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c.c. Dr Mark Jackson
Jackson Environment and Planning Pty Ltd

Site Audit 0097_IDG, Remondis Tomago – Interim Audit Advice #1, Review of Investigation Reports and Remedial Action Plan

Dear Ms McBurney

1. Introduction

Ian Gregson of GHD Pty Ltd (the Auditor and author of this letter) has been engaged by Remondis Australia Pty Ltd (Remondis) to conduct a site audit under the provisions of the Contaminated Land Management Act 1997 (the CLM Act) in relation to assessment and management of contamination at the proposed development property comprising Lot 11 and Lot 8 DP 270328, located at 21D and 21F School Drive, Tomago NSW (the site).

Jackson Environment and Planning Pty Ltd (JEP) is currently working on a State Significant Development application for the REMONDIS Resource Recovery Facility and Truck Parking Depot proposed to be operated at the site. As part of the Environmental Impact Statement (EIS), JM Environments (JME) was engaged to conduct a detailed site assessment and a groundwater investigation to assess contamination and prepare a remedial action plan (RAP).

Following review of the EIS, the NSW Environment Protection Authority (EPA) has requested the following:

> *A Section B Site Audit Statement or an interim audit advice from a NSW accredited site auditor certifying:*
>
> - *the appropriateness of the contamination assessment reports prepared,*
> - *that the nature and extent of contamination have been determined, and*
> - *whether the site can be made suitable for the proposed use subject to the Remedial Action Plan submitted as part of the proposal.*

This Interim Audit Advice #1 (IAA#1) provides my certification in regard to the above points, and is based on review of the following reports (which have been updated since preparation of the EIS):

– *Detailed Contamination Assessment, 21D and 21F School Drive, Tomago*, JM Environments, 13 July 2021 (Rev 2, ref. JME20005-2). (JME 2021a)

– *Groundwater Contamination Assessment Report, JME20005-5 – 21D and 21F School Drive Tomago*, JM Environments, 13 July 2021 (Rev 2). (JME 2021b)

– *Remedial Action Plan, 21D and 21F School Drive, Tomago*, JM Environments, 17 July 2021 (Rev 2, ref. JME20005-3). (JME 2021c).

In arriving at this point in the site audit, I have inspected the site in the company of Scott Smith of Remondis on 24 May 2021, and have reviewed previous versions of the above reports and provided comments to JME leading up to preparation of the reports listed above.

I have also briefly reviewed the EIS (*Environmental Impact Statement, REMONDIS Australia Pty Ltd, Tomago Resource Recovery Facility and Truck Parking Depot*, JEP, 22 September 2020) as a basis for understanding the nature of the proposed development. I also reviewed *JME20005-5 – 21D and 21F School Drive Tomago Data Gap Sampling Analysis and Quality Plan* (JME, 1 June 2021) which presented the basis for supplementary soil and groundwater investigations undertaken by JME following the initial reports which were provided as a basis for the EIS, leading to preparation of the reports listed above.

Please note that this communication has been provided as Interim Audit Advice only, as part of the audit process. The advice does not constitute a site audit report or site audit statement under the provisions of the CLM Act, and does not pre-empt the conclusions which will be drawn at the end of the audit process. A site audit report and site audit statement will be issued when the audit process has been completed.

This Interim Audit Advice relates solely to the assessment and proposed remediation of contamination at the site, and is not intended to provide any opinions regarding the other aspects of the suitability of the site for any particular use.

The opinions and recommendations offered in this Interim Audit Advice are subject to the attached Limitations.

2. Disclosure

The *Detailed Contamination Assessment* (DCA) (JME 2021a) references a 2011 report prepared by GHD (*Phase 2 Contamination Site Assessment, Aluminium Rod and Conductor Manufacturing Facility, Tomago NSW*, May 2011, prepared for Midal Cables International Pty Limited) and reviewed by me at the time of preparation of the 2011 report as part of GHD's quality assurance procedures. At the time of my engagement for this site audit, I was not aware that the GHD report would be referenced in JME's reports. In accordance with the *Guidelines for the NSW Site Auditor Scheme* (EPA 2017), Auditors must not audit first-tier (i.e. consulting) work if they have been involved in any aspect of that work, because they would not have the necessary independence from this work. Accordingly, I have not relied on the GHD report as part of this site audit, and I consider there is no conflict of interest in this regard, for the following reasons:

– JME's reference to the GHD report was primarily as part of a waste classification assessment (ref. MBES2016 dated 7 December 2012, included in Appendix G of JME 2021a).
– As part of reviewing the appropriateness of JME's assessments, I have checked that JME has correctly referred to information contained in the GHD report, but I have not otherwise reviewed the GHD report as part of this site audit.
– JME 2021a indicates the soil which was subject to assessment by GHD in 2011 (shallow / surface soils on the Lot 11 portion of the site, prior to development by Midal Cables) was removed from Lot 11 for the Midal Cables development. Therefore the GHD assessment is not directly relevant to the current suitability of the site for the proposed Remondis development.

3. Review methodology

I have reviewed the available contamination assessment and management reports in the context of guidelines made or approved by the NSW EPA under the provisions of the CLM Act and other relevant guidelines, including the following:

– ANZG 2018, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*
– HEPA 2020, *PFAS National Environmental Management Plan*, Version 2.0, Heads of EPAs Australia and New Zealand, January 2020
– NEPC 2013, *National Environment Management (Assessment of Site Contamination) Measure 1999*

– NSW DECC 2007, *Guidelines for the Assessment and Management of Groundwater Contamination*
– NSW EPA 1995, *Sampling Design Guidelines*
– NSW EPA 2017, *Guidelines for the NSW Site Auditor Scheme*
– NSW EPA 2020, *Consultants reporting on contaminated land*

My opinions on whether the contamination assessments have been appropriate, whether the nature and extent of contamination have been sufficiently determined, and whether the site can be made suitable for the proposed use are based on the above guidelines with consideration of the following factors primarily influencing these opinions:

– What is the scope of investigations that have been carried out to date?
– Is the information considered reliable and consistent with relevant guidelines?
– Is the information sufficient to determine the extent and significance of contamination at the site?
– Does the Remedial Action Plan (RAP) sufficiently address the contamination in order to make the site suitable for the proposed land use?

A summary of information presented in the JME reports and my comments from the review are presented in Attachment A. My overall findings and conclusions are summarised below.

4. Project description

From information provided in the EIS (JEP, 2020), Remondis is proposing to develop a Resource Recovery Facility and Truck Parking Depot at 21D (Lot 11, DP270328) and 21F (Lot 8, DP DP270328) and part of Lot 301, DP 634536 School Drive, Tomago. (See Section 5.2.3 below in relation to part Lot 301).

Remondis proposes to use the existing buildings at 21D School Drive for the receipt and processing of solid and liquid waste materials. A truck parking depot will be established on the adjacent vacant lot referred to as 21F School Drive [Lot 8] to provide overnight parking for 24 rigid trucks and 9 semi-trailers.

The EIS refers to the truck parking depot as a paved and bunded area. Drawings indicate this area will occupy approximately a third of Lot 8, with the remainder designated as “Area of future development”. The Landscape concept Plan – 21F (Figure 19.1 in the EIS) indicates a landscaped bund will be present on the southern, eastern and part of the northern boundaries of Lot 8.

5. Contamination assessment

5.1 Appropriateness of the contamination assessment reports

JME has undertaken preliminary and detailed site investigations (documented in the DCA report) including review and summary of previous investigations carried out at the site. Further investigations of soil and groundwater were undertaken after my review and comments on the initial reports prepared for the EIS. My review comments and summaries of information contained in the current versions of the contamination assessment reports are presented in Table 1 and Table 2 of this IAA.

I consider the contamination assessment reports have been prepared in substantial compliance with relevant guidelines, and are appropriate for the purpose of defining the nature and extent of contamination and the remediation required to make the site suitable for the proposed land use.

5.2 Nature and extent of contamination

5.2.1 Lot 11 DP270328 soil

The presence of soil contamination on Lot 11 has primarily been assessed by previous reports completed for waste classification purposes, and included in Appendix G of the DCA. Previous investigations indicated heavy metal impact in fill material present on Lot 11 prior to the Midal Cables development, however no contamination was identified in underlying natural soils except for Total Petroleum Hydrocarbons (TPH) impact at one location (TP34), at concentrations below commercial/industrial health investigation levels. The DCA indicates approximately 9,000 m^3 of excess spoil was removed from Lot 11, and light brown fine to medium grained sand beneath the fill was interpreted as representing in-situ, 'natural' material.

Limited supplementary investigations on Lot 11 were undertaken by JME in June 2021 as part of the DCA. These did not show any significant contamination in soil on Lot 11 except for a zinc concentration exceeding the ecological investigation level (EIL) in shallow soils at one location (HA2) in a grassed area, and an arsenic concentration exceeding the EIL in deeper soils from the same location. As vegetation appeared healthy, and only limited areas of Lot 11 are not covered by structures or pavement, these exceedances are not considered to present an unacceptable risk to health or the environment, and therefore Lot 11 is considered suitable for ongoing commercial/industrial use without remediation. (See discussion of groundwater in Section 5.2.4 below).

While the DCA indicates fill material was removed from Lot 11, this was not validated at the time, and Section 11.3 of the DCA states "*The purpose of MBES2016 and MBES2017 was to facilitate the removal of 9,000m^3 of surface soils from Lot 11. The upper soils assessed in MBES2016 were likely to have been removed first and the deeper soils assessed in MBE2017 removed later. It is uncertain whether all of the soils assessed in MBES2017 were removed from all locations*." Hence while I consider Lot 11 is suitable for ongoing commercial/industrial use in its current configuration, it should be subject to a long term environmental management plan (LTEMP), to document any requirements to manage potential remaining contamination in case of any intrusive works or change in land use. This is consistent with long term management requirements for the remainder of the site, as discussed below.

5.2.2 Lot 8 DP270328 soil

Investigations have shown fill material on Lot 8 is contaminated by heavy metals, with one location having a lead concentration (4,200 mg/kg) exceeding commercial/industrial health based criteria (HIL D) by more than 250%. Zinc concentrations (maximum concentration 27,000 mg/kg) exceeded EILs across most of Lot 8, with less frequent exceedances of EILs for arsenic, cadmium and copper. Groundwater monitoring (discussed in Section 5.2.4 below) shows that groundwater is impacted by zinc and per- and poly-fluoroalkyl substances (PFAS). No significant PFAS concentrations were found in soil samples analysed from Lot 8 and Lot 11.

On the basis of investigations to date, JME has defined the extent of soil contamination on Lot 8 requiring remediation or management to address the health risks posed by the lead contamination and ecological risks (including risk to groundwater) posed by the zinc contamination.

I consider the nature and extent of soil contamination on Lot 8 have been adequately defined to determine remediation requirements to make the site suitable for the proposed land use.

5.2.3 Part of Lot 301, DP 634536 soil

The EIS indicates a small part of Lot 301, to the north of Lot 11, is included in the proposed development. The investigations reviewed as part of the site audit have not assessed contamination in this area. From my site inspection the area is covered by asphalt paved roadways and a non-trafficked area of crushed concrete. Review of aerial photographs provided with the DCA indicates this area is likely to be consistent with or less impacted than the other areas that have been assessed, and as it is a relatively small area, I consider it can be managed with the same approach as the rest of the site. In the absence of specific information I consider it reasonable and conservative to assume it may contain contamination similar to the

other areas of the site, for management purposes. Any requirements for intrusive works or change in land use can therefore be managed by the LTEMP that will be required for the rest of the site.

5.2.4 Groundwater

Two rounds of recent groundwater monitoring have been undertaken at the site, including wells on the upgradient, central and downgradient portions of the site. Previous groundwater monitoring undertaken during the construction and operation of the Midal Cables facility on Lot 11 has also been considered in the Groundwater Contamination Assessment report.

Groundwater monitoring has indicated the impact on groundwater of the arsenic, cadmium, copper and lead contamination identified in soil is not significant. Zinc concentrations in groundwater exceeded the default guideline value (DGV) for protection of aquatic ecosystems in all wells except the two upgradient wells in the first monitoring event, but were near or below the DGV in the second event (except for a newly installed well, MW10 which was only sampled in the second event). Further monitoring is proposed, however the remediation is intended to minimise ongoing impact of zinc to groundwater from leaching of fill soils on the site.

PFAS were detected in groundwater wells within and downgradient of the site, with much lower concentrations in the two upgradient wells, indicating the source of PFAS impact was historically on site. The source is unknown, however JME considers it possible that PFAS was either previously used on site or was due to a previous bush fire. As no significant PFAS concentrations were detected in site soils, JME considered the primary source has been removed from site and groundwater concentrations of PFAS should naturally attenuate with time. Concentrations of PFAS compounds were generally below assessment criteria except for PFOS exceeding the 99% species protection ecological guideline value (which is very conservative, and based on the potential for PFOS to bioaccumulate or biomagnify), and the sum of PFOS and PFHxS exceeding the adopted DGV (drinking water) in MW4 in the second monitoring round.

JME notes that the site is within the Tomago Aluminium Company (TAC) buffer zone, which is a special environmental management zone defined in the TAC conditions of consent and derived from the ambient fluoride levels associated with TAC operations. Fluoride and aluminium concentrations in groundwater were highest in the upgradient wells and diminish with distance from TAC. JME considered aluminium to be the highest ecological risk to downgradient receptors.

I consider groundwater contamination has been adequately assessed, subject to further monitoring (as proposed by JME in the RAP) to assess variability and trends in contaminant concentrations. Groundwater contamination is not considered to present a risk to site users and hence does not affect the suitability of the site for the proposed land use; however, due to apparent migration of groundwater contamination from the site there are additional considerations as discussed in Section 7 below.

5.2.5 Conclusion

I consider the nature and extent of soil and groundwater contamination have been sufficiently defined to determine the suitability of the site for the proposed land use, and what remediation is required to make the site suitable for this use.

As recommended by JME in the RAP, further groundwater monitoring is proposed to assess variability and trends. The results of this monitoring should be reviewed in conjunction with final design for the remediation works (as discussed below). As noted in Table 2, in future monitoring the least-impacted groundwater wells (i.e. the upgradient wells) should be sampled first to minimise potential cross contamination.

6. Remedial action plan

For general content of the RAP, I have referred to the specific reporting requirements for RAPs from the *Guidelines for consultants reporting on contaminated land* (EPA 2020). The compliance of the RAP with these requirements is illustrated in Table 3 attached. Table 4 attached indicates compliance of the RAP with remediation policy considerations described in the *Guidelines for the NSW Site Auditor Scheme* (EPA 2017).

The remediation strategy recommended by JME comprises removal and off-site disposal of the lead contamination hot spot in soil, and consolidation of the most significant zinc contaminated fill soils beneath a truck parking area intended to be constructed on Lot 8 as part of the proposed development.

Specifications for the capping layer to be provided by the truck parking area are provided in the RAP, however the detailed design is required to be undertaken by a suitably qualified engineer. The detailed design should include earthworks quantities, site design levels, grading and drainage, selection of an appropriate “impermeable geotextile” layer, details on verifying that cap construction is in accordance with the RAP specifications and a material movement plan to confirm the remediation area nominated in the RAP will be addressed. Extending the area of capping is considered an appropriate alternative to off-site disposal of excess fill, if the required volumes from the remediation area cannot be accommodated under the proposed truck parking area.

The RAP also recommends monthly groundwater monitoring until remediation activities commence, in order to get a better understanding of groundwater contamination status beneath the site. I note that three to four additional rounds of groundwater monitoring may be sufficient to establish a pre-remediation baseline, and depending on timing for construction, monthly monitoring may not be required.

The site will be subject to a LTEMP, which is outlined in the RAP, and a period of post-remediation groundwater monitoring. The RAP states monitoring should be undertaken on the monthly basis for the first twelve months after the completion of the remediation at which time the scheduling of the groundwater monitoring events can be reviewed. I recommend the proposed post-remediation groundwater monitoring program be reviewed at the time of final design, as monthly post remediation monitoring may not be warranted (depending on the pre-remediation monitoring results).

I consider the RAP has been prepared in substantial accordance with relevant guidelines, and that the recommended remediation strategy is appropriate and consistent with EPA policy as set out in current guidelines. I consider the site can be made suitable for the proposed land use subject to implementation of the RAP, including preparation of a detailed design for the capping layer. An assessment of the pre-remediation groundwater monitoring results and the detailed capping layer design should be subject to review by a site auditor prior to construction of the proposed parking area and the associated capping of identified contamination.

7. Additional considerations

Sections 4.3.11 and 4.4.2 of the *Guidelines for the NSW Site Auditor Scheme* (EPA 2017) relate to groundwater remediation and site suitability where groundwater contamination is present.

In accordance with the Guidelines, the presence of groundwater contamination does not preclude an auditor from certifying that the land is suitable for a specific use despite the contamination (nor, in the case of this IAA, from certifying that the land can be made suitable subject to implementation of the RAP), provided the groundwater contamination does not pose an unacceptable risk to users of the site. However, the final certification would be subject to the following provisos, as per Section 4.4.2 of the guidelines:

- *the auditor has advised the person who commissioned the site audit in writing that groundwater contamination is present*
- *a copy of the advice to the person who commissioned the audit is appended to the site audit report and is also noted or summarised in the site audit statement*

- *the auditor has discussed with the EPA whether any remediation may be required to address off-site contamination and, if so, what regulatory mechanism may be required for this further work.*

The auditor should explain that if future remediation is required this could interfere with activities on the site while remediation is carried out. The auditor should take reasonable steps to draw attention to any duty to report contamination under the CLM Act (see Section 3.8).

This IAA should be taken as advice in writing that groundwater contamination is present. This IAA is intended to be appended to the Site Audit Report and the advice regarding groundwater contamination will be noted in the Site Audit Statement at the completion of the site audit, if monitoring shows groundwater contamination is still present.

In relation to the duty to report, Section 9.3 of the RAP notes there is potential for a person to be exposed to contaminants at the site, and the site owner therefore potentially has a duty to notify the EPA, and JME recommends legal advice be obtained regarding reporting under s.60 of the CLM Act.

Section 4.7 of the RAP has a more detailed assessment of the Duty to Report, with key matters discussed by JME summarised as follows:

- Remondis is not the current owner but intends to purchase the site.
- Contaminants in soil (lead) exceed triggers for notification, however Remondis intends to remove the lead hot spot from the site and therefore it is not foreseeable than an employee will be exposed to the lead.
- Groundwater is impacted by zinc and PFAS but it is expected that these concentrations will reduce with time.
- An example is provided where a person would not be expected to seek advice [or notify the site], wherein the site contamination is appropriately contained and disturbance of the cap is subject to an EMP, subject to development consent or a site audit statement has been issued certifying the suitability of the site and no potentially contaminating activities have been carried out at the site since the statement was issued.

In relation to the points above, I consider JME is pre-empting circumstances (i.e. remediation and the audit outcome) that have not yet occurred, and therefore the Duty to Report is not necessarily negated at this time. However, Remondis is not yet the occupier or owner of the site, and therefore does not yet have a duty. I understand this IAA (and the JME reports) will be provided to the EPA, and expect that the EPA will advise their regulatory requirements by way of the planning and approval process.

8. Auditor's overall conclusions and recommendations

The following conclusions and recommendations are made on the basis of the documents reviewed as listed in Section 1 of this IAA, and in the context of current guidelines made or approved by the NSW EPA.

8.1 Conclusions

I consider that the contamination assessment reports prepared by JME are substantially in accordance with relevant guidelines, and are appropriate for the purpose of defining the nature and extent of contamination and the remediation required to make the site suitable for the proposed land use.

I consider the nature and extent of soil and groundwater contamination have been sufficiently defined to determine the suitability of the site for the proposed land use, and what remediation is required to make the site suitable for this use. As recommended by JME in the RAP, further monthly groundwater monitoring is proposed to assess variability and trends. I note that three to four additional rounds of groundwater monitoring may be sufficient to establish a pre-remediation baseline, and depending on timing for construction, monthly monitoring may not be required.

I consider the site can be made suitable for the proposed land use subject to implementation of the RAP, including preparation of a detailed design for the capping layer.

8.2 Recommendations

An assessment of the pre-remediation groundwater monitoring results and the detailed design for the capping, as proposed in the RAP, should be reviewed by a site auditor prior to construction of the proposed parking area and the associated capping of identified contamination.

The detailed design should include earthworks quantities, site design levels, grading and drainage, selection of an appropriate “impermeable geotextile” layer, details on verifying that cap construction is in accordance with the RAP specifications and a material movement plan to confirm the remediation area nominated in the RAP will be addressed. Extending the area of capping is considered an appropriate alternative to off-site disposal of excess fill, if the required volumes from the remediation area cannot be accommodated under the proposed truck parking area.

The proposed post-remediation groundwater monitoring program should also be reviewed at the time of final design, as monthly post remediation monitoring may not be warranted (depending on the pre-remediation monitoring results).

Prior to taking ownership or occupancy of the site, Remondis should consider their obligations to notify the EPA under s.60 of the CLM Act regarding contamination of the site. It is expected that this IAA and the JME reports will be provided to the EPA and will form the basis for EPA’s regulatory requirements.

The remediation and validation works should be supervised and documented in a Remediation and Validation Report by an appropriately qualified and experienced environmental consultant, and the Remediation and Validation Report and LTEMP should be reviewed by a site auditor to enable certification of the suitability of the site for the proposed land use.

I recommend that the requirement to implement the LTEMP be made a condition of consent, as a mechanism for making implementation of the LTEMP legally enforceable (as required by the *Guidelines for the NSW Site Auditor Scheme*).

Regards
GHD Pty Ltd

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Attachments: A Review of JME reports
B Limitations to Interim Audit Advice

Attachment A: Review of JME reports

DCA (JME 2021a)

Table 1 Detailed Contamination Assessment (DCA)

Aspect	Summary of information
Objectives and Scope of Work	Section 2 states the objectives of this assessment were to: – Identify potentially contaminating activities that are currently being performed on the site, and that may have been performed on the site in the past; – Assess Areas of Environmental Concern (AECs) and Contaminants of Concern (COCs) on the site; and – Provide recommendations on further assessment or remediation, if considered necessary. The following scope of works was undertaken: – Review of previous assessments regarding the site; – Review of published information related to soils, acid sulfate soils, geology and hydrogeology; – Review of previous site ownership (land titles search); – Review of historical aerial photography over the past 60 years; – Interviews with people familiar with the history of the site; – Review of the site's Section 10.7 Certificate; – Review of NSW EPA notices under the Contaminated Land Management Act 1997 (the CLM Act) and the Protection of the Environment Operations Act 1997 (the POEO Act); – Search of WaterNSW groundwater database for records of nearby registered groundwater bores; – Review of the above information, and identification of potential AECs and COCs; – Site walkover; – Field work including the collection of soil samples; – Laboratory analysis; – Tabulation of analytical results (including previous assessments); and – Preparation of this DCA report.
Auditor's comments: The objectives and scope of work are considered appropriate.	
Site identification	The DCA identifies the site as 21D and 21F School Drive, Tomago NSW. Lots 8 and 11 DP 270328, total area approximately 3.9 ha, local government area of Port Stephens, Parish of Stockton, County of Gloucester.
Auditor's comments: As noted in Section 4 of this IAA, the EIS includes part of Lot 301, DP 634536 within the proposed development site. This area lies to the north of Lot 11 DP 270328. The Auditor has considered this area as part of review. As noted in Section 5.2.3, it is considered it can be managed in the same way as the rest of the site.	
Site description	Section 6 of the DCA contains a description of the site, supplemented by site features shown in Figure 2 and photographs in Appendix A. The Executive Summary description is as follows: The site was mostly flat, and divided into two parts. The western part of the site (Lot 11) was paved, and contained two large sheds, and some smaller buildings and water tanks. The eastern part of the site (Lot 8) was unpaved, and sparsely covered with grass and other low vegetation. Fill mounds including concrete, metal and timber were observed, and concrete beams and concrete-filled tyres had been stockpiled in the northern part of Lot 8.
Auditor's comments: The site description is adequate and consistent with the Auditor's observations from inspection of the site. The DCA report refers to a "hydrocarbon trench" on Lot 11, which from the Auditor's inspection was a series of below-ground access galleries within the northern building, part of the former Midal Cables infrastructure. This trench is more accurately described in the Groundwater report as discussed in Table 2.	
Site history	Section 5 of the DCA presents site history, compiled from historical titles search and aerial photograph review. Section 4 includes review of the Section 10.7(5) Planning Certificate and NSW EPA records (included in Appendix C and D respectively). The site was undeveloped in 1954, cleared (possibly for sand mining) in 1974, industrial facilities had been constructed on and

Aspect	Summary of information
	around the site by 1987, with Midal Cables constructed on Lot 11 prior to 2016. Property ownership included a variety of industrial proprietors since 1950. A newspaper article included in Appendix E with title information indicates Courtaulds (proprietor from 1950 to 1983) manufactured rayon in the area (but based on aerial photographs, not at the site), with sulfuric acid and acetone as chemical plant streams.
Auditor's comments: The site history is considered adequate for the purposes of the assessment. While details of surrounding land use are sparse, site investigations (described below) are considered adequate to compensate for lack of detail on potential impacts from surrounding land use.	
Surrounding land use	Surrounding land use is briefly described in Section 3: Setco (mechanical engineer) directly west of the site and Tomago Aluminium Smelter further to the west; Vegetated and mostly unoccupied to the north and east; Vacant land with some commercial/industrial premises to the south, and North Channel Hunter River further to the south. Section 5.2 describes surrounding land use as part of aerial photograph review, and Section 6 (Site Walkover) states land adjacent to the north of the site was observed to be low scrub on white sand; to the east, the land appeared similar to Lot 8, and to the west was commercial/industrial. To the south was vacant land and some commercial/industrial premises, including the former Hydromet facility. The land use to west as a specialised vehicle manufacturer and it is considered likely that PFAS was used in testing fire vehicles. It is not known whether this activity did take place either on the adjoining land or on the subject site at a time it was vacant land.
Auditor's comments: The combined descriptions of surrounding land use are considered adequate. Although there is little detail of actual operations, there appears potential for current and historical surrounding land uses to have impacted the site.	
Topography and hydrology	Section 4.2 states a review of an online topographic map (www.maps.six.nsw.gov.au) indicates that the site is relatively flat and <10m above sea level. Stormwater runoff from the site would presumably flow south into the Hunter River. Section 6 notes that car parks and traffic areas in Lot 11 were concrete and asphalt paved, and contained gratings which presumably led to an underground stormwater system. Further details were not provided.
Auditor's comments: Given the flat topography and sandy natural soils, runoff is expected to mainly infiltrate except where paving or less permeable fill is present. If underground stormwater leads to infiltration trenches, this would affect hydrogeology. Details should be considered further as part of hydrogeological assessment.	
Geology and hydrogeology	Section 4.3 describes local soils with reference to the NSW Department of Planning, Industry and Environment –"eSPADE NSW Soil and Land Information" online service which indicates that the site lies on disturbed terrain (it is understood [by JME] that sand extraction has previously taken place on the site) within the Tea Gardens Aeolian Soil Landscape. Section 4.4 describes local geology with reference to the Newcastle 1:250,000 Geology Sheet which indicates the site is located in Quaternary-aged alluvial and fluvial deposits associated with the meandering river valley of the Hunter River, defined by the Newcastle 1:250,000 Geological Sheet as Quaternary Alluvium. As such, the site is underlain by sedimentary deposits comprising mixtures of sands, silts, clays, gravels and "Waterloo Rock". JME noted that soil conditions can vary considerably over relatively short distances in a meandering river valley setting. Generally, the alluvium within the Hexham, Tomago and Raymond Terrace area is made up of barrier sand and channel deposits that exist within the soil profile and are erratically distributed, and both vertically and laterally discontinuous. Section 4.5 described hydrogeology, including a search of the WaterNSW website for registered bores, which indicated that there were five registered bores on the site, and nine within 500 m of the site. A summary of groundwater bore information was presented [with most details shown as "Not recorded"]. Groundwater bore locations are shown on Figure 5 of the DCA. Of the three bores that did have details, one was for mineral exploration, one for industrial, and one for Domestic stock and irrigation. The latter (GW017544) was recorded to have a total depth of 9.1 m, and is located approximately 440 m south-south-east of the site (as described in the Groundwater report).
Auditor's comments: Descriptions of geology and hydrogeology are considered sufficient for the assessment. Further site-specific details on hydrogeology are provided in the Groundwater report (see Table 2).	
Previous investigations	Section 4.1 of the DCA references and summarises two previous assessments of Lot 11, and Appendix G of the DCA included three previous reports, summarised as follows: MBE2016 dated 7 December 2012 A waste classification assessment of topsoil / fill undertaken by MB Engineering Solutions (MBE) for Lot 11, for the removal of topsoil / fill prior to the construction of the Midal project. The MBE report included reference to results from the GHD 2011 assessment mentioned in Section 2 of

Aspect	Summary of information
	this IAA, and included tabulation of GHD's metal results relevant to waste classification. As summarised by MBE, the GHD assessment included analysis of soil samples [primarily from surface (0-0.1 m) / shallow (maximum 0.3 m depth) soils] for a suite of 13 heavy metals, Total petroleum hydrocarbon/benzene, toluene, ethylbenzene and xylenes (TPH/ZBTEX), Polynuclear Aromatic Hydrocarbons (PAH), Organochlorine Pesticides (OCP) and Polychlorinated Biphenyls (PDB). MBES stated there were no exceedances of the commercial/industrial health investigation levels in the samples analysed. The scope of work undertaken by MBE in this assessment included an acid sulfate soil and groundwater (pH and fluoride only) assessment from three boreholes / monitoring wells to a maximum depth of 6 m below ground surface (bgs). Ten test pits were excavated in a pattern to complement the locations sampled by GHD. Samples were analysed for eight metals (arsenic, cadmium, chromium, copper, lead, zinc and mercury), PAH, TPH/BTEX and fluoride. Two samples were analysed for asbestos (which was not detected). MBE reported the site soils were fill to a depth of approximately 0.2-0.3 mbgs, comprising gravelly, clayey sand with traces of brick, wood and metal. Results were discussed in terms of waste classification rather than the context of land use suitability, with the fill / topsoil classified as General Solid Waste. The underlying sand was not considered to meet the definition of Virgin Excavated Natural Material (VENM) by virtue of slight impact by heavy metals and fluoride. Sand at approximately 4 – 4.5 mbgs was considered likely to be acid sulfate soil (ASS). MBE2017 dated 8 April 2013 An Excavated Natural Material (ENM) Exemption Assessment for Lot 11, in anticipation of approximately 9,000 m^3 of spoil potentially requiring off-site disposal. Subsurface sands were sampled from 35 bore holes at depths of 1 m and 2 m bgs. MBES noted the ground surface level had been altered due to preliminary ground works for the project. One sample was collected from 3 mbgs for potential ASS. Seventy one samples were analysed for eight metals, BTEX, PAH, electrical conductivity (EC), pH and foreign materials. MBE reported that results showed no exceedances of the ENM criteria except for TPH C_{10}-C_{36} in samples TP34 1m and TP34 2m (maximum 1,900 mg/kg) and zinc (660 mg/kg) in sample TP34 1m. Sands were considered ENM except for within a 31.5 m diameter of TP34. MBE2017 Addendum dated 21 May 2013 [MBE2017A as referred to in JME 2021c] An addendum to MBE2017 involving 5 test pits (1a-1e shown on DCA Figure 4) collected from an area in the north-western portion of Lot 11 that was planned to be excavated to a depth of approximately 4 m. Samples were collected from 3 m and 4 m bgs for ENM analysis as above (although only one sample was tabulated with analytical results for each location – depth not stated but assumed from conclusions to be 3 m bgs), with samples from 4 m depth field screened for the presence of ASS, and analysed for SPOCAS. MBE concluded the sand met the criteria for ENM to a depth of 3 m bgs in the northwest portion of Lot 11, but dark brown sand from below 3 m bgs was confirmed as ASS and could not be classified as ENM. MBE stated however that the concentration of potential ASS was not sufficient to trigger further management.
Auditor's comments: MBE2016 accurately summarised the GHD 2011 investigations to the extent they were presented. Details not presented by MBE were that TPH/BTEX, PAH, OCP and PCB results (in a combination of individual and composite samples) were all less than the laboratory limit of reporting (LOR), but there were some significant zinc concentrations (seven locations exceeding 1,000 m/kg, with a maximum concentration of 4,800 mg/kg) in the GHD samples. MBE samples had concentrations of zinc up to 5,200 mg/kg, with 4 locations exceeding 1,000 mg/kg (not tabulated, but in laboratory reports). As these soils were reportedly removed from site, this has no bearing on the current site condition but may be relevant to historical impact to groundwater at the site. MBE2017 results indicated the underlying sands were not significantly impacted from contamination identified in the surface fill material except in the area of TP34. ASS were present at a depth of approximately 4 m bgs. TRH identified at TP34 was actually 490 mg/kg >C_{10}-C_{16} (F2) and 1400 mg/kg >C_{16}-C_{34} (F3). These fractions are non-limiting for vapour risk (HSL D) but the F2 fraction exceeded the ESL for commercial/industrial land use (NEPC 2013). TP34 was located in the southern portion of Lot 11, and if the contamination material was not removed, it would be below the slabs and structures of Lot 11 and hence not present any current risk to ecological receptors. Supporting information was generally complete except for laboratory reports for the MBE2017A samples, and there were no logs for the MBE investigations. Based on the information provided in the reports, the Auditor considers the results were likely to be representative of the materials sampled at the site at the time of these assessments. While not discussed in the DCA, the Auditor notes that the RAP (Section 3 and Appendix A) also includes discussion of limited soil and groundwater investigations undertaken by EHO Consulting Pty Ltd (EHO) in 2020, which included installation and sampling of 4 temporary groundwater wells and soil sampling from 8 test pits centred around JME test pit TP8 reported in the DCA (see results below). The Auditor agrees with JME's assessment (in the RAP) that EHO's groundwater results are likely to be unreliable (due to well construction and sampling methodology), but considers the EHO soil sampling provides useful delineation of impacts at TP8 and additional sampling density. The EHO soil sampling information has been incorporated in the RAP.	

Aspect	Summary of information
Potential contaminants	In discussion of source zone characteristics (as part of the CSM), Section 13.3 of the DCA identifies potential sources of impact on the site to include use of the site for manufacture of metal products (potentially including sandblasting operations); and potential importation of uncontrolled fill. It further states that based on the results of this assessment, identified contaminants of concern (COCs) on the site were considered to include heavy metals (arsenic, cadmium, copper, lead and zinc). Earlier sections of the DCA report do not specifically discuss potential contaminants, however the Sampling and Analysis Quality Plan (Section 7) states samples were to be analysed for BTEXN, Total Recoverable Hydrocarbons (TRH), PAH, Volatile organic compounds (VOCs), eight heavy metals, per- and poly-fluoroalkyl substances (PFAS), phenols, OCPs, organophosphorus pesticides (OPPs), PCBs, pH and cation exchange capacity.
Auditor's comments: While the DCA did not specifically discuss potential contaminants in a pre-investigation context, a wide suite of potential contaminants was selected for analysis, which is considered to encompass the contaminants likely to be encountered at the site. PFAS were selected for the second stage of assessment, following the identification of PFAS in groundwater.	
Conceptual Site Model (CSM)	A CSM is presented in Section 13 of the DCA report. The CSM includes sources, pathways and receptors, limited to contaminants that were identified above investigation levels. The CSM does not indicate the likely risk associated with each source-pathways-receptor linkage, however this has been addressed in the subsequent Groundwater assessment report and RAP.
Auditor's comments: The CSM framework has been presented in general accordance with relevant guidelines, and while not complete in regard to assessment of risk, this is considered to have been adequately addressed in subsequent reports, discussed below.	
Sampling plan and methodology	A Sampling and Analysis Quality Plan (SAQP) is presented in Section 7 of the DCA, including data quality objectives (DQOs), rationale for the sampling plan, and sampling procedures. The sampling location rationale was based on the contamination status of Lot 11 being sufficiently understood from previous investigations, with systematic sampling concentrated in Lot 8. Based on the *Sampling Design Guidelines* (EPA 1995) minimum recommended number of sampling points (50 for a site of four ha), JME proposed 15 test pits as part of this assessment, to complement the 35 boreholes sampled in MBE2017. Targeted boreholes [BH1 and BH2] were also to be located in the vicinity of a hydrocarbon / emulsion storage trench [better explained in the Groundwater report as noted above in comments on the site description] and exposed soils on Lot 11 [HA1 and HA2], constructed since that part of the site was assessed in MBE2017. As stated in Section 8 of the DCA, an additional borehole MW10 was extended to 2m below perceived groundwater depth near the centre of Lot 11.
Auditor's comments: The sampling density referred to by JME is for the overall site, whereas a density for Lot 8 alone (1.25 ha) would require a minimum of 22 systematic sampling points. Notwithstanding, given Lot 8 had an additional 2 hand augers by JME [HA3 and HA4] and 8 test pits by EHO (discussed in the RAP – see Table 3 below), while not all these were systematic locations the Auditor considers sufficient sampling has been undertaken to characterise contamination at the site. BH1 and BH2 were intended to assess potential hydrocarbon impact from the "hydrocarbon trench", but as they only extended to 2.5 m bgl, the Auditor considers the more convincing justification that there had been no impact from the trench (stated to have been excavated to 5 – 6 mbgl) was that no groundwater appears to have infiltrated into the trench, indicating it is appropriately sealed. The Auditor notes that MW10 and HA1 to HA4 were sampled as a second stage of investigations following the Auditor's site inspection and review of initial versions of the JME reports, based on detection of PFAS in groundwater and to assess current exposed areas of soil on Lot 11.	
QA/QC	The SAQP in Section 7 of the DCA includes DQOs, a QA/QC plan with data quality indicators, field and laboratory quality control procedures, and a relatively comprehensive review of QA/QC elements. A number of elevated relative percent differences (RPDs) were noted, both for field duplicates and laboratory duplicate samples. The DCA states that based on a review of QA/QC results it is considered that analytical results are indicative of the contamination status of the site at the time of sampling. The highest value of the primary sample, duplicate sample and triplicate sample was used for the assessment.
Auditor's comments: QA/QC applied during the recent investigations was in general accordance with current guidelines, and in previous investigations was considered adequate to provide representative sample results. While discussion is limited on the cause or implications of QC results exceeding nominated data quality indicator (DQI) limits, the Auditor considers some variability is inherent in fill soils, and as the most conservative results were adopted, the variability in other samples (i.e. without duplicate results) can be addressed by statistical assessment (as used in the DCA) and a robust remediation or management approach (discussed further in Table 3 below).	

Aspect	Summary of information
Assessment criteria	Section 7.7 of the DCA presents soil assessment criteria, primarily drawn from NEPC 2013. JME stated the site's current zoning is General Industrial, and considered the applicable land use setting to be HIL D commercial/industrial. Assessment criteria adopted by JME included health investigation levels (HILs), health screening levels (HSLs), ecological investigation levels (EILs), ecological screening levels (ESLs) and management limits. EILs for zinc, copper, chromium and nickel were based on site-specific added contaminant limits (ACLs) dependent on soil pH, CEC and/or % clay (as applicable). Provisional phytotoxicity based investigation levels (PILs) from the 2nd edition *Guidelines for the Site Auditor Scheme* were adopted for cadmium and mercury. The ESL for benzo(a)pyrene was adopted from CRC CARE Technical Report No. 39. PFAS criteria were taken from HEPA 2020. Statistics were applied in accordance with NEPC 2013.
Auditor's comments: The assessment criteria applied by JME were appropriate and in accordance with current guidelines. JME used the term "Default guideline values" (DGV) collectively, which is not common usage for soil criteria (being the term applied to water criteria in ANZG 2018). For consistency with JME's reports, the Auditor has used this terminology in summarising JME's findings below.	
Results	Section 11.2 of the DCA reports the following analytes were not detected above the laboratory LOR: BTEXN, TRH F1, OCP, OPP, PCB and mercury. The following were detected above LOR but below the adopted DGVs: PFOS (detected in the field triplicate sample [QC1A – the secondary laboratory having a lower LOR than the primary laboratory]), xylenes, TRH F3 and F4 [TP09 only, and only F4], benzo(a)pyrene (BaP), chromium and nickel. Results exceeding DGVs were as follows: • Lead exceeded 250% of the adopted HIL in a surface sample collected from TP8. No other lead exceedances were observed; • Zinc exceeded the adopted EIL in 17 samples from across Lot 8 with 10 samples exceeding the EIL by more than 250%. The ten samples were collected from test pits TP1, TP2, TP3, TP5, TP7, TP8, TP11, TP13 and TP14. Three samples from the fill mound on Lot 8 with two samples exceeding the EIL by more than 250%. Zinc exceeded the adopted EIL [by more than 250%] in a sample from hand auger HA2 on Lot 11. • Copper exceeded the adopted EIL by more than 250% in five samples from test pits TP3, TP5, TP7, TP8 and TP13; • Arsenic exceeded adopted EILs by more than 250% in surface samples collected from TP5, TP7 and TP8, and arsenic exceeded adopted EIL in a sample collected from hand auger HA2 on Lot 11 (see Figure 10); and • Cadmium exceeded adopted EILs in surface samples collected from TP5, TP7 and TP8. JME used ProUCL for statistical assessment of results. Section 11.3 of the DCA notes the purpose of MBES2016 and MBES2017 was to facilitate the removal of 9,000 m^3 of surface soils from Lot 11 and states the upper soils assessed in MBES2016 were likely to have been removed first and the deeper soils assessed in MBE2017 removed later. The DCA states it is uncertain whether all of the soils assessed in MBES2017 were removed from all locations, therefore, the results from MBES2017 were included in the data set along with results collected by JME this assessment, with observations as follows: • The standard deviation (SD) of arsenic concentrations exceeded 50% of the DGV. When 'hot spot' results (where concentrations were >250% of the DGV) for samples TP5 0, TP7 0 and TP8 0 were removed from statistical analysis, the SD result satisfied the NEPM requirements for commercial/industrial land use; • The SD of cadmium concentrations exceeded 50% of the DGV. When the two highest concentrations from TP5 and TP8 were removed from statistical analysis, the SD satisfied the NEPM requirements for commercial/industrial land use; • The SD of copper concentrations exceeded 50% of the DGV, and the 95% UCL of the mean copper concentration exceeded the DGV. When 'hot spot' results from TP3, TP5, TP7, TP8 and TP13were removed from statistical analysis, the SD and 95% UCL results satisfied the NEPM requirements for commercial/industrial land use; and • The SD of zinc concentrations exceeded 50% of the DGV, and the 95% UCL of the mean zinc concentration exceeded the DGV. When 'hot spot' results from TP3, TP5, TP 7, TP8 and TP13 were removed from statistical analysis, the SD and 95% UCL results satisfied the NEPM requirements for commercial/industrial land use.
Auditor's comments: The Auditor's check of laboratory results showed no significant errors in JME's reporting of results. The results show only limited health risk (the lead exceedance), with most exceedances relating to ecological criteria, and potential impact to groundwater (i.e. from zinc). The Auditor does not agree with JME's use of MBES2017 data in application of statistics, as the overall data set is not	

Aspect	Summary of information
representative of Lot 8 fill material, and including data for material that may have been removed is not a conservative approach. (The Auditor notes that Section 3 of the RAP, in discussion of MBE2017A, notes that MBES was not requested to validate or verify the disposal of the 9,000m^3 [of excess spoil], however MBES were present on site at various times throughout the removal of the soil and site photos indicate most of surface soil and subsoil had been removed). Using Procedure D from the *Sampling Design Guidelines* (EPA 2015), the Auditor has checked the statistical assessment of arsenic, cadmium, copper and zinc concentrations based solely on results for fill soils (including the fill mound) on Lot 8; and also for fill soils that will remain "exposed" following construction of the parking area and consolidation of the more significantly contaminated soils (as nominated in Section 6.6 of the RAP) with the following results for Lot 8 (using a single worst-case concentration for each sample location, and without re-use of the fill mound soils): • The existing 95% UCLav arsenic concentration is approximately 5,000 mg/kg (based on a lognormal distribution) with an arithmetic mean of 176 mg/kg. Following proposed remediation, the 95% UCLav concentration for exposed soils would be approximately 18 mg/kg (normal distribution), with an arithmetic mean of 11 mg/kg, well below HIL D and the EIL. • The existing 95% UCLav cadmium concentration is approximately 2.3 mg/kg (based on a lognormal distribution) with an arithmetic mean of 1.0 mg/kg, below HIL D and the EIL. • The existing 95% UCLav copper concentration is approximately 5,300 mg/kg (based on a lognormal distribution) with an arithmetic mean of 440 mg/kg. Following proposed remediation, the 95% UCLav concentration for exposed soils would be approximately 62 mg/kg (normal distribution), with an arithmetic mean of 44 mg/kg, well below HIL D and the EIL. • The existing 95% UCLav zinc concentration is approximately 31,700 mg/kg (based on a lognormal distribution) with an arithmetic mean of 6,025 mg/kg. Following proposed remediation, the 95% UCLav concentration for exposed soils would be approximately 1,300 mg/kg (normal distribution), with an arithmetic mean of 920 mg/kg. These post-remediation concentrations are below HIL D, still above the EIL but representing a six-fold reduction in the arithmetic mean concentration compared with the pre-remediation data. Also, selective removal of "hot spot" results does not necessarily address the potential for similar hot spots to occur between sample locations. The Auditor has considered these factors in reviewing the remediation requirements for the site, noting the following mitigating circumstances: • Lead was the only COC exceeding health-based criteria, and this only at one location (TP8) which also had elevated concentrations of other heavy metals. Previous investigations of fill material on Lot 11 did not detect any lead exceedances. Therefore this contamination is considered to be isolated and unlikely to be present at similar concentrations on other areas of the site. • Other COC exceedances were of ecological criteria, and unlikely to affect the suitability of the site for the proposed use, although landscaping in site fill soils may not be successful. • Arsenic, cadmium and copper exceedances were relatively limited but zinc exceedances were widespread across the site. JME and the Auditor have further considered heavy metal impacts to groundwater as part of the Groundwater assessment and RAP, discussed in Table 2 and Table 3 below.	
Site characterisation / discussion	The DCA states that the western part of the site (Lot 11) was paved, and contained two large sheds, and some smaller buildings and water tanks. Beneath the pavement [on Lot 11], brown gravelly sand, containing concrete and brick rubble to a depth of between 1 m bgl and 1.8 m bgl, was interpreted to be fill. This material had previously been assessed as meeting the criteria for excavated natural material, and for commercial/industrial land use. Approximately 9,000m^3 [of excess spoil] was removed from Lot 11 for the Midal Cables development. Light brown fine to medium grained sand beneath the fill was interpreted as representing in-situ, 'natural' material. Groundwater was intersected at 2.4 m bgl. Hydrocarbon contamination was not detected in samples collected from adjacent to the hydrocarbon trench in Lot 11, indicating that significant contamination of soils in this area had not been caused by leaks from the trench. The eastern part of the site (Lot 8) was unpaved, and sparsely covered with grass and other low vegetation. Fill mounds including concrete, metal and timber were observed, and concrete beams and concrete-filled tyres had been stockpiled in the northern part of Lot 8. Fill, comprising brown to black sand, and containing some plastic, road base gravel, brick, concrete, metal and rocks, was observed to a depth of approximately 0.5 – 1 m bgl across much of Lot 8. Elevated zinc and copper concentrations in this material were considered to be consistent with the use of sandblasting in the metal manufacturing process. Beneath the fill, brown sand, interpreted as representing in-situ material, appeared to be largely uncontaminated. Acid sulfate soils have been identified on site at depths greater than 3 m bgl. Elevated arsenic, cadmium, copper, lead and zinc concentrations were observed in fill material on the surface in the northeast corner of the site. Elevated lead (4,600mg/kg) was limited to one location, test pit TP8. The lead concentration was more than 250% of adopted Human Health guideline value. Zinc contamination was higher along the northern and eastern borders of Lot 11

Aspect	Summary of information
	with the highest concentrations, 27,000 mg/kg (TP8), 25,000 mg/kg (TP7) and 18,000 mg/kg (TP5), located at or near the lead impact location. Arsenic and copper were also detected at concentrations greater than 250% of the adopted ecological default guideline value at three locations, TP5, TP7 and TP8. Cadmium was detected at concentration less than 250% of the adopted ecological guidelines at the same locations.
Auditor's comments: JME's discussion presents a representative summary of contamination at the site.	
Conclusions / recommendations	The DCA conclusion states that based on this assessment, it was considered that the site had been impacted by contamination comprising heavy metals at concentrations exceeding guideline values for commercial/ industrial land use. JME considers the impact to be minor and that the site could meet the environmental requirements for commercial/industrial land use subject to the development and successful implementation of an appropriate Remedial Action Plan.
Auditor's comments: While the conclusions do not include all elements recommended by the *Guidelines for consultants reporting on contaminated land*, the Auditor considers they are generally accurate, and combined with preceding information in the DCA report (in particular the discussion section) provide a sufficient summary to understand the requirements for remediation at the site. Preparation of a RAP is an implicit recommendation.	

Groundwater report (JME 2021b)

Table 2 Groundwater Contamination Assessment

Aspect	Summary of information

Objectives and Scope of Work	JME states the objectives of this groundwater assessment were to:
	• Assess the current groundwater contamination status of Lots 8 and 11.
	• Assess the groundwater flow direction.
	• Improve understanding of the contamination status of groundwater beneath the site.
	A scope of work was not clearly stated in the groundwater report, but can be derived from Section 10 of the report to comprise the following:
	• Installation of three groundwater monitoring wells (MW7 – MW9) on 6 April 2021 and one well (MW10) on 3 June.
	• Groundwater gauging and sample collection from MW7 – MW9 plus pre-existing wells MW4 – MW6 on 13 April 2021.
	• Groundwater gauging and sample collection from MW4 – MW10 on 11 June 2021.
	• Survey of top of casing of MW4 – MW9 by registered surveyors.
	• Pump testing of MW7 and MW8.
	• Measurement of field parameters (dissolved oxygen, electrical conductivity, pH, Redox potential and temperature) during sampling.
	• Laboratory analysis of groundwater samples for the following:
	  • PFAS (samples collected 13/4/2021 and 11/6/2021);
	  • Fluoride (samples collected 13/4/2021);
	  • Metals (Al, As, Cd, Cr, Cu, Ni, Pb, Zn, Hg) (samples collected 13/4/2021 and 11/6/2021);
	  • Volatile organic compounds (VOC) (samples collected 13/4/2021);
	  • PAH (samples collected 13/4/2021); and
	  • TRH (samples collected 13/4/2021).

Auditor's comments: While the scope has not been reported in accordance with guidelines (i.e. summary section of scope), the Auditor considers the objectives and scope of work carried out are appropriate and sufficient for the purposes of the assessment, which ultimately includes further assessment of remediation requirements at the site.	
Hydrogeology	Section 1.1 of the Groundwater report presents further background to site hydrogeology, including the following points: Beneath the site is the Tomago Sand Aquifer. Hunter Water extract water from this aquifer and following treatment the extracted water forms part of the Hunter regions reticulated drinking water supply. Hunter Water's groundwater extraction area is [to] the north and west of the site. It is expected the regional ground water flow would be toward the Hunter River and as such

Aspect	Summary of information
	groundwater from the site is not likely to affect the quality of groundwater extracted by Hunter Water. The Williamtown RAAF base is located approximately 9.5 km north west of the site. The per- and poly-fluoroalkyl substances (PFAS) groundwater contamination associated [with] Williamtown RAAF base are unlikely to impact on the site's groundwater. Located to the west of the site [is] the Varley Group manufacturing facility. Amongst the specialised vehicles manufactured include fire fighting trucks. On that basis it was considered that testing of new fire trucks, including spraying PFAS foams, feasible. The Tomago Aluminium Company (TAC) is located just over 200 m to the west of the site. It has been smelting aluminium since 1983. The "*Tomago Aluminium Company Pty Ltd Production Capacity Increase 585,000 to 600,000 tonnes Saleable Production Project Description and Statement of Environment Effects*", dated August 2016 reports that fluoride concentrations measured in its "eastern boundary bores" ranged from 5.2-6.6 mg/L between 2011 and 2015. JME has assumed that the fluoride concentrations are an average of six wells located off the TAC site and in proximity to the TAC eastern boundary. Site specific hydrogeology is reported in Section 10 of the Groundwater report, summarised as follows: • Based on the constant head pump tests in 2 wells, the hydraulic conductivity was approximated by the flow rate into the wells as ranging from 7.4 x 10^{-5} m/s to 9.5 x 10^{-5} m/s (6.4 to 8.2 m/day). • The groundwater gradient was approximately 0.0024 (m/m), with flow in a south-south-east direction. • The groundwater velocity was calculated using Darcy's law and estimated to be around 0.07 – 0.09 m/day [25 to 33 m/year]. Based on this estimate the Groundwater report states it would take approximately 13-17 years for the site groundwater to reach the nearest [registered] domestic groundwater well and 33-43 years for the site groundwater to reach the Hunter River.
Auditor's comments: The additional information above provides useful context to groundwater use and background quality in the regional area of the site. The methodology used to approximate the hydraulic conductivity of the aquifer is unclear. A hydrogeologist from the Auditor's support team reviewed the calculations and derived a hydraulic conductivity approximately 5 times greater. The Auditor also compared JME's values with 'tentative aquifer parameters' used to model groundwater flow for land in proximity to the site, to the south of Tomago Road down to the Hunter River (as described in "*Modelling Shallow Groundwater – Lot 1001 Tomago, For Proposed Northbank Enterprise Hub Business and Industrial Park*, Environ Australia Pty Ltd, 23 August 2012 Microsoft Word - AS130310_Lot 1001 Tomago Modelling_Final_a (nsw.gov.au)), which for the sand aquifer modelled assigned hydraulic conductivity from 2 x 10^{-4} m/s to 3 x 10^{-4} m/s, which with a gradient ranging from to 0.0004 to 0.0045 resulted in a groundwater velocity range from 7.2 to 120 m/year. On that basis the JME estimates do not appear unreasonable, but may underestimate hydraulic conductivity and groundwater flow velocity by a factor of 2 to 5 (and hence overestimate travel time by a similar factor).	
Previous investigations	Section 1.1.3 of the Groundwater report describes groundwater monitoring undertaken by JME during the construction and operational phase of the Midal Cables facility on Lot 11 from 2013 to 2016. Potential impacts from use of a Waste Water Treatment Plan (WWTP) and spills entering the stormwater infiltration on site were monitored in one up-gradient well (MW6) and two down-gradient wells (MW4 and MW5). JME summarised groundwater monitoring results for monitoring wells MW4 - MW6 from February 2013 until December 2016 in Summary Table 1 of the Groundwater report. JME states the heavy metal concentrations were relatively stable over the monitoring period and no increasing or decreasing trends were detected using the Mann-Kendall Trend Test Analysis. The Groundwater report states that elevated soil concentrations of arsenic, cadmium, copper lead and zinc were reported in JME2005-2 [the DCA]. The minimum and maximum concentrations [in groundwater] of these metals across monitoring wells MW4 - MW6 were: • Arsenic: <1µg/L - 2µg/L • Cadmium: <0.1µg/L – 0.3µg/L; • Copper: <1µg/L - 5µg/L; • Lead: <1µg/L - 2µg/L; and • Zinc: 5µg/L - 230µg/L. The Groundwater report states that the WWTP was decommissioned around April 2015 and a sewage pump out tank system was used in its stead.

Aspect	Summary of information
	JME states that metal impacted fill on Lot 8 was unlikely to affect the groundwater on Lot 11, however: • the mean concentration of copper was greater than the default guideline value in each of the monitoring wells; • the mean concentration of zinc was 4.8 times greater than the DGV in monitoring well MW4, 2.8 times greater than the DGV in monitoring well MW5. The Groundwater report states that the mean zinc concentrations did not exceed the DGV in monitoring well MW6, which indicates that the groundwater under Lot 11 was impacted by the previous landuses. However, JME20005-2 had assessed that the soil on Lot 11 was not significantly impacted by heavy metals.
Auditor's comments: While the Groundwater report states that "*JME20005-2* [the DCA report] *had assessed that the soil on Lot 11 was not significantly impacted by heavy metals*", as discussed in the 'Previous Investigations' section of Table 1 above, significant zinc concentrations were reported by previous investigations in fill material on Lot 11 prior to construction of the Midal Cables facility. The fill may have affected groundwater quality on the site, as may the operation of the former WWTP. Removal of the fill (as stated in the DCA report) and capping of Lot 11 with structures and pavement, together with decommissioning of the WWTP, would be expected to result in a gradual improvement of groundwater quality on Lot 11.	
Potential contaminants	The CSM (Section 2.3 of the Groundwater report) identifies contaminants of concern as TRH F1 and F2, benzo(a)pyrene, total PAH, degreasers (chlorinated hydrocarbons, CHCs), heavy metals (aluminium, arsenic, cadmium, copper, lead and zinc) and PFAS.
Auditor's comments: Based on the DCA, the Auditor considers the identified contaminants of concern include those most likely to be present at the site as a result of contamination from the site or surrounding properties (excluding nutrients from the former WWTP). PAHs other than benzo(a)pyrene are more soluble, but are included in the PAH analytical suite.	
Conceptual Site Model (CSM)	The Groundwater report includes a CSM similar to the DCA report, including site history summary, site condition, primary groundwater contaminant sources, contaminants of concern, transport mechanisms, exposure pathways and potential sensitive receptors. The site history summary supplements information in the DCA with the following: The Midal Cables facility manufactured aluminium transmission cable from molten aluminium sourced from the nearby TAC. Due to the thickness of the concrete slabs and relatively short life of the facility it is considered very unlikely that the Midal operations impacted on the groundwater quality of the site with the exception of a former septic system in the southern portion of Lot 11 which is no longer in use. This is supported by the groundwater monitoring discussed in Section 1.1.3. The manufacture of aluminium cable from molten metal included the use of an emulsion to lubricate the cable strands during the drawing process. Excess emulsion was capture in an "emulsion trench" and recycled through the process. The emulsion trench was located in the northern Midal building. The trench was constructed of cement below the water table. No groundwater has appeared to have seeped into the disused trench since Midal has shut down and therefore it reasonable assume that emulsion did not leak into the groundwater when Midal was operating.
Auditor's comments: The additional site history in the Groundwater report CSM assists in understanding site features and potential contaminant sources. The CSM is considered appropriate. As with the DCA, the CSM does not indicate the likely risk associated with each source-pathways-receptor linkage, however this is addressed in the subsequent discussion section of the Groundwater report.	
Sampling plan and methodology	Section 3 of the Groundwater report presents a brief data gap analysis, with DQOs in Section 4 and a sampling plan in Section 5. The Auditor reviewed a separate SAQP which was the basis for additional soil and groundwater sampling after the initial DCA and Groundwater Report. Methodology for installation of groundwater wells and purging and sampling of groundwater is included.
Auditor's comments: The sampling plan and methodology are considered appropriate for the investigations. No well logs were provided for existing wells MW4 – MW6, however JME advised in separate correspondence that these were installed using similar methodology to the current groundwater monitoring wells. No field sampling sheets were provided in the Groundwater report, however field parameters are tabulated in Section 10.4 of the report.	
QA/QC	Section 8 of the Groundwater report includes a QA/QC plan with DQIs based on Appendix V of the *Guidelines for the NSW Site Auditor Scheme* (2nd edition). Sampling protocols are documented, with field and laboratory quality control measures. A review of field and laboratory QA protocols and QC results is included in Section 10.3 of the Groundwater Report. Duplicate, triplicate and blank samples were collected and analysed. QC results were generally acceptable, with the exception of low concentrations of PFAS detected in a rinsate blank

Aspect	Summary of information
	collected on 11/6/2021 and in tap water used for rinsing. As concentrations in both these samples were similar, JME considered it unlikely that the PFAS were introduced by the sampling train. JME discussed PFAS testing reported by Hunter Water and considered the tap water being the source of the PFAS compounds observed in the QC samples cannot be ruled out. The Groundwater report states that the two wells with the lowest PFAS concentrations were sampled in the middle of the sampling run indicating that cross contamination between sampling locations caused by the sampling method is unlikely. The Groundwater report states that based on a review of QA/QC results it is considered that analytical results are indicative of the contamination status of the site at the time of sampling.
Auditor's comments: The 2nd edition of the *Guidelines for the NSW Site Auditor Scheme* is superseded, but the DQIs are consistent with those currently included in NEPC (2013). The Auditor considers the overall QA/QC was appropriate and generally consistent with current guidelines. Contrary to JME's conclusion, the Auditor considers the wells with the lowest PFAS concentrations could potentially have been influenced by cross contamination, and future monitoring should commence with the least-impacted wells. The Auditor considers it likely that results were representative of groundwater at the time of sampling, but there is a potential for uncertainty that will need to be assessed over multiple rounds (see discussion of results below).	
Assessment criteria	Section 4.3.1 of the Groundwater report presents assessment criteria, including consideration of drinking water and incidental ingestion by trench workers, vapour intrusion, and protection of aquatic ecosystems. The Groundwater report includes a qualitative health and ecological PFAS risk assessment (qualitative risk of exposure to receptors). Table 3 of the Groundwater report (Adopted Groundwater Contaminant Trigger Values) and the results Summary Tables do not clearly indicate which guidelines the adopted trigger values have been taken from, except for fluoride in Table 3 (10 times drinking water criteria).
Auditor's comments: While there is a lack of clarity about the respective sources of the adopted trigger values, the Auditor considers appropriate guidelines have been used to select assessment criteria, and for the contaminants detected at the site, appropriate criteria have been used for comparison.	
Results	Field parameters for the two monitoring rounds are presented in Table 7 and Table 8 of the Groundwater Report. The Auditor notes significant differences in Redox between the two monitoring rounds, which have not been discussed by JME, nor have pH trends across the site. Other comparisons between the two rounds are presented in the Discussion section below. Laboratory results are summarised in comparison with adopted DGVs in Summary Table 2 of the Groundwater report, with results discussed as follows. BTEX, TRH and PAH were not detected at concentrations above the laboratory LOR. CHCs were not detected at concentrations above the laboratory LOR, with the exception of chloroform, which was detected in sample MW5 at a concentration significantly below the adopted DGV. Several PFAS compounds were detected in the six samples collected on the 13/4/2021 and the seven samples collected on 11/6/2021. The PFAS fingerprint in the samples collected from MW4, MW5, MW7 and MW8 appeared similar in the makeup of compounds and their concentrations. PFOS was detected at concentrations above the NEMP2.0 99% ecological protection value for both monitoring rounds in monitoring wells MW4, MW5, MW7 and MW8 and in monitoring wells MW9 and MW10 in the second monitoring round. The sum of PFOS and PHxS exceeded the adopted DGV in MW4 in the second monitoring round. PFOA was detected at concentrations below the adopted DGV in in monitoring wells MW4, MW5, MW7 and MW8. PFOA was not detected above the laboratory limit of reporting in monitoring wells MW6 and MW9. Fluoride was detected below the adopted DGV in monitoring wells MW4, MW5, MW6, and MW9. [Fluoride was <LOR in MW7 and MW8]. Arsenic, cadmium, nickel, lead and mercury were either not detected at concentrations above the laboratory LOR or detected in some wells above the laboratory detection limit but below the adopted DGVs. The following metals were detected in some samples at concentrations which exceeded adopted guideline values: • Aluminium was detected at concentrations significantly greater than the adopted DGV in the each of the monitoring wells sampled; • Copper was detected [approximately twice the DGV] in monitoring wells MW4, MW5 and MW7 in the first monitoring round; • Chromium was detected in MW6 [upgradient, at approximately twice the DGV] in both monitoring rounds; and

Aspect	Summary of information
	• Zinc was detected in monitoring wells MW4, MW7 and MW8 in the first monitoring round only and monitoring well MW5 in both monitoring rounds.
Auditor's comments: The Auditor's check of laboratory results showed no significant errors in JME's reporting of results. Given consideration of results for the two rounds, and upgradient vs downgradient results, the monitoring undertaken to date indicates the contaminants in groundwater exceeding assessment criteria and associated with the site are essentially limited to PFAS and zinc. The implications are discussed below.	
Site characterisation / discussion	Discussion in the Groundwater report includes the following. The groundwater monitoring undertaken on 13 April 2021 was undertaken after a significant rainfall event in March 2021 where 459 mm of rainfall was recorded at the Williamtown Base and another 40 mm of rainfall was recorded on 8 April 2021. By comparison, 46.8 mm of rainfall was recorded in the thirty days preceding the groundwater monitoring event on 11 June 2021. The difference in rainfall preceding the monitoring events had an expected effect on the groundwater depth which was higher on the 13 April across the wells monitored. Similarly with the historical electrical conductivity data displayed in Graphs 1-3, the electrical conductivity of the two upgradient wells, MW6 and MW9, were relatively stable when compared to the remaining wells. Groundwater monitoring indicated that the impact of arsenic, cadmium and copper in soil on the groundwater is negligible across both sampling rounds with the lower concentrations being observed in the second monitoring round. Cadmium has not exceeded the DGV in the samples in the recent monitoring rounds. Copper concentrations were slightly above the DGV in the first round, with no exceedances in the second monitoring round. Chromium slightly exceeded the DGV in both monitoring rounds. There were no exceedances of lead in either sampling rounds in the monitoring wells sampled. Zinc was significantly elevated at MW7 with a concentration of 89 µg/L compared to trigger value of 15 µg/L in the first monitoring round and less than the trigger value with a concentration of 5 µg/L in the second monitoring round. Monitoring well MW7 was in the vicinity, but down hydraulic gradient of, the highest soil zinc impacts reported in JME20005-2. It appears that the form of zinc present in the soil is more labile than the forms of the other metals that have impacted the soils in the vicinity of MW7. The difference in the zinc concentrations in the two monitoring rounds was likely to be caused by the 10-fold difference in rainfall in the thirty days leading up to the monitoring events. The highest zinc groundwater concentration, 220 µg/L was detected in monitoring well MW10, located in Lot 11. It was reasonably assumed that a significant proportion of the surface soils were removed from Lot 11 and on this basis is expected that the zinc in this area would self attenuate. The highest zinc soil impacts are associated with the highest lead soil impacts and, as such, are planned to be removed from the site or placed under a cap in the remediation process. PFOA detections were significantly lower than the adopted human health trigger values and the NEMP2.0 99% ecological protection value. The PFOS+PFHxS concentration exceeded the adopted human health trigger by 20% in monitoring well MW4 in the second monitoring event and was below it the first monitoring event. The PFOS+PFHxS concentrations were below the adopted human health trigger in the remaining wells across both monitoring events. The concentration PFOS was detected in the downgradient wells were almost 30 times greater than the NEMP2.0 99% ecological protection value. Although the concentrations in the wells nearer to the Varley site are slightly higher and gradually diminish across the site, the concentrations of PFOS are similar enough in the PFAS impacted wells to consider its presence is unlikely to be caused by onsite migration from the neighbouring site. Therefore, it is considered possible that PFAS was either previously used on site or a significant (bush) fire threatened the site. Either way, the primary source has been removed from site and no significant PFAS soil concentrations (secondary source) were reported in JME2005-2, thus groundwater concentrations of PFAS should naturally attenuate with time. No PFOS was detected in the upgradient wells, MW6 and MW9. It is difficult to assign trends in concentrations from 2 rounds of monitoring and its recommended that additional rounds of monitoring are undertaken to provide a better understanding of the background values. This will assist the assessment the remediation effort required to minimise the impact on offsite receptors in a sustainable fashion. The site is within the TAC buffer zone. The TAC buffer zone is a special environment management zone and is defined in the TAC conditions of consent and is derived from the ambient fluoride levels associated with TAC operations. Fluoride and aluminium concentrations were largest in the upgradient wells and appeared to diminish the further away from TAC the groundwater well was located. Aluminium concentrations were 160 times greater than the adopted trigger value in monitoring well MW9 and 129 greater in monitoring well MW6. On this basis, aluminium is considered to be highest ecological risk to down gradient receptors.

Aspect	Summary of information
	No further action is required for fluoride and aluminium because these will continue to migrate onto site whilst the TAC smelter is still operable. The concentration of fluoride does exceed the drinking water guidelines in some wells and therefore the drinking of groundwater should be strictly prohibited on site.
Auditor's comments: Based on the data, JME's discussion of results is generally considered appropriate, although the variation in results between the two rounds is not clearly linked to the difference in rainfall, given that while zinc concentrations significantly decreased in most wells in the second event, the highest zinc concentration was in MW10 which was a newly installed well and only sampled in the second event. In addition, there was not a commensurate reduction in PFAS between the two events, with the second event having higher PFAS concentrations (for most compounds) in all wells except MW6 (upgradient).	
Conclusions / recommendations	The Groundwater report conclusions were as follows. JME considers that the elevated arsenic, cadmium, copper, lead and zinc concentrations in soil had not had a significant impact on the site's groundwater. It was noted that zinc was significantly elevated in a monitoring well, MW7, near the site's boundary following a significant rainfall event and was below the DGV in the second monitoring event. The zinc impacted soils with the highest concentrations are associated with the lead impacted soils that are planned to be removed along with the placement of a cap over a portion of site. The cap, in conjunction with a storm water system was intended to reduce stormwater percolation through the soil thereby reducing the metal leaching potential. PFAS concentrations were considered not to be risk to human health and would attenuate as there were no continuing sources. On this basis, it considered that groundwater specific remediation is not required.
Auditor's comments: The Auditor considers JME's conclusions are generally supported by the data to date, although impact to groundwater by zinc should be verified by further monitoring given the high concentration (220 µg/L) reported in MW10. In addition, no reducing trend in PFAS has been established to date. While it is unlikely that groundwater specific remediation would be required, the Auditor reserves opinion in this regard pending the results of further monitoring and the effectiveness of the proposed soil remediation. While the identified groundwater contamination is not considered to affect the suitability of the site for its proposed use, discussion with EPA may be required in accordance with the *Guidelines for the NSW Site Auditor Scheme* (3rd ed EPA 2017)/	

RAP (JME 2021c)

Table 3 Remedial Action Plan compliance with reporting guidelines

Reporting requirement	Summary / compliance with guidelines
Remediation goal	The stated objectives of the remediation, where contamination poses unacceptable risks to human health or the environment, are to render the site suitable for its proposed use, and to ensure that the environment is protected from contamination (s.1.2 of RAP). Specific remediation goals are not stated, but can be inferred from discussion in Section 6 of the RAP.
Auditor's comments: The objective of the remediation is appropriate. Specific goals are assumed to include: • Removal of anthropogenic waste. • Removal of fill contaminated with lead exceeding 1200 mg/kg. • Consolidation of zinc concentrations exceeding 2500 mg/kg beneath the truck parking area. • Capping to meet design specifications in Section 6.8 of the RAP. • Groundwater monitoring to show stable or reducing concentrations of zinc and PFAS.	
Extent of remediation required	Section 5.2 of the RAP describes the requirements for remediation based on concentrations of lead and zinc in soils, with the areas requiring remediation or management shown on Figure 7 from the RAP. The RAP incorporates additional soil data from EHO (2020) as discussed in Table 1 above.
Auditor's comments: Based on the investigations documented in the DCA and Groundwater report and the additional information from EHO (2020) included in the RAP, the Auditor considers the extent of remediation described in the RAP and shown in Figure 7 is appropriate to meet the remediation objectives.	
Discussion of possible remedial options and how risk can be reduced	Remediation options are discussed in Section 5.4 of the RAP, including the following: • Treatment (on-site or off-site) of contaminated material – not technically feasible or financially viable for heavy metal contamination on the site. • Isolation and containment – considered feasible, with a site management plan committing to long term management of the contamination. Potential exposure of human and environmental receptors would be removed, and infiltration of surface water would be reduced. • Excavation and off-site disposal – considered technically feasible, but not financially viable for the full extent of contamination identified as requiring remediation. May be suitable to remediate limited contamination hot spots on the site.
Auditor's comments: The review of options was relatively basic and high level, but given the nature of identified contamination and the characteristics of the proposed development, the Auditor considers the discussion was adequate and an appropriate combination of remediation options has been identified to reduce the risks of exposure to contaminated soils and from leaching of contaminants in fill material to groundwater. More detailed assessment of risks could justify a reduction in remediation requirements, but such detailed assessment may not be necessary given the proposed remediation (primarily capping) is consistent with the infrastructure requirements already planned for the development. While not specifically stated in the RAP, capping of a portion of the site may also reduce the potential risks associated with migration of PFAS in groundwater, although if stormwater is infiltrated on site, overall groundwater flow would not change.	
Rationale for selection of the recommended remedial option	The recommended remediation strategy (described in s.6.2 of the RAP) is a combination of removal of the lead in soil hotspot and consolidation and capping of the significant zinc impacted soil. The rationale is discussed in Section 6.3 of the RAP, summarised as follows: • Treatment of heavy metal contamination was not deemed to be feasible. • The cost of disposal of [all] fill requiring remediation was considered prohibitive, but the removal and disposal of lead impacted soil that poses a human health risk was considered not to be prohibitive. • A low-permeability cap is considered to be an appropriate remediation method for heavy metal contamination at the site. The cap will reduce stormwater infiltration through contaminated soils, and combined with an underground stormwater drainage system will reduce the potential for groundwater to be contaminated. • As the capping layer would be achieved via the construction of a parking surface pad, there would be limited additional groundwater specific remediation measures required.
Auditor's comments: The Auditor considers the rationale for the recommended option is appropriate.	

Reporting requirement	Summary / compliance with guidelines
Description of remediation works	The RAP (sections 6.4 to 6.8) provides a brief description of the remediation works to be undertaken, including removal of anthropogenic waste, removal and disposal of lead impacted soil, preparation of the capped area (the proposed truck parking area – shown in Figure 6 of the RAP and occupying approximately a third of Lot 8) including consolidation of significantly impacted soils beneath the capped area, installation of the marker layer and construction of the cap. The RAP states the cap must be designed by a suitably qualified engineer to ensure that the design is robust enough to endure heavy vehicle movements. The primary remediation aim of the cap is to reduce the infiltration of storm water through zinc impacted soil. Section 6.8 of the RAP states the cap must have the following specifications: • A low leachability of heavy metals; • Underlain by an impermeable geotextile; • A maximum permeability of 1x10-7 m/s; • A minimum grade of 1% to the stormwater drain; • No ponding of stormwater; • Stormwater is to [be] directed to a subsurface infiltration pit; and • The subsurface stormwater infiltration zones must [be] more than 0.5 mbgs. JME advised by separate correspondence that the impermeable geotextile is to be selected as part of the final design.
Auditor's comments: The Auditor considers the description of remediation works is sufficient to indicate the site can be made suitable by implementing the proposed remediation measures. Detailed design of the cap is required, and should be reviewed by a site auditor prior to construction. Detailed design should include earthworks quantities and site design levels to confirm whether the fill material requiring management can be placed beneath the capped area, and a material movement plan to confirm the remediation area nominated in the RAP will be addressed.	
Data gaps	The RAP does not specifically discuss data gaps, but notes in Section 6.1 that the remediation is based on the results of two rounds of groundwater monitoring, and in order to get a better understanding of the groundwater contamination status beneath the site, recommends that the groundwater is monitored on a monthly basis until the remediation activities commence.
Auditor's comments: The Auditor considers that groundwater quality trends and potential variability are the main data gap and agrees that further monitoring will better establish remediation requirements. An assessment of groundwater monitoring results should be provided to the Auditor for review as part of final design. Three to four additional rounds of monitoring may be sufficient to establish a pre-remediation baseline, and depending on timing for construction, monthly groundwater monitoring may not be required.	
Validation plan	Section 7 of the RAP includes protocols for validation of excavations, validation / classification of stockpiles, validation of the marker layer placement, validation of imported soils and post-remediation monitoring.
Auditor's comments: The validation plan is generally adequate although details are lacking in regard to validation of the cap construction. Further details on verifying that the cap construction is in accordance with the RAP specifications should be provided as part of detailed design.	
Contingency plan if the selected remedial strategy fails	Section 6.6 of the RAP states that excess spoil generated from excavating zinc impacted soils, that are superfluous to the filling needs of the capped area, will be validated or waste classified and removed from site. Section 12 includes a contingency plan to address conditions such as identification of unexpected contamination (actions to address and further assessment if required), or if groundwater contamination does not self-attenuate (assess cap performance, seal pavement, continue monitoring).
Auditor's comments: Contamination at the site is considered relatively low risk, and a simple and robust remediation strategy has been proposed. The Auditor considers the proposed contingencies are likely to cover reasonably anticipated circumstances. The Auditor notes that an appropriate alternative to off-site disposal of excess zinc impacted soils may be to extend the area of capping, and this should be considered as an option (eg. as part of final design).	
Adopted remediation criteria	Remediation criteria for validation of excavations are presented in Section 7.1, being 1,200 mg/kg for lead and 810 mg/kg for zinc. Section 7.2 states validation of stockpiled materials is stated to be against trigger levels [EILs] in Table 3 of the RAP. The lead criterion is less than the commercial/industrial HIL D (1,500 mg/kg), which may be a typographic error. The zinc criterion is not explained, but corresponds with the 95% UCL zinc concentration stated in Section 5.2 of the RAP to result from removing the highest zinc

Reporting requirement	Summary / compliance with guidelines
	concentrations from the statistical calculations, corresponding to the nominated extent of remediation.
Auditor's comments: While the basis for selection of the nominated criteria for lead and zinc is not clear, the values are considered appropriate given there is no impact to groundwater by lead, and validation for zinc is commensurate with the reduction in zinc concentrations expected to be achieved by the proposed remediation. Assessment of stockpiles against EILs will confirm the material is suitable for use on site such as in landscape mounds.	
Interim site management plan (before remediation)	No interim site management measures are discussed in the RAP.
Auditor's comments: The Auditor understands Remondis does not yet own the site and is not currently in a position to apply further management. Lot 11 is predominantly covered by structures and pavement, and the surface of Lot 8 is stable and not subject to erosion. The site is located in a commercial/industrial area and is unlikely to be disturbed without authorisation. The Auditor considers contaminants at the site are relatively low risk and interim management is not required.	
Site management plan (operational phase)	Section 8 of the RAP describes requirements for site management during remediation, and states that the works will be conducted under a Construction Environmental Management Plan (CEMP) which will include consideration of site access, hours of operation, stormwater and soil management, trafficking of soil off-site, noise control, dust control and monitoring, odour control, work health and safety (WHS), remediation schedule and other issues. An outline of management measures for each of these issues is provided in the RAP.
Auditor's comments: The RAP provides sufficient outline of environmental management measures required during the remediation. As indicated in the RAP, a CEMP should be provided with further details of management measures.	
Contingency plans to respond to site incidents	The RAP does not mention a requirement for a contingency plan to respond to site incidents, although incident reporting is mentioned in the context of a health, safety, security and environmental (HSSE) plan.
Auditor's comments: The CEMP should also include an incident response plan.	
Identification of regulatory compliance requirements	Section 9 of the RAP discusses legislative and regulatory requirements, including the Environmental Planning and Assessment Act 1979 (EP&A Act), requirements under SEPP 55 – Remediation of land (under which the RAP considers the remediation is classified as Category 2 remedial works), the Protection of the Environment Operations Act 1977 (POEO Act) (including contaminated soil treatment and waste management considerations), the Contaminated Land Management Act 1997 (CLM Act) and the Waste Classification Guidelines (EPA 2014). In relation to the CLM Act, Section 9.3 of the RAP notes there is potential for a person to be exposed to contaminants at the site and the site owner therefore potentially has a duty to notify the EPA, and recommends legal advice be obtained regarding reporting under s.60 of the CLM Act. Section 4.7 of the RAP has a more detailed assessment of the Duty to Report, with key matters summarised by the Auditor as follows: • Remondis is not the current owner but intends to purchase the site. • Contaminants in soil (lead) exceed triggers for notification, however Remondis intends to remove the lead hot spot from the site and therefore it is not foreseeable than an employee will be exposed to the lead. • Groundwater is impacted by zinc and PFAS but it is expected that these concentrations will reduce with time. • An example is provided where a person would not be expected to seek advice [or notify the site], wherein the site contamination is appropriately contained and disturbance of the cap is subject to an EMP, subject to development consent or a site audit statement has been issued certifying the suitability of the site and no potentially contaminating activities have been carried out at the site since the statement was issued.
Auditor's comments: Identification of regulatory compliance requirements in the RAP are considered adequate. In relation to the Duty to Report, the Auditor considers JME is pre-empting circumstances (i.e. remediation and the audit outcome) that have not yet occurred, and therefore the Duty to Report is not necessarily negated at this time. However, Remondis is not yet the occupier or owner of the site, and therefore does not yet have a duty. The Auditor	

Reporting requirement	Summary / compliance with guidelines
understands this Interim Audit Advice (and the JME reports) will be provided to the EPA, and expects that EPA will advise their regulatory requirements by way of the planning and approval process.	
Contact details for appropriate personnel during remediation	Contact details are provided for JME.
Auditor's comments: Full contact details should be provided as part of the CEMP.	
Community relations plans	No details of community relations plans are provided in the RAP.
Auditor's comments: As the proposed development is a State Significant Development and has been the subject of an EIS, the Auditor assumes appropriate stakeholder engagement / community relations have been undertaken, and any further requirements will be prescribed as part of the approval process.	
Staged progress reporting, where appropriate	Staged progress reporting is not discussed in the RAP.
Auditor's comments: The Auditor does not consider staged progress reporting is required, except for review of pre-remediation monitoring and detailed design, as mentioned above.	
Long term site management plan	Section 10 of the RAP states that as the remediation goal does not aim to fully remediate the site, contamination remaining will be managed under a long term environmental management plan (LTEMP). The LTEMP will: • Satisfy the requirements for a capping and containment strategy outlined in the *NSW EPA Guidelines for the NSW Site Auditors Scheme* (3rd Edition); • Be produced following the validation report, when the final contamination status of the site is known; and • Manage the fill remaining beneath the surface of the site, and the potential exposure of future site workers and the ecology to heavy metal contamination within the fill. A list of information to be included in the LTEMP is provided. Section 7.5 of the RAP also ongoing groundwater monitoring following completion of remediation to demonstrate the effectiveness of remediation and attenuation of PFAS compounds in groundwater. The RAP states monitoring should be undertaken on the monthly basis for the first twelve months after the completion of the remediation at which time the scheduling of the groundwater monitoring events can be reviewed.
Auditor's comments: The long term management requirements outlined the RAP are considered appropriate. The LTEMP will need to be reviewed by a site auditor to comply with EPA requirements, and will need to reasonably be made legally enforceable. The Auditor recommends that the requirement for preparation and implementation of the LTEMP be made a condition of consent, so that it will be legally enforceable under the EP&A Act. The groundwater monitoring commitments provided in the LTEMP should include a decision process for when monitoring can be reduced or cease. The Auditor recommends the proposed post-remediation groundwater monitoring program be reviewed at the time of final design, as monthly post remediation monitoring may not be warranted (depending on the pre-remediation monitoring results).	

Table 4 Compliance of RAP with Remediation Policy

Policy / Issue	RAP compliance
Remediation hierarchy	The NEPM remediation hierarchy is discussed in Section 5.3 of the RAP, and consideration of options has been undertaken in accordance with the preferred order of remediation options.
On-site containment and capping	The recommended remediation strategy is primarily on-site containment and capping, as outlined in Sections 6.6 to 6.8 of the RAP. This is considered appropriate, as more preferred approaches from the remediation hierarchy are not feasible. The Auditor considers the requirements of Section 4.3.3 of the *Guidelines for the NSW Site Auditor Scheme* (EPA 2017) will be met by the proposed capping, subject to provision and review of satisfactory final design documentation for the capping.
Contamination at depth	Investigations have not identified any contamination at depth.
Vertical mixing	Vertical mixing is not proposed.
Bioremediation	Bioremediation is not proposed.
Waste management	Waste management requirements, including off-site disposal and importation of material, are discussed in the RAP.
Chemical control orders / asbestos waste	No chemical control orders are applicable to contamination identified at the site, and no significant asbestos materials have been found.
Groundwater remediation and management	Groundwater remediation and management is one of the main factors in the proposed remediation, as discussed in the Groundwater report and the RAP. The Auditor has considered the EPA (2017) requirements in this regard as follows: • Source removal – zinc in fill soils is proposed to be capped to minimise leaching; no on site source of PFAS has been identified. • Impacts of groundwater contamination – the nature and extent of contamination has been identified, and it is apparent that migration off-site is occurring. This IAA is considered to constitute advice in writing to Remondis of the duty of site owners and polluters to notify the EPA under the CLM Act, noting that Remondis is not the polluter nor currently the owner or occupier of the site. • While direct remediation of groundwater is not proposed, remediation is proposed to mitigate impacts to groundwater. Further groundwater monitoring is proposed to better understand risks (particularly to off-site receptors) and remediation requirements / effectiveness. • Groundwater contamination does not pose any unacceptable risk to users of the site. The Auditor considers the proposed remediation will make the site suitable for the proposed use. This IAA constitutes written advice to Remondis that groundwater contamination is present. The Auditor understands this IAA will be provided to the EPA, and expects any regulatory requirements will be advised by the EPA. The Auditor intends to discuss the groundwater impact with the EPA following completion of the pre-remediation monitoring, if impact exceeding relevant assessment criteria is still present.
Hazardous ground gas	Investigations carried out at the site do not indicate any significant potential for hazardous ground gas.

Attachment B: Limitations to Interim Audit Advice

This Interim Audit Advice (IAA) has been prepared as part of a site audit undertaken in accordance with relevant provisions of Part 4 of the Contaminated Land Management (CLM) Act 1997.

This IAA:

1. has been prepared by Ian Gregson and members of his support team as indicated in the appropriate sections of this IAA ("GHD") for Remondis Australia Pty Ltd (Remondis);
2. may be used and relied on by Remondis;
3. may be used by and provided to the EPA and the relevant planning authority for the purpose of meeting statutory obligations in accordance with the relevant sections of the CLM Act 1997 or the Environment Planning and Assessment (EP&A) Act 1979;
4. may be provided to other third parties but such third parties' use of or reliance on the IAA is at their sole risk, as this IAA must not be relied on by any person other than those listed in 1-3 above without the prior written consent of GHD; and
5. may only be used for the purpose as stated in Section 1 of the IAA (and must not be used for any other purpose).

GHD and its servants, employees and officers (including the Auditor) otherwise expressly disclaim responsibility to any person other than Remondis arising from or in connection with this IAA.

Whereas these current opinions and recommendations have been provided as interim guidance to assist in the assessment and management of contamination issues at the site, this guidance should not be regarded as "approval" of any proposed investigations or remedial activities, as such approval is beyond the scope of an independent review. The NSW EPA Guidelines for the NSW Site Auditor Scheme (2017) contains a description of the site assessment and audit process, which includes the following:

– A site audit is the second in two tiers of work in the site assessment and remediation process.
– The **'first tier' is the work of a contaminated site consultant**, generally engaged by the site owner or developer. The contaminated site consultant designs and conducts a site assessment and any necessary remediation and validation, and documents the processes and information in reports; and
– The **'second tier' is the site audit** which involves a site auditor independently and at arm's length reviewing, for one of the audit purposes stated in the CLM Act, the consultant's assessment, remediation and validation plans or reports. The material outcomes of a site audit are a site audit report and site audit statement.

The purpose of the auditor's review is to assess whether the works undertaken (or proposed to be undertaken) comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate for the proposed land use. In the first instance, the contaminated land consultant should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines; and is appropriate, based on the site's historical land use, physical characteristics and proposed land use.

This interim review and advice do not constitute an audit under the provisions of the Contaminated Land Management (CLM) Act 1997, and do not pre-empt the conclusions which will be drawn at the end of the audit process. A site audit report and site audit statement will be issued when the audit process has been completed.

It is the nature of contaminated site investigations that the degree of variability in site conditions cannot be completely known and no sampling and analysis program can eliminate all uncertainty concerning the condition of the site. Professional judgement must be exercised in the collection and interpretation of the data. In the conduct of this review, in particular, reliance has been placed on data provided in the various site investigation and assessment reports. The Auditor is unable to provide certification outside of areas over which he had some control or is reasonably able to check, and does not accept responsibility for inaccuracies in information provided for review as part of this Audit.

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

The services undertaken by the Auditor, his team and GHD in connection with preparing this IAA were undertaken in accordance with current profession practice and by reference to relevant guidelines made or approved by the EPA under Section 105 of the CLM Act 1997.

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

GHD and the Auditor expressly disclaim responsibility for any error in, or omission from, this IAA arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the IAA, the opinions, conclusions and any recommendations in this IAA are based on conditions encountered and information reviewed at the time of preparation of this IAA and are relevant until such times as the site conditions or relevant legislations changes, at which time, GHD expressly disclaims responsibility for any error in, or omission from, this IAA arising from or in connection with those opinions, conclusions and any recommendations.

The Auditor and GHD have prepared this IAA on the basis of information provided by the client, their consultants and others who provided information to GHD (including Government authorities), which the Auditor and GHD have not independently verified or checked ("Unverified Information") beyond the agreed scope of work. The Auditor and GHD expressly disclaim responsibility in connection with the Unverified Information, including (but not limited to) errors in, or omissions from, the IAA, which were caused or contributed to by errors in, or omissions from, the Unverified Information.

The opinions, conclusions and any recommendations in this IAA are based on information obtained from, and testing undertaken at or in connection with, specific sampling points and may not fully represent the conditions that may be encountered across the site at other than these locations. Site conditions at other parts of the site may be different from the site conditions found at the specific sampling points.

Although reasonable care has been used to assess the extent to which the data collected from site is representative of the overall site condition and its beneficial uses, investigations undertaken in respect of this IAA are constrained by the particular site conditions as discussed in this IAA. As a result, not all relevant site features and conditions may have been identified in this IAA.

Site conditions (including any the presence of hazardous substances and/or site contamination) may change after the date of this IAA. The Auditor and GHD expressly disclaim responsibility:

— Arising from, or in connection with, any change to the site conditions;

— To update this IAA if the site conditions change.

These Disclaimers should be read in conjunction with the entire IAA and no excerpts are taken to be representative of the findings of this IAA. This IAA should not be altered, amended or abbreviated, issued in part or issued incomplete in any way without prior checking and approval by GHD.