain insitu.

Stage 2 Validation

- Section 1.4;
 - Please provide an overview of the timeline and a summary of the scope of works rather than details of individual samples collected on each day as the level of detail is not helpful in understanding the works completed.
 - Include a section that identifies deviations from the RAP/RWP.
- Section 5.1 - Please include a cross section showing the asbestos containment areas, the marker layer and the capping.
- Section 5.2.1 - Please provide a figure that shows the location of all PAC treated soils. This will also need to be included in the LTEMP.



- The validation results section is focused on exceedances, please also include a summary section that identifies the areas that passed validation and are considered suitable.
- Section 6.2;
 - The adjustment of the criteria by a factor of 5 needs further justification on why this is protective and appropriate. What is the reduced factor for PFOS?
 - The adjustment of the total PFOS criteria to compensate for the lack of leachate sampling requires further justification. Please include a summary of the data set that shows the correlation between the total concentration and the leachate.
- Section 7.1.1/7.1.2 - Sample heterogeneity for fill soils does not explain high RPDs in water and soil vapour samples, please provide additional justification on why the high RPDs are not considered significant. Soil vapour QA/QC also needs to include a comment on the front and back of tubes to confirm there was no breakthrough.
- Section 7.3.2 - Include discussion of holding time breach identified in Table 7.3.
- Section 8.1.3 - Include description of the area of concrete retained on site and the expected material beneath the slab and why the material beneath the slab is considered suitable for the proposed uses. Include the residual concrete on a figure.
- Section 8.3.13 - Table 8.9 Include the creek sample results to show the concentrations are below criteria.
- Section 9.0 - Please confirm that the waste tracking records correlate with the documented works and that the disposal records are considered representative of the material removed from site at their relevant classifications.
- Table 9.1;
 - Provide address and EPL numbers of disposal facilities.
 - Update quantity for Rock and Dirt Recycling for date 19/04/2023 to 199.86 T.
- Section 10. Study question 4. Confirm that all drainage infrastructure used to transfer petroleum or chlorinated hydrocarbon has been removed from site and the underlying soil remediated/validated.
- Section 11 - Provide a comment on whether the site has been remediated in accordance with the RAP/RWP and where there are deviations from the RAP, list these and state why they are considered appropriate.
- Appendix H;
 - Dockets provided for Sydney Recycling Park on 02/05/23, and for Cleanaway on 04/05/23 and 05/05/23. Provide all remaining waste disposal dockets for Bingo, Cleanaway, Rock and Dirt Recycling and Sydney Recycling Park.
 - The EPA WasteLocate asbestos tracking quantities do not match the quantities reported as received by Cleanaway Erskine Park and Bingo, and do not match those provided in Table 9.1. Please update.
 - Provide EPA WasteLocate tracking details for all asbestos disposals, including asbestos in soil.
 - Appendix E Please provide calibration certificates for the air pump.
- Appendix F - Please provide these missing items;
 - ES2308407 SRN (soil).
 - ES2308744 SRN (soil).
 - 985282 entire report (soil).
 - 321753 entire report (SV).

Appendix I – Comments on the LTEMP will be provided under a separate IAA;

- Figures, please provide:
 - A summary figure that shows the location of samples that exceeded the criteria that remain in-situ.
 - A figure that identifies all the areas where PAC treated soil is located.
 - A figure that identifies the locations of where residual concrete sealed surfaces and buildings.



3. Closure

I look forward to receiving the revised reports. We may have further comments following review of the responses and as we prepare the Site Audit Report and Site Audit Statement.

If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

6 July 2023

David Peplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 17: Review of the Long-Term Environmental Management Plan Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded:

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guildford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A SAS to confirm whether the site is suitable for commercial/industrial land uses excluding basements. Since the Section B SAS was issued, I have reviewed several additional investigation and remediation reports with comments provided in a series of Interim Audit Advice (IAA) letters. The remediation works have now been completed and I have been provided with the following report for review:

- *'Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW, 8 May 2023 by JBS&G.*

Audit review comments are provided below.



2. Auditor Comments

The LTEMP needs to address not only asbestos, but also the remaining contamination on-site including PFAS, PAC treated soils (location) and the exceedances of ecological criteria (for contaminants other than PFAS). Please revise all sections of the LTEMP to reflect this.

Section 1.1.

- The asbestos in the containment cell was not sourced from off-site, JBS&G indicated that it is likely from demolition of the previous site buildings. Please revise the description to be site specific.
- Include how key stakeholders, particularly the new owners, have been consulted and ultimately their agreement to implement the proposed actions.
- Discuss the intended mechanism for ensuring the plan is legally enforceable, in consultation with the current and proposed owners. Written agreement should be provided prior to finalisation of the LTEMP.

Section 2.2

- Last paragraph does not seem to be relevant to the site with reference to Ourimbah Road?

Section 2.4.

- The validation report Stage 2 states there is 3m of capping not 0.5m. Please confirm the actual capping layers and include a cross section to show the layers of clean capping, marker layer and asbestos impacted layers.
- Consider combining the two dot points describing the area to the south of the site under the trees as it currently reads like there are two separate areas with residual asbestos.
- Include a description of the fill/soil material expected at the three asbestos areas so workers can identify the material. A picture of the marker layer should be included for reference.
- At what depth is the asbestos pipe likely to be encountered and what does it look like?
- The management for friable vs non friable asbestos will be different so please make it clear which areas have friable asbestos and that which have non friable and bonded ACM. Confirm how likely it is to encounter friable asbestos in the area to the south of the site.
- Consider naming/numbering the three different asbestos areas so it is easy to identify and easy to understand what management is required in what location.
- Include description of the other contamination areas on site – PFAS, PAC treated materials (include photo of treated material) and ecological exceedances.
- Also need to identify odorous soil that may still be on site.

Section 4.2

- Expand to discuss the management requirements for the 3 different asbestos areas, the containment cell, the asbestos pipe and the area to the south beneath the trees. The areas have different management requirements and need to be adequately discussed; the current discussion only seems relevant for when disturbing the area to the south of the site.
- Management of the capped asbestos area needs to be clear that excavation above the marker layer of the containment cell does not require the same level of management as the material is clean.
- There needs to be clear instructions for repairing the marker layer if it is disturbed as well as procedures for keeping the clean capping material segregated from the asbestos material if both are excavated. The LTEMP needs to include a log for excavations/repair of the marker layer.
- Management of the area to the south of the site under the trees should include general management to reduce dust – maintenance of surface vegetation, periodic inspection, an inspection register.
- Describe the management required for other contamination areas on site.



Section 6.

- A register of updates to the EMP should be included. The register will need to identify the relevant stakeholders have been provided with the update. Please also include a list of the relevant stakeholders. Revisions to the LTEMP will need to be approved by a contaminated site auditor.

Figures, please include:

- A summary figure that shows the location of samples that exceeded criteria that remain in-situ, including exceedances of ecological criteria i.e., contaminants other than PFAS.
- A cross section showing the asbestos containment areas, the marker layer and the capping.
- A figure that shows the location of all PAC treated soils.
- Figure 2C and Figure 3. Remove the black lines that show the extent of excavation.

3. Closure

I look forward to receiving the revised report.

If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

4 August 2023

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 18: Stage 1 and Stage 2 Validation Assessments

Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded:

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A SAS to confirm whether the site is suitable for commercial/industrial land uses excluding basements. Since the Section B SAS was issued, I have reviewed several additional investigation and remediation reports with comments provided in a series of Interim Audit Advice (IAA) letters. The remediation works have now been completed and I have been provided with the following reports for review:

- 'Stage 1 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW' dated 28 February 2023 by JBS&G. (Stage 1 Validation)
- 'Stage 2 Validation Assessment, Former Castrol Refinery, 132 McCredie Rd, Guildford NSW' dated 10 May 2023 by JBS&G. (Stage 2 Validation)

Audit review comments are provided below.



2. Auditor Comments

Stage 1 Validation

- Deviations from the RAP/RWP also need to be identified – The asbestos containment is a significant deviation from the RAP which needs to be identified in this section.
- Section 5.6 - Please include the details (location, volume and sample information) of the stockpiles that were taken off site.
- Section 7.1.1, 7.1.2;
 - Table 7.1 Frequency - Table 7.1 is a summary and it is not clear why it has been expanded to list every single rinsate, trip blank and trip spike sample analysed over the course of the fieldwork. As identified in the previous IAA, presenting long tables with individual sample names is not helpful, please present the information as a summary of the information which identifies if the required sampling frequency was met in accordance with the data quality objectives. The individual sample results should be moved to appendix L.

- Section 8.4. Include a summary of the quantities of each type of material imported to site in this section.

'Imported materials were confirmed to be free of impacts and consistent with virgin soils.' How was this confirmed? Inspection at the source site or upon arrival to site by JBS&G? Was additional sampling undertaken by JBS&G? Provide details of validation of imported material for both the VENM and crushed concrete.

An import material tracking spreadsheet needs to be provided either here or in Appendix N which includes the below information for all imported material (as stated in IAA No. 5).

Material Source information	Classification	Quantity imported	Dates imported	Placement on site	Visual inspection details post arrival on site	Details of any samples collected
-----------------------------	----------------	-------------------	----------------	-------------------	--	----------------------------------

The second paragraph suggests other material besides VENM and crushed concrete were imported to site. Include all details of the types of material received to site.

More detail needs to be provided for 'engineered materials' (which appear to be recycled materials). Include information on where this material came from, what it consisted of, and any validation activities that are relevant i.e., letterhead from source facility stating the nature of material?

- Section 9.0 and Appendix I;
 - Waste dockets and disposal details need to be provided for liquid wastes.
 - As WasteLocate dockets are unable to be supplied, please provide a collated dataset that shows the stockpile volumes, when the material left the site, and the trucking delivery dockets to show that the volumes and times correspond with the documentation provided by the waste facilities.

Stage 2 Validation

- Section 6.2;
 - While the approach of considering the partitioning relationship between the total PFOS and the leachable PFOS to reduce the leachate sampling is supported, a more robust discussion on the appropriateness of the selected total criteria value of 0.024 mg/kg is required. Further statistical evaluation of the data set is required as follows:
 - Provide a discussion detailing the number of samples considered to enable the relationship between leachate and total concentrations to be confirmed and the basis of why this is robust/appropriate.
 - Present the samples where total PFOS was less than the 0.024 mg/kg but the ASLPs exceeded 1 µg/L, showing the number is not significant.
 - Present the partitioning graph in a log scale, as the low concentrations relevant to the derivation of the criteria cannot be clearly evaluated in the current graph.
 - Please reword the discussion to confirm the process of analysing total concentration was at 0.024 mg/kg a leachate sample if the soil concentrations was above 0.024mg/kg or if no leachate samples also analysed?
 - Also note this change in approach to validation as a variation from the RAP in Section 1.



- Section 7
 - Table 7.1 Frequency - Table 7.1 is a summary and it is not clear why it has been expanded to list every single rinsate, trip blank and trip spike sample analysed over the course of the fieldwork. As identified in the previous IAA presenting long tables with individual sample names is not helpful for analysing the data, please present the information as and a summary which identifies if the required sampling frequency was met in accordance with the data quality objectives. The individual sample results should be moved to an appendix.
- Table 11 not all PFAS results for samples from batch 984060 are included in the table, key analytes PFOS PFOS+PFHxS are missing – please revise and complete a quality check on the tables to ensure all data is present.
- Section 9. Similar for Stage 1 As WasteLocate dockets are unable to be supplied, please provide a collated dataset that shows the stockpile volumes, when the material left the site, and the trucking delivery dockets to show that the volumes and times correspond with the documentation provided by the waste facilities.

3. Closure

I look forward to receiving the revised reports. We may have further comments following review of the responses and as we prepare the Site Audit Report and Site Audit Statement.

If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*

4 August 2023

David Pepplinkhouse
Project Manager – NSW/ACT
Remediation Management
BP Australia Pty Ltd
132 McCredie Road, Guildford NSW 2161

Dear David,

Re: Interim Audit Advice No. 19: Review of the Long-Term Environmental Management Plan Former Castrol Guildford Terminal, 132 McCredie Road, Guildford NSW

As a NSW EPA Accredited Auditor, I have been engaged by BP Australia Pty Ltd (BP) to undertake an audit in relation to the Castrol Lubricant Facility, 132 McCredie Road Guildford (Lot 1 Deposited Plan 596315). I understand that the site, a former Castrol Lubricant Facility, is to be divested and the audit has been commissioned as a condition of sale (COS).

1. Background

I have previously provided a Section B Site Audit Statement (SAS) for the site dated 19 February 2021 (MP165) that concluded:

'...the site can be made suitable for ongoing commercial/industrial land use (no basement) if the site is remediated in accordance with the following remedial action plan:

- *'Remediation Action Plan BP Guildford Terminal Castrol Lubricant Plant 132 McCredie Road, Guilford, NSW 2716' by Kleinfelder dated 19 February 2021 (Rev 1.3) (the RAP).*

Preparation of a Site Audit Statement certifying suitability for the proposed use is required at the completion of remediation and validation works.'

I have since been engaged to prepare a Section A SAS to confirm whether the site is suitable for commercial/industrial land uses excluding basements. Since the Section B SAS was issued, I have reviewed several additional investigation and remediation reports with comments provided in a series of Interim Audit Advice (IAA) letters. The remediation works have now been completed and I have been provided with the following report for review:

- *'Long-term Environmental management Plan, Former Castrol Refinery, 132 McCredie Rd Guildford NSW, 24 July 2023 by JBS&G. (the LTEMP)*

A previous version of the LTEMP was reviewed and comments provided in IAA No.17. Audit review comments are provided below.



2. Auditor Comments

Written acknowledgement from the current owners (Goodman) is required prior to finalising the LTEMP, to confirm they have reviewed the LTEMP and have agreed to implement it,

Section 1.1.

- Clarify in this section that the asbestos onsite is from different sources; the asbestos containing pipe, asbestos in fill, and asbestos from building materials.

Section 2.4.

- A picture of the marker layer should be included for reference.

Section 4.2

- It is currently difficult to identify what management activity is required in each area. Please label the three management areas and include a summary table that identifies the key management activities required in each area (and reference the relevant sections of the LTEMP).
- Management of the area to the south of the site requires periodic inspection, and an inspection register to ensure the surface covering is maintained.

Section 6.

- Please include a statement that the LTEMP will require updating if the site ground levels change over the asbestos management areas, particularly the containment cell area.

3. Closure

I look forward to receiving the revised report.

If you have any comments or questions, please do not hesitate to contact the undersigned at melissa.porter@senversa.com.au or via mobile on 0402 537 759.

Yours sincerely,

Melissa Porter

NSW EPA Accredited Auditor 0803

JB/MP

Limitations

This Interim Audit Advice is not a site audit report or a site audit statement, as defined in the Contaminated Land Management Act 1997, but forms part of the site audit process. It is intended that a site audit statement and report will be issued at the completion of the site audit. Consistent with NSW EPA requirements for staged "sign-off" of sites that are the subject of progressive assessment, remediation and validation, the auditor is required to advise that:

- *This site audit advice does not constitute a site audit report or statement.*
- *This letter is considered by the auditor to be consistent with NSW EPA guidelines and policies.*
- *This letter will be documented in the final site audit statement and associated documentation.*
- *At the completion of the site audit, a site audit statement will be prepared, for the consent agency to include the site's property information, held by the local council.*

Reliance – *This document has been prepared solely for the use of BP Australia. No responsibility or liability to any third party is accepted for any damages arising out of the use of this document by any third party.*

Copyright and Intellectual Property – *This document is commercial in confidence. No portion of this document may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa. Intellectual property in relation to the methodology undertaken during the creation of this document remains the property of Senversa.*



Guidelines made or approved by the EPA under section 105 of the *Contaminated Land Management Act 1997*

(as of: 30 June 2020)

Section 105 of the Contaminated Land Management Act 1997 (CLM Act) allows the EPA to make or approve guidelines for purposes connected with the objects of the Act. The EPA must consider these guidelines whenever they are relevant. Other people must also consider the guidelines, namely, accredited site auditors when conducting a site audit; contaminated land consultants when investigating, remediating, validating and reporting on contaminated sites; and those responsible for land contamination with a duty to notify the EPA.

A current list of guidelines made or approved by the EPA under the CLM Act appears below.

Guidelines made by the EPA

- Assessment and management of hazardous ground gases: Contaminated land guidelines (PDF 4MB)
- Guidelines for the vertical mixing of soil on former broad-acre agricultural land (PDF 148KB)
- Sampling design guidelines (PDF 2MB)
- Guidelines for assessing banana plantation sites (PDF 586KB)
- Consultants reporting on contaminated land: Contaminated land guidelines (PDF 1MB)
- Guidelines for assessing former orchards and market gardens (PDF 172KB)
- Guidelines for the NSW Site Auditor Scheme, 3rd edition (PDF 999KB)
- Guidelines for the assessment and management of groundwater contamination (PDF 604KB)
- Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997 (PDF 412KB)
- Guidelines that refer to the
- Australian Water Quality Guidelines for Fresh and Marine Waters (ANZECC, October 2000), are replaced as of 29 August 2018 by the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018), with the exception of the water quality for primary industries component, which still refer to the ANZECC & ARMICANZ (2000) guidelines
- National Environment Protection (Assessment of Site Contamination) Measure 1999 are replaced as of 16 May 2013 by the National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013).

Guidelines approved by the EPA

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZG (August 2018)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, Primary Industries - Rationale and Background Information (ANZECC & ARMICANZ (October 2000)
- Composite sampling, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide.
Email enHealth.Secretariat@health.gov.au for a copy of this publication.
- Environmental health risk assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia (June 2012)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)* (ASC NEPM)
- Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental (February 1996)
- Australian Drinking Water Guidelines, NHMRC and Natural Resource Management Ministerial Council of Australia and New Zealand (2011)

*The ASC NEPM was amended on 16 May 2013.

Senversa Pty Ltd

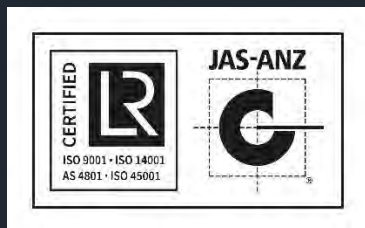
ABN 89 132 231 380

www.senversa.com.au

enquiries@senversa.com.au

LinkedIn: Senversa

Facebook: Senversa



Certified



Corporation

To the extent permissible by law, Senversa shall not be liable for any errors, omissions, defects or misrepresentations, or for any loss or damage suffered by any persons (including for reasons of negligence or otherwise).

©2023 Senversa Pty Ltd