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HARWOOD ENVIRONMENTAL CONSULTANTS

SITE AUDIT REPORT FOR SAS 384

SITE AUDIT REPORT FOR SAS 384: 285 FINNS ROAD, MENANGLE NSW, 2568: PROPOSED DEPOT WITH ASSOCIATED BUILDINGS

Prepared for Muscat Developments Pty Ltd | 6 September 2021

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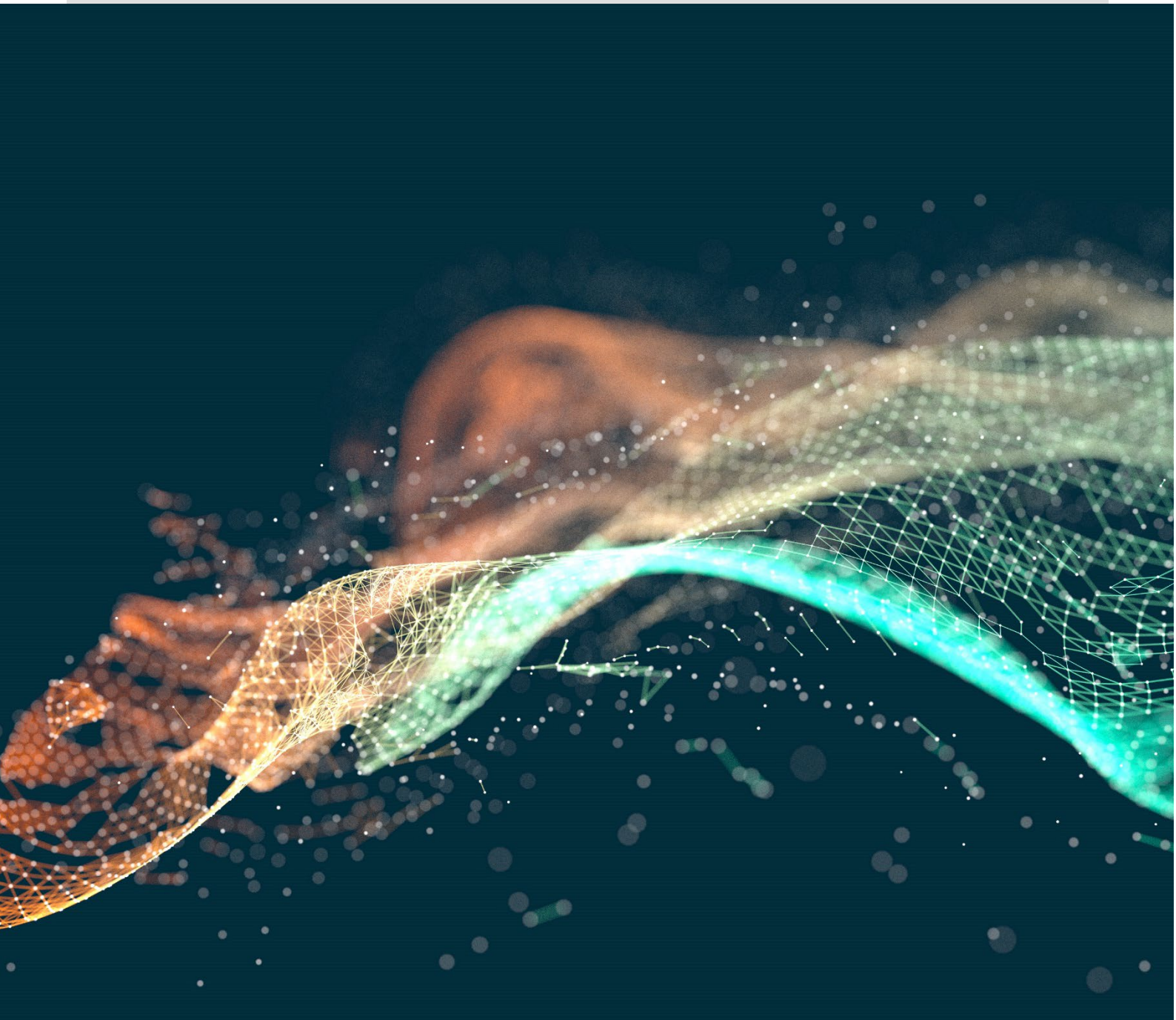

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Disclaimer

This Site Audit relates only to those matters relevant to the Contaminated Land Management Act 1997, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3.". The SAS and SAR do not seek to provide an opinion regarding other aspects of the environment not related to site contamination, to the suitability of the site in regard to the occupational health and safety legislation, or to the suitability of the engineering design.

By definition, Auditing involves the review and critique of Consultants' and Contractors' work, including site histories, site surveys, subsurface investigations, chemical and physical analyses, risk assessments and modelling. Accordingly, the Auditor relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While the Auditor has used reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, the Auditor is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

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

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

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NSW EPA Reporting Requirement	Section in this Report
a) site location details, including maps giving details of potential receptors	3
b) site history including past, current and proposed zoning and approved use, describing all potentially contaminating activities on the site and adjoining land	5
c) a clear outline of the actual or potential contamination of the land	6
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EXECUTIVE SUMMARY

Background

Muscat Developments Pty Ltd engaged Rod Harwood, a New South Wales (NSW) Environmental Protection Authority (EPA) Accredited Contaminated Land Site Auditor (Accreditation Number 03-04), to provide Audit Services for the site located at 285 Finns Road, Menangle NSW, 2568 (Figure 1, Appendix A). The larger Site is known as Lot 1 in DP 718840. This Audit for part lot 1 in DP 718840 excludes the areas of the site currently used for residential purposes (north-eastern portion of the larger site) and on which no development is proposed under the application. A survey completed by Chadwick Cheng Consulting Surveyors (2020) is included in Figure 22 of Appendix A.

The area is annotated on Figures as Appendices to this report and on the SAS which will be completed after the completion of this report. The Investigation Area (IA) is defined in the background documents listed in section 2.8 prepared by Martens & Associates Pty Ltd (Martens).

Review of historical aerial imagery indicated the land predominantly was cleared land/grassed paddock prior to 1969 and the current site conditions were constructed between 1975 and 2002. Available Wollondilly Shire Council (WSC) records included development and/or building records for the site dated between 1987 and 2020. Approved applications including poultry farming and several minor alterations related to the residential part of the larger site.

Between 2010 and 2017, trenches are understood to have been filled during the site's operation as a poultry farm. Martens indicate that the burial trenches cover an approximate 1000m^2 of the site. Between 2017 and 2018, approximately 3480-4380 tonnes of Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM) were imported onto the site and placed into the two dams in the south-western portion of the site.

It is understood that the proposed depot redevelopment (development application 2019/688/1) , includes construction of an office building and two sheds; cut and fill in various locations; filling of two dams; and construction of hardstand and other site infrastructure. It is understood that the proposed development is currently the subject of a Class 1 appeal in NSW's Land and Environment Court (LEC) proceedings number 2020/00178157.

A Preliminary Site Investigation (PSI) was completed by Martens (2020) to support the development application. At the time the PSI was completed, minor filling works had commenced in the vicinity of the two dams to be filled under the application. This imported fill material was deemed VENM and ENM by supporting waste classification documentation and review by Martens. In addition, a 400-tonne stockpile of "recovered aggregate" asphalt had also been imported to the site under the NSW EPA waste exemption "Recovered Aggregate Order, 2014". It is understood that on October 19, 2020, Martens prepared correspondence to address several of Council's concerns on the proposed development which includes concerns regarding site contamination. Based on the findings of the PSI, Martens proposed the following items be included as conditions of consent for the development:

> *Prior to issue of a Construction Certificate, an Asbestos Management Plan ("AMP") shall be prepared to:*
>
> *1. Identify and manage asbestos in structures and any fragments resulting from building deterioration or stockpiling of asbestos containing building materials.*
>
> *2. Prepare and maintain an asbestos register of all asbestos containing materials to be retained on the site (i.e. building products etc in existing structures).*
>
> *3. Undertake asbestos removal works of all asbestos not associated with structures. Removal works shall include any stockpiled asbestos building products, picking of PACM fragments surrounding sheds and removal of any identified asbestos impacted soil/fill material on the site. The AMP is to include all*

> *asbestos related controls required for asbestos removal works. Prior to issue of a Construction Certificate, an Unexpected Finds Protocol ("UFP") shall be prepared for the proposed site earthworks. UFP shall provide guidance for the management of any encountered PACM in soil material, oil stains or other signs of contamination should they be exposed during the proposed site earthworks.*

In addition to the above conditions, Martens recommended that the following condition be imposed in relation to the importation of any fill material required for the development:

> *Fill material to be brought onto site for the development to be only fill characterised as VENM, ENM or otherwise waste exempt material under the NSW Waste Regulation (2014). Copies of certifications or validation reports for all fill used shall be retained and presented to Council on request".*

Following submission of both the PSI and letter, it is understood that Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020) acting on behalf of Council. The response stated that:

> *Further to our letter dated 30 October 2020 and the s.34 conference for this matter, we have now obtained advice from the Council's contaminated lands officer.*
>
> *We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.*

Martens note that the above is confirmation that, as of November 5, 2020, the consent authority (Council) was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

Subsequent to Council issuing their advice, further fill material was imported to the site. Due to this further imported material, on 3 March 2021 Council advised that their contamination concerns were no longer satisfied. This advice was taken as a requirement under clause 7(3) to carry out and report on a Detailed Site Investigation (DSI) of this newly imported fill. It is understood that an estimated 35,000m^3 of fill material was imported to the site following completion of the PSI.

This Site Audit Report (SAR) has been developed to document the information reviewed as part of a site audit of contamination assessment and remediation, and to form the basis and rationale for the conclusions contained in the associated Site Audit Statement (SAS) No.384.

The purpose of this Audit is to inform the assessment and management of land contamination associated with the proposed use of the site for the purposes of a depot. It is understood Muscat Developments Pty Ltd requested that a NSW EPA Accredited Auditor be engaged to a prepare a Site Audit Statement (SAS) following validation of the site. Since this audit has not been commissioned to satisfy a consent condition currently and has not been written to satisfy a planning instrument , or NSW EPA, it is therefore a non-statutory Audit under the Contaminated Land Management Act,1997.

Environmental Investigations and Proposed Remediation

Four stages of environmental investigations have occurred at the site during 2021. The investigations concluded that the site was contaminated by both asbestos containing material (ACM) within recently imported fill material and hazardous ground gases (GG) as a result of the historical burial of waste in trenches most likely associated with past poultry farm uses.

The presence of asbestos in fill material was detected at the surface and at depth, with bonded and asbestos fines/friable asbestos (AF/FA) detected in the recently filled area within the southern, central and western portion of the site. It is noted that AF/FA exceeded the adopted criteria at one location on the site. Other site assessment contaminant (SAC) concentrations at the site were generally below the adopted criteria, with the exception of ecological exceedances identified within the filled area and in a surface sample close to one of the large existing site sheds. Ground gas has been detected at the site and is

primarily centred around the vicinity of the burial trenches in the southern portion of the site. Ground gas included elevated concentrations of methane and carbon dioxide detected in gas monitoring wells.

Groundwater investigations indicated detections of and/or exceedances of heavy metals, dissolved methane and carbon dioxide, nutrients, total coliforms, E.coli, TRH, benzene, toluene, formaldehyde and/or PFAS at the site. It is however noted that TRH, benzene, toluene and formaldehyde have been detected primarily in the perched groundwater system in the burial trench area and remain below human health and ecological screening levels. Elevated heavy metals, free carbon dioxide, nutrients and total coliforms have been detected in downgradient wells.

Due to the presence of ACM and ground gas, site remediation is therefore required to make the site suitable for the intended land use.

The preferred soil remediation option is to cap the contaminated material onsite. It is noted in parts of the site, some ACM impacted fill has been placed outside the proposed filling described in the development and at levels in excess of those required to achieve a cap and proposed design levels. The reworking of an estimated 19,000m^3 of fill material is required to achieve final cut and fill elevations. The adopted capping option will vary depending on the proposed development conditions across the site which include concrete slabs (structural); concrete hardstand or flexible 'pavement'; and landscaped areas. The preferred remedial option for the ground gas arising from waste burial trenches is onsite management. Ground gas management measures involve installation of ground gas cut off trenches along the southern hardstand boundary, a ground gas collection system constructed within the retaining wall backfill along the southern side of Road 2 to the south of existing Shed 4; and a ground gas barrier/venting system along the stormwater drainage lines running south and east from Shed B. Any excess buried waste beyond the hardstand is proposed to be classified and disposed offsite. Based on calculated characteristic gas situations, a mitigation measure has also been proposed for the construction of Shed B. This mitigation measure includes construction of a passive under slab ground gas collection and venting system and a reinforced concrete ground bearing floor slab to provide 2 points of protection.

Data gap investigations to further characterise the known site conditions are proposed and include: (1) near surface soil sampling for PFAS in the former poultry sheds to determine if the source of PFAS detections below the 95% protection criteria are attributed to a soil source; (2) an SAQP for further ground gas monitoring and pilot trials to determine a detailed collection system design; and (3) installation of an additional groundwater monitoring well on the downgradient site boundary, completion of an additional sampling round and slug tests to determine permeability variations.

The site, including the asbestos capped area and mapped burial trenches/ground gas mitigation infrastructure will be managed under an Environmental Management Plan (EMP) which is to be a legally enforceable document retained by the current or future site owners and is to be appended to the site's Section 10.7 planning certificate as a note on title.

Audit Conclusions

It is noted that the development footprint includes land within the proposed depot investigation area. Therefore, only the data collected from these development areas are applicable to this SAR and subsequent remediation.

Bonded asbestos was detected across the investigation area, with one detection of AF/FA above criteria. It is recommended that the entire area to be disturbed should be treated as a friable area during earthworks.

Elevated concentrations of B(a)P and zinc exceeding ecological criteria in soil are not expected to be of concern as the proposed development will include the construction of hardstand in areas of B(a)P exceedances, thereby stopping the ongoing pathway for receptors. The zinc hotspot detected in the surface sample is in an area of proposed exposed soil. Martens consider that this attributed to the likely

degradation of galvanised metal used for the shed construction. Ecological receptors in the area are expected to be minimal in consideration of the proposed development, and the risk is considered low by the Auditor. However, the Auditor recommends that the hotspot be delineated and removed, or testing should be completed to assess the mobility and bioavailability of the contaminant to ecological receptors.

The Auditor recommended that additional ground gas monitoring rounds, pilot trials, potential leachate control trials and dewatering measures be considered for the proposed ground gas collection and venting systems. This should occur prior to remediation to ensure that the proposed protection measures will be sufficient for the “worst case” scenario. In addition, to ensure that unacceptable concentrations of heavy metals, nutrients, free carbon dioxide and total coliforms are not migrating offsite in groundwater, the Auditor advised that an additional groundwater monitoring well be installed on the downgradient site boundary and slug tests be performed to determine permeability rates at the site. The Auditor expects that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site which is generally low in permeability. In addition, groundwater is unlikely to pose a risk to receptors as the proposed development drinking water is to be supplied by rainwater tanks. Use of bore water will be limited to landscape irrigation purposes; and the onsite irrigation bore is installed in the deep sandstone water bearing zone, which is not representative of the shallow groundwater system screened during investigative works.

Based on the discussion presented above, the Auditor is satisfied that the site has been demonstrated through assessment that the vertical and lateral extent of contamination has been well defined and concludes the site may be made suitable for the proposed depot commercial/industrial land use if the Remedial Action Plan (Martens, 3 September 2021, Ref: P1806774JR14V04) is followed, in addition to the Auditor’s recommendations in Section 12.3.

Accordingly, it is the Auditor’s conclusion that the site may be made suitable for the proposed use (depot) if the Remedial Action Plan is followed and the Auditor’s conditions in Section 12.3 are considered.

1. INTRODUCTION

1.1. Background to this Site Audit Report

Muscat Developments Pty Ltd engaged Rod Harwood, a New South Wales (NSW) Environmental Protection Authority (EPA) Accredited Contaminated Land Site Auditor (Accreditation Number 03-04), to provide Audit Services for the site located at 285 Finns Road, Menangle NSW, 2568 (Figure 1, Appendix A). The larger Site is known as Lot 1 in DP 718840, and is annotated on Figures as Appendices to this report and also on the SAS. This Audit for part lot 1 in DP 718840 excludes the areas of the site currently used for residential purposes (north-eastern portion of the site) and on which no development is proposed under the application. A survey completed by Chadwick Cheng Consulting Surveyors (2020) is included in Figure 22 of Appendix A. The Investigation Area (IA) is defined in the background documents listed in section 2.8 prepared by Martens & Associates Pty Ltd (Martens).

Consistent with Section 3.2.5 of the NSW EPA (2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 3rd Edition*, formal Site Audit Notification was not required to be submitted to the NSW EPA .

Review of historical aerial imagery indicated the land predominantly was cleared land/grassed paddock prior to 1969 and the current site conditions were constructed between 1975 and 2002. Available Wollondilly Shire Council (WSC) records include development and/or building records for the site between 1987 and 2020. Approved applications including poultry farming and minor alterations associated with the adjacent residential dwelling (i.e., continued use of a swimming pool, and deck; drainage works and extension of the driveway; and surface spray irrigation.

Between 2010 and 2017 burial trenches are understood to have been filled during the site's operation as a poultry farm. Martens indicate that the burial trenches cover an approximate 1000m^2 of the site. Between 2017 and 2018, approximately 3480-4380 tonnes of VENM and ENM were imported into the site and placed into the two dams in the south-western portion of the site.

It is understood that the subject areas of the site are proposed to be depot redevelopment (development application 2019/688/1) for a depot, including construction of an office building and two sheds; cut and fill in various locations; filling of two dams; and construction of hardstand and other site infrastructure. under development application 2019/688/1. It is understood that the proposed development is currently the subject of a Class 1 appeal in NSW's Land and Environment Court (LEC) proceedings number 2020/00178157.

A PSI was completed by Martens (2020) to support the development application. At the time the PSI was completed, minor filling works had commenced in the vicinity of the two dams to be filled under the application. This imported fill material was deemed VENM and ENM by supporting waste classification documentation and review by Martens. In addition, a 400-tonne stockpile of "recovered aggregate" asphalt had been imported to the site under the waste exemption "Recovered Aggregate Order, 2014". The PSI concluded that the proposed site development works should be subject to an Asbestos Management Plan (AMP) and Unexpected Finds Protocol (UFP) and identified land contamination risks that would be appropriately mitigated and managed during the construction and operation phase of the development. It is understood that on October 19, 2020, Martens prepared correspondence to address several of Council's concerns regarding the proposed development which includes site contamination. Following submission of both the PSI and letter, it is understood that Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020) acting on behalf of Council stating that: *We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.*

Martens note that the above is confirmation that, as of November 5, 2020, the consent authority (Council) was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

Subsequent to Council issuing their advice, further fill material was imported to the site. Due to this newly imported material, Council advised that their contamination concerns were no longer satisfied. This advice was taken as a requirement under clause 7(3) to carry out and report on a Detailed Site Investigation (DSI) of this newly imported fill. It is understood that an estimated 35,000m^3 of fill material was imported to the site following completion of the PSI in August 2020.

The purpose of this Audit is to inform the assessment and management (including a plan to remediate) of land contamination associated with the proposed development and use of the site for the purposes of a depot. It is understood that the proposed development is currently the subject of a Class 1 appeal in NSW's Land and Environment Court (LEC) proceedings number 2020/00178157.

This audit is to provide a third-party review of assessment and remediation, and is not in support of consent, or to satisfy a planning instrument, or NSWEPA. It is therefore, a non-statutory audit. The Contaminated Land Accredited Site Auditor (accredited by the NSW Environment Protection Authority (EPA)) and the scope of the Audit are contained in Section 2. The SAS and SAR relate to the property identified in Section 3.

1.2. Overview of the Site Audit Process

The Site Audit has been conducted in accordance with the requirements of the Contaminated Land Management (CLM) Act 1997. The CLM Act (Part 1, Section 4) describes a site audit as an independent review:

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

NSW EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd edition), describes the site assessment and audit process as:

1. Consultant is commissioned to assess contamination

In most cases, a site owner or developer engages a contaminated site consultant to assess a site for contamination and, where required, to develop a remediation plan, implement the plan and validate the remediation.

The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer. The site Auditor independently reviews the works undertaken to ensure that they comply with current regulations, standards and guidelines, and that the site has been assessed, remediated and validated to a standard appropriate to the proposed land use.

2. Site auditor reviews the consultant's work

The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Where the planning consent authority or the EPA uses its legal powers to require the carrying out of a site audit, the site owner or developer must commission a site auditor accredited under the CLM Act to perform this task. This is known as a 'statutory' audit. The CLM Act requires that an auditor must notify the EPA when they have been commissioned by anyone other than the EPA to perform a statutory site audit. The auditor is also required to furnish the local authority and the EPA with a copy of the completed site audit statement and must give a copy of the site audit report to the local authority, the consent authority if different to the local authority and/or the EPA on request.

Section 53B(6) of the CLM Act describes that site audits conducted by EPA accredited site Auditors must take the following matters into account:

- the provisions of the CLM Act and the CLM Regulations;
- the guidelines made or approved by the EPA; and
- the provisions of any environmental planning instruments applying to the site.

Guidelines made and approved by NSW Environment Protection Authority (EPA) are listed in Section 17 of this document.

2. AUDIT DETAILS

2.1. Site Auditor

The NSW EPA Contaminated Land Accredited Site Auditor who conducted this site audit was Mr Rod Harwood (NSW EPA Accreditation Number 03-04).

Consistent with Section 3.2.5 of the NSW EPA (2017) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 3rd Edition*, formal Site Audit Notification was not required to be submitted to the NSW EPA.

2.2. Site Audit Statement

This SAR relates to Site Audit Statement (SAS) Number 384.

2.3. Input to this Report by Auditor's Support Team

The Auditor did not rely on members of his support team during this Audit but did utilise Renee Ashton and William Lines from Harwood Environmental Consultants (HEC) as peer reviewers in the preparation of this report.

2.4. Type of Audit

A statutory site audit is one that is required by:

- a regulatory instrument issued under the Contaminated Land Management Act 1997 (CLM Act), including EPA agreements issued by EPA to voluntary proposals
- the Environmental Planning and Assessment Act 1979, including an environmental planning instrument or development consent condition
- any other Act.

Muscat Developments Pty Ltd have requested that a NSW EPA Accredited Auditor be engaged to provide oversight of the contamination on the site. The audit is therefore a non-statutory Audit under the Contaminated Land Management Act,1997.

This Site Audit Report has been written in accordance with NSW EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd edition).

2.5. Proposed Development

This Audit is focused on characterising the investigation area and assessing the level of acceptability of material imported to the site to meet the land use criteria in the investigation area. In addition, this Audit is limited to the area under the development application (DA) and does not include the residential portion of the site in the north-east. It is understood that the subject areas of the site are proposed to be redeveloped for a depot, including construction of an office building and two sheds; cut and fill in various locations; filling of two dams; and construction of hardstand and other site infrastructure under DA 2019/688/1. It is understood that the proposed development is currently the subject of a Class 1 appeal in NSW's Land and Environment Court (LEC) proceedings number 2020/00178157.

- The proposed development plans involve the relocation of significant volumes of fill material present on site. Comparison of the Chadwick Cheng survey dated 17 May 2021 (4009/D1-MGA94-3d) with the 'existing contours' show design earthworks plans (MA PS03-C100) demonstrate the change in levels resulting from the recent site filling. Comparison of design levels of these plans to the survey show that significant amounts of recently placed fill is to be relocated to achieve the design site levels. In general, this recontouring earthworks shall require excavation from the south-east and southern areas of the site and placement of fill in the two dams at the site's south western corner.

The Auditor notes that a request was made to Martens in Interim Advice 03 (rev1) to estimate the volume of fill material present on site and the volume of fill to be moved. Martens indicated that an estimated 35,000m^3 of fill material had been imported to the site and an approximate 19,000m^3 of material is expected to require reworking during recontouring earthworks.

- Should excess material result from the site earthworks, that material will be classified and disposed offsite to a site or facility that is licensed to receive that material.

  The Auditor requested in IA03 (rev1) that Martens provide an indication on if it is likely that material will require classification and offsite disposal. Martens have estimated approximately 9500m^3 of fill material will require offsite disposal.
- Earthworks proposed involve the excavation of imported fill from all areas of the site where existing filled levels are higher than 500mm below the design levels. This is required to permit the construction of hardstand and landscaping layers over any imported fill.
- Earthworks Cut & Fill Plan (MA PS03-C500) shows the earthworks required for the development against the prefilling surface. Imported fill alters this analysis, however, this plan is still relevant for areas outside of recent filling.
- Proposed Sheds A and B are to be constructed on an areas which have been, or are to be filled using the recently imported fill material. The 'office building' is proposed to be constructed on piers.
- Much of the site is to be sealed with hardstand either as open air pavement (access driveways, circulation areas and parking, or by new shed foundation slabs). The remainder of the areas to be filled with recently imported material shall comprise batters required to form the hardstand and shed areas.

2.6. Potential for Conflict of Interest

Under the provisions for the Site Auditor Scheme laid out in the Contaminated Land Management Act 1997, section 54 deals with the potential for conflict of interest in conducting contaminated Site Audits. Section 54 of the Contaminated Land Management Act 1997 states:

1. A site auditor must not carry out a site audit of land:
   i. if he or she is or is related to a person by whom any part of the land is owned or occupied, or
   ii. if he or she has a pecuniary interest in any part of the land or any activity carried out on any part of the land, or
   iii. if it involves the site auditor reviewing any aspect of work carried out by, or a report written by, the site auditor or a person to whom the site auditor is related.
2. A site auditor has a pecuniary interest for the purposes of this section if there is a reasonable likelihood or expectation of appreciable financial gain or loss to the site auditor, or to a person to whom he or she is related, from the relevant part or activity, but does not have such an interest if the interest is so remote or insignificant that it could not reasonably be regarded as likely to influence any decision that the site auditor might make in relation to a site audit of the land.
   i. A site auditor is related to a person for the purposes of this section if the site auditor:
   ii. is an employer, partner or employee of the person, or
   iii. is a spouse, de facto partner, sibling, parent or child of the person, or
   iv. has a contractual arrangement with the person that might reasonably be seen to give rise to a conflict between the site auditor's duties as a site auditor and the site auditor's interests under the arrangement, or
   v. is employed by the same employer as the person.

The Auditor confirms that none of the above conditions apply with regard to this Audit as the Auditor and the HEC team:

- Within the meaning given in S 54(3) of the Contaminated Land Management Act 1997 is not related to the site owners or occupiers;
- Does not have a pecuniary interest in the land or any activity carried out on the land; and
- Has not ever been employed by any of the companies involved in the contaminated site assessment and remediation.

2.7. Objectives of Audit

The objective of the audit is to provide a Site Audit Statement and Site Audit Report for the site certifying that there are no risks posed to human health or the environment for the proposed development and that the site may be made suitable if the Remedial Action Plan is followed.

2.8. Documents Reviewed

The Auditor has been provided with the following documents detailing the environmental investigations conducted at the site:

- Alliance Geotechnical Material Classification Report, Cnr Muscovy Drive and Warbler Street, The Ponds NSW, 2769. Ref: 6196/ER-1-1, dated 31 October 2017.
- Alliance Geotechnical Waste Classification Report Darlinghurst Road Precinct, Darlinghurst NSW. Ref: 2189-ER-1-7-Rev B, dated 13 June 2018.
- Geotest Services Re: VENM & Salinity Assessment of In-situ Residential Soil Material at the Garde Pty Ltd Civil Construction site, Tarro Avenue, Revesby, NSW 2212. Ref: P32021.2_L02, dated 22 November 2018.
- Dirt Doctors Geotechnical Testing Services Re: Material Classification, 285 Finns Road, Menangle NSW. Ref: DDE-178C ENV01, dated 11 June 2019.
- Martens & Associates Preliminary Site Investigation, Proposed Depot and Transport Depot with Associated Buildings, 285 Finns Road, Menangle NSW. Ref: P1806774JR07V01, dated 11 August, 2020.
- Martens & Associates Detailed Site Investigation: Proposed Depots and Transport Depot, 285 Finns Road, Menangle NSW. Ref: P1806774JR13V01, dated 25 March 2021 (a).
- Martens & Associates Supplementary Detailed Site Investigation: Proposed Depots and Transport Depot, 285 Finns Road, Menangle NSW. Ref: P1806774JR16V01, dated 24 May, 2021 (b).
- Martens & Associates Sampling and Analysis Quality Plan: Supplementary Investigations at 285 Finns Road, Menangle NSW (Draft). Ref: P1806774JR17V01, dated 27 July 2021 (c).
- Martens & Associates Further Detailed Site Investigation: Proposed Depots, 285 Finns Road Menangle NSW. Ref: P1806774JR18V01, dated 3 September 2021 (d).
- Martens & Associates Remedial Action Plan: Proposed Depots, 285 Finns Road Menangle NSW. Ref: P1806774JR14V04, dated 3 September 2021 (e).
- Martens & Associates Re: Preliminary Volume Assessment: 285 Finns Road, Menangle, NSW. Ref: P1806774JC39V01, dated 2 September 2021 (f).

2.9. Audit Meetings and Site Inspection

Audit meetings and site inspections are summarised Table 1 below.

Table 1 Audit Meetings and Site Inspection

Date	Reason	Observations
1 September 2021	Site inspection	The site inspection revealed that all monitoring wells for ground gas and groundwater were completed as site monuments. Imported fill was evident above former ground surface and primarily above and close to the southern chicken shed. The former land surface may have fallen to the north and west in the direction of monitoring well MW01.

2.10. Audit Correspondence

The Site Auditor provided feedback during the course of the audit on reports provided for review, documented as verbal communication. Letters of Interim Advice and checklists of reports against the requirements of the Guidelines for Consultants Reporting on Contaminated Land, NSW EPA (2020) are provided in Appendix B. In addition to Interim Advice Letters, the Auditor had numerous meetings with Martens to resolve outstanding issues and provide advice.

3. SITE IDENTIFICATION & SURROUNDS

This section provides details of the site and its land use, it describes the surrounding land uses and summarises the potentially sensitive human health and environmental receptors. This information has been sourced primarily from the consultants' reports, the Auditor's observations of the site and, where required, from referenced published literature.

3.1. Site Identification and Land use

The site location is shown in Figure 1, Appendix A. The layout of the site is shown on Figure 2 Appendix A.

The site identification and land use details are included in Table 2 below.

Table 2 Site Identification

Item	Detail
Street Address	285 Finns Road, Menangle NSW, 2568.
Lot and DP	Part Lot 1 in DP718840 (Chadwick Cheng Consulting Engineers Survey, 2020). The investigation area excludes the residential dwelling and associated 'residential use' areas of the site, therefore the subject of this Audit refers only to the investigation area.
Area	Entire Site: 4.385 ha (Chadwick Cheng Consulting Engineers survey, 2021). Investigation Area: 4.032 ha (QGIS)
Co-ordinates Centre of the Site (GDA2020-MGA56)	Northing: 6221151.913 Easting: 288026.706 (Source: http://maps.six.nsw.gov.au).
Local Government	Wollondilly Shire Council.
Site Location	Figure 1.
Surrounding Land Use	The site is bordered by Finns Road to the northeast and rural properties to the north, south and west.
Nearby Sensitive Receptors	• Rural and/or rural residential properties immediately north, south and west. • Navigation Creek approximately 700m northeast.
Current Land Use	The site is currently approved for use as a poultry farm. There are four large sheds with associated access roads and other infrastructure. A residential dwelling is located in the north-eastern corner of the larger site. This area is not included in the scope of the Audit. Three farm dams are located along the western site boundary, within the investigation area.
Current Zoning	RU2 – Rural Landscape (NSW Planning Portal) The site is currently approved for use as a poultry farm. The 'residential area' of the site has a single dwelling and associated residential land uses (open space). The Audit excludes the residential dwelling and surrounds.
Proposed Land Use	The proposed development in the investigation area includes construction of an office building, two new sheds, and filling of two dams for use of the investigation area as a depot.

3.2. Audit Discussion

The Auditor is satisfied that the site identification details provided are an accurate representation of the area and are generally consistent with the Auditor's observations and knowledge of the area.

It is noted that SIXMaps indicates that part of the site falls within Lot 2 in DP718840, however, the Auditor has confirmed with Martens that the cadastral boundary in SIXMaps is incorrect. A survey completed by Chadwick Cheng Consulting Engineers (October 2020) for the DA indicates the boundary of the site (see Figure 22 in Appendix A) and confirms the investigation area is known as part Lot 1 in DP718840.

4. ENVIRONMENTAL SETTING

4.1. Topography and Hydrology

Martens (2021d) provide the following description of the surface hydrology:

Gently sloping lands with slopes of approximately 5% and a northerly aspect. Elevation ranges from approximately 117.9 mAHD in the site's southern corner to approximately 99.5 mAHD in the site's northeastern corner.

Site drainage is via an overland flow discharging to the Finns Road reserve and into an unnamed tributary of Navigation Creek, which flows into the Nepean River at Camden South. It is noted that Navigation Creek is approximately 700m north-east of the site.

The topography of the site observed during the Auditor's site visit was consistent with the description above.

4.2. Soils and Geology

4.2.1 Regional Geology

Martens (2021d) describe the regional geology as:

The Wollongong – Port Hacking 1:100,000 Geological Sheet 9130 (1985) describes site geology as Bringelly Shale consisting of shale, carbonaceous claystone, laminate, coal in parts.

The Auditor has confirmed this mapping on the Port Hacking Geological sheet.

4.2.2 Site Soil Profile and Geology

The site geology observed by Martens & Associates (2021a) is reproduced by the Auditor below.

The NSW Environment and Heritage eSPADE website identifies site soils characteristic of the Menangle soil landscape, Red/Brown Kurosols (Red/Brown Podzolic Soils) on upper foot slopes, Brown and Yellow Sodosols (Soloths, Solodic Soils, Yellow Podzolic Soils) on lower foot slopes and near drainage lines.

Detailed Site Investigation:

During subsurface assessment within the IA, FILL was observed to consist predominantly of clay fill material to a maximum observed depth of 4.0m BGL (TP103). Underlying natural soil predominantly consisted of SILTY CLAY and was observed at all locations. This residual clay is often orange, brown and grey mottled and is consistent with the residual clay above the Wianamatta Shale and the Bringelly Shale.

Anthropogenic inclusions observed during test pitting included: steel fragments; timber; brick and concrete fragments; PVC and other plastic pipe; tile fragments; geofabric textile; and several PACM fragments. The depth of anthropogenic impacted fill material varied across the IA.

The site geology observed by Martens (2021b) is reproduced by the Auditor below:

Supplementary DSI:

- FILL to depths of 0.0m up to 4.00m BGL: Gravels/Gravelly or Sandy silt or clay, low plasticity, grey brown with shale gravels/Clay/Silty Clay: low plasticity, red brown grey with shale or sandstone gravels.
- ALLUVIUM to depths of 0.0m up to 7.0m BGL: Silty clay: low plasticity, orange red, grading to yellow brown/Silt: low plasticity, brown.
- RESIDUAL SOIL from 0.2m up to 8.0m BGL: Silty clay: medium plasticity, brown grey/Clay: medium plasticity, grey/Clayey Silt: pale grey brown.
- WEATHERED ROCK to depths of 1.8m up to 11.40m BGL: Shale: inferred extremely low strength.

- SHALE from 1.80m to the depth of investigation (11.40m BGL): Shale: inferred low strength; grey brown/yellow.

Anthropogenic inclusions such as bricks, tiles, PVC piping, ACM, gravels and timber were detected in fill material. Eggshells and bones were detected from depths between 1.8-2.7m at TP402 – TP407.

The site geology observed by Martens (2021d) is reproduced by the Auditor below:

Further DSI:

Martens note that access roads around the site typically comprised crushed sandstone (sandstone gravels in a silty clay matrix) overlying natural underlying clay material. Soil in the northern grassed area of the site between the northwest dam and Finns Road was found to be consistent with expected natural material found elsewhere on the site.

The Auditor is satisfied that the geological descriptions accurately describe the fill and natural profile at the site. Martens note that the material identified in subsequent intrusive investigations was generally consistent with that identified during the Phase 1 investigations.

The Auditor is surprised that alluvium is up to 7.0m thick and would consider that such unconsolidated material would only potentially exist in the north-western section near the entrance to Finns Road and to a lesser extent, on the western boundary.

During the Auditor's site visit on 1 September, 2021, a stockpile of crushed sandstone was observed on the site slightly west of the southern chicken shed. The Auditor recommends Martens investigate the source of this material to confirm its suitability for use on the site.

4.2.3 Acid Sulphate Soils

Martens did not provide an assessment of Acid Sulfate Soil Mapping.

The Auditor has reviewed ASS risk mapping from eSPADE, which indicates the land is not mapped for acid sulfate soils probability.

Data from the Australian Soil Resource Information System indicates the site is classed as C4, extremely low probability for ASS/very low confidence.

4.3. Hydrogeology

Martens (2021d) describe the hydrogeology of the site:

Martens completed a review of the Australian Groundwater Explorer (BOM, 2002) which indicated there are three groundwater bores within 500m of the site, with groundwater bores summarised below:

Table 3 Nearby Groundwater Bores with 500m of the site

Bore ID	Recorded Date	Intended Use	Standing water level (mBGL)	First water bearing zone (mBGL) and substrate	Distance and direction from site
GW1062945.1.1	1986	Stock/Domestic	15.0	6.2-77.8 Shale	Onsite; southern boundary
GW104766.1.1	2002	Stock/Domestic	82.0	24.5-82.5 Shale	390m west
GW105325.1.1	2001	Stock/Domestic/Recreation	NA	NA	475m north-west

No springs were listed within 500m of the site in the NSW Government Hydrography Spatial Data (SEED, 2019).

Martens 2021(c) indicate the following:

A total of 10 groundwater monitoring wells (MW01 to MW10) were installed at the site as part of the FDSI investigations. Measured standing water level (SWL) at each well location is summarised below:

Table 4 Measured Groundwater Depths

Monitoring Well	SWL (15/04/2021) (mTOC)	SWL (17/05/2021) (mTOC)	SWL (10/08/2021) (mTOC)	Well Elevation (mAHD)[1]
MW01	5.28	5.42	5.37	103.72
MW02	5.60	5.76	7.41	106.03
MW03	8.08	8.14	8.88	115.56
MW04	3.41	3.21	3.76	116.60
MW05	NA[2]	Dry	Dry	116.99
MW06	NA[2]	6.72	6.74	114.99
MW07	NA[2]	Dry	Dry	115.28
MW08	NA[2]	Dry	Dry	115.77
MW09	NA[2]	NA[2]	9.76	116.37
MW10	NA[2]	NA[2]	Dry	117.84

Notes:

1: Based on Chadwick Cheng Survey (18/08/2021)

2: NA – Groundwater well not installed yet by 15 April 2021.

mTOC: metres below top of casing.

mAHD: metres Australian Height Datum.

Review of groundwater levels indicate that MW01, 02, 03, 06 and 09 are likely representative of the main local groundwater system. Groundwater levels in this system range from 98.38 mAHD (MW01) to 108.69 mAHD (MW06).

As noted by Martens, *results from MW04 indicate it is installed into a perched groundwater system, located in a shallow water bearing zone of saturated material within identified former poultry farm waste burial trenches. The presence of groundwater at this location (MW04) is likely a result of the natural soils around the trenches having a lower permeability, causing accumulation of infiltrated stormwater within more permeable trench material. This water is at a considerably higher level than the SWL of the deeper water bearing zone observed in other wells and is separated from that deeper water bearing zone by clay and shale expected to have low permeability.*

A preliminary review of the above groundwater data suggests that the deeper groundwater (i.e. not including the isolated, perched water bearing zone identified at MW04) at the site typically flows in an approximate north northeast direction.

4.4. Audit Discussion

4.4.1 Soils and Geology

The Auditor is satisfied that the consultants have adequately documented the soils and geology of the site, including the lack of ASS, from a regional and site perspective.

4.4.2 Hydrogeology

The Auditor is satisfied that the regional hydrogeology is sufficiently documented for the purposes of the assessment. In particular the Auditor agrees that the groundwater recorded in MW4 is representative of perched groundwater; and not the deeper groundwater.

The Auditor notes that a drop in the hydraulic head of approximately 1.6-1.8m at MW02 during the third event may be due to a low permeability environment.

5. SITE HISTORY

5.1. Auditor's Summary of Site History

Limited site history information is available. Aerial imagery reviewed from 1969 to 2020 indicate that the land predominantly remained cleared land/grassed paddock prior to 1969 and the current site structures and elevations were constructed between 1975 and 2002.

Based on historical aerial photography, Martens indicate the trenches are understood to have been filled between 2010 and 2017 during the site's operation as a poultry farm. Martens indicate that the burial trenches cover an approximate 1000m^2 of the site.

Between 2017 and 2018, approximately 3480-4380 tonnes of VENM and ENM were imported to the site and placed into the two dams located near the southwest portion of the site. The imported material came from the following locations and the associated waste classification documentation is summarised in Section 9.2:

- Approximately 1850 tonnes of ENM from Corner of Muscovy Drive and Warbler Street, The Ponds NSW 2769.
- Approximately 530 tonnes of VENM from Tarro Avenue, Revesby NSW. Approximately 1800-2000 tonnes of ENM from Darlinghurst Road Precinct, Darlinghurst NSW, 2010.

The Auditor notes that there is a large variation of 900 tonnes of imported material. The reason for this discrepancy is likely due to the following reasons:

- Martens (2020) indicate that their review of the AG (2017) report concludes that the stockpile is more likely to be approximately 1150-1850 tonnes, and based on records of imported materials, the applicant has imported approximately 1020 tonnes (assuming 30t per truck and dog trailer) of materials from this source (The Ponds) Martens indicated that based on the report's sample map, the stockpiled area was actually 822m^2, not 360m^2 as described by AG (2017).
- The waste classification prepared by AG (2018) for material imported from Darlinghurst does not provide an estimate of the total volume or tonnage, but states that the materials were in-situ in an area within the stormwater and sewage pipelines. Martens estimate the total length of the pipelines to be 665m (466m sewer pipe and 219m stormwater pipe) with a width of 1m and an average depth of 2 to 3m. Assuming 10% variability in width, and average depth of 2.5m, the classified volume is expected to be 1660-1850m^3. Assuming a bulk density of 1.8t/m^3, this is a total tonnage of 3000-3300 tonnes.

  In addition, as described in Section 9.2.2, this report detailed material classed as GSW and ENM. A statutory declaration stating that GSW was not imported to the site was provided. Martens indicate that based on the figures, at least 60% of the material is classified as ENM, which equates to an estimated 1800-2000 tonnes. Based on the records of imported materials, Martens estimate the applicant has imported approximately 1340 tonnes (assuming 30 t per truck and dog trailer) of materials from this source.
- Geotest Services (2018) indicated approximately 530 tonnes (295m^3) of surplus natural material were proposed to be excavated from the source site. Martens (2020) indicate that assuming a 10% variability in trench dimensions, Martens estimate a total material volume imported is between 295-395m^3 (based on a bulk density of 2.0t/m^3 for shale clay/clay. Martens consider the variability in the actual excavated trench dimensions, the bulk density of the shale and clay, and the variability in tonnage per imported load to account for a minor discrepancy between the estimated tonnage in the waste classification and records of imported material to site.

Martens (2020) indicate that the material imported to the site is classified as VENM or ENM and has been certified by Alliance Geotechnical (ENM) and Geotest Services (VENM) as being uncontaminated and fit for use. Martens indicated that there were no discrepancies observed during the PSI walkover that indicated

this material would not be VENM or ENM. During the course of the site investigations, the Auditor has ensured that appropriate site coverage which exceeds the recommended minimum sample density (NSW EPA, 1995) has been achieved and this imported material would have been sampled by Martens.

On 27 May, 2019 Dirt Doctors (2019) completed a material classification (see summarised in Section 9.2) on an approximate 400 tonne stockpile of recovered asphalt parent material that had been imported to the site for use as engineered fill which they classified as “Recovered Aggregate”. The material was originally placed into two stockpiles on either side of the shed previously located near the centre of the site. The stockpile and then moved southwest of the second southernmost largest shed. Some of this asphalt fill material had been placed on top of the VENM and ENM in various locations between the two dams in the south-west corner of the site.

Following completion of the PSI, additional fill material was imported to the site (estimated volume of 35,000m^3). The material was placed predominantly in the southern and western portions of the site and covers an approximate area of 1.5-1.6 ha. Council advised on 3 March 2021 that the imported fill meant there was insufficient information for Council to be satisfied regarding the contamination status of the site and therefore detailed site investigations were completed by Martens.

5.1.1 NSW EPA Records

At the time of the PSI completed by Martens in 2020, there were no contaminated sites within 500m of the site notified to the NSW EPA under the CLM Act (1997), Environmentally Hazardous Chemicals Act (1985), or listed on the NSW EPA public register under section 308 of the POEO Act 1997.

5.1.2 Council Information:

Martens (2020) indicated the following:

Nine historical development and/or building records were held by Council for the site:

- No description provided for records:
  - B875/87 (1987)
  - B221/87 (1987)
  - S423/50 (1994)
- Poultry farming; approved historic in 1987 (D35/87);
- Continued use of swimming pool and deck; approved under delegation in 2014 (this is likely to be for the residential portion of the site which is not the subject of this Audit);
- DA – Filling of two existing dams, retaining walls, stormwater drainage in 2019; withdrawn;
- DA – Conversion of site to depot/transport depot and associated work in 2019; refused under delegation;
- DA – Drainage works and extension of existing driveway in 2019; approved PCA; and
- DA – S68 AWTS with surface spray irrigation, associated with dwelling house in 2020 (this is likely to be for the residential portion of the site which is not the subject of this Audit).

5.1.3 Externally Potentially Contaminating Activities

No potentially contaminating activities such as service stations, mechanics and dry cleaners were identified within 500m of the site.

5.2. Audit Discussion

The Auditor is satisfied that the site history identified by the consultant is adequate given the site usage. The Auditor notes that the initial DSI completed by Martens focussed on the assessment of potential

contaminants in soil associated with deteriorated PACM cladding on site sheds and imported fill material while subsequent investigations assessed the infilled trenches from poultry operations which are now the known sources of ground gas and groundwater contamination.

6. SITE CONDITION

6.1. Previous Site Layout

Martens (2020) reviewed aerial imagery from 1969 to 2020, which indicated the site has predominantly consisted of cleared land/grassed paddock since prior to 1969. The 1969 aerial imagery indicates the site consisted of rural cleared land/grassed paddock with a dam near the south-western portion of the site and the north-south gravel roadway present to the east. Between 1969 and 1975, two dams had been constructed near the south-western portion of the site and one dam had been constructed near the northern portion of the site. Three large sheds were evident in the central portion of the site in the 1969 image.

Between 1975 and 1990, two additional large sheds were constructed near the central portion of the site, with two small sheds evident near the south-eastern portion of the site and northern portion of the site. A dwelling was observed on the north-eastern portion of the larger site, with a small shed constructed on the south side of the residence. A gravel pathway had been constructed surrounding the sheds in the central portion of the site.

Between 1990 and 2002, an additional small shed had been constructed near the south-eastern site corner and an above ground swimming pool had been constructed on the larger site, south of the residential dwelling. An additional shed was evident in the south-western corner of the residential property. Disturbed soil was evident surrounding the dams near the south-western portion of the site and along the southern boundary.

Between 2002 and 2010, a stockpile of unknown pale material was observed between the two dams near the south-western portion of the site and three small stockpiles of light brown material were evident near the south-western boundary. Miscellaneous materials were stored along the south-eastern site boundary and four water tanks (two small, two large) had been constructed west of the small shed in the south-eastern portion of the site. An additional two small sheds had been built near the south-western portion of the larger site, near to the residential property.

The 2015 aerial imagery shows several small areas of disturbed soil present near the south-western portion of the site.

The Auditor understands that a Hazmat survey was not completed for the sheds which have been demolished. Although this is recommended, the Auditor considers that the subsequent DSI is sufficient to identify any contamination that occurred from demolishing site structures.

Between 2015 and 2020, a large volume of ENM and VENM fill material had been placed in the dams near the south-western portion of the site. Materials and equipment previously observed in aerials near the southern site boundary had been removed. The 2020 imagery indicated one of the large sheds in the central portion of the site had been removed and various materials of unknown composition were observed to be stored in bags in this area. A stockpile of grey recovered asphalt was evident southwest of the second southernmost large shed. On the larger site, the above ground swimming pool located south of the residence had been removed.

Surrounding Land:

Aerial imagery from 1969 to 2020 indicates the surrounding land in 1969 was predominantly occupied by rural cleared land/grassed paddocks to the south, east and west, with the northern side of the property bound by Finns Road with bushland to the north of Finns Road. By 1975, a large dam had been constructed on the northern property and a small dam was evident on the property to the east. By 1990, a gravel roadway, small shed and a small dam had been constructed on the property west of the site, and a gravel roadway had been constructed to the east. No major changes were observed from the 1990 imagery to the 2020 imagery.

6.2. Current Site Layout

Martens made a number of observations during a site walkover on 5 August 2020, as described in the Preliminary Site Investigation:

- The larger site consisted of *four larger former poultry sheds, two medium sized sheds, four small sheds, three dams, a gravel roadway which surrounds the poultry sheds and a residence with several small sheds.*
- *The open space between the two southernmost sheds was used for vehicle storage and contained a stockpile of recovered asphalt pavement with dimensions of approximately 15m x 8m x 1.5m.*
- *The southern portion of the site is an open field.*
- *The area between the two dams near the southwest side of the site consist of an area filled with VENM, ENM and recovered asphalt pavement.*
- *There were two water tanks located northeast of the southernmost shed.*
- *Site drainage is via overland flow discharging to the Finns Road reserve and into an unnamed tributary of Navigation Creek, which flows into the Nepean River at Camden South.*
- *The site is bordered by Finns Road to the northeast and rural properties to the north, south and west.*
- *Access to the sheds was not available during the inspection, with the exception of the second southernmost large shed, which was being used for a woodworking business.*

Martens (2021a) made the following observations during the works completed for the initial Detailed Site Investigation during a site walkover on 10 and 11 March 2021:

- The fill material was unvegetated and in a broad stockpile/pad across the IA.
- No staining or odours were noted at the surface of the fill material.

Martens (2021b) noted the following observations during soil, ground water and ground gas investigation works completed for the Supplementary DSI on 14 and 29 April and 17 and 21 May 2021:

- Site fill material was unvegetated and placed over the majority of the southern and western portions of the IA. No fill material in addition to that observed during the DSI were observed to be present.
- The footprints of the sheds were noted to be predominantly unsealed, with partial asphalt ground cover in some areas of the site. Soil staining and/or odours were not observed within site sheds or the immediate vicinity of the sheds.

Martens (2021d) noted the following observation during groundwater investigation works completed for the Further DSI between 29 July to 10 August 2021:

- No visual or olfactory signs of contamination were noted in any of the boreholes conducted along the access roads.
- Dam silts were found to be free of any visual or olfactory signs of contamination.

6.3. Visible and Olfactory Signs of Contamination

Martens (2020) note:

- *Historically two small diesel above ground storage tanks (ASTs) had been used at the site. The first AST was located on the southeast side of the northern most large sheds and the second was located near the central east boundary of the site. No staining was apparent on the ground surface.*

- *An approximately 2m x 2m x 0.3m stockpile of broken "super six" PACM fibre cement roofing material was observed in the field near the southwest boundary.*
- *An approximately 2m x 2m x 0.2m stockpile of burned waste, paint cans, aerosol cans and glass bottles was observed on the southeast side of the dam located near the southwest corner of the site.*
- *A soil stockpile located approximately 25m northwest of the southernmost large shed with dimensions of approximately 3m x 2m x 1.5m contained soil, brick, plastic, ceramics and PACM fragments.*
- *The lower exterior walls along the perimeter of the two southern larger sheds contained PACM consisting of "super six" or fibre cement sheets which extended into the subsurface. The PACM was broken or fractured in many locations and PACM had fallen to the ground surface in some locations.*
- *There is a potential that the previously demolished large shed that was located between the two current southernmost sheds may have contained PACM in a similar configuration and condition to the two large sheds currently present on the south side of the site and PACM may be present in the subsurface.*
- *The lower perimeter walls of two large northern sheds contained rendered concrete that appeared to contain PACM sheets beneath the concrete. This material was in good condition.*
- *Fill material was present along the southern boundary of the site, on the north side of the southernmost shed and near the north west corner of the second southernmost large shed.*
- *Fill material was present in the dam walls. It is not known what this material consists of because it was grass covered.*

Martens (2021a) note:

- Minor observations of anthropogenic inclusions at the surface were observed including brick, concrete, tile, plastic pipe and several PACM fragments.

Martens (2021b) note:

- Minor anthropogenic inclusions were observed at the surface of the site and within the majority of fill material excavated. Anthropogenic materials consisted of brick, concrete and tile fragments, plastic pipe fragments and several PACM fragments.
- No staining or odours were noted at the surface of the fill material or within test pits/boreholes, with the exception of deeper poultry farm trenches. Minor surface staining was observed at SS07, SS08 and SS09 surrounding the AST.
- Test pit investigations undertaken on 29 April 2021 identified potential waste disposal trenches and waste consistent with the site's former poultry farm use such as eggshells and bones were observed. This material was detected below depths of approximately 2mBGL.
- No other major anthropogenic inclusions (such as buried drums) were identified during test pitting within the area. Strong organic odours were noted during test pitting.

Martens (2021d) note that groundwater was found to be turbid with no odours or sheens observed during sampling. Water recovered from MW04 was atypical in appearance (yellowish) with discolouration differentiating it from groundwater recovered from other wells. This groundwater is likely to be representative of a perched groundwater system and is not representative of the wider groundwater system.

6.4. Audit Discussion

The site condition described by the consultant's assessments is generally consistent with the Auditor's review of historical documentation.

The Auditor notes that evidence of soil excavations is evident in the southern portion of the site in the 2002 imagery, which suggests trenches may have been excavated as early as 2002. Evidence of equipment and waste materials are evident in the vicinity of the burial trenches in the 2010 and 2017 imagery, which indicates filling may have occurred in this period. The 2020 aerial image shows the southern portion of the site is now grass covered, which indicates burial of poultry waste likely ceased between the period of 2017 and 2020.

The Auditor notes that the fate of the stockpiles described by Martens (2020) is unknown and it is likely that this material was disposed offsite. This occurred prior to the Auditor's engagement for this Audit. The Auditor has requested Martens provide additional information on these stockpiles (if available). The Auditor will reassess the status of these materials in the Section A2 SAR which is proposed following remediation.

7. CONTAMINANTS AND MEDIA

7.1. Potential Contaminants of Concern

The following potential chemicals of concern (POoCs) at the site were selected by Martens (2020) during the DSI:

- Heavy Metals;
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene (BTEXN);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organochlorine and Organophosphorus Pesticides (OCP/OPPs); and
- Asbestos.

The following potential chemicals of concern at the site were selected for soil, groundwater and/or ground gas by Martens (2021d) during the Further DSI:

Fill Material and Sheds:

- Heavy Metals, TRH, BTEXN, PAH, OCP/OPP and asbestos.

Former Poultry Farm Use:

- Formaldehyde, Per- and Polyfluoroalkyl Substances (PFAS) and nutrients (nitrates, phosphorus, ammonia).

The Auditor notes that PFAS is listed as a CoPC in Table B2 of the NEMP (2020) for sites with a history of agricultural activity. The NEMP (2020) indicates that PFAS was *potentially used as an adjuvant or active ingredient in fertilisers and pesticides, firefighting foam used in the poultry industry to destroy infected flocks.* The Auditor notes that there is no evidence that such an activity had occurred at the site.

AST:

- Heavy Metals, TRH, BTEXN and PAHs.

Former Burial Trenches:

- Heavy Metals, TRH, BTEXN, PAH, OCP/OPP, formaldehyde, PFAS, nutrients and ground gas (methane and carbon dioxide).

The Auditor is satisfied that this suite of potential contaminants in soil, groundwater and ground gas addresses the identified potential sources based on the site history and known previous activities.

The Auditor recommended that in addition to nutrients such as nitrates and phosphorus, ammonia, E. coli and total coliforms be sampled for in soil and groundwater in the vicinity of the burial trenches at a minimum. The Auditor also advised that dissolved methane and carbon dioxide be considered in groundwater due to the former poultry farm use and detection of ground gases in the southern portion of the site. In addition, the Auditor recommended that PCBs be analysed for in fill material to confirm they are not a COPC potentially associated with imported fill of unknown origin. These analyses were completed at selected sample locations.

It is noted that Volatile Organic Compounds (VOCs) are not included as COPC, however, they were sampled for in groundwater as a precautionary measure.

In Addition, the Auditor required justification in IA03 on if phenols were considered a COPC in soils due to the AST. The Auditor is satisfied that phenols are generally considered COPC for waste oil tanks and are unlikely to be found in refined diesel products.

PFAS was detected at low concentrations below the 95% protection criteria in some monitoring wells within the burial trench area and also in a downgradient well. The Auditor has recommended that Martens complete additional soil sampling for PFAS in the near surface soils within the former poultry sheds to determine if there is any source of PFAS in soil, and Martens have proposed this as part of the RAP data gap investigation works.

The Auditor notes that biological analytes such as E.coli and total coliforms are also COPC due to the presence of putrescible waste from poultry farming. These COPC were analysed by Martens in soil in the vicinity of the burial trenches and in groundwater as per the Auditors request.

7.2. Media Assessed

Media assessed included soil, groundwater and ground gas.

The Auditor is satisfied that soil vapour monitoring (i.e. VOCs) is not required to understand the contaminant profile of the site as volatile contaminants were not identified in soil at the site and potential sources were limited to a small AST with diesel fuel .

Ground gas was included in the media assessed due to the identification of infilled burial trenches in the southern portion of the site which contained putrescible waste such as eggshells and bones and is likely attributed to the former use of the site as a poultry farm.

7.3. Audit Discussion

The potential contaminants identified are consistent with the known site history. The Auditor is satisfied that the contaminant suite identified is appropriate.

The Auditor is satisfied that all potentially affected media have been assessed. Soil vapour assessment would only be required by the Auditor if volatile contaminants exceeding current NEPC (2013) HSL values were identified in soil. No such impacts were apparent or suspected. An AST was identified on the site by Martens, however, soil and groundwater sampling across the investigation area did not indicate the need for soil vapour sampling. Elevated concentrations of hydrocarbons were detected in the vicinity of the burial trenches in soil and groundwater. In addition, the groundwater with the highest concentrations of hydrocarbons was at MW04 which is not considered representative of the deeper groundwater system. Martens note that this location is likely representative of a perched groundwater system within the burial trenches. All groundwater results for hydrocarbons, BTEXN and VOCs were below the adopted criteria and/or the laboratory limit of reporting.

8. CONCEPTUAL SITE MODEL

Martens (2020) identify the following potential areas of contamination and contaminants of concern:

AEC	Potential for Contamination	COPC
AEC A Dwellings including 2 - 5 m curtilage	Pesticides and heavy metals may have been used underneath dwelling for pest control. Building construction may include PACM, zinc treated (galvanised) metals, and lead based paints.	HM, OCP / OPP and asbestos
AEC B sheds including 2 - 5 m curtilage	Pesticides and heavy metals may have been used underneath existing and past garage / sheds for pest control. Building construction may include PACM, zinc treated (galvanised) metals, and lead based paints.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
AEC C Former poultry farm use	Application of agricultural chemicals, use of pesticides and heavy metals for pest control during site use as a poultry farm.	HM and OCP / OPP
AEC D ASTs	Diesel fuel in ASTs has the potential to impact the underlying soil with heavy metals, TRH, BTEXN, and PAHs.	HM, TRH, BTEXN, PAH,
AEC E Fill Material	Fill from unknown sources has the potential to add contamination including hydrocarbons, heavy metals, pesticides and asbestos.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
AEC F PACM Stockpile	PACM stockpile may contain asbestos.	Asbestos
AEC G Burned Material Stockpile	Burned rubbish, paint cans and aerosol cans could have impacted the soil with a variety of COPC.	HM, TRH, BTEXN, PAH,

COPC	Pathway	Exposure Route	Receptor
HM PAH OCP / OPP	Leaching of contaminants through the soil profile. Transport of contaminants via air (dust). Transport of contaminants by mechanical disturbance (e.g. earthworks).	Direct contact with contaminants. Ingestion of contaminants. Inhalation of contaminated media (e.g. vapour, dust).	<u>Possible Human Receptors</u> Current or future site users such as residents, visitors and workers. On and offsite construction or maintenance workers. Hydraulically down gradient groundwater users who extract groundwater for purposes that could have implications for human health (e.g. potable / domestic, primary contact recreation, irrigation of home grown produce). <u>Possible Environmental Receptors</u> Flora and fauna that may inhabit or migrate through the site.
TRH / BTEXN	As above plus: Volatilisation to air (vapour).		
Asbestos	Transport of contaminants via air and inhalation of particles. Transport of contaminants by mechanical disturbance (e.g. earthworks). Transport of particles on clothing.	Inhalation of contaminated media (e.g. dust).	<u>Possible Human Receptors</u> Current or future site users. On and offsite construction or maintenance workers. Current or future users of surrounding residences, reserves, and commercial or industrial premises.

Martens (2021a) outlined the CSM for the IA:

AEC	Potential for Contamination	COPC
AEC A Fill	Fill from unknown sources has the potential to add contamination including hydrocarbons, heavy metals, pesticides and asbestos.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos

AEC	COPC	Exposure Pathway	Potential Receptors	Likelihood of Complete Exposure Pathway
AEC C Fill	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos	Ingestion of contaminants. Dermal contact with contaminants. Inhalation of contaminated media (vapour, dust).	Current and future site users including staff and visitors. Construction and maintenance workers.	**Medium** (in areas of exposed soil) **High** (where excavation is to be undertaken)

Martens (2021b) outlined the CSM for the IA:

AEC[1]	Potential for Contamination	COPC
AEC B[1] – sheds and 2 – 5 m curtilage	Pesticides and heavy metals may have been used underneath existing and past garage / sheds for pest control. Building construction may include PACM, zinc treated (galvanised) metals, and lead based paints.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
AEC C[1] – poultry farm use	Application of agricultural chemicals, use of pesticides or heavy metals for pest control during site use as a poultry farm.	HM, OCP / OPP, formaldehyde, PFAS
AEC D[1] – ASTs	Diesel fuel in ASTs has the potential to impact the underlying sub surface environment with heavy metals, TRH, BTEXN, and PAHs.	HM, TRH, BTEXN, PAH,
AEC E – Burial Trenches	A number of trenches have been identified in the southern portion of the site which may have been used for burial of waste from unknown sources.	HM, TRH, BTEXN, PAH, OCP / OPP, formaldehyde, PFAS, asbestos. Landfill gas (methane and carbon dioxide).

Notes:

[1] AEC identification is based on the PSI (MA, 2020). AEC A (Fill material from unknown sources) has been previously investigated in MA (2021a) DSI.

Exposure Pathways:

- Direct contact and/or ingestion of potentially contaminated soil or groundwater.
- Inhalation of vapour (from soil or groundwater) contaminated with volatile and semi volatile contaminants.
- Ingress of potential ground gas to future development structures.

- Transport of contaminants to underlying groundwater aquifers.

Potential Receptors:

- Future site workers involved in construction.
- Future site users including workers and visitors.
- Future workers undertaking intrusive maintenance works for repair or installation of subsurface utilities.
- Groundwater beneath the site and receiving environments for that groundwater.
- Ecological receptors include terrestrial organisms and plants, however it is noted that much of the proposed development will include mostly hardstand pavement. Freshwater ecology of the nearest surface water body being Navigation Creek located approximately 700m northeast.

Martens (2021d) provide the following CSM:

Contamination Source	Potential for Contamination	COPC
A – Fill material	Fill material has been imported and placed in the IA. Fill material not consistent with a VENM classification may contain contaminants such as heavy metals, pesticides, hydrocarbons and asbestos. Leaching of contaminants through the fill profile and into underlying natural material and / or impacting the groundwater may be possible.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
B – Sheds	Pesticides and heavy metals may have been used underneath existing and past garage / sheds for pest control. Building construction may include PACM, zinc treated (galvanised) metals, and lead based paints. Oils and fuels may have been used in site sheds, which may have spilled or leaked into natural underlying soils.	HM, TRH, BTEXN, PAH, OCP / OPP and asbestos
C – Former Poultry Farm Use	Application of agricultural chemicals, cleaning agents, use of pesticides or heavy metals for pest control during site use as a poultry farm. Contaminants may have impacted both underlying soils and groundwater receivers.	Formaldehyde, PFAS and nutrients (nitrates, phosphorus and ammonia).
D – Above Ground Storage Tank	Diesel fuel in ASTs has the potential to impact the underlying sub surface environment with heavy metals, TRH, BTEXN, and PAHs.	HM, TRH, BTEXN and PAH
E - Former Burial Trenches	A number of trenches have been identified in the southern portion of the site which may have been used for burial of (likely) poultry farm waste from unknown sources, including potential disposal of organic material from former poultry farm land use. Assessment of impacts of the trenches to include local soil contamination, leaching of contaminants to groundwater and migration of GG.	HM, TRH, BTEXN, PAH, OCP / OPP, formaldehyde, PFAS, nutrients (nitrates, phosphorus and ammonia) and GG (methane and carbon dioxide).

Notes

[1] Phenols are not considered a COPC for given the AST was used to store diesel. Phenols are more typically associated with waste oils which were not observed onsite.

[2] PFAS assessed at the most sensitive receptor (groundwater) first to guide further assessment requirements.

Potential Exposure Pathways:

- Direct contact and/or ingestion of potentially contaminated soil or groundwater.
- Transport of contaminants to the underlying groundwater system/s.
- Inhalation of vapour (from soil and groundwater) contaminated with volatile and semi volatile contaminants.
- Inhalation and explosive risks associated with GG generated from buried agricultural waste material in the site's south.
- Inhalation of dust and/or harmful fibres.
- Ground Gas Exposure Pathways include:
  - Prior to recent filling works, ground gas would have been expected to vent through the soil profile to the overlying open grassed areas. By impeding this pathway, the placement of fill material over the burial trenches may have increased the lateral migration of gas. The site is proposed to be regraded and concrete hardstand is proposed to be placed over burial trenches. The change in capping may alter the pathways for gas to vent from buried waste material.
  - Considering the proposed hardstand development, pre and post fill profiles and the buoyant nature of the ground gas of concern, the preferential pathways for ground gas may be altered. Some gas may locally vent through fill and the hardstand, however, this pathway may be impeded. Martens expect the pathways for ground gas to include:

1. Primary: following the previous site surface beneath placed fill and overlying hardstand southeast towards the edge of the hardstand.
2. Minor: through fill and hardstand to the open atmosphere.
3. Minor: north towards the proposed retaining wall adjacent to Shed 4.
4. Minor: towards proposed Shed B potentially through the stormwater drainage line proposed along the southern side of the retaining wall immediately south of existing Shed 4. This stormwater drainage line is graded down to the west towards Shed B, therefore the pathway for buoyant gases is likely to be preferentially to the east away from Shed B.
5. Very Minor/Negligible: towards existing Shed 4 – the floor level of this shed is approximately 113.5m AHD with areas between the shed and the burial trenches at the southwest of the shed as low as 112.5m AHD. By comparison, ground levels in the vicinity of the buried waste were 112 to 116m AHD. Assuming the burial pits are 1-2m depth, trenches to the west of Shed 4 are likely to have been of the order of 112.5-115.7m AHD. For ground gas from these pits to be a risk to Shed 4, the preferred vapour pathway would need to be near horizontal, which Martens consider highly unlikely due to alternate pathways for the gas to rise through placed fill to the underside of the hardstand which is likely to then rise south away from Shed 4.

Martens note that management measures for ground gas are required to address exposure pathways.

Potential Receptors:

- Future site workers involved in construction.
- Future site users including workers and visitors.
- Future intrusive and subsurface maintenance workers.
- Groundwater beneath the site and the receiving environments.
- Ecological receptors include terrestrial organisms and plants, however it is noted that much of the proposed development will comprise of concrete hardstand or imported landscaping materials.

Martens (2021e) provide the following updated CSM as part of the RAP:

AEC	Potential for Contamination	COPC
ACM impacted fill	ACM impacted fill material identified at the Site presents an unacceptable risk to human receptors.	Asbestos
Waste burial trenches	Former burial trenches containing agricultural waste are generating elevated concentrations of methane and carbon dioxide, which presents an unacceptable risk to the proposed development and future receptors.	Hazardous GG: methane and carbon dioxide

Potential Exposure Pathways:

- Inhalation of asbestos fibres from ACM within fill.
- Inhalation of ground gas.
- Ingress of ground gas to future development structures and associated explosion risk (methane).

Potential Receptors:

- Future site workers involved with construction.
- Future site users including workers and visitors.
- Future site workers undertaking intrusive maintenance works for repair or installation of subsurface utilities.

CSM Discussion:

- The FDSI confirmed the presence of asbestos (bonded in fragments of fibrous cement sheeting and at one location, AF/FA was detected exceeding the adopted SAC) contamination in fill material (both at the surface and at depth) located in the southern half of the site. Access to exposed soil in this area is, presently, readily available and a potential pathway between sensitive site receptors and identified ACM impacted fill is considered complete.
- Additionally, future earthworks associated with the proposed development will involve relocation of considerable volumes of ACM impacted fill and, without mitigation, a complete exposure pathway for ACM and future site workers may potentially be completed.
- GG (methane and carbon dioxide) have been detected in screening assessment works in wells located in the southern portion of the site at unacceptable concentrations. GSV and CS were calculated and the CS ranged from 1 (very low risk) to 3 based on GG concentration and an adopted conservative flow rate where the highest flow was used for each well.

Auditor Comment: The Auditor concludes the CSM adequately summarises the likely source-pathway-receptor linkages at the site. It is noted that the FDSI prepared by Martens (2021d) indicates that ground gas would preferentially move south-east. The Auditor notes that this may be the case due to site grading, however there is a potential that gas could move north, south, east and west and that this needed to be considered in the remedial design. It is however, noted that if ground gas were to move south, it may impact a sensitive receptor and would be potentially migrating offsite and that is one of the primary reasons why Martens focused on mitigation measures to the south. It is noted that the results indicate there is very minimal to no flow of ground gas at the site. The mitigation measures proposed by Martens appear suitable and are for the purposes of a RAP, conceptual but suitable.

The Auditor notes that additional monitoring and pilot trials have been proposed as part of remedial preparation works to confirm that the mitigation measures proposed will be suitable to manage ground gas

at the site. The Auditor notes that it may be appropriate to modify the ground gas characteristic situation (CS) based on the weight of evidence approach as per section 4.2(4) of the NSW EPA Ground Gas Guidelines (NSW EPA, 2020). This would allow an initial CS to be based on the existing CS determined from Table 7 and the value could then be adjusted based on the evidence provided, ensuring that the adjustment is fully justified. It is not expected that the CS could be adjusted by more than one unit. However, the Auditor notes that where the CS is 1 no further action is required.

In addition, it was agreed with Martens that after the DSI and SDSI identified the presence of asbestos contamination in fill material, the NEPM (2013) gravimetric method of asbestos analysis originally recommended by the Auditor was not required as all fill material would be deemed asbestos contaminated and required remediation. The Auditor requested that AF/FA be sampled for instead to determine what management measures and asbestos controls need to be put in place during remediation and earthworks for WHS requirements.

The Auditor notes that biological analytes such as E.coli and total coliforms are also COPC due to the presence of putrescible waste from poultry farming. These COPC were analysed by Martens in soil in the vicinity of the burial trenches and in groundwater as per the Auditors request.

The CSM provided by Martens (2021e) refers to asbestos being a COPC for site workers. The Auditor considers that if appropriate asbestos control and management measures are put in place during remedial works and earthworks, the pathway for ACM and site workers will be unlikely to be complete.

It is noted that elevated concentrations of heavy metals, nutrients, E.coli and/or total coliforms have been detected in groundwater at the site and due to the expected low permeability of the underlying geology, the risk is considered low. However, the Auditor has recommended an additional well be installed on the downgradient boundary as part of the RAP to ensure unacceptable concentrations of contaminants in groundwater are not migrating offsite. Martens have included this as part of their RAP.

The Auditor required justification in IA03 on if phenols were considered a COPC in soils due to the AST. The Auditor is satisfied that phenols are generally considered COPC for waste oil tanks and are unlikely to be found in refined diesel fuel products.

PFAS was detected at low concentrations below the 95% protection criteria in some monitoring wells within the burial trench area and also in a downgradient well. The Auditor has recommended that Martens complete additional soil sampling for PFAS in the former poultry sheds to determine if there is any source of PFAS in soil, and Martens have proposed this as part of the RAP additional investigation works.

9. STAGES OF SITE INVESTIGATIONS AND MILESTONES

9.1. Chronology

A summary of key stages of the investigations is presented in Table 5.

Table 5 Key Stages of the Investigation and Remediation

Date	Investigation or Milestone
31 October 2017	Waste Classification Report (for ENM imported to the site – Alliance Geotechnical)
13 June 2018	Waste Classification Report (for ENM imported to the site – Alliance Geotechnical)
22 November 2018	Re: VENM & Salinity Assessment of In-Situ Residual Soil Material at the Garde Pty Ltd Civil Construction Site (for VENM imported to the site – Geotest Services)
11 June 2019	Material Classification (for imported recovered asphalt – Dirt Doctors)
11 August 2020	Preliminary Site Investigation, Proposed Depot and Transport Depot with Associated Buildings (Martens)
25 March 2021	Detailed Site Investigation: Proposed Depots & Transport Depot (Martens)
24 May 2021	Supplementary Detailed Site Investigation: Proposed Depots & Transport Depot (Martens)
16 July 2021	Interim Advice 01: Review of DSI, SDSI and RAP (HEC)
28 July 2021	Interim Advice 02 (Rev1): Review of SAQP (HEC)
1 September 2021	Interim Advice 03 (V01): Review of FDSI and Updated RAP (HEC)
1 September 2021	Auditor Site Visit
2 September 2021	Interim Advice 04 (Rev1): Advice to Notify 285 Finns Road, Menangle NSW Under the CLM Act 1997 (HEC)
2 September 2021	Re: Preliminary Volume Assessment: 285 Finns Road, Menangle NSW (Martens)
3 September 2021	Further Detailed Site Investigation: Proposed Depots (Martens)
3 September 2021	Remedial Action Plan: Proposed Depots (Martens)
6 September 2021	Notification sent to the EPA for duty to report under the POEO Act 1997 (HEC)

9.2. Summary of Reports

A summary of the investigations conducted at the site are produced by the Auditor below:

9.2.1. Alliance Geotechnical Material Classification Report, dated 31 October 2017

This report was prepared for material which was imported to the site from the Corner of Muscovy Drive and Warbler Street, The Ponds NSW, 2769.

- A total of 3 samples were collected by AG on 23 October 2017 (SP1-1 – SP1-3). The samples were analysed for COPC and results were compared to the NSW EPA ENM Order (2014). AG concluded that the material was classifiable as ENM.
- Samples were analysed for heavy metals, TRH, PAH, BTEX, EC, foreign materials, pH and asbestos.
- AG indicated the material comprised a total of approximately 330 tonnes and the stockpile consisted of gravelly clay, grey/red in colour, medium to high plasticity, dry to moist containing shale.
- No visible or olfactory signs of contamination were noted.
- Geological mapping indicated the source site was consistent with Wianamatta Group Bringelly Shale and there was no known occurrence of ASS.

Martens (2020) indicate that their review of the AG (2017) report concludes that the stockpile is more likely to be approximately 1150-1850 tonnes, and based on records of imported materials, the applicant has imported approximately 1020 tonnes (assuming 30t per truck and dog trailer) of materials from this source. Martens indicated that based on the report's sample map, stockpiled area was actually 822m^2, not 360m^2 as described by AG.

9.2.2. Alliance Geotechnical Waste Classification Report, dated 13 June 2018.

This report was prepared for material which was imported to the site from Darlinghurst Road Precinct, Darlinghurst NSW.

- The report indicates the classified material was estimated 466m sewer and storm water at Darlinghurst Road Precinct.
- A total of 19 soil samples were collected from 9 test pits between the 19th March and 6th June within the area of the proposed stormwater/sewer drainage alignment. The samples were analysed for COPC in accordance with the NSW EPA Waste Classification Guidelines (2014) and ENM Order (2014).
- Samples were analysed for heavy metals, TRH, PAH, BTEX, EC, foreign materials, pH and asbestos.
- Material from soil between the sections comprised of TP4 to TP2, soil material at TP3 (Farrell Avenue), as well as soil material located to the southern section of the alignment starting from TP2, and northern section of the alignment starting from TP7 (generally from below asphalt and concrete/road base to the depth of invert) is ENM.
- AG described the test pits contained asphalt to 0.1m BGL; fill material or road base and concrete to 0.4m BGL; fill material (sand, grey or mottled red/grey/brown, loose, moist) from 0.4-0.7mBGL; and natural sand (red/orange, traces of clay, loose and moist, no foreign materials) from 0.8-1.3m BGL.
- No visible or olfactory signs of contamination were noted.
- Geological mapping indicated the source site was consistent with Quaternary alluvium gravel, sand, silt and clay; and Triassic Liverpool subgroup shale with sandstone bed. There was no known occurrence of ASS in the area.
- It is noted that this waste classification also includes classification of some GSW. However, a statutory declaration (Oaths Act 1900) from a representative of Old Bawn Construction PL declared that all material delivered to 285 Finns Road, Menangle soured from Darlinghurst Precinct has been certified as ENM by AG (2189-ER-1-7 Rev B, 2018) for Diona Pty Ltd. The declaration states that no GSW classified by AG was delivered to 285 Finns Road, Menangle.

Martens note that the waste classification report does not provide an estimate of the total volume or tonnage, but states that the materials were in-situ in an area within the stormwater and sewage pipelines. The total length is estimated to be 665m (466m sewer pipe and 219m stormwater pipe) with a width of 1m and an average depth of 2 to 3m. Assuming 10% variability in width, and average depth of 2.5m, the classified volume is expected to be 1660-1850m^3. Assuming a bulk density of 1.8t/m^3, this is a total tonnage of 3000-3300 tonnes.

As described above, a statutory declaration stating that GSW was not imported to the site was provided. Martens indicate that based on the figures, at least 60% of the material is classified as ENM, which equates to an estimated 1800-2000 tonnes. Based on the records of imported materials, Martens estimate the applicant has imported approximately 1340 tonnes (assuming 30 t per truck and dog trailer) of materials from this source.

9.2.3. Geotest Services Re: VENM & Salinity Assessment of In-Situ Residual Soil Material at the Garde Pty Ltd Civil Construction Site, Tarro Avenue, Revesby NSW, 2212, dated 22 November 2018.

This report was prepared for material which was imported to the site from Tarro Avenue, Revesby NSW.

- This material originated from a trench line within an existing roadway area adjacent to Lot 220 in DP1171057 extending to adjacent Lot 14 in DP36379.
- Approximately 530 tonnes (295m^3) of surplus natural material were proposed to be excavated to a site or facility approved to accept the materials.
- GS indicated that the material was not special waste, liquid waste or possessed hazardous characteristics.
- GS pre-classified this material as VENM due to materials being considered natural material (clay, gravel, sand, soil or rock fines) that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues as a result of industrial, commercial, mining or agricultural activities; and the material does not contain sulfidic ores or soils, or any other waste.
- GS considered the material is non-putrescible.
- GS indicated the material consisted of gravelly, silty clays, brown and grey in colour.
- The history of the source site was predominantly low density residential.
- The site is not located in an area of known ASS.
- A total of 3 soil samples were collected on 20th November 2018 (PP1120-1 – PP1120-3) and were analysed for heavy metals, PAH, TRH, BTEX, OCP, PCB, EC, pH, sulphate and chloride.
- A site soil salinity review and assessment was carried out and indicated the site is situated in a zone of moderate to high salinity potential. EC results indicated that the material was slightly saline.
- pH results indicated the soil is mildly aggressive and moderately aggressive towards concrete and non-aggressive towards steel.
- The chloride and sulphate levels are considered non-aggressive to concrete and steel.
- GS classified the material as VENM.

Martens (2020) indicate that assuming a 10% variability in trench dimensions, Martens estimate a total material volume imported is between 295-395m^3 (based on a bulk density of 2.0t/m^3 for shale clay/clay. Martens consider the variability in the actual excavated trench dimensions, the bulk density of the shale and clay, and the variability in tonnage per imported load to account for a minor discrepancy between the estimated tonnage in the waste classification and records of imported material to site.

9.2.4. Dirt Doctors Material Classification, 285 Finns Road, Menangle NSW, dated 11 June 2019.

Dirt Doctors representative was appointed by Muscat Hydroponics Pty Ltd to conduct an assessment and chemical analysis of stockpiled material at the site on 27 May 2019. The purpose of this assessment was to classify the quality of an approximate 400 tonnes of stockpiled material to be used as engineered fill during proposed internal road construction operations.

- DD described the material as sandy gravel, grey in colour.
- Samples were assessed for heavy metals, conductivity, and asbestos.

Although referenced by DD, there is no evidence of foreign materials assessment results in the report.

- DD did not classify the material as Special Waste and it is not pre-classified in accordance with the NSW EPA Waste Classification Guidelines.
- A total of 5 samples were collected and analysed (E1 – E5).
- No visible or olfactory signs of contamination were observed within the stockpiled material.
- Results indicated that the material was classifiable as Recovered Aggregate as contaminant values were within the NSW EPA Recovered Aggregate Order (2014) contaminant guidelines.

- DD concluded that the contaminants identified in the stockpile did not pose a risk to human health and/or the environment for the exposure setting and it is suitable for standard residential with garden/accessible soil and it is suitable for use as engineered fill.

9.2.5. Martens Preliminary Site Investigation, Proposed Depot and Transport Depot with Associated Buildings, 285 Finns Road, Menangle NSW, dated August 2020.

This report was prepared by Martens to document the PSI and potentially contaminating activities to support a DA to the Wollondilly Shire Council for construction of a Depot and Transport Depot at the site.

- At the time of the site visit the site was approved for use as a poultry farm and consisted of four large sheds with associated access roads; two medium sheds; four small sheds; a residential dwelling on the larger site in the northeastern corner with several small sheds; and three farm dams along the western site boundary.
- Available Council records indicate that there were 9 development/building records held by Council for the site including: approved applications for poultry farming, continued use of a swimming pool and deck (larger site), drainage works and extension of the existing driveway; withdrawn application for filling of two dams, retaining walls and stormwater drainage; a refused (under delegation) application for conversion of the site to a depot/transport depot; and a current S68 AWTS surface spray irrigation associated with the dwelling.
- No sites were listed on the NSW contaminated sites register or EPA public register within 500m of the site.
- Neighbouring service stations, mechanics and dry cleaners were not identified within 500m of the site.
- Aerial photography indicated the land was predominantly cleared/grassed paddock prior to 1969 and the current site conditions were constructed between 1975 and 2002.
- A site walkover by Martens identified that the open space between the two southernmost sheds was used for vehicle storage and contained a stockpile of recovered asphalt and the southern portion of the site as an open field.
- The area between the two dams near the southwest side of the site consisted of VENM and ENM and recovered asphalt.
- Two water tanks were observed near the northeast of the southernmost shed.
- Martens identified signs of potential contamination including:
  - A small diesel AST on the central eastern site boundary. No staining was noted.

    The Auditor notes that the PSI referred to two ASTs, however, this was later clarified by Martens that there was only one.
  - A 2m x 2m x 0.3m stockpile of broken “super six” PACM fibre cement roofing material near the southwestern boundary.
  - A 2m x 2m x 0.2m stockpile of burned waste, paint cans, aerosol cans and glass bottles on the southeast side of the dam located near the southwestern site corner.
  - A soil stockpile located 2m north-west of the southernmost large shed (3m x 2m x 1.5m) containing soil, brick, plastic, ceramics and PACM.
  - The lower exterior walls along the perimeter of the two southern larger sheds contained PACM consisting of “super six” or fibre cement sheets which extended into the subsurface. Martens noted that the PACM was broken or fractured in many locations and PACM had fallen to the ground surface.
  - There is a potential that the previously demolished shed may have contained PACM and it may be present in the subsurface.

  - The lower perimeter walls of the two large northern sheds contained rendered concrete that appeared to contain PACM sheets beneath the concrete. This material was noted to be in good condition.
  - Fill material was observed along the southern boundary of the site, on the north side of the southernmost shed and near the northwest corner of the second southernmost large shed.
  - Fill material was present in dam walls.
- The second southernmost large shed appeared to be occupied by a woodworking business at the time of the walkover.
- Approximately 3480-4380 tonnes of VENM and ENM was imported to the site and placed into the two dams located near the southwestern portion of the site. This material was classified by other consultants including Alliance Geotechnical (ENM) and Geotest Services (VENM) (see above sections for a summary of waste classification reports).
- On 27 May 2019, Dirt Doctors completed a material classification for a 400-tonne stockpile of recovered asphalt parent material that had been imported to the site for use as engineered fill. Dirt Doctors classified this material as “Recovered Aggregate”. This material was placed on either side of a shed previously located in the central portion of the site and was later moved southwest of the second southernmost large shed. Some of this material had been placed overlying VENM and ENM in various locations between the two dams in the southwest corner of the site.
- Due to the presence of asbestos material in the sheds; storage of PACM building materials; agricultural uses including storage and stockpiling of materials and equipment; and past earthworks associated with agricultural activities including dam construction, the site has a potential for localised contamination.
- Martens concluded an Asbestos Management Plan (AMP), asbestos register and Unexpected Finds Protocol (UFP) should be prepared for the site. If these measures were implemented, Martens concluded that contamination risks would be adequately mitigated and managed.

9.2.6. Martens Detailed Site Investigation: Proposed Depots & Transport Depot, 285 Finns Road, Menangle NSW, dated 25 March 2021.

This report documents a DSI for potentially contaminating activities, to support a Development Application to the Wollondilly Shire Council for construction of a depot and transport depot. The site is currently approved for use as a poultry farm.

- The objective of the DSI is to determine if the importation of fill material to site has altered the conclusions of the PSI and ultimately to reassess the suitability (from a contamination perspective) of the site following recent filling works. It is understood filling has predominantly occurred in the southern portion of the site.
- Intrusive investigations were completed within the site areas subject to recent filling works.
- The investigation area is 1.494 ha (larger site area 4.385 ha).
- The site is currently occupied by 4 large sheds with associated access roads, a residential dwelling in the north-eastern corner and three farm dams along the western site boundary.

Sampling:

- Excavation of 29 test pits (TP101-TP129) to a maximum depth of 4.3m BGL. This exceeds the recommended sampling density for a 1.5 ha site.
- Collection of representative samples from each location. A total of 28 soil samples were laboratory analysed, noting that no fill material was identified at TP115. Selected samples were chosen from a range of depths throughout the fill profile.

- Collection of 7 PACM samples.
- Collection of 4 QA/QC samples, including three duplicates, one triplicate and one trip blank and one trip spike.
- A total of 28 samples were analysed for BTEXN, TRH, PAH, asbestos in soil (ID), a total of 32 samples (including QA/QC) were analysed for heavy metals and OCP/OPPs. A total of 7 samples were analysed for PACM.

Results:

- Minor observations of anthropogenic inclusions at the site surface were noted by Martens, including brick, concrete, tile, plastic pipe and several PACM fragments.
- Fill was observed to consist predominantly of clay fill material to a maximum depth of 4.0m BGL (TP103). Underlying natural material was observed to be silty clay.
- Anthropogenic inclusions observed during test pitting included steel fragments, timber, brick and concrete fragments, PVC and other plastic pipe, tile fragments, geofabric textile and several PACM fragments.
- All soil results for heavy metals, TPH/BTEXN, OCP/OPP, PAH and asbestos in soil were below the adopted criteria.

The Auditor notes there was an ecological exceedance of B(a)P at two locations:
- TP112/2.0 (1.5 mg/kg); and
- TP117/0.1 (2.6 mg/kg).

- All PACM samples were confirmed to contain asbestos:
  - MS101a – ground surface
  - MS101b – ground surface
  - MS102 – ground surface
  - MS103 – ground surface
  - MS104 – collected from TP112 at 2.0m BGL
  - MS105 – collected from TP121 at 1.5m BGL
  - MS106 – collected from TP129 at 0.5m BGL

Discussion:

- As the consent authority has concluded the site in the condition prior to the importation of the recent fill was suitable for the proposed development, Martens considered no further assessment outside of the investigation area was required.
- The results of laboratory testing of samples found concentrations of hydrocarbons, heavy metals and pesticides to be less than the adopted SAC for commercial/industrial land use.
- Martens consider the risk to human health from chemical contamination to be low, similarly, ecological risks are considered to be low.
- Asbestos was identified in the collected material samples from both the surface and at depth within the fill material. Soil sampling in accordance with AS4964 did not identity the presence of loose asbestos fibres in soil samples at the reporting limit of 0.1mg/kg.
- The presence of ACM at the surface of the IA exceeds the asbestos HSL outlined in NEPM (2013) and the potential risk to future site users is considered unacceptable in its current condition. Some management or remediation will be required to render the investigation area and the wider site suitable.
- Martens recommend a RAP be prepared for remediation of bonded ACM within the investigation area.

- This RAP would likely involve implementation of a capping layer across in the investigation area to remove exposure pathways. Proposed structures and extensive hardstand shall likely provide the necessary capping layer over much of the site.
- Where landscaping is proposed, an appropriate depth of clean landscaping material shall be required over any contaminated fill.
- In addition to the conditions outlined above and preparation of a RAP, Martens recommend a validation report be submitted including a survey of any buried asbestos, a survey of the upper layer of any capping material, calculation and analysis to confirm the capping layer meets specifications of the RAP and a statement that remediation works were completed and validated, indicating the site has been made suitable for the intended purpose.

9.2.7. Martens Supplementary Detailed Site Investigation: Proposed Depots & Transport Depot, 285 Finns Road, Menangle NSW, dated 24 May, 2021.

This report was prepared to document recent additional soil, groundwater and soil gas investigations undertaken to address data gaps identified at the site.

Data Gaps:

During the DA assessment process, further information was sought by WSC regarding site areas previously investigated, but identified as AECs in the PSI:

- Potential contamination as a result of possible past poultry farm use of disinfectants, such as formaldehyde for shed disinfection and possible use of PFAS. The Auditor notes that PFAS associated with agriculture and the poultry industry is listed as a COPC in the NEMP (2020) guidelines.
- Earthworks including infilled trenches in the southern portion of the site, used between 2010-2017, potentially for burial of waste.
- Possible groundwater impact due to leaching of contaminants.
- Possible ground gas generation as a result of buried materials and/or fill material imported to the site.

Field Works:

- Excavation and logging of 12 boreholes (BH301-BH312) within site shed footprints to a maximum investigation depth of 0.6m BGL.
- Collection of representative soil samples from boreholes and collection of an additional 13 near surface soil samples from across the former poultry farm area (outside of the existing site sheds) and adjacent to the onsite AST.
- A total of 4 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde and asbestos in soil.
- Excavation and logging of 13 test pits (TP401-TP413) within the burial trench area in the southern portion of the site to a maximum depth of 3.8m BGL and collection of soil samples.
- A total of 5 soil duplicate samples and 1 soil triplicate sample was collected during the two sampling events. One soil trip blank and trip spike were used during each sampling event.
- A total of 21 primary samples were analysed for BTEXN, PAH, TRH, heavy metals, OCP/OPP, PCB, formaldehyde and asbestos in soil.
- Drilling and logging of four boreholes (BH201-BH204) to a maximum investigation depth of 11.4m BGL to facilitate the construction of wells (MW01-MW04).
- Collection of groundwater samples from initial four monitoring wells for laboratory analysis.
- A total of 4 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde, PFOS/PFOA and VOCs.

- An additional four monitoring wells were installed – BH501 to BH504 were drilled to a maximum depth of 7.2m BGL (MW05-MW08) and representative groundwater samples were collected from each well.
- One groundwater duplicate was collected during each monitoring event. One trip blank and one trip spike was used during each subsequent monitoring event.
- A total of 8 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde, PFOS/PFOA and VOCs.
- During well construction MW01, MW02, MW04, MW05, MW07 and MW08 were fitted with sealed landfill gas caps. A single ground gas screening assessment was undertaken on 21 May 2021.
- Sampling was completed using a landfill gas analyser (LGA) to measure flow rate, methane %v/v, carbon dioxide %v/v, oxygen %v/v, carbon monoxide (ppm) and hydrogen sulphide (ppm).

Results:

- Encountered groundwater depth was variable but ranged between 3.21-8.14 mBGL. It is noted that MW05 – MW08 were installed at a shallower depths at approximately 6m BGL to target potential groundwater impacts from recent and historical infilled trenches with poultry farm waste– three of these wells were dry during sampling.
- Imported site fill material was observed across the majority of the southern and western portions of the investigation area.
- Minor anthropogenic inclusions were observed at the surface of the site and within the imported fill material excavated including brick, concrete and tile fragments, plastic pipe and several presumed ACM fragments.
- No staining or odours were noted, with the exception of boreholes in deeper infilled trenches with poultry farm waste. Minor surface staining was observed at SS07, SS08 and SS09 surrounding the AST. Test pits undertaken in the trenches identified eggshells and bones. This material was observed to be below depths of 2mBGL. Strong organic odours were noted.
- The footprints of sheds at the site were generally unsealed, with partial asphalt ground cover in some areas.
- Soil: analytical results for heavy metals, TRH/BTEXN, OCP/OPP, PAH, formaldehyde and asbestos in soil were below the LOR or SAC.

  The Auditor notes there was an exceedance of the site-specific ecological criteria for zinc at surface sample SS12 (3900 mg/kg).

- Groundwater: all results for TPH/BTEXN, OCP/OPP, PAH, VOC, formaldehyde and PFAS/PFOA were below the LOR or 95% protection criteria. Heavy metals were below the adopted criteria, with the exception of:
  - Copper in MW03
  - Cadmium, copper, lead, nickel and zinc in MW04
  - Copper and zinc in MW01
  - Cadmium, copper, nickel and zinc in MW04.
- Landfill Gas: high concentrations of methane and carbon dioxide were detected in monitoring wells adjacent to waste burial trenches (MW04, MW05, MW07 and MW08).
  - MW01 and MW02 located in the northern portion of the site reported no elevated methane or carbon dioxide.
  - No discernible flow rates were detected, however, only a single round of screening has been completed, which may not have captured the worst case meteorological scenario.

  - The highest concentration of methane detected was 40.8 %w/w at MW04, the highest concentration of carbon dioxide was 24.2 %w/w at MW08, the highest concentration of oxygen was recorded at 21.5 %w/w at MW02 and the highest concentration of carbon monoxide was 1ppm. Hydrogen sulphide was not detected.

Discussion:

- Minor detections of TRH/PAH were detected in soil above the LOR for samples collected from existing sheds, general poultry farm area (surface samples) and within waste trenches, however, all results were below the adopted SAC.
- Formaldehyde was detected above the LOR in two samples collected form the waste trenches, where concentrations were reported equal to the LOR of 1mg/kg. It is concluded that any past use of formaldehyde during poultry farm operation has not contributed to soil contamination at levels which present a risk to future site receptors.
- Outside of poultry waste (chicken bones and eggshells), no other anthropogenic inclusions were observed within waste trenches.
- Elevated concentrations of TRH were reported in SS07, SS08 and SS09, which were collected from near surface soils adjacent to the AST. No exceedance of SAC were reported.
- Additional presumed ACM was observed on the site surface, however, Martens consider the RAP addresses asbestos contamination. Further refinement of the remedial strategy is recommended to ensure that details are provided to address potential future physical works in the asbestos contaminated material.
- Groundwater is expected to flow north-northeast towards Navigation Creek.
- It is unlikely that groundwater will be encountered during site development works, nor will groundwater be used as part of the proposed development.
- Elevated concentrations of TRH, Benzene and Toluene were detected at MW04 during both monitoring events. PFAS was detected slightly above the LOR at MW04 during both monitoring events. The proximity of MW04 to the burial trenches would suggest that reported contaminant concentrations are likely attributed to past waste burial practices. No monitoring well further downgradient (MW06 and MW08) reported significant concentrations of contaminants, which indicates limited mobility of these contaminants in groundwater.
- The nearest potentially ecological receptor is 350m downgradient of MW04. The absence of these COPCs in wells <20m downslope indicates migration is limited with natural soil attenuation processes sufficient to prevent impacts on downslope receptors.
- Heavy metals were detected during both monitoring events exceeding ecological criteria at MW03 (located in recently placed fill) and MW04 (near burial trenches). The latest monitoring round reported concentrations of copper and zinc in MW01 (downslope of the northernmost poultry shed in an area of no recent site filling) which exceeded ecological criteria. Some elevations in heavy metal concentration may be attributed to former waste burial and past agricultural practices. Given the regional agricultural land use, elevated concentrations of heavy metals would not be unexpected.
- The landfill gas screening assessment identified the presence of elevated levels of methane and carbon dioxide, as well as very depleted levels of oxygen in monitoring wells adjacent to former waste burial trenches. It appears likely that ground gas generation is originating from anaerobic decay of waste in burial trenches in the southern portion of the site.

Conclusions:

- Martens note that the elevated LFG in the southern portion of the site requires some form of management or remediation.

- Asbestos requires remediation to make the site suitable.
- Amendments to the RAP (Martens 2021) should be made to manage LFG and mitigate the risk posed to potential receptors.

9.2.8. Martens Sampling Analysis and Quality Plan: Supplementary Investigation, 285 Finns Road, Menangle NSW, dated July 2021.

This SAQP was prepared to inform further testing requirements at 285 Finns Road, Menangle NSW.

- Additional investigations are required to allow preparation of a data gap closure report and amendments to the existing RAP to detail measures required to make the site suitable for the intended depot and transport depot land use.
- The proposed ground gas assessment has been prepared to better characterise the site ground gas conditions understanding that the remedial approach at the time the SAQP was prepared for the management of the identified ground gases shall involve:

1. Excavation of the presumed source material for GG being buried waste.
2. Remediation of the waste material on site through either land farming to achieve degradation of the organic putrescible material from which the GG are being generated or through waste classification and removal of the material from the site.
3. Validation of the remediated waste material prior to reburial onsite. This shall involve assessment of chemicals and the potential for material to continue to generate potentially hazardous GG.
4. Validation that the site GG conditions are acceptable prior to development works. Where GG conditions are unacceptable, remediation through excavation and replacement of GG impacted fill (and natural material, where required) shall be undertaken.
5. The above source of remediation shall result in a modification to the RAP as previously submitted. Rather than managing the potential GG impacts on the development, the remedial strategy is to be adjusted to allow for the removal of the GG hazard from the site.

It is noted by the Auditor that the above remedial strategy has changed since the SAQP was prepared. The current remedial strategy allows for leaving this material in place and adopting ground gas mitigation measures. Further ground gas monitoring may yield different recommendations.

Further Assessment:

- Asbestos in Soil:
  - Further analysis of asbestos is required to address WHS risks during proposed site earthworks required for the development. Analysis of AF/ FA in fill is proposed to eb undertaken.
  - Investigations and analysis is to be undertaken in all areas with recently placed fill material which are required to be disturbed during the construction phase of the development. These areas include locations where fill has been temporarily placed outside of the proposed extent of filling and where current fill levels are above that required to allow for capping of fill and achieving of design ground levels.
  - Investigations are to be undertaken at twice the rate specified in the NSW EPA (1995) sampling design guidelines, as previous investigations indicate that asbestos is likely in the area. At each investigation location samples are to be collected at a rate of 1 per testing location where fill depth is less than 1.0m, with an additional sample collected for each metre (or part thereof) of encountered fill material:
    - <1m – 1 sample
    - 1-<2m – 2 samples
    - 2-<3m – 3 samples

    - 3-<4m – 4 samples
  - In accordance with the guidelines outlined in section 11.3 of the NEPM (2013), and as discussed and agreed with the Auditor, further investigation of fill material which is not to be disturbed is not proposed.
- Deep Fill and Natural Soils
  - To assess deeper fill material >1m BGL and natural underlying soils, additional investigations are required in areas where fill has been recently placed.
  - The minimum sampling density as noted in the NSW EPA guidelines has been exceeded in the IA from previous investigations, so a reduced rate of 50% of the NSW EPA guidelines has been adopted.
- Above Ground Storage Tank
  - To determine if deep soil contamination is present in the vicinity of the AST, an additional 2 samples are to be collected from depths >0.3m BGL around the AST.
- Proposed Testing Locations:

6. Asbestos in soil (1.2 ha): 46 additional sample locations are proposed – double density
7. Deep fill and natural soils (2.0 ha): an additional 15 sample locations are proposed, as 41 locations have already been sampled to date
8. Additional AST (<0.1 ha): 3 locations have been sampled to date and an additional 2 sample locations are proposed.

Additional Groundwater Investigations:

- Further groundwater monitoring is recommended. The proposed monitoring event will include the same analytical suite as sampled in the SDSI as well as additional analytes associated with the buried poultry farm waste and possible decomposition products of that waste including E. Coli and thermo tolerant coliforms, nutrients (dissolved phosphorus, ammonia, total nitrogen, nitrogen oxides) as well as dissolved GGs (methane, Carbon dioxide and hydrogen sulfide).
- Two deeper groundwater monitoring wells are proposed to be installed downgradient of MW03-MW08 to assist in the delineation of contamination extents and will be included in the sampling event.

Additional Ground Gas Investigations:

- Six additional soil vapour monitoring wells are to be installed around the perimeter of the expected extent of former burial trenches. These are located to further delineate the extent of current GG impacts.
- An additional round of GG monitoring is proposed to further define the GG risks and extent of contamination. The additional round of monitoring shall include all previously tested wells in addition to the additional wells.
- To assist in defining the vertical extent of GG impacts, surface monitoring for hazardous gases will also be undertaken in transects across the surface to assess if any vertical gas migration is present.

Sampling Procedures:

- Test pits will be excavated to a maximum depth of the design finished surface less 700mm for assessment of asbestos for earthworks areas and underlying natural material where sampling of deeper fill and natural materials are required.
- Two boreholes are to be excavated in the vicinity of the AST.
- Soil samples will be collected at a rate of 1 sample per 1m of fill or at notable changes in the soil profile. A minimum of one or two samples will be collected at each location (1 fill and 1 natural).

- Additional deep fill and natural soil samples will be selected for analysis based on visual and olfactory indicators of contamination and to allow for a good vertical and horizontal spread across the site.
- For samples collected from fill, underlying natural material and areas adjacent to the AST, COPC to be included are TRH, BTEXN, heavy metals, OCP/OPP, PCB and formaldehyde.
- Groundwater monitoring wells are proposed to be installed to a depth of 9-10m BGL or a minimum of 1m beneath the SWL. The wells will be developed dry on the day of installation and left to stabilise for one week prior to sampling.
- Ground gas wells will be installed in a general perimeter around the former burial trench area and driveway on the southern side of the nearest existing shed. Wells are to be installed at a depth matching the depth of putrescible waste in burial trenches. This material was identified at a maximum depth of 3.0m BGL.
- Static monitoring of GG wells is to be undertaken using a landfill gas analyser for methane, carbon dioxide, carbon monoxide and hydrogen sulphide and are to be screened for 10 minutes or until parameters are stable, whichever comes first.
- Surface emissions monitoring is to be undertaken in a grid transect at 25m spacing. Readings are to be recorded every 25m as well as any location where the adopted SAC (methane >500ppm) is exceeded. An intraspectra laser will be used for methane monitoring.

The Auditor notes that if the comment provided to Martens on the SAQP in IA02 were addressed, the SAQP was considered to be suitable for further site characterisation works.

9.2.9. Martens Further Detailed Site Investigation: Proposed Depots, 285 Finns Road, Menangle NSW, dated September 2021.

Two DSIs, outlined in sections 9.2.6 and 9.2.7 were prepared for the site to address different phases of the investigations. This DSI includes all investigation previous DSI findings in a compiled format, as well as including findings of the further DSI.

This has been prepared to support a DA for a proposed depot and associated ancillary works at the site. The assessment is limited to the portion of the site where development is proposed and excludes areas of the site which are used for residential purposes and where no development is proposed under the application.

Proposed Development:

1. Relocation of significant volumes of fill material present on site. This generally includes excavation from the southeast and southern areas of the site and placement of fill in the two dams at the site's south western corner. Martens estimate of the order of 19,000m^3 of recently placed fill is to be relocated to achieve the design site levels.
2. Should excess material result, that material would require waste classification and offsite disposal to a site/licensed facility. Martens indicate that preliminary analysis of civil earthworks volumes conclude that of the order of 9,500m^3 of material will require waste classification and offsite disposal.
3. Earthworks shall involve the excavation of placed fill from all areas of the site where existing filled levels are higher than 500mm below the design levels. This is required to permit the construction of hardstand and landscaping layers over any imported fill.
4. Earthworks cut and fill plan shows earthworks required for the development against the prefilling surface. Imported fill alters this analysis.
5. Proposed sheds A and B are to be constructed on areas which have been or are to be filled using recently imported fill.
6. Much of the site is to be sealed with hardstand as either open air pavement (access driveways, circulation areas and parking, or by new shed foundation slabs). The remainder of the areas to be filled with recently imported material shall comprise batters required to form these areas.

Groundwater:

- A total of 10 groundwater monitoring wells (MW01 to MW10) have been installed at the site.
- Over three gauging events from April to August 2021, standing water level ranged from 3.21 in MW04 to 9.76m TOC in MW09. It is noted that MW05, MW07, MW08, and MW10 were dry from April to August.
- Groundwater elevation ranged from 103.72 in MW01 to 116.99mAHD in MW05.
- Martens indicate that MW01, MW02, MW03, MW06 and MW09 are likely to be representative of the main local groundwater system in a water bearing zone located in the underlying shale. Groundwater levels in this system range from 98.38 mAHD in MW01 to 108.69 mAHD in MW06.
- MW04 results indicate it is installed in a perched layer of saturated material within an identified former poultry farm waste burial trenches. This water is at a higher level than the rest of the site. Martens indicate that this well has been installed in a shallow water bearing zone of saturated material. The presence of groundwater at this location is likely due to natural soils around the trenches having lower permeability and causing accumulation of infiltrated stormwater within more permeable trench material. This water is separated from deeper groundwater by clay and shale which is expected to have low permeability.
- Martens indicate that groundwater is flowing north/north-east.

Investigation Phases & Results:

Phase 1: Initial Soil Investigations (10 and 11 March 2021)

- Preliminary fill investigations were undertaken to characterise imported fill material. This includes test pitting in areas where fill was placed following the PSI and sampling.
- 29 test pits (TP101-TP129) were excavated where fill material had recently been placed to a maximum depth of 4.3m BGL.
- Samples were collected from each location and PACM fragments were collected.
- The Auditor notes that 28 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, asbestos in soil and 7 samples for asbestos fragments. Martens collected 29 samples, however, as one location did not contain fill, it was not analysed.
- Fill was detected across large areas of the southern and western portions of the IA and consisted of a clay fill to a maximum depth of 4.0m BGL at TP103. Timber, steel, brick, concrete and tile fragments, PVC and other plastic pipe, geofabric material and several PACM fragments were observed. Staining or odours were not noted.
- Underlying material consisted of silty clay,- natural soil was encountered at all locations.
- Metals, TPH/BTEXN, OCP/OPP, PAH were below the adopted criteria and asbestos in soil was not detected, with the exception of B(a)P at TP112/2.0 (1.5 mg/kg) and TP117/0.1 (2.6 mg/kg) exceeding ecological criteria. Asbestos was detected in all PACM (bonded) samples.

Phase 2: Supplementary Soil Investigations (14 to 17 April 2021)

- Additional investigations to characterise other site areas identified as AECs in the PSI and additional areas identified during the data gap review. Test pits, boreholes and near surface soil samples were collected surrounding sheds, an onsite AST and within areas of former burial trenches.
- 12 boreholes (BH301-BH312) within the site shed footprints (AEC B) to a maximum depth of 0.6m BGL.
- 13 test pits were excavated (TP401-TP413) within the former burial trench area (AEC E) to a maximum depth of 3.8m BGL.
- Soil samples were collected from each location. In addition, 13 near surface soil samples were collected from across the former poultry farm area (AEC C) and adjacent to the onsite AST (AEC D).

- A total of 46 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde and/or asbestos in soil. It is noted additional samples were collected but do not appear to have been analysed.
- Minor surface staining was observed at SS07 – SS09 around the AST.
- The shed footprints were generally unsealed with partial asphalt in some areas. No staining or odours were noted.
- Test pits indicated potential waste disposal trenches including eggshells and bones. This material was observed below depths of 2mBGL. Strong organic odours were noted.
- Heavy metals, TPH/BTEXN, OCP/OPP, PAH, formaldehyde were below the adopted SAC or detection limit, with the exception of an ecological exceedance of the site specific zinc criteria was detected at surface sample location SS12 (3900 mg/kg).
- Asbestos was not detected in soil.

Phase 3: Additional Asbestos in Soil Investigation (29 July to 2 August 2021)

- To assess WHS risks posed by asbestos in fill additional asbestos analysis was completed. –
- It is noted that gravimetric assessment of fill was unnecessary as previous investigations established the presence of bonded ACM within imported fill which required remediation and establishing the %w/w of bonded ACM would not change the remedial strategy.
- Testing for AF/FA had not been completed, however, its presence would not change the remediation strategy. However, due to WHS requirements, sampling methods for AF/FA included:
- Excavation of 49 test pits (TP601 to TP649) to a maximum depth of 5.3m BGL-

  The Auditor notes that of these 49 test pits, samples were analysed from 46 test pits.
- Collection of 500mL AF/FA samples from each location.
- Samples were collected where anthropogenic materials were observed at a rate of one per test pit (minimum) with an additional sample collected per metre of fill beyond 1m. A total of 112 bulk (500mL) soil samples were collected for AF/FA analysis. The Auditor notes that 110 samples were laboratory analysed from 46 of the locations. It is noted that 2 out of the 112 samples were not submitted, and 3 out of the 49 locations were not analysed and/or submitted (based on the laboratory reports).
- AF/FA was identified in two of the 110 samples sent for laboratory analysis at TP625/1.5 (0.0021%) exceeding the adopted SAC of 0.001% and at TP630/0.5 (0.0004%) below the adopted SAC. All other AF/FA samples reported no detects.
- Four of the 110 samples contained bonded asbestos >7mm: TP614/2.0 at 0.05% exceeding the adopted criteria; TP628/0.5 at 0.0033% below the adopted criteria; TP634/0.5 at 0.055% exceeding the adopted criteria; and TP642/0.5 at 0.04% below the adopted criteria.

  The Auditor notes that Martens (2021d) refer to 112 samples being analysed for AF/FA, however, upon review of the laboratory reports, two samples were not submitted, therefore, the Auditor considers 110 samples have been analysed.

Phase 4: Data Gap Closure Investigation (29 July and 10 August 2021)

- To address data gaps identified by the Auditor in IA01, data gap investigations were undertaken. This included additional borehole investigations across the site as well as collection of deeper fill samples and underlying natural material samples in areas of imported fill material where previous testing was limited to shallow (<2m) fill.
- Excavation of 18 test pits (TP601-TP618) in filled areas into the underlying natural material for collection of deeper soil samples and underlying natural materials to a maximum depth of 5.1m BGL.

- 28 boreholes (TP801-TP828) were excavated in areas of historical filling along access roads, within and adjacent to site sheds, the AST and in areas where limited testing had been completed to a maximum depth of 2.5m BGL.
- Two silt dam samples were collected from onsite dams (as close to the centre of the dam).
- Representative samples were collected from fill and natural material.
- Despite numbers referred to in the FDSI, the Auditor considers a total of 66 primary samples have been analysed for a range of COPC including BTEXN, TRH, PAH, OCP/OPP, PCB and/or asbestos, 16 primary samples for nutrients, E.coli and total coliforms, and 3 primary samples for pH and CEC. It is noted that the FDSI refers to additional sample numbers, however, the Auditor has reported the number of primary samples laboratory analysed.
- Access roads comprised crushed sandstone (sandstone gravels in a silty clay matrix) overlying natural clay material. No visual or olfactory signs of contamination were noted.
- Soil in grassed areas of the site between the north west dam and Finns road were found to be consistent with expected natural material found elsewhere on site.
- Dam silts were found to be free from visual or olfactory signs of contamination.
- Heavy metals, TPH/BTEXN, OCP/OPP, PAH, formaldehyde were below the adopted SAC or LOR and no asbestos was detected.

Phase 5: Groundwater Investigations (14 April and 29 July 2021)

- 10 groundwater wells (MW01-MW10) were installed and groundwater samples were collected on three events undertaken on 15 April, 17 May and 10 August 2021.
- Four boreholes BH201-BH204 to a maximum depth of 11.4m BGL on 14 and 15 April 2021 for monitoring well installation.
- Four boreholes (BH501-BH504) were drilled to maximum depths of 7.2m BGL for groundwater monitoring well installation of 29 April 2021.
- Two boreholes were drilled (BH701-BH702) to a maximum depth of 11.7m BGL for monitoring well installation on 29 July 2021.
- Groundwater samples were collected during three events:
  - Sampling of MW01-MW04 on 15 April 2021.
  - Sampling of MW01-MW08 on 17 May 2021.
  - Sampling of MW01-MW10 on 10 August 2021.
- A total of 15 primary samples were analysed for BTEX, TRH, PAH, heavy metals, OCP/OPP, PFAS, PCB, formaldehyde, VOCs and 6 primary samples were analysed for nutrients, E.coli and total coliforms and dissolved methane, carbon dioxide and hydrogen sulphide.
- Water from MW04 was described as “yellowish” and different to other wells. The water from MW04 was significantly shallower than other wells and it is expected that this groundwater is representative of a perched system and not the wider groundwater system.
- Heavy metals were identified above the adopted criteria for arsenic, copper, cadmium, lead, nickel and/or zinc in all wells except MW06.
- Benzene in MW04 exceeded the adopted SAC of 1µg/L, with a concentration of 5µg/L.
- All other results were below the adopted criteria.
- OCP/OPP, PAH, VOC, PFAS were below the adopted criteria.
- Formaldehyde exceeded the adopted criteria in MW04 (maximum concentration of 1.6mg/L).

- Nutrients were below the adopted criteria except for nitrate in MW01 and MW02 and ammonia in MW04 during the third GME. E.coli was detected in MW04,

  The Auditor notes that total coliforms were detected in all wells, with particularly elevated concentrations at MW01 and MW04.

Phase 6: Ground Gas Investigations (2 August 2021)

- Dedicated GG wells (MW11-MW16/BH703-BH709) were installed on 2 August 2021. GG was screened during two monitoring events undertaken on 21 May and 10 August.
- Groundwater monitoring and ground gas wells were fitted within sealed GG caps.
- Surface GG emissions monitoring was undertaken on 10 August 2021.
  - MW01, MW02, MW04, MW05, MW07, MW08 were screened on 21 May 2021.
  - MW01-MW07, MW09, MW11-MW16 on 10 August 2021.
- The maximum flow rate measured was 0.5 L/hr.
- Oxygen ranged from 0.0 to 21.0 %v/v in MW02.
- Methane ranged from 0.1 to 62.1% v/v in MW04.
- CO2 ranged from 0.2 to 24.2 in MW08
- Hydrogen sulphide ranged from 0 to 1ppm in MW05 and MW13.
- Carbon monoxide ranged from 0 to 2ppm in MW01 and MW09.
- Surface monitoring using an intraspectra laser approximately 100mm from the ground surface indicated methane concentrations between 0 and 3.8ppm which is below the adopted criteria of 500ppm.

Ground Gas Risk Classification:

- GSV and CS were calculated for actual measured flow rates as well as 'worse case' 0.5l/hr which was the highest recorded flow rate.
- The GG concentration for any gas ranged from 0.6 in MW01 and MW16 to 62.1 %v/v of methane in MW04.
- GSV at actual flow rate ranged from NA (due to no flow) to 0.034 at MW08.
- GSV at worst case 0.5l/hr flow rate ranged from 0.003 at MW01 and MW16 to 0.311 at MW04.
- CS ranged from 1 to 3, with a CS of 3 at MW04, MW05 and MW08 and a CS of 2 at MW14. A CS of 1 was calculated for the remaining 12 wells (MW01 - MW03, MW06, MW07, MW09 – MW13, MW15 and MW16).

The field sheets for the second round of monitoring indicate that there was no gas cap for MW08 and MW10 and that they were dry. MW10 has not been sampled and it is noted that Martens have given it a CS1 value. This is likely to be accurate, based on the two wells surrounding MW10 to the north-west (MW12) and south-west (MW11) also being calculated as CS1, however the Auditor suggests that Martens do not infer the characteristic situations.

Discussion:

- Fill:
  - The extent of fill has been determined through inspections, review of aerial imagery and test pitting in filled and unfilled areas.
  - Bonded ACM at the surface was observed across the filled area and this is an exceedance of the adopted HSL for asbestos (top 100mm should be free of ACM).

  - It is noted fill material was generally characterised as clay fill with minor anthropogenic inclusions such as timber, steel, brick, concrete and tile fragments; PVC and other plastic pipe; geofabric material; and several PACM fragments.
  - The two B(a)P ecological exceedances are not expected to pose a significant ecological risk due to development implementing a hardstand finish across most of the development area, including the two detection areas.
  - Elevated zinc concentrations exceeding ecological criteria at SS12, adjacent to an existing site shed has been attributed to the likely degradation of galvanised metal used for shed construction. Martens note that ecological receptors in the area are expected to be minimal in consideration of the proposed development, and the risk is considered low. The Auditor recommends that the hotspot be delineated and removed, or testing should be completed to assess the mobility and bioavailability of the contaminant to ecological receptors.
  - Minor detections of TRH and PAH were reported above the LOR for samples from sheds, the poultry farm surface and within buried agricultural waste, however results remained below the SAC.
  - Formaldehyde was detected below the LOR with the exception of two samples from the waste trenches which were reported at the LOR. Martens conclude that past use of formaldehyde has not contributed to soil contamination at levels which pose a risk.
  - Bonded ACM was detected within fill and remediation of the site will be required to address bonded ACM. Gravimetric analysis was not completed as the proposed remediation strategy will involve cap and contain and implementation of an EMP therefore as all imported fill is deemed to contain asbestos, the quantity is not necessary.
  - AF/FA was identified in two out of 110 primary samples, with one above the adopted criteria. Martens indicate this is likely due to fragmentation of bonded ACM by compaction and earthworks during material placement-do we say somewhere else in the report how many samples.
- Former Burial Trenches (soil):
  - The extent has been derived based on aerial imagery from 2002 to 2015.
  - Burial trenches contained PAHs, TRH and formaldehyde above the LOR, however all concentrations were below the SAC and not considered to pose a risk to future site use.
- Natural Soil:
  - Concentrations of chemicals were detected below the SAC and asbestos was not detected. Martens note that this indicates leaching of contaminants is unlikely to have occurred from the fill material based on the results and nature of contaminants identified in fill material.
- Groundwater:
  - Groundwater is expected to flow north, north-east towards Navigation Creek. It is noted that the permeability of the shale water bearing zone is expected to be very low. The groundwater investigation identified a water bearing zone between 5 and 7m BGL. The groundwater in MW04 is considered to be a perched water bearing zone due to former burial trenches.
  - Of the 10 groundwater wells installed, 6 wells were sampled and 4 were dry.
  - Elevated cadmium, copper, lead, nickel and zinc were attributed to the site and surrounding rural land use. The Auditor notes arsenic was also detected within MW04 in the burial trench area.
  - Elevated nutrient and concentrations were reported in most wells with MW01 and MW02 reporting nitrate exceeding drinking water guidelines. Elevated coliform levels were noted at a number of locations and E.coli detections were made in MW03 exceeding the criteria. Martens indicate this is likely due to the former poultry farm use.

  - Elevated methane in groundwater was detected in MW03, MW04 and MW06. Given the proximity of these wells to the former trenches, and absence of methane in other monitoring wells, it is expected that methane in groundwater is attributed to decomposition of putrescible burial trench materials. Elevated carbon dioxide was detected at MW04 which is also attributed to decomposition. Elevated carbon dioxide was also noted at MW01 and MW02, and Martens have attributed the concentrations to be indicative of natural water quality (as occurs in shale water bearing zones), rather than as a result of site activities.

    The Auditor notes that MW03 also had elevated carbon dioxide.
  - Elevated benzene and formaldehyde at MW04 were observed and contaminants are likely attributed to waste material in former burial trenches. It is anticipated that permeability of the surrounding natural soils is significantly lower than that of the waste resulting in the retention of infiltrated water in trenches. Contaminants from buried trench material have leached into this retained water in the shallow perched water bearing zone. Comparison of the results to the rest of the site indicate that local perched water contamination has not impacted the deeper groundwater system in the shale and the risk posed by the perched groundwater system is considered low.
  - Minor elevated PFAS concentrations were detected in groundwater at MW01 and MW04. Concentrations are below the 95% protection limit and are not considered a risk to future site receptors.
  - Martens note the proposed land use does not include bore water and will be serviced by onsite rainwater tanks. Site earthworks are not expected to encounter the deeper aquifer or the shallow aquifer. The licensed groundwater well in the southern site boundary is installed to 145.9m into the first available aquifer in sandstone beneath the shale which begins at 78m. The water bearing zones assessed as part of this investigation are excluded from the bore as it is cased to 86.9m.
- Ground Gas:
  - Elevated methane and carbon dioxide and depleted oxygen were detected in wells (not all) adjacent to the burial trenches. Additional GG wells were installed further north of the trenches which also detected elevated concentrations of GG, however lower than the wells closest to the trenches.
  - MW01 and MW02 located in the site's north did not report elevated methane or CO2. Martens note that GG generation is originating from the anaerobic decay of waste in burial trenches in the southern portion of the site.
  - The CS at the site ranges from 1 to 2, however as MW04, MW05 and MW08 have concentrations of GG >20%v/v, they are reclassified as CS3.
  - Martens consider the GG is venting through site soils and the placement of fill over the trenches may have led to some degassing of the trench due to overburden pressures and changes in preferential pathways. Martens do not know if the GG observations to the north of the trenches predated the filling or are a result of filling.
  - As part of the earthworks, reductions in fill heights over the trenches will occur and it is anticipated this will reverse any acceleration to degassing caused by current fill. The construction of hardstand over these areas will likely maintain the effect of preventing or reducing venting of GG other than along the southern edge of the proposed filling.
  - Martens consider that the placement of fill and/or hardstand shall maintain a similar reduced oxygen availability to buried waste and therefore anaerobic decomposition shall continue and GG generation shall not be significantly changed other than as occurs through progressive decomposition of organic inclusions. –
  - Two GG events have been undertaken. The NSW EPA (2020) recommends sufficient monitoring events be undertaken to assess GG risks in varying atmospheric conditions. Investigations to date

are considered unlikely to have captured a worst case scenario. It is considered unlikely that the CS will increase as a result of further investigations, however, Martens recommend additional monitoring be undertaken to capture data over periods of change in atmospheric conditions and confirm future mitigation measures proposed as part of the development and provide appropriate protection levels.

Conclusions:

- A RAP is required to manage site asbestos, construction of a capping layer and mitigation measures for potential GG risks.
- Martens conclude that groundwater is not considered to warrant remediation or further management as the risk of migration of a significant mass of pollutant from the site through the low permeability shale in the water bearing zone is very low. The shale water bearing zone in which the metals and nutrients are encountered is unlikely to be an economically valuable water source due to low anticipated permeability and likely saline conditions. Other than the site well, there are no downgradient groundwater users which are expected to be impacted by the contaminants. The depth to local groundwater tables indicates the ultimate surface water receiving environment is likely to be a considerable distance from the site.

9.2.10 Re: Preliminary Volume Assessment: 285 Finns Road, Menangle NSW, dated 2 September 2021.

Martens provided a letter in response to the Auditor's comment in Interim Advice Letter 03 surrounding the requirement for Martens to indicate an estimate on the volume of imported fill material and the expected volume required to be reworked and disposed offsite.

- Martens used LiDar data and the current land surface plans from Chadwick Cheng's May 17 2021 survey of the site, and design levels from Martens planset PS03 Release 14.
- Martens note some inaccuracy between the calculated volumes using LiDar which is due to the survey surface in areas of the site where earthworks have not been observed between the LiDar survey and land survey. Martens analysed the LiDar and survey surfaces areas of the site where earthworks have not been observed between the LiDar survey and the land survey. In areas where fill had not been placed, the LiDar surface was approximately 3200m^3 lower than the surveyed surface over an area of approximately 2.7ha. Martens estimate a variance of approximately 120mm which is considered acceptable for LiDar variability.

Estimates:

- The preworks surface compared to the Chadwick Cheng survey concludes that approximately 27,000m^3 of material has been imported to the site.
- Over the 1.6 ha area in which fill has been placed, the uncertainty derived from LiDar is expected to be an order of +2000m^3. It is likely that the total imported volume to the site is therefore of the order of 35,000m^3.
- Analysis of the material presently stockpiled in areas of the site where filling is not proposed; and material placed at levels in excess of the required pre capping surface, concludes that of the order of 19,000m^3 of fill material will be required to be excavated and relocated on site.
- The estimated volume of material required to be placed in areas of the site where current levels are below the pre capping surface levels indicates of the order of 8500m^3 of material will require placement to achieve the pre capping surface.
- Comparison of the fill volume to the volume to be placed concludes that of the order of 10,500m^3 of fill material will be in excess of site earthworks requirements. As advised by geotechnical and civil engineers, the placement of fill material will be likely required at higher densities than what has been

currently placed. This would likely result in a reduction of the volume of excess spoil. An increase in density of 10% would reduce the volume of fill material to be disposed offsite to approximately 9,500m^3.

10. SITE ASSESSMENT CRITERIA

The selected criteria and data evaluation methods adopted for the various investigation and validation phases of works conducted by the consultants are detailed and discussed in this section.

10.1. Assessment Criteria for Soil

The assessment criteria have been chosen in accordance with current Australian and NSW EPA guidelines. Australian Guidelines have been used in preference to international guidelines where available. The criteria provided are the most current and widely accepted for Tier 1 assessment of land use suitability at present in Australia and have generally been developed using a risk-based approach. Criteria from the NEPM (NEPC, 2013) Schedule B1 were utilised for this assessment.

The appreciate assessment criteria for the proposed site use includes the following:

- Health Investigation Level D (commercial/industrial land use) – NEPC, 2013.
- Health Screening Level D (commercial/industrial land use for fine grained soils - Clay) – NEPC, 2013.
- Ecological Investigation Levels (commercial/industrial) – NEPC, 2013.
  - It is noted that EILs were calculated using site specific physiochemical properties (pH and CEC).
- Ecological Screening Levels (commercial/industrial – fine grained soil) – NEPC, 2013.
- Management Limits for Petroleum Hydrocarbons (commercial/industrial – fine grained soil) – NEPC, 2013.
- Asbestos Health Screening Levels D (commercial/industrial land use) – NPEC, 2013.

The Auditor has reproduced the criteria in Table 6 below.

Table 6 Assessment Criteria for Soil (mg/kg)

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D
Heavy Metals						
Arsenic	4	3000	-	160	-	-
Cadmium	0.4	900	-	-	-	-
Chromium	1	3600	-	670	-	-
Copper	1	240 000	-	290	-	-
Lead	1	1500	-	1800	-	-
Nickel	1	6000	-	320	-	-
Mercury	0.1	730	-	-	-	-
Zinc	1	400 000	-	670	-	-
BTEX						
Benzene	0.2	-	4/6/9/20	95	-	-
Toluene	0.5	-	NL/NL/NL/NL	135	-	-
Ethylbenzene	1	-	NL/NL/NL/NL	185	-	-
Xylene	3	-	NL/NL/NL/NL	95	-	-
Total Recoverable Hydrocarbons						
F1 C6-C10 minus BTEX	25	-	310/480/NL/NL	215	800	-

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D
F2 >C10 – C16 less naphthalene	50	-	NL/NL/NL/NL	170	1000	-
F3 >C16 – C34	100	-	-	2500	5000	-
F4 >C34 – C40	100	-	-	6600	10 000	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene	0.05	-	-	1.4	-	-
Carcinogenic PAHs	0.5	40	-	-	-	-
Total PAH	0.05	4000	-	-	-	-
Naphthalene	0.1	-	NL/NL/NL/NL	370	-	-
Organochlorine Pesticides						
Aldrin	0.1	45	-	-	-	-
Dieldrin	0.1		-	-	-	-
Chlordane	0.1	530	-	-	-	-
Endrin	0.1	100	-	-	-	-
Endrin Aldehyde	0.1	-	-	-	-	-
Endosulfan I	0.1	2000	-	-	-	-
Endosulfan II	0.1	-	-	-	-	-
Endosulfan Sulfate	0.1	-	-	-	-	-
Heptachlor	0.1	50	-	-	-	-
Heptachlor epoxide	0.1	-	-	-	-	-
DDT + DDE + DDD	0.1	3600	-	640 (DDT)	-	-
Methoxychlor	0.1	2500	-	-	-	-
a-BHC	0.1	-	-	-	-	-
b-BHC	0.1	-	-	-	-	-
d-BHC	0.1	-	-	-	-	-
g-BHC	0.1	-	-	-	-	-
Hexachlorobenzene	0.1	80	-	-	-	-
Organophosphorus Pesticides						
Azinophos methyl	0.1	-	-	-	-	-
Bromophos-ethyl	0.1	-	-	-	-	-
Chlorpyrifos	0.1	2000	-	-	-	-
Chlorpyrifos methyl	0.1	-	-	-	-	-
Diazinon	0.1	-	-	-	-	-
Dichlorvos	0.1	-	-	-	-	-
Dimethoate	0.1	-	-	-	-	-
Ethion	0.1	-	-	-	-	-

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D
Fenitrothion	0.1	-	-	-	-	-
Malathion	0.1	-	-	-	-	-
Ronnel	0.1	-	-	-	-	-
Polychlorinated Biphenyls	0.1	7	-	-	-	-
Asbestos						
Asbestos Detected	-	-	-	-	-	D
Bonded Asbestos (%w/w)	-	-	-	-	-	0.05
AF/FA (%w/w)	-	-	-	-	-	0.001

Notes:
NL: Non-Limiting

ND: Not Detected

D: Detected

F1: To obtain F1, subtract the sum of BTEX concentrations from the C6-C10 fraction.

F2: To obtain F2, subtract Naphthalene from the >C10 – C16 fraction.

F3: >C16 – C34.

F4: >C34 – C40.

1: Site specified EILs have been derived by Martens.

Source Depth:

a: 0m to <1m

b: 1m to <2m

c: 2m to <4m

d: 4m+

The Auditor is satisfied that the assessment criteria applied during the site assessment were suitable for site characterisation based on the site history and proposed land use.

10.2. Criteria for Groundwater

In accordance with DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*, groundwater acceptance criteria are based on environmental values considered relevant for groundwater use at the site and surrounding uses of groundwater and surface waters that may be affected by the site.

Groundwater criteria appropriate for the site were the:

- Water Quality Guidelines for Fresh and Marine Water – ANZG, 2018.
  - Fresh Water 95% level of protection of aquatic ecosystems. The 99% protection was applied for the bio-accumulative analytes.
- The Auditor notes that the Ecological Guideline Values for 95% Species Protection in a Freshwater Environment should have been included – PFAS NEMP, 2020
- Health Screening Level D (commercial/industrial) – NEPC, 2013.

- Drinking Water Guidelines – ADWG, 2018.

The Auditor has reproduced the criteria in Table 7 below. Note that whilst other analytes were analysed, only those with criteria are reproduced in Table 7.

Table 7 Assessment Criteria for Groundwater (µg/L)

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) Silt	NEMP Fresh Water [3]	Drinking Water Guideines (ADWG)
Heavy Metals					
Arsenic	1	24 (As III) 13 (As V)	-	-	10
Cadmium	0.1	0.06[2]	-	-	2
Chromium	1	3.3 (Cr III) 1 (Cr VI)	-	-	50
Copper	1	1.4	-	-	2000 1000 (aesthetic)
Lead	1	3.4	-	-	10
Mercury	0.05	0.06[2]	-	-	1
Nickel	1	11	-	-	20
Zinc	1	8	-	-	3000 (aesthetic)
BTEX					
Benzene	1	950	30 000/30 000/35 000	-	1
Toluene	1	180	NL/NL/NL	-	800 25 (aesthetic)
Ethylbenzene	1	80	NL/NL/NL	-	300 3 (aesthetic)
o-Xylene	1	350	NL/NL/NL	-	600 20 (aesthetic)
m/p-Xylene	2	75 (m)/200(p)		-	
Total Recoverable Hydrocarbons					
F1 C6 – C10 minus BTEX	10	-	NL/NL/NL	-	-
F2 >C10 – C16 less Naphthalene	50	-	NL/NL/NL	-	-
F3 >C16 – C34	100	-	-	-	-
F4 >C34 – C40	100	-	-	-	-
Total Petroleum Hydrocarbons					
C6-C9	10	-	-	-	-
C10-C14	50	-	-	-	-
C15-C28	100	-	-	-	-
C29-C36	100	-	-	-	-
Per- and Polyfluoroalkyl Substances					

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) Silt	NEMP Fresh Water [3]	Drinking Water Guideines (ADWG)
PFOS	0.01	-	-	0.13 0.00023[2]	-
PFOA	0.01	-	-	220 19[2]	0.56
PFHxS	0.01	-	-	-	-
Sum of PFAS	0.01	-	-	-	-
Sum of PFHxS and PFOS	0.01	-	-	-	0.07
Polycyclic Aromatic Hydrocarbons					
Total PAHs	0.001	-	-	-	-
Anthracene	1	0.01[2]	-	-	-
Benzo(a)pyrene	1	0.1[2]	-	-	0.01
Naphthalene	1	16	NL/NL/NL	-	-
Fluoranthene	1	1[2]	-	-	-
Phenanthrene	1	0.6[2]	-	-	-
Organochlorine Pesticides					
DDE	0.2	-	-	-	-
DDD	0.2	-	-	-	-
DDT	0.2	0.006[2]	-	-	9
Aldrin	0.2	0.001[1]	-	-	0.3 (Aldrin & Dieldrin)
b-BHC	0.2	-	-	-	-
Chlordane	0.2	0.03[2]	-	-	-
d-BHC	0.2	-	-	-	-
Dieldrin	0.2	0.01[1]	-	-	-
Endosulfan I	0.2	0.03[2]	-	-	20
Endosulfan II	0.2		-	-	-
Endosulfan Sulphate	0.2	-	-	-	-
Endrin	0.2	0.01[2]	-	-	-
Endrin Aldehyde	0.2	-	-	-	-
g-BHC	0.2	0.2	-	-	10
Heptachlor	0.2	0.09	-	-	0.3
Heptachlor epoxide	0.2	-	-	-	-
Methoxychlor	0.2	0.005[1]	-	-	300
Organophosphorus Pesticides					
Azinphos methyl	0.2	0.01[2]	-	-	30
Bromophos-ethyl	0.2	-	-	-	10
Chlorpyrifos	0.2	0.01	-	-	10

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) Silt	NEMP Fresh Water [3]	Drinking Water Guideines (ADWG)
Chlorpyrifos methyl	0.2	-	-	-	-
Diazinon	0.2	0.01	-	-	4
Dichlorvos	0.2	-	-	-	5
Dimethoate	0.2	0.15	-	-	7
Ethion	0.2	-	-	-	4
Fenitrothion	0.2	0.2	-	-	7
Malathion	0.2	0.05	-	-	70
Parathion	0.2	0.004	-	-	20
Ronnel	0.2	-	-	-	-
Formaldehyde	100	-	-	-	500
Volatile Organic Compounds (VOCs)					
1,2,3-trichlorobenzene	1	10	-	-	-
1,2,4-trichlorobenzene	1	160	-	-	1500
1,2-dichlorobenzene	1	160	-	-	1500 1 (aesthetic)
1,3-dichlorobenzene	1	260	-	-	20 (aesthetic)
1,4-dichlorobenzene	1	60	-	-	40 0.3 (aesthetic)
Chlorobenzene	1	55	-	-	300 10 (aesthetic)
Carbon tetrachloride	1	240	-	-	3
Chloroform	1	770 370[2]	-	-	-
1,1-dichloroethene	1	700	-	-	30
1,2-dichloroethane	1	1900	-	-	3
Bromomethane	10	-	-	-	1
1,2,4-trimethylbenzne	1	170 85[2]	-	-	-
1,3,5-trimethylbenzne	1	-	-	-	-
1,1-Trichloroethane	1	6500	-	-	-
1,1,1-Trichloroethane	1	270	-	-	-
1,1,2,2-Tetrachloroethane	1	400	-	-	-
Isopropylbenzene	1	30	-	-	-
n-butylbenzene	1	-	-	-	-
n-propylbenzne	1	-	-	-	-
p-isopropylbenzene	1	-	-	-	-
Sec-butylbenzene	1	-	-	-	-

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) Silt	NEMP Fresh Water [3]	Drinking Water Guideines (ADWG)
1,2-Dichlorobenzene	1	160	-	-	-
1,2-Dichloropropane	1	900	-	-	-
1,3-Dichloropropane	1	1100	-	-	-
1,2,3-Trichlorobenzene	1	10	-	-	-
Styrene	1	-	-	-	30 4 (aesthetic)
Tert-butylbenzene	1	-	-	-	-
Vinyl Chloride	10	100	-	-	0.3
Biological					
Total Coliforms by MF (CFU/100mL)	-	-	-	-	-
E.coli (CFU/100mL)	1	-	-	-	0
Inorganics					
Free CO_2	0	-	-	-	-
Ammonia as N	5	900	-	-	500 (Aesthetic)
Nitrate (as N)	5	-	-	-	50 000
Nitrite as N	5	-	-	-	3000
Nitrogen (Total)	100	-	-	-	-
Total Phosphorus (Organic Phosphate)	50	-	-	-	-
Reactive Phosphorus as P (orthophosphate as P)	5	-	-	-	-
Sulphide	500	-	-	-	-
Organic					
Methane	5	-	-	-	-

Notes: -

1: Unknown species protection level.

2: To account for the bio accumulative nature of this toxicant, it is recommended that the 99% species protection level DGV is used for slightly to moderately disturbed systems.

NL: Non-Limiting

F1: To obtain F1, subtract the sum of BTEX concentrations from the C6-C10 fraction.

F2: To obtain F2, subtract Naphthalene from the >C10 – C16 fraction.

F3: >C16 – C34.

F4: >C34 – C40.

Source Depth:

a: 2m to <4m

b: 4m to <8m

c: 8m+

The Auditor agrees the assessment criteria for groundwater are appropriate for site characterisation. It is noted that Martens have included the drinking water criteria and the Auditor has included the aesthetic criteria from the Drinking Water Guidelines (ADWG 2018) where applicable. It is however, noted that this has been included as a screening measure and it is understood that potable water is not proposed or currently in use at the site. There is a bore on the southern site boundary installed in a deep groundwater aquifer and it is understood that this bore is used for irrigation purposes only.

Martens note the proposed land use does not include bore water and will be serviced by onsite rainwater tanks. Site earthworks are not expected to encounter the deeper aquifer or the shallow aquifer. The licensed groundwater well in the southern site boundary is installed to 145.9m into the first available aquifer in sandstone beneath the shale which begins at 78m. The water bearing zones assessed as part of this investigation are excluded from the bore as it is cased to 86.9m.

10.3. Criteria for Soil Vapour

Soil vapour were not assessed and criteria for soil vapour were not presented. See Section 10.5 below for the Auditors discussion of the absence of soil vapour sampling.

10.4. Criteria for Ground Gas

In accordance with NSW EPA Assessment and Management of Hazardous Ground Gases (2020), NSW EPA (2016) Solid Waste Landfills Guidelines and Safe Work Australia (2018) Workplace Exposure Standards, ground gas acceptance criteria are considered relevant for the site.

Ground gas criteria appropriate for the site were the:

- Subsurface Monitoring – NSW EPA, 2016.
- Surface Emissions Monitoring – Safe Work Australia, 2018.
- The Auditor has included Workplace Exposure Standards for Airborne Contaminants as a screening tool – Safe Work Australia, 2019.

The Auditor has reproduced the criteria in Table 8 below. Note that whilst other analytes were analysed, only those with criteria are reproduced in Table 8.

Table 8 Ground Gas Assessment Criteria (% v/v)

Gas	Instrument Limit	Solid Waste Landfills (2016)	Safe Work (2018)	Safe Work (2019)
Methane %v/v	0.1	1.0	-	-
Carbon Dioxide %v/v	0.1	1.5	-	-
Methane (surface emissions) ppm	0.0	-	500	-
Carbon Monoxide ppm	-	-	-	30
Hydrogen Sulfide ppm	-	-	-	10

10.5. Data Evaluation

Martens (2021) adopted a direct comparison approach to use of the guidelines. Statistical analysis was not relied upon.

10.6. Audit Discussion

10.6.1. Appropriateness of Criteria

The Auditor is satisfied that the criteria adopted for soil, groundwater and ground gas are appropriate to the proposed site use.

Soil vapour was not assessed, and the Auditor is satisfied that there is no indication that volatile contaminants are present. See Section 11.3 for further discussion.

10.6.2. Criteria and LORs

Tabulated comparison of criteria and assessment LORs for soils is presented in Table 6 above. Criteria and assessment LORs for groundwater is presented in Table 7 above. Criteria for ground gas is presented in Table 8 above. All LOR values were below the adopted criteria and are therefore acceptable, with the exception of the following:

Where the 99% protection criteria was adopted, the criteria for cadmium, PFOS, anthracene, benzo(a)pyrene, phenanthrene, DDT, aldrin, chlordane, dieldrin, endosulfan, endrin and azinphos methyl were lower than the laboratory LOR.

Where the 95% protection criteria was adopted, the criteria for heptachlor, methoxychlor, chlorpyrifos, diazinon, dimethoate, malathion and parathion were lower than the laboratory LOR.

Due to the sensitivity of the criteria for cadmium, PAHs, PFAS and pesticides, the Auditor considers the data acceptable as for analytes which have an applicable criterion, groundwater results were below the adopted LOR, except for cadmium and PFOS in MW04 which is not representative of the regional groundwater system.

11. ASSESSMENT OF INVESTIGATION RESULTS

This section provides an overview of the soil results obtained from the environmental investigations conducted at the site. The figures provided in Appendix A show the site layout and sampling locations.

11.1. Soil

A summary of the primary soil sample results is reproduced by the Auditor in Table 9 below. The Auditor has summarised all data from Martens (2021) irrespective of geological strata with the intent of identifying those contaminants which were identified at the site as requiring remediation. This evaluation is intended to be a high-level screening assessment of the data to identify which contaminants may be problematic at the site. In addition, the Auditor has also provided data from imported VENM/ENM as detailed in waste classification reports from Alliance Geotechnical (2017/2018) and Geotest Services (2018). Limited data has also been provided for the imported "Recovered Aggregate" classified by Dirt Doctors (2019).

Soil data are summarised in Table 9 below. Concentrations exceeding adopted criteria are highlighted in red.

Resolution by strata, where required, is discussed in Section 11.5 below.

Table 9 Soil Analytical Data (mg/kg)

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D	Martens (2021)		Imported VENM/ENM (2017/2018)		Imported Recovered Aggregate (2019)	
							Min	Max	Min	Max	Min	Max
Heavy Metals												
Arsenic	2 to 4	3000	-	160	-	-	<4	12	<3	28	2	7
Cadmium	0.3 to 0.4	900	-	-	-	-	<0.4	0.6	<0.3	0.4	<0.3	<0.3
Chromium	1 to 5	3600	-	670	-	-	5	240	1.2	32	0.9	44
Copper	0.5 to 5	240 000	-	290	-	-	4	70	<0.5	20	1.5	7.8
Lead	1 to 5	1500	-	1800	-	-	5	120	2	45	2	10
Nickel	0.5 to 5	6000	-	320	-	-	1	43	<0.5	7.7	<0.5	19
Mercury	0.1 to 0.05	730	-	-	-	-	<0.1	0.1	<0.05	<0.1	<0.05	0.07
Zinc	1 to 5	400 000	-	670	-	-	9	3900	<2	46	6	36
BTEX												
Benzene	0.2	-	4/6/9/20	95	-	-	<0.2	<0.2	<0.1	<0.1	-	-

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D	Martens (2021)		Imported VENM/ENM (2017/2018)		Imported Recovered Aggregate (2019)	
							Min	Max	Min	Max	Min	Max
Toluene	0.5	-	NL/NL/NL/NL	135	-	-	<0.5	<0.5	<0.1	<0.1	-	-
Ethylbenzene	1	-	NL/NL/NL/NL	185	-	-	<1	<1	<0.1	<0.1	-	-
Xylene	3	-	NL/NL/NL/NL	95	-	-	<3	<3	<0.3	<0.3	-	-
Total Recoverable Hydrocarbons												
F1 C6-C10 minus BTEX	25	-	310/480/NL/NL	215	800	-	<25	<25	<20	<20	-	-
F2 >C10 – C16 less naphthalene	50	-	NL/NL/NL/NL	170	1000	-	<50	160	<50	<50	-	-
F3 >C16 – C34	100	-	-	2500	5000	-	<100	1300	<100	<100	-	-
F4 >C34 – C40	100	-	-	6600	10 000	-	<100	420	<100	<100	-	-
Total Petroleum Hydrocarbons												
C6-C9	20	-	-	-	-	-	-	-	<20	<20	-	-
C10-C14	20	-	-	-	-	-	-	-	<20	<20	-	-
C15-C28	50	-	-	-	-	-	-	-	<50	<50	-	-
C29-C36	50	-	-	-	-	-	-	-	<50	<50	-	-
C10-C36	50 to 110	-	-	-	-	-	-	-	<50	<110	-	-
Polycyclic Aromatic Hydrocarbons												
Benzo(a)pyrene	0.05 to 0.5	-	-	1.4	-	-	<0.05	2.6	<0.1	0.2	-	-
Carcinogenic PAHs	0.2 to 0.5	40	-	-	-	-	<0.5	3.7	<0.2	<0.5	-	-
Total PAH	0.2 to 0.8	4000	-	-	-	-	<0.05	26	<0.2	1.4	-	-
Naphthalene	0.1 to 0.5	-	NL/NL/NL/NL	370	-	-	<0.1	0.2	<0.1	<0.5	-	-
Organochlorine Pesticides												
Aldrin	0.05 to 0.1	45	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Dieldrin	0.05 to 0.1		-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Chlordane	0.1	530	-	-	-	-	<0.1	<0.1	<0.1	<0.1	-	-

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D	Martens (2021)		Imported VENM/ENM (2017/2018)		Imported Recovered Aggregate (2019)	
							Min	Max	Min	Max	Min	Max
Endrin	0.05 to 0.1	100	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Endrin Aldehyde	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Endosulfan I	0.05 to 0.1	2000	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Endosulfan II	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Endosulfan Sulfate	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Heptachlor	0.05 to 0.1	50	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Heptachlor epoxide	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
DDT + DDE + DDD	0.05 to 0.1	3600	-	640 (DDT)	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Methoxychlor	0.1 to 0.2	2500	-	-	-	-	<0.1	<0.1	<0.2	<0.2	-	-
a-BHC	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
b-BHC	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
d-BHC	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
g-BHC	0.05 to 0.1	-	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Hexachlorobenzene	0.05 to 0.1	80	-	-	-	-	<0.1	<0.1	<0.05	<0.05	-	-
Organophosphorus Pesticides												
Azinophos methyl	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Bromophos-ethyl	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Chlorpyrifos	0.1	2000	-	-	-	-	<0.1	<0.1	-	-	-	-
Chlorpyrifos methyl	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Diazinon	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Dichlorvos	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Dimethoate	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Ethion	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Fenitrothion	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-

Analyte	LOR	HIL D	HSL D CLAY (a/b/c/d)	EIL/ESLs[1] (Fine Grained)	Management Limits (Fine Grained)	Asbestos HSL D	Martens (2021)		Imported VENM/ENM (2017/2018)		Imported Recovered Aggregate (2019)	
							Min	Max	Min	Max	Min	Max
Malathion	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Ronnel	0.1	-	-	-	-	-	<0.1	<0.1	-	-	-	-
Polychlorinated Biphenyls	0.1 to 0.5	7	-	-	-	-	<0.1	<0.1	<0.5	<0.5	-	-
Formaldehyde	1	-	-	-	-	-	<1	**1**	-	-	-	-
Asbestos												
Asbestos Detected	-	-	-	-	-	D	ND	D	ND	ND	ND	ND
Bonded Asbestos (%w/w)	-	-	-	-	-	0.05	ND	0.055	-	-	<0.01	<0.01
AF/FA (%w/w)	-	-	-	-	-	0.001	ND	0.0021	-	-	-	-
Nutrients												
Total Nitrogen	-	-	-	-	-	-	320	**1800**	-	-	-	-
Nitrate as N	-	-	-	-	-	-	<0.5	**2**	-	-	-	-
Nitrite as N	-	-	-	-	-	-	<0.1	**0.6**	-	-	-	-
Ammonia as N	-	-	-	-	-	-	2.6	**9.7**	-	-	-	-
Phosphate as P	-	-	-	-	-	-	<0.5	**<0.5**	-	-	-	-
E. Coli (MPN/100g)	-	-	-	-	-	-	<200	**4900**	-	-	-	-
Total Coliforms (MPN/100g)	-	-	-	-	-	-	<200	**160 000**	-	-	-	-

Notes:
NL: Non-Limiting

ND: Not Detected

D: Detected

NT: Not Tested

F1: To obtain F1, subtract the sum of BTEX concentrations from the C6-C10 fraction.

F2: To obtain F2, subtract Naphthalene from the >C10 – C16 fraction.

F3: >C16 – C34.

F4: >C34 – C40.

1: Site specified EILs have been derived by Martens.

* This detection is on the edge of where GSW ends and ENM begins, therefore the detection of B(a)P is likely attributed to this. A signed declaration has been included in the report to confirm all material imported from Darlinghurst Road Precinct is ENM.

The Auditor is satisfied that the soil data is adequate to characterise the contamination status at the site. During the three DSI's, a total of 158 samples have been analysed across fill and natural material from 117 soil locations, and 2 dam locations for a range of contaminants of potential concern, including heavy metals, BTEXN, TRH, PAH, OCP/OPP, PCBs, formaldehyde, nutrients, E.coli and coliforms, and asbestos presence/absence. In addition, a total of 7 asbestos fragments were analysed and 110 samples were analysed for asbestos (AF/FA) from 46 locations. For a site approximately 4.032 ha in size, a minimum of 50 sampling locations are required in accordance with the sampling design guidelines (NSW EPA, 1995). An additional 4 fragments of ACM were observed on the surface of the site throughout the recently filled area, but were not sampled. Throughout the Audit process, the Auditor recommended the following: nutrients and E.coli/coliforms be analysed in the vicinity of the burial trenches; deeper fill and natural material be characterised; the area that had not recently been filled, but within the Audit scope be characterised even if natural material is present only; the roadways be characterised; the soil within the two dams remaining on the Audit site be sampled; and the deeper material surrounding the AST be analysed.

It is noted there is a slight discrepancy between sample numbers reported above and sample numbers reported by Martens (2021d). The Auditor considers the above numbers are representative of the tabulated data in the Martens reports and the laboratory reports attached as appendices.

All PACM fragments had a positive detection for asbestos. It was agreed with Martens that after the DSI and SDSI identified the presence of asbestos contamination in fill material, the NEPM (2013) gravimetric method of asbestos analysis originally recommended by the Auditor was not required as all fill material would be deemed asbestos contaminated and required remediation. The Auditor requested that AF/FA be sampled for instead to determine what management measures and asbestos controls need to be put in place during remediation and earthworks for WHS requirements. As per Section 11.3 of the NEPM, additional gravimetric analysis of soils within areas outside of proposed areas of disturbance (i.e. areas of cut) is not required if a proposed conservative remedial strategy is implemented (such as cap and contain). These locations were filled areas of the site and Martens note that AF/FA is likely a result of fragmentation of bonded ACM material through mechanical disturbances and earthworks. The Auditor notes that due to detections of AF/FA at the site, it should be treated as a friable area during earthworks. ACM was not detected during presence/absence sampling, however, of the 110 samples analysed for AF/FA, a positive detection for ACM was identified at 4 locations (TP614/2.0 – 0.05% w/w; TP628/0.5 – 0.0033% w/w; TP634/0.5 – 0.055% w/w; and TP642/0.5 – 0.04% w/w). A total of two locations had a positive detection for AF/FA (TP625/1.5 – 0.0021% w/w FA; and TP630/0.5 – 0.0004% w/w FA). Of these locations, one sample equalled the criteria for ACM, and one sample exceeded the criteria for ACM and FA. The exceedance locations all fall within the southern, central and central western portion of the site.

It is noted that exceedances of site-specific ecological criteria of zinc (3900 mg/kg) were reported for surface sample SS12, located on the north eastern boundary of the second southernmost shed. Martens attribute the zinc exceedance to the degradation of galvanised metal used for shed construction. It is noted that this sample was not delineated by Martens, however nearby samples did not report concentrations above the adopted criteria which indicates it is likely to be an isolated hotspot. Martens note that although this hotspot will remain in an area of exposed soil, the hotspot poses low risk to ecological receptors due to the proposed commercial/industrial nature of the site and the limited ecological receptors expected in the area. The Auditor recommends that Martens either delineate and remove the zinc, or complete testing to assess the mobility and bioavailability of the contaminant to ecological receptors.

Two exceedances of ecological criteria for B(a)P were detected during soil investigations (TP112/2.0 at 1.5 mg/kg; and TP117/0.1 at 2.6 mg/kg). The exceedance at TP112 was detected in the recently filled are west of the three large sheds in the centre of the site. The exceedance at TP117 was detected within the recently filled area, south of the second southernmost shed in the central portion of the site. Martens consider that these exceedances are not of concern. It is understood the two B(a)P exceedances will be capped under the hardstand and therefore an exposure pathway to ecological receptors will not exist.

There are currently no criteria for nutrients in soil, however elevated nutrients, total coliforms, and E.coli were detected in soil in the vicinity of the burial trenches. Total nitrogen in soil ranged from 370mg/kg to 1800mg/kg and was detected at all locations sampled for at BH701 – BH707 and BH709. Nitrate was detected below the LOR, with the exception of BH704/2.4-2.5, BH709/0.0-0.2 and 1.0-1.2 where it was detected at a maximum concentration of 2mg/kg. Nitrite was detected below the LOR with the exception of BH705/2-2.2 and BH709/1-1.2 at a maximum concentration of 0.6mg/kg. Ammonia was detected at all locations, ranging from 2.6mg/kg at BH703/2-2.2 and BH705/2.5-2.7 to 9.7mg/kg at BH705/1-1.2. Phosphate was not detected in soils above the LOR. Total coliforms were detected at BH702/1-1.2 and 2-2.2, BH703/1-1.2, BH705/1-1.2, BH707/3-3.2 and BH709/0.0-0.2 at concentrations between 200 and 160 000 MPN/100g. E.coli was detected in soil at BH705/1-1.2, BH703/1-1.2, BH707/3-3.2, BH709/0-0.2 and BH709/1-1.2 at concentrations between 200 and 4900 MPN/100g. This indicates that biological contaminants may extend beyond the maximum investigation area for biological contaminants. The remedial strategy and management of the site under the EMP are proposed to mitigate risks posed to receptors.

It is noted that prior to the recent filling event, the following material was imported to the site and noted in the PSI by Martens:

- Approximately 1850 tonnes of ENM from Corner of Muscovy Drive and Warbler Street, The Ponds NSW 2769.
- Approximately 530 tonnes of VENM from Tarro Avenue, Revesby NSW.
- Approximately 1800-2000 tonnes of ENM from Darlinghurst Road Precinct, Darlinghurst NSW, 2010.

Martens (2020) indicate that the material imported to the site is classified as VENM or ENM and has been certified by Alliance Geotechnical (ENM) and Geotest Services (VENM) as being uncontaminated and fit for use. Martens indicated that there were no discrepancies observed during the

PSI walkover that indicated this material would not be VENM or ENM. During the course of the site investigations, the Auditor has ensured that appropriate site coverage has been achieved and this imported material is likely to have also been sampled by Martens.

Dirt Doctors (2019) completed a material classification on an approximate 400 tonne stockpile of recovered asphalt parent material that had been imported to the site for use as engineered fill which they classified as “Recovered Aggregate”. The material was originally placed into two stockpiles on either side of the shed previously located near the centre of the site. The stockpile was then moved southwest of the second southernmost largest shed. Some of this asphalt fill material had been placed on top of the VENM and ENM in various locations between the two dams in the south-west corner of the site. It is unclear if this material remains onsite but was not observed during the recent Auditor site visit. Although referenced by DD, the recovered asphalt does not appear to have been sampled for foreign materials as outlined in the Recovered Aggregate Exemption 2014. The Auditor has included the results for completeness of the Audit Report. The results indicate the imported VENM/ENM and Recovered Aggregate meet the land use criteria for the limited analytes sampled.

The Auditor notes that based on the correspondence provided in Attachment E of the PSI, they following issues were previously raised by Council: An email from Michael Kelly of WSC dated 5 May 2020 indicated that Council reviewed additional information submitted by Martens regarding Council’s request for a Phase 2 ESA, as well as photographs taken during the site inspection by WSC. The email noted that Phase 2 ESA was considered warranted and the “chunks” of bitumen in fill material onsite was not considered to meet the NSW EPA Recovered Aggregate Exemption 2014 as it applies to ‘engineered material’ (processed) not to broken up pieces of bitumen road surface. Martens prepared a letter to Michael Kelly of WSC on 7 May 2020 outlining that they understood the fill material consisted of (1) general imported fill material characterised at the source with waste classification certificates indicating it is not contaminated; and (2) imported material for road making purposes consists of reclaimed asphalt material which was assessed onsite and classified as waste exempt by DD under the recovered aggregates exemption. An email from Martens dated 18 May 2020 indicated that a discussion occurred with WSC and the outstanding matter regarding contamination related to the presence of broken up road pavement material in the recovered aggregates. Martens further clarified that waste under the exemption applies to aggregate comprising of *concrete, brick, ceramics, natural rock and asphalt processed into an engineered material. This does not include refractory bricks or associated refractory materials, or asphalt that contains coal tar.* Martens described the road pavement material as dark grey to black manufactured material used to form the top layer of many road pavements. This material is asphaltic concrete and is commonly referred to as “asphalt”, and is a manufactured material which comprises sand, aggregates, bitumen, binders and other additives. Martens state if the material was bitumen, it would be a black, highly viscous liquid, while a constituent of asphalt, Martens stated that they did not believe bitumen is what had been observed on site by WSC.

No further correspondence was provided, however, Martens note in the PSI that following submission of both the PSI and letter to address several of Council’s concerns surrounding the proposed development (October 19, 2020), it is understood that Martens received a written response from Council’s contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020) acting on behalf of Council stating that: *We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian’s letter to you dated 19 October 2020 will satisfactorily address the Council’s outstanding contamination concerns.*

11.2. Groundwater

A summary of the primary groundwater sample results is reproduced by the Auditor in Table 10 below. The Auditor has summarised all data from Martens (2021), with the intent of identifying those contaminants which were identified at the site as requiring remediation. This evaluation is intended to be a high-level screening assessment of the data to identify which contaminants may be problematic at the site.

Groundwater data are summarised in Table 10 below. Concentrations exceeding site criteria are highlighted in red.

Table 10 Analysis of Groundwater Data (µg/L)

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) CLAY	NEMP Fresh Water [3]	Drinking Water Guidelines (ADWG)	Min	Max
Heavy Metals							
Arsenic	1	24 (As III) 13 (As V)	-	-	10	<1	320
Cadmium	0.1	0.06[2]	-	-	2	<0.1	0.6
Chromium	1	3.3 (Cr III) 1 (Cr VI)	-	-	50	<1	18
Copper	1	1.4	-	-	2000 1000 (aesthetic)	<1	71
Lead	1	3.4	-	-	10	<1	6
Mercury	0.05	0.06[2]	-	-	1	<0.05	<0.05
Nickel	1	11	-	-	20	<1	110
Zinc	1	8	-	-	3000 (aesthetic)	<1	130
BTEX							
Benzene	1	950	30 000/30 000/35 000	-	1	<1	**5**
Toluene	1	180	NL/NL/NL	-	800 25 (aesthetic)	<1	**170**
Ethylbenzene	1	80	NL/NL/NL	-	300 3 (aesthetic)	<1	<1
o-Xylene	1	350	NL/NL/NL	-	600 20 (aesthetic)	<1	<1
m/p-Xylene	2	75 (m)/200(p)		-		<2	<2

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) CLAY	NEMP Fresh Water [3]	Drinking Water Guidelines (ADWG)	Min	Max
Total Recoverable Hydrocarbons							
F1 C6 – C10 minus BTEX	10	-	NL/NL/NL	-	-	<10	770
F2 >C10 – C16 less Naphthalene	50	-	NL/NL/NL	-	-	<50	680
F3 >C16 – C34	100	-	-	-	-	<100	6800
F4 >C34 – C40	100	-	-	-	-	<100	250
Total Petroleum Hydrocarbons							
C6-C9	10	-	-	-	-	<10	300
C10-C14	50	-	-	-	-	<50	340
C15-C28	100	-	-	-	-	<100	2000
C29-C36	100	-	-	-	-	<100	5400
Per- and Polyfluoroalkyl Substances							
PFOS	0.01	-	-	0.13 0.00023[2]	-	<0.01	**0.03**
PFOA	0.01	-	-	220 19[2]	0.56	<0.01	0.01
PFHxS	0.01	-	-	-	-	<0.01	<0.01
Sum of PFAS	0.01	-	-	-	-	<0.01	0.07
Sum of PFHxS and PFOS	0.01	-	-	-	0.07	<0.01	0.03
Polycyclic Aromatic Hydrocarbons							
Total PAHs	1	-	-	-	-	ND	ND
Anthracene	1	0.01[2]	-	-	-	<1	<1
Benzo(a)pyrene	1	0.1[2]	-	-	0.01	<1	<1
Naphthalene	1	16	NL/NL/NL	-	-	<1	<1
Fluoranthene	1	1[2]	-	-	-	<1	<1
Phenanthrene	1	0.6[2]	-	-	-	<1	<1

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) CLAY	NEMP Fresh Water [3]	Drinking Water Guidelines (ADWG)	Min	Max
B(a)P TEQ	5	-	-	-	-	<5	<5
Organochlorine Pesticides							
DDE	0.2	-	-	-	-	<0.2	<0.2
DDD	0.2	-	-	-	-	<0.2	<0.2
DDT	0.2	0.006[2]	-	-	9	<0.2	<0.2
Aldrin	0.2	0.001[1]	-	-	0.3 (Aldrin & Dieldrin)	<0.2	<0.2
b-BHC	0.2	-	-	-	-	<0.2	<0.2
Chlordane	0.2	0.03[2]	-	-	-	<0.2	<0.2
d-BHC	0.2	-	-	-	-	<0.2	<0.2
Dieldrin	0.2	0.01[1]	-	-	-	<0.2	<0.2
Endosulfan I	0.2	0.03[2]	-	-	20	<0.2	<0.2
Endosulfan II	0.2		-	-	-	<0.2	<0.2
Endosulfan Sulphate	0.2	-	-	-	-	<0.2	<0.2
Endrin	0.2	0.01[2]	-	-	-	<0.2	<0.2
Endrin Aldehyde	0.2	-	-	-	-	<0.2	<0.2
g-BHC	0.2	0.2	-	-	10	<0.2	<0.2
Heptachlor	0.2	0.09	-	-	0.3	<0.2	<0.2
Heptachlor epoxide	0.2	-	-	-	-	<0.2	<0.2
Methoxychlor	0.2	0.005[1]	-	-	300	<0.2	<0.2
Organophosphorus Pesticides							
Azinphos methyl	0.2	0.01[2]	-	-	30	<0.2	<0.2
Bromophos-ethyl	0.2	-	-	-	10	<0.2	<0.2
Chlorpyrifos	0.2	0.01	-	-	10	<0.2	<0.2
Chlorpyrifos methyl	0.2	-	-	-	-	<0.2	<0.2
Diazinon	0.2	0.01	-	-	4	<0.2	<0.2

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) CLAY	NEMP Fresh Water [3]	Drinking Water Guidelines (ADWG)	Min	Max
Dichlorvos	0.2	-	-	-	5	<0.2	<0.2
Dimethoate	0.2	0.15	-	-	7	<.02	<0.2
Ethion	0.2	-	-	-	4	<0.2	<0.2
Fenitrothion	0.2	0.2	-	-	7	<0.2	<0.2
Malathion	0.2	0.05	-	-	70	<0.2	<0.2
Parathion	0.2	0.004	-	-	20	<0.2	<0.2
Ronnel	0.2	-	-	-	-	<0.2	<0.2
Formaldehyde	100	-	-	-	500	<100	1600
Volatile Organic Compounds (VOCs)							
1,2,3-trichlorobenzene	1	10	-	-	-	<1	<1
1,2,4-trichlorobenzene	1	160	-	-	1500	<1	<1
1,2-dichlorobenzene	1	160	-	-	1500 1 (aesthetic)	<1	<1
1,3-dichlorobenzene	1	260	-	-	20 (aesthetic)	<1	<1
1,4-dichlorobenzene	1	60	-	-	40 0.3 (aesthetic)	<1	<1
Chlorobenzene	1	55	-	-	300 10 (aesthetic)	<1	<1
Carbon tetrachloride	1	240	-	-	3	<1	<1
Hexachlorobenzene	0.2	0.1	-	-	-	<0.2	<0.2
Chloroform	1	770 370[2]	-	-	-	<1	<1
1,1-dichloroethene	1	700	-	-	30	<1	<1
1,2-dichloroethane	1	1900	-	-	3	<1	<1
1,2-dibromomethane	1	-	-	-	1	<1	<1
Bromomethane	10	-	-	-	1	<10	<10

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) CLAY	NEMP Fresh Water [3]	Drinking Water Guidelines (ADWG)	Min	Max
1,2,4-trimethylbenzne	1	170 85[2]	-	-	-	<1	<1
1,3,5-trimethylbenzne	1	-	-	-	-	<1	<1
1,1,1-Trichloroethane	1	270	-	-	-	<1	<1
1,1,2,2-Tetrachloroethane	1	400	-	-	-	<1	<1
Isopropylbenzene	1	30	-	-	-	<1	<1
n-butylbenzene	1	-	-	-	-	<1	<1
n-propylbenzne	1	-	-	-	-	<1	<1
p-isopropylbenzene	1	-	-	-	-	<1	<1
Sec-butylbenzene	1	-	-	-	-	<1	<1
1,2-Dichlorobenzene	1	160	-	-	-	<1	<1
1,2-Dichloropropane	1	900	-	-	-	<1	<1
1,3-Dichloropropane	1	1100	-	-	-	<1	<1
1,2,3-Trichlorobenzene	1	10	-	-	-	<1	<1
Styrene	1	-	-	-	30 4 (aesthetic)	<1	<1
Tert-butylbenzene	1	-	-	-	-	<1	<1
Cyclohexane	1	-	-	-	-	<1	**1**
Vinyl Chloride	10	100	-	-	0.3	<10	<10
Biological							
Total Coliforms by MF (CFU/100mL)	-	-	-	-	-	**20**	**5400**
E.coli (CFU/100mL)	1	-	-	-	0	<10	100
Inorganics							
Free CO_2	0	-	-	-	-	26 000	**896 000**

Analyte	LOR	ANZG Fresh Waters	HSL D (source depth a/b/c) CLAY	NEMP Fresh Water [3]	Drinking Water Guidelines (ADWG)	Min	Max
Ammonia as N	5	900	-	-	500 (Aesthetic)	35	1 600 000
Nitrate (as N)	5	-	-	-	50 000	<5	260 000
Nitrite as N	5	-	-	-	3000	<5	47
Nitrogen (Total)	100	-	-	-	-	5700	**1 900 000**
Total Phosphorus (Organic Phosphate)	50	-	-	-	-	<50	**13 000**
Reactive Phosphorus as P (orthophosphate as P)	5	-	-	-	-	<5	**10 000**
Sulphide	500	-	-	-	-	<500	<500
Organic							
Methane	5	-	-	-	-	<5	**420**

Notes:
1: Unknown species protection.

2: To account for the bio accumulative nature of this toxicant, it is recommended that the 99% species protection level DGV is used for slightly to moderately disturbed systems.

3: 95% species protection for slightly to moderately disturbed systems in marine water has been used.

NL: Non-Limiting

ND: Not Detected

Source Depth:

a: 2m to <4m

b: 4m to <8m

c: 8m+

The Auditor is satisfied that the groundwater data is adequate to provide a good understanding of the contamination status at the site except for some of the metal results which may have been affected by lack of field filtering. A total of 10 groundwater monitoring wells were installed by Martens in 2021 (MW01-MW10). MW05, MW07, MW08 and MW10 were dry during all sampling rounds and therefore, only MW01-MW04, MW06 and MW09 were sampled. It is noted that elevated concentrations of benzene were detected at MW04 (maximum concentration of 5µg/L). Elevated concentrations of toluene were detected at MW01 (maximum concentration of 4µg/L), MW02 (maximum concentration of 2µg/L), MW03 (maximum

concentration of 1µg/L), and MW04 (maximum concentration of 170µg/L). During the third sampling event in August 2021, the concentration of toluene was below the LOR at all wells, with the exception of MW04 at 10µg/L.

Elevated concentrations of TRH were detected in MW04 during all sampling events and TRH was not detected in any other monitoring well. Elevated concentrations of formaldehyde were detected at MW04 (maximum concentration of 1600µg/L) during all sampling rounds and formaldehyde was not detected in any other monitoring well.

Biological analytes including total coliforms were detected at all monitoring wells, with the highest concentrations detected in MW04 (3500 CFU/100mL) and MW01 (5400 CFU/100mL), E.coli was detected below the elevated LOR (likely due to interference), with the exception of MW03 at 100 CFU/100mL. Inorganics were detected above the LOR at all monitoring wells, with ammonia above drinking water criteria at MW01 and MW02 (maximum concentration of 260 000 µg/L) and ammonia at MW04 above criteria at a maximum concentration of 1 600 000 µg/L. There is currently no established criteria for nitrite, nitrogen, total phosphorus, reactive phosphorus and sulphide. Dissolved methane was detected below or equal to the LOR at all wells except for MW03 and MW04 (maximum concentration of 420 µg/L at MW04). Free carbon dioxide was detected in all monitoring wells ranging from 26 000 µg/L in MW06 to 896 000 µg/L in MW04. The presence of elevated concentrations of nutrients and biological analytes in wells in the vicinity of the burial trenches (MW03, MW04, MW06 and MW09) is expected due to the putrescible poultry farm waste.

The reason for elevated concentrations of total coliforms, carbon dioxide and/or nutrients in downgradient wells MW01 and MW02 is unknown, however, Martens note that the presence of carbon dioxide in groundwater may be attributed to the shale which the wells are installed into. It is expected that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site. The site overlies Bringelly Shale which is generally low in permeability and therefore if a minimal amount of contaminant or nutrient enters the fractured shale, the concentration of contaminants will increase, however, in terms of kilograms of contaminant, it is likely to be a very small mass. Where there is very minimal water in storage, a very small amount of mass of a contaminant or nutrients would change the chemistry of the groundwater. To ensure that unacceptable nutrient, carbon dioxide and total coliform concentrations are not migrating offsite in groundwater, the Auditor has recommended as part of remedial works that an additional groundwater monitoring well be installed on the downgradient boundary and slug tests be performed to determine permeability variations. This has been included as part of the additional site works in Martens RAP. Martens note that the groundwater investigation identified a water bearing zone between 5 and 7m BGL. The groundwater in MW04 is considered to be a perched water bearing zone due to former burial trenches. Martens indicate elevated nutrients in MW01 and MW02 is likely due to the former poultry farm use.

Martens attributed elevated benzene and formaldehyde at MW04 was to likely due to waste material in former burial trenches. Martens anticipate that permeability of the surrounding natural soils is significantly lower than that of the waste resulting in the retention of infiltrated water in trenches. Contaminants from buried trench material may have leached into this retained water in the shallow perched water bearing zone. Comparison of the results to the rest of the site indicate that local perched water contamination has not impacted the deeper groundwater system in the shale and the risk posed by the perched groundwater system is considered low.

PFOS was detected in one monitoring well at concentrations above the 99% protection criteria (MW04 at 0.03µg/L). This well remains below the 95% protection criteria and because this location is not considered representative of the wider groundwater system, the Auditor considers the

results to be acceptable. 6:2 FTS PFAS was detected in MW01 above the LOR in the first two sampling rounds, however, the most recent sampling event indicated results were below the LOR. It is noted that the LOR is higher than the 99% protection criteria. The Auditor has requested as part of remedial works that PFAS be analysed for in soil in the former poultry sheds to ensure there is not a source in the soil.

Elevated concentrations of arsenic were detected above criteria in MW04 (maximum concentration 320µg/L). Arsenic was detected above the As V criteria at MW09 (20 µg/L). Cadmium and chromium were detected above criteria at MW04 (maximum concentration of 0.6 µg/L and 18µg/L respectively). Copper was detected above the adopted criteria at MW01, MW02, MW03, MW04, MW09 (maximum concentration of 710µg/L at MW04 in perched groundwater and 210µg/L at MW01 in the regional groundwater system). Lead was detected above criteria at MW04 during the initial sampling round (6 µg/L) and was later detected below the criteria in subsequent sampling rounds. Nickel was detected above the adopted criteria at MW02, MW03, MW04, and MW09 (maximum concentration of 110µg/L at MW04 in perched groundwater and 38µg/L at MW09 in the regional groundwater system). Zinc was detected above the adopted criteria at MW01, MW02, MW03, MW04, and MW09 (maximum concentration of 130µg/L in MW01).

After review of the laboratory reports, it appears Martens did not filter for metals in the field in all monitoring wells due to the presence of silts in some samples, and filtering was completed in unpreserved sample bottles in the laboratory for some samples. This could result in varied concentrations of metals. The Auditor considers that based on the current data, the concentrations observed in MW04 can be attributed to the well being screened within the perched groundwater system in the burial trenches. The remaining five wells had concentrations of heavy metals that are likely to be attributable to the regional rural agricultural use of the land and/or surrounding land uses and may be representative of background concentrations. As stated above, the Auditor has recommended that a monitoring well be installed on the downgradient boundary as part of the RAP. This well should also be sampled for both total and dissolved heavy metals, with dissolved metals filtered in the field to confirm the above results. If unacceptable concentrations of contaminants and/or nutrients are found to be migrating offsite, an addendum to RAP may be required and groundwater may require treatment or remediation.

The Auditor notes that it appears MW01-MW04 were sampled one day after installation and development and therefore results from the first round of sampling may not be as representative of the actual groundwater conditions compared to rounds 2 and 3. Martens have proposed an additional groundwater monitoring event as part of the RAP. The Auditor has also advised that future field sheets are required to indicate parameters had stabilised within 10% prior to sampling. Martens have provided field sheets for Round 1 of sampling, which does not record any of the physiochemical parameters. Field sheets have been included for the second round of sampling, however, a log of physiochemical parameters recorded during purging has not been included. Martens have included the final physiochemical result for each wells sampled. Field sheets from the third monitoring event indicated recorded parameters during purging, however, not all parameters appear to be within 10% prior to sampling and stabilisation may have not been achieved.

11.3. Soil Vapour

Soil vapour was not assessed, however as no volatile contaminants were detected in concentrations that pose a risk to human health and the environment, an assessment of soil vapour is not seen to be required.

11.4. Ground Gas

A summary of the primary ground gas sample results is reproduced by the Auditor in Table 11 below. The Auditor has summarised all data from Martens (2021), with the intent of identifying those contaminants which were identified at the site as requiring remediation. This evaluation is intended to be a high-level screening assessment of the data to identify which contaminants may be problematic at the site.

This data has been collected over two monitoring events for up to 15 ground gas wells and monitoring wells fitted with sealed GG caps:

- Round 1: Screening of MW01, MW02, MW04, MW05, MW07 and MW08 on 21 May, 2021.
- Round 2: Screening of MW01 – MW07, MW09 and MW11-MW16 on 10 August, 2021.

Ground gas data are summarised in Table 11 below. Concentrations exceeding site criteria are highlighted in red.

Table 11 Ground Gas Data

Gas	Instrument Limit	Solid Waste Landfills (2016)	Safe Work (2018)	Safe Work (2019)	Min	Max
Methane %v/v	0.1	1.0	-	-	0.1	62.1
Carbon Dioxide %v/v	0.1	1.5	-	-	0.2	24.2
Methane (surface emissions) ppm	0.0	-	500	-	0.0	3.8
Oxygen %v/v	0.1	-	-	-	0.0	21.0
Carbon Monoxide (ppm)	0	-	-	30	0	2
Hydrogen Sulfide (ppm)	0	-	-	10	0	1
Flow Rate (L/hr)	0	-	-	-	0.0	0.5
Atmospheric Pressure (mb)	-	-	-	-	1013-1015 (10/8/2021)	1017-1018 (21/5/2021)

It is noted that atmospheric pressure was lower during the second sampling round, where the most elevated concentrations of methane were detected in MW04 (62.1% v/v). It is understood that Martens used the maximum ground gas concentration in % volume/volume and flow rate in L/hr to calculate gas screening values. In addition, Martens calculated the GSV using the “worst case” flow rate of 0.5 L/hr for each well. MW01 – MW03, M06 – MW07, MW09 – MW13 and MW15 – MW16 were classified as Very Low Risk with a characteristic situation of 1. MW14 was calculated as Low Risk, with a characteristic situation of 2. MW04, MW05 and MW08 were classified as Moderate Risk with characteristic situations of 2 calculated, which were then increased to 3 due to the maximum ground gas concentration exceeding 20%v/v.

Based on the field sheets provided by Martens in Attachment D (2021d), a total of two rounds of ground gas sampling have occurred. In Round 1, Methane ranged from 0.1%v/v at downgradient locations MW01 and MW02 in the central to northern portion of the site to 40.7%v/v at MW04 within the putrescible waste. Carbon dioxide ranged from 0.2 %v/v at MW02 to 24.2%v/v at MW08. Oxygen ranged from 0.2%v/v at MW05 to 21.0%v/v at MW02. Carbon monoxide and hydrogen sulfide were not detected, with the exception of MW07 which had CO at 1ppm.

In Round 2, Methane ranged from 0.1%v/v at MW01, MW02, MW06 and MW16 to 62.1%v/v at MW04. Carbon dioxide ranged from 0.6%v/v at MW01 and MW16 to 18.7%v/v at MW05. Oxygen ranged from 0%v/v at MW05 and MW12, to 19.4%v/v at MW01. Hydrogen sulfide was detected at MW05 and MW09 at 1ppm. Carbon monoxide was detected at MW01, MW07, MW09, MW14 and MW15 at a maximum concentration of 2ppm. Elevated concentrations above the adopted criteria of either methane or carbon dioxide were detected at all wells, except for MW01 and MW02 in the northern and central portion of the site and MW16 in the south-western corner of the site.

The field sheets for the second round of monitoring indicate that there was no gas cap for MW08 and MW10 and that they were dry. MW10 has not been sampled and it is noted that Martens have given it a CS1 value. This is likely to be accurate, based on the two wells surrounding MW10 to the north-west (MW12) and south west (MW11) also being calculated as CS1, however the Auditor suggests that Martens do not infer the characteristic situations.

Surface emission methane transects were completed in the southern portion of the site in the vicinity of the trench area. The readings ranged from 0.0 ppm to a maximum of 3.8 ppm, close to the south-western boundary. This indicates that surface emissions of methane are not of concern and are well below the adopted criteria of 500ppm.

The proposed management/remedial option for burial trenches will be onsite management. The proposed development in the remediation area will primarily consist of open hardstand for vehicle parking and circulation. Proposed remedial works will be put in place to provide controlled venting of any generated ground gas and to prevent migration of ground gas to sheds, service conduits or offsite to the south. This will involve construction of ground gas cut off trenches along the southern boundary of the proposed hardstand to allow for the interception of any gas that may be directed offsite to the south; a ground gas collection system to be constructed within the retaining wall backfill along the southern side of Road 2 to the south of the existing shed 4 to allow for interception of any gas that may be directed north; and a ground gas barrier/venting system along the stormwater drainage lines running south and east from proposed Shed B to prevent the accumulation of gas in these services. In addition, a passive under slab ground gas collection and venting system will be constructed beneath the proposed shed slab along with a reinforced concrete ground bearing floor slab to provide 2 protection points. The ground gas infrastructure will be managed under an EMP. The proposed office to be constructed in the southern portion of the site will be built on piers and therefore a “wind tunnel” effect will mitigate the vertical migration of ground gas in this building. The Auditor notes that there is very minimal to negative flow at the site and therefore, migration in the site’s current state may not be an issue. However, measures are required to be put in place if hardstand is placed on top of the burial trenches which may result in decreased ability for gases to vent vertically, and result in lateral migration of gases via a subsurface pathway.

The Auditor notes that it may be appropriate to modify the ground gas characteristic situation (CS) based on the weight of evidence approach as per section 4.2(4) of the NSW EPA GG guidelines (2020). This would allow an initial CS to be based on the existing CS determined from Table 7 and the value could then be adjusted based on the evidence provided, ensuring that the adjustment is fully justified. It is not expected that the CS could be adjusted by more than one unit. However, the Auditor notes that where the CS is 1 no further action is required.

The Auditor has requested that additional ground gas monitoring rounds, pilot trials, potential leachate control trials and dewatering measures be put in place for the proposed ground gas collection and venting systems occur prior to remediation to confirm that the proposed protection will be sufficient for the “worst case scenario”. Martens have included this in the RAP. These additional monitoring rounds should include tracked atmospheric pressure from the nearest weather station over the course of the monitoring event.

11.5. Quality Assurance/Quality Control

This section of the SAR discusses both QA/QC sampling in the assessment stage as well as the adequacy of the sampling methods and sampling densities adopted and other similar aspects of the site assessment requiring appropriate documentation.

11.5.1 Field QC Samples

The field QC evaluation is provided in Attachment G of Martens (2021a and d). The Auditors summary of the field QC is provided below:

Table 12 Site Investigation Field QA/QC

Investigation	Field QA/QC Summary
Detailed Site Investigation and Further Detailed Site Investigation Martens (2021a and 2021d)	Martens indicate that the following measures were satisfactorily met: sample chain of custody procedures; sample preservation; the sample receipt notification matches COC and samples were analysed within holding times were all met. In addition, samples were analysed by NATA laboratories, trip spikes and trip blanks were used and adequate duplicate samples were analysed. **Trip Blank/Trip Spike:** Martens indicate that trip spike and blanks were used where volatiles were analysed, with acceptable results. The Auditor notes that a total of 5 sets of trip blanks and trip spikes were used for soil sampling throughout the investigation and a total of 3 sets of trip blanks and trip spikes were used for groundwater sampling throughout the investigation. **Rinsates:** The field rinsate (RINS01) for report 275727, collected during the third round of groundwater sampling identified minor TRH detections. It is noted that deionised water was used for the rinsate and it was collected from plastic bottles and therefore, detections may be a result of hydrocarbon breakdown from the bottle. For other sampling rounds for soil and groundwater, Martens indicate that dedicated sampling equipment was used during all investigations and no rinsate was required. **Soil:** **It is understood that a total of 14 duplicate samples were collected** **The RPD control limits were exceeded for heavy metals in the following duplicate samples:** • TP102/0.1 and DUP101 for lead (76%) • TP110/0.1 and DUP102 for zinc (54%) • TP112/0.1 and DUP03 for zinc (48%) • TP119/0.1 and DUP103 for arsenic (152%), nickel (100%) and zinc (80%) • SS08 and DUP03 for lead (64%) and zinc (43%) • TP607/2.5 and DUP602 for copper (49%) and nickel (57%) • TP611/2.5 and DUP604 for chromium (III + VI) (60%) and zinc (38%) • TP401/2.0 and DUP401 for lead (45%) and nickel (158%) • TP403/2.6 and DUP402 for chromium (III + VI) (74%), nickel (137%) and zinc (87%) Martens note that all samples were collected from heterogenous fill and all values were significantly less than the SAC and therefore the data is considered useable. Based on laboratory reports, it is understood the following duplicate samples were collected for intra-laboratory analysis: • DUP101, DUP102, DUP103 (DSI); DUP01, DUP02, DUP03, DUP401, DUP402 (SDSI); DUP601, DUP602, DUP604, DUP701, DUP801, DUP802 (FDSI) • Martens indicate that 11 duplicate samples were collected over the course of the investigation. The Auditor notes that including the DSI

	duplicate samples, it is considered that based on reports, a total of 14 intra-laboratory samples have been collected. It is understood that the following duplicate samples have been collected for inter-laboratory analysis: • DUP104 (DSI); DUP403 (SDSI); DUP603, DUP702 (FDSI) Exceedances of the RPD for interlaboratory samples include: • TP122/0.1 and DUP104 for zinc (48%) • BH709/1-1.2 and DUP702 for chromium (III + VI) (89%) and lead (84%) **Groundwater:** It is understood that a total of 3 QA/QC duplicate samples were collected over three sampling rounds: • DUP01 (R1); DUP02 (R2); and DUP01 (R3). • RPD exceedance at MW09/210810 and DUP01 for nitrite (86%) It is noted that the nitrite sample was in groundwater and would unlikely be attributed to sample heterogeneity. It is understood that triplicate samples were not collected during groundwater sampling for inter-laboratory analysis. A total of 11 soil QA/QC duplicate/triplicate samples were collected.

The Auditor notes the field QC data is considered acceptable as Martens (2021) collected sufficient QA/QC information for the site. A total of 14 soil duplicates were collected over the course of the investigations for intra-laboratory analysis. For chemical contaminants, a total of 158 primary soil samples were analysed for chemical contaminants. The ratio of primary soil samples to duplicate samples analysed is 1:11, which is considered acceptable. A total of 4 soil duplicate samples were collected over the course of the investigations for inter-laboratory analysis. The ratio of primary soil samples to inter-laboratory duplicate samples analysed is almost 1:40, which is less than the recommended 1:20 ratio. Due to the number of intra-laboratory duplicate samples analysed, the results are considered acceptable.

The Auditor does note that field filtering and preservation for dissolved metals should have been completed along with total metals to understand some of the metal concentrations which may not be attributable to regional conditions. Field purging and equilibrium with physicochemical parameters prior to sampling will be important particularly with high carbon dioxide and potential degassing of groundwater .

During all three rounds of groundwater sampling, one duplicate sample was collected per sampling event for intra-laboratory analysis. The ratio of primary samples to duplicate samples ranged from 1:4 to 1:6, which is considered acceptable. Inter-laboratory duplicates were not collected during groundwater sampling. Although inter-laboratory analysis is recommended, due to sufficient intra-laboratory analysis, the Auditor considers the absence of triplicate samples would not impact the results greatly.

Trip blank and trip spike samples were during each soil and groundwater sampling event, and the Auditor does not consider there has been a potential loss of volatiles. It is understood that rinsate sampling was not completed as no reusable equipment was required, with the exception of a rinsate sample collected during the third round of groundwater sampling with a micropurge pump.

11.5.2 Laboratory QC

The Auditor has reviewed the laboratory quality control data for the following laboratory reports relied upon in the site assessment reports. Laboratory QC results are within the acceptability ranges except as noted:

Table 13 Laboratory QA/QC

Laboratory Report	Laboratory	Comments
Martens (2021) Further Detailed Site Investigation		
ASET91863.95043.1-7	ASET	7 PACM samples: • Sample holding times were met.
264163 R00	Envirolab	Soil samples (TP101 – TP129): • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics. • For metals in soil, the % recovery was not reported due to the non-homogenous nature of samples, however the laboratory noted that an acceptable recovery was obtained for the LCS. • Surrogate recoveries were within control limits.
780555-S	Eurofins	Inter-laboratory duplicate soil sample: • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics, with the exception of: – DDD (160%), DDE (91%) and DDT (190%) – Ethion (190%) – Chromium (31%) • As the results are <10 times the LOR, there is no RPD limit, therefore the results are considered acceptable. Surrogate recoveries were within control limits.
266725 R00	Envirolab	Soil Samples (BH301-BH312 and SS01-SS13): • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics, with the exception of Chromium (266725-22 – RPD 60%) and a triplicate result was issued. • For metals and TRH (C10-C40) in soil, the % recovery was not reported due to the high concentration of elements in the samples, however the laboratory noted that an acceptable recovery was obtained for the LCS for metals. • Surrogate recoveries were within control limits.
266720 R00	Envirolab	Water samples (MW01 – MW04) • Sample holding times were met.

		• Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics. • Surrogate recoveries were within control limits. It is noted by the laboratory that for PFAS Extracted Internal Standards outside the acceptance range, the respective target analytes results may be unaffected, in other circumstances the PQL has been raised to accommodate outlier(s). Dissolved metals: no filtered, preserved sample was received, therefore an unpreserved sample was filtered through 0.45µm filter at the lab.
268016 R00	Envirolab	Soil Samples (TP401 – TP413) • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics, with the exception of: – Nickel (268016-3 – RPD 149%) and a triplicate result was issued. – Copper and Zinc (268016-20 – 75% and 55% RPD) and a triplicate result was issued. • For metals in soil, the % recovery was not reported due to the high concentration of elements in the samples, however the laboratory noted that an acceptable recovery was obtained for the LCS for metals. • Surrogate recoveries were within control limits.
268016-A R00	Envirolab	Additional analysis on soil samples for formaldehyde: • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits. • Surrogate recoveries were within control limits.
792156-S	Eurofins	Inter-laboratory Soil Duplicate Sample: • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics, with the exception of: – Chlordanes Total (34% RPD) – Endrin Aldehyde (69% RPD) As the results are <10 times the LOR, there is no RPD limit, therefore the results are considered acceptable. • Surrogate recoveries were within control limits.
268259 R00	Envirolab	Water Samples (MW01 – MW04) • Sample holding times were met. • Method blanks were below the LOR.

		• Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics. • Surrogate recoveries were within control limits. • It is noted by the laboratory that for PFAS Extracted Internal Standards outside the acceptance range, the respective target analytes results may be unaffected, in other circumstances the PQL has been raised to accommodate outlier(s). Dissolved metals: no filtered, preserved sample was received, therefore an unpreserved sample was filtered through 0.45µm filter at the lab.
269259-A R00	Envirolab	Additional Analysis for 1 Water Sample (MW06) • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics. • Surrogate recoveries were within control limits. Dissolved metals: no filtered, preserved sample was received, therefore an unpreserved sample was filtered through 0.45µm filter at the lab.
275181 R00	Envirolab	Soil Samples (TP601 – TP615, TP617, TP649, BH701 – BH711) • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics, with the exception of: – Chromium and Zinc (275181-38 – 81% and 49% RPD) and a triplicate result was issued. – Chromium (275181-54 – 54% RPD) and a triplicate result was issued. • Surrogate recoveries were within control limits. • Total coliforms and E.coli in soil analysed by Sonic Food & Water Testing (W2118197 & W2118198).
815102-S	Eurofins	Inter-laboartory Soil Duplicates: • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. Where matrix spike recoveries were outside of the acceptance criteria, an acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits. • As the results are <10 times the LOR, there is no RPD limit, therefore the results are considered acceptable. • Surrogate recoveries were within control limits.
275727 R00	Envirolab	Water Samples (MW01 - MW04, MW06, MW09) • Sample holding times were met. • Method blanks were below the LOR.

		• Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics. • Surrogate recoveries were within control limits. • It is noted by the laboratory that for MISC_INORG % recovery is not applicable due to the high concentration of the analyte/s in the sample/s. However, an acceptable recovery was obtained for the LCS. • Total coliforms and E.coli in soil analysed by Sonic Food & Water Testing (W2118624 & W2118599). It is noted the presence of competing background organisms in the sample may have reduced the count. Dissolved metals: no filtered, preserved sample was received, therefore an unpreserved sample was filtered through 0.45µm filter at the lab.
275730 R00	Envirolab	Soil Samples (BH805 – BH810, BH813, BH816, BH823 – BH828, DS801, DS802): • Sample holding times were met. • Method blanks were below the LOR. • Matrix spikes/matrix spike duplicates were analysed and within the control limits. • Laboratory control samples were analysed and within the control limits. • Laboratory duplicates were analysed and within the control limits for organics and inorganics, with the exception of: – Copper, Zinc and Nickel (275730-16 – 63%, 126%, 67% RPD) and a triplicate result was issued. – Zinc (275730-32 – 46% RPD) and a triplicate result was issued. • Surrogate recoveries were within control limits.
ASET95198/98378/1-46	ASET	Samples for Asbestos AF/FA: • Sample holding times were met
ASET95198/98378/47-70	ASET	Samples for AF/FA: • Sample holding times were met
ASET95198/98378/71-112	ASET	Samples for AF/FA: • Sample holding times were met

Chain of custody documentation was complete for Martens (2021). Signed sample receipt notices from the laboratory were included in the reports from Martens (2021).

The Auditor is satisfied that the laboratory QC generally indicates reliable data quality for the assessment. Although not strictly in accordance with the recommended sampling density for quality assurance and quality control, the samples collected by Martens are sufficient for accurate representation of the site. Further sampling of both total and dissolved metal species will be required to understand some of the metal exceedances found in the groundwater.

11.5.3 General Requirements

Table below provide summaries of general requirements and field methods adopted in the assessment of the site. The Auditor's discussion is presented below.

Table 14 Summary of General Reporting Requirements

General Reporting Requirement	Martens (2020-2021)	Auditor Comment
Figures showing sample locations	✓	Acceptable

General Reporting Requirement	Martens (2020-2021)	Auditor Comment
Sampling density appropriate – soil	• 158 samples have been analysed across fill and natural material from 117 soil locations, and 2 dam locations for a range of COPC. • In addition, a total of 7 asbestos fragments were analysed and 110 samples were analysed for asbestos (AF/FA) from 46 locations. A total of 10 fragments of ACM were observed on the surface of the site throughout the recently filled area.	Sample density is compliant to EPA (1995). The minimum number of sampling points for the investigation area is 50, based on a site size of 4.032 ha.
Sampling locations adequate – groundwater and vapour	GW: ✓ SV: NA GG: ✓	Acceptable – it is noted that Martens installed additional ground gas wells to delineate the extent of methane and carbon dioxide, with boundary wells identifying concentrations above criteria. The Auditor considers the remedial strategy proposed by Martens is suitable to address contamination. In addition, elevated concentrations of nutrients and/or biological analytes have been detected in groundwater wells. The Auditor has recommended as part of the remedial strategy that an additional groundwater well be installed on the downgradient site boundary to ensure that acceptable concentrations of contaminants are not migrating offsite.
Borehole logs recording sample locations	✓	Acceptable
Laboratory reports and discussion of rationale	✓	Acceptable
Presentation of results	Tabulated	Acceptable
Identification of fill and natural materials	✓	Acceptable
Groundwater and vapour well construction	GW: ✓ SV: NA GG: ✓	Acceptable

Table 15 Summary of Field Methods and QA/QC

Field Methods and QA/QC	Martens (2021)	Auditor Comment
Method of Soil Sampling	✓	Acceptable
Decontamination between Samples	✓	Acceptable
Use of PID	✗	Acceptable – Martens do not indicate that a PID was used during soil sampling, however, sufficient site characterisation is considered to have occurred to screen if there is a volatile risk at the site.
Use of laboratory prepared/preserved containers as required	✓	Acceptable
Unique sample identification	✓	Acceptable
Storing of samples in eskies	✓	Acceptable
Chain of custody documentation	✓	Acceptable

Details of well construction provided	GW: ✓ SV: NA GG: ✓	Acceptable
Purging of wells appropriately prior to sampling	✓	Acceptable
Groundwater sampling method	R1: Peristaltic Pump R2: Peristaltic Pump R3: Micropurge Pump	Acceptable
Soil vapour sampling method	NA GG: Landfill Gas Analyser (GA5000)	Acceptable

11.6 Audit Discussion on Contamination Status

11.6.1 Soil

The initial sampling competed in Phases 1 and 2 by Martens (2021a, and b) was sufficient to identify the need for further investigation and identify asbestos in recently imported fill material and burial trenches as a source of ground gas. In addition, three ecological exceedances of site specific criteria were detected in site soils. As noted by Martens, two of these B(a)P exceedances are proposed to be capped under concrete hardstand. It is noted that exceedances of site-specific ecological criteria of zinc (3900 mg/kg) were reported for surface sample SS12, located on the north eastern boundary of the second southernmost shed. Martens attribute the zinc exceedance to the degradation of galvanised metal used for shed construction. It is noted that this sample was not delineated by Martens, however nearby samples did not report concentrations above the adopted criteria which indicates it is likely to be an isolated hotspot. Martens note that although this hotspot will remain in an area of exposed soil, the hotspot poses low risk to ecological receptors due to the proposed commercial/industrial nature of the site and the limited ecological receptors expected in the area. The Auditor recommends that Martens either delineate and remove the zinc, or complete testing to assess the mobility and bioavailability of the contaminant to ecological receptors.

After review of the initial DSI, SDSI (2021a and b) and SAQP completed by Martens in 2021(c), the Auditor recommended additional sampling for asbestos and in fill and natural materials at within the investigation area was required. In addition, the Auditor recommended that the investigation area needs to be suitably characterised in shallow and deep fill and natural material. In Interim Advice letter 02, the Auditor provided advice on proposed ground gas monitoring wells and looking at dissolved methane and carbon dioxide, as well as methane and carbon dioxide ground gas. The Auditor also provided advice on ensuring the material in the previously filled dam was sampled and appropriate site coverage was completed. As part of the FDSI (2020d), the Phase 3 investigation identified the presence of AF/FA above criteria in one location. It was agreed with Martens that after the DSI and SDSI identified the presence of asbestos contamination in fill material, the NEPM (2013) gravimetric method of asbestos analysis originally recommended by the Auditor was not required as all fill material would be deemed asbestos contaminated and required remediation. The Auditor requested that AF/FA be sampled for instead to determine what management measures and asbestos controls need to be put in place during remediation and earthworks for WHS requirements. As per Section 11.3 of the NEPM, additional gravimetric analysis of soils within areas outside of proposed areas of disturbance (i.e. areas of cut) is not required due to the proposed conservative remedial strategy; the Phase 4 investigation closed data gaps in previously unassessed areas of the site as well as ensuring the sufficient samples were analysed in shallow and deep fill, and natural material. As part of the remedial strategy, the Auditor has recommended that sampling for PFAS in soils in the vicinity of groundwater monitoring wells which had detections of PFAS above the LOR should be completed to ensure there is no source of PFAS in soil.

11.6.2 Vapour

Soil vapour impacts were not assessed. The Auditor is satisfied that soil vapour assessment is not required as the soil and groundwater data does not indicate the need for a soil vapour assessment.

11.6.3 Groundwater

The Phase 5 groundwater investigation (2021d) was sufficient to identify the presence of elevated concentrations above the LOR and/or above criteria for heavy metals, nutrients, dissolved methane, dissolved carbon dioxide, E.coli, total coliforms, TRH, benzene, toluene, formaldehyde and/or PFAS in groundwater. It is noted that elevated concentrations of the above contaminants are primarily within the burial trench area in wells within the southern portion of the site, particularly MW04 which is installed in the perched groundwater system. Elevated concentrations of heavy metals, nutrients, total coliforms and/or dissolved carbon dioxide have been detected in downgradient wells MW01 and MW02. It is expected that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site. The site overlies Bringelly Shale which is generally low in permeability and therefore if a minimal amount of contaminant or nutrient enters the fractured shale, the concentration of contaminants will increase, however, in terms of kilograms of contaminant, it is likely to be a very small mass. Where there is very minimal water in storage, a very small amount of mass of a contaminant or nutrients would change the chemistry of the groundwater. The Auditor advised that an additional groundwater monitoring well is required to be installed as part of the RAP on the downgradient site boundary to confirm elevated concentrations of contaminants are not migrating offsite at unacceptable levels. In addition, the Auditor recommended slug tests be performed to determine permeability variations. Martens have included these recommendations as part of the RAP. The additional round of groundwater sampling should include analysis of both total and dissolved metals to provide more clarity on groundwater chemistry. If unacceptable concentrations of contaminants and/or nutrients are found to be migrating offsite, an addendum to RAP may be required and groundwater may require treatment or remediation.

11.6.4 Ground Gas

The Phase 6 ground gas investigations (2021d) identified the presence of elevated concentrations of methane and carbon dioxide in the southern portion of the site surrounding the burial pits. This allowed for gas screening values and characteristic gas situations to be calculated to develop appropriate mitigation measures for the site. The Auditor considers the design presented in the RAP is acceptable to address the known ground gas conditions at the site. The Auditor notes that there is very minimal to negative flow at the site and therefore, migration in the site's current state may not be an issue. However, as noted in IA03 (Rev1) measures are required to be put in place if hardstand is placed on top of the burial trenches which may result in decreased ability for gases to vent vertically, and result in lateral migration of gases via a subsurface pathway. The Auditor has requested that additional ground gas monitoring rounds, pilot trials, potential leachate control trials and dewatering measures be put in place for the proposed ground gas collection and venting systems occur prior to remediation to confirm that the proposed protection will be sufficient for the "worst case scenario". Martens have proposed this as part of additional site characterisation works in the RAP.

The Auditor notes that it may be appropriate to modify the ground gas characteristic situation (CS) based on the weight of evidence approach as per section 4.2(4) of the NSW EPA GG guidelines (2020). This would allow an initial CS to be based on the existing CS determined from Table 7 and the value could then be adjusted based on the evidence provided, ensuring that the adjustment is fully justified. It is not expected that the CS could be adjusted by more than one unit. However, the Auditor notes that where the CS is 1 no further action is required.

12. REMEDIAL ACTION PLAN

A Remedial Action Plan (RAP) was prepared by Martens (3 September 2021) in order to render the site suitable for the proposed future land use and to ensure that the works will not pose an unacceptable risk to human health or the environment. The most recent version of the RAP is referenced below:

- Martens Remedial Action Plan: Proposed Depots, 285 Finns Road, Menangle NSW (Ref: P1806774JR14V04, dated 3 September 2021).

12.1. Summary of proposed remediation

12.1.1. Extent of known contamination

The DSI's identified the presence of asbestos contamination in the recently filled investigation area. The DSI has confirmed the presence of asbestos in fill material both at the surface and at depth. It is noted that all fill material has been presumed to contain bonded asbestos after preliminary investigations. This was presumed to avoid the need for additional gravimetric sampling for fill material that is likely to be ACM impacted. This area was proposed to be capped as part of the remedial strategy and managed under an EMP. AF/FA was detected in the recently filled area in two locations, with one location exceeding the adopted criteria. The Auditor suggests that Martens treat the investigation area as a friable zone. In addition to asbestos impacted fill, ground gas risks associated with former poultry farm waste burial trenches in the southern portion of the site were identified. Elevated methane and/or carbon dioxide above the adopted criteria were detected at all monitoring wells, with the exception of one well in the south-west and two wells north of the burial trench in the northern and central portions of the site.

12.1.2. Extent of Remediation Required

Asbestos impacted fill material and ground gas were identified as requiring remediation at the subject site.

1. **Fill Material:** Investigations and mapping of the extent of fill impacted areas concludes approximately 16,500m^2 of the site has fill material likely to be impacted by ACM. The extent of filling was mapped based on aerial photograph interpretation and test pitting to confirm outer limits.
2. **Burial Trenches:** Elevated methane and carbon dioxide concentrations have been observed in monitoring wells located in the southern portion of the site. Based on the CSM, these gas concentrations are likely to be associated with the waste burial trenches identified to contain agricultural waste (chicken bones and eggshells). Based on aerial photograph review and onsite investigations, burial trenches are believed to be limited to an area of approximately 1000m^2 in the south of the site. The trenches are believed to have been excavated and filled between 2010 and 2015 by a previous site owner, prior to the importation of fill material. From onsite test pit investigations, trenches containing agricultural waste material are expected to be approximately 0.5-1.0m deep, and underlying an estimated 2.0-2.5m of fill material.

12.1.3. Preferred Remedial Option – Cap the material onsite & onsite management of ground gas.

1. **Fill Material: Cap Onsite**

- As some ACM impacted fill material has been placed onsite in areas outside of proposed filling described in the development, and at levels in excess of those required to achieve a cap and proposed design levels, the excavation and replacement of some of the previously imported fill material shall be required.
- Suitable capping options for the capping layer to separate the ACM impacted fill from end users have been developed to respond to each of the final surface uses/treatments proposed under the application:
  - Structural concrete ground slabs for sheds.

- Hardstand – this may be constructed as a rigid (i.e. concrete) or flexible sealed or unsealed 'pavement'. The hardstand is to comprise, as a minimum: (1) high visibility marker layer (geotextile layer) over ACM impacted fill; and (2) pavement layers. Where a rigid pavement is proposed, the thickness will be determined by the structural/pavement engineer's design. Where a flexible pavement is proposed, it shall comprise a minimum 300mm total thickness of pavement materials such as sandstone, road base and wearing course (e.g. chip seal/asphalt) materials. Development plans propose an unsealed pavement.
- Landscape layer – this is to comprise, as a minimum (1) high visibility marker layer (geotextile layer) over ACM impacted fill; and (2) minimum of 500mm of clean material for the establishment of site vegetation. Only shallow rooted vegetation is to be used in these areas.

The Auditor advised Martens that any area capped under an EMP should contain a high visibility marker layer. The EMP will indicate where the capping layer extends to via a survey post laying of the marker layer and subsequent to the final capping layer being installed. The Auditor has also recommended that all hardstand have an appropriate MPa rating for the proposed use.

Figures 16 and 18 in Appendix A outlines the proposed capping extent for asbestos material. Martens have assumed that a 500mm capping layer is required beneath the landscape and hardstand areas. Where a reduced capping layer is required (300mm hardstand), the extent of capping is understood to potentially extend further south-west, however within the approved DA earthworks area.

2. Burial Trenches: Onsite Management

The proposed development in the remedial area predominantly consists of an open hardstand for vehicle parking and circulation. The ground gas guidelines do not provide construction guidance on protection levels for an open air carpark as the accumulation risk of gases is negligible. The risk identified in this area is that the proposed filling and hardstand construction may result in the redirection of ground gas towards other sensitive receivers such as neighbours, existing and proposed sheds and buried services. The proposed remedial works involve the controlled venting of any generated ground gas to prevent migration of ground gas to sheds or service conduits.

To manage GG risks associated with the hardstand, Martens have recommended the following:

- GG cut off trenches to be constructed along the southern edge of the proposed hardstand. The cut off trench is proposed to extend to a depth of 2m below the prefilling surface. Vent points are to be provided at intervals along the trench to permit the passive release of ground gas. Preliminary vent point spacing of 50m is shown on proposed gas mitigation plans.

  This trench is proposed to intercept any GG which may be directed south as a result of the hardstand capping. Its purpose is to prevent the offsite migration of GG to the property to the south and allow for the controlled venting of any accumulated GG.
- A GG collection system to be constructed within the retaining wall backfill along the southern side of Road 2 to the south of Existing Shed 4. This trench is to be extended to a depth of 1m below the existing contour levels. Vent points are proposed to be provided at intervals along the trench to permit the passive release of GG. Preliminary vent point spacing of 50m is shown on proposed gas mitigation plans.

  This trench is proposed to intercept any GG which may be directed north as a result of the hardstand capping. Its purpose is to prevent the uncontrolled venting of GG through the retaining wall and to stop the migration of GG towards Shed 4.
- A GG barrier/venting system is proposed along the stormwater drainage lines running south and east from Shed B. These measures are proposed to prevent the accumulation of gas in these services. Venting of the stormwater line to the south of Shed 4 may use the same vent structures as the proposed GG trench along the retaining wall described above. Similar service trench GG venting is to

be provided for any other service trench across the hardstand area to the south of (or between) Shed 4 and Shed B.

It is noted that elevated methane concentrations (>20% v/v) indicate that gas protection measures for a site with a CS value of 3, as outlined in the NSW EPA (2020) Hazardous Ground Gas Guidelines, will be required for structures within the remediation area. Shed B is to be constructed on as yet not placed fill material. As this structure is potentially "at risk", should ground gas migration occur, although unexpected. It is proposed that mitigation measures will be provided for Shed B assuming a CS3 based on the highest recorded GG levels in the investigation area. The structure will require 2 points of protection and Martens have recommended the following:

1. Construction of a passive, under slab GG collection and venting system beneath the shed slab (1.5 points); and
2. Construction of a reinforced concrete ground bearing floor slab (0.5 points).

In addition, an office is proposed to be constructed in the south-western corner of the hardstand and is to be constructed on piers with an air gap between the hardstand and the office. This shall provide adequate protection for all situations up to and including CS3.

Long term site management will include the preparation of an EMP detailing the presence and location of capped ACM impacted material, and mapped burial trenches. The EMP will detail maintenance requirements for the capping material and GG infrastructure and monitoring requirements for ground gas. The EMP will outline procedures for any future required works beneath the capping layer or GG protection measures (e.g. future installation of services).

- The EMP is to be a legally enforceable document retained by the current or future site owners and is to be appended to the site's Section 10.7 planning certificate as a note on title.

12.1.4. Remedial Strategy

The required work stages are outlined as follows:

1) Notifications and Site Preliminaries:

- It is anticipated that remediation works required by the RAP shall be approved by development consent conditions imposed on the DA.
- The following notifications shall be required for any remediation of ACM.
  - Notification to SafeWork NSW will be required to advise the presence of asbestos contamination.

2) Appointment of Remediation Contactor/Environmental Consultant/Surveyor

- Due to the presence of AF/FA material and the remediation plans requiring transport of AF/FA impacted material across the site, all remediation works are to be completed by a suitably licenced 'Çlass A' asbestos removal contractor.
- The LARC will be required to prepare an asbestos removal contract plan which along with the RAP will require submission to SafeWork NSW.
- The environmental consultant will supervise all remediation works; confirm the suitability of capping material; monitor placement of capping material; document stages of remediation; perform validation inspections and testing of remediation areas; and prepare a validation report.
- The surveyor will survey the upper surface of the buried asbestos impacted fill material after the placement of the geotextile marker layer and survey the upper surface of the capping layer. The surveyor will also undertake a survey of GG mitigation measures.

3) Site Establishment

Prior to the commencement of remedial works, the site shall be prepared for the works:

- Establishment of site offices, work sheds and amenities for the site workers, including fencing and signage to indicate asbestos works are underway.
- Establishment of appropriate decontamination facilities for personnel, vehicles and plant/equipment.
- Establishment of air monitoring locations. Due to the size of the site and presence of multiple remediation areas it is anticipated that air monitoring locations will not remain static.
- Installation of appropriate dust suppression and air quality control measures as required by the SafeWork approved plan.
- Establishment of site holding areas for contaminated material. Site areas are to have appropriate environmental controls in place including stormwater diversion, erosion, sedimentation controls and dust suppression. All site holding aeras nominated for storage of contaminated material are to be lined with HDPE or placed on hardstand.

4) ACM Remediation Work

- Relocation of fill material to levels and locations which allow for the formation of the required capping layers beneath the formation of the required capping layers beneath the proposed site design levels. These works shall regrade the site to a 'precap' surface in all areas where ACM impacted fill is to be retained and capped. The surface is defined as the surface sufficiently lowered from the design site levels to allow for the construction of the capping layer.

  In areas where the current level of fill exceeds the required levels for the precap surface, fill material shall be excavated and used elsewhere on the site to achieve the precap surface levels.
- Where fill material has been placed on the site in areas where the DA does not seek consent for filling, this material will be relocated to locations where filling is included in the DA.

  It is noted an estimated 19,000m^3 of material will require reworking.
- Where excess ACM impacted fill remains after the formation of the precap surface, that material will be waste classified and removed from the site to an appropriately licensed or approved location.

  The Auditor notes that this material will be required to be taken to an EPA licensed landfill, and would not be considered suitable for reuse on another site. Martens estimate 9,500m^3 of material will require classification and offsite disposal. The Auditor advises that this be sampled at an appropriate density in accordance with the waste classification guidelines for at a minimum, heavy metals, TRH, BTEXN, PAH, OCP/OPP, PCBs, asbestos, and any other COPC that are associated with the area the fill material originated from. If any buried putrescible waste is to be disposed offsite, any additional organic, biological or inorganic contaminants required by the receiving facility should be included.
- The precap surface of the remedial area is to undergo an emu pick by the remedial contractor to remove surface ACM. A surface clearance certificate should then be prepared.
- A high visibility marker layer is to be placed over fill material prior to the establishment of the capping layer/s.
- A survey is to be completed of the top of the surface of the marker layer, prior to the commencement of capping material placement. Following capping, an additional survey is to be completed to confirm the thickness of the capping layer and ensure it is adequate.

5) Ground Gas Management

It is noted that works associated with the installation of the gas protection system will be subject to requirements of the final development layout and are subject to a detailed design which is to be approved by the Auditor.

- GG measures including (1) Installation of the cut off trench along the southern hardstand edge. Where buried waste material is identified south of this structure, that buried material shall be excavated, waste classified and removed from the site; (2) installation of a GG cut off trench along the retaining wall

immediately south of shed 4; (3) installation of GG venting systems within drainage and other service trenches to prevent GG accumulation and migration to sheds; (4) construction of a passive, under slab GG collection and venting system beneath proposed new on ground building (it is understood that Shed B is the only structure proposed to have mitigation measures as the second shed is beyond the expected migration distance of the ground gas and cut off systems would mitigate gases prior to it reaching the second building and the office is proposed to be constructed on piers, therefore creating a "wind tunnel" effect); and (5) survey by a registered surveyor of the extent of all gas management infrastructure.

6) Site Validation

- Prior to the site being certified for the proposed land use, a validation report documenting the completed remediation works must be prepared by the appointed environmental consultant.
- Fill Relocation: Areas of the site where ACM impacted fill has been placed, but are outside the proposed capping area are to be validated after relocation of ACM impacted fill material. Areas are to be validated via visual inspection confirming all previously placed fill material has been removed and no remaining ACM is present. Final validation of the ACM impacted fill material's removal is to be achieved through shallow test pitting at a depth not less than 500mm, with test pits to be completed at a density determined by the NSW EPA Sampling Design Guidelines (1995).

  The Auditor has recommended that in addition to visual validation, sampling also be completed to confirm the absence of ACM.
- Hardstand/Structural Slab Capping Layer: Remediation areas where hardstand or slabs are proposed should be constructed in accordance with engineering requirements. Flexible pavements are to be designed by a geotechnical/pavement engineer and have a minimum thickness of 300mm over buried ACM. Capping layer verification is to be provided by the consultant once the survey of the marker and capping layers has been completed. This will be included in the Validation Report and EMP.
- Soil Capping Layer: All non-hardstand areas within the remedial area are to be capped with a landscaping layer. The construction of the capping layer is to be supervised by the consultant and the capping layer is to consist of VENM, ENM or waste exempt material for the purposes of landscaping. The capping layer should be a minimum of 0.5m thick and should be confirmed by the surveyor.

  The Auditor has noted that all imported material should be sampled at a density of 1 per 100m^3 for heavy metals, BTEXN, TRH, PAH, OCP/OPP, PCBs, and asbestos. Where ENM is imported, foreign materials, pH and EC should also be sampled for.
- Where the capping thickness does not meet the minimum thickness specified, additional capping material is required to be placed and the cap resurveyed.
- To validate GG protection measures, Martens recommend the following: (1) inspections at relevant hold points including the excavation cut off trench; placement of gas collection infrastructure; and completion of the venting system; (2) review of data collected during the detailed design phase and construction phase inspections; and (3) surface methane monitoring to be completed following passive sub slab ventilation installation. The GG guidelines indicate that steady state methane concentration over 100% of the ventilation layer <1% v/v at a wind speed of 0.3m/s is considered 'very good performance'.
- A site validation report is to be prepared by the consultant and shall detail the remediation and validation sequence, assessment results, provide material tracking data for any material taken offsite (if required) and document any imported material (and testing or supporting documentation).

  It is noted by the Auditor if any material is to be taken offsite, waste classification certificates will be required to be prepared by the consultant and reviewed by the Auditor.

12.1.5. Additional Site Characterisation

To further characterise/validate the findings detailed in the investigations, further works are recommended. Additional investigations are not intended to change the adopted remedial strategy, however, are proposed to better characterise identified contamination risks. Following completion of the additional works, and subject to the Auditor's advice, an addendum to the RAP may be required to detail any amendment to the remedial solution. The current remedial strategies adopted by Martens and approved by the Auditor have been suitably conservative in nature and are considered appropriate for the known site contamination.

Soil:

PFAS in groundwater was assessed as part of the FDSI. PFAS was detected above the laboratory limit of reporting in MW01 and MW04, however results were below the 95% protection criteria, and are not considered to pose a risk or require management and/or remediation.

Whilst no management or remediation of PFAS is considered necessary at this stage, to better understand the potential sources of PFAS detections in groundwater, additional near surface soil samples are proposed to be collected from inside former poultry sheds. At a minimum, one near surface soil sample is proposed to be collected from each shed at the site which has formerly been used for poultry farming. These samples will be analysed for PFAS.

Ground Gas:

To inform the detailed design of ground gas measures, further characterisation of ground gas should be undertaken in consultation with the Auditor:

- A GG specific SAQP to be prepared which will detail further monitoring to inform the detailed design, and additional monitoring events to determine changes in soil gas conditions over time.
- Documentation of SAQP findings in a GG report which analyses findings, review soil gas trends and details a further GG risk assessment.
- It is recommended that prior to approval of the final GG mitigation measure designs, pilot trials of the proposed GG mitigation measures should be undertaken to ensure the suitability of the proposed design to manage risks.

Groundwater:

To better characterise site groundwater conditions and migration risks from the site, additional groundwater monitoring is recommended:

- Installation of an additional groundwater monitoring well adjacent to the northern site boundary.
- Completion of an additional groundwater monitoring event, including onsite screening of groundwater quality parameters and collection of groundwater samples from each monitoring wells.
- Analysis of groundwater samples for heavy metals, TRH, PAH, nutrients (ammonia, nitrates, nitrites and phosphorus) and PFAS.
- Completion of (falling or rising head) slug tests at each monitoring well location to assess the water bearing zone permeability.

The Auditor recommends that BTEXN, total coliforms, E.coli, dissolved methane and carbon dioxide also be included in the above sampling event.

The Auditor notes appropriate site and construction phase management requirements and recommendations for preparation of asbestos removal control plans, environmental management plans, worker health and safety plans, waste disposal requirements and asbestos licences are included in the RAP. Martens have included contingency plans, should any unexpected finds, generation of unacceptable

levels of dust, asbestos fibres or noise occur, or if excessive rainfall or excessive water occurs in excavations.

12.1.6. Long Term EMP

The EMP must, as a minimum, provide the following:

- A plan identifying the location and extent of capped ACM material, burial trenches and ground gas mitigation measures.
- Provide protocols and procedures to ensure the integrity of the capping layer.
- Provide a monitoring framework to ensure GG do not present an ongoing risk to receptors.
- Identify WHS requirements to current and future site users or workers.
- Provide recommendations and control measures for any future site works which have the potential to impact the capping layer or be impacted by site GG (future building construction, deep landscaping or services installation/maintenance works).
- Detail how the EMP will be legally enforced and included on the site's Section 10.7 planning certificate as a note on title.
- Be approved by the Section A2 SAS and shall be varied only with the approval of Council or be the subject of a subsequent Section A2 SAS.

Martens conclude that following successful remediation and validation of the site, it shall be made suitable for the proposed development. Implementation and validation of this RAP should be made a condition of development consent to give Council the required certainty that remediation shall be completed prior to the proposed use.

In accordance with the Managing Asbestos in or on soil (WorkCover 2014) guidelines, the Auditor recommends that for asbestos a 0.5m cap is required and the material must be geotechnically suitable in such that it is resistant to erosion over time. All earthworks must be completed in accordance with AS3798-2007 to ensure suitable compaction. In addition, the Auditor recommends that all marker layers are to have 0.5m overlaps between joins.

The Auditor considers the proposed remediation is adequate to address the identified impacts at the site and the proposed validation regime is appropriate. It is noted that it is important to have an appropriate haul route and to minimise dust. The Auditor notes that sampling has been conducted by Martens in the investigation area. However, due to the nature of asbestos, the Auditor suggests that contingency plans be put in place during remedial and earthworks, if additional contamination in areas which are not proposed to be subject to remediation and an EMP, or unexpected finds are discovered. The Auditor has recommended that in addition to visual validation, sampling also be completed to confirm the absence of ACM in areas which are not capped.

The reason for elevated concentrations of total coliforms, carbon dioxide and/or nutrients in downgradient wells MW01 and MW02 is unknown. Martens attribute the presence of carbon dioxide may be due to the natural shale that the wells are installed in. It is expected that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site and reasons stated in Section 11.6.3. In addition to the above RAP which details installation of an additional groundwater well and completion of a fourth groundwater monitoring event for heavy metals, TRH, PAH, nutrients (ammonia, nitrates, nitrites and phosphorus) and PFAS. The Auditor recommends that BTEXN, total coliforms, E.coli, formaldehyde dissolved methane and carbon dioxide also be included. During the additional round of groundwater sampling, the Auditor recommends that both total and dissolved metals are sampled and analysed to provide more clarity on groundwater chemistry.

It is noted that for burial trenches, the proposed management/remedial option will be onsite management. The proposed development in the remediation area will primarily consist of open hardstand for vehicle

parking and circulation. Proposed remedial works will be put in place to provide controlled venting of any generated ground gas and to prevent migration of ground gas to sheds, service conduits or offsite to the south. This will involve construction of ground gas cut off trenches along the southern boundary of the proposed hardstand to allow for the interception of any gas that may be directed offsite to the south; a ground gas collection system to be constructed within the retaining wall backfill along the southern side of Road 2 to the south of the existing shed 4 to allow for interception of any gas that may be directed north; and a ground gas barrier/venting system along the stormwater drainage lines running south and east from proposed Shed B to prevent the accumulation of gas in these services. In addition, a passive under slab ground gas collection and venting system will be constructed beneath the proposed shed slab along with a reinforced concrete ground bearing floor slab to provide 2 protection points. The ground gas infrastructure will be managed under an EMP. The proposed office to be constructed in the southern portion of the site will be built on piers and therefore a "wind tunnel" effect will mitigate the vertical migration of ground gas in this building.

The Auditor notes that there is very minimal to negative flow at the site and therefore, migration in the site's current state may not be an issue. However, measures are required to be put in place if hardstand is placed on top of the burial trenches which may result in decreased ability for gases to vent vertically, and result in lateral migration of gases via a subsurface pathway. The Auditor has requested that additional ground gas monitoring rounds, pilot trials, potential leachate control trials and dewatering measures be put in place for the proposed ground gas collection and venting systems occur prior to remediation to confirm that the proposed protection will be sufficient for the "worst case scenario". Martens have included this as part of their additional investigation works in the RAP.

12.2. Guideline Compliance

The Auditor has assessed the RAP prepared by Martens (2021e) against the NSW EPA (2020) reporting criteria for remedial action plans.

Section 1.5 of *NSW EPA (2020) Guideline for Consultants Reporting on Contaminated Land* states that:

The Remedial Action Plan must:

- *Summarise the findings of the preliminary and detailed site investigations and risk assessment (where applicable) and present the refined conceptual site model.*
- *Document the identified contamination risks to human health and/or the environment.*
- *Set remediation objectives that ensure the remediated site will be suitable for its current and/or proposed use and which will result in no unacceptable risk to human health or to the environment and state remediation criteria.*
- *Define the extent of remediation required across the site.*
- *Assess options and remedial technologies to achieve the remediation objectives and select and justify a preferred approach, which must include the consideration of the principles of ecologically and sustainable development.*
- *Document in detail all procedures and plans to reduce risks posed by contamination to acceptable levels for the proposed site use.*
- *Identify the need for and reporting requirements of remedial technology pilot trials (if applicable).*
- *Establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner, including consideration of the potential for offsite impacts (such as air quality, odour and aesthetics).*
- *Address contingencies and unexpected finds protocols.*
- *Identify the necessary approvals and licenses required by regulatory authorities including any items contained in development consent conditions.*
- *Clearly outline waste classification, handling and tracking requirements in accordance with the Guidelines for the NSW Site Auditor Scheme and Waste Classification Guidelines (EPA 2014).*

- *Ensure remediation is consistent with relevant laws, policies (including planning instruments and policies) and guidelines and reference these in the remedial action plan.*
- *Identify how successful implementation of the remedial action plan will be demonstrated, for example the validation requirements by documentation of site works and sampling and analysis etc (when sampling and analysis is required, a validation and sampling and analysis quality plan must be included, with clearly defined acceptance criteria indicating what statistics will be used and any trend analysis following remediation, i.e. Mann-Kendall test).*
- *Identify the need for, and nature of, any long-term management and/or monitoring following the completion of remediation and, if required, provide an outline of an environmental management plan and include this in the remedial action plan.*

Once remedial work is complete, a report should be prepared detailing the site work conducted and regulatory decisions made.

12.3. Audit Discussion

The Remedial Action Plan prepared by Martens (2021e), although not prepared strictly in accordance with NSW EPA (2020) was of sufficient quality to define the extent of remediation and ongoing monitoring required to show the site may be made suitable for the proposed land use.

In addition to the RAP, the Auditor considers the following should occur:

1. Where movement of asbestos is proposed, validation of the haul route (where necessary) should be completed. For other areas of the site where ACM impacted fill is to be relocated, the Auditor has recommended that in addition to visual validation, sampling for laboratory analysis should also be completed to confirm the absence of ACM.
2. The Auditor notes that in accordance with the Managing Asbestos in or on soil (WorkCover 2014) guidelines, for asbestos capped under 0.5m in landscaped areas, the material must be geotechnically suitable so that it is resistant to erosion over time. For structural concrete ground slabs under sheds, 0.5m is not required, as long as the hardstand has an MPa rating suitable for the proposed use and must comply with gas protection measures where required.
3. In addition to COPC proposed to be analysed in the fourth groundwater monitoring event (heavy metals, TRH, PAH, nutrients (ammonia, nitrates, nitrites and phosphorus) and PFAS), the Auditor recommends that BTEXN, total coliforms, E.coli, formaldehyde, dissolved methane and carbon dioxide also be included.
   During the additional round of groundwater sampling, the Auditor recommends that both total and dissolved metals are sampled and analysed to provide more clarity on groundwater chemistry.
   If unacceptable concentrations of contaminants and/or nutrients are found to be migrating offsite, an addendum to RAP may be required and groundwater may require treatment or remediation.
4. It is noted that exceedances of site-specific ecological criteria of zinc (3900 mg/kg) were reported for surface sample SS12, located on the north-eastern boundary of the second southernmost shed. Martens attribute the zinc exceedance to the degradation of galvanised metal used for shed construction. The Auditor recommends that the hotspot be delineated and removed or testing should be completed to assess the mobility and bioavailability of the contaminant to ecological receptors.

13. REMEDIATION AND VALIDATION

The remediation and validation of the site has not yet occurred, but the Auditor is satisfied that the site may be made suitable if the Remedial Action Plan prepared by Martens (3 September 2021, Ref: P1806774JR14V04) is followed and the above additional measures suggested by the Auditor outlined in Section 12.3 are included.

14. ASSESSMENT OF RISK

Assessment of risk was conducted through comparison to guideline criteria (tier 1 risk assessment) without requirement for site specific risk assessment. It is noted that remediation has not been completed for the site and that a risk assessment is unlikely to be required. The site, including the ACM capped area and portion of the site requiring ongoing management for ground gases will be subject to a long term Environmental Management Plan, which is to be prepared by the consultant following remediation.

It is noted that at the time this report was prepared, a risk assessment has not proposed for the site, although considered unlikely, the requirement for a risk assessment may be reconsidered following additional ground gas and groundwater sampling at the site during remedial works. Due to the negative to minimal flow of ground gas detected at the site and the relatively impermeable nature of the underlying shale, the potential requirement for a future risk assessment is considered low.

The Auditor is satisfied that soil, groundwater and ground gas contamination has been adequately addressed and that there is currently no appreciable risk to soil vapour quality.

The Auditor notes that data gap investigations will be completed as part of the remedial works and these investigations are considered more to be confirmation sampling to ensure preliminary conclusions.

1. Installation of an additional groundwater monitoring well on the downgradient site boundary to ensure that elevated concentrations of contaminants are not migrating offsite at unacceptable concentrations. In addition to a ground water monitoring event for all site wells, slug tests will be performed to determine permeability variations.

2. Completion of additional ground gas monitoring, as per an SAQP to be prepared by Martens and approved by the Auditor. This is proposed to be completed to ensure that the “worst case” meteorological scenario is captured and to determine ground gas changes over time and barometric pressure. The Auditor considers that this is warranted to ensure sufficient sampling rounds have been completed at the site to be confident in the protection measures proposed in the RAP. In addition, the Auditor has requested that pilot trials, potential leachate control trials and dewatering measures be put in place for the proposed ground gas collection and venting systems, and that this occur prior to remediation to confirm that the proposed protection will be sufficient for the “worst case scenario”.

3. PFAS was detected at low concentrations below the 95% protection criteria in some monitoring wells within the burial trench area and also in a downgradient well. The Auditor has recommended that Martens complete additional soil sampling for PFAS in the subsurface soils within former poultry sheds to determine there is no source of PFAS in soil, and Martens have proposed this as part of the RAP data gap investigation works.

The Auditor has also recommended that the exceedance of site-specific ecological criteria for zinc (3900 mg/kg) reported for surface sample SS12, should be delineated and removed, or testing should be completed to assess the mobility and bioavailability of the contaminant to ecological receptors.

15. LONG TERM MANAGEMENT

Long term site management of contamination will be required for the capped ACM area and the area of the site impacted by ground gas. An Environmental Management Plan will be prepared following remediation works. As noted by Martens (2021e) and the Auditor, the EMP must detail:

- A plan which clearly identifies the location and extent of capped ACM, including the specific location of any buried waste material and ground gas mitigation infrastructure.
- Provide protocols and procedures to ensure the integrity of the capping layer.
- Identify work health and safety requirements to current and future site users.
- Provide a monitoring framework to ensure GG do not present an ongoing risk to receptors.
- Provide recommendations and control measures for any future site works which have the potential to impact the capping layer and/or ground gas infrastructure (e.g. future building construction, deep landscaping or services installation/maintenance).
- Detail how the EMP will be legally enforced. The Auditor notes that the EMP will be retained by the site owners and appended to the site's section 10.7 planning certificate.
- The EMP will need to be reviewed by Council and the Auditor appointed will need to explain it to Council so that Council can form an opinion and be satisfied that it is legally enforceable.

16. POTENTIAL FOR OFF-SITE MIGRATION

There is currently no significant potential for off-site migration of contaminants from soil on the site. The Auditor considers there is insufficient evidence to conclude there is a potential for offsite migration of groundwater at the site and considers that this will be reassessed following installation of a downgradient well on the site boundary to gain further information. The Auditor notes that although it is unlikely based on the current flow rate data and site conditions, there is a potential offsite migration risk for ground gas.

16.1. Groundwater

Groundwater is understood to flow north north-east towards Navigation Creek. MW04 has been installed in the perched groundwater system and Martens do not consider this well is representative of the regional groundwater system. It is noted that elevated concentrations above the LOR and/or above criteria of benzene, TRH, PFOS and formaldehyde were detected at MW04. In addition, toluene was detected at MW04, MW03, and in downgradient wells MW01 and MW02. However, the most recent sampling event in August 2021 indicates toluene was only detected in MW04, and remained below criteria. Martens attributed elevated benzene and formaldehyde at MW04 was to likely due to waste material in former burial trenches. Martens anticipate that permeability of the surrounding natural soils is significantly lower than that of the waste resulting in the retention of infiltrated water in trenches. Contaminants from buried trench material may have leached into this retained water in the shallow perched water bearing zone. Comparison of the results to the rest of the site indicate that local perched water contamination has not likely impacted the deeper groundwater system in the shale and the risk posed by the perched groundwater system is considered low.

Elevated concentrations of arsenic, cadmium, chromium, copper, lead, nickel and/or zinc have been detected at all wells with the exception of MW06. The most elevated concentrations were detected within the perched groundwater system at MW04, and the most elevated concentration in downgradient wells was copper at 210µg/L and zinc at 130µg/L in MW01.

Biological analytes including total coliforms and/or E.coli were detected at all monitoring wells, with the highest concentrations at MW01, MW04, MW03. Nutrients (ammonia, nitrate, nitrite, nitrogen, total phosphorus and/or reactive phosphorus) have been detected above the LOR at all monitoring wells, including the downgradient wells. Elevated free carbon dioxide was detected in groundwater at all wells, and dissolved methane was detected above or equal to the LOR at MW03, MW04 and MW06. The presence of elevated concentrations of nutrients and biological analytes in wells in the vicinity of the burial trenches (MW03, MW04, MW06 and MW09) is expected due to the putrescible poultry farm waste. The reason for elevated concentrations of total coliforms, carbon dioxide and/or nutrients in downgradient wells MW01 and MW02 is unknown, however Martens note that carbon dioxide may be attributable to the organics in the natural shales the wells are screened in. It is expected that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site. The site overlies Bringelly Shale which is generally low in permeability and therefore if a minimal amount of contaminant or nutrient enters the fractured shale, the concentration of contaminants will increase, however, in terms of kilograms of contaminant, it is likely to be a very small mass. Where there is very minimal water in storage, a very small amount of mass of a contaminant or nutrients would change the chemistry of the groundwater.

To ensure that unacceptable nutrient, carbon dioxide and total coliform concentrations are not migrating offsite in groundwater, the Auditor has recommended as part of remedial works that an additional groundwater monitoring well be installed on the downgradient boundary and slug tests be performed to determine permeability variations of the water bearing zones. Martens note that the groundwater investigation identified a water bearing zone between 5 and 7m BGL. The groundwater in MW04 is considered to be a perched water bearing zone due to former burial trenches. Martens indicate elevated nutrients in MW01 and MW02 is likely due to the former poultry farm use. If unacceptable concentrations of

contaminants and/or nutrients are found to be migrating offsite, an addendum to RAP may be required and groundwater may require treatment or remediation.

16.2. Ground Gas

Ground gas has been detected at the site surrounding the former poultry waste burial pits. Martens have completed two sampling rounds to date, and negative to minimal flow has been detected at the site (maximum of 0.5L/hr). Martens calculated the GSV using the “worst case” flow rate of 0.5 L/hr for each well. MW01 – MW03, M06 – MW07, MW09 – MW13 and MW15 – MW16 were classified as Very Low Risk with a characteristic situation of 1. MW14 was calculated as Low Risk, with a characteristic situation of 2. MW04, MW05 and MW08 were classified as Moderate Risk with characteristic situations of 2 calculated, which were then increased to 3 due to the maximum ground gas concentration exceeding 20%v/v. The maximum concentration of gas was detected at MW04 (62.1% v/v of methane). Concentrations above the adopted criteria were not detected in downgradient wells MW01 and MW02. Surface emission methane transects were completed in the southern portion of the site in the vicinity of the trench area. The readings ranged from 0.0 ppm to a maximum of 3.8 ppm, close to the south western boundary. This indicates that surface emissions of methane are not of concern and are well below the adopted criteria of 500ppm.

It is unknown if offsite migration of ground gas has already occurred, however, it is considered unlikely based on the negative to minimal flow rate. Due to the close proximity of the well with the most elevated concentration of methane to the southern boundary, the Auditor has taken a conservative approach and advised a Section 60 notification under CLM Act be prepared for ground gas and the presence of AF/FA in soil above criteria at one location.

It is noted that for burial trenches, the proposed management/remedial option will be onsite management. The proposed development in the remediation area will primarily consist of open hardstand for vehicle parking and circulation. Proposed remedial works will be put in place to provide controlled venting of any generated ground gas and to prevent migration of ground gas to sheds, service conduits or offsite to the south. This will involve construction of ground gas cut off trenches along the southern boundary of the proposed hardstand to allow for the interception of any gas that may be directed offsite to the south; a ground gas collection system to be constructed within the retaining wall backfill along the southern side of Road 2 to the south of the existing shed 4 to allow for interception of any gas that may be directed north; and a ground gas barrier/venting system along the stormwater drainage lines running south and east from proposed Shed B to prevent the accumulation of gas in these services. In addition, a passive under slab ground gas collection and venting system will be constructed beneath the proposed shed slab along with a reinforced concrete ground bearing floor slab to provide 2 protection points. The ground gas infrastructure will be managed under an EMP. The proposed office to be constructed in the southern portion of the site will be built on piers and therefore a “wind tunnel” effect will mitigate the vertical migration of ground gas in this building.

The Auditor notes that there is very minimal to negative flow at the site and therefore, migration in the site’s current state may not be an issue. However, measures are required to be put in place if hardstand is placed on top of the burial trenches which may result in decreased ability for gases to vent vertically, and result in lateral migration of gases via a subsurface pathway. The Auditor has requested that additional ground gas monitoring rounds, pilot trials, potential leachate control trials and dewatering measures be put in place for the proposed ground gas collection and venting systems occur prior to remediation to confirm that the proposed protection will be sufficient for the “worst case scenario”. This has been included in the additional site works section of the RAP prepared by Martens.

17. REGULATORY REQUIREMENTS

The following regulatory aspects are considered to relate to the investigations, remediation and validation works conducted at the site.

17.1. Protection of the Environment Operations Act, 1997

Activities governed by the Protection of the Environment Operations Act 1997 (PoEO Act 1997) and associated regulations include waste disposal.

To the Auditor's knowledge, no waste has been generated or disposed of from the site at the time this report was prepared.

However, it is noted that during the PSI site walkover, Martens identified a stockpile of burned rubbish, paint cans, aerosol cans, and glass bottles on the south east side of the dam located near the south west corner of the site. An additional stockpile 2m x 2m x 0.3m of broken "super six" PACM was observed in the grassed area near the south west boundary which may have introduced PACM into the soil. A third soil stockpile located approximately 25m north west of the southernmost large shed with dimensions of approximately 3m x 2m x 1.5m contained soil, brick, plastic, ceramics and PACM fragments. It is unclear what the fate of these stockpiles were as they were not present at the time of the Auditor's involvement. It is likely that these stockpiles were removed from the site after Council originally approved the PSI prepared by Martens. The Auditor has asked Martens to comment on the fate of these stockpiles (if known). As this issue is still under investigation, the Auditor will provide an update in the Section A2 SAR to be prepared following remediation.

It is noted that prior to the recent filling event, the following material was imported to the site and noted in the PSI by Martens:

- Approximately 1850 tonnes of ENM from Corner of Muscovy Drive and Warbler Street, The Ponds NSW 2769.
- Approximately 530 tonnes of VENM from Tarro Avenue, Revesby NSW.
- Approximately 1800-2000 tonnes of ENM from Darlinghurst Road Precinct, Darlinghurst NSW, 2010.

Martens (2020) indicate that the material imported to the site is classified as VENM or ENM and has been certified by Alliance Geotechnical (ENM) and Geotest Services (VENM) as being uncontaminated and fit for use. Martens indicated that there were no discrepancies observed during the PSI walkover that indicated this material would not be VENM or ENM. During the course of the site investigations, the Auditor has ensured that appropriate site coverage has been achieved and this imported material is likely to have also been sampled by Martens.

Dirt Doctors (2019) completed a material classification on an approximate 400 tonne stockpile of recovered asphalt parent material that had been imported to the site for use as engineered fill which they classified as "Recovered Aggregate". The material was originally placed into two stockpiles on either side of the shed previously located near the centre of the site. The stockpile and then moved southwest of the second southernmost largest shed. Some of this asphalt fill material had been placed on top of the VENM and ENM in various locations between the two dams in the south-west corner of the site. It is unclear if this material remains onsite. Although referenced by DD, there is no evidence that the recovered asphalt does has been sampled for foreign materials as outlined in the Recovered Aggregate Exemption 2014. It is understood that the above imported items were approved by Council prior to the Auditor's engagement. The Auditor has included the waste classification reports and results for completeness of the Audit Report. The results indicate the imported VENM/ENM and Recovered Aggregate meet the land use criteria for the specific analytes which were sampled.

The Auditor considers there has been a breach of the POEO Act (1997) due to the importation of fill (of the order of 35,000m^3) that is not consistent with VENM or ENM classification. This is understood to have occurred following the PSI prepared by Martens in August 2020. The Auditor has prepared and notified the site under the POEO Act and this notification is attached in Appendix D of this SAR. This notification was sent to the Director of Waste Compliance (EPA) and the client on 6 September 2021.

In addition, during the Auditor's site visit on 1 September 2021, a stockpile of crushed sandstone was observed on the site. The Auditor does not have any indication of where this material was imported from, and recommends Martens investigate the source of this material.

17.2. Duty to Notify under Contaminated Land Management Act 1997

Under Section 60 of the CLM Act 1997, and in accordance with NSW EPA (2015) Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, the owner of a site is obligated to report that site to NSW EPA where:

the level of the contaminant in, or on, soil is equal to or above a level of contamination set out in Schedule B1 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013) or other approved guideline value with respect to a current or approved use of the land, and people have been, or foreseeably will be, exposed to the contaminant

OR

the contamination meets a criterion prescribed by the regulations

OR

the contaminant or a by-product has entered, or will foreseeably enter, neighbouring land, the atmosphere, groundwater or surface water, and is above, or will foreseeably be above, a level of contamination set out in National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013) or other approved guidelines and will foreseeably continue to remain equal to or above that level.

The Auditor notes that the remediation of the site is yet to be completed. As a precautionary measure, the Auditor has advised Muscats and Martens that the site should be notified under the CLM Act due to the presence of AF/FA and elevated concentrations of methane and carbon dioxide in ground gas.

For the purposes of section 60(3)(b) of the CLM Act, notification of asbestos contamination is required where: Friable asbestos is present in or on soil on the land

AND

The level of asbestos (% weight for weight) in an individual soil sample is equal to or above the health screening level of friable asbestos in soil (0.001%) specified in Section 4.8, Schedule B1 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 2013) AND

A person has been, or foreseeably will be, exposed to elevated levels of asbestos fibres by breathing them into their lungs.

It is noted that there was only one detection of AF/FA, however, as it is not certain that a person has been exposed to the fibres during the importation process, the Auditor considers notification is advised. It is noted that the RAP prepared by Martens proposed to be put in place will ensure that the risk posed to receptors during, and post remediation will be negligible.

In addition, notification of ground gases was advised as an extra level of conservatism due to the sensitive nature of the site and its proceedings under the Land and Environment Court. It is noted that elevated concentrations of methane and carbon dioxide have been detected above the adopted criteria across the southern portion of the site in the vicinity of burial trenches and although there is no to minimal flow rate,

the Auditor considers notification under the CLM Act is warranted due to concentrations of methane detected up to a maximum concentration of 62.1%v/v.

The Auditor sent a letter of Interim Advice (IA04_Rev1) on 2 September 2021 advising Muscats in conjunction with the consultant conducting investigative works, Martens, that notification under the CLM Act (1997) is considered warranted (see Appendix B). In this letter the Auditor also noted that although there are elevated concentrations of heavy metals, nutrients, total coliforms and/or dissolved carbon dioxide in downgradient groundwater wells, there is currently insufficient data to warrant notification. This will be reconsidered once an additional groundwater monitoring well has been installed on the downgradient boundary during remedial works to determine if unacceptable concentrations of contaminants are migrating offsite. This letter has been forwarded to the EPA on 6 September 2021.

17.3. Guidelines made by the NSW EPA

EPA (1995a) *Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-acre Agricultural Land*. NSW EPA, Sydney

EPA (1995b) *Contaminated Sites: Sampling Design Guidelines*. NSW EPA, Sydney

EPA (1997a) *Contaminated Sites: Guidelines for Assessing Banana Plantation Sites*. NSW EPA, Sydney

EPA (2020) *Contaminated Land Guidelines: Assessment and Management of Hazardous Ground Gases*, NSW EPA.

NSW EPA (2014) *Waste Classification Guidelines*. NSW DECC, NSW EPA Sydney

NSW EPA (2015) *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*. NSW EPA Sydney

NSW EPA (2017) Contaminated Land Management: *Guidelines for the NSW Site Auditor Scheme – 3rd Edition*. NSW EPA, Sydney

DEC (2005) *Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens*. DEC, Sydney

DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*. NSW DEC, Sydney

NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Land*. NSW EPA, Sydney

17.4. Guidelines approved by the EPA

AGI (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian Government Initiative;

ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*. Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council, Canberra;

Department of Health and Ageing and EnHealth Council (2002) *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards*. Commonwealth of Australia, Canberra;

Heads of the EPA (HEPA) (2020) PFAS National Environmental Management Plan (NEMP), version 2.0, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand.

Lock, W. H., (1996) Composite Sampling, *National Environmental Health Forum Monographs, Soil Series No. 3*, National Environmental Health Forum, SA Health Commission, Adelaide;

NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Measure, Schedule A and Schedules B(1)-B(10).* National Environment Protection Council, Adelaide;

NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure No 1, Schedule A and Schedules B(1)-B(9)*. National Environment Protection Council, Adelaide;

NHMRC, NRMMC (2011) *Australian Drinking Water Guidelines* Paper 6 National Water Quality Management Strategy (updated November 2018); and

NHMRC (2008) Guidelines for Managing Risks in Recreational Water, National Health and Medical Research Council, Australian Government, 2008 (addendum produced in August 2019).

17.5. Guidelines from International Sources

No international guidelines were relied upon during the assessment of results.

17.6. NSW EPA (2017) Appendix A: Decision-making process for assessing urban redevelopment sites

The investigation area of the site is proposed to be redeveloped for use as a depot. As such, the decision-making process for assessing this site falls under Item 1 of Appendix A, NSW EPA (2017) Commercial or Industrial, and the following items are required to be checked as part of the Site Audit:

A. Check that:

- All site assessment, remediation and validation reports follow applicable guidelines
- Any aesthetic issues relating to site soils have been adequately addressed
- Soils have been assessed against relevant health-based investigation levels and potential for migration of contamination from soils to groundwater has been considered
- Groundwater (where relevant) has been assessed against relevant health-based investigation levels and, if required, any potential impacts to buildings and structures from the presence of contaminants considered
- Hazardous ground gases (where relevant) have been assessed against relevant health-based investigation levels and screening values
- Any issues relating to local area background soil concentrations that exceed relevant investigation levels have been adequately addressed in the site assessment report(s)
- The impacts of chemical mixtures have been assessed
- Any potential ecological risks have been assessed
- Any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed, including potential risks to off-site receptors, and reported to the site owner or occupier
- The site management strategy (where relevant) is appropriate including post-remediation environmental plans.

B. Prepare a site audit report and site audit statement.

These points are covered below. Where relevant, reference is also made to other sections of this document.

17.6.1 NSW EPA (2020) Guidelines for Consultants Reporting on Contaminated Land

The investigation reports compiled for the site generally comply with the guideline requirements. Where non-compliance has been noted, the Auditor's review has indicated that the non-compliances do not materially affect the required technical approach or conclusions able to be drawn from the reports and as such are considered acceptable.

The Auditor's review of these reports is presented throughout this document.

17.6.2 Aesthetic Issues

There is no record of ash or other odorous material in soil, but ground gas may be an aesthetic issue if not appropriately managed.

Bulk earthworks have not yet been completed at the site. It is expected that asbestos in fill material and buried putrescible waste will present an aesthetic issue if not managed correctly.

It is noted that Martens have included the drinking water criteria and the Auditor has included the aesthetic criteria from the Drinking Water Guidelines (ADWG 2018) where applicable. The aesthetic criteria have been exceeded at MW04 for toluene and ammonia. This well has been installed in the perched groundwater system and is therefore not representative of regional groundwater. It is noted that this has been included as a screening measure and it is understood that potable water is not proposed or currently in use at the site. There is a bore on the southern site boundary installed in a deep groundwater aquifer and it is understood that this bore is used for irrigation purposes only.

Martens note the proposed land use does not include bore water and will be serviced by onsite rainwater tanks. Site earthworks are not expected to encounter the deeper aquifer or the shallow aquifer. The licensed groundwater well in the southern site boundary is installed to 145.9m into the first available aquifer in sandstone beneath the shale which begins at 78m. The water bearing zones assessed as part of this investigation are excluded from the bore as it is cased to 86.9m.

17.6.3 Investigation Levels

Appropriate investigation levels were adopted for the site. See Section 10 of this report for detailed discussion.

17.6.4 Groundwater Assessment

As discussed in Section 11.6.3, groundwater was appropriately assessed to characterise site conditions. As requested by the Auditor an additional monitoring well will be installed during remedial works to ensure that there are not unacceptable concentrations of contaminants migrating offsite. If unacceptable concentrations of contaminants and/or nutrients are found to be migrating offsite, an addendum to RAP may be required and groundwater may require treatment or remediation.

17.6.5 Hazardous Ground Gases

A source of hazardous ground gases was identified at the site and primarily is centred around the southern portion of the site. The source of hazardous ground gases including methane and carbon dioxide are attributed to the presence of buried putrescible waste in trenches associated with former use of the site for poultry farming. This is discussed in Section 11.6.4. Ground gas has been assessed at a sufficient level to understand the gas situation at the site. As noted throughout the Audit report, additional sampling rounds are proposed as part of remedial works to ensure that the "worst case" scenario has been captured and proposed mitigation measures will be sufficient for the site.

17.6.6 Background Soil Concentrations

Background soil conditions were not assessed.

17.6.7 Assessment of Chemical Mixtures

Chemical mixtures were not assessed as part of the investigations.

The Auditor is satisfied that assessment of chemical mixtures would not have a bearing on the results of the suitability of the site for the proposed land use and that in this case, the absence of assessment of mixtures is acceptable.

17.6.8 Assessment of Ecological Risks

The concentrations of all CoPC in the investigation areas of the site were shown to have some contaminants exceed the ecological criteria. It is noted that exceedances of site-specific ecological criteria of zinc (3900 mg/kg) were reported for surface sample SS12, located on the north eastern boundary of the second southernmost shed. Martens attribute the exceedance to likely degradation of galvanised metals used in the shed construction. It is noted that this sample was not delineated by Martens, however nearby samples did not report concentrations above the adopted criteria which indicates it is likely to be an isolated hotspot. Martens note that although this hotspot will remain in an area of exposed soil, the hotspot poses negligible risk to ecological receptors due to the proposed commercial/industrial nature of the site and the limited ecological receptors identified that may access the site. The Auditor recommends that the hotspot be delineated and removed, or testing should be completed to assess the mobility and bioavailability of the contaminant to ecological receptors.

Two exceedances of ecological criteria for B(a)P were detected during soil investigations (TP112/2.0 at 1.5 mg/kg; and TP117/0.1 at 2.6 mg/kg). The exceedance at TP112 was detected in the recently filled are west of the three large sheds in the centre of the site. The exceedance at TP117 was detected within the recently filled area, south of the second southernmost shed in the central portion of the site. Martens consider that these exceedances are not of concern. It is understood the two B(a)P exceedances will be capped under the hardstand and therefore an exposure pathway to ecological receptors will not exist.

Elevated concentrations of heavy metals, dissolved methane and carbon dioxide, nutrients, total coliforms, E.coli, TRH, benzene, toluene, formaldehyde and/or PFAS have been detected in groundwater at the site above the LOR and/or the adopted criteria. It is however noted that TRH, benzene, formaldehyde and toluene have been detected primarily in the perched groundwater system in the burial trench area and remain below human health and ecological screening levels. Elevated heavy metals, free carbon dioxide, nutrients and total coliforms have been detected in downgradient wells. The reason for elevated concentrations of total coliforms, carbon dioxide and/or nutrients in downgradient wells MW01 and MW02 is unknown, however, Martens indicate elevated carbon dioxide may be due to the organic shales the wells are screened in. It is expected that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site. The site overlies Bringelly Shale which is generally low in permeability and therefore if a minimal amount of contaminant or nutrient enters the fractured shale, the concentration of contaminants will increase, however, in terms of kilograms of contaminant, it is likely to be a very small mass. Where there is very minimal water in storage, a very small amount of mass of a contaminant or nutrients would change the chemistry of the groundwater.

To ensure that unacceptable nutrient, carbon dioxide and total coliform concentrations are not migrating offsite in groundwater, the Auditor has recommended as part of remedial works that an additional groundwater monitoring well be installed on the downgradient boundary and slug tests be performed to determine permeability variations of the water bearing zones. Martens note that the groundwater investigation identified a water bearing zone between 5 and 7m BGL. The groundwater in MW04 is considered to be a perched water bearing zone due to former burial trenches. Martens indicate elevated nutrients in MW01 and MW02 is likely due to the former poultry farm use.

The Auditor considers that based on the current data, the concentrations observed in MW04 can be attributed to the well being screened within the perched groundwater system in the burial trenches. The remaining five wells had concentrations of heavy metals that are likely to be attributable to the regional rural agricultural use of the land and may be representative of background concentrations, with maximum concentrations of metals in downgradient wells detected for copper (210µg/L) and zinc (130µg/L) in MW01 . As stated above, the Auditor has recommended that a monitoring well be installed on the downgradient boundary as part of the RAP. Navigation Creek is approximately 700m north east from the site and the

Auditor considers there is currently not sufficient evidence to conclude there is an ecological risk posed. This will be reconsidered following installation of the additional well on the downgradient site boundary.

17.6.9 Migration of Contaminants

The migration of contaminants is discussed above in Section 16.

17.6.10 Site Management Strategy

The Auditor notes that remedial works have not been conducted at the site, however, site management of the investigation area will be required via implementation of an Environmental Management Plan (EMP) (cap and contain and onsite management of ground gas).

17.7. Audit Discussion

The Auditor is satisfied that the assessment works conducted at the site have satisfactorily complied with the appropriate guidelines and are consistent with current industry standards.

The Auditor is satisfied that other regulatory requirements and EPA guidelines have been adequately met.

18. ADEQUACY OF CONSULTANT'S WORK

The work completed at the site by Martens was adequate and has appropriately characterised the site. If the RAP prepared by Martens (3 September, P1806774JR14V04) and the Auditors recommendations in Section 12.3 are followed, the investigation areas of the site may be made suitable for the proposed land use as a depot (commercial/industrial).

18.1. Audit Conclusions

In total, during the three DSI's, a total of 158 samples have been analysed across fill and natural material from 117 soil locations, and 2 dam locations for a range of contaminants of potential concern, including heavy metals, BTEXN, TRH, PAH, OCP/OPP, PCBs, formaldehyde, nutrients, E.coli and coliforms, and asbestos presence/absence. In addition, a total of 7 asbestos fragments were analysed and 110 samples were analysed for asbestos (AF/FA) from 46 locations. For a site approximately 4.032 ha in size, a minimum of 50 sampling locations are required in accordance with the sampling design guidelines (NSW EPA, 1995). An additional 4 fragments of ACM were observed on the surface of the site throughout the recently filled area, but were not sampled. In addition, a total of ten groundwater monitoring wells have been installed at the site, with six of these wells sampled and the other four wells dry during all sampling events. Up to three groundwater monitoring events have been completed in April, May and August 2021 for various wells, depending on the date of installation

For ground gas characterisation, a total of 15 ground gas wells have been sampled across the investigation area in addition to surface methane monitoring in the southern portion of the site. Up to two rounds of ground gas monitoring have been completed for various wells to date in May and August 2021, with additional rounds proposed as part of the remedial works.

The Auditor notes that adequate asbestos sampling has been conducted by Martens in the investigation area, with all recently imported fill material assumed to contain asbestos. However, due to the nature of asbestos, the Auditor suggests that contingency plans be put in place during remedial and earthworks, if additional contamination in areas which are not proposed to be subject to remediation and an EMP or unexpected finds are discovered.

Based on the discussion presented above, the Auditor is satisfied that the site contamination has been demonstrated through comprehensive assessment and intrusive sampling.

The RAP outlines capping options for the imported fill and redistribution of soils to meet the development reduced levels proposed. In addition, ground gas control will be implemented in the southern area of the site, consistent with the current ground gas levels.

The plan also allows for ongoing groundwater monitoring and further delineation. It is anticipated that an EMP will apply to the site as part of the ongoing management.

If the Remedial Action Plan is followed and the Auditor's suggestions in Section 12.3 are considered, the site may be made suitable for the proposed commercial/industrial depot.

Accordingly, it is the Auditor's conclusion that the site may be made suitable for the proposed use if the RAP (Martens 3, September 2021, P1806774JR14V04) and the Auditor's recommendations in Section 12.3 are followed.

APPENDIX A

FIGURES

From Google Maps & Martens RAP (2021e)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 1: Site Location

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

martens
Environment | Water | Geotechnics | Civil | Projects

From Martens RAP (2021e)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 2: Investigation Area

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

DIRT DOCTORS GEOTECHNICAL TESTING SERVICES	Stockpile Location	Muscat Hydroponics 285 Finns Rd, Menangle NSW	Job No.	DDE – 178C
			Drawing No.	DDE – 178C_1
		Drawn By MT	Ref No.	ENV01
		Approved By MT	Scale	N.T.S.

From Martens PSI (2020) - this figure was within the Dirt Doctors Waste Classification Report (2019)

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 3: Recovered Aggregate Stockpile

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens PSI (2020)

Larger Site Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 4: Areas of Environmental Concern (PSI)

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 5: Phase 1 Testing Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 6: Phase 2 Testing Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 7: Phase 3 Testing Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 8: Phase 4 Testing Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 9: Phase 5-6 Testing Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 10: Imported Fill Extent and Observed ACM

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

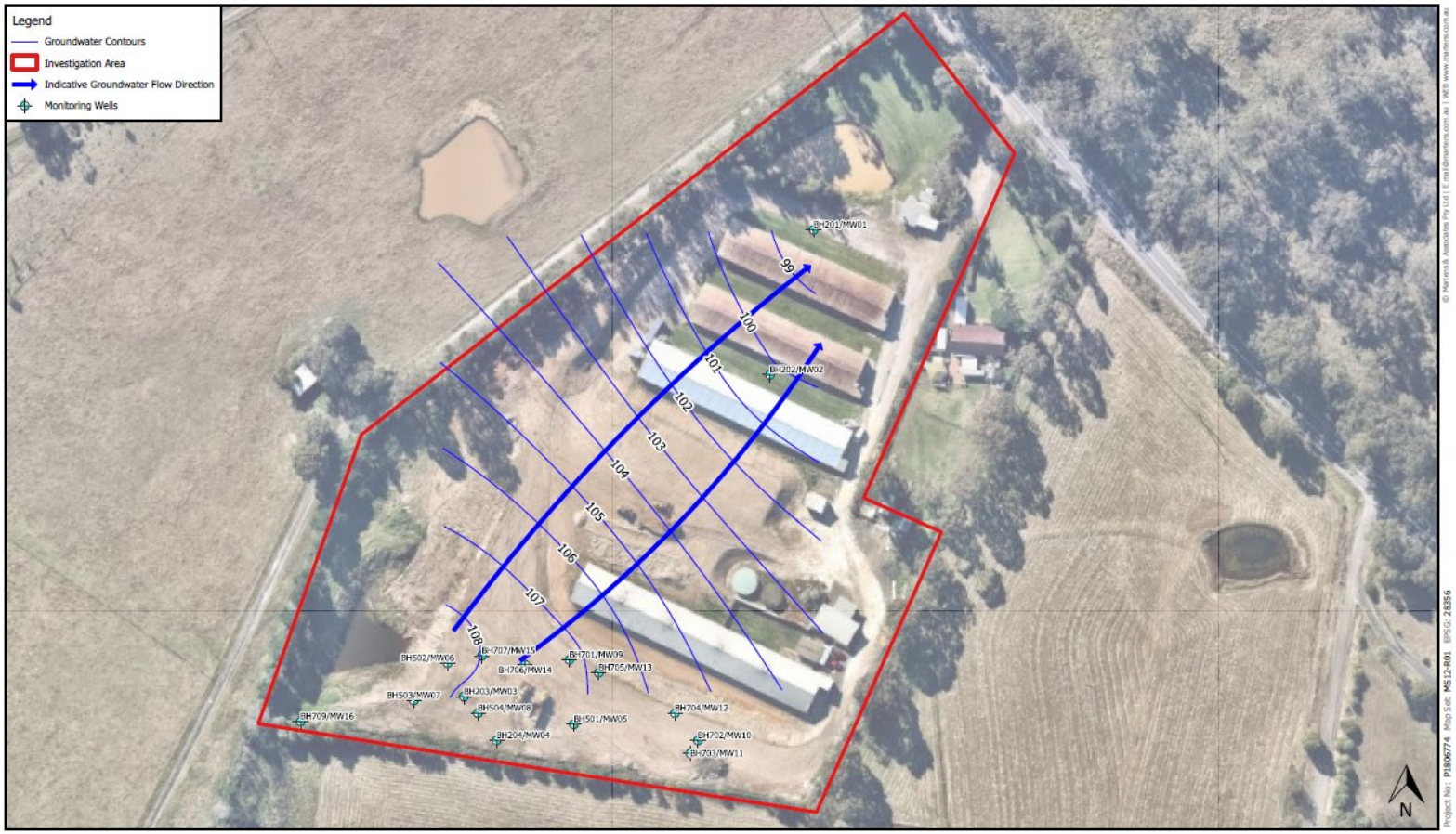
Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 11: Approximate Burial Trench Locations

21044 – Site Audit Report
285 Finns Road, Menangle NSW.



From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 12: Groundwater Contours

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 13: Surface Emissions Transects & Readings

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 14: Maximum Ground Gas Concentrations (%v/v)

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens FDSI (2021d)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 15: GSV (L/hr) and CS

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens RAP (2021e)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 16: Approximate Extent of Fill and Cap Extent

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens RAP (2021e)

Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 17: Former Burial Trenches and Impacted Area

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

From Martens RAP (2021e)

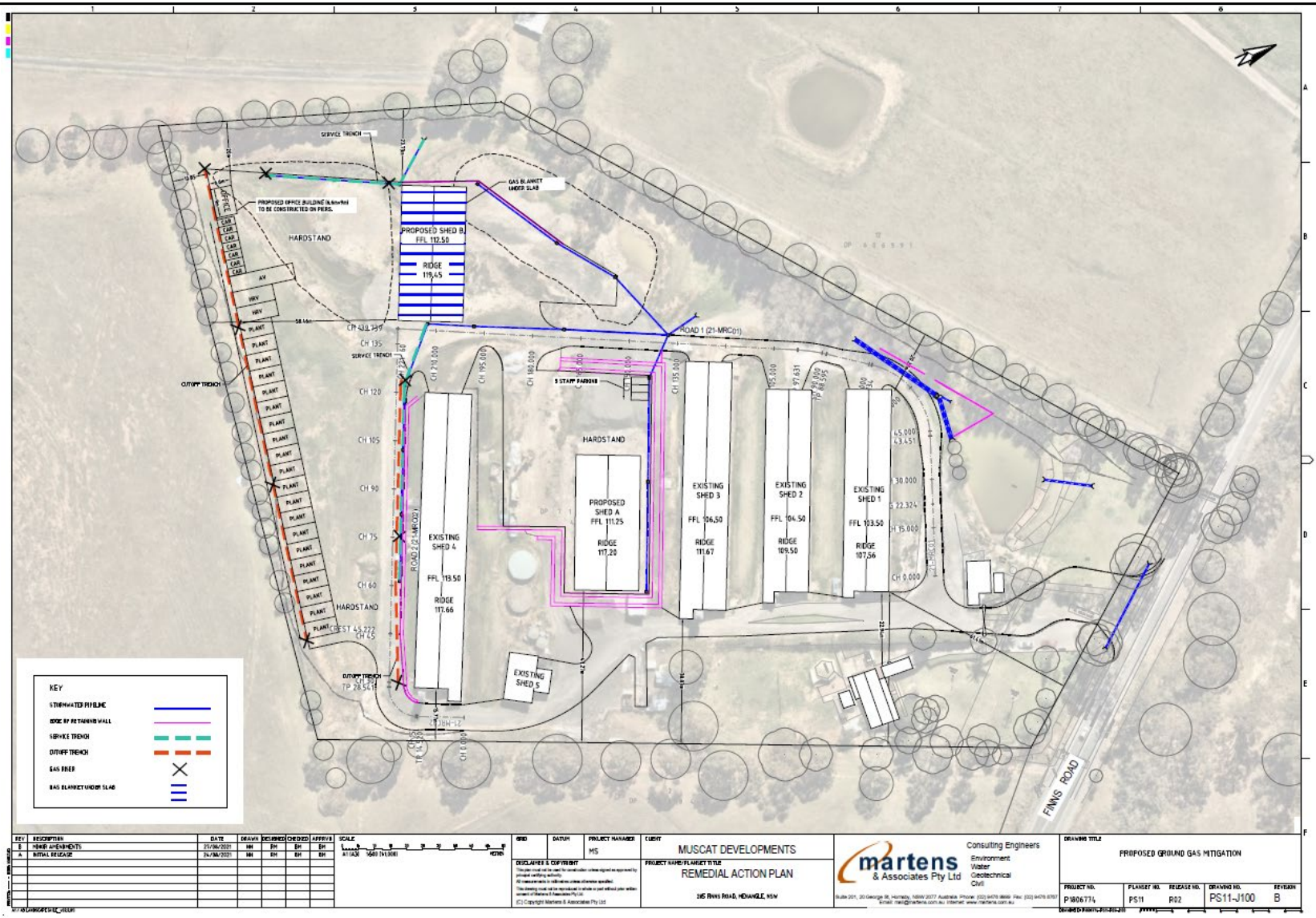
Investigation Area Boundary

N

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 18: Proposed ACM Capped Areas

21044 – Site Audit Report
285 Finns Road, Menangle NSW.



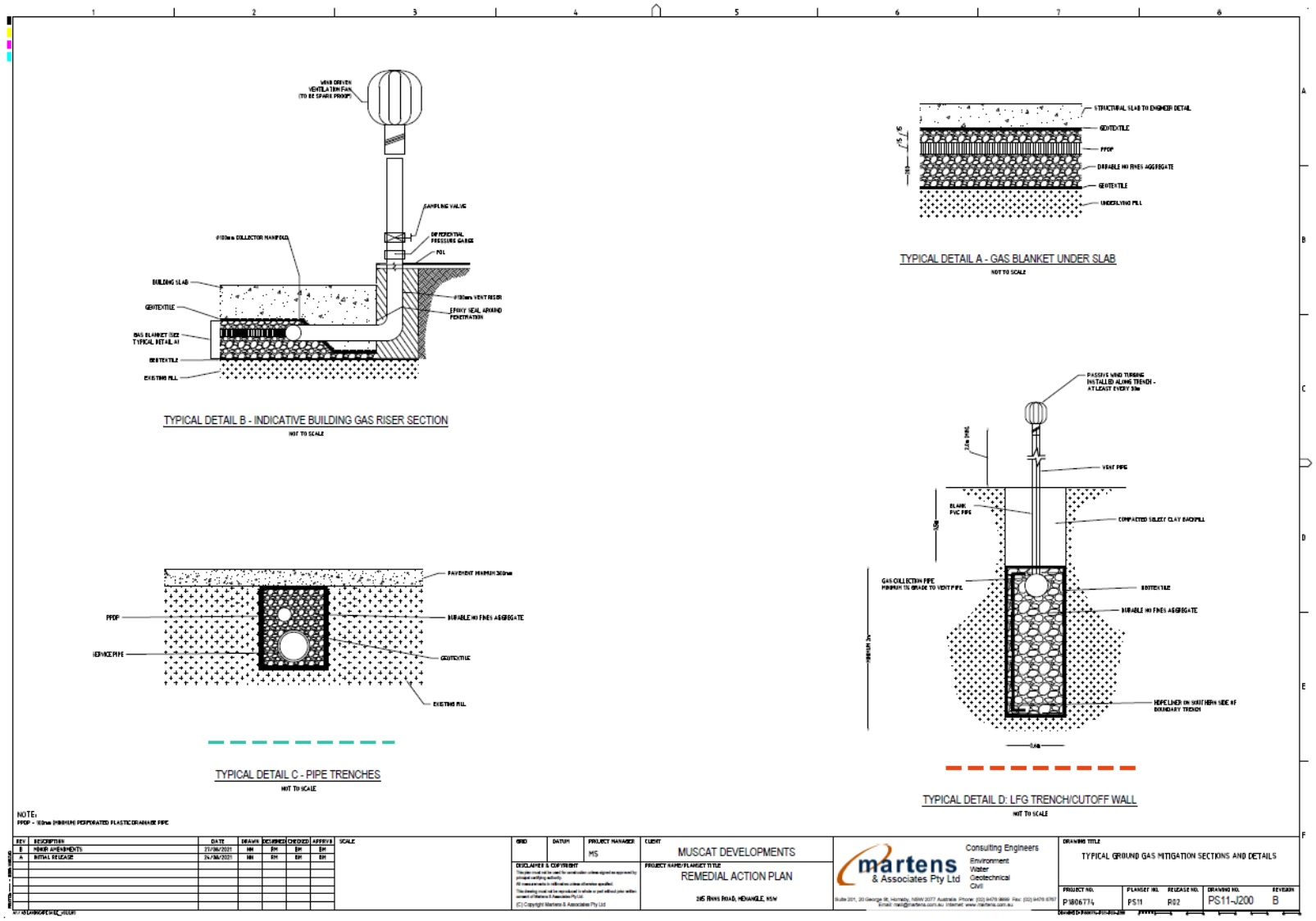
From Martens RAP (2021e)

Entire Site Area Boundary

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 19: Proposed Ground Gas Mitigation

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

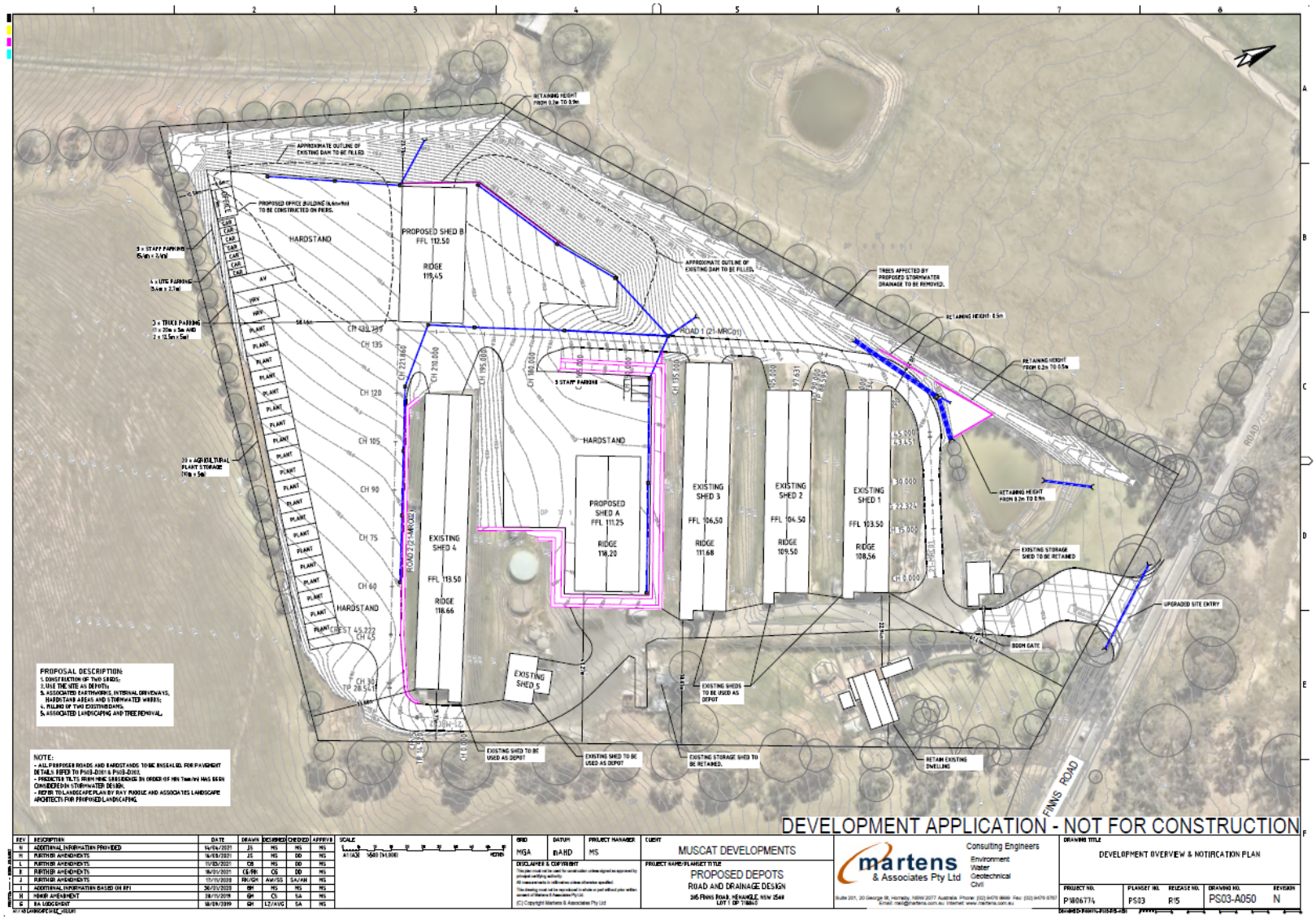


From Martens RAP (2021e)

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 20: Typical Ground Gas Mitigation Sections

21044 – Site Audit Report
285 Finns Road, Menangle NSW.



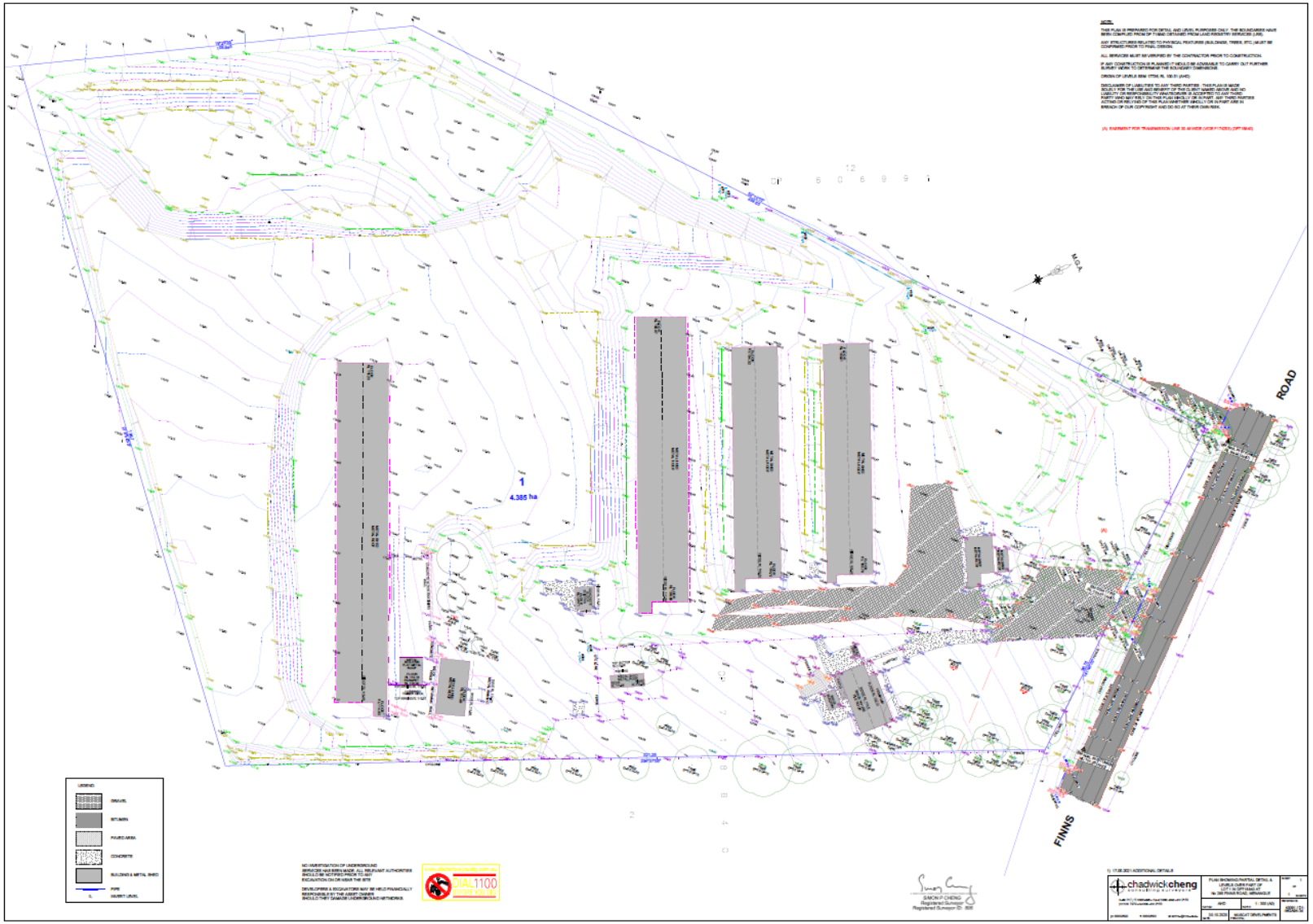
From Martens RAP (2021e)

Entire Site Area Boundary

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 21: Development Overview Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.



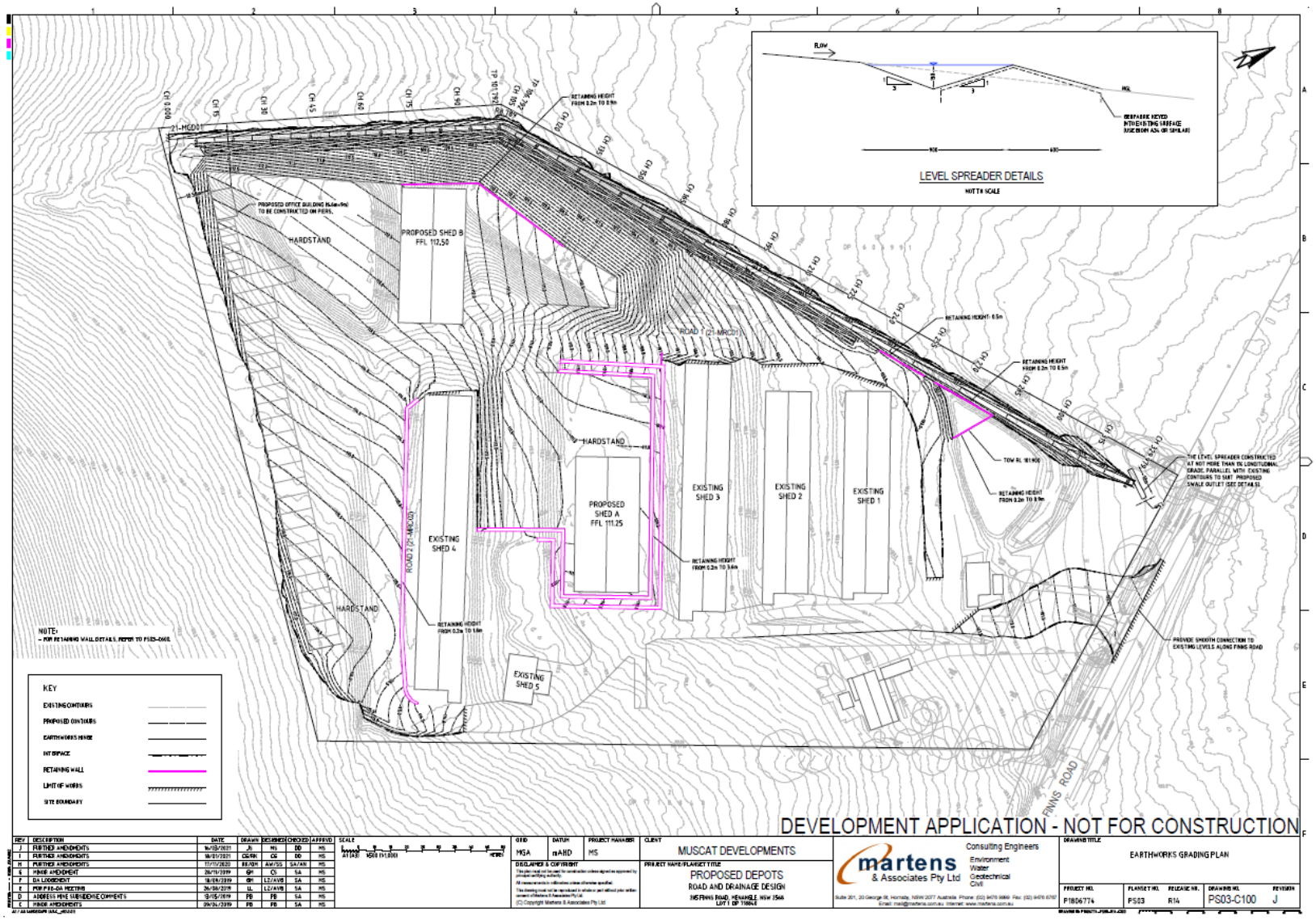
From Martens RAP (2021e)

Entire Site Area Boundary

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 22: Chadwick Cheng Survey (October 2020)

21044 – Site Audit Report
285 Finns Road, Menangle NSW.



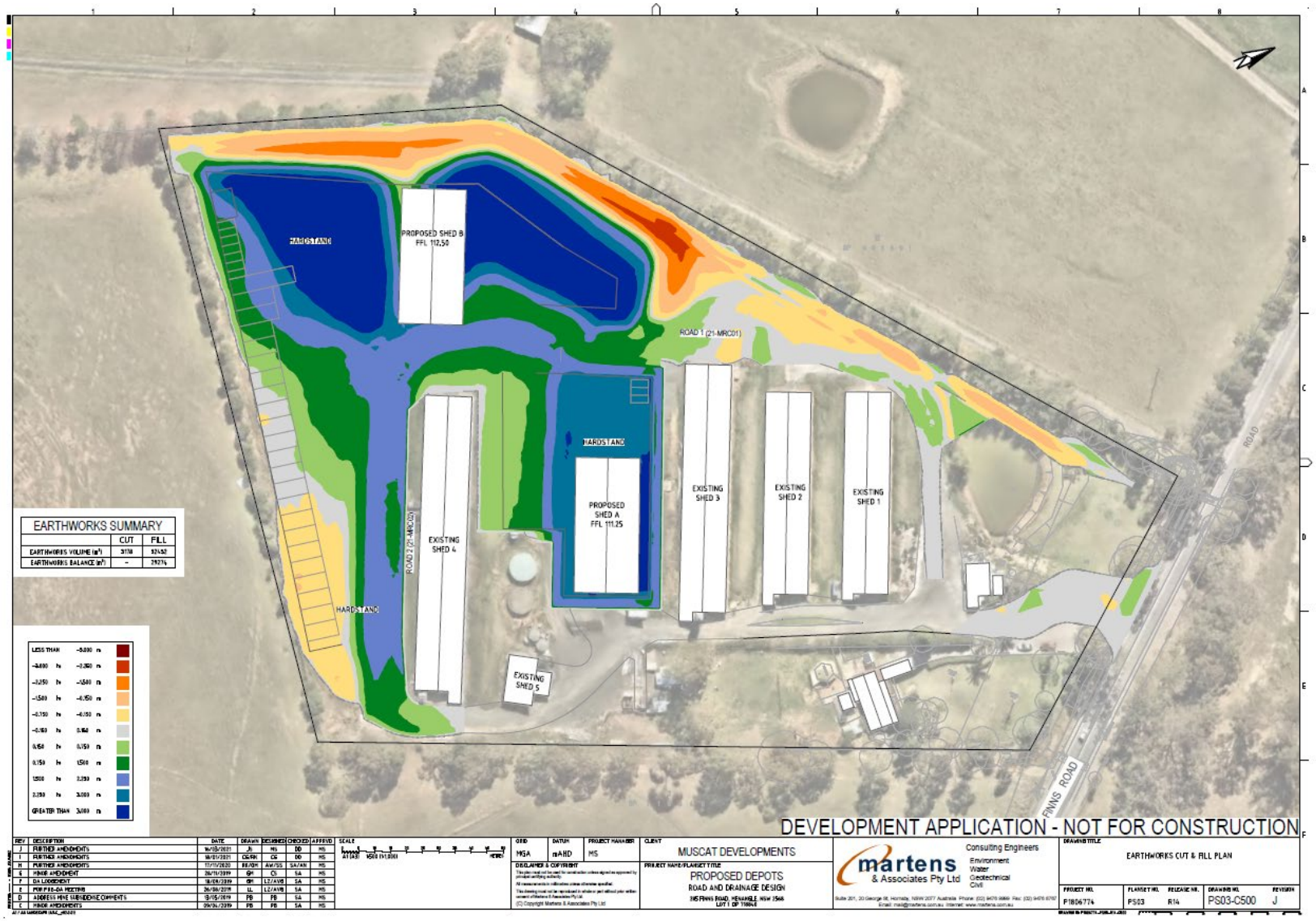
From Martens RAP (2021e)

Entire Site Area Boundary

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 23: Earthworks Grading Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.



From Martens RAP (2021e)

Entire Site Area Boundary

HARWOOD ENVIRONMENTAL CONSULTANTS

Figure 24: Earthworks Cut & Fill Plan

21044 – Site Audit Report
285 Finns Road, Menangle NSW.

APPENDIX B

INTERIM ADIVCE

Harwood Environmental Consultants
Gunners Barracks
Suite F, 38 Suakin Drive
George Heights, Mosman 2088

rod@harwoodenviro.com.au

16 July 2021

Mr James Muscat
Muscat Developments Pty Ltd
by email

INTERIM ADVICE 01: REVIEW OF DETAILED SITE INVESTIGATION REPORT, SUPPLEMENTARY DETAILED SITE INVESTIGATION AND REMEDAIL ACTION PLAN PREPARED BY MARTENS (2021)

Dear James,

1. INTRODUCTION

1.1. Background

James Muscat of Muscat Developments Pty Ltd engaged Rod Harwood, a NSW EPA accredited Contaminated Land Auditor (accreditation no. 03-04) who is employed by Harwood Environmental Consultants (HEC), to provide Contaminated Site Audit Services for the Site located at 285 Finns Road, Menangle NSW.

The final outcome of this engagement is to prepare a Site Audit Statement (SAS) and associated Site Audit Report (SAR), indicating the suitability of the Site for the proposed depot and transport depot. It is noted that the site is currently approved for use as a poultry farm. The proposed development includes construction of an office building and two new sheds; cut and fill in various locations; filling of two dams at the ground surface near the south, southwest, northwest, west and central portions of the site; and construction of hardstand and other site infrastructure in accordance with the Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017.

It is understood that the proposed development is currently the subject of a Class 1 appeal in the NSW Land and Environment Court (LEC proceedings number 2020/00178157). It is understood that Martens prepared correspondence dated 19 October 2020 to address several of Council's concerns regarding the proposed development which include site contamination. Based on the findings of a Preliminary Site Investigation (PSI) completed by Martens in August 2020, Martens proposed that the following items be included as conditions of consent for the development:

> *Prior to issue of a Construction Certificate, an Asbestos Management Plan ("AMP") shall be prepared to:*
>
> *1. Identify and manage asbestos in structures and any fragments resulting from building deterioration or stockpiling of asbestos containing building materials.*
>
> *2. Prepare and maintain an asbestos register of all asbestos containing materials to be retained on the site (i.e. building products etc in existing structures).*
>
> *3. Undertake asbestos removal works of all asbestos not associated with structures. Removal works shall include any stockpiled asbestos building products, picking of PACM fragments*

surrounding sheds and removal of any identified asbestos impacted soil/fill material on the site. The AMP is to include all asbestos related controls required for asbestos removal works.

Prior to issue of a Construction Certificate, an Unexpected Finds Protocol ("UFP") shall be prepared for the proposed site earthworks. UFP shall provide guidance for the management of any encountered PACM in soil material, oil stains or other signs of contamination should they be exposed during the proposed site earthworks.

In addition to the above conditions, Martens recommended that the following condition be imposed in relation to the importation of any fill material required for the development:

Fill material to be brought onto site for the development to be only fill characterised as VENM, ENM or otherwise waste exempt material under the NSW Waste Regulation (2014). Copies of certifications or validation reports for all fill used shall be retained and presented to Council on request".

Following submission of both the PSI and letter, Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020), acting on behalf of Council. The response stated that:

Further to our letter dated 30 October 2020 and the s.34 conference for this matter, we have now obtained advice from the Council's contaminated lands officer.

We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.

Martens note that the above is confirmation that, as of November 5, the consent authority (Council) had considered if the land was contaminated; and was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

However, Martens note that subsequent to Council's assessment and conclusion that the site was suitable with regards to land contamination, fill material not present during the PSI assessment, nor at the time of Council's assessment, was imported to the site. Council has therefore indicated that they required further information to be satisfied that the site is suitable for the proposed use as required by Clause 7(1) of SEPP 55.

This Audit has not been completed in support of development consent, or to satisfy NSW EPA, but for additional technical review. The Audit is therefore considered to be a non-statutory site audit.

The Site Audit Statement will be issued to the client. Rod Harwood is an Auditor accredited by the NSW EPA (accreditation number 03-04) who has worked with a wide range of consultants to provide practical and competent outcomes and resolutions on contaminated site issues.

Whereas Interim Audit Advice is provided to assist in the assessment and management of contamination issues at the site, the Interim Audit Advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

1.2. Site Audit Process

EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition), describes the site assessment and Audit 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.

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,

validation and management plans or reports. The material outcomes of a site audit are a site audit report and a site audit statement.

It is important to note that with respect to waste management on contaminated sites, the EPA Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition) state:

- When reviewing information relating to the management of waste, site auditors must have regard to the provisions of the NSW Government's framework for managing wastes. In New South Wales, it is an offence to transport waste to a place that cannot lawfully receive it or use a site to receive waste that cannot lawfully be used as a waste facility. To ensure that waste generators (or their representatives) do not trigger such offences:
- in relation to disposal, they must ensure their waste is carefully classified in accordance with the Waste Classification Guidelines – Part 1: Classifying Waste (EPA 2014) as in force from time to time (the 'Waste Guidelines', available from Waste classification guidelines: www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines), and the waste is taken to a facility that is lawfully able to receive that waste; and
- in relation to re-use for land application purposes, they must ensure their waste meets the requirements of the resource recovery order and resource recovery exemption framework.

For consultants who have been engaged to classify waste, or to assist their client in complying with the order and exemption framework, they must ensure their work complies with all of the requirements of the Waste Guidelines, and the relevant order and exemption. It is an offence to supply information about waste that is false or misleading.

Part 4 Section 53B of the CLM Act describes that Site Audits conducted by EPA Accredited Site Auditors must take the following matters into account:

- the provisions of the CLM Act and the CLM Regulations;
- the provisions of any environmental planning instruments applying to the site; and
- the guidelines made or approved by the EPA.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

At the completion of the Site Audit process, the Site Auditor must complete a Site Audit Statement (form provided by EPA which only accredited site Auditors may sign under the Contaminated Land Management Act 1997) supported by a Site Audit Report (comprehensive critical review of all contamination assessment and remediation conducted at the site). However, the Auditor may provide written interim advice on the work plans or reports in the lead-up to issuing the final Site Audit Statement at the end of the entire Audit.

When this Interim Advice is provided, the Site Auditor must:

- specify that the Interim Advice does not constitute a Site Audit Report or Statement;
- ensure the Interim Advice is consistent with NSW EPA guidelines and policy;
- not pre-empt the conclusion to be drawn at the end of the Site Audit process;
- clarify that a Site Audit Statement will be issued at the end of the Audit process; and
- document in the Site Audit Report all Interim Advice that was given.

Section 3.1 of the Auditor Guidelines states that the site auditor must meet the following particular requirements regardless of whether the audit is statutory or non-statutory:

a. comply with applicable provisions of the CLM Act, regulations, environmental planning instruments, and any guidelines made or approved by the EPA under the CLM Act
b. not have a conflict of interest in relation to the audit as defined by the CLM Act
c. where these guidelines allow an auditor to adopt or endorse an approach that differs from policies made or approved by the EPA, exercise independent professional judgement in doing so and provide in the site audit report adequate and explicit justification for taking this course
d. finalise the site audit report before signing the site audit statement

e. provide in the site audit report a clear, logical discussion of issues covered in the site audit and clearly substantiate the rationale for the auditor's conclusions Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

f. discuss in the site audit report all issues pertinent to the actual or potential contamination of the site and all issues required by these guidelines to be raised during a site audit

g. state clearly why any human health and environmental issues that would normally be of concern are not of concern in the case of this audit

h. make every reasonable effort to identify and review all relevant data, reports and other information held by the person who commissioned the site audit, or which is readily available from other sources, that provides evidence about conditions at the site which is relevant to the audit

i. obtain advice from the appropriate expert support team members on issues that are outside the auditor's professional education, training or experience, and document in the site audit report where and from whom advice has been obtained

j. exercise independent and professional judgement in deciding whether or not they have sufficient information to make a decision about the suitability of a site or a plan or to draw any other conclusion in relation to actual or potential contamination of a site in the course of a site audit, with justification for conclusions to be given in the site audit report

k. make reasonable endeavours to find out whether any other audits have been commissioned in relation to the site and, if so, whether any of them were prematurely ceased and why

l. state in the audit report the scope and findings of any previous audits

m. in cases where the audit involves a review of site assessment, remediation or management work, visit the site to observe and verify, as far as is practicable, the completion of this work.

2. INTERIM ADVICE

The current interim advice provides comments on the following documents:

- Martens Detailed Site Investigation: Proposed Depots and Transport Depot, 285 Finns Road, Menangle NSW. Ref: P1806774JR13V01, dated March 2021.
- Martens Remedial Action Plan: Proposed Depots and Transport Depot, 285 Finns Road, Menangle NSW. Ref: P1806774JR14V03, dated June 2021.
- Martens Supplementary Detailed Site Investigation: Proposed Depots and Transport Depot, 285 Finns Road, Menangle NSW. Ref: P1806774JR16V01, dated May 2021.

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Detailed Site Investigation Martens (March 2021)	**This report documents a DSI for potentially contaminating activities, to support a Development Application to the Wollondilly Shire Council for construction of a depot and transport depot. The site is currently approved for use as a poultry farm.** • The proposed depot and transport depot development is understood to involve the construction of an office building and two new sheds; cut and fill in various locations; filling of two dams and at the ground surface near the south, southwest, northwest, west and central portions of the site; and construction of hardstand and other site infrastructure. • The PSI concluded that subject to the preparation and implementation of an Asbestos Management Plan (AMP) and an unexpected finds protocol, that identified land contamination risks shall be appropriately mitigated and managed during construction and operation of the development. – The PSI indicated the site was cleared land/paddock until 1969 and the poultry farm and residence were constructed between 1969 and 1990. The site had remained a poultry farm and residential property until May 2018.

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	– Between 2017 and 2018, material was imported to the site and placed in the two dams located in the south western portion of the site. Records indicate approximately 3480-4380 tonnes of material was imported. Documentation indicated material was VENM or ENM. – No evidence during the site walkover by Martens indicated the imported material was not VENM or ENM. – Martens note that other potential contamination sources include past shed construction, storage and maintenance (asbestos), pesticides and heavy metals (paints, galvanised metals, pest control). Portions of the poultry shed walls are clad with potential ACM. Lower exterior walls along the perimeter of two southern sheds contained PACM, which was observed to be broken or fractured into the ground surface. – Two former diesel ASTs may have introduced PAHs, Heavy Metals, BTEXN and TRH. No staining was observed. – A stockpile of burned rubbish, paint cans, aerosol cans and glass bottles was observed on the south east site of the dam located near the south west corner of the site. – 2m x 2m x 0.3m stockpile of broken “super six” PACM was observed in the field near the south west boundary. – A soil stockpile located approximately 25m north west of the southernmost large shed (3m x 2m x 1.5m) contained soil, brick, plastic, ceramics and PACM. – A previously demolished large shed located between the two current southernmost sheds may have contained PACM – Former poultry farm use may have introduced heavy metals or OCP/OPP into the soil. – Fill material previously and currently present along the southern site boundary, on the north site of the southernmost shed and near the north west corner of the second southernmost large shed has the potential to add contamination including hydrocarbons, metals, pesticides and asbestos. – Dwelling construction and maintenance have the potential to have introduced contaminants such as asbestos, pesticides and heavy metals. • The objective of the DSI is to determine if the importation of fill material to site has altered the conclusions of the PSI and ultimately to reassess the suitability (from a contamination perspective) of the site following recent filling works. It is understood filling has predominantly occurred in the southern portion of the site. • Intrusive investigations were completed within the site areas subject to recent filling works. • The investigation area is 1.494 ha (larger site area 4.385 ha). • The site is currently occupied by 4 large sheds with associated access roads, a residential dwelling in the north eastern corner and three farm dams along the western site boundary. **CSM:** • Fill: fill from unknown sources has the potential to add contaminants including heavy metals, TRH, BTEXN, PAH, OCP/OPP and asbestos. • Exposure: ingestion, dermal contact and inhalation. • Receptors: current and future site users including staff and visitors and construction/maintenance workers. • The likelihood of completion is medium in areas of exposed soil and high where excavation is to be undertaken. **Sampling:** • Excavation of 29 test pits (TP101-TP129) to a maximum depth of 4.3m BGL. This exceeds the recommended sampling density for a 1.5 ha site. • Collection of representative samples from each location. A total of 28 soil samples were laboratory analysed, noting that no fill material was identified at TP115. Selected samples were chosen from a range of depths throughout the fill profile. • Collection of 5 PACM samples.

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	• Collection of 4 QA/QC samples, including three duplicates, one triplicate and one trip blank and one trip spike. • A total of 28 samples were analysed for BTEXN, TRH, PAH, asbestos in soil (ID), a total of 32 samples were analysed for heavy metals and OCP/OPPs. A total of 6 samples were analysed for PACM. **Results:** • Minor observations of anthropogenic inclusions at the site surface were noted by Martens, including brick, concrete, tile, plastic pipe and several PACM fragments. • Fill was observed to consist predominantly of clay fill material to a maximum depth of 4.0m BGL (TP103). Underlying natural material was observed to be silty clay. • Anthropogenic inclusions observed during test pitting included steel fragments, timber, brick and concrete fragments, PVC and other plastic pipe, tile fragments, geofabric textile and several PACM fragments. • All soil results for heavy metals, TPH/BTEXN, OCP/OPP, PAH and asbestos in soil were below the adopted criteria. • All PACM samples were confirmed to contain asbestos: – MS101a – ground surface – MS101b – ground surface – MS102 – ground surface – MS103 – ground surface – MS104 – collected from TP112 at 2.0m BGL – MS105 – collected from TP121 at 1.5m BGL – MS106 – collected from TP129 at 0.5m BGL **Discussion:** • As the consent authority has concluded the site in the condition prior to the importation of the recent fill was suitable for the proposed development, Martens considered no further assessment outside of the investigation area was required. • The results of laboratory testing of samples found concentrations of hydrocarbons, heavy metals and pesticides to be less than the adopted SAC for commercial/industrial land use. • Martens consider the risk to human health from chemical contamination to be low, similarly, ecological risks are considered to be low. • Asbestos was identified in the collected material samples from both the surface and at depth within the fill material. Soil sampling in accordance with AS4964 did not identity the presence of loose asbestos fibres in soil samples at the reporting limit of 0.1mg/kg. • The presence of ACM a the surface of the IA exceeds the asbestos HSL outlined in NEPM (2013) and the potential risk to future site users is considered unacceptable in its current condition. Some management or remediation will be required to render the investigation area and the wider site suitable. • Martens recommend a RAP be prepared for remediation of bonded ACM within the investigation area. • This RAP would likely involve implementation of a capping layer across in the investigation area to remove exposure pathways. Proposed structures and extensive hardstand shall likely provide the necessary capping layer over much of the site. • Where landscaping is proposed, an appropriate depth of clean landscaping material shall be required over any contaminated fill. • In addition to the conditions outlined in Section 1.1 above and preparation of a RAP, Martens recommend a validation report be submitted including a survey of any buried asbestos, a survey of the upper layer of any capping material, calculation and analysis to confirm the capping layer meets specifications of the RAP and a statement that remediation works were completed and validated, indicating the site has been made suitable for the intended purpose.
	Auditor Comment: • It is noted that Martens prepared a PSI for the site to support the proposed development – can the Auditor please have a copy of this?

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	• Minor change for Section 1.4 – reference to NSW EPA contaminated sites guidelines should read Guidelines for Consultants Reporting on Contaminated *Land.* • Comments should be made on nearby sensitive receptors – distance and direction from the IA • Comments should be made on groundwater flow direction and nearest water bodies • Acid Sulfate Soils are unlikely to be mapped in that area, however Martens should note in Table 1 that they have checked this mapping. • Martens state that two dams are proposed to be infilled. Later in Table 1, Martens note there are three dams – is one dam going to remain onsite? • Martens note that if any of the above potential contamination sources were to have introduced site contamination, it would be likely to be limited to near surface soils. Additionally, based on the proposed development design which will establish widespread hardstand across much of the site area, there will be no direct pathway between future long term site receptors and underlying soils – the Auditor agrees contamination may be likely to be limited to the subsurface, however, analysis of deeper materials should be completed to confirm this. In addition, for areas where filling has occurred, potential contamination can vary throughout the fill profile and may not be found in the shallow subsurface only due to the heterogenous nature of fill and the fact that imported contamination in fill is not attributed to 'top down' contamination. • In table 8 Martens state that 5 PACM pieces were collected, however in table 9 Martens state that 6 PACM fragments were analysed. In addition, lab reports indicate 7 samples were analysed – Martens to clarify. • Why was the high reliability criteria (CRC Care) used for B(a)P in soil? The NEPM standard should be used as the CRC Care value is for fresh B(a)P <2 years old. The NEPM value for commercial/industrial land use of 1.4mg/kg should be applied. • Was any PACM observed outside of the investigation area and why weren't the observed PACM fragments in Map05 sampled? • Site specific EILs/ESLs – as noted in Attachment D, did Martens also analyse the iron content and organic carbon content? It is understood pH and CEC were laboratory analysed. • QA/QC – Martens state they collected 3 duplicate samples and one triplicate – the triplicate and trip blank/trip spike results should be included in the tables. • Martens have primarily analysed the shallow subsurface, with limited locations analysed in the deeper fill at 1.0m or 2.0m, however, only one sample was collected at each location – the Auditor does not think the fill material has been sufficiently characterised and no natural materials have been sampled. • Are Martens confident that fill extends to the area outlined as the 'investigation area'? It is understood no fill was identified at TP115, however, fill was detected at all other locations around the perimeter of the investigation area. Locations could also be sampled/analysed around the perimeter of the IA to ensure that is the extent of fill. • What is the rationale for not using the NEPM standard for asbestos analysis with sieving 10L buckets, and collection of a 500mL sample for AF/FA analysis? This method should have been used, particularly since ACM was observed in multiple locations. Based on the ACM identified at the site, the NEPM sampling procedure should be implemented. • As the consent authority has concluded the site in the condition prior to the importation of the recent fill was suitable for the proposed development, Martens considered no further assessment outside of the investigation area was required – it is understood that Council approved the site condition prior to importation of fill, however, do Martens consider other areas of the site requiring assessment such as the former ASTs, stockpiles, former building/shed and current site footprints, use of the site for poultry farming? • The Auditor recommends groundwater be analysed and potential landfill gas due to the former poultry farm use. • Can the Asbestos results please be included in the tables so the Auditor can understand which locations have been sampled? • As the site was formerly used as a poultry farm, nutrients, E.coli, coliforms and ammonia should be considered to be sampled in soil and groundwater.

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Supplementary Detailed Site Investigation Martens (May 2021)	**This report was prepared to document recent additional soil, groundwater and soil gas investigations undertaken to address data gaps identified at the site.** • Subsurface investigations of soil, groundwater and ground gases were undertaken across the site (4.385ha) **Data Gaps:** During the DA assessment process, further information was sought regarding site areas previously investigated, but identified as AECs in the PSI: • Potential contamination as a result of possible past poultry farm use of disinfectants, such as formaldehyde for shed disinfection and possible use of PFAS. • Earthworks including trenches in the southern portion of the site, used between 2010-2017, potentially for burial of waste. • Possible groundwater impact due to leaching of contaminants. • Possible ground gas generation as a result of buried materials and/or fill material imported to the site. **Updated CSM:** • AEC B – sheds and 2-5m curtilage: pesticides and heavy metals may have been used underneath existing and past garage/sheds for pest control. Building construction may include PACM, zinc treated (galvanised) metals and lead based paints. – Heavy metals, TRH, BTEXN, PAH, OCP/OPP, asbestos. • AEC C – poultry farm use: application of agricultural chemicals, use of pesticides or heavy metals for pest control during site use as a poultry farm. – Heavy metals, OCP/OPPP, formaldehyde and PFAS. • AEC D – ASTs: diesel fuel ASTs have the potential to impact the underlying subsurface environment with heavy metals, TRH, BTEXN and PAHs. – Heavy metals, TRH, BTEXN and PAH. • AEC E – Burial Trenches: a number of trenches have been identified in the southern portion of the site which may have been used for burial of waste from unknown sources. – Heavy metals, TRH, BTEXN, PAH, OCP/OPP, formaldehyde, PFAS, asbestos, landfill gas (methane and carbon dioxide). • Pathways: direct contact, ingestion, inhalation, ingress of potential ground gas to future development structures and transport of contaminants to underlying groundwater aquifers. • Receptors: future construction workers, future site users (workers and visitors), future workers undertaking maintenance or subsurface works, groundwater beneath the site and receiving environments and ecological receptors (terrestrial) and freshwater ecology of the nearest surface water body being Navigation Creek, located approximately 650m north east. **Field Works:** • Excavation and logging of 12 boreholes (BH301-BH312) within site shed footprints to a maximum investigation depth of 0.6m BGL. • Collection of representative soil samples from boreholes and collection of an additional 13 near surface soil samples from across the former poultry farm area (outside of the existing site sheds) and adjacent to the onsite AST. – A total of 4 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde and asbestos in soil. • Excavation and logging of 13 test pits (TP401-TP413) within the burial trench area in the southern portion of the site to a maximum depth of 3.8m BGL and collection of soil samples. – A total of 5 soil duplicate samples and 1 soil triplicate sample was collected during the two sampling events. One soil trip blank and trip spike were used during each sampling event. – A total of 21 primary samples were analysed for BTEXN, PAH, TRH, heavy metals, OCP/OPP, PCB, formaldehyde and asbestos in soil. • Drilling and logging of four boreholes (BH201-BH204) to a maximum investigation depth of 11.4m BGL to facilitate the construction of wells (MW01-MW04).

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	• Collection of groundwater samples from each monitoring well for laboratory analysis. – A total of 4 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde, PFOS/PFOA and VOCs. • An additional four monitoring wells were installed – BH501 to BH504 were drilled to a maximum depth of 7.2m BGL (MW05-MW08) and representative groundwater samples were collected from each well. – One groundwater duplicate was collected during each monitoring event. One trip blank and one trip spike was used during each event. – A total of 8 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde, PFOS/PFOA and VOCs. • During well construction MW01, MW02, MW04, MW05, MW07 and MW08 were fitted with sealed landfill gas caps. A single soil gas screening assessment was undertaken on 21 May 2021. – Sampling was completed using a LGA to measure flow rate, methane %v/v, carbon dioxide %v/v, oxygen %v/v, carbon monoxide (ppm) and hydrogen sulphide (ppm). **Results:** • Encountered groundwater depth was variable, but ranged between 3.21-8.14 mBGL. It is noted that MW05 – MW08 were installed at a shallower depth at approximately 6m BGL to target potential groundwater impacts from recent and historical filling works – three of these wells were dry during sampling. • Site fill material was observed across the majority of the southern and western portions of the investigation area. • Minor anthropogenic inclusions were observed at the surface of the site and within the fill material excavated including brick, concrete and tile fragments, plastic pipe and several presumed ACM fragments. • No staining or odours were noted, with the exception of boreholes in deeper poultry farm waste trenches. Minor surface staining was observed at SS07, SS08 and SS09 surrounding the AST. Test pits undertaken in the trenches identified eggshells and bones. This material was observed to be below depths of 2mBGL. Strong organic odours were noted. • The footprints of sheds at the site were generally unsealed, with partial asphalt ground cover in some areas. • Soil: analytical results for heavy metals, TRH/BTEXN, OCP/OPP, PAH, formaldehyde and asbestos in soil were below the LOR or SAC. • Groundwater: all results for TPH/BTEXN, OCP/OPP, PAH, VOC, formaldehyde and PFAS/PFOA were below the LOR or 95% protection criteria. Heavy metals were below the adopted criteria, with the exception of: – Copper in MW03 – Cadmium, copper, lead, nickel and zinc in MW04 – Copper and zinc in MW01 – Cadmium, copper, nickel and zinc in MW04. • Landfill Gas: significant concentrations of methane and carbon dioxide were detected in monitoring wells adjacent to waste burial trenches (MW04, MW05, MW07 and MW08). – MW01 and MW02 located in the northern portion of the site reported no elevated methane or carbon dioxide. – No discernible flow rates were detected, however, only a single round of screening has been completed, which may not have captured the worst case meteorological scenario. – The highest concentration of methane detected was 40.8 %w/w at MW04, the highest concentration of carbon dioxide was 24.2 %w/w at MW08, the highest concentration of oxygen was recorded at 21.5 %w/w at MW02 and the highest concentration of carbon monoxide was 1ppm. Hydrogen sulphide was not detected. **Discussion:** • Minor detections of TRH/PAH were detected in soil above the LOR for samples collected from existing sheds, general poultry farm area (surface samples) and within waste trenches, however, all results were below the adopted SAC.

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	• Formaldehyde was detected above the LOR in two samples collected form the waste trenches, where concentrations were reported equal to the LOR of 1mg/kg. It is concluded that any past use of formaldehyde during poultry farm operation has not contributed to soil contamination at levels which present a risk to future site receptors. • Outside of poultry waste (chicken bones and eggshells), no other anthropogenic inclusions were observed within waste trenches. • Elevated concentrations of TRH were reported in SS07, SS08 and SS09, which were collected from near surface soils adjacent to the AST. No exceedance of SAC were reported. • Additional presumed ACM was observed on the site surface, however, Martens consider the RAP addresses asbestos contamination. Further refinement of the remedial strategy is recommended to ensure that details are provided to address potential future physical works in the asbestos contaminated material. • Groundwater is excepted to flow north-northeast towards Navigation Creek. • It is unlikely that groundwater will be encountered during site development works, nor will groundwater be used as part of the proposed development. • Elevated concentrations of TRH, Benzene and Toluene were detected at MW04 during both monitoring events. PFAS was detected slightly above the LOR at MW04 during both monitoring events. The proximity of MW04 to the burial trenches would suggested that reported contaminant concentrations are likely attributed to past waste burial practices. No monitoring well further downgradient (MW06 and MW08) reported significant concentrations of contaminants, which indicates limited mobility of these contaminants in groundwater. • The nearest potentially ecological receptor is 350m downgradient of MW04. The absence of these COPCs in wells <20m downslope indicates migration is limited with natural soil attenuation processes sufficient to prevent impacts on downslope receptors. • Heavy metals were detected during both monitoring events exceeding ecological criteria at MW03 (located in recently placed fill) and MW04 (near burial trenches). The latest monitoring round reported concentrations of copper and zinc in MW01 (downslope of the northernmost poultry shed in an area of no recent site filling) which exceeded ecological criteria. Some elevations in heavy metal concentration may be attributed to former waste burial and past agricultural practices. Given the regional agricultural land use, elevated concentrations of heavy metals would not be unexpected. • The landfill gas screening assessment identified the presence of elevated levels of methane and carbon dioxide, as well as very depleted levels of oxygen in monitoring wells adjacent to former waste burial trenches. It appears likely that ground gas generation is originating from anaerobic decay of waste in burial trenches in the southern portion of the site. **Conclusions:** • Martens note that the elevated LFG in the southern portion of the site requires some form of management or remediation. • Asbestos requires remediation to make the site suitable. • Amendments to the RAP (Martens 2021) should be made to manage LFG and mitigate the risk posed to potential receptors.
	Auditor Comment: • As above, reference Guidelines for Consultants Reporting on Contaminated Land. • Martens should survey the groundwater wells and provide groundwater flow contours. • Did Martens let the wells stabilise for one week after development prior to sampling? • What is the rationale for only collecting water quality parameters during the second round of sampling? How did Martens know the groundwater being sampled in the first round was representative of natural conditions? • What is the rationale for not collecting groundwater triplicates or rinsates? • It is noted that for bioaccumulative analytes, the 99% protection criteria should be applied for groundwater. • It is understood groundwater monitoring wells were installed and 3 were dry during sampling – why does table 7 say that 8 primary samples were analysed?

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	• Table 10 – Martens should include a discussion on what the groundwater parameters indicate e.g. pH indicates a slightly acidic to slightly alkaline environment etc. In addition, was redox parameters collected? Why do Martens think the EC changes significantly between wells? • What is the rationale for sampling PFAS in groundwater, but not soil? • What about COPC such as E.coli and coliform presence, nutrients (nitrogen/nitrate and phosphorus/phosphate etc) and ammonia for the buried waste area? Why weren't these COPCs sampled for in soil and groundwater? • A visual CSM may best describe the site situation. • The AECs described in the DSI such as multiple stockpiles do not appear to have been assessed – Martens to comment. • If heavy metals in groundwater were attributed to site fill or burial trenches, wouldn't we expect to see elevated concentrations in soil? • Martens note that groundwater concentrations are not of concern as it will not be encountered during the excavations and is not part of the proposed development - it is noted there is a stock/domestic bore on the southern site boundary – is this bore in use? There are other stock/domestic and recreational bores west and north west of the site. In addition, what about the impact on the receiving water bodies such as neighbouring dams and the creek? • Has the soil that was used to infill the former site dams been analysed? • What is the rationale for placing MW03-MW08 so close together? What about the remainder of the site? It is understood there is MW01 and MW02 in the central/northern portion of the site. • Martens could consider test pitting to delineate the boundary of the buried waste and characterise potential lateral and vertical migration of contamination from the waste? • What is the rationale for only collecting limited surface samples for the areas where poultry farming occurred surrounding the sheds and surrounding the AST? The Auditor considers that boreholes or test pits should have been drilled. • MW01, MW02 MW03, MW04 and MW08 were screened in the shale only, whereas MW05, MW06, MW07 were screened in silty clay overlying shale – do Martens think this has an impact on the results? • BH302, BH311 and BH312, were terminated in fill – we do not know the extent of fill in this area. • Were BH301, 303, 304, 305, 306, 307, 308, 309 and 310, terminated in fill or natural material? • The sampling density and number of locations does not provide adequate coverage for the Auditor to sign off the entire site as being suitable. As noted above, surface samples have only been collected surrounding sheds and the AST. Samples from BH301-BH312 (shed footprints) were only collected in the shallow subsurface to a maximum depth of 0.3m BGL. And samples from TP401 – TP413 (waste burial trenches) were collected from depths between 1.0 and 3.6m BGL, with one or two samples collected from each location – what is the rationale for only sampling at these depths? • Attachment F – the full water and landfill gas sampling record forms should be included, showing stabilised parameters within 10% for three consecutive readings. • Soil table: site specific EILs were not included in the laboratory summary table for metals. • Groundwater table: the NEPM HSL values were not included in the summary table. • Martens should show calculations and provide discussions on characteristic gas situation and gas screening values. • Martens could consider surface monitoring of methane emission across the inferred waste footprint to determine if surface emission is a major gas migration pathway. • The Auditor agrees the worst-case meteorological scenario in the Australian climate is likely to not have been captured – this is generally represented by a pressure drop of 3.3 hPa over a 3 hour period. Did Martens record atmospheric pressure and water levels? The Auditor recommends additional sampling rounds occur.

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	• Was any leachate observed? If so, this could be sampled, with results compared to groundwater results in a piper plot to determine if the leachate perched in the waste has influenced the quality of the groundwater system. • What was the condition of surface water in the remaining dam? • Rain percolating through fill materials potentially could have liberated soluble contaminants and introduced oxygen into the shallow subsurface which thereby increased carbon dioxide by aerobic bacteria. • Table 12: Martens should include the monitoring date, atmospheric pressure, min, max and steady flow, standing water level, measured well depth, adjusted peak flow, gas screening value for each location, and if the screen was flooded by groundwater • It is noted that benzene, toluene and elevated levels of hydrocarbons, particularly F3 were detected in groundwater, primarily at MW04 – Do Martens consider the groundwater contamination is centred around MW04? It is understood that groundwater is expected to flow north/northeast – Do Martens think we have enough wells downgradient of MW04 to determine if offsite migration is an issue? It is noted MW01 and MW02 are slightly north/north east of MW04, however they are quite a distance away – The level of toluene is almost at the criteria of 180ug/L in MW04 (170ug/L) – Are Martens sure that the source has been identified and this is not the edge of a potential plume? • Martens should comment on the EPA ground gas guidelines which state that 1% v/v of methane (screening value) (NSW EPA Environmental Guidelines Solid Waste Landfills) and 5% LEL – Ground Gas indicate corrective action or further investigation is required. • In addition, Martens could refer to the guideline values of 45mg/m^3 (30ppm) for CO and 14mg/m^3 (10ppm) for H_2S (SafeWork Australia 2019)
Remedial Action Plan Martens (June 2021)	**This RAP was prepared to detail the necessary remediation to make the site suitable for the intended land use (DA 2019.688.1). This version of the RAP (V2) has been updated in light of supplementary DSI investigations which were undertaken between April and May 2021.** **Updated CSM:** • Fill: Fill material, observed to contain ACM has been identified at the site – asbestos • Burial trenches: former burial trenches containing agricultural waste is generating elevated concentrations of methane and carbon dioxide, which presents an unacceptable risk to the proposed development and future receptors – methane and carbon dioxide. • Exposure Pathways: direct contact, ingestion, inhalation of landfill gas and ingress of landfill gas to future development structures. • Receptors: future site construction workers, future site users and future maintenance or subsurface workers. • The DSI has confirmed the presence of asbestos (bonded in fragments of fibrous cement sheeting) contamination in fil material (surface and at depth) located in the southern half of the site. Access to exposed soil in this area is presently readily available and a potential pathway is considered complete. Future earthworks may also create a complete pathway to subsurface ACM. • Landfill gases (methane and carbon dioxide) have been detected in screening assessment works in wells located in the southern portion of the site. It is anticipated that ingress of landfill gases into enclosed structures, as well as build up of landfill gases beneath impermeable pavement and/or slabs may cause a health risk to future site workers, as well as a potential explosive risk. **Extent of Remediation:** **1.** Fill: • Preliminary estimates indicate the fill impacted area covers 16,500m^2. The approximate extent of filling has been mapped based on aerial photographs. Some areas where ACM impacted fill was identified are outside of site areas to be filled as part of the development. • The proposed cap extent indicates that in these areas of the site, ACM impacted fill shall be placed and capped as part of remediation works. **2.** Burial Trenches:

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	• Elevated methane and carbon dioxide have been observed in monitoring wells in the southern portion of the site. based on aerial photograph review and site investigations, burial trenches are believed to be limited to an area of 1000m^2 in the south of the site. • Trenches are believed to have been excavated and filled between 2010 and 2017 by a previous site owner, prior to importation of fill. Trenches containing agricultural waste are expected to be approximately 0.5-0.8m deep and beneath 2.0-2.5m of overlying fill material. **Preferred Remedial Option:** Fill Material: cap the material onsite • As some ACM impacted fill has been placed outside of the proposed development footprint, or at levels in excess of those required, the relocation for burial of some previously imported fill material shall be required. • Suitable options for capping layer to separate ACM impacted fill from end users have been developed to respond to each of the final surface uses/treatments proposed: – Structural concrete ground slabs for sheds. – Hardstand – rigid (concrete) or flexible sealed or unsealed 'pavement'. The hardstand is to comprise, as a minimum (1) a marker layer (geotextile layer) over ACM impacted fill and (2) pavement layers. Where flexible pavement is proposed, it shall comprise a minimum 300mm total thickness of pavement materials (sandstone, road base, wearing course materials) – Landscape layer – this is to comprise a minimum (1) marker layer (geotextile layer) over ACM impacted fill and (2) minimum of 500mm of clean material for the establishment of site vegetation. Burial Trenches: onsite management of landfill gas • Elevated methane concentrations (>20%v/v) indicate gas protection measures for a site with a characteristic situation of 3 will be required. • The final gas protection measure may be refined subject to further assessment works and detailed structural design of proposed buildings, but are expected to include: – Construction of a passive, under slab landfill gas collection and venting system beneath new buildings located in the vicinity of the burial trenches – Construction of a passive gas drainage collection and venting system from the cut off trench to a line 10m north of the northern most trench. Collection system is to be graded to venting locations to allow discharge of 'lighter than air' LFG. – Installation of a methane proof membrane above the passive venting system and below the new building slabs, hardstand pavement material or landscape capping layers and across the fill pad in the southern portion of the site (including batters). For gas drainage blanket areas outside of ACM capping areas, a minimum cover over the methane proof membrane equivalent to the ACM capping layer requirement will be provided. – Installation of a gas cut off trench along the southern boundary to manage potential offsite migration risk. • Martens recommend an additional landfill gas characterisation. The findings may present alternative options such as: – A level 3 risk assessment to refine site risk and potentially mitigate measures. – Excavation and offsite disposal of putrescible material within burial trenches to remove the gas generation source and remove the risk of LFG generation. If natural attenuation of existing LFG occurs, management measures may not be required. • A long term environmental management plan (EMP) will be required for the site to detail the presence and location of capped ACM and mapped burial trenches, monitoring requirements for LFG trends, maintenance requirements for capping material and landfill gas management infrastructure and procedures for any further required works beneath the capping layer or landfill gas protection measures. **Remediation Plan:** **1.** Stage 1: Notifications and Preliminaries • It is anticipated remedial works will be approved by development consent conditions imposed on the DA.

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	• Notification to SafeWork NSW will be required to advise of the presence of asbestos contamination. **2.** Appointment of a Remediation Contractor/Environmental Consultant/Surveyor • All remediation works are to be completed by a licensed asbestos removal contractor who will prepare an asbestos removal control plan for submission to SafeWork NSW. • The environmental consultant will supervise remediation and validation, confirm suitability of capping material, monitor placement of capping material, document remedial stages, perform validation inspections and prepare a validation report. • The surveyor will undertake a survey of the upper surface of buried ACM impacted fill after the placement of a geotextile marker layer and survey the upper surface of the capping layer. **3.** Site Establishment • Establishment of site offices, work sheds and amenities, decontamination facilities, physical barriers and signage. • Installation of air monitoring and quality control measures. • Establishment of site holding areas for contaminated material. **4.** ACM Remediation • Where recently imported fill has been placed outside of the proposed cap areas, it is to be excavated and placed in the areas to be capped. • The surface of the remediation area is to undergo an emu pick by the remediation contractor to remove surface ACM. A surface clearance certificate will be produced to confirm the surface of the remediation area is free of ACM. • A marker layer (geotextile fabric) is to be placed over fill material prior to the establishment of the capping layer. • A survey is to be completed of the top of the marker layer and then post placement of capping material (in mAHD) **5.** Landfill Gas Management • Construction of a passive, under slab LFG collection and venting system beneath new buildings. • Construction of gas collection and venting system over trenches. • Installation of a methane proof membrane above the passive venting system (and below new building slabs) and across the fill pad in the southern portion of the site (including batters) • Installation of a cut off trench along the southern boundary to manage potential offsite migration risk • Survey of the extent of all constructed gas management infrastructure. **6.** Site Validation • A validation report documenting the completed remediation works must be prepared by the consultant. – Remediation areas where hardstand or structural slab is proposed – capping layer verification is to be provided – Soil capping layer – the capping layer is to consist of VENM/ENM or waste exempt material for landscaping purposes and be a minimum of 0.5m thick – this is to be visually confirmed by the environmental consultant along with the thickness confirmed through survey data – Where capping thickness is less than the specified minimum thickness, additional capping material is to be placed and the surface resurveyed. – LFG – inspections at relevant hold points (1) excavation of cut off trench (2) placement of gas collection infrastructure (3) placement of gas membrane and (4) completion of venting system. Data is to be reviewed during installation and surface methane monitoring is to be completed following passive sub slab ventilation system. The methane concentration over 100% of the ventilation layer at <1% v/v at a wind speed of 0.3m/s is considered a 'very good performance' (NSW EPA 2020). – Where fill is imported to the site it should be documented as VENM/ENM or waste exempt material suitable for the intended purpose. Waste classification documentation is to be provided.

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	• The validation report shall detail remedial works, results of the assessment, tracking data for material taken offsite, imported material, preferred LFG remedial strategy as well as remediation and validation. All survey data will need to be included. **Further LFG Characterisation:** • A LFG SAQP is to be prepared to detail further investigation works, which may include installation of additional gas monitoring wells (north of existing wells, at varying distances to assess migration), additional monitoring events to determine changes in soil gas conditions over time and long term continuous gas monitoring to monitor gas trends over time over varying atmospheric conditions. • After the above is completed, further risk assessment of LFG will be undertaken. Martens consider that the RAP provides remediation and validation methodology to manage risks posed by contamination and render the site suitable for the proposed development.
	Auditor Comment: • As above reference contaminated *land* guidelines. • Table 1 – Martens should reference nearby receptors and direction of groundwater flow. • Has the northern portion of the site been sampled for asbestos at an appropriate density? • Section 4.2.2 – Are Martens confident that they know the extent of burial trenches and therefore the extent of landfill gas? Martens could refer to historical aerial photographs to determine expected locations of where chicken carcasses were buried. Martens have not provided enough detail on potential surface emission and subsurface movement of LFG. • The Auditor is not yet satisfied that the rest of the site been sampled at an appropriate density to state it does not require capping. • Is the entire site proposed to be commercial/industrial land use? It is noted a dwelling exists in the north eastern portion of the site. • Martens note that detailed design of the gas management measure will be required and shall be included as an addendum to the RAP, prior to site installation. The Auditor agrees not enough detail of the gas mitigation system has been provided and the Auditor cannot yet state that it is satisfactory to mitigate LFG. • Any areas used as 'site holding areas for contaminated material' should be lined with HDPE to ensure cross contamination onto the site surface does not occur. • The Auditor requires that in addition to visual clearance certificates, validation samples also be collected from asbestos impacted fill which is proposed to be moved to the capped area to confirm no residual contamination remains. • Section 6.6.3 – Martens have listed placement of gas collection infrastructure twice – is there a missing hold point? • Map 02 – why is the extent of fill larger than what is being capped? Is the pink area beyond the proposed capping area going to be excavated and placed within the blue capped area? – In addition, it appears some of the area which is proposed to be part of the earthworks falls within the waste burial area and outside of the asbestos capped area – will some buried waste from historical poultry farming be excavated as part of the development? • The visual capping designs for ACM impacted material and visual designs for gas mitigation systems should be included. • The concentrations of methane and carbon dioxide are typical of a putrescible waste landfill • Martens should refer to the level 1 risk analysis (table 4, 5 and 6 of the EPA Ground Gas Guidelines) to determine the risk assessment and likelihoods. Martens should then refer to the level 2 risk analysis of the guidelines where the gas screening value and characteristic gas situation is determined (section 4.3.4). Martens then need to refer to the guidance value for gas protection (table 8) and discuss protection measures (table 9 of guidelines). Martens should discuss further what remedial strategy they are adopting and what gas protection score that gives the site. • Martens should comment on the cap integrity and specifications.

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	• Have Martens considered leachate management? • Passive venting to the atmosphere of untreated gas should be avoided. • How will Martens demonstrate there is no offsite migration? Should wells be installed along the perimeter of the waste area? • If methane is detected above the 1% v/v, additional investigation or corrective action is required. • Will there be any footings or services penetrating the material? • Periodic monitoring which takes into account varied meteorological conditions and contingencies will be required – Martens to detail the number of events. • Laboratory analysis for gas sampling should be considered, at a minimum, the wells with elevated concentrations should also be sampled with summa canisters to validate LFG results. Summa canisters will provide quality control checks that the sampling equipment (LGA) used is reliable. • The building design needs to be understood prior to the Auditor confirming the remedial strategy is suitable and is an effective mitigation system. • Indoor air monitoring post construction with the LGA may provide more accurate data and could form part of the validation process. • How often will surface monitoring of methane be completed and at what level will it be tested? At what density will it be tested (e.g. on a grid?), what atmospheric conditions will monitoring be completed on to validate that the system is working? What are contingencies if the system isn't working? In addition, for surface monitoring of methane, the wind speed, peak and ambient readings for each transect should be detailed. • The marker layer under the cap should consist of a high visibility geofabric layer. • Martens need to make it clear that the EMP is legally enforceable under a positive covenant and is to be retained by the site owners and appended to the site's Section 10.7 Planning Certificate.

3. CONCLUSIONS

The Auditor concludes the above comments should be addressed. Auditor will then address the suitability of the Detailed Site Investigations and Remedial Action Plan for the site. The Auditor is not yet satisfied that sufficient soil sampling density has been achieved. In addition, only one groundwater and ground gas monitoring round has been completed for the site, and additional sampling rounds are likely to be required. A meeting with Martens is recommended to discuss the above issues.

Yours Sincerely

Rod Harwood

NSW EPA Accredited Contaminated Sites Auditor (Accreditation No. 03-04.)

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28 July 2021

Mr James Muscat
Muscat Developments Pty Ltd
by email

INTERIM ADVICE 02: REVIEW OF SAMPLING AND ANALYSIS QUALITY PLAN: SUPPLEMENTARY INVESTIGATION AT 285 FINNS ROAD, MENANGLE NSW.

Dear James,

1. INTRODUCTION

1.1. Background

James Muscat of Muscat Developments Pty Ltd engaged Rod Harwood, a NSW EPA accredited Contaminated Land Auditor (accreditation no. 03-04) who is employed by Harwood Environmental Consultants (HEC), to provide Contaminated Site Audit Services for the Site located at 285 Finns Road, Menangle NSW.

The final outcome of this engagement is to prepare a Site Audit Statement (SAS) and associated Site Audit Report (SAR), indicating the suitability of the Site for the proposed depot and transport depot. It is noted that the site is currently approved for use as a poultry farm. The proposed development includes construction of an office building and two new sheds; cut and fill in various locations; filling of two dams at the ground surface near the south, southwest, northwest, west and central portions of the site; and construction of hardstand and other site infrastructure in accordance with the Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017.

It is understood that the proposed development is currently the subject of a Class 1 appeal in the NSW Land and Environment Court (LEC proceedings number 2020/00178157). It is understood that Martens prepared correspondence dated 19 October 2020 to address several of Council's concerns regarding the proposed development which include site contamination. Based on the findings of a Preliminary Site Investigation (PSI) completed by Martens in August 2020, Martens proposed that the following items be included as conditions of consent for the development:

> *Prior to issue of a Construction Certificate, an Asbestos Management Plan ("AMP") shall be prepared to:*
>
> *1. Identify and manage asbestos in structures and any fragments resulting from building deterioration or stockpiling of asbestos containing building materials.*
>
> *2. Prepare and maintain an asbestos register of all asbestos containing materials to be retained on the site (i.e. building products etc in existing structures).*
>
> *3. Undertake asbestos removal works of all asbestos not associated with structures. Removal works shall include any stockpiled asbestos building products, picking of PACM fragments*

surrounding sheds and removal of any identified asbestos impacted soil/fill material on the site. The AMP is to include all asbestos related controls required for asbestos removal works.

Prior to issue of a Construction Certificate, an Unexpected Finds Protocol ("UFP") shall be prepared for the proposed site earthworks. UFP shall provide guidance for the management of any encountered PACM in soil material, oil stains or other signs of contamination should they be exposed during the proposed site earthworks.

In addition to the above conditions, Martens recommended that the following condition be imposed in relation to the importation of any fill material required for the development:

Fill material to be brought onto site for the development to be only fill characterised as VENM, ENM or otherwise waste exempt material under the NSW Waste Regulation (2014). Copies of certifications or validation reports for all fill used shall be retained and presented to Council on request".

Following submission of both the PSI and letter, Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020), acting on behalf of Council. The response stated that:

Further to our letter dated 30 October 2020 and the s.34 conference for this matter, we have now obtained advice from the Council's contaminated lands officer.

We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.

Martens note that the above is confirmation that, as of November 5, the consent authority (Council) had considered if the land was contaminated; and was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

However, Martens note that subsequent to Council's assessment and conclusion that the site was suitable with regards to land contamination, fill material not present during the PSI assessment, nor at the time of Council's assessment, was imported to the site. Council has therefore indicated that they required further information to be satisfied that the site is suitable for the proposed use as required by Clause 7(1) of SEPP 55.

This Audit has not been completed in support of development consent, or to satisfy NSW EPA, but for additional technical review. The Audit is therefore considered to be a non-statutory site audit.

The Site Audit Statement will be issued to the client. Rod Harwood is an Auditor accredited by the NSW EPA (accreditation number 03-04) who has worked with a wide range of consultants to provide practical and competent outcomes and resolutions on contaminated site issues.

Whereas Interim Audit Advice is provided to assist in the assessment and management of contamination issues at the site, the Interim Audit Advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

1.2. Site Audit Process

EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition), describes the site assessment and Audit 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.

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,

validation and management plans or reports. The material outcomes of a site audit are a site audit report and a site audit statement.

It is important to note that with respect to waste management on contaminated sites, the EPA Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition) state:

- When reviewing information relating to the management of waste, site auditors must have regard to the provisions of the NSW Government's framework for managing wastes. In New South Wales, it is an offence to transport waste to a place that cannot lawfully receive it or use a site to receive waste that cannot lawfully be used as a waste facility. To ensure that waste generators (or their representatives) do not trigger such offences:
- in relation to disposal, they must ensure their waste is carefully classified in accordance with the Waste Classification Guidelines – Part 1: Classifying Waste (EPA 2014) as in force from time to time (the 'Waste Guidelines', available from Waste classification guidelines: www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines), and the waste is taken to a facility that is lawfully able to receive that waste; and
- in relation to re-use for land application purposes, they must ensure their waste meets the requirements of the resource recovery order and resource recovery exemption framework.

For consultants who have been engaged to classify waste, or to assist their client in complying with the order and exemption framework, they must ensure their work complies with all of the requirements of the Waste Guidelines, and the relevant order and exemption. It is an offence to supply information about waste that is false or misleading.

Part 4 Section 53B of the CLM Act describes that Site Audits conducted by EPA Accredited Site Auditors must take the following matters into account:

- the provisions of the CLM Act and the CLM Regulations;
- the provisions of any environmental planning instruments applying to the site; and
- the guidelines made or approved by the EPA.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

At the completion of the Site Audit process, the Site Auditor must complete a Site Audit Statement (form provided by EPA which only accredited site Auditors may sign under the Contaminated Land Management Act 1997) supported by a Site Audit Report (comprehensive critical review of all contamination assessment and remediation conducted at the site). However, the Auditor may provide written interim advice on the work plans or reports in the lead-up to issuing the final Site Audit Statement at the end of the entire Audit.

When this Interim Advice is provided, the Site Auditor must:

- specify that the Interim Advice does not constitute a Site Audit Report or Statement;
- ensure the Interim Advice is consistent with NSW EPA guidelines and policy;
- not pre-empt the conclusion to be drawn at the end of the Site Audit process;
- clarify that a Site Audit Statement will be issued at the end of the Audit process; and
- document in the Site Audit Report all Interim Advice that was given.

Section 3.1 of the Auditor Guidelines states that the site auditor must meet the following particular requirements regardless of whether the audit is statutory or non-statutory:

a. comply with applicable provisions of the CLM Act, regulations, environmental planning instruments, and any guidelines made or approved by the EPA under the CLM Act
b. not have a conflict of interest in relation to the audit as defined by the CLM Act
c. where these guidelines allow an auditor to adopt or endorse an approach that differs from policies made or approved by the EPA, exercise independent professional judgement in doing so and provide in the site audit report adequate and explicit justification for taking this course
d. finalise the site audit report before signing the site audit statement

e. provide in the site audit report a clear, logical discussion of issues covered in the site audit and clearly substantiate the rationale for the auditor's conclusions Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

f. discuss in the site audit report all issues pertinent to the actual or potential contamination of the site and all issues required by these guidelines to be raised during a site audit

g. state clearly why any human health and environmental issues that would normally be of concern are not of concern in the case of this audit

h. make every reasonable effort to identify and review all relevant data, reports and other information held by the person who commissioned the site audit, or which is readily available from other sources, that provides evidence about conditions at the site which is relevant to the audit

i. obtain advice from the appropriate expert support team members on issues that are outside the auditor's professional education, training or experience, and document in the site audit report where and from whom advice has been obtained

j. exercise independent and professional judgement in deciding whether or not they have sufficient information to make a decision about the suitability of a site or a plan or to draw any other conclusion in relation to actual or potential contamination of a site in the course of a site audit, with justification for conclusions to be given in the site audit report

k. make reasonable endeavours to find out whether any other audits have been commissioned in relation to the site and, if so, whether any of them were prematurely ceased and why

l. state in the audit report the scope and findings of any previous audits

m. in cases where the audit involves a review of site assessment, remediation or management work, visit the site to observe and verify, as far as is practicable, the completion of this work.

2. INTERIM ADVICE

The current interim advice provides comments on the following documents:

- Martens Sampling and Analysis Quality Plan: Supplementary Investigation at 285 Finns Road, Menangle NSW, dated July 2021. Ref: P1806774JR17V01.

Report	Auditor Summary
SAQP Martens (July 2021)	**This SAQP has been prepared to inform further testing requirements at 285 Finns Road, Menangle NSW.** • Additional investigations are required to allow preparation of a data gap closure report and amendments to the existing RAP to detail measures required to make the site suitable for the intended depot and transport depot land use. • The proposed ground gas assessment has been prepared to better characterise the site ground gas conditions understanding that the remedial approach for the management of the identified ground gases shall involve: **1.** Excavation of the presumed source material for GG being buried waste. **2.** Remediation of the waste material on site through either land farming to achieve degradation of the organic putrescible material from which the GG are being generated or through waste classification and removal of the material from the site. **3.** Validation of the remediated waste material prior to reburial onsite. This shall involve assessment of chemicals and the potential for material to continue to generate potentially hazardous GG. **4.** Validation that the site GG conditions are acceptable prior to development works. Where GG conditions are unacceptable, remediation through excavation and replacement of GG impacted fill (and natural material, where required) shall be undertaken. **5.** The above source of remediation shall result in a modification to the RAP as previously submitted. Rather than managing the potential GG impacts on the development, the

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	remedial strategy is to be adjusted to allow for the removal of the GG hazard from the site. **Proposed Development:** Construction of an office building and two new sheds; cut and fill in various locations; filling of two dams and at the ground surface near the south, southwest, northwest, west and central portions of the site; and construction of hardstand and other site infrastructure. This is subject of a Class 1 appeal in the NSW L&E Court – LEC proceedings (2020/00178157). **Former Burial Trenches:** • Historical aerial photographs taken between 1969 and 2021 were reviewed as part of a desktop contamination review. Evidence of former burial trenches in the south of the site can be seen in aerial photographs taken between 2010 and 2015 and disturbance of the area in 2002, during the site's operation as a poultry farm. • While it is noted that operation began circa 1975, no evidence of burial trenches can be seen prior to 2002. • Intrusive test pit investigations in the former burial trenches were undertaken. Impacts to groundwater and the presence of land fill gas (methane and carbon dioxide) were attributed to burial trenches. Further investigation is required to characterise groundwater impacts and GG extent. The lateral extent of both groundwater and GG impacts is of primary concern. Additional groundwater and GG investigations will be undertaken in the vicinity of identified trench areas. **Further Assessment:** • Asbestos in Soil: – Further analysis of asbestos is required to address WHS risks during proposed site earthworks required for the development. Analysis of AF/ FA in fill is proposed to eb undertaken. – Investigations and analysis is to be undertaken in all areas with recently placed fill material which are required to be disturbed during the construction phase of the development. These areas include locations where fill has been temporarily placed outside of the proposed extent of filling and where current fill levels are above that required to allow for capping of fill and achieving of design ground levels. – Investigations are to be undertaken at twice the rate specified in the NSW EPA (1995) sampling design guidelines, as previous investigations indicate that asbestos is likely in the area. At each investigation location samples are to be collected at a rate of 1 per testing location where fill depth is less than 1.0m , with an additional sample collected for each metre (or part thereof) of encountered fill material: • <1m – 1 sample • 1-<2m – 2 samples • 2-<3m – 3 samples • 3-<4m – 4 samples – In accordance with the guidelines outlined in section 11.3 of the NEPM (2013), and as discussed and agreed with the Auditor, further investigation of fill material which is not to be disturbed is not proposed. • Deep Fill and Natural Soils – To assess deeper fill material >1m BGL and natural underlying soils, additional investigations are required in areas where fill has been recently placed. – The minimum sampling density as noted in the NSW EPA guidelines has been exceeded in the IA from previous investigations, so a reduced rate of 50% of the NSW EPA guidelines ahs been adopted. • Above Ground Storage Tank – To determine if deep soil contamination is present in the vicinity of the AST, an additional 2 samples are to be collected from depths >0.3m BGL around the AST. • Proposed Testing Locations: **1.** Asbestos in soil (1.2 ha): 46 additional sample locations are proposed – double density **2.** Deep fill and natural soils (2.0 ha): an additional 15 locations are proposed, as 41 locations have already been sampled to date

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	3. Additional AST (<0.1 ha): 3 locations have been sampled to date and an additional 2 sampling locations are proposed. **Additional Groundwater Investigations:** • Further groundwater monitoring is recommended. The proposed monitoring event will include the same analytical suite as sampled in the SDSI as well as additional analytes associated with the buried poultry farm waste and possible decomposition products of that waste including E. Coli and thermo tolerant coliforms, nutrients (dissolved phosphorus, ammonia, total nitrogen, nitrogen oxides) as well as dissolved GGs (methane, Carbon dioxide and hydrogen sulfide). • Two deeper groundwater monitoring wells are proposed to be installed downgradient of MW03-MW08 to assist in the delineation of contamination extents and will be included in the sampling event. **Additional Ground Gas Investigations:** • Six additional soil vapour monitoring wells are to be installed around the perimeter of the expected extent of former burial trenches. These are located to further delineate the extent of current GG impacts. • An additional round of GG monitoring is proposed to further define the GG risks and extents of contamination. The additional round of monitoring shall include all previously tested wells as well as the additional wells. • To assist in defining the vertical extent of GG impacts, surface monitoring for hazardous gases will also be undertaken in transects across the surface to assess if any vertical gas migration is present. **Sampling Procedures:** • Test pits will be excavated to a maximum depth of the design finished surface less 700mm for assessment of asbestos for earthworks areas and underlying natural material where sampling of deeper fill and natural materials are required. • Two boreholes are to be excavated in the vicinity of the AST. • Soil samples will be collected at a rate of 1 sample per 1m of fill or at notable changes in the soil profile. A minimum of one or two samples will be collected at each location (1 fill and 1 natural). • Additional deep fill and natural soil samples will be selected for analysis based on visual and olfactory indicators of contamination and to allow for a good vertical and horizontal spread across the site. • For samples collected from fill, underlying natural material and areas adjacent to the AST, COPC to be included are TRH, BTEXN, heavy metals, OCP/OPP, PCB and formaldehyde. • Groundwater monitoring wells are proposed to be installed to a depth of 9-10m BGL or a minimum of 1m beneath the SWL. The wells will be developed dry on the day of installation and left to stabilise for one week prior to sampling. • Ground gas wells will be installed in a general perimeter around the former burial trench area and driveway on the southern side of the nearest existing shed. Wells are to be installed at a depth matching the depth of putrescible waste in burial trenches. This material was identified at a maximum depth of 3.0m BGL. • Static monitoring of GG wells is to be undertaken using a landfill gas analyser for methane, carbon dioxide, carbon monoxide and hydrogen sulphide and are to be screened for 10 minutes or until parameters are stable, whichever comes first. • Surface emissions monitoring is to be undertaken in a grid transect at 25m spacing. Readings are to be recorded every 25m as well as any location where the adopted SAC (methane >500ppm) is exceeded. An intraspectra laser will be used for monitoring.
	Auditor Comment: • As previous gas levels were taken from the headspace of groundwater monitoring wells, we are likely to only have data on dissolved ground gas. If the screen is above and below the water table, dissolved gases have been measured. If the screen is above the water table, GG has been measured. We should have an indicator of both dissolved methane and methane gas. Martens could consider installing an additional soil vapour well inside the buried waste area to get an accurate ground gas reading – this could be installed in the worst case scenario location. • GG assessment criteria – carbon dioxide should be 1.5% v/v, not 15% v/v.

Report	Auditor Summary
	• In addition, Martens could refer to the guideline values of 45mg/m^3 (30ppm) for CO and 14mg/m^3 (10ppm) for H_2S (SafeWork Australia 2019) • Test pits will be excavated to a maximum depth of the design finished surface less 700mm for assessment of asbestos for earthworks areas and underlying natural material where sampling of deeper fill and natural materials are required – the Auditor notes that the depth of fill should be delineated and test pits should extend into natural material. • The coverage of deep soil sampling and AF/FA testing appears to be appropriate (see comment below regarding the western portion). Martens should ensure that for the AST and deep soil sampling, at least one deep fill and one natural material location is analysed. • Martens state that for samples collected from fill, underlying natural material and areas adjacent to the AST, COPC to be included are TRH, BTEXN, heavy metals, OCP/OPP, PCB and formaldehyde – the Auditor recommends that PAHs should be included in this analytical suite and limited natural material locations should also be sampled for presence/absence of asbestos to provide characterisation. • It is understood groundwater is to be analysed for the same contaminants as the last round, which was BTEXN, TRH, PAH, Heavy metals, OCP/OPP, PCB, formaldehyde, PFOS/PFOA and VOC, with the addition of E. coli and thermo tolerant coliforms, nutrients (dissolved phosphorus, ammonia, total nitrogen, nitrogen oxides) as well as dissolved GGs (methane, Carbon dioxide and hydrogen sulfide) – the Auditor agrees with this approach. • An extra SV point should be considered to the west of MW07 as it is noted that MW06 was never assessed. • In the text martens say 6 soil vapour wells are to be installed – map 18 only shows 5. • Groundwater is expected to flow north east – the two additional proposed wells appear to be sufficient to capture downgradient migration of potential contaminants from the buried waste. • If former dams were infilled, sampling of that material should also be completed. • Are Martens confident that fill extends to the area outlined as the 'investigation area'? It is understood Map 20 shows fill to be disturbed which is where AF/FA sampling is proposed, but previous reports indicate filled material extends further west. Two-three deeper fill/natural material locations for characterisation of material could be considered in the former TP113-TP115 vicinity to cover the western portion. • The Auditor is satisfied that Martens are completing surface monitoring of methane emission across the inferred waste footprint to determine if surface emission is a major gas migration pathway. If results indicate unacceptable levels beyond the grid outlined in map 19, additional monitoring should occur until acceptable readings are recorded. • Martens should ensure flow rate is measured during sampling and atmospheric and barometric pressure is recorded. It is assumed concentration and flow will be measured. A characteristic gas situation can then be calculated. • The Auditor agrees the proposed remedial strategy is more appropriate to address buried waste and agrees an updated RAP will be required following additional investigations. • As noted by the Auditor as discussed with Martens, additional sampling surrounding the sheds is only required if fill material was observed in this area. If previous sampling events identified natural material at the surface, no additional sampling is required. However, if COPC other than pesticides were identified (such as volatile contaminants), the Auditor recommends deeper sampling occur in this area. • The Auditor recommends soil in the proposed 6 ground gas well locations, the additional ground gas well location the Auditor has recommended within the burial area and the two additional groundwater monitoring wells should be sampled for nutrients including nitrate, nitrite, phosphorus, ammonia, E.coli and total coliforms.

0 10 20 30 40 50 m

1:1500 @ A3

Source: Nearmap (2021)

martens
Environment | Water | Geotechnics | Civil | Projects

Map Title / Figure:
Proposed Monitoring Well Locations

Map 18	Map
285 Finns Road, Menangle, NSW	Site
Data Gap Closure Investigations	Project
SAQP	Sub-Project
Muscat Developments	Client
27/07/2021	Date

Project No: P1806074 Map Set: MS11-R01 EPSG: 28356

0 10 20 30 40 50 m

1:1500 @ A3

Source: Nearmap (2021)

martens
Environment | Water | Geotechnics | Civil | Projects

Map Title / Figure:
Surface Emission Transects

Map 19	Map
285 Finns Road, Menangle, NSW	Site
Data Gap Closure Investigations	Project
SAQP	Sub-Project
Muscat Developments	Client
27/07/2021	Date

Project No: P1806074 Map Set: MS11-R01 EPSG: 28356

3. CONCLUSIONS

The Auditor concludes that if the above comments are addressed, the SAQP will be suitable to address further site characterisation works.

Yours Sincerely

Rod Harwood

NSW EPA Accredited Contaminated Sites Auditor (Accreditation No. 03-04.)

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1 September 2021

Mr James Muscat
Muscat Developments Pty Ltd
by email

INTERIM ADVICE 03: REVIEW OF THE FURTHER DETAILED SITE INVESTIGATION AND UPDATED REMEDIATION ACTION PLAN AT 285 FINNS ROAD, MENANGLE NSW.

Dear James,

1. INTRODUCTION

1.1. Background

James Muscat of Muscat Developments Pty Ltd engaged Rod Harwood, a NSW EPA accredited Contaminated Land Auditor (accreditation no. 03-04) who is employed by Harwood Environmental Consultants (HEC), to provide Contaminated Site Audit Services for the Site located at 285 Finns Road, Menangle NSW.

The final outcome of this engagement is to prepare a Site Audit Statement (SAS) and associated Site Audit Report (SAR), indicating the suitability of the Site for the proposed depot and transport depot in accordance with the Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017. It is noted that the site is currently approved for use as a poultry farm. The proposed development includes construction of an office building and two new sheds; cut and fill in various locations; filling of two dams at the ground surface near the south, southwest, northwest, west and central portions of the site; and construction of hardstand and other site infrastructure. It is noted that to support the development application, detailed site investigations have occurred across the investigation area and a Remedial Action Plan has been prepared to address site contamination.

It is understood that the proposed development is currently the subject of a Class 1 appeal in the NSW Land and Environment Court (LEC proceedings number 2020/00178157) after Council had not granted consent for the development. It is understood that Martens prepared correspondence dated 19 October 2020 to address several of Council's concerns regarding the proposed development which include site contamination. Based on the findings of a Preliminary Site Investigation (PSI) completed by Martens in August 2020, Martens proposed that the following items be included as conditions of consent for the development:

> *Prior to issue of a Construction Certificate, an Asbestos Management Plan ("AMP") shall be prepared to:*
>
> *1. Identify and manage asbestos in structures and any fragments resulting from building deterioration or stockpiling of asbestos containing building materials.*
>
> *2. Prepare and maintain an asbestos register of all asbestos containing materials to be retained on the site (i.e. building products etc in existing structures).*

3. Undertake asbestos removal works of all asbestos not associated with structures. Removal works shall include any stockpiled asbestos building products, picking of PACM fragments surrounding sheds and removal of any identified asbestos impacted soil/fill material on the site. The AMP is to include all asbestos related controls required for asbestos removal works.

Prior to issue of a Construction Certificate, an Unexpected Finds Protocol ("UFP") shall be prepared for the proposed site earthworks. UFP shall provide guidance for the management of any encountered PACM in soil material, oil stains or other signs of contamination should they be exposed during the proposed site earthworks.

In addition to the above conditions, Martens recommended that the following condition be imposed in relation to the importation of any fill material required for the development:

Fill material to be brought onto site for the development to be only fill characterised as VENM, ENM or otherwise waste exempt material under the NSW Waste Regulation (2014). Copies of certifications or validation reports for all fill used shall be retained and presented to Council on request".

Following submission of both the PSI and letter, Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020), acting on behalf of Council. The response stated that:

Further to our letter dated 30 October 2020 and the s.34 conference for this matter, we have now obtained advice from the Council's contaminated lands officer.

We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.

Martens note that the above is confirmation that, as of November 5th, 2020 the consent authority (Council) was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

However, Martens note that subsequent to Council's assessment and conclusion that the site was suitable with regards to land contamination, fill material not present during the PSI assessment, nor at the time of Council's assessment, was imported to the site. Council has therefore indicated that they required further information to be satisfied that the site is suitable for the proposed use as required by Clause 7(1) of SEPP 55.

This Audit has not been completed in support of development consent, or to satisfy NSW EPA, but for additional technical review of the process of assessment and remediation to ensure a higher order of input . The Audit is therefore considered to be a non-statutory site audit.

The Site Audit Statement will be issued to the client and will be listed on the Auditor's Annual return to NSW EPA. In addition, where issues such as offsite migration, Duty to Report are relevant and require communication with NSW EPA, they will be communicated. . Rod Harwood is an Auditor accredited by the NSW EPA (accreditation number 03-04) who has worked with a wide range of consultants to provide practical and competent outcomes and resolutions on contaminated site issues.

Whereas Interim Audit Advice is provided to assist in the assessment and management of contamination issues at the site, the Interim Audit Advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

1.2. Site Audit Process

EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition), describes the site assessment and Audit 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.

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, validation and management plans or reports. The material outcomes of a site audit are a site audit report and a site audit statement.

It is important to note that with respect to waste management on contaminated sites, the EPA Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition) state:

- When reviewing information relating to the management of waste, site auditors must have regard to the provisions of the NSW Government's framework for managing wastes. In New South Wales, it is an offence to transport waste to a place that cannot lawfully receive it or use a site to receive waste that cannot lawfully be used as a waste facility. To ensure that waste generators (or their representatives) do not trigger such offences:
- in relation to disposal, they must ensure their waste is carefully classified in accordance with the Waste Classification Guidelines – Part 1: Classifying Waste (EPA 2014) as in force from time to time (the 'Waste Guidelines', available from Waste classification guidelines: www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines), and the waste is taken to a facility that is lawfully able to receive that waste; and
- in relation to re-use for land application purposes, they must ensure their waste meets the requirements of the resource recovery order and resource recovery exemption framework.

For consultants who have been engaged to classify waste, or to assist their client in complying with the order and exemption framework, they must ensure their work complies with all of the requirements of the Waste Guidelines, and the relevant order and exemption. It is an offence to supply information about waste that is false or misleading.

Part 4 Section 53B of the CLM Act describes that Site Audits conducted by EPA Accredited Site Auditors must take the following matters into account:

- the provisions of the CLM Act and the CLM Regulations;
- the provisions of any environmental planning instruments applying to the site; and
- the guidelines made or approved by the EPA.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

At the completion of the Site Audit process, the Site Auditor must complete a Site Audit Statement (form provided by EPA which only accredited site Auditors may sign under the Contaminated Land Management Act 1997) supported by a Site Audit Report (comprehensive critical review of all contamination assessment and remediation conducted at the site). However, the Auditor may provide written interim advice on the work plans or reports in the lead-up to issuing the final Site Audit Statement at the end of the entire Audit.

When this Interim Advice is provided, the Site Auditor must:

- specify that the Interim Advice does not constitute a Site Audit Report or Statement;
- ensure the Interim Advice is consistent with NSW EPA guidelines and policy;
- not pre-empt the conclusion to be drawn at the end of the Site Audit process;
- clarify that a Site Audit Statement will be issued at the end of the Audit process; and
- document in the Site Audit Report all Interim Advice that was given.

Section 3.1 of the Auditor Guidelines states that the site auditor must meet the following particular requirements regardless of whether the audit is statutory or non-statutory:

a. comply with applicable provisions of the CLM Act, regulations, environmental planning instruments, and any guidelines made or approved by the EPA under the CLM Act
b. not have a conflict of interest in relation to the audit as defined by the CLM Act

c. where these guidelines allow an auditor to adopt or endorse an approach that differs from policies made or approved by the EPA, exercise independent professional judgement in doing so and provide in the site audit report adequate and explicit justification for taking this course

d. finalise the site audit report before signing the site audit statement

e. provide in the site audit report a clear, logical discussion of issues covered in the site audit and clearly substantiate the rationale for the auditor's conclusions Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

f. discuss in the site audit report all issues pertinent to the actual or potential contamination of the site and all issues required by these guidelines to be raised during a site audit

g. state clearly why any human health and environmental issues that would normally be of concern are not of concern in the case of this audit

h. make every reasonable effort to identify and review all relevant data, reports and other information held by the person who commissioned the site audit, or which is readily available from other sources, that provides evidence about conditions at the site which is relevant to the audit

i. obtain advice from the appropriate expert support team members on issues that are outside the auditor's professional education, training or experience, and document in the site audit report where and from whom advice has been obtained

j. exercise independent and professional judgement in deciding whether or not they have sufficient information to make a decision about the suitability of a site or a plan or to draw any other conclusion in relation to actual or potential contamination of a site in the course of a site audit, with justification for conclusions to be given in the site audit report

k. make reasonable endeavours to find out whether any other audits have been commissioned in relation to the site and, if so, whether any of them were prematurely ceased and why

l. state in the audit report the scope and findings of any previous audits

m. in cases where the audit involves a review of site assessment, remediation or management work, visit the site to observe and verify, as far as is practicable, the completion of this work.

2. INTERIM ADVICE

The current interim advice provides comments on the following documents:

- Martens Further Detailed Site Investigation: Proposed Depots, 285 Finns Road, Menangle NSW, dated August 2021. Ref: P1806774JR18V01.
- Martens Remedial Action Plan: Proposed Depots, 285 Finns Road, Menangle NSW, dated August 2021. Ref: P1806774JR14V04.

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Further Detailed Site Investigation Martens (August 2021)	**This has been prepared to support a DA for a proposed depot and associated ancillary works at the site. The assessment is limited to the portion of the site where development is proposed and excludes areas of the site which are used for residential purposes and where no development is proposed under the application- The Auditor notes that if the residential area is part of the DA, then Martens would need to justify why they are not assessing this area.** **This FDSI documents all investigations previously reported in the DSI and SDSI, as well as additional data.** **Scope and Objectives:** • Review previous documentation • Subsurface soil investigation and sampling of AEC.

Report	Auditor Summary
	• Installation of monitoring wells and assessment of subsurface groundwater and ground gas. • Preparation of a report documenting works. **Proposed Development:** **1.** Relocation of significant volumes of fill material present on site. This generally includes excavation from the south east and southern areas of the site and placement of fill in the two dams at the site's south western corner. – Martens should indicate where on site and where it will be relocated and put a range of volumes in the text. **2.** Should excess material result, that material would require waste classification and offsite disposal to a site/licensed facility.- Martens should have an idea of whether this is likely based on the above **3.** Earthworks shall involve the excavation of placed fill from all areas of the site where existing filled levels are higher than 500mm below the design levels. This is required to permit the construction of hardstand and landscaping layers over any imported fill. **4.** Earthworks cut and fill plan shows earthworks required for the development against the prefilling surface. Imported fill alters this analysis. **5.** Proposed sheds A and B are to be constructed on areas which have been or are to be filled using recently imported fill. **6.** Much of the site is to be sealed with hardstand as either open air pavement (access driveways, circulation areas and parking, or by new shed foundation slabs). The remainder of the areas to be filled with recently imported material shall comprise batters required to form these areas. **Groundwater:** • A total of 10 groundwater monitoring wells (MW01 to MW10) have been installed at the site.- – Over three gauging events from April to August 2021, standing water level ranged from 3.21 in MW04 to 9.76m TOC in MW09 – It is noted that MW05, MW07, MW08, and MW10 were dry. – Well elevation ranged from 103.72 in MW01 to 116.99mAHD in MW05. – Martens indicate that MW01, MW02, MW03, MW06 and MW09 are likely to be representative of the main local groundwater system in a water bearing zone located in the underlying shale. Groundwater levels in this system range from 98.38 mAHD in MW01 to 108.69 mAHD in MW06. – MW04 results indicate it is installed in a perched layer of saturated material within an identified former poultry farm waste burial trenches. This water is at a higher level than the rest of the site. Martens indicate that this well has been installed in a shallow water bearing zone of saturated material. The presence of groundwater at this location is likely due to natural soils around the trenches having lower permeability and causing accumulation of infiltrated stormwater within more permeable trench material. This water is separated from deeper groundwater by clay and shale which is expected to have low permeability. – Martens indicate that groundwater is flowing north/north east. **Conceptual Site Model:** • Fill Material: imported and placed in the IA which is not consistent with VENM classification. Leaching of the contaminants through the fill profile and into the underlying natural material and/or impacting the groundwater may be possible. – Heavy Metals, TRH, BTEXN, PAH, OCP/OPP and asbestos. • Sheds: pesticides and heavy metals may have been used underneath existing and past garage/sheds for pest control. Building construction may include PACM, zinc treated (galvanised) metals and lead based paints. Oils and fuels may have been used in site sheds which could have spilled or leaked. – Heavy Metals, TRH, BTEXN, PAH, OCP/OPP and asbestos. • Former Poultry Farm Use: application of agricultural chemicals, cleaning agents, pesticides or heavy metals. Contaminants may have impacted both underlying soil and groundwater. – Formaldehyde, PFAS and nutrients (nitrates, phosphorus)

Report	Auditor Summary
	• Above Ground Storage Tank: Diesel fuel in ASTs has the potential to impact the underlying subsurface. – TRH, BTEXN and PAH. The Auditor notes Heavy Metals would also be a COPC. • Former Burial Trenches: A number of trenches in the southern portion of the site have been identified for burial of poultry farm waste from unknown sources including potential disposal of organic material from former poultry farm use. Assessment of impacts of the trenches to include local soil contamination, leaching of contaminants to groundwater and migration of ground gas. – Metals, TRH, BTEXN, PAH, OCP/OPP, formaldehyde, PFAS, nutrients (nitrates, phosphorus) and ground gas (methane and carbon dioxide). • Exposure Pathways: direct contact and/or ingestion of soil and groundwater; transport of contaminants to underlying groundwater; inhalation of vapour from soil or groundwater; inhalation and explosive risks associated with ground gas generated from buried agricultural waste material and inhalation of dust/harmful fibres. – Prior to recent filling, GG would have been expected to vent through the soil profile to overlying open grassed areas. By impeding this pathway through placing fill over the trenches is likely to have increased the lateral migration of GG. The proposed site regrading and construction of hardstand over the trenches may alter the pathways of GG to vent from buried waste. – Considering the proposed hardstand construction, pre and post filling profiles and the buoyant nature of GG of concern, the preferential pathways for GG are likely to have been altered by the completed fill placement and shall be further modified by proposed works. While some GG may continue to locally vent through the placed fill and pavement, it is expected this pathway will be impeded. Following the placement of fill and construction of hardstand, the principal pathways expected to be completed for GG include: • Primary: following the underside of the proposed hardstand (and underside of fill) south east towards the edge of the hardstand. • Minor: through fill and hardstand to open atmosphere. • Minor: north towards the proposed retaining wall adjacent to shed 4. • Minor: towards proposed shed B potentially through stormwater drainage line proposed along the south side of the retaining wall immediately south of existing shed 4. This stormwater drainage line is graded down to the west (towards Shed B) meaning that the pathway for buoyant gases would be preferentially to the east away from Shed B. • Very Minor/Negligible: towards existing Shed 4. The floor level of Shed 4 is approximately 113.5m AHD with areas between the shed and burial trenches at the north of the shed as low as 112.5m AHD. Ground levels in the vicinity of historical waste burial was 112 to 116mAHD. Assuming burial pits of 1-2m depth trenches to the west of Shed 4 are likely to have been an order of 112.5-115.7mAHD. For GG from these pits to be a risk to Shed 4, the preferred vapour pathway would need to be near horizontal. This is considered highly unlikely given the alternate pathways would be to rise through placed fill to the underside of the hardstand which then rises to the south away from Shed 4. • Receptors: future site works, future site users, future maintenance workers, groundwater and receiving environments and ecological receptors including terrestrial organisms and plants **Investigation Phases & Results:** **Phase 1: Initial Soil Investigations (10 and 11 March 2021)** • Preliminary fill investigations were undertaken to characterise imported fill material. This includes test pitting in areas where fill was placed following the PSI and sampling. • 29 test pits (TP101-TP129) were excavated where fill material had recently been placed to a maximum depth of 4.3m BGL. • Samples were collected from each location and PACM fragments were collected. • 50 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, 30 samples for asbestos in soil and 7 samples for asbestos fragments. • Fill was detected across large areas of the southern and western portions of the IA and consisted of a clay fill to a maximum depth of 4.0m BGL at TP103. Timber, steel, brick,

Report	Auditor Summary
	concrete and tile fragments, PVC and other plastic pipe, geofabric material and several PACM fragments were observed. Staining or odours were not noted. • Underlying material consisted of silty clay,- natural soil was encountered at all locations. • Metals, TPH/BTEXN, OCP/OPP, PAH were below the adopted criteria and asbestos in soil was not detected, with the exception of B(a)P at TP117/0.1 (2.6 mg/kg) exceeding ecological criteria. Asbestos was detected in all PACM (bonded) samples. **Phase 2: Supplementary Soil Investigations (14 to 17 April 2021)** • Additional investigations to characterise other site areas identified as AECs in the PSI and additional areas identified during the data gap review. Test pits, boreholes and near surface soil samples were collected. • 12 boreholes (BH301-BH312) within the site shed footprints (AEC B) to a maximum depth of 0.6m BGL. • 13 test pits were excavated (TP401-TP413) within the former burial trench area (AEC E) to a maximum depth of 3.8m BGL. • Soil samples were collected from each location. In addition, 13 near surface soil samples were collected from across the former poultry farm area (AEC C) and adjacent to the onsite AST (AEC D). • A total of 25 primary samples were analysed for BTEXN, TRH, PAH, heavy metals, OCP/OPP, PCB, formaldehyde and asbestos in soil. • Minor surface staining was observed at SS07 – SS09 around the AST. • The shed footprints were generally unsealed with partial asphalt in some areas. No staining or odours were noted. • Test pits indicated potential waste disposal trenches including eggshells and bones. This material was observed below depths of 2mBGL. Strong organic odours were noted. • Heavy metals, TPH/BTEXN, OCP/OPP, PAH, formaldehyde were below the adopted SAC or detection limit. Asbestos was not detected in soil. **Phase 3: Additional Asbestos in Soil Investigation (29 July to 2 August 2021)** • To assess OH&S risks posed by asbestos in fill additional asbestos analysis was completed. - • It is noted that gravimetric assessment of fill was unnecessary as previous investigations established the presence of bonded ACM within imported fill which required remediation and establishing the %w/w of bonded ACM would not change the remedial strategy. • Testing for AF/FA had not been completed, however, its presence would not change the remediation strategy. However, due to WHS requirements, sampling methods for AF/FA included: – Excavation of 49 test pits (TP601 to TP649) to a maximum depth of 5.3m BGL- – Collection of 500mL AF/FA samples from each location. • Samples were collected where anthropogenic materials were observed at a rate of one per test pit (minimum) with an additional sample collected per metre of fill beyond 1m. A total of 112 bulk (500mL) soil samples were collected for AF/FA analysis. • AF/FA was identified in two of the 112 samples sent for laboratory analysis at TP625/1.5 (0.0021%) exceeding the adopted SAC of 0.001% and at TP630/0.5 (0.0004%) below the adopted SAC. All other AF/FA samples reported no detects. • Four of the 112 samples contained bonded asbestos >7mm: TP614/2.0 at 0.05% exceeding the adopted criteria; TP628/0.5 at 0.0033% below the adopted criteria; TP634/0.5 at 0.055% exceeding the adopted criteria; and TP642/0.5 at 0.04% below the adopted criteria. **Phase 4: Data Gap Closure Investigation (29 July and 10 August 2021)** • To address data gaps identified by the Auditor, data gap investigations were undertaken. This included additional borehole investigations across the site as well as collection of deeper fill samples and underlying natural material samples in areas of imported fill material where previous testing was limited to shallow (<2m) fill.- • Excavation of 18 test pits (TP601-TP618) in filled areas into the underlying natural material for collection of deeper soil samples and underlying natural materials to a maximum depth of 5.1m BGL.

Report	Auditor Summary
	• 28 boreholes (TP801-TP828) were excavated in areas of historical filling along access roads, within and adjacent to site sheds, the AST and in areas where limited testing had been completed to a maximum depth of 2.5m BGL. • Two silt dam samples were collected from onsite dams (as close to the centre of the dam). • Representative samples were collected from fill and natural material. • A total of 67 primary samples were analysed for BTEXN, TRH, PAH, 77 primary samples for heavy metals, 73 primary samples for OCP/OPP, 63 primary samples for PCB, 73 primary samples asbestos in soil, 16 primary samples for nutrients, E.coli and total coliforms and 3 primary samples for pH and CEC. • Access roads comprised crushed sandstone (sandstone gravels in a silty clay matrix) overlying natural clay material. No visual or olfactory signs of contamination were noted. • Soil in grassed areas of the site between the north west dam and Finns road were found to be consistent with expected natural material found elsewhere on site. • Dam silts were found to be free from visual or olfactory signs of contamination. • Heavy metals, TPH/BTEXN, OCP/OPP, PAH, formaldehyde were below the adopted SAC or LOR and no asbestos was detected. **Phase 5: Groundwater Investigations (14 April and 29 July 2021)** • 10 groundwater wells (MW01-MW10) were installed and groundwater samples were collected on three events undertaken on 15 April, 17 May and 10 August 2021. • Four boreholes BH201-BH204 to a maximum depth of 11.4m BGL on 14 and 15 April 2021 for monitoring well installation. • Four boreholes (BH501-BH504) were drilled to maximum depths of 7.2m BGL for groundwater monitoring well installation of 29 April 2021. • Two boreholes were drilled (BH701-BH702) to a maximum depth of 11.7m BGL for monitoring well installation on 29 July 2021. • Groundwater samples were collected during three events: – Sampling of MW01-MW04 on 15 April 2021. – Sampling of MW01-MW08 on 17 May 2021. – Sampling of MW01-MW10 on 10 August 2021. • A total of 15 primary samples were analysed for BTEX, TRH, PAH, heavy metals, OCP/OPP, PFAS, PCB, formaldehyde, VOCs and 6 primary samples were analysed for nutrients, E.coli and total coliforms and dissolved methane, carbon dioxide and hydrogen sulphide. • Water from MW04 was described as “yellowish” and different to other wells. The water from MW04 was significantly shallower than other wells and it is expected that this groundwater is representative of a perched system and not the wider groundwater system. • Heavy metals were identified above the adopted criteria for copper, cadmium, lead, nickel and/or zinc in all wells except MW06. • Benzene in MW04 exceeded the adopted SAC of 1ug/L, with a concentration of 5ug/L. • All other results were below the adopted criteria. • OCP/OPP, PAH, VOC, PFAS were below the adopted criteria (maximum concentration of 1.6mg/L). • Formaldehyde exceeded the adopted criteria in MW04. • Nutrients were below the adopted criteria except for nitrate in MW01 and MW02 and ammonia in MW04 during the third GME. E.coli was detected in MW04, **Phase 6: Ground Gas Investigations (2 August 2021)** • 6 dedicated GG wells (MW11-MW16/BH703-BH709) were installed on 2 August 2021. GG was screened during two monitoring events undertaken on 21 May and 10 August. • The Auditor notes that construction details are worth noting - screens above and below the water table or well below as well an understanding of permeability • Surface GG emissions monitoring was undertaken on 10 August 2021. • MW01, MW02, MW04, MW05, MW07, MW08 were screened on 21 May 2021.

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	• MW01-MW07, MW09, MW11-MW16 on 10 August 2021. • The maximum flow rate measured was 0.5 L/hr. • Oxygen ranged from 0.0 to 21.0 %v/v in MW02. • Methane ranged from 0.1 to 62.1% v/v in MW04. • CO2 ranged from 0.2 to 23.2 in MW05. • Hydrogen sulphide ranged from 0 to 1 in MW05 and MW13. • Surface monitoring indicated methane concentrations between 0 and 3.8ppm which is below the adopted criteria of 500ppm. **Ground Gas Risk Classification:** • GSV and CS were calculated for actual measured flow rates as well as 'worse case' 0.5l/hr which was the highest recorded flow rate. • The maximum GG concentration for any gas ranged from 0.6 in MW01 and MW16 to 62.1 %v/v of methane in MW04. • GSV at actual flow rate ranged from NA (due to no flow) to 0.034 at MW08. • GSV at worst case 0.5l/hr flow rate ranged from 0.003 at MW01 and MW16 to 0.311 at MW04. • CS ranged from 1 to 3, with a CS of 3 at MW04, MW05 and MW08 and a CS of 2 at MW14. **Discussion:** • Fill: – The extent of fill has been determined through inspections, review of aerial imagery and test pitting in filled and unfilled areas. – Bonded ACM at the surface was observed across the filled area and this is an exceedance of the adopted HSL for asbestos (top 100mm should be free of ACM). – A single B(a)P exceedance is not expected to pose a significant ecological risk due to development implementing a hardstand finish across most of the development area. – Minor detections of TRH and PAH were reported above the LOR for samples from sheds, the poultry farm surface and within buried agricultural waste, however results remained below the SAC. – Formaldehyde was detected below the LOR with the exception of two samples from the waste trenches which were reported at the LOR. Martens conclude that past use of formaldehyde has not contributed to soil contamination at levels which pose a risk. – Bonded ACM was detected within fill and remediation of the site will be required to address bonded ACM. Gravimetric analysis was not completed as the proposed remediation strategy will involve cap and contain and implementation of an EMP therefore as all imported fill is deemed to contain asbestos, the quantity is not necessary. – AF/FA was identified in two samples, with one above the adopted criteria. Martens indicate this is likely due to fragmentation of bonded ACM by compaction and earthworks during material placement. • Former Burial Trenches(soil): – The extent has been derived based on aerial imagery from 2002 to 2015. – Burial trenches contained PAHs, TRH and formaldehyde above the LOR, however all concentrations were below the SAC and not considered to pose a risk to future site use. • Natural Soil: – Concentrations of chemicals were detected below the SAC and asbestos was not detected. Martens note that this indicates leaching of contaminants is unlikely to have occurred from the fill material. • Groundwater: – Groundwater is expected to flow north, north-east towards Navigation Creek. It is noted that the permeability of the shale water bearing zone is expected to be very low. The groundwater investigation identified a water bearing zone between 5 and

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	7m BGL. The groundwater in MW04 is considered to be a perched water bearing zone due to former burial trenches. – Of the 10 groundwater wells installed, 6 wells were sampled and 4 were dry. – Elevated cadmium, copper, lead, nickel and zinc were attributed to the site and surrounding rural land use. – Elevated nutrient and concentrations were reported in most wells with MW01 and MW02 reporting nitrate exceeding drinking water guidelines. Martens indicate this is likely due to the former poultry farm use. While no permeability testing has been undertaken at this stage, the shale bedrock in which this water bearing zone is located is expected to be of very low hydraulic conductivity (order of 10-7 – 10^{-5}m/day). Combined with assessed hydraulic gradients of the order of 5% of the risk of significant migration of heavy metals and nutrients are considered minimal. – Elevated benzene and formaldehyde at MW04 was observed and contaminants are likely attributed to waste material in former burial trenches. It is anticipated that permeability of the surrounding natural soils is significantly lower than that of the waste resulting in the retention of infiltrated water in trenches. Contaminants from buried trench material have leached into this retained water in the shallow perched water bearing zone. Comparison of the results to the rest of the site indicate that local perched water contamination has not impacted the deeper groundwater system in the shale and the risk posed by the perched groundwater system is considered low. – Martens note the proposed land use does not include bore water and will be serviced by onsite rainwater tanks. Site earthworks are not expected to encounter the deeper aquifer or the shallow aquifer. The licensed groundwater well in the southern site boundary is installed to 145.9m into the first available aquifer in sandstone beneath the shale which begins at 78m. the water bearing zones assessed as part of this investigation are excluded from the bore as it is cased to 86.9m. • Ground Gas: – Elevated methane and carbon dioxide and depleted oxygen were detected in wells (not all) adjacent to the burial trenches. Additional GG wells were installed further north of the trenches which also detected elevated concentrations of GG, however lower than the wells closest to the trenches. – MW01 and MW02 located in the site's north did not report elevated methane or CO2. Martens note that GG generation is originating from the anaerobic decay of waste in burial trenches in the southern portion of the site. – The CS at the site ranges from 1 to 2, however as MW04, MW05 and MW08 have concentrations of GG >20%v/v, they are reclassified as CS3. – Martens consider the GG is venting through site soils and the placement of fill over the trenches may have led to some degassing of the trench due to overburden pressures and changes in preferential pathways. Martens do not know if the GG observations to the north of the trenches predated the filling or are a result of filling. – As part of the earthworks, reductions in fill heights over the trenches will occur and it is anticipated this will reverse any acceleration to degassing caused by current fill. The construction of hardstand over these areas will likely maintain the effect of preventing or reducing venting of GG other than along the southern edge of the proposed filling. – Martens consider thatthe placement of fill and/or hardstand shall maintain a similar reduced oxygen availability to buried waste and therefore anaerobic decomposition shall continue and GG generation shall not be significantly changed other than as occurs through progressive decomposition of organic inclusions. – – Two GG events have been undertaken. The NSW EPA (2020) recommends sufficient monitoring events be undertaken to assess GG risks in varying atmospheric conditions. Investigations to date are considered unlikely to have captured a worst case scenario. It is considered unlikely that the CS will increase as a result of further investigations, however, Martens recommend additional monitoring be undertaken to capture data over periods of change in atmospheric conditions and confirm future mitigation measures proposed as part of the development and provide appropriate protection levels. **Conclusions:**

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	A RAP is required to manage site asbestos, construction of a capping layer and mitigation measures for potential GG risks. Groundwater is not considered to warrant remediation or further management as the risk of migration of a significant mass of pollutant from the site through the low permability shale in the water bearing zone is very low. The shale water bearing zone in which the metals and nutrients are encountered is unlikely to be an economically valuable water source due to low anticipated permeability and likely saline conditions. Other than the site well, there are no downgradient groundwater users which are expected to be impacted by the contaminants. The depth to local groundwater tables indicates the ultimate surface water receiving environment is likely to be a considerable distance from the site.
	Auditor Comment: • Section 2.2: Martens should provide an indication where possible of the amount of material which is going to be relocated and where to rather than saying "relocation of significant volumes of fill material" It is noted that some of the southern fill above the putrescible chicken waste will be moved to capped areas, however the EMP will still cover this putrescible waste area which is not "capped for asbestos purposes". Excess material generated should be disposed to a licensed facility and would unlikely be suitable to be taken to another site – Martens should indicate if this is likely that excess material will require offsite disposal. Should the earthworks cut and fill plan be redesigned if the imported fill alters the plans? • CSM: For the AST heavy metals and potentially phenols would also be considered COPC. Where nutrients are of concern, ammonia would be considered a COPC. • The reason why 10 GW wells were installed should be included. • Section 4.2.1: If the primary pathway for GG is going south east, that means it potentially has migrated offsite. The Auditor considers that the gas could potentially migrate in any direction and emphasis should be placed that there is a sensitive receptor to the south. • Section 6: it is noted that the SAQP prepared by Martens and reviewed by the Auditor in IA02 was further discussed via teams, with additional recommendations agreed upon with Martens via email. • Section 6.4.1: Martens state that 10 duplicate intra-laboratory samples were collected during the course of the DSIs and 2 inter-laboratory samples were collected during the course of the DSIs – what is this ratio to primary samples? • Section 6.4.4 Water quality parameters should be stabilised within 10% prior to sampling. • Section 6.5.1 – weren't some soil samples analysed for PFAS? This was considered a COPC due to the former poultry farm use. • Results: what about nutrients etc in soil? • Groundwater results: total coliforms, phosphorus and dissolved methane/CO2 are not discussed. • Section 8.6.3: Shouldn't the GSV be calculated for actual flow rates use the limit of detection of the instrument as a flow rate instead of 0? Or is the limit of detection 0L/hr? • Section 9.1.4: A conclusion on AF/FA should be made e.g. will this be part of the capped area? Do these locations fall within the material to be disturbed etc? It is understood all fill material will be capped. • Was MW04 included in the GW contours? It should not be if it is not part of the same groundwater system as the other wells. • Attachment D: Field sheets with stabilised data within 10% should be included. The first GME field sheets indicate parameters were not even recorded. • Attachment E: – Table 1: Comments should be made on B(a)P above criteria at TP117/0.1 – is this in a proposed capped area? – TP112/2.0 also exceeds B(a)P criteria & has not been delineated or highlighted in the table or discussed in the text.

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	– Phase 2: there is a zinc EIL exceedance with quite high concentrations at 6774/SS12 – this should be highlighted and comment made on this throughout the report. This is a surface sample and no deeper sample has been collected. This is not in an area where hardstand is proposed – should this be remediated? Will there be exposure pathways to ecological receptors. It is noted that no ecological exceedances have been delineated vertically or laterally. – E.Coli is high in MW01 5400 CFU/100mL followed by MW04 at 3500 CFU/100mL and MW06 (50 CFU/100mL) and MW02 (20 CFU/100mL). What is the rationale for not analysing coliforms and E.coli in MW03 and MW09? – Martens should discuss PFAS, nutrients, E. Coli and anerobic indicators in soil? Weren't nutrients and PFAS analysed in soil? • It is noted that the rinsate indicated minor TRH detections which Martens attribute to an old plastic bottle – old bottles should not be used for rinsate waters. • Why do Martens think there is low to negative gas flow? Explanation on what this means is required. • A rinsate sample should have been collected off the pump during micropurge sampling. • Only 11 RPDs have been calculated in the QA/QC section – this does not match the number of QA/QC samples Martens stated they collected • The RPD exceedance for groundwater would not generally be attributed to heterogeneity of the sample • There is no table which shows all ground gas results. • Asbestos results should be tabulated. • Some of the logs are hard to determine where the fill stops and natural starts as all material is generally clay or silty clay. Martens should indicate the number of samples & locations sampled for fill and the number of samples and locations sampled for natural • BH709 is not evident on MAP08 and is referenced in the text. • Borelogs are missing for BH710, BH711, BH827 and BH828. • There appears to be discrepancies in sample numbers throughout the text and in tables – 50 primary samples in phase 1, however the tables show 29 samples, in phase 2 Martens say 25 primary samples were analysed, however the tables indicate 46, and in phase 4 Martens state that 77 samples were analysed however the tables indicate 85 – clarification needs to be provided and the text should reflect the results.
Remediation Action Plan Martens (August 2021)	**This RAP has been prepared to make the site suitable for DA 2019.688.1.** The proposed development is the subject of a Class 1 appeal in the NSW L&E Court (2020/00178157). The PSI indicated the site contamination risks would be mitigated and managed by an AMP and UFP. On October 19 2020, Council provided advice to say that the PSI addresses the Council concerns. Subsequent to the issue of Council advice, further fill material was imported to site. Council advised that they were no longer satisfied regarding contamination and a DSI was required. The DSI detected ACM within fill and hazardous ground gases as a result of historical burial of waste material due to former poultry farm use. This version of the RAP (V4) has been updated to address site works completed during the FDSI (2021). **Remediation Areas:** **1.** ACM Impacted Fill **2.** Waste Burial Trenches: generating elevated methane and CO2 which presents an unacceptable risk to the development and receptors. • Exposure pathways: inhalation of asbestos fibres, inhalation of GG and ingress of GG to future development structures and associated explosion risk (methane). • Receptors: future site works involved in construction and development, future site users and future maintenance workers. • Bonded asbestos and AF/FA were detected in fill material at the surface and at depth in the southern portion of the site. Access to exposed soil is presently, readily available and a potential pathway between sensitive site receptors and ACM is considered complete. Future earthworks will require relocation of considerable volumes of ACM impacted fill and without mitigation, a complete pathway is likely to be completed.

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	• GG have been detected in assessment works at the southern portion of the site at unacceptable concentrations. **Extent of Remediation:** **1.** Fill: The extent of fill impacted areas includes approximately 16,500m^2 of the site likely to be impacted by ACM. The extent of filling was mapped based on aerial photographs and test pitting to confirm outer limits. Fill will require remediation and management. - **2.** Burial trenches: elevated methane and carbon dioxide in the southern portion of the site. Based on the CSM, gas concentrations are likely to be associated with waste burial trenches. Based on aerial photographs and investigations, burial trenches are understood to be limited to an area of 1000m^2. The trenches are understood to have been excavated and filled between 2010 and 2017 by the previous site owner prior to importation of fill. Trenches are expected to be approximately 0.5-1.0m deep and beneath approximately 2.0-2.5m of fill. **Preferred Soil Remedial Option:** **1.** Fill: Cap onsite. Some ACM impacted fill material has been placed onsite in areas outside of proposed filling as described in the development or at levels in excess of those required to achieve a cap and the proposed design levels. The excavation and replacement of some previously imported fill shall be required. Suitable options for capping layer to separate the ACM from end users have been developed to respond to each of the final surface uses/treatments proposed: • Structural concrete ground slabs for sheds. • Hardstand: this may be constructed as a rigid (concrete) or flexible sealed or unsealed pavement. The hardstand is to comprise as a minimum a marker layer over ACM impacted fill and pavement layers. The proposed thickness is to be determined by the engineer. Where flexible pavement is proposed, it shall comprise a minimum 300mm thickness of pavement materials.-the Auditor notes that this will also need to satisfy protection levels based on ground gas. • Landscape: this is to comprise as a minimum: a marker layer over ACM impacted fill and a minimum of 500mm clean material for the establishment of vegetation. **2.** Burial Trenches: the preferred option is onsite management. • The proposed development in the remediation area is primarily open hardstand for vehicle parking and circulation. The GG guidelines do not provide construction guidance for this development as it does not present a GG accumulation risk. The proposed filling and hardstand construction may result in redirection of GG towards other sensitive receivers (neighbours, existing and proposed sheds and buried services). This remediation is aimed at controlling venting of any GG and prevent migration. – A GG cut off trenches to be constructed along the southern edge of the proposed site hardstand. This is to extend to 2m below the prefilling surface and vent points are to be at 50m intervals to permit the passive release of GG. This allows for interception of any GG which may be directed south as a result of the hardstand capping and prevent offsite migration to the property to the south. – A GG collection system is to be constructed within the retaining wall backfill along the southern site of Road 2 to the south of existing shed 4. This is to be extended to 1m below the existing contour levels and vent points are to be provided at 50m intervals along the trench to permit passive release of GG. This allows for interception of GG which may be directed north as a result of the hardstand capping and prevent uncontrolled venting of GG through the retaining wall and stop the migration of GG towards Shed 4. – A ground gas barrier/venting system along the stormwater drainage lines running south and east from Shed B. These measures are provided to prevent the accumulation of gas in these services. Venting of the stormwater line to the south of shed 4 may use the same vent structures as GG trench along the retaining wall described above. Similar service trench GG venting is to be provided for any other service trench across the hardstand area to the south of (or between) shed 4 and shed B. – Elevated methane concentrations indicate a CS of 3 is required for structures in the remediation area. Shed B is to be constructed on as yet not placed fill material. It is proposed that mitigation measures be provided for Shed B assuming CS3. This will require two points of protection:

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	1. A passive, under slab GG collection and venting system beneath the shed slab (1.5 points). **2.** Construction of a reinforced concrete ground bearing floor slab (0.5 points). Long term management of the site will be required under the EMP. **Remediation Plan:** Stage 1: Notifications and Site Preliminaries • Notification to SafeWork NSW due to the presence of asbestos contamination. Stage 2: Appointment of Remediation Contractor/Environmental Consultant/Surveyor • All site remediation works are to be completed by a licensed asbestos removal contractor and due to AF/FA, a Class A LARC will be required. • The consultant will supervise works and validate the site. • The surveyor will survey the upper surface of the buried ACM impacted fill after placement of the marker layer and survey the upper surface of the capping layer. In addition, the GG mitigation measures will be surveyed. Stage 3: Site Establishment • Site offices, work sheds, amenities, decontamination facilities, physical barriers and signage, air monitoring, and site holding areas are required. Stage 4: ACM Remediation Work • Relocation of fill to levels and locations which allow for formation of required caping layers. This shall regrade the site to a 'precap' surface in all areas where ACM impacted fill is to be retained and capped. Where current level of fill exceeds the required levels, fill material will be excavated and used elsewhere. • Where fill has been placed on the site in areas where the DA does not seek consent for fill material, this is to be relocated to locations where filling is included in the DA • Where excess ACM impacted fill remains after formation of the precap surface, this material is to be classified and removed from site to an appropriately licensed/approved location. • The precap surface is to undergo an emu pick by the contractor to remove surface ACM. A surface clearance will then be prepared. • A marker layer is to be placed over fill material prior to establishment of the hardstand, building slab or landscaping material capping layer. • A survey is to be completed of the top surface of the marker layer and after the capping layer has been placed to confirm the thickness of the capping. Stage 5: Ground Gas Management: • Installation of a GG cut off trench along the southern edge of the hardstand area to allow controlled venting and prevent offsite migration. Where buried waste material is identified south of this structure, that buried material shall be excavated, waste classified and removed offsite. • Installation of a GG cut off trench along the retaining wall immediately south of shed 4 to prevent the uncontrolled GG off gassing at the retaining wall and migration of GG to shed 4. • Installation of a GG venting system within drainage and other service trenches to prevent GG accumulation and potential migration to site sheds. • Construction of a passive, under slab GG collection and venting system beneath new buildings. • Survey by a registered surveyor the extent of all constructed gas management infrastructure. • Further GG characterisation will be required including a GG specific SAQP to be prepared which will detail further monitoring to determine if there are changes in soil gas conditions over time. Findings will be documented in a GG report and will inform the detailed design of the GG management system. Subject to instruction and advice from the auditor, an addendum to the RAP shall be prepared if the remedial solution is amended. Stage 6: Site Validation A validation report documenting the remediation must be prepared and issued to the Site Auditor for a Section A2 SAS to be prepared.

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	Validation: **1.** Fill Relocation: Areas of the site where ACM impacted fill has been placed, but are outside of the proposed capping areas are to be validated after relocation of ACM impacted fill. This is to be completed via visual inspection to confirm all previously placed fill has been removed. Final validation of the ACM impacted fill is to be achieved via shallow test pitting to at least 0.5m in accordance with the NSW EPA sampling design guidelines for presence/absence. **2.** ACM Capping Layer Validation: • Hardstand/Structural Slab: remediation areas where hardstand or structural slab are proposed, are to be constructed in accordance with designs by the structural engineer. Flexible pavement is to be designed by a geotechnical or pavement engineer with a minimum total thickness of 300mm. • Capping layer verification is to be provided by the consultant once an as built survey of the marker layer and capping layer has bene completed. This is to be included in the validation report and EMP. • All non-hardstand areas within the remediation area are to be capped with a landscaping layer. This is to be supervised by the consultant and the capping layer is to consist of VENM, ENM or waste exempt material (for the purposes of landscaping) and be a minimum of 0.5m thick. This is to be visually confirmed by the consultant and surveyed. • Where capping is less than the specified minimum, additional material is to be placed and the cap resurveyed. • The GG protection system will include the following validation: – Inspections at relevant hold points (to be confirmed at detailed design) but to include excavation of cut off trench, placement of gas collection infrastructure and completion of a venting system. – Review of data collected during period inspection of the system installation. – Surface methane monitoring to be completed following passive subslab ventilation system. Steady state methane over 100% of the ventilation layer at <1%v/v at a wind speed of 0.3m/s is considered a very good performance (NSW EPA 2020). Site Management Plan for Remediation: • A site specific asbestos removal control plan (ARCP) and WHS plan is to be prepared by the remedial contractor.
	Auditor Comments: • Do Martens have an estimate on the volume of fill imported? Was this material meant to be VENM? In addition, the volume of buried waste should be estimated. Where is the other former diesel AST? Martens only refer to one in later reports. Has a HAZMAT been conducted? Are any buildings going to be demolished? What happened to the stockpile of burned rubbish etc on the south east side of the dam identified during the PSI? In addition, a stockpile of supersix PACM was noted near the south west boundary in the PSI and a soil stockpile north west of the southernmost shed which contained PACM and other anthropogenic materials – Martens should comment on the fate of these stockpiles. Is the imported asphalt still on site as detailed in the PSI? It is agreed an AMP and UFP are still required for the site. • Section 3.2 – Martens say that all ecological results are below the criteria, however, this is not the case – there is B(a)P and zinc exceeding criteria. • The Auditor recommends a well be installed on the downgradient boundary to determine that offsite migration of nutrients and metals in groundwater is not of concern. • Section 5.3.1: capping for asbestos sounds reasonable, however, where concrete is proposed, the MPa rating should be applicable for the proposed use. For landscaped areas, only shallow rooted vegetation should be used. Where movement of asbestos is proposed, validation of the haul route and validation of the areas where asbestos was removed and a cap is not proposed is required (via sampling and clearances).

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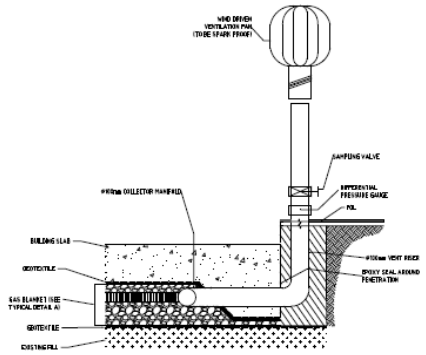
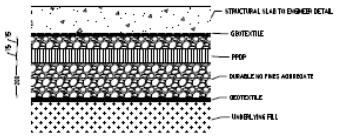
	• Will the EMP cover the entire site or just capped areas and GG impacted areas? • Validation of not only the ACM areas where a cap is not proposed, but also movement of fill material from the burial trench area is necessary. • Section 6.1: Notification to Council should be provided at least 30 days prior to commencement of remediation (if not done so already). An AMP, CEMP and WHS plan also need to be prepared. • Section 6.6.5: Any imported material should also be sampled for PCBs. • Section 6.3: any site holding areas for contaminated material should be lined with HDPE, placed on hardstand or validated following removal of contaminated material. • All marker layers should consist of high visibility geofabric. • The site management plans should include measures for stormwater runoff etc. • Ground gas is primarily pressure driven by advection and the mitigation systems may be suitable to stop migration of gases offsite or to the existing shed, however a further understanding of migration processes are required. What about migration to the east? Mitigation measures to limit migration may be put in place but has this already migrated offsite? • Slug tests should be considered as part of data gap works. In addition, Martens need to conduct pilot trials for the gas collection and venting system to determine if they are suitable. In these trials, the need for leachate control and water collection systems may be necessary. It is ok for this RAP to be conceptual, however, additional trials will be required. • Section 3.4.6 of the GG guidelines indicates at a minimum, borehole flow rates and concentrations should be assessed over an appropriate number of monitoring rounds. This should includes measurements during falling atmospheric pressure. For residential with minimal access to soil, between 6-12 monitoring events over 2-24 months is recommended, therefore it can be assumed for commercial/industrial settings, a slightly lesser frequency would be acceptable. Additional monitoring rounds are proposed before remediation occurs. In addition, ambient air monitoring in the buildings post remediation could be considered as a validation measure. • Is the passive sub-floor ventilation with very good performance (2.5 points) or good performance (1.5 points) being applied? Validation in section 6.6.4 indicates the very good performance system is proposed, however, earlier in the RAP, the good performance system is indicated by the number of protection points stated by Martens. • High visibility marker layer should be placed under hardstand where the EMP extends.



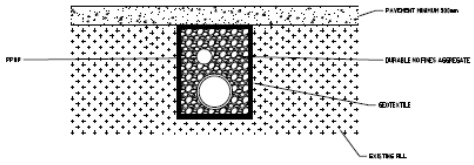
TYPICAL DETAIL B - INDICATIVE BUILDING GAS RISER SECTION

NOT TO SCALE



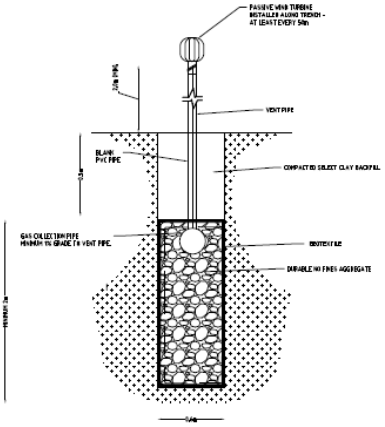
TYPICAL DETAIL A - GAS BLANKET UNDER SLAB

NOT TO SCALE



TYPICAL DETAIL C - PIPE TRENCHES

NOT TO SCALE



TYPICAL DETAIL D: LFG TRENCH/CUTOFF WALL

NOT TO SCALE

NOTE:
PROP – 100mm (MINIMUM) PERFORATED PLASTIC DRAINAGE PIPE

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPROVED	SCALE
A	INITIAL RELEASE	24/08/2021	MH	BH	BH	BH	

GRID | DATUM | PROJECT MANAGER: MS

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CLIENT: MUSCAT DEVELOPMENTS

PROJECT NAME/PLANSET TITLE: RAP

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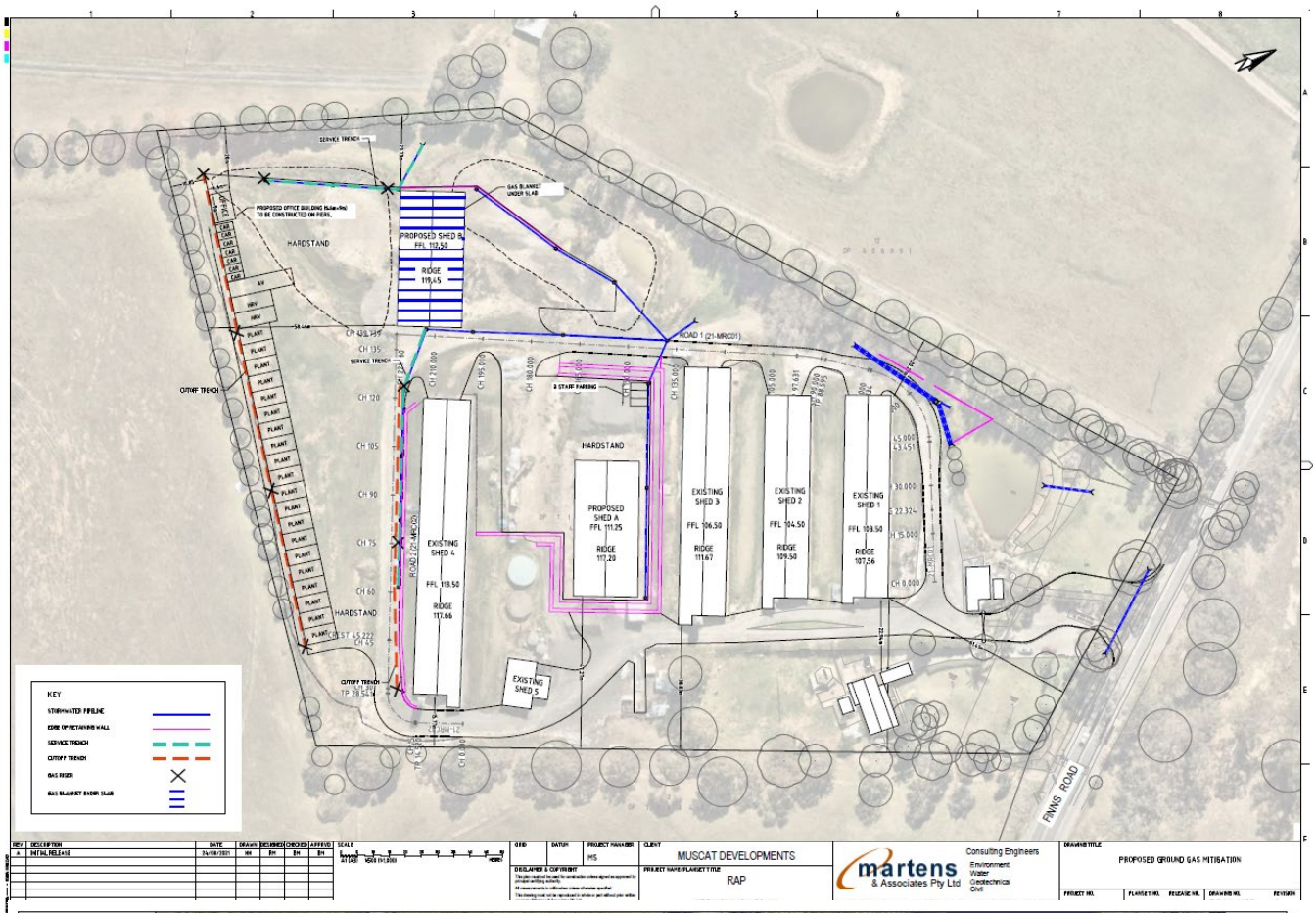
DRAWING TITLE: TYPICAL GROUND GAS MITIGATION SECTIONS AND DETAILS

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1806774	PS11	R01	PS11-J200	A



0 10 20 30 40 50 m

1:1500 @ A3

Map Title / Figure:

Proposed Capped Areas

Map 04

285 Finns Road, Menangle, NSW. — Site

Planning & Engineering Services: 285 Finns Road, Menangle — Project

Remedial Action Plan — Sub-Project

Muscat Developments — Client

23/08/2021 — Date

martens
Environment | Water | Geotechnics | Civil | Projects

0 10 20 30 40 50 m

1:1500 @ A3

Map Title / Figure:

Approximate Extent of Fill

Map 02

285 Finns Road, Menangle, NSW.

Planning & Engineering Services: 285 Finns Road, Menangle

Remedial Action Plan

Muscat Developments

23/08/2021

Map | Site | Project | Sub-Project | Client | Date

martens

Environment | Water | Geotechnics | Civil | Projects

0 10 20 30 40 50 m

1:1500 @ A3

Map Title / Figure:

Former Burial Trenches and Impacted Area

Map 03

285 Finns Road, Menangle, NSW.

Planning & Engineering Services: 285 Finns Road, Menangle

Remedial Action Plan

Muscat Developments

23/08/2021

Map | Site | Project | Sub-Project | Client | Date

martens

Environment | Water | Geotechnics | Civil | Projects

3. CONCLUSIONS

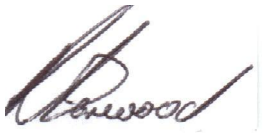
The Auditor concludes that the above comments are to be addressed.

The Auditor notes that notification of the site by the client under the CLM Act 1997 is required for importation of fill that is not consistent with VENM, presence of asbestos (including AF/FA in one location above criteria) and ground gas exceeding acceptable levels for methane and carbon dioxide. As a conservative measure, the Auditor recommends that any groundwater issues be mentioned in the notification, and justification as to why Martens do not consider it to be an issue be noted.

The Auditor will be notifying the site under the POEO Act 1997 due to the importation of fill that is not consistent with VENM classification.

The Auditor will send a separate letter advising Muscats and Martens of the above.

Yours Sincerely



Rod Harwood

NSW EPA Accredited Contaminated Sites Auditor (Accreditation No. 03-04.)

0438 200 055

Harwood Environmental Consultants
Gunners Barracks
Suite F, 38 Suakin Drive
George Heights, Mosman 2088

rod@harwoodenviro.com.au

2 September 2021

Mr James Muscat
Muscat Developments Pty Ltd
by email

INTERIM ADVICE 04 (REV1): ADVICE TO NOTIFY 285 FINNS ROAD, MENANGLE NSW UNDER THE CONTAMINATED LAND MANAGEMENT ACT 1997.

Dear James,

1. INTRODUCTION

1.1. Background

James Muscat of Muscat Developments Pty Ltd engaged Rod Harwood, a NSW EPA accredited Contaminated Land Auditor (accreditation no. 03-04) who is employed by Harwood Environmental Consultants (HEC), to provide Contaminated Site Audit Services for the Site located at 285 Finns Road, Menangle NSW.

The final outcome of this engagement is to prepare a Site Audit Statement (SAS) and associated Site Audit Report (SAR), indicating the suitability of the Site for the proposed depot and transport depot in accordance with the Guidelines for the NSW Site Auditor Scheme (3rd Edition), 2017. It is noted that the site is currently approved for use as a poultry farm. The proposed development includes construction of an office building and two new sheds; cut and fill in various locations; filling of two dams at the ground surface near the south, southwest, northwest, west and central portions of the site; and construction of hardstand and other site infrastructure .

It is understood that the proposed development is currently the subject of a Class 1 appeal in the NSW Land and Environment Court (LEC proceedings number 2020/00178157). It is understood that Martens prepared correspondence dated 19 October 2020 to address several of Council's concerns regarding the proposed development which include site contamination. Based on the findings of a Preliminary Site Investigation (PSI) completed by Martens in August 2020, Martens proposed that the following items be included as conditions of consent for the development:

> *Prior to issue of a Construction Certificate, an Asbestos Management Plan ("AMP") shall be prepared to:*
>
> *1. Identify and manage asbestos in structures and any fragments resulting from building deterioration or stockpiling of asbestos containing building materials.*
>
> *2. Prepare and maintain an asbestos register of all asbestos containing materials to be retained on the site (i.e. building products etc in existing structures).*
>
> *3. Undertake asbestos removal works of all asbestos not associated with structures. Removal works shall include any stockpiled asbestos building products, picking of PACM fragments*

surrounding sheds and removal of any identified asbestos impacted soil/fill material on the site. The AMP is to include all asbestos related controls required for asbestos removal works.

Prior to issue of a Construction Certificate, an Unexpected Finds Protocol ("UFP") shall be prepared for the proposed site earthworks. UFP shall provide guidance for the management of any encountered PACM in soil material, oil stains or other signs of contamination should they be exposed during the proposed site earthworks.

In addition to the above conditions, Martens recommended that the following condition be imposed in relation to the importation of any fill material required for the development:

Fill material to be brought onto site for the development to be only fill characterised as VENM, ENM or otherwise waste exempt material under the NSW Waste Regulation (2014). Copies of certifications or validation reports for all fill used shall be retained and presented to Council on request".

Following submission of both the PSI and letter, Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020), acting on behalf of Council. The response stated that:

Further to our letter dated 30 October 2020 and the s.34 conference for this matter, we have now obtained advice from the Council's contaminated lands officer.

We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.

Martens note that the above is confirmation that, as of November 5, the consent authority (Council) was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

However, Martens note that subsequent to Council's assessment and conclusion that the site was suitable with regards to land contamination, fill material not present during the PSI assessment, nor at the time of Council's assessment, was imported to the site. Council has therefore indicated that they required further information to be satisfied that the site is suitable for the proposed use as required by Clause 7(1) of SEPP 55.

This Audit has not been completed in support of development consent, or to satisfy NSW EPA, but for additional technical review. The Audit is therefore considered to be a non-statutory site audit.

The Site Audit Statement will be issued to the client. Rod Harwood is an Auditor accredited by the NSW EPA (accreditation number 03-04) who has worked with a wide range of consultants to provide practical and competent outcomes and resolutions on contaminated site issues.

Whereas Interim Audit Advice is provided to assist in the assessment and management of contamination issues at the site, the Interim Audit Advice should not be regarded as 'approval' of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

1.2. Site Audit Process

EPA (2017) Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition), describes the site assessment and Audit 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.

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,

validation and management plans or reports. The material outcomes of a site audit are a site audit report and a site audit statement.

It is important to note that with respect to waste management on contaminated sites, the EPA Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition) state:

- When reviewing information relating to the management of waste, site auditors must have regard to the provisions of the NSW Government's framework for managing wastes. In New South Wales, it is an offence to transport waste to a place that cannot lawfully receive it or use a site to receive waste that cannot lawfully be used as a waste facility. To ensure that waste generators (or their representatives) do not trigger such offences:
- in relation to disposal, they must ensure their waste is carefully classified in accordance with the Waste Classification Guidelines – Part 1: Classifying Waste (EPA 2014) as in force from time to time (the 'Waste Guidelines', available from Waste classification guidelines: www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines), and the waste is taken to a facility that is lawfully able to receive that waste; and
- in relation to re-use for land application purposes, they must ensure their waste meets the requirements of the resource recovery order and resource recovery exemption framework.

For consultants who have been engaged to classify waste, or to assist their client in complying with the order and exemption framework, they must ensure their work complies with all of the requirements of the Waste Guidelines, and the relevant order and exemption. It is an offence to supply information about waste that is false or misleading.

Part 4 Section 53B of the CLM Act describes that Site Audits conducted by EPA Accredited Site Auditors must take the following matters into account:

- the provisions of the CLM Act and the CLM Regulations;
- the provisions of any environmental planning instruments applying to the site; and
- the guidelines made or approved by the EPA.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

At the completion of the Site Audit process, the Site Auditor must complete a Site Audit Statement (form provided by EPA which only accredited site Auditors may sign under the Contaminated Land Management Act 1997) supported by a Site Audit Report (comprehensive critical review of all contamination assessment and remediation conducted at the site). However, the Auditor may provide written interim advice on the work plans or reports in the lead-up to issuing the final Site Audit Statement at the end of the entire Audit.

When this Interim Advice is provided, the Site Auditor must:

- specify that the Interim Advice does not constitute a Site Audit Report or Statement;
- ensure the Interim Advice is consistent with NSW EPA guidelines and policy;
- not pre-empt the conclusion to be drawn at the end of the Site Audit process;
- clarify that a Site Audit Statement will be issued at the end of the Audit process; and
- document in the Site Audit Report all Interim Advice that was given.

Section 3.1 of the Auditor Guidelines states that the site auditor must meet the following particular requirements regardless of whether the audit is statutory or non-statutory:

a. comply with applicable provisions of the CLM Act, regulations, environmental planning instruments, and any guidelines made or approved by the EPA under the CLM Act
b. not have a conflict of interest in relation to the audit as defined by the CLM Act
c. where these guidelines allow an auditor to adopt or endorse an approach that differs from policies made or approved by the EPA, exercise independent professional judgement in doing so and provide in the site audit report adequate and explicit justification for taking this course
d. finalise the site audit report before signing the site audit statement

e. provide in the site audit report a clear, logical discussion of issues covered in the site audit and clearly substantiate the rationale for the auditor's conclusions Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.
f. discuss in the site audit report all issues pertinent to the actual or potential contamination of the site and all issues required by these guidelines to be raised during a site audit
g. state clearly why any human health and environmental issues that would normally be of concern are not of concern in the case of this audit
h. make every reasonable effort to identify and review all relevant data, reports and other information held by the person who commissioned the site audit, or which is readily available from other sources, that provides evidence about conditions at the site which is relevant to the audit
i. obtain advice from the appropriate expert support team members on issues that are outside the auditor's professional education, training or experience, and document in the site audit report where and from whom advice has been obtained
j. exercise independent and professional judgement in deciding whether or not they have sufficient information to make a decision about the suitability of a site or a plan or to draw any other conclusion in relation to actual or potential contamination of a site in the course of a site audit, with justification for conclusions to be given in the site audit report
k. make reasonable endeavours to find out whether any other audits have been commissioned in relation to the site and, if so, whether any of them were prematurely ceased and why
l. state in the audit report the scope and findings of any previous audits
m. in cases where the audit involves a review of site assessment, remediation or management work, visit the site to observe and verify, as far as is practicable, the completion of this work.

2. CONCLUSIONS

The Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition, 2017) indicate that

- *Section 4.2.8: The site auditor must take all reasonable steps to advise the site owner or occupier of any potential risk of off-site migration of contamination and draw their attention to the circumstances where they may have obligations under the CLM Act. The auditor should advise the site owner or occupier in writing of any obligations they may have under the CLM Act as soon as practicable after the auditor becomes aware of these.*
- *Section 4.3.7: Where an auditor is not satisfied the waste has met the definition of VENM, and the waste has been applied to land on the audit site, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste...*
- *Section 4.3.12: If the auditor concludes hazardous ground gases may be having an impact on human health or the environment on site, or, due to its presence off site, either due to the migration of hazardous ground gases or the movement of soil or groundwater contamination, this should be specifically discussed in the site audit report and noted on the site audit statement.*

Upon review of the most recent data collected by Martens (August 2021), the Auditor advises that the site owner, Muscat Developments Pty Ltd in conjunction with the consultant completing assessment works at the site, Martens & Associates Pty Ltd should notify the site under Section 60 of the Contaminated Land Management Act, 1997 due to the presence of asbestos, including AF/FA exceeding the human health screening level of 0.001% w/w in one sample location; and the presence of elevated concentrations of

methane and carbon dioxide ground gas exceeding the acceptance criteria. It is noted that although there are elevated concentrations of heavy metals, nutrients, total coliforms and/or dissolved carbon dioxide in downgradient wells, we currently have insufficient evidence to warrant notification. This will be reconsidered once an additional groundwater monitoring well has been installed on the downgradient boundary during remedial works to determine if unacceptable concentrations of contaminants are migrating offsite.

It is also noted that the Auditor has an obligation to notify the site under the Protection of the Environment Operations (POEO) Act (1997) due to the importation of fill which is not consistent with VENM classification.

Currently we are in the process of reviewing site assessments and a Remedial Action Plan (RAP) from the consultant with the objective of completing a Section B Site Audit Statement that the site may be made suitable if the RAP is followed.

Yours Sincerely

Rod Harwood

NSW EPA Accredited Contaminated Sites Auditor (Accreditation No. 03-04.)

0438 200 055

APPENDIX C

SITE PHOTOGRAPHS

Taken by HEC 1.09.2021
Looking south west, showing the southern dam area in the foreground.

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 1: Southern Dam Area

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021
Looking south across the southern site boundary. Ground gas and monitoring wells are evident in the background.

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 2: Southern Portion of the Site

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 3: Ground Gas Well Installed by Martens

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021
Looking north across the site from the southern poultry shed, approximately 50m from the southern site boundary.

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 4: Looking North across the Site

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 5: Southern Poultry Shed

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 6: Stockpile of Crushed Sandstone

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021
Monitoring Well MW01 – looking south towards the northernmost poultry shed.

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 7: Monitoring Well MW01

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

Taken by HEC 1.09.2021
Fill above the southern Poultry Shed along the east to west roadway.

HARWOOD ENVIRONMENTAL CONSULTANTS

Photograph 8: Fill above the Southern Poultry Shed

21044 – Site Audit Report
285 Finns Road, Menangle, NSW.

APPENDIX D

POEO NOTIFICATION LETTER

Harwood Environmental Consultants
Gunners Barracks
Suite F, 38 Suakin Drive
George Heights, Mosman 2088

rod@harwoodenviro.com.au

6 September 2021

Director of Waste Compliance & NSW EPA
waste.operations@epa.nsw.gov.au
nswauditors@epa.nsw.gov.au
NSW EPA

Mr James Muscat
Muscat Developments Pty Ltd
by email

RE: DUTY TO REPORT CONTAMINATION NOTIFICATION UNDER SECTION 148 OF THE POEO ACT, 1997 – 285 FINNS ROAD, MENANGLE NSW, 2568.

To the Director of Waste Compliance, NSW EPA & James,

Rod Harwood, NSW EPA accredited Site Auditor (accreditation number 03-04) is undertaking a non-statutory site audit at the site located at 285 Finns Road, Menangle NSW 2568. The site is known as part lot 1 in DP718840. It is understood the subject areas of the site are proposed to be used for depots, and this will involve the construction of an office building; two new sheds; cut and fill in various locations; filling of two dams; and construction of hardstand and other site infrastructure (DA 2019/688/1). The subject of this Audit excludes the residential dwelling and surrounds in the north-eastern corner of the larger site, on which, no development is proposed under the application. The investigation area covers an investigation area of 4.032 ha. The proposed development is currently the subject of a Class 1 appeal and in the NSW Land and Environment Court – LEC proceedings number 2020/00178157. The Auditor considers a breach of the Protection of the Environment Operations (POEO) Act has occurred due to importation of fill material to the subject site. Section 150 of the amended POEO Act indicates that the below information about a pollution incident must be included in a notification:

"(a) the time, date nature, duration, and location of the incident

(b) the location of the place where pollution is occurring or is likely to occur

(c) the nature, estimated quantity or volume and concentrations of any pollutants involved, if known

(d) the circumstances in which the incident occurred (including cause of the incident, if known)

(e) the action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution, if known

(f) other information prescribed by the regulations."

I trust that the information below includes the required information to the best of my knowledge.

1.1. Background

A Preliminary Site Investigation (PSI) was completed by Martens (2020 Ref: P1806774JR07V01) to inform the assessment of development application by Council. It is understood there were four dams on the larger

site, with three of these falling within the Audit scope. At the time the PSI was completed, minor filling works had commenced in the vicinity of the two dams to be filled under the application. This fill material (3480-4380 tonnes) was deemed VENM and ENM by supporting waste classification documentation and review by Martens. In addition, a 400-tonne stockpile of "recovered aggregate" asphalt had been imported to the site under the NSW EPA waste exemption "Recovered Aggregate Order, 2014". It is understood that on October 19, 2020 Martens prepared correspondence to address several of Council's concerns regarding the proposed development which includes site contamination. Based on the findings of the PSI, Martens proposed the following items be included as conditions of consent for the development:

> *Prior to issue of a Construction Certificate, an Asbestos Management Plan ("AMP") shall be prepared to:*
>
> *1. Identify and manage asbestos in structures and any fragments resulting from building deterioration or stockpiling of asbestos containing building materials.*
>
> *2. Prepare and maintain an asbestos register of all asbestos containing materials to be retained on the site (i.e. building products etc in existing structures).*
>
> *3. Undertake asbestos removal works of all asbestos not associated with structures. Removal works shall include any stockpiled asbestos building products, picking of PACM fragments surrounding sheds and removal of any identified asbestos impacted soil/fill material on the site. The AMP is to include all asbestos related controls required for asbestos removal works. Prior to issue of a Construction Certificate, an Unexpected Finds Protocol ("UFP") shall be prepared for the proposed site earthworks. UFP shall provide guidance for the management of any encountered PACM in soil material, oil stains or other signs of contamination should they be exposed during the proposed site earthworks.*

In addition to the above conditions, Martens recommended that the following condition be imposed in relation to the importation of any fill material required for the development:

> *Fill material to be brought onto site for the development to be only fill characterised as VENM, ENM or otherwise waste exempt material under the NSW Waste Regulation (2014). Copies of certifications or validation reports for all fill used shall be retained and presented to Council on request".*

Following submission of both the PSI and letter, it is understood that Martens received a written response from Council's contaminated lands officer via advice from Bradley Allen Love Lawyers (email dated 5 November 2020) acting on behalf of Council. The response stated that:

> *Further to our letter dated 30 October 2020 and the s.34 conference for this matter, we have now obtained advice from the Council's contaminated lands officer.*
>
> *We advise that the imposition of the consent conditions proposed at items 4 & 5 of Mr Shahrokhian's letter to you dated 19 October 2020 will satisfactorily address the Council's outstanding contamination concerns.*

Martens note that the above is confirmation that, as of November 5, 2020, the consent authority (Council) was satisfied that the land was suitable for the proposed purpose for which the development is proposed to be carried out. Martens note that the SEPP 55 clause 7 had been satisfied.

Subsequent to Council issuing their advice, further fill material was imported to the site. Due to this imported material, Council advised that their contamination concerns were no longer satisfied. This advice was taken as a requirement under clause 7(3) to carry out and report on a Detailed Site Investigation (DSI) of this newly imported fill. It is understood that an estimated 35,000m^3 of fill material was imported to the site following completion of the PSI. It is understood that Council advised on 3 March 2021 that due to the imported material, their contamination concerns were no longer satisfied.

A Detailed Site Investigation (DSI) was conducted to investigate the newly imported fill and assess the significance of potential site contamination. It is understood that fill was imported to the southern and western portions of the site and the filled area covers an area of approximately 1.6 hectares. Martens

completed a DSI (2021) and supplementary DSI (2021), followed by additional site works once the Auditor was engaged and recommended further works were required. All investigation works were summarised in a Further Detailed Site Investigation report prepared by Martens (3 September, 2021 Ref: Ref: P1806774JR18V01). The FDSI concluded that the site was contaminated by both asbestos containing material (ACM) within fill material and hazardous ground gases as a result of historical burial of waste material most likely due to the use of the site for poultry farming.

Review of historical aerial photography of the site identified former burial trenches in the southern portion of the site. The trenches are understood to have been filled between 2010 and 2017 during the site's operation as a poultry farm. Martens indicate that the burial trenches cover an approximate 1000m^2 of the site. The trenches are understood to have been excavated to depths between 0.5 and 1.0m deep, with approximately 2.0-2.5m of imported fill material overlying the trenches. The Auditor recommended further soil, groundwater and ground gas investigations occur and further test pitting identified putrescible material (including eggshells and bones) in former burial trench locations; and minor elevated PAHs, TRH and formaldehyde in the former burial trenches.

Elevated concentrations of heavy metals, dissolved methane and carbon dioxide, nutrients, total coliforms, E.coli, TRH, benzene, toluene, formaldehyde and/or PFAS have been detected in groundwater above the laboratory limit of reporting and/or above the adopted criteria. It is however noted that TRH, benzene, formaldehyde and toluene have been detected primarily in the perched groundwater system in the burial trench area and remain below human health and ecological screening levels. Elevated heavy metals, free carbon dioxide, nutrients and total coliforms have been detected in downgradient wells.

Ground gas screening indicated the presence of elevated levels of methane and carbon dioxide, in addition to depleted oxygen levels in monitoring wells adjacent to former burial trenches. Additional ground gas wells installed further north identified elevated, however, low concentrations of ground gas. Downgradient wells did not record gas above the adopted criteria. Martens calculated a maximum characteristic situation of 2 at the site, however, this was reclassified as CS3 due to elevated concentrations of methane >20% v/v. The maximum flow rate detected at the site was 0.5 L/hr, with the maximum concentration of methane detected at 62.1% v/v screened within the burial trench, and carbon dioxide detected at a maximum concentration of 24.2% v/v within the burial trench area.

1.2. Reason for Notification

Consistent with requirements of Section 4.3.7 of the NSW EPA Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd Edition), the Auditor considers notification to the EPA is required for the site located at 385 Finns Road, Menangle NSW, 2568. The guidelines indicate *"Where an auditor is not satisfied the waste* (coming onto the site) *has met the definition of VENM, and the waste has been applied to land on the audit site, the auditor must note this in the site audit report and notify the EPA in accordance with the EPA notification policy for waste".* The guidelines indicate that *"site auditors must notify the person who engaged them to undertake the site audit, and the EPA, as soon as practicable".*

The Protection of the Environment Operations Act 1997 defines VENM as:

"Natural material (such as clay, gravel, sand, soil or rock fines):

(a) That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities and

(b) That does not contain any sulfidic ores or soils or any other waste.

and includes excavated natural material that meets such criteria for virgin excavated natural material as may be approved for the time being pursuant to an EPA Gazettal notice"

The Auditor considers that the waste received at the audit site from an offsite source does not meet the definition of VENM, or the conditions of an order, and this material has been applied to the land.

Environmental investigations have occurred at the site between March and August 2021. Investigations identified bonded asbestos impacted fill material requiring remediation across the areas of the site where fill has been imported. Martens estimate an approximate 16,500m^2 of the site has fill material likely to be impacted with ACM. Martens have indicated of the order of 35,000m^3 of material has been imported to the site. The weight of bonded ACM was not measured and the NEPM standard of gravimetric sieving was not completed in subsequent investigations once Martens were confident that all imported fill would be deemed asbestos impacted and required remediation. As per Section 11.3 of the NEPM, additional gravimetric analysis of soils within areas outside of proposed areas of disturbance (i.e. areas of cut) is not required if a suitably conservative remedial strategy is proposed (such as cap and contain). The Auditor requested that in areas where cut and fill was proposed, asbestos fines/friable asbestos (AF/FA) be sampled for as the presence of fines or friable asbestos may pose a work health safety risk to remedial contractors. Of 110 samples tested for AF/FA, a total of two had positive detections, with one sample above the adopted criteria of 0.001%w/w. Contaminant concentrations in fill material at the site were generally below the adopted criteria, with the exception of ecological exceedances of B(a)P and zinc identified in fill material at three locations within the investigation area, with B(a)P within the recently imported fill, and nutrients, E.coli and total coliforms within soil in the vicinity of the burial trenches.

Martens indicate that analysis of the material presently stockpiled in areas of the site where filling is not proposed; and material placed at levels in excess of the required pre capping surface, concludes that of the order of 19,000m^3 of fill material will be required to be excavated and relocated on site. The estimated volume of material required to be placed in areas of the site where current levels are below the pre capping surface levels indicates of the order of 8500m^3 of material will require placement to achieve the pre capping surface.

Comparison of the fill volume to the volume to be placed concludes that of the order of 10,500m^3 of fill material will be in excess of site earthworks requirements. As advised by geotechnical and civil engineers, the placement of fill material will be likely required at higher densities than what has been currently placed. This would likely result in a reduction of the volume of excess spoil. An increase in density of 10% would reduce the volume of fill material to be disposed offsite to approximately 9,500m^3.

1.3. Potential Risk Posed to Human or Ecological Receptors

Section 4.3.7 of the NSW EPA (2017) guidelines indicate that *"The written notification to the person who engaged the auditor to undertake the site audit and the EPA should be appended to the site audit report and also noted or summarised in the site audit statement. Where a site has been notified under the EPA notification policy for waste but the circumstance does not or is unlikely to make the site unsuitable for use because it does not pose an unacceptable risk to users of the site, an auditor may issue a site audit statement certifying the land is suitable for a specific use despite the notification."*

The Auditor notes that review of the RAP prepared by Martens is currently underway, with the aim of a Section B Site Audit Statement (SAS) and Site Audit Report (SAR) to be prepared for the site.

Section 147 of the POEO Act, 1997 indicates the meaning of material harm to the environment where notification is warranted includes:

147 Meaning of material harm to the environment

(1) For the purposes of this Part—

(a) harm to the environment is material if—

(i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or

(ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and

(b) loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.

(2) For the purposes of this Part, it does not matter that harm to the environment is caused only in the premises where the pollution incident occurs.

Notification is required to the NSW EPA under Section 148 of the POEO Act (1997), as importation of fill material that is not consistent with VENM is a breach of Section 147 of the POEO Act (1997). However, the Auditor considers there is low risk posed to human or ecological receptors due to the following reasons:

1. In addition to multiple meetings with the consultant, the Auditor has reviewed and provided letters of interim advice during the environmental investigation process to ensure the investigation areas of the site are characterised appropriately and a Remedial Action Plan is proposed to ensure the risk posed by imported fill migrating to neighbouring receptors is minimal. However, it is noted that a separate issue of potential ground gas migrating offsite is posed due to burial trenches. Currently it is unknown if ground gas is migrating offsite to the south, however, due to the proximity of the burial trenches to the southern site boundary, it is possible that offsite migration of gases has already occurred. The Auditor has requested this issue be addressed by notification under the CLM Act (1997).
2. A Remedial Action Plan has been prepared by Martens & Associates Pty Ltd (ref: Remediation Action Plan: Proposed Depots, 285 Finns Road, Menangle NSW (Ref: P1806774JR14V04, dated 3 September 2021), which has been approval by the Auditor in addition to extra minor conditions to be outlined by the Auditor in the SAR and SAS for the RAP.

   A summary of the RAP is as follows:

   – The remedial areas include ACM impacted fill and waste burial trenches containing agricultural waste and generating unacceptable concentrations of methane and carbon dioxide. The proposed remedial strategy involves cap and containment of ACM impacted fill material. Some ACM impacted fill has been placed onsite in areas outside of the proposed filling as described in the development plans, or at levels in excess of those required to achieve a cap and the proposed design levels. Therefore, excavation and replacement of some previously imported fill material shall be required. A number of capping options will be required for the filled area and this will be dependent on the proposed development conditions, including structural concrete ground slabs for sheds; hardstand or flexible pavement; and landscaped layers.
   – For burial trenches, the proposed management/remedial option will be onsite management. The proposed development in the remediation area will primarily consist of open hardstand for vehicle parking and circulation. Proposed remedial works will be put in place to provide controlled venting of any generated ground gas and to prevent migration of ground gas to sheds, service conduits or offsite to the south. This will involve construction of ground gas cut off trenches along the southern boundary of the proposed hardstand to allow for the interception of any gas that may be directed offsite to the south; a ground gas collection system to be constructed within the retaining wall backfill along the southern side of Road 2 to the south of the existing shed 4 to allow for interception of any gas that may be directed north; and a ground gas barrier/venting system along the stormwater drainage lines running south and east from proposed Shed B to prevent the accumulation of gas in these services. In addition, a passive under slab ground gas collection and venting system will be constructed beneath the proposed shed slab along with a reinforced concrete ground bearing floor slab to provide 2 protection points. The capped ACM and ground gas infrastructure will be managed under an EMP. The proposed office to be constructed in the southern portion of the site will be built on piers and therefore a “wind tunnel” effect will mitigate the vertical migration of ground gas in this building. The Auditor has included the above in this letter as a

conservative measure and notes that there is very minimal to negative flow at the site and therefore, migration in the site's current state may not be an issue. However, measures are required to be put in place if hardstand is placed on top of the burial trenches which may result in decreased ability for gases to vent vertically, and result in lateral migration of gases via a subsurface pathway.

- The Auditor has requested that additional ground gas monitoring rounds, pilot trials, potential leachate control trials and dewatering measures be put in place for the proposed ground gas collection and venting systems occur prior to remediation to confirm that the proposed protection will be sufficient for the "worst case scenario". In addition, to ensure that unacceptable nutrient, carbon dioxide and total coliform concentrations are not migrating offsite in groundwater, the Auditor has recommended as part of remedial works that an additional groundwater monitoring well be installed on the downgradient boundary and slug tests be performed to determine permeability variations at the site. It is expected that offsite migration of groundwater is unlikely to be an issue due to the underlying geology of the site. The site overlies Bringelly Shale which is generally low in permeability and therefore if a minimal amount of contaminant or nutrient enters the fractured shale, the concentration of contaminants will increase, however, in terms of kilograms of contaminant, it is likely to be a very small mass. Where there is very minimal water in storage, a very small amount of mass of a contaminant or nutrients would change the chemistry of the groundwater.
- In addition, due to detections of PFAS detected in groundwater within the burial trench area, and a detection of PFAS in a downgradient well during two sampling rounds, the Auditor has requested as part of remedial works that PFAS be analysed for in soil in the former poultry sheds to ensure there is no source in the soil.

3. The site, including the capped ACM remediation areas and ground gas venting/collection infrastructure, and any future requirements for ground gas monitoring at the site will be subject to a legally enforceable Environmental Management Plan (EMP) which will be retained by the site owners and appended to the site's Section 10.7 Planning Certificate.

- The Auditor notes that in accordance with the Managing Asbestos in or on soil (WorkCover 2014) guidelines, for asbestos, a 0.5m cap should be provided and the material must be geotechnically suitable so that it is resistant to erosion over time. For structural concrete ground slabs under sheds, 0.5m is not required, as long as the concrete hardstand has an MPa rating suitable for the proposed use. For hardstand (rigid concrete or flexible sealed or unsealed pavement areas), a marker layer over ACM impacted fill followed by pavement layers is required. For rigid pavement, the thickness is to be determined by a structural engineer and for flexible pavement, a minimum of 300mm thickness of pavement materials is required. For landscaping layers, a minimum of a marker layer over ACM impacted fill followed by 500mm of clean material for the establishment of clean vegetation. The Auditor has recommended that shallow rooted vegetation be planted in these areas only and it is understood that the EMP will indicate assessment measures to ensure the capping is in place and contingency measures if the cap is found to be compromised.

4. Due to the nature of the main contaminant of concern in imported fill at the site being asbestos, there is negligible risk of offsite migration. In addition, the Auditor considers that due to the nature of asbestos, there is no risk of the contaminant leaching into the water table. It is unknown if receptors were exposed to asbestos in soil during importation processes, however, the Auditor considers that if the site is remediated in accordance with the RAP (Martens, 2021) and the EMP is implemented, there will be no pathway for receptors to access contaminated soil in the future.

5. An Asbestos Management Plan is proposed to be prepared and implemented to manage exposure risks and movement of asbestos impacted soils. Implementation of an AMP and use of a Class A licensed asbestos assessor for all friable asbestos works is considered satisfactory to mitigate risks of potential exposure to asbestos.

6. The Auditor has requested that any VENM or ENM imported during remedial and/or construction works be sampled at the source at a rate of one sample per 100m^3. The Auditor has then requested to review the data to determine if the sampling density is appropriate.

CONCLUSIONS

The Auditor has advised in Interim Advice Letter 04 (sent to the client on 2 September 2021) that the site owner, Muscat Developments Pty Ltd in conjunction with the consultant completing assessment works at the site, Martens & Associates Pty Ltd should notify the site under Section 60 of the Contaminated Land Management Act, 1997 due to the presence of AF/FA exceeding the human health screening level of 0.001% w/w in one sample location; and the presence of elevated concentrations of methane and carbon dioxide ground gas exceeding the acceptance criteria. The Auditor notes there is currently insufficient evidence that groundwater is migrating offsite at unacceptable concentrations, and that this will be reassessed after an additional groundwater well has been installed on the downgradient site boundary.

The Auditor concludes that although the site requires notification under the POEO Act, the future risk of exposure to receptors is considered low if the RAP (Martens, 2021) and an EMP is implemented to remediate and manage the site.

Yours Sincerely,

Rod Harwood

NSW EPA Accredited Contaminated Sites Auditor (Accreditation No. 03-04.)

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