Mandatory Auditor's Report

Tamala Park Waste Management Facility,
1700 Marmion Avenue, Tamala Park, WA

Prepared for:

Mindarie Regional Council

Prepared by:

Australian Environmental Auditors Pty Ltd

Date of Report:

9 April 2025

Project Number:

EA1191

AUSTRALIAN
ENVIRONMENTAL AUDITORS

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Tamala Park, WA 6030

Prepared by:

Australian Environmental Auditors Pty Ltd
335 Carrington Street
Adelaide, SA 5000
T: 08 8223 3488

Date of Report:

9 April 2025

***Author*:**

Ms Larissa Willoughby
WA DWER Accredited Auditor No. MR0088

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List of Abbreviations

Note: Chemical nomenclature follows rules defined by the International Union of Pure and Applied Chemistry (IUPAC) unless otherwise stated.

Abbreviation	Description
ADWG	Australian Drinking Water Guidelines
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Water Quality Guidelines
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASC NEPM	National Environmental Protection (Assessment of site Contamination) Measure
BOD	Biochemical Oxygen Demand
BM	Boundary Monitoring
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
CoPC	Contaminants of Potential Concern
C-RR	Contaminated – Remediation Required
C-RU	Contaminated – Restricted Use
CS Act	*Contaminated Sites Act 2003*
CSM	Conceptual Site Model
DGV	Default Guideline Values
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EEM	Eastern Edge Monitoring
EMP	Environment Management Plan
EPN	Environment Protection Notice
MRC	Mindarie Regional Council
FWG	Freshwater Water Guidelines
GME	Groundwater Monitoring Event
HDPE	High-density Polyethylene
HEPA	Heads of EPA
IAA	Interim Audit Advice
LDPE	Low-density Polyethylene
LFG	Landfill Gas
LOR	Limit of Reporting
LW	Leachate Recovery Well
mAHD	metres Australian Height Datum
mbgl	metres below ground level
mBTOC	metres Below Top Of the bore Casing
MAR	Mandatory Auditor's Report
MNA	Monitored Natural Attenuation
MS	Ministerial Statements
NATA	National Association of Testing Authorities
NEM	Northern Edge Monitoring
NEMP	National Environmental Management Plan
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
NLE	Northern Landfill Edge
NPUG	Non potable Use Guidelines
OSM	Outside Monitoring (Northern Buffer Zone)
PFAS	Per- and Polyfluorinated Alkyl Substances
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
SEM	Southern Edge Monitoring
SMP	Site Management Plan

Abbreviation	Description
SLE	Southern Landfill Edge
S-P-R	Source-Pathway-Receptor
SWGWEMP	Surface Water and Groundwater Environmental Management Plan
SWL	Standing Water Level
TDS	Total Dissolved Solids
TN	Total Nitrogen
TP	Total Phosphorus
TPH	Total Petroleum Hydrocarbons
TPWMF	Tamala Park Waste Management Facility
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
WAM	Waugal Monitoring
WEM	Western Edge Monitoring
WMP	Water Monitoring Procedure
WS	Workshop Pins

Citation of Western Australian Departments in Text

The following abbreviations have been used for citation of Western Australian government departments in this report.

In-text Citation	Department name
DEC	Western Australia Department of Environment and Conservation (formerly DoE)
DEP	Western Australia Department of Environmental Protection
DER	Western Australia Department of Environment Regulation (formerly DEC)
DMIRS	Western Australia Department of Mines, Industry Regulation and Safety (formerly DMP)
DMP	Western Australia Department of Mines and Petroleum
DoE	Western Australia Department of Environment (formerly DEP)
DoH	Western Australia Department of Health
DoW	Western Australia Department of Water (now incorporated within DWER)
DWER	Western Australia Department of Water and Environmental Regulation (formerly DER)
WAPC	Western Australian Planning Commission

Executive Statement

Mindarie Regional Council (MRC) operates the Tamala Park Waste Management Facility (Tamala Park) (the Site) located at 1700 Marmion Avenue, Tamala Park, which provides waste disposal services for the Local Government members of MRC. The Site is owned by a group of seven councils (Town of Cambridge, City of Perth, City of Wanneroo, City of Joondalup, City of Stirling, City of Vincent, Town of Victoria Park).

The Site has operated as a licensed landfill since 1991. The Site was initially classified as "possibly contaminated – investigation required" (PC-IR) by the Department of Environment and Conservation (DEC) in July 2007. The reasons for classification were last updated in October 2023 (Senversa, 2023).

On 28 November 2024, EPN 202405 was issued to MRC by DWER, stating that there is, or is likely to be, an emission or multiple emissions from the premises that have caused or are likely to cause pollution.

DWER identified odour and leachate emissions from the premises as key environmental concerns. Odour emissions were primarily attributed to landfill leachate stored in ponds, leachate seepage from the face of landfill cells, and landfill gas generation. Additionally, MRC reported significantly elevated leachate levels within the landfill, which may be increasing seepage through the landfill liner and impacting groundwater quality. As a result, an EPN was issued to require the occupier of the Site to implement measures to prevent, control, and mitigate pollution, assess the extent of environmental harm and its consequences, and report on actions taken to comply with these requirements.

In December 2024, MRC engaged Ms Larissa Willoughby (AEA) in her capacity as a DWER accredited auditor (as the contract with the previous auditor had concluded) to review relevant reports and address, in particular, EPN Item 10 (hereafter referred to as EPN-10) and prepare a MAR to include a groundwater risk assessment to assess the risk to groundwater from elevated leachate heads within the Site and include recommended actions to mitigate any assessed risk to groundwater and a proposed timeline for implementing the recommendations.

This MAR has been prepared in accordance with the CS Act 2003 and relevant DWER guidance.

The following presents the Auditor's conclusions following auditing of the contaminated site works undertaken by MRCs appointed consultants (SLR and Talis):

- The Auditor is satisfied that the current reviewed reporting is complete, reliable and compliant with the requirements of the DWER Contaminated Sites Guidelines and other relevant published technical guidance.
- The scope of works and methodology undertaken are considered adequate to determine groundwater and landfill gas quality at the Site.

Conclusions

Based on the review, the following conclusions have been made:

- Groundwater beneath the Site contains concentrations of ammonia, chloride, iron, and arsenic that exceed drinking water and NPUG criteria. Additionally, concentrations of nickel, FHxS, and the sum of PFHxS and PFOS also exceeded drinking water criteria. Benzene concentrations at one on-site location also exceeds drinking water criteria. Furthermore, concentrations of nickel, cobalt, zinc, ammonia, and PFOs were reported above marine water criteria.
- Groundwater beneath the affected site contains concentrations of ammonia, chloride, iron, arsenic, sum of PFHxS and PFOS that exceed drinking water. Concentrations of chloride and ammonia exceed the NPUG criteria. Furthermore, concentrations of nickel, cobalt, zinc, ammonia, and PFOs were reported above marine water criteria.

- The metals present in groundwater on-site and downgradient are regionally common and align with upgradient/background conditions. They are typically associated with acid sulphate soils and are prevalent in the local geology. The impact on groundwater use is mainly aesthetic, causing staining and clogging of pipework, rather than posing health risks. The Auditor considers they are a low risk to human health or the environment.
- The Site is capable of generating a significant quantity of landfill gas, including methane, carbon dioxide, hydrogen sulfide, and carbon monoxide. Methane levels in boreholes outside the waste mass exceed 1% v/v, reaching nearly 62% v/v along the northern wall of the landfill cell. The extraction system appears to be effectively mitigating methane, with minimal detections outside of the extraction well network.
- Fugitive emissions with methane concentrations above 200 ppm were reported in the western final capping area, while four locations with intermediate cover recorded concentrations above 500 ppm.
- No methane has been detected in monitoring wells outside the site boundary during the 2024 events.
- The assessment of trace gases in individual wells especially those outside of the waste mass is not considered best practice aligned with recommended guidance.

Recommendations

The auditor generally concurs with recommendations provided in the respective sections of the Groundwater Monitoring Report (SLR, 2025c), Landfill Gas Assessment (SLR, 2025d) and Leachate Management Plan (Talis, 2025). A summary of all these recommendations and auditor opinion are provided in Section 12.2 of this MAR.

With reference to the specific requirements of EPN-10, the auditor is required to include recommended actions to mitigate any assessed risk to groundwater and a proposed timeline for implementing the recommendations. The following table summarises the recommended actions and timeframes.

Item	Source	Recommended Action	Auditor Opinion
Timeframe: Immediate (2 weeks)			
1	SLR (2025d)	Measures to manage leachate levels outlined in the LMP (Talis, 2025) should be implemented as suggested.	✓ Agreed
2	SLR (2025d)	Due to the presence of groundwater exceedances to the nominated risk assessment criteria in Catalina Bore 5, the bore should not be used for extraction or dust suppression. However, it is understood that the bore is currently not in use, and potential mislabelling may have led to erroneous results.	✓ Agreed
Timeframe: Short Term (1 Year)			
3	SLR (2025d)	Delineation wells (shallow, intermediate, and deep) should be installed offsite to the west of the Premises along a transect between BB24 and TPL1, and to the south of BB35, to determine the extent of the leachate plume in those directions.	✓ Agreed
4	SLR (2025d)	As part of ongoing GMEs, it is recommended to include iron speciation and analysis of both total and dissolved manganese in leachate and groundwater. This will support the differentiation of potential source contributions and enhance evaluation of monitored natural attenuation (MNA) processes in groundwater.	✓ Agreed

Item	Source	Recommended Action	Auditor Opinion
Timeframe: Medium to Long Term (>1 Year)			
5	SLR (2025d)	Groundwater monitoring should continue under the SMP/SAQP to evaluate the stability of the leachate plume.	✓ Agreed
6	SLR (2025d)	Annual leachate risk assessments should be undertaken to confirm the risk status of using water from the onsite bore for dust suppression.	✓ Agreed
7	SLR (2025d)	If the Water Corporation bore becomes operational, additional groundwater monitoring will be necessary to assess whether the leachate plume from the site is impacting on groundwater resources.	✓ Agreed
8	SLR (2025d)	If required due to a change in the site's risk profile, additional groundwater monitoring wells should be installed to enable differentiation between leachate sources originating from Stage 1 and Stage 2. This should be informed by a groundwater monitoring network integrity assessment (i.e. review of well construction details, surveys, piezometric contours etc) to ensure that any monitoring wells are ideally located to help differentiate between the two leachate sources.	✓ Agreed

The following parcel-specific classification recommendations are based on information reviewed regarding the groundwater contamination plume and LFG impacts. Contamination relating to soil, soil vapour, surface water (such as onsite sumps and ponds etc.) and sediments have not been considered. Hence this is specific to groundwater and LFG contamination only.

The following table considers the whole of the prescribed premise, unless specifically noted.

Table A: Source Site – Parcel-Specific Reccomendations for Classification – Part of Lot 9020 on Plan 408820 (TPWF Prescribed Premise)

Current Nature and Extent of Contamination **Part of Lot 9020 on Plan 408820 (Volume 4007, Folio 807)**					
Groundwater	**Landfill Gas**	**Soil**	**Soil Vapour**	**Surface Water**	**Sediments**
Nutrients: ammonia **Major Anions:** Chloride **PFAS:** PFOS, PFHxS and Sum of PFOS and PFHxS **Metals:** arsenic, nickel, cobalt, iron and zinc **BTEXN:** Benzene **Refer to Table 16 and Table 17 and Section 7.4 for specific exceedances**	CH_4, H_2S, CO_2 and CO **Refer to Section 7.4.3 for specific exceedances**	NA	NA	NA	NA
Suitability for use					
The land use is restricted to ongoing commercial/industrial use and shall not be developed for any other purposes without further contamination assessment or remediation.					
Proposed Classification					
No change in classification. *'Contaminated-Remediation Required'*					

Restrictions on Use {for Contaminated-Remediation Required, Remediated for Restricted Use, Contaminated-Restricted Use}
The land use is restricted to the current commercial/industrial use and configuration and shall not be developed for any other purposes without further contamination assessment or remediation. *Groundwater should not be abstracted for drinking purposes without appropriate treatment and testing to confirm its suitability.*

Table B: Affected Site – Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903

Current Nature and Extent of Contamination **Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903**					
Groundwater	**Landfill Gas**	**Soil**	**Soil Vapour**	**Surface Water**	**Sediments**
Nutrients: ammonia **Metals**: arsenic, cobalt, iron and zinc **PFAS:** PFOS, and Sum of PFOS and PFHxS **Refer to Table 16 and Table 17 and Section 7.4 for specific exceedances**	CH_4, H_2S, CO_2 and CO **Refer to Section 7.4.3 for specific exceedances**	NA	NA	NA	NA
Suitability for use					
Site remains suitable for its *current zone as a development ''buffer zone''.*					
Proposed Classification					
No change in classification *Contaminated-Restricted use*					
Restrictions on Use {for Contaminated-Remediation Required, Remediated for Restricted Use, Contaminated-Restricted Use}					
The land use is restricted to current zone as a development ''buffer zone'' and shall not be developed for any other purposes without further contamination assessment or remediation. *Groundwater should not be abstracted for drinking purposes without appropriate treatment and testing to confirm its suitability.*					

1. Introduction

This Mandatory Auditor's Report (MAR) presents the findings of a mandatory Contaminated Sites Audit (the Audit) undertaken by WA Department of Water and Environmental Regulation (DWER) accredited Auditor Ms Larissa Willoughby (the Auditor) in relation to the Tamala Park Waste Management Facility, 1700 Marmion Avenue, Tamala Park, WA (the Site). The Site location and layout are shown in Figure 1 and Figure 2.

This audit was undertaken to provide an update on groundwater and landfill gas data collected from the Site during 2024. In particular, the audit addresses Requirement 10 of the Environmental Protection Notice (EPN) (Reference No: 202405), issued by the Department of Water and Environmental Regulation (DWER) on 28 November 2024 for the Tamala Park Waste Facility (TPWF). Requirement 10 of EPN (hereafter referred to as EPN-10) requires a groundwater risk assessment to assess the risk to groundwater from elevated leachate heads within the Site and include recommended actions to mitigate any assessed risk to groundwater and a proposed timeline for implementing the recommendations.

The Site has operated as a licenced Landfill since 1991. Stage 1 North and Stage 2 South were closed in 2002 and 2004, respectively. Stage 1 is unlined and does not have a leachate management system in place. The status and condition of any leachate generated from Stage 1 is unknown.

The assessment has focused exclusively on Stage 2 of the landfill, which is lined and has a leachate management system and Leachate Management Plan (LMP).

Site background and the initiation of the Audit are detailed in the following Sections.

The following table presents key MAR details.

Table 1: Site Audit Details

Audit Identifier	Detail
Auditor	Ms Larissa Willoughby Australian Environmental Auditors Pty Ltd 335 Carrington Street Adelaide, SA 5000 T: (+61) 8 8223 3488
DWER Auditor accreditation no.	MR0088 The Auditor declaration form is provided in Appendix A.
Person requesting audit	Ms Kathrine Goldsmith Mindarie Regional Council 1700 Marmion Avenue, Tamala Park, WA 6030 The commissioner declaration form is provided in Appendix A.
Requestor's relationship to Site	Ms Goldsmith is the Environmental Supervisor of the Mindarie Regional Council (MRC), which leases the site for the operation of the waste facility.
Property Owner	The Site is owned by seven councils (Town of Cambridge, City of Perth, City of Wanneroo, City of Joondalup, City of Stirling, City of Vincent and Town of Victoria Park).
Site Address	1700 Marmion Avenue, Tamala Park, WA 6030
Property identification	Part of Lot 9020 on Plan 408820 (Volume 4007, Folio 807) (Source Site) The Site also includes the *affected site* to the north (previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903). The certificates of title are provided in Appendix B.
Date audit commenced	19 December 2024
Date audit completed	9 April 2025

Audit Identifier	Detail
Reason for audit	To address the *Contaminated Sites Act 2003* (CS Act) Regulations 2006 r. 31(1)b. The Site is a 'source site' and to fulfill requirement 10 of the EPN 202405. The EPN is provided in Appendix B.
Support team	The following Australian Environmental Auditors Pty Ltd staff members were utilised on this project: • Stuart Thurlow, Principal Environmental Scientist (expert support in landfill gas and leachate assessment); • Phil Hitchcock, Site Contamination Auditor (internal peer review); and • Nina Alavi, Senior Environmental Engineer (technical audit support).

1.1 Background

Mindarie Regional Council (MRC) manages the Tamala Park Waste Management Facility (TPWMF) (the Site) located at 1700 Marmion Avenue, Tamala Park, and provides centralised waste disposal services for the Local Government members of MRC. MRC has operated the facility since February 1991 on behalf of a group of seven councils (Town of Cambridge, City of Perth, City of Wanneroo, City of Joondalup, City of Stirling, City of Vincent and Town of Victoria Park).

The TPWMF operates by the controlled disposal of municipal refuse into a series of landfill cells covering an approximate area of 37 hectares of which approximately 16.73 hectares have now been filled and capped. In addition, various recycling services are provided at the facility. The TPWMF is a licensed Class II and Class III landfill and a Category 64 Solid Waste Disposal Facility and operates under the DWER Licence L9395/2023/1 updated on 16 July 2024.

The Site was initially classified as "possibly contaminated – investigation required" (PC-IR) by the Department of Environment and Conservation (DEC) in July 2007. The reasons for this classification were updated by DEC in June 2013, based on information available prior to April 2013.

Historical information about the Site indicates that multiple groundwater investigations identified contamination from hydrocarbons (e.g., petrol, diesel, oil), metals (arsenic, chromium, cobalt, copper, nickel, zinc), and ammonia. These contaminants exceeded relevant environmental and drinking water criteria, including the Australian Drinking Water Guidelines and international groundwater intervention values. Monitoring between 2009 and 2012 confirmed that a leachate plume from the Site was migrating northwest, with contamination levels exceeding drinking water criteria at a boundary monitoring well.

Soil gas investigations have been ongoing at the Site since 1997, with remediation efforts implemented through landfill gas extraction wells installed between 2010 and 2013. These systems contained the landfill gas within the Site. In 2013, the DEC recommended continued perimeter landfill gas monitoring and further investigations to better define the extent of both groundwater and landfill gas contamination on and beyond the Site.

A MAR was completed in February 2020 (Senversa, 2020a), with an addendum issued in June 2020 (Senversa, 2020b). The report reviewed potential risks based on available data and current scientific understanding of groundwater and landfill gas risks. The Site was reclassified as ''Contaminated – Remediation Required'' (C-RR) in December 2021, based on the findings of all investigations conducted on-site and the MAR prepared by Vanessa Bryant of Senversa in November 2021 (Senversa, 2021). In October 2023, a MAR was submitted by Senversa, with Site classification remained unchanged (Senversa, 2023).

The current basic summary of records for the Site (dated 2 December 2021) indicates that '' A landfill leachate plume is present in groundwater migrating in a north-westerly direction. Landfill gas has been detected on site and is being intercepted to prevent off-site migration in a northerly direction.'' A series of actions, outlined in the basic summary of the report, were included in the previous MAR (Senversa, 2023). Additional

investigations were undertaken in line with the actions listed in the basic summary report, which were further summarised in the previous MAR (Senversa, 2023).

The Senversa (2023) MAR identified that concentrations of ammonia in groundwater exceed criteria for both drinking water and non-potable uses on-site. Additionally, concentrations of arsenic and nickel in groundwater (with nickel exceeding criteria only in the northern buffer area, N1) were found to exceed drinking water criteria, however, the reported concentrations remain below criteria for non-potable uses. No contaminants of concern were detected off-site, except for exceedances of marine ecological criteria, where the associated risk to the receptor was considered low. The audit also noted that while risks to human health, including explosion and asphyxiation, were possible both on-site and in nearby areas, these risks were considered low due to the operation of landfill gas extraction system. Maintaining the landfill gas system was considered crucial, and ongoing long-term assessment of risks posed by landfill gas and contaminants of potential concerns in groundwater was considered appropriate. The MAR (Senversa, 2023) recommended the ongoing assessment of landfill gas and groundwater as part of an ongoing Site Management Plan (SMP) to monitor long-term trends and determine the need or otherwise for mitigation measures.

The MAR (Senversa, 2023) was reviewed by DWER, and comments were provided in a letter dated 15 November 2023 (included in Appendix C). DWER agreed with the MAR's conclusion that the landfill remained suitable for ongoing use as a Class II landfill, provided the site management plan (SMP) was implemented. Further investigations were recommended to assess contamination levels and associated risks to human health and the environment, with ongoing monitoring of landfill gas and groundwater to track long-term trends and determine if mitigation measures are needed. DWER further advised that northern adjacent site was considered suitable as a buffer zone but not for residential development. DWER also agreed that the classification of the landfill was likely to remain 'Contaminated – Remediation Required' (C-RR) under the CS Act. The classification of the buffer zone was likely to remain 'Contaminated – Restricted Use' (C-RU) under the CS Act.

1.2 Audit Background

On 3 February 2024, the former Auditor (Ms Vanessa Bryant, Senversa) provided an email to DWER after reviewing the groundwater and landfill gas monitoring reports for Tamala Park. She noted that the reasons for classification had not been updated following the 2023 MAR. The auditor recommended that MRC continue to provide updated information as it becomes available, with at least six-monthly updates following sampling, annual reporting, and immediate notification of any significant changes. However, since there had been no change in the Site's risk profile or any indication that restrictions should be revised, the next MAR was recommended for submission in 2025 after two years of monitoring.

On 28 November 2024, EPN 202405 was issued to MRC by DWER, stating that there is, or is likely to be, an emission or multiple emissions from the premises that have caused or are likely to cause pollution.

DWER identified odour and leachate emissions from the premises as key environmental concerns. Odour emissions were primarily attributed to landfill leachate stored in ponds, leachate seepage from the face of landfill cells, and landfill gas generation. Additionally, MRC reported significantly elevated leachate levels within the landfill, which may be increasing seepage through the landfill liner and impacting groundwater quality. As a result, the EPN was issued to require the occupier of the Site to implement measures to prevent, control, and mitigate pollution, assess the extent of environmental harm and its consequences, and report on actions taken to comply with these requirements.

In December 2024, MRC engaged Ms Larissa Willoughby (AEA) in her capacity as a DWER accredited auditor (as the contract with the previous auditor had concluded). As noted previously, only Stage 2 of the landfill is lined with a leachate management system and LMP in place. Stage 1 (North and South) is unlined and does not have a leachate system in place. The status and condition of any leachate generated from Stage 1 is unknown.

1.3 Regulatory Background and Key Documents

The Site is subject to the following regulatory requirements relevant to this Audit:

- Environment Protection Notice (EPN) (202405) Groundwater emission requirement 10 (EPN-10) (dated 28 November 2024);
- Action required for Tamala Park Landfill and Buffer Zone under the letter issued by Department of Health (DOH) (dated 6 November 2023);
- DWER issued Licence L9395/2023/1; and
- Obligations and actions required under the CS Act – DWER notification of Classification (dated 7 December 2021).

Copies of these documents are provided in Appendix B and Appendix C.

The following documents have been prepared to address the requirements of the above regulatory requirements:

- Energy Developments Pty Ltd (2023) Tamala Park Landfill Gas Management Plan, Rev 0, dated 27 February 2023;
- Energy Developments Pty Ltd (2024) Tamala Park LFG Infrastructure Report Overview, Rev 0, dated 12 December 2024;
- SLR Consulting Australia (2025a) Response to Environmental Protection Notice Item 3 – Tamala Park Waste Facility, dated 13 January 2025;
- SLR Consulting Australia (2025b) EPN-5 Landfill Gas System Review, Tamala Park Waste Management Facility, Revision 0.1, dated 12 February 2025;
- SLR Consulting Australia (2025d) EPN-10: Groundwater Risk Assessment, Tamala Park Waste Facility, Revision 4, dated 4 April 2025; and
- Talis Consultants (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, Version 4, dated 28 February 2025.

1.4 Previous Audits

TPWF has been subject to four audit reports which have previously been submitted to DWER.

- Senversa (2020a) Mandatory Auditor's Report, Tamala Park, 1700 Marmion Ave, Tamala Park, Western Australia, 28 February 2020 (2020 MAR);
- Senversa (2020b) June 2020 Addendum to MAR Tamala Park, 1700 Marmion Ave, Tamala Park, Western Australia, 26 June 2020 (June 2020 Addendum);
- Senversa (2021) Mandatory Auditor's Report, Tamala Park Landfill, 1700 Marmion Ave, Tamala Park, Western Australia, 9 November 2021 (2021 MAR); and
- Senversa (2023) Mandatory Auditor's Report, Tamala Park Landfill, 1700K Marmion Ave, Tamala Park, 19 October 2023 (2023 MAR).

1.5 Audit Objectives

The objectives of a contaminated site audit are to:

- determine if the contaminated site works undertaken by the environmental consultants are complete, accurate, defensible and in accordance with WA legislation, relevant guidelines and policies;
- determine the suitability of the source site and affected sites for the current/proposed use; and

- understand the sites conditions and consider if there is sufficient data to recommend reclassification(s).

In addition, this MAR has been prepared to specifically address the requirements of EPN-10 which requires:

The groundwater risk assessment must:

a. Be undertaken by a contaminated sites auditor.

b. Include an update to the Mandatory Auditors Report (MAR) that includes specific discussion around the risk to groundwater from elevated leachate head, including a review of the historic MAR data, with a specific focus on potential trends in leachate head and plume characteristics.

c. Assess the likely risks to groundwater quality from any increased risk of seepage through the landfill liner.

d. Include recommended actions to mitigate any assessed increased risk to groundwater and a proposed timeline for implementing the recommendations.

1.6 Methodology

The Audit was undertaken in accordance with DWER *The Western Australian Contaminated Sites Auditor Scheme* (DWER 2024b). The Audit included a Site inspection by the Auditor, review and comment on contaminated site consultant reports and preparation of this MAR.

The MAR has been prepared based upon the framework recommended in DWER *Contaminated Sites Guidelines, Requirements for Mandatory Auditors Reports* (DWER 2024a).

The MAR will determine whether the environmental consultant's work is sufficiently sound to form a basis for decisions or actions relating to the current or future use of the Site and address the requirements of EPN-10.

2. Site Identification

Table 2 presents key Site identification details. See Figure 2, Site Layout Plan and Appendix B for Certificates of Titles.

Table 2: Key Site Identification Details

Item	Detail
Street Address	1700 Marmion Avenue, Tamala Park, WA
Certificate of Title Description	Site: Portion of Lot 9020 on Plan 408820, Volume 4007, Folio 807
	Affected Site: Northern portion of Lot 9020 on Plan 408820, Volume 4007, Folio 807 (previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903).
Site Area	Approximately 157 ha
Local Government Authority	City of Wanneroo
Current Zoning	DPS2 Zoning: Public Purposes – MRS, Regional Parks and Recreation Urban Development. MRS Zoning: Urban, PP- Special Uses, Urban Deferred, Parks and Recreation
Current/Future Land Use	Site: Operational Class II landfill
	Affected Site: Buffer zone
Current Classification	Site: Contaminated – Remediation Required (C-RR)
	Affected Site: Contaminated – restricted use (C-RU)

Auditor's Opinion

The Auditor considers that Site identification is complete, accurate and compliant with DWER requirements.

3. Audited Documentation

A large volume of work has been completed for the Site since 1997 and prior to the auditor's engagement. Previous MARs as presented by the former auditor (including Senversa 2020a, 2020b, 2021 and 2023) have determined contaminated site works undertaken and documented in historical reports has been complete, accurate, defensible and in accordance with WA legislation, relevant guidelines and policies.

3.1 Non- Audited Documentation

The following reports were prepared and finalised prior to the auditor involvement, therefore no changes were made to these documents. It is understood these reports have been provided to DWER. The auditor has referred to these documents to provide context to the site details for background purposes:

- 360 Environmental (2023) 2022 Landfill Gas Assessment, Tamala Park Waste facility, 1700 Marimon Avenue, Tamala Park, WA, Rev2, dated 28 September 2023;
- SLR Consulting Australia (2024a) Sampling and Analysis Quality Plan – Groundwater Monitoring, Tamala Park waste Facility – 1700 Marmion Avenue, Tamala Park, WA, Revision 02, dated 8 February 2024;
- SLR Consulting Australia (2024b) Sampling and Analysis Quality Plan – Landfill Gas Investigation, Tamala Park waste Facility – 1700 Marmion Avenue, Tamala Park, WA, Revision 01, dated 30 May 2024;
- SLR Consulting Australia (2024c) Site Management Plan, Tamala Park Landfill waste Facility, Revision 02, dated 8 August 2024; and
- Talis Consultant (2023) 2022 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Version 4.0, dated 29 September 2023.

3.2 Audited Documentation and Correspondence

The following reports have been reviewed by the auditor:

- SLR Consulting Australia (2025c) 2024 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Revision 0.2, dated 12 February 2025;
- SLR Consulting Australia (2025d) 2024 Landfill Gas Assessment Tamala Park waste Facility, Revision 02, dated 17 March 2025;
- SLR Consulting Australia (2025e) EPN-10: Groundwater Risk Assessment, Tamala Park Waste Facility, Revision 0.4, dated 4 April 2025; and
- Talis Consultants (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, Version 4, dated 28 February 2025.

It is understood the LMP (Version 4) prepared by Talis (2025) is currently with DWER for review. Based on the meeting held between MRC, DWER and the auditor (27 March 2025), whilst the auditor has provided an advice letter to MRC regarding Talis (2025), any outstanding items for resolution will be held pending a response from DWER and any additional updates and recommendations can be consolidated into a subsequent version.

Relevant correspondence is included in Appendix C. Copies of the above mentioned reports are submitted with this MAR. The auditor has reviewed the data to ensure it could be relied upon for the purpose of this assessment. Summaries of reports are provided in Section 6.

3.3 Audit Exclusions

This Audit does not provide an opinion on the following:

- Operational Remediation Requirements (i.e. liner, capping, rehabilitation etc.); and
- EPN-10 relates to Stage 2 leachate management. Whilst the closed Stage 1 Landfill site characteristics have been included in this MAR, the specific impact of leachate discharges from Stage 1 remains difficult to determine, particularly in differentiating between contributions from Stage 1 and Stage 2.

3.4 Audit Team Site Inspections

Table 3 summarises site inspections conducted for the purpose of this MAR.

Table 3: Site Inspections

Date	Purpose of Inspection and relevant comments
27 March 2025	The auditor attended the Site to meet with MRC (Kathrine Goldsmith) and representatives of SLR. A site inspection was conducted to become familiar with the Site layout and conditions. A meeting was held with MRC to discuss recommendations to be included in the MAR and address any outstanding queries regarding Site operations. Site activities were observed as per normal operating requirements. The auditor confirmed the decommissioning of leachate Batter 1 pond had commenced, with partial filling completed. Active filing was occurring in Stage 2. The auditor observed changes to the landform and elevation to the north on land defined as the buffer zone (Affected Site : Subject Area N1). Substantial excavations have occurred to remove top soil and natural sands to depth (estimated in some areas to be greater than 5 m bgl). Existing monitoring locations (groundwater bores) appear to have been retained but will be further checked by MRC, including whether re-surveying of elevations is required.

3.5 Involvement of Support Team

Mr Stuart Thurlow was supporting expert for this MAR providing review and advice on the Landfill Gas Assessment (SLR, 2025d), the Groundwater Risk Assessment (SLR, 2025e) and the Leachate Management Plan (Talis, 2025). A signed Form J is provided in Appendix A.

The auditor was assisted by Ms Nina Alavi for general audit support. The MAR was peer reviewed by Mr Philip Hitchcock.

4. Site Characteristics

This section provides a summary of key site characteristics including potential contamination sources (current and previous land uses/activities), exposure pathways, sensitive human/environmental receptors and the derivation of a Conceptual Site Model (CSM).

Information has been included current and previous assessment reports including those reviewed by the former auditor and presented in Senversa (2023).

4.1 Site Layout

MRC operates the TPWF, one of the largest putrescibles (Category 64, Class II) landfills, located 30 km north of Perth, with an approximate waste cell area of 37 ha. The Site has been an operational landfill since 1991 and operates under Licence Number L9395/2023/1, issued by DWER in accordance with Part V of the Environmental Protection Act 1986. The landfill has a capacity of handling 350,000 tonnes of waste per annum.

The TPWF includes a range of infrastructure, as shown in Figure 2. This consists of a Class II landfill divided into two stages, three phases, and two proposed piggyback cells. Additionally, there is a purpose-built chemical storage facility, a recycling/resource recovery centre, and a transfer station with 12 car bays. The site also features a power station, leachate ponds, and an ERTECH tank, along with a wastewater treatment plant located immediately northeast of the power station. Other infrastructure includes a southern limestone stockpile, a maintenance workshop, a training academy, and a small concrete batching and cement product manufacturing area.

4.2 Accepted Waste Summary

The Site licence allows for the disposal of the following, subject to acceptance criteria outlined in Table 1 of their licence conditions (L9395/2023/1):

- Category 61 Waste: including hazardous liquid waste and waste mineral oil.
- Category 62 Waste: including clean fill, Type 1 inert waste, Type 2 inert waste, putrescible waste, hazardous waste, e-waste and scrap metal.
- Category 64 Waste: including clean fill, Type 1 inert waste and special waste, Type 2 inert waste and special waste, putrescible waste, contaminated solid waste – class II and contaminated solid waste – class III.
- Other categories relating to prescribed premises including 12, 57, 61A and 77.

4.3 Site Land Use

The Site has been operating as a landfill since 1991. Before landfill operations began, the land appears to have been used for sheep grazing.

The general character of the broader area includes a combination of bushland, industrial infrastructure, and growing urban developments, such as the Catalina residential estate to the north and the suburb of Kinross to the south of the site.

The Tamala Park landfill is divided into two distinct stages. Stage 1 is located in the eastern portion. It is unlined and ceased operating between 2002-2004 when it was progressively capped and rehabilitated. Stage 2 is in the western portion of the Site and is lined with a geosynthetic lining system. It is being progressively filled in a general east to west direction. South of the landfill, office and workshop facilities are present, while further south, there is a landfill gas power plant with six engines and a large limestone quarry/borrow pit area.

The following table presents the operational timeline of the landfill cells, as provided in the SLR (2025d), and is reproduced below.

Table 4: Landfill Operation Timeline

Infrastructure Description		Opened	Closed	Leachate Collection	Gas Extraction
Landfill Stage 1 (10 cells)	South	1991	2002	None	Yes
	North	1994	2004	None	Yes
Landfill Stage 2 (12 cells)	Phase 1	2004	2009	Yes	Yes
	Phase 2 East	2006	2028	Yes	Yes
	Phase 2 West	2007	2028	Yes	Yes
	Phase 3	2012	2028	Yes	Yes

4.3.1 Surrounding Land Uses

Surrounding land use is summarised in the table below.

Table 5: Surrounding Land Use Summary

Direction from Site	Site Use (Nature of Activity)
North	A buffer zone, followed by Catalina residential estate.
East	Connolly Drive, followed by bushland and the Neerabup (Water Corp) Groundwater Treatment Plant.
South	Midlothian Cresent, followed by residential suburbs of Kinross.
West	Marimon Avenue, followed by Tamala Park Conservation Reserve.

4.4 Key Infrastructure

4.4.1 Landfill Cell Details

Table 6 provides details regarding the landfill stage status, liner detail, capping and general dimensions as sourced from SLR (2025d):

Table 6: Landfill Stages

Description	Status	Liners	Depth	Height	Capping
Stage 1 Landfill (North)	Closed (2004)	• No base liner • No side walls liner	~5.5 mAHD	~46 mAHD	Final cap (liner and soil) – 3m thick
Stage 1 Landfill (South)	Closed (2003)#	• No base liner • No side walls liner		~46 mAHD	Final cap (liner and soil) – 1-2 m thick
Piggyback Liner	Installation of a 500 mm thick spanning layer between Stage 1 and Stage 2 Landfill in 2004 to address differential settlement. The geomembrane in the liner system is a linear low-density polyethylene (LLDPE)				
Stage 2 Phase 1 Landfill (North)	Closed (2011)	• Rolled clay in 3 m lifts, 2.4 m wide • HDPE Geomembrane at the base	3.9 mAHD	55 mAHD	Final cap (liner and soil) – 2 m thick

Description	Status	Liners	Depth	Height	Capping
Stage 2 Phase 2 Landfill	Active (since late 2006) expected to close 2028	• HDPE Geomembrane at the base	4.4 – 5.0 mAHD	-	Western portion partially capped in January 2025 Intermediate and Daily cover
Stage 2 Phase 3 Landfill	Active (since Jan 2012)	• Rolled clay in 3 m lifts, 3 m wide followed by a liner system for the side walls • HDPE Geomembrane at the base	5.3 – 6.8 mAHD	-	Western portion partially capped in January 2025 Intermediate and Daily cover
Southern Piggyback Cell	Yet to be constructed	-	-	-	-

4.4.2 Leachate Management System

Leachate extraction and management is undertaken at the Site for Stage 2. No leachate system is in place for Stage 1.

As presented in the Leachate Management Plan (LMP) (Talis,2025), it is understood that Stage 1 of the landfill is unlined and does not contain a leachate management system, whereas the lined Stage 2 features a basal leachate collection system composed of a 300mm thick non-calcareous aggregate layer and a network of perforated HDPE collector pipes. The leachate accumulates within the aggregate layer and flows downward toward the sumps located at the lowest points of each cell, allowing for effective long-term collection and extraction of leachate from the base of the landfill.

In Stage 2, leachate is removed using pneumatic submersible pumps installed in inclined sidewall risers. Phase 1 has four risers along the northern edge, with Risers 1 and 2 operational, Riser 3 under repair, and Riser 4 non-functional. Phase 2 has one riser on the western edge (Riser 6), while Phase 3 has three risers on the southern edge (Risers 1A, 2A, and 3A). Extracted leachate is transferred via an HDPE rising main to designated locations. Leachate infrastructure layout is shown in Figure 3.

In October 2024, Talis estimated the volume of leachate within Stage 2. The calculation was based on waste porosity, using the default value of 0.671 from the Hydrologic Evaluation of Landfill Performance (HELP) Model (2013), resulting in an estimated volume of 417,398m^3. This is considered a conservative estimate, as the site's historic leachate irrigation campaign likely reduced porosity significantly, though the extent of this reduction is uncertain. The assessment did not account for perched leachate in the unsaturated zone due to the complexity of factors such as past irrigation, pond leakage, condensate return, rainfall infiltration, reinjection, and discharge from temporary sumps like the Eastern Pond in Stage 2 Phase 2.

According to the LMP (Talis, 2025), MRC will continue to monitor leachate levels in all operational risers on a monthly basis. Due to the pumps' low flow rates (approximately 1 L/s) and the significant existing leachate head, shutting down the pumps 24 hours before measuring resting leachate levels is not considered necessary. Instead, it is proposed to turn off the pumps and record leachate levels after a 5-minute stabilisation period. Pumps will be shut off over the weekend, allowing monitoring to take place early Monday morning where possible. Once leachate heads are reduced to below 1 m, the 24-hour pre-monitoring equalisation period can be reinstated without significantly impacting volumetric reduction rates.

4.5 Environmental Characteristics

Potential pathways (or exposure routes) for contaminant migration are detailed in this section.

Table 7: Environmental Characteristics

Aspect	Summary
Topography	Site's natural elevations range from 10 to 50 m AHD (Senversa, 2023). The Site has been extensively modified by excavations and landfill, with the final level before settlement, following landfill closure, anticipated to reach approximately 60 m AHD.
Geology and Natural Soils	The surface geology is mainly composed of calcareous sands from the Quindalup Dune system, which unconformably overlie the Tamala (Coastal) Limestone. The base of the limestone is located at approximately -35 m AHD (ie approximately 45 to 85m below natural site levels). A geophysical investigation was conducted in the area north of the landfill. The investigation, carried out by GBG MAPS in October 2020, involved the use of Electrical Resistivity Tomography (ERT) over 15 transects within the area to the north of the existing active landfill site. The collected ERT data was processed and inverted to create cross-sections that illustrate variations in subsurface electrical resistivity along the transects to a depth of 30 m below ground level (BGL). The investigation identified areas near or below the water table with increased porosity and permeability, which could serve as preferential flow pathways for groundwater and potential contamination. A significant feature was found in the eastern part of the investigation area, extending from the northern boundary of the active landfill site into the northern buffer zone. Other similar regions were also identified within the buffer zone, but they do not extend into the landfill site.
Generalised Lithology	Based on localised drilling data, monitoring well installation logs, and regional hydrogeological information, the geological profile beneath the Tamala Park landfill consists of Tamala Limestone, approximately 65 m thick, underlain by the Leederville Formation.
Aquifer	An unconfined aquifer system exists within the sand and limestone of the superficial formations beneath the site. These superficial formations are underlain by the Leederville Formation, which consists of an extensive multi-layered, generally confined aquifer system beneath the Perth Metropolitan Area (SLR, 2025a).
Hydrogeology	The groundwater level within the Tamala Limestone near the landfill is approximately 20 mbgl at its shallowest and can reach up to 30 mbgl. Historically, the groundwater flow direction has been influenced by the groundwater abstraction bore located to the north of the landfill. Water level data indicates that the groundwater gradient has a northward component during the summer, when groundwater abstraction is at its peak, and tends to shift westward during the winter, when abstraction is at its lowest. The flow does not seem to be specifically driven by the nearby Water Corporation supply bore (Q40), but rather by the series of bores in the Neerabup bore field extracting water from the aquifer.
Depth to Groundwater	Variable across the Site. • 19 – 46 mTOC at the source zone (active landfill) (Stage 2). • 20 – 30 mTOC at the source zone (unlined closed landfill) (Stage 1). • 11 – 38 mTOC at the affected site (Buffer zone).
Groundwater Flow	The groundwater flow direction, as determined by SLR (2025a) for February and July 2024, generally flows towards the west, towards the Indian Ocean. However, the auditor notes that while the eastern boundary of the landfill shows a westerly flow towards the ocean, the flow direction north of the landfill appears to be north to north-westerly, which aligns with the influence of groundwater extraction from the Neerabup extraction bores. Refer to the groundwater flow for February and July 2024 as presented in Figure 4 and Figure 5.
Hydraulic properties	The hydraulic conductivity of the limestone is considered highly variable, ranging from 5 m/day in areas where sandy units are present to as high as 100 to 1000 m/day in regions where cavities are found. (Davidson, 1995). It is noted this range is large and does not take into consideration the site specific hydraulic properties of the Site.

Aspect	Summary
Seepage velocity	Based on the north-northwest groundwater flow direction, the seepage velocity at the site was calculated by SLR (SLR 2025a). In February 2024, the seepage velocity was calculated to be 0.1569 m/day, while in July 2024, it was calculated at 0.074 m/day.
Groundwater abstraction	The Water Corporation is the nearest major user of groundwater from the superficial formation, abstracting water from the aquifer through the Neerabup bore field as part of the Coastal Groundwater Scheme. These bores are located to the north, north-east, and south-east of the site. Groundwater is also extracted within the Catalina housing development to the north, used for dust suppression and irrigation of public spaces. The nearest irrigation bores are Catalina PB4 and PB5, with other nearby bores including Catalina bores 1, 2, 3, 25, and 26. Additionally, the Water Corporation's supply bore (Q40) is located to the north-east of the site. The site itself has a groundwater production bore for dust suppression purposes. Groundwater well locations are shown in Figure 6.
Proximity to Aquatic Ecosystems	The nearest permanent surface water bodies are the Indian Ocean, located approximately 1.5 km to the west and Neerabup Lakes, approximately 3.5 km to the north-east.
Potential Beneficial Usage of Groundwater	• Potable use. • Domestic non-potable (irrigation).
Acid Sulfate Soil	According to DWER mapping, the site is not located in an area with a potential risk of Acid Sulfate Soils (ASS).
Climate Data	The rainfall data were retrieved from the Bureau of Meteorology Tamala Park station BOM ID 9264 while temperature data were retrieved from the Swanbourne (BOM ID 9215). Rainfall is higher in the winter, with a maximum mean of 125 mm in July due to cold fronts from the south-west, while summer rainfall is much lower, ranging from 8 to 15 mm per month. The highest average temperatures occur during the summer, with monthly maximums ranging from 28.1°C in December to 30.5°C in February. The lowest temperatures are experienced from June to August, with average monthly maximums between 18.5°C in July and 19.4°C in June (SLR, 2025c).

4.6 Areas and Contaminants of Concern

Contaminants of Potential Concern (CoPC) that may potentially be contained within, or generated from these received waste types are shown in the table below. These include CoPC identified in the Groundwater Risk Assessment Report (SLR, 2025e), which are reproduced in table below.

Table 8: Potential Areas and Contaminants of Concern

Waste Type	Disposal Area	CoPC
Liquid Waste		
Hazardous Liquid Waste	Liquid waste facility	Non-chlorinated organics (hydrocarbons, cresols, benzene, toluene ethylbenzene, phenols, polycyclic aromatic hydrocarbons, volatile and semi-volatile organic compounds), chlorinated organics (pesticides, polychlorinated biphenyls, solvents). PFAS-impacted materials not licenced for acceptance.
Waste Mineral Oil	Solid waste facility	Non-chlorinated organics (hydrocarbons, cresols, benzene, toluene ethylbenzene, phenols, polycyclic aromatic hydrocarbons, volatile and semi-volatile organic compounds)
Solid Waste		
Contaminated Solid Waste: contaminated soils and solid waste materials with concentrations less than Class 3 landfill disposal criteria	Active landfill cells	Metals, cyanide, fluoride, non-chlorinated organics (hydrocarbons, cresols, benzene, toluene ethylbenzene, phenols, polycyclic aromatic hydrocarbons, volatile and semi volatile organic compounds), chlorinated organics (pesticides, polychlorinated biphenyls, solvents). PFAS-impacted materials not licenced for acceptance.
Inert Waste Type 1: non-hazardous, non-biodegradable wastes with contaminant concentrations less than Class 1		
Inert Waste Type 2: stable, nonbiodegradable organic materials such as plastics (tyres not accepted)		
Putrescible Waste: municipal waste, food waste, biosolids sewage waste, vegetative wastes, timber, paper plastics and composites		Nutrients, metals, phenols, pathogens
Special Waste Type 1: Asbestos and asbestos cement products		Asbestos fibres
Special Waste Type 2: Biomedical Waste		Nutrients, metals, pathogens
Tyres	Tyre stacks	Metals, polycyclic aromatic hydrocarbons, volatile and semi-volatile organic compounds), sulfur, brominated flame retardants, phthalates. Tyres to be removed to an appropriate authorised facility.

4.7 Potential Receptors

The migration of leachate through groundwater, via voids and dissolution cavities within the Tamala Limestone and the overlying sands, was deemed the primary pathway for contaminant transport.

Onsite receptors:

- Site workers encountering leachate/waste during maintenance works and visitors.

Offsite receptors:

- The Catalina residential area, located 500 m north of the site boundary, including groundwater abstraction bores used for construction and public open space irrigation.
- Aboriginal sites including Mindarie Waugal (located between northern side of landfill and the northern boundary fence).
- Kinross residential properties, located 700 m south of the site boundary, including residents who use irrigation bores.

- The Water Corporation groundwater abstraction bore (Q40), located 400 m north of the site boundary, is part of the Water Corporation's Neerabup bore field.
- Ecological: Vegetation on the cap, along with Bushland Forever regions located within the site boundary and adjacent to the west, north, and east as well as Neerabup National Park which is located 700 m east of the landfill cells.

4.8 Conceptual Site Model

An important element of any site assessment is the development of a Conceptual Site Model (CSM). The CSM is an assessment of the contaminant sources, pathways and potential receptors and evolves as the project progresses. If a contaminant source has one or more pathways to potential receptors, it is considered a complete pollutant linkage. The complete pollutant linkage can be severed by removing one of these components. This can be achieved by active remedial or management measures.

The SLR (2025e) CSM has been reproduced below. A revised CSM was also developed by SLR (SLR, 2025c) (Section 9.3 of the 2024 Groundwater Monitoring Report) based on the findings of the investigations undertaken at the Site and risk assessment and a graphical CSM which is shown in Figure 7 and Figure 8.

Table 9: Preliminary CSM (SLR, 2025e)

Potential Source	Potential Migration Pathway		Potential Receptors
Liquid waste and solid waste	Leaching in the unsaturated zone	• Dermal/direct contact • Incidental Ingestion • Biotic uptake • Groundwater abstraction	• Onsite workers • Onsite terrestrial flora • Offsite bore users (potable/non-potable) • Offsite terrestrial flora • Offsite marine ecosystems
	Dispersion, diffusion, advection of COPCs in the saturated zone		
	Lateral migration of contaminants in groundwater in the direction of groundwater flow		
	Transport of contaminants via abstraction of groundwater	• Direct contact • Incidental Ingestion	
	Vapour intrusion into building structures via underground services and utilities.	• Inhalation	

Auditor Opinion

- The CSM has been updated based on investigations completed and a risk assessment undertaken in 2024.
- The areas of concern and CoPC adequately reflect likely Site sources and contaminant migration.
- The primary and secondary sources, along with release mechanisms, have been well defined, and migration pathways and receptors have been included.
- Exposure routes identified, such as direct contact, accidental ingestion, and inhalation, are considered appropriate.

5. Basis for Adoption of Assessment Criteria

Based on the DWER publication '*Assessment and management of contaminated sites – Contaminated Sites guidelines*' (DWER 2021), the primary guidance in WA for Tier 1/screening risk assessments (assessment criteria) is:

- Schedule B(1) of the National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM).

Investigations have been conducted at the Site since 1997, and site assessment criteria have changed depending upon the guidelines current at that period. Criteria adopted for landfill gas and groundwater assessments are outlined in the following sections. The adequacy of the adopted criteria is discussed in detail within Section 6 for each reviewed report. No soil investigations were conducted as part of the most recent works.

5.1 Surface and Groundwater Criteria

The surface and groundwater criteria adopted by SLR (2025a and 2025c) are presented in in the following Table.

Table 10: Adopted Assessment Criteria – Groundwater

Surface and/or Groundwater Criteria	Reference	Criteria selected?	Consultant Justification
Ecological			
ANZG, July 2023, ANZG Marine Toxicant DGVs LOSP 99% (July 2023	Australian and New Zealand Governments and Australian state and territory governments, 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018);	Yes	The 99% protection value has been adopted for high conservation/ecological value systems, as the ocean remains largely unmodified.
Irrigation Long Term Trigger Values	ANZECC & ARMCANZ, 2000	No	No rationale.
PFAS and largely unmodified ecosystems (ecological/marine receptors) HEPA, January 2020, PFAS NEMP 2020 Marine water 99% HEPA, January 2020, PFAS NEMP 2020 Drinking Water	PFAS National Environmental Management Plan – Version 2.0 (HEPA 2020)	Yes	The 99% largely unmodified ecosystem criteria have been adopted.
Human Health			
Non potable Use Guidelines (NPUG)	DoH (2014)	Yes	Groundwater is used onsite for dust suppression and is relevant for evaluating potential impacts on offsite groundwater users, such as those relying on bores for garden irrigation and domestic use.
Drinking Water Guidelines (DWG)	National Water Quality Management Strategy (NWQMS, 2022)	Yes	The Water Corporation bore to the north of the site is used to supply groundwater to the Perth's IWSS.

Surface and/or Groundwater Criteria	Reference	Criteria selected?	Consultant Justification
	World Health Organization, petroleum products in drinking water (WHO, 2008)	Yes	World Health Organization, petroleum products in drinking water (WHO, 2008)
Health Screening Levels HSL – D for Vapour Intrusion	National Environment Protection Council, 1999 (amended 2013). National Environmental Protection (Assessment of Site Contamination) Measure (ASC NEPM).	Yes	The groundwater at the site is encountered at a depth greater than 8 mbgl. Soil types vary from sands to clays, with sand criteria being used as the most conservative measure.
PFAS	(HEPA 2020) NEMP 2.0	Yes*	Relevant for the assessment of potential impacts to offsite users of groundwater from groundwater bores.. * It is noted the report references HEPA (2020) NEMP 2.0 which was relevant at the time of preparation. This has since been superseded by HEPA (2025) NEMP 3.0.

Auditor's Opinion

The Auditor considers that:

- The adopted criteria are considered suitable and appropriately applied for surface and ground water.

5.2 Landfill Gas Criteria

The landfill gas criteria adopted by SLR (2025d) are presented as follows:

- Construction Industry Research and Information Association (CIRIA) (2007) - Assessing Risks Posed by Hazardous Ground Gases to Buildings:
    - CIRIA (2007) guidance does not specify values for H_2S, therefore, guidance from the following was referenced.
        - DOH (2009) Hydrogen sulfide and public health
        - Safework Australia (2018) Workplace Exposure Standard for Airborne Contaminants guidelines.
    - CIRIA (2007) guidance does not specify values for CO2, therefore, guidance from the following was referenced.
        - National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment
        - Safework Australia (2018) Workplace Exposure Standard for Airborne Contaminants guidelines.
- New South Wales Environment Protection Authority (2020) – Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA, 2020);

- British Standards Institution (2019) – BS 8485:2014+A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings (BSI, 2019); and
- VIC EPA (2015) Siting, design, operation and rehabilitation of landfills. Best Practice Environmental Management (BPEM), publication 788.3.

Auditor's Opinion

The Auditor considers that:

- The adopted criteria are considered suitable and appropriately applied for landfill gas.

6. Guideline Compliance

The auditor has based the technical review on professional experience and relevant published guidelines that include but are not limited to the following:

- BS8495: 2015+A1: 2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings;
- BS 8576 (2013) Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs);
- CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings (Publication C665);
- CRC CARE (2019): National Remediation Framework, Guideline on performing remediation options assessment, August 2019;
- DWER (2021) Assessment and Management of Contaminated Sites;
- DoH (2021) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia;
- Environment Agency Wales (2010) Guidance for monitoring trace components in landfill gas;
- EPA Victoria (2015) Best practice environmental management – Siting, design, operation and rehabilitation of landfills, (Publication 788.3);
- HEPA (2025) PFAS National Environmental Management Plan (NEMP) 3.0, Heads of EPA Australia and New Zealand 2025*;
- NEPC (1999) (as amended 2013) National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM);
- NSW EPA (2016) Environmental Guidelines for Solid Waste Landfills; and
- NSW EPA (2020) Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases.

**some reports have been prepared prior to HEPA (2025) NEMP 3.0 being released however it is noted that there were no changes to groundwater criteria relevant to this current assessment.*

The investigations were reviewed by the auditor (and where specified her landfill specialist) for compliance with the above referenced guidelines.

Consideration was given to the conceptual site model (CSM), sampling and analysis program, data quality objectives (DQOs), field and laboratory quality assurance (QA) and quality control (QC), community consultation, risk identification and assessment and these aspects have been incorporated into the following sections of the MAR.

6.1 Documents Reviewed

Consistent with the list of audited documents as presented earlier in Section 3.2 of this MAR the following reports have been reviewed by the auditor:

- SLR Consulting Australia (2025c) 2024 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Revision 0.2, dated 12 February 2025;
- SLR Consulting Australia (2025d) 2024 Landfill Gas Assessment Tamala Park waste Facility, Revision 02, dated 17 March 2025;
- SLR Consulting Australia (2025e) EPN-10: Groundwater Risk Assessment, Tamala Park Waste Facility, Revision 4, dated 4 April 2025; and
- Talis Consultants (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, Version 4, dated 28 February 2025.

Summaries of these reports are presented in the following sections.

6.1.1 2024 Groundwater Monitoring Report (SLR, 2025c)

SLR prepared the 2024 Groundwater Monitoring Report (SLR 2025c), which summarises the findings of the biannual groundwater monitoring events (GMEs) undertaken in February 2024 and July 2024 at the Site as part of the ongoing Site Management Plan (SMP). The objectives of the monitoring were to provide additional temporal and spatial groundwater data to better understand the extent of impacts, the potential for offsite migration, and the overall risk to receptors and the beneficial use of groundwater.

The scope of monitoring included a comprehensive summer GME conducted in February 2024 by Talis Consultants Pty Ltd (Talis) and a limited winter GME carried out in July 2024 by SLR. The Auditor noted that while the SAQP initially scheduled the summer GME for November/December, it was conducted in February to maintain consistency with previous GMEs and align with the 2024 reporting year.

The limited winter GME focused on key groundwater monitoring wells along the landfill boundary to monitor the groundwater plume beneath the landfill. Additionally, monitoring wells north of the landfill and along the northern boundary of the buffer zone were assessed to determine whether groundwater impacts extend beneath the Catalina Residential Development.

The GMEs were carried out in general accordance with the methodology and QA/QC program identified in the SAQP (SLR, 2024a). Variations from the SAQP are discussed in the table below.

A summary of compliance of the SLR (2025c) report with the DWER (2021) Contaminated Sites Guidelines is provided below in Table 11. Section references below are consistent with Appendix A (Reporting Checklist) for a DSI from DWER (2021) Assessment and management of contaminated sites.

Table 11: 2024 Groundwater Monitoring Report (SLR, 2025c) – Guideline Compliance Overview

Section/Element	*Auditor's Assessment of Compliance*
Document Control	*The document control is of sufficient quality and completeness, with all relevant details such as the date, revision, and reference information included.*
Executive Summary	*The executive summary is of adequate quality and completeness, including the background, objectives, scope, findings of groundwater monitoring and recommendations.*
Introduction	*The introduction section is considered comprehensive and of acceptable quality.*
Objectives	*The objectives are clearly defined and accepted by the Auditor.*
Scope of Works	*The scope of work is summarised adequately.*
Contaminated Site Status	*The contaminated site classification is considered complete and accurate.*
Site Identification	*The site identification is of adequate quality and completeness.*
Site Condition and Surrounding Environment	*The site condition and surrounding environment is considered complete and accurate.*
Site History	*The site history is not provided or referenced in this report, except for the mention that it has been operating as a landfill. However, this does not indicate a data gap or incompleteness.*
Site Investigation History	A summary of previous investigations at the site is not included. Although a summary would ideally be provided, this information is well-documented in historical reports.
Regional and Local Geology, Hydrogeology and Hydrology	*The information is considered of adequate quality and completeness, including a combination of desktop sources and physical soil and groundwater data to describe the current geological and hydrogeological conditions, specifically related to site characterization, pathways, receptors, and beneficial uses.*
Meteorological Data	*Not included.*

Section/Element	*Auditor's Assessment of Compliance*
Contaminant Characteristics And Migration	*Contaminant characteristics and migration are considered of adequate quality and completeness, including known and potential sources of contamination, and identifying potential and complete contaminant migration pathways and exposure routes to receptors, sufficient to inform assessment levels.*
Preliminary Conceptual Site Model	*While source, pathways, and receptors are identified, this information is not integrated into a conceptual site model.*
Assessment Levels	*The assessment levels are considered complete and accurate.*
Sampling Analysis and Quality Plan	*This information is of adequate quality and completeness. It includes clearly defined DQOs and references the detailed SAQP previously provided, including variations to the SAQP. The sampling methodology, analyte selection, and analysis methods were appropriate based on the potential contaminants of concern.*
Fieldwork Methodology	*Methodology provided, and any deviations in groundwater sampling were noted in the SLR report.* *Some blocked, or dry groundwater monitoring wells were reported. SLR have provided recommendations to relocate or reinstate.* *The groundwater sampling method was deemed acceptable.*
Field QA/QC Procedures	*Low-flow sampling techniques were generally used, with HydraSleeves employed for PFAS sampling. In addition, The deep groundwater wells sampled during the July 2024 GME were sampled using HydraSleeves.*
Laboratory QA/QC Results	*The Laboratory QC data is considered acceptable. The isolated non-conformances are not considered to be indicative of significant data quality issues.*
Field Data Interpretation	*The interpretation of field data is deemed acceptable.*
Analytical Results	*Analytical results were provided in a tabulated format, summarized, and discussed within the report, with the discussions deemed appropriate.*
Tier 1 and/or 2 Risk Assessment (Human Health and Ecological)	*Tier 1 assessment was considered which was deemed appropriate. A revised CSM figure is also provided.*
Fate and Transport Modelling	*No modelling completed.*
Community Engagement	*Community engagement is of adequate quality and completeness. Relevant stakeholders have been identified, with ongoing discussions taking place with the appropriate individuals, including those from the adjacent buffer zone and Water Corporation.*
Conclusions and Recommendations	*The conclusion and recommendation are considered adequate and acceptable.* *The conclusion of the assessment indicates that groundwater beneath the site is impacted by a leachate plume containing elevated levels of chloride, ammonia, arsenic, iron, and PFAS compounds, with contamination primarily originating from the active western portion of the landfill. Heavy metals are present in wells along the landfill's western, northern, and southern edges, though their spread appears contained within the site boundary. While the plume is expanding westward and downward in the water column, it is retracting in the northern buffer zone. Groundwater onsite is unsuitable for drinking or non-potable use, with moderate risks from ammonia, arsenic, E. coli, and PFAS, though occupational health risks remain low. The Site remains suitable for continued use under current conditions, provided risk management measures outlined in the SMP are followed.*

Section/Element	*Auditor's Assessment of Compliance*
Conclusions and Recommendations	*The report made several recommendations, which are listed in section 11.2 of the SLR (2025c). Key points include the continuation of biannual monitoring to assess groundwater quality changes and seasonal trends. Due to exceedances in Catalina Bore 5, it is advised that the bore not be used for abstraction or dust suppression. The SAQP should be updated to include the following:* • *Use of HydraSleeves for groundwater monitoring,* • *PFAS analysis in key wells showing increasing trends or data gaps, and a full suite of nutrient analysis for shallow wells only.* • *Removal of MTBE from the list of CoPCs.* • *Installation of new delineation wells offsite to assess the extent of the leachate plume.* • *Consideration of drilling Bore BB27A deeper to allow for sample collection.* • *Annual leachate risk assessments to evaluate the suitability of the on-site bore for dust suppression.* • *If the Water Corporation bore becomes operational, further monitoring will be required to assess its impact on groundwater resources.*

Auditor's Opinion

The Auditor considers that:

Overall, the groundwater monitoring program was undertaken in accordance with the current SAQP (SLR, 2024a) and MRC's current licence. The Auditor has reviewed the document (SLR, 2025c) and has provided comments and recommendations, so the report is presented in accordance with best management technical practice and DWER guidelines. The Auditor's review of document is provided in Appendix C of this MAR.

The Auditor considers that the monitoring program scope adequately addresses contaminant delineation to the north and east of the site. However, additional offsite wells are required to be installed to assess the leachate impact, particularly to the west and south of the Site.

Overall, the quality of the report has shown to be compliant with DWER contaminated sites guidelines, and hence the data collected can be verified by the Auditor and is considered suitable for use.

6.1.2 2024 Landfill Gas Assessment (SLR, 2025d)

SLR prepared the 2024 landfill Gas Assessment (SLR 2025d) report**,** which presents the findings of the LFG monitoring and investigations undertaken between March 2024 and December 2024 at the Site. The objectives of the 2024 landfill gas monitoring program were to evaluate the potential hazards associated with the accumulation and emission of LFG, in order to mitigate risks to adjacent communities, personnel, and the surrounding ecosystem.

The scope of monitoring included the completion of eight LFG monitoring events between March 2024 and December 2024, in accordance with the 2024 Landfill Gas SAQP (SLR, 2024b). The Auditor noted that although the SAQP was initially scheduled from February to December, it was conducted in March due to delays in procurement. Additionally, an annual LFG fugitive emission survey was completed along north-south and east-west transects, spaced every 50 m across the capped areas of the landfill. An annual survey of buildings and offsite utility pits was also conducted to assess the potential for surface methane emissions that may require management.

The scope further included trace gas sampling at LFG wells representative of the typical gas source, specifically those closest to the waste body with the highest historically reported LFG concentrations. The

monitoring also encompassed a review of the LFG data collected by MRC and LFG extraction data collected by EDL to determine if adjustments to the well fields were necessary. Additionally, an LFG risk assessment was conducted to evaluate the need for active remediation measures or ongoing management of LFG at the site to mitigate potential risks to human health and the environment.

A summary of compliance of the SLR (2025d) report with the DWER (2021) Contaminated Sites Guidelines is provided below in Table 12. Section references below are consistent with Appendix A (Reporting Checklist) for a DSI from DWER (2021) Assessment and management of contaminated sites.

Table 12: 2024 Landfill Gas Monitoring (SLR, 2025d) – Guideline Compliance Overview

Section/Element	*Auditor's Assessment of Compliance*
Document Control	*The document control is of sufficient quality and completeness, with all relevant details such as the date, revision, and reference information included.*
Executive Summary	*The executive summary is of adequate quality and completeness, including the background, objectives, scope, findings of LFG monitoring and recommendations.*
Introduction	*The introduction section is considered comprehensive and of acceptable quality.*
Objectives	*The objectives are clearly defined and accepted by the Auditor.*
Scope of Works	*The scope of work is summarised adequately.*
Contaminated Site Status	*The contaminated site classification is considered complete and accurate.*
Site Identification	*The site identification is of adequate quality and completeness.*
Site Condition and Surrounding Environment	*The site condition and surrounding environment is considered complete and accurate.*
Site History	*The site history is not provided or referenced in this report, except for the mention that it has been operating as a landfill. However, this does not indicate a data gap or incompleteness.*
Site Investigation History	*Historical LFG monitoring from 2007 to 2023 is tabulated in Section 2.3 of the LFG report. The information provided is considered of adequate quality and completeness.*
Regional and Local Geology, Hydrogeology and Hydrology	*The information is considered of adequate quality and completeness, including a combination of desktop sources and physical soil and groundwater data to describe the current geological and hydrogeological conditions, specifically related to site characterization, pathways, receptors, and beneficial uses.*
Meteorological Data	*The information provided is considered of adequate quality and completeness. Climatic conditions are discussed in Section 6.9.2.1 of the LFG report.*
Contaminant Characteristics And Migration	*Contaminant characteristics and migration are considered of adequate quality and completeness, including known and potential sources of contamination, and identifying potential and complete contaminant migration pathways and exposure routes to receptors.*
Preliminary Conceptual Site Model	*The preliminary Conceptual Site Model is provided in Section 3.0 of the LFG report, where the source, pathways, and receptors are adequately identified.*
Assessment Levels	*The assessment levels are considered complete and accurate.*
Sampling Analysis and Quality Plan	*This information is of adequate quality and completeness. It includes clearly defined DQOs and references the detailed SAQP previously provided, including variations to the SAQP. The sampling methodology was considered appropriate for LFG assessment.*

Section/Element	*Auditor's Assessment of Compliance*
Fieldwork Methodology	*Fieldwork methodology is considered complete and accurate.* *The gas well network at the site consists of various monitoring locations designed to track landfill gas movement and assess potential risks. These include Boundary Monitoring (BM), Southern Landfill Edge (SLE), Northern Landfill Edge (NLE), Outside Monitoring (Northern Buffer Zone) (OSM), Southern Edge Monitoring (SEM), Eastern Edge Monitoring (EEM), Northern Edge Monitoring (NEM), Waugal Monitoring (WAM), and Workshop Area (WS). Wells located closer to the landfill are spaced approximately 25 m apart, while those further away can be spaced up to 100 m. The wells are designed to be appropriately screened through the fill to the surface, except for the Waugal Monitoring locations, which were installed with smaller implants to a depth of 2 m to minimise disruption to Aboriginal Heritage. These wells may not fully capture off-site risks but provide valuable local exposure data.* *Some wells had to be relocated for safety reasons, but these changes did not result in significant data gaps, and the well network's spatial coverage remains appropriate. The site also features a network of vertical and horizontal collection wells within the waste material of Stage 1 and Stage 2, as well as 76 landfill gas extraction wells along the landfill's edge. Of these, 66 are located around the landfill's edge (NLE, WLE, and SLE), and 10 are located across the road (WEM wells). The NEM wells, which were originally used for extraction but are now monitoring wells due to insufficient landfill gas, confirm the proper functioning of the extraction system. However, extraction wells are not suitable for risk assessment.* *Other surveys, such as surface emission, building, and utility pit surveys, offer point-in-time measurements influenced by daily conditions.* *LFG bore locations, extraction wells and utility pits and building survey locations are shown in* Figure 9*,* Figure 10 *and* Figure 11 *respectively.*
Field QA/QC Procedures	*Field QA/QC procedure is considered appropriate. For most events, standard field QA checks were conducted, including measurements of bore pressure, atmospheric conditions, rainfall, and general weather. The report also includes supporting documentation and equipment calibration certificates.*
Laboratory QA/QC Results	*Not applicable.*
Field Data Interpretation	*The interpretation of field data is deemed acceptable.*
Analytical Results	*Analytical results were provided in a tabulated format, summarized, and discussed within the report, with the discussions deemed appropriate.*
Tier 1 and/or 2 Risk Assessment (Human Health and Ecological)	*Tier 1 assessment was considered which was deemed appropriate. CSM figures are also provided.*
Fate and Transport Modelling	*No modelling completed.*
Community Engagement	*The report does not include details on community consultation. However, given that the data focuses on landfill gas and the site itself, and there is little development in the surrounding area, this is considered reasonable.*
Conclusions	*The conclusions are considered adequate and acceptable.* *The conclusion of the assessment indicates that while there may be some diffusive flow occurring outside the landfill, the pressure appears insufficient to support elevated flow rates and present significant offsite risks, as confirmed by the absence of elevated CH4 levels (above the threshold) in the offsite pits.* *Given the current site conditions, which include active LFG extraction and ongoing methane monitoring in the workshop, the risks to offsite residents and site infrastructure are considered minimal. However, elevated CH_4 concentrations in certain areas of the cap create a potential risk to onsite workers, which can be effectively managed under the SMP. Additionally, there is a potential risk to workers entering excavations where LFG has accumulated. To reduce this risk, the mitigation measures outlined in the SMP should be implemented, particularly in small or confined spaces.*

Section/Element	*Auditor's Assessment of Compliance*
Conclusions	*If the gas extraction system or continuous methane monitoring in the workshop were to fail, the risks would increase to a moderate level. This could lead to the release of gases into the atmosphere, intrusion into landfill infrastructure, and offsite migration, which may pose risks to workers, site infrastructure, offsite residents, and the surrounding environment.*
Recommendations	*The recommendations are considered adequate and acceptable.* *The report made several recommendations, which are listed in section 10.2 of SLR (2025d).* • *Complete the capping works in the western area, ensuring compaction to create an impermeable surface, and reinstate the LFG extraction system across this area.* • *Conduct a repeat fugitive emission survey during winter (July/August) to evaluate the effectiveness of the western cap and gas extraction system, ensuring gas levels are controlled.* • *Continue landfill gas monitoring as outlined in the 2024 SAQP (SLR, 2024b), ensuring gas concentrations remain within historical trends and that the site's risk profile remains stable.* • *Additional investigation or monitoring should be conducted to identify the cause of the slight rise in CH_4 and CO_2 in NEM during May and December 2024.* • *Regularly review gas monitoring and extraction results to determine if wellfield optimization or expansion is necessary.* • *Additional capping material is required in the eastern portion of the Intermediate Cover Area to reduce fugitive gas emissions.* • *Consider reintegrating some WEM locations into the gas extraction network to prevent diffusive flow towards the west.* • *Consider converting certain monitoring wells (SLE19, SEM220, SEM221, and SEM227) into extraction wells to mitigate landfill gas impacts further southeast.* • *Continue periodic inspections for H_2S odour impacts offsite and assess the need for mitigation measures.* • *Perform yearly monitoring to assess the final cap's integrity, identifying cracks or erosion, and carry out regular surface maintenance to prevent settlement or cap degradation.* • *Implement necessary upgrades or changes to the gas extraction system to adapt to changing gas migration patterns and ensure effective collection.* • *Conduct annual onsite building and fugitive emission surveys, along with an offsite utility pit survey.* • *For any intrusive works near the landfill, follow risk mitigation actions in the SMP to minimise exposure risks.* • *Maintain continuous methane monitoring in the workshop, keeping sensors set at 1% v/v methane as per guidelines.* • *The area around the landfill should be included in the Before You Dig Australia (BYDA) register to account for subsurface gas risk.*

Auditor's Opinion

The Auditor considers that:

Overall, the LFG monitoring program was undertaken in accordance with the current SAQP (SLR, 2024b) and MRC's current licence. The Auditor has reviewed the document (SLR, 2025d) and has provided comments and recommendations, so they are prepared in accordance with best management technical practice and DWER guidelines. The Auditor's review of document is provided in Appendix C of this MAR.

Overall, the quality of the report has shown to be compliant with DWER contaminated sites guidelines, and hence the data collected can be verified by the Auditor and is considered suitable for use.

6.1.3 Leachate Management Plan (Talis, 2025)

Talis prepared a Leachate Management Plan (LMP) (Talis, 2025) for MRC in response to Requirement 1 of the EPN 202405 (EPN-1) issued by DWER on 28 November 2024 for TPWF. EPN-1 states that:

*The **Person** to whom this Notice is given must, within 28 days of this Notice being given, provide to the CEO for approval, a plan to manage leachate volumes on the Premises. The plan must identify:*

- *a) The volume of leachate currently held at the premises and the methodologies used to arrive at the volume.*
- *b) The chemical characteristics of the leachate.*
- *c) A detailed methodology including times, dates and meteorological conditions under which any process involving leachate may be undertaken.*
- *d) The measures that will be taken to ensure that implementation of the plan does not cause odour emissions outside the premise boundary.*
- *e) Details of the monitoring that will be undertaken to assess the effectiveness of controls in preventing odour emissions outside the premises boundary.*
- *f) Records relating to the monitoring must be provided to the CEO every 14 days post implementation of the approved plan.*

The LMP (Talis, 2025) includes leachate management, odour prevention, and monitoring to assess the effectiveness of mitigation measures, ensure compliance, and ultimately reduce environmental pollution. LMP's primary focus is odour management, while also considering both the short-term and long-term needs of the site.

The LMP (Version 4) prepared by Talis (2025) is currently with DWER for review. Based on the meeting held between MRC, DWER and the auditor (27 March 2025), whilst the auditor has provided an advice letter to MRC regarding Talis (2025), any outstanding items for resolution will be held pending a response from DWER and any additional updates and recommendations can be consolidated into a subsequent version.

A summary of compliance of the Talis (2025) report with the DWER (2021) Contaminated Sites Guidelines is provided below in Table 13. Section references below are consistent with Appendix A (Reporting Checklist) for a DSI from DWER (2021) Assessment and management of contaminated sites.

Table 13: Leachate Management Plan (Talis, 2025) – Guideline Compliance Overview

Section/Element	*Auditor's Assessment of Compliance*
Document Control	*The document control is of sufficient quality and completeness, with all relevant details such as the date, revision, and reference information included.*
Executive Summary	*Not provided.*
Introduction	*The introduction section is considered comprehensive and of acceptable quality.*
Purpose and scope	*The purposes are clearly defined and accepted by the Auditor.*
Site Identification	*The site identification is of adequate quality and completeness.*
Site Condition and Surrounding Environment	*The site condition and surrounding environment is considered complete and accurate.*
Site History	*The site history is not provided or referenced in this report, except for the mention that it has been operating as a landfill. However, this does not indicate a data gap or incompleteness.*
Regional and Local Geology, Hydrogeology and Hydrology	*The information is considered of adequate quality and completeness.*
Meteorological Data	*The information provided is considered of adequate quality and completeness. Local climate data is discussed in Section 3.0 of the LMP.*
Leachate Infrastructure	*The leachate infrastructure is discussed in Section 4.1 of the LMP and is considered accurate and appropriate.*

Section/Element	*Auditor's Assessment of Compliance*
Leachate Generation Method	*The leachate generation method is discussed in Section 4.3 of the LMP and is considered accurate and appropriate.*
Accumulated Leachate Volume	*The estimate of accumulated leachate is provided in Section 4.4 of the LMP and is considered accurate.*
Leachate Extraction Rates	*The leachate extraction rates are provided in Section 4.4 of the LMP and are considered accurate.*
Leachate Chemistry	*The leachate chemistry is discussed in Section 5.1 of the LMP and is considered accurate.*
Leachate Management Strategy	*The leachate management strategy is provided in Section 6 of the LMP and is considered appropriate.*
Odour Management and Monitoring	*The odour management and monitoring are provided in Section 7 of the LMP and are considered appropriate.*
Sampling Analysis and Quality Plan	*Not applicable.*
Fieldwork Methodology	*Not applicable.*
Field QA/QC Procedures	*Not applicable.*
Laboratory QA/QC Results	*Not applicable.*
Conclusions and Recommendations	*The conclusion of the LMP indicates that the updated LMP, revised following the DWER's request on 13 February 2025, provides additional details on the operation, monitoring, and corrective actions needed for effective leachate management. It includes predetermined performance indicators, clear thresholds for triggering mitigation measures, and flexible monitoring and reporting schedules.* *The LMP made several recommendations, which are listed in section 8 of the Talis (2025).* • *The filling and capping of the Site's landfill cells will be carried out in phases to minimise leachate generation.* • *The leachate extraction system will be regularly inspected, maintained, and repaired when necessary. Leachate monitoring will be undertaken on a regular basis to ensure the leachate collection and extraction system is operating effectively, to determine the head and quality of leachate, and to ensure compliance with assessment criteria and compliance limits.* *It is strongly recommended that the proposed strategies, as outlined in Table 6-1 and Table 6-6 of the LMP, be implemented promptly. This includes the required operational changes, infrastructure upgrades, and ongoing management actions. Furthermore, the monitoring methods detailed in Table 9-1 will be essential to assess the effectiveness of the leachate management plan. By adopting these comprehensive solutions and monitoring approaches, the MRC can ensure that odour generation from leachate is minimised to acceptable levels as quickly as possible and maintained over the long term.*

Auditor's Opinion

The Auditor considers that:

- Overall, the Auditor concurs with the recommendations and approaches outlined in the LMP and support the proposed strategies for implementation. The LMP is deemed reliable, with Auditor's recommendations outlined in Section 12.2 for further consideration.

6.1.4 EPN-10: Groundwater Risk Assessment (SLR, 2025e)

SLR prepared the EPN-10: Groundwater Risk Assessment (SLR 2025e) in response to Requirement 10 of the EPN 202405 (EPN-10) issued by DWER on 28 November 2024 for TPWMF.

The groundwater risk assessment is conducted in accordance with Schedule B6 of the ASC NEPM. It applies the source-pathway-receptor (SPR) model to evaluate potential risks to human health, the environment, and the sustainable use of groundwater.

The risk assessment involves several key steps, including reviewing the premises' history and leachate management, analysing relevant investigations and design documentation, and characterising the hydrogeological setting and groundwater flow. It also involves examining historic data on leachate head and groundwater plume trends, assessing the risks to groundwater from leachate management, and establishing SPR linkages. Recommendations will be provided to mitigate any increased risks, along with an implementation timeline.

The assessment has involved several key steps, including reviewing the premises' history and leachate management, analysing relevant investigations and design documentation, and characterising the hydrogeological setting and groundwater flow. It also included examining historic data on leachate head and groundwater plume trends, assessing the risks to groundwater from leachate management, and establishing SPR linkages. Recommendations have been provided to mitigate any identified risks, along with a proposed implementation timeline.

A summary of compliance of the SLR (2025e) report with the DWER (2021) Contaminated Sites Guidelines is provided below in Table 14. Section references below are consistent with Appendix A (Reporting Checklist) for a DSI from DWER (2021) Assessment and management of contaminated sites.

Table 14: EPN-10: Groundwater Risk Assessment (SLR, 2025e) – Guideline Compliance Overview

Section/Element	*Auditor's Assessment of Compliance*
Document Control	*The document control is of sufficient quality and completeness, with all relevant details such as the date, revision, and reference information included.*
Executive Summary	*The executive summary is of adequate quality and completeness, including the background, objectives, scope, findings of groundwater monitoring and recommendations.*
Introduction	*The introduction section is considered comprehensive and of acceptable quality.*
Objectives	*The objectives are clearly defined and accepted by the Auditor.*
Scope of Works	*The scope of work is summarised adequately.*
Contaminated Site Status	*The contaminated site classification is considered complete and accurate.*
Site Identification	*The site identification is of adequate quality and completeness.*
Site Condition and Surrounding Environment	*The site condition and surrounding environment is considered complete and accurate.*
Site History	*The site history is not provided or referenced in this report, except for the mention that it has been operating as a landfill. However, this does not indicate a data gap or incompleteness.*
Site Investigation History	A summary of previous investigations at the site is not included. Although a summary would ideally be provided, this information is well-documented in historical reports.
Regional and Local Geology, Hydrogeology and Hydrology	*The information is considered of adequate quality and completeness, including a combination of desktop sources and physical soil and groundwater data to describe the current geological and hydrogeological conditions, specifically related to site characterization, pathways, receptors, and beneficial uses.*
Meteorological Data	*The information provided is considered of adequate quality and completeness. Climatic conditions are discussed in Section 2.6.1 of the SLR (2025e) report.*

Section/Element	*Auditor's Assessment of Compliance*
Contaminant Characteristics And Migration	*Contaminant characteristics and migration are considered of adequate quality and completeness, including known and potential sources of contamination, and identifying potential and complete contaminant migration pathways and exposure routes to receptors, sufficient to inform assessment levels.*
Preliminary Conceptual Site Model	*The Conceptual Site Model is provided in Section 4.0 of the (SLR, 2025e) report, where the source, pathways, and receptors are adequately identified.*
Assessment Levels	*The assessment levels are considered complete and accurate.*
Sampling Analysis and Quality Plan	*Not applicable.*
Fieldwork Methodology	*Not applicable.*
Field QA/QC Procedures	*Not applicable.*
Laboratory QA/QC Results	*Not applicable.*
Field Data Interpretation	*The interpretation of field data is deemed acceptable.*
Analytical Results	*Analytical results were provided in a tabulated format, summarized, and discussed within the report, with the discussions deemed appropriate.*
Tier 1 and/or 2 Risk Assessment (Human Health and Ecological)	*Tier 1 assessment was considered which was deemed appropriate. A revised CSM figure is also provided.*
Fate and Transport Modelling	*No modelling completed.*
Community Engagement	*The report does not include details on community consultation. However, given that the data focuses on addressing Requirement 10 of the EPN, this is considered reasonable.*
Conclusions and Recommendations	*The conclusions and recommendations are considered adequate and acceptable.* *The conclusion of the assessment indicates that leachate levels at the site remain high, especially in the uncapped landfill, and are likely contributing to groundwater contamination. While the cessation of irrigation hasn't impacted these levels, the leachate plume extends offsite, particularly to the west, posing a moderate risk to human health and marine life. The plume contains ammonia, arsenic, E. coli, and PFAS, which exceed human health guidelines. The plume, with PFAS concentrations above human health limits, remains undefined to the northwest, posing a moderate risk to offsite residents and users of nearby boreholes. Leachate impacts, particularly PFAS and ammonia, pose a moderate risk to human health at Catalina Bore 5, although the bore is not currently in use, and possible mislabelling may have led to incorrect results. The PFOS levels in the leachate plume exceed ecological guidelines and remain undefined to the west of the site, extending toward the Indian Ocean (1.8 km). This is assumed to present a moderate risk to offsite marine and terrestrial ecology. Data gaps in the Groundwater Risk Assessment (GRA) involve the spatial extent and stability of the leachate plume, as well as its associated risks to offsite human health and marine ecology.* *The report made several recommendations, which are listed in section 8.1 of the SLR (2025e). The recommendations are categorised into immediate, short term and medium to long term actions with a timeline also provided.* *Immediate actions (2 weeks) are:* • *Measures to manage leachate levels outlined in the LMP (Talis, 2025) should be implemented as suggested.* • *Due to the presence of groundwater exceedances to the nominated risk assessment criteria in Catalina Bore 5, the bore should not be used for extraction or dust suppression. However, it is understood that the bore is currently not in use, and potential mislabelling may have led to erroneous results.*

Section/Element	*Auditor's Assessment of Compliance*
Conclusions and Recommendations	*Short term actions (1 year):* • *Delineation wells (shallow, intermediate, and deep) should be installed offsite to the west of the Premises along a transect between BB24 and TPL1, and to the south of BB35, to determine the extent of the leachate plume in those directions.* • *As part of ongoing GMEs, it is recommended to include iron speciation and analysis of both total and dissolved manganese in leachate and groundwater. This will support the differentiation of potential source contributions and enhance evaluation of monitored natural attenuation (MNA) processes in groundwater.* *Medium to long term actions (>1 year)* • *Groundwater monitoring should continue under the SMP/SAQP to evaluate the stability of the leachate plume.* • *Annual leachate risk assessments should be undertaken to confirm the risk status of using water from the onsite bore for dust suppression.* • *If the Water Corporation bore becomes operational, additional groundwater monitoring will be necessary to assess whether the leachate plume from the site is impacting on groundwater resources.* *If required due to a change in the site's risk profile, additional groundwater monitoring wells should be installed to enable differentiation between leachate sources originating from Stage 1 and Stage 2. This should be informed by a groundwater monitoring network integrity assessment (i.e. review of well construction details, surveys, piezometric contours etc) to ensure that any monitoring wells are ideally located to help differentiate between the two leachate sources.*

Auditor's Opinion

The Auditor considers that:

- The EPN-10: Groundwater Risk Assessment has addressed EPN-10 of the EPN202405 and is considered reliable and accurate.
- The recommendations are considered appropriate and should be implemented within the suggested timeframe.

7. Auditors Assessment

7.1 Audit Correspondence

Draft versions of reports were received and amended. In addition to the final reports listed in Section 3.2, the following correspondence was documented by the auditor and provided in Appendix C.

Table 15: Relevant Audit Correspondence

Date	Author	Document	Title
25 February 2025	Larissa Willoughby	Letter EA1191_C1a	Interim Audit Advice – 2024 Groundwater Monitoring Event Report, TWMF
13 March 2025	Larissa Willoughby	Letter EA1191_C4	Interim Audit Advice – Leachate Management Plan, TWMF (including Auditor Issues Register AIR_04_13Mar25)
24 March 2025	Larissa Willoughby	Letter EA1191_C2a	Interim Audit Advice – 2024 Landfill Gas Assessment, TWMF
4 April 2025	Larissa Willoughby	Letter EA1191_C3a	Interim Audit Advice – EPN-10: Groundwater Risk Assessment, TWMF
7 April 2025	Larissa Willoughby	Letter EA1191_C4a	Interim Audit Advice – Leachate Management Plan, TWMF

This section reviews the results and the Tier 1 assessment of the risk to human health, the environment or environmental values.

7.2 Groundwater flow and quality

Groundwater contours plans are shown in Figure3a and 3b of SLR (2025c). The most recent contour plans are provided as Figure 4 and Figure 5 of the MAR.

As shown on these figures, groundwater flows:

- Groundwater flow is generally westward toward the Indian Ocean.
- In the northeastern portion of the landfill, groundwater flows north and northwest.
- The northern part of the landfill also shows a westerly flow direction.

February 2024 monitoring events:

- Groundwater levels ranged from 11.285 mBTOC (BB27B) to 46.104 mBTOC (BB22C).
- TDS ranged from 230 mg/L (CB06A) to 1,100 mg/L (BB21A).
- pH ranged from 6.9 pH units (BB19A, BB33A and BB34A) to 8.1 pH units (BB22A).

July 2024 monitoring events:

- Groundwater levels ranged from 10.95 mBTOC (BB27B and BB27C) to 45.81 mBTOC (BB22C).
- TDS ranged from 339.02 (BB31A) to 8,822 (BB22C). It should be noted that these TDS results are based on electrical conductivity measurements taken during field sampling and calculated using a conversion factor of 0.067 to determine the TDS value.
- pH ranged from 2.28 pH units (BB27B) to 7.29 (BB31A).

7.3 Analytical Results

During the 2024 GMEs, a comprehensive GME was conducted in February, while a limited GME took place in July. Since the July GME was limited in scope and focused on specific wells, the Auditor has summarised the results based on the highest concentrations observed in each area of the site in Table 16. The Auditor has also summarised the results of abstraction bores in Table 17. Complete tables with results are provided in Appendix A of SLR (2025c).

Table 16: February 2024 GME Results

Analyte	Adopted Criteria (mg/L)[1]			Upgradient	On-site	Down Gradient	Southern Area	Affected Site	Offsite
	99% Marine Water (ANZG)	Drinking Water (ADWG)	NPUG AMCS 2021						
Arsenic	NA	0.01	0.1	<0.001	0.13	0.0026	0.089	0.055	<0.001
Nickel	0.007	0.02	0.2	<0.001	0.058	0.014	0.021	0.014	0.0038
Cobalt	0.001	0.006	0.5	<0.001	0.0043	0.0016	0.0043	0.0013	<0.001
Iron	NA	0.3	0.3	<0.01	4.9	0.027	1.3	1.1	<0.01
Zinc	0.0033	3	3	0.0031	0.013	0.012	0.005	0.012	0.0038
Chloride	NA	250	250	190	5,800	830	300	310	180
Ammonia	0.00091	0.05	0.05	0.97	110	44	64	79	0.0095
TRH F1	NA	NA	NA	<0.01	<0.01	<0.01	<0.01	0.013	<0.01
TRH F2	NA	NA	NA	<0.05	0.16	<0.05	0.31	<0.05	<0.05
Benzene	0.5	0.001	0.02	<0.001	0.0012	<0.001	<0.001	<0.001	<0.001
PFOS (µg/L)	0.00023 (99%)	0.07	0.7	0.0032	0.034	0.017	0.014	0.012	<0.00020
Perfluorohexane sulfonic acid (PFHxS) (µg/L)	NA	0.07	0.7	0.027	0.24	0.18	0.15	0.14	<0.00020
Sum of PFHxS and PFOS (µg/L)	NA	0.07	0.7	0.030	0.274	0.197	0.164	0.152	<0.00020

Notes:

1. Results are all in mg/L unless otherwise stated.
2. Highest result in each area of the Site is included in this table.
3. Green shading indicates exceedances of applicable criteria.

Table 17: February 2024 GME Results – Abstraction Bores

Analyte	Adopted Criteria (mg/L)[1]			PB1	PB2	PB3	PB4	PB5	On-site Bore
	99% Marine Water (ANZG)	Drinking Water (ADWG)	NPUG AMCS 2021						
Arsenic	NA	0.01	0.1	<0.0010	0.0017	<0.0010	<0.0010	0.0014	0.014
Cobalt	0.001	0.006	0.5	<0.0010	0.0019	<0.0010	<0.0010	<0.0010	0.0012
Iron	NA	0.3	0.3	0.68	0.011	<0.01	4.4	9.7	0.096
Zinc	0.0033	3	3	0.039	0.011	0.044	0.0062	0.0052	0.0015
Ammonia	0.00091	0.05	0.05	0.033	0.019	<0.005	0.25	18	23
TRH F1	NA	NA	NA	<0.01	<0.01	<0.01	0.032	0.047	0.012
TRH F2	NA	NA	NA	<0.05	<0.05	<0.05	<0.05	0.34	<0.05
Benzene	0.5	0.001	0.02	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
PFOS (µg/L)	0.00023 (99%)	0.07	0.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0056	0.0045
Perfluorohexane sulfonic acid (PFHxS) (µg/L)	NA	0.07	0.7	<0.0002	0.00041	<0.0002	<0.0002	0.066	0.046
Sum of PFHxS and PFOS (µg/L)	NA	0.07	0.7	<0.0002	0.00041	<0.0002	<0.0002	0.0716	0.0505

Notes:

4. Results are all in mg/L unless otherwise stated.
5. Green shading indicates exceedances of applicable criteria.

7.4 Analytical Results Summary

7.4.1 Groundwater Monitoring Wells Results

Auditor summary of results:

Heavy Metals

- Nickel, cobalt, and zinc concentrations in groundwater exceeded marine water criteria. However, due to the distance to the receptor and the lower concentrations observed in monitoring wells west of the landfill, the risk to the marine ecosystem is considered unlikely.
- Arsenic concentrations exceeded drinking water criteria in most landfill wells and those within the buffer zone. However, arsenic levels in offsite wells were reported below the limit of reporting (LOR).
- Iron concentrations have been reported above the NPUG in onsite wells, southern area and affected site area, while concentrations in offsite wells were below the LOR.
- Heavy metals concentrations suggest that the plume is primarily concentrated along the western and northern edges of the landfill, extending southward toward BB35. The plume appears to remain contained within the Site boundary.

TRH F1 and F2

- During the 2024 GMEs, TRH F1 and F2 concentrations were mainly reported below the LOR, with minor detections of F2 onsite and in the southern area of the site.

BTEXN

- Benzene concentrations were below the LOR, except for one onsite detection (BB23A at 0.0012 mg/L), where the concentration slightly exceeded the drinking water criteria of 0.001 mg/L.
- Toluene, ethylbenzene, xylene and naphthalene were not detected in any groundwater samples.

Chloride

- Chloride concentrations were generally consistent across all wells, except for BB22C, where a significantly elevated chloride result of 5,400 mg/L was reported. Although this result appears anomalous, SLR suggested that it aligns with the high electrical conductivity (EC) field reading of 13,198 µS/cm, indicating near-saline conditions at this location. The auditor agrees that the cause of the high EC and chloride readings in this well is currently unknown and should be closely monitored. Chloride concentrations in offsite wells did not exceed drinking water criteria.

Ammonia

- The highest ammonia concentrations, indicating leachate impacts, were observed in shallow wells located along the western, northern, downgradient, eastern, and southern edges of the landfill. Elevated ammonia levels were also detected in intermediate wells and in the buffer zone wells. Ammonia concentrations exceeded the NPUG and drinking water criteria in all wells, except for the offsite wells, where no detections were reported, except for one well (CB12C) that reported concentrations exceeding the marine water criteria.

Dissolved Methane

- Dissolved methane was detected above the limit of reporting (LOR) in several wells, with concentrations ranging from 0.0077 mg/L to 1.1 mg/L (BB33A). However, none of the wells exceeded the trigger action level of 28 mg/L adopted by SLR.

PFAS

- Historically, PFOS has been detected in groundwater on-site at concentrations exceeding drinking water criteria but remaining below non-potable use criteria. While PFOS was still detectable, all results from the November/December 2022 sampling event were at least an order of magnitude below the drinking water criteria.

- During the 2024 GME, PFOS concentrations remained below both drinking water and NPUG criteria, with exceedances observed only against the marine water criteria. PFOS concentrations were not detected in offsite wells.
- Perfluorohexane sulfonic acid (PFHxS) and the sum of PFHxS and PFOS concentrations exceeded drinking water criteria in onsite, downgradient, southern, and affected areas, while no detections were reported in upgradient or offsite wells.

7.4.2 Abstraction Bores Results

Bores 1 – 5 are situated near or within the Catalina Residential Development and are primarily used for lawn irrigation. In contrast, the Onsite Bore is utilised by the MRC for dust suppression.

Heavy Metals

- Zinc concentrations in groundwater monitoring bore (PB1, PB3, PB4 and PB5) exceeded marine water criteria. However, due to the distance to the receptor, the risk to the marine ecosystem is considered unlikely.
- Arsenic concentrations were only reported to be greater than the drinking water criteria in on-site bore.
- Cobalt concentrations were reported to exceed marine water criteria in both PB2 and on-site bore.
- Iron concentrations have been reported above the drinking water and NPUG criteria in in groundwater monitoring bore (PB4 and PB5).

Ammonia

- Ammonia concentrations exceeded both drinking water and NPUG criteria in PB4, PB5, and the on-site bore. All ammonia concentrations were reported above the marine water criterion.

PFAS

- PFOS concentrations remained below both drinking water and NPUG criteria, with exceedances observed only against the marine water criteria in PB5 and on-site bore.
- Sum of PFHxS and PFOS concentrations exceeded drinking water criteria in PB5 and on-site bore Trend Analysis.

Auditor's Opinion

The Auditor considers that

- Tier 1 assessment criteria and results are correct.
- Overall, the groundwater results are generally consistent with previous years.
- Mann-Kendall Statistical analysis was performed by SLR to better understand the stability of the plume.
- The discussion provided regarding the plume stability is considered accurate and appropriate.

7.4.3 Landfill Gas

The current landfill monitoring locations includes 119 LFG monitoring wells, seven onsite utility pits, eight wall pins, and 26 Waugal LFG to evaluate the gas characteristics at the site and the buffer zone area to the north of the landfill. Sampling locations are shown in Figure 9, landfill extraction wells are shown in Figure 10 and the utility pit and building survey is shown in Figure 11. Landfill CSM figures are also displayed in Figure 18 to Figure 21.

The Landfill Gas Monitoring wells have been labelled in order of their locations as follows:

- Boundary Monitoring (BM)
- Southern Landfill Edge (SLE)

- Northern Landfill Edge (NLE)
- Outside Monitoring (Northern Buffer Zone) (OSM)
- Southern Edge Monitoring (SEM)
- Eastern Edge Monitoring (EEM)
- Northern Edge Monitoring (NEM)
- Western Edge Monitoring (WEM)
- Waugal Monitoring (WAM)
- Workshop pins (WS)

LFG monitoring events were completed in March, May, June, July, August, September, October, and December 2024, along with a landfill gas survey, which included a fugitive emission survey, an offsite utility pit survey, and a building survey. These surveys were completed in December 2024. Additionally, trace gas sampling was conducted in September 2024.

Based on information provided by SLR (2025d), meteorological conditions were assessed prior to each LFG monitoring event to identify days with low or decreasing barometric pressure, in accordance with the fifth percentile decrease in atmospheric pressure. Additionally, field measurements, including barometric pressure, temperature, flow rate, relative pressure, and landfill gas emissions of CH_4, CO_2, O_2, CO, and H_2S were recorded for each well. A GA5000 landfill gas analyser was used to capture these parameters, with calibration certificates and field sheets provided in Appendix B of the SLR report (SLR, 2025c).

Maximum LFG results are shown in Figure 13 to Figure 17.

Auditor summary of results:

- CH_4 concentrations did not exceed 1% v/v in any of the boundary wells (except for BM534 to BM536 in specific months), OSM wells, or workshop pins.
- Elevated CH_4 and CO_2 concentrations, along with depleted O_2 levels, were reported in the following wells: EEM228–EEM242 along the eastern landfill boundary, NLE52–NLE56 along the northern landfill edge, and SEM202–SEM207, SEM218–SEM227, and SLE15–SLE25 along the southern edge.
- CH_4 concentrations ranged from 5% to 15% were reported during multiple monitoring events at the following locations: EEM228, EEM231, EEM232, EEM233, EEM236, EEM239, EEM240, EEM242, SEM203, SEM204, SEM205, SEM217, SEM218, SEM221, SLE15, SLE16, SLE21, WAM400, BM535R, BM536, and NEM265.
- The NLE and/or SLE wells consistently reported the highest levels of CH_4 and CO_2, followed by the EEM wells, with the SEM and NEM wells showing lower concentrations.
- H_2S concentrations were consistently reported above criteria in the following onsite wells: EEM228, NLE53, SEM227, SLE17AA, and SLE25.
- The highest concentrations of landfill gases were reported during the September 2024 monitoring event, coinciding with the 'worst-case' atmospheric pressure conditions.

The onsite pits (BM500, BM528, BM529, BM530, BM531, BM532, and BM533) are monitored monthly. A building survey was conducted in December 2024 by SLR within the main site buildings, including the workshop, weighbridge, administration building, and transfer station. CH_4 concentrations ranged from 2.3 ppm to 4.4 ppm, with no CH_4 detections exceeding 5,000 ppm in any of the monitored buildings.

The utility/services survey was conducted in December 2024 by SLR along the roads nearest to the site boundary. CH_4 concentrations were low with no values over 5 ppm.

SLR also completed a fugitive emissions monitoring event between 4 and 6 December 2024 using a HubergOne Laser portable gas detector. Methane concentrations above 200 ppm were reported in the western final capping area, and concentrations above 500 ppm were recorded at four locations with intermediate cover. Fugitive emission survey results are included in Table F of SLR (2025d) and are shown in Figure 12.

Auditor's Opinion

The Auditor considers that

- Overall, the LFG results are generally consistent with the previous audit.
- Gas flows in the monitoring wells are very low. It is considered that landfill gas migration is effectively controlled by the active gas extraction system currently in place on-site.
- The risk to onsite workers within the existing buildings is considered low, as all CH_4 concentrations were reported below the criteria during the building and onsite utility pit survey.

8. Additional Risk Assessment

As per DWER guidelines, if Tier 1 assessment levels are exceeded, then further investigation (Tier 2 intermediate risk assessment) is required to determine whether the identified substances of concern pose a risk in the existing or proposed Site setting and to determine the scale and urgency of further action if appropriate.

SLR revised the CSM based on general principals set out in DWER guidance and ISO31000:2009 Risk Management. The risk assessment formed part of the CSM preparation. Matrix criteria for sensitivity and magnitude are provided in Table 21 of SLR (2025c).

8.1 Qualitative Risk Assessment

SLR provided the following qualitative risk assessment in their CSM.

8.1.1 On-site Site Workers

- Groundwater onsite is not suitable for drinking or non-potable water use. It is extracted for dust suppression, which means site workers may come into contact with, or accidentally ingest, fine droplets of contaminated groundwater.
- Based on the Leachate Risk Assessment conducted by SLR in 2023, the following findings were noted:
    - The occupational health risk from exposure to chloride, through ingestion or inhalation of leachate droplets, is considered very low or negligible.
    - The occupational risk from exposure to nickel is low for ingestion and inhalation, with moderate risk from skin contact during leachate spraying and handling.
    - The occupational risk from exposure to ammonia, arsenic, and PFAS, due to accidental ingestion, inhalation, or dermal contact with contaminated leachate, is considered moderate.
    - The occupational risk from exposure to E. coli, via ingestion during leachate spraying and handling, is moderate, while the risk from inhalation and skin contact is negligible, assuming no direct exposure to the digestive tract.
    - Overall, the risk to onsite workers has remained unchanged since 2023 and should continue to be managed in accordance with the Site Management Plan.

8.1.2 Offsite Residents

- SLR summarised that that the NPUG ammonia plume is confined to the north of the landfill and does not extend past the Buffer Zone/Affected Site. Similarly, the plume for PFHxS, PFOS, and PFOA do not pose a risk to offsite residents. However, the PFHxS plume is undelineated to the northwest, where new residential areas are located, posing a potential risk. A nearby WIN bore could potentially intersect the PFHxS plume, creating an exposure pathway for offsite residents.
- PFAS chemicals are water-soluble, highly stable, and persistent, making them bioaccumulative and potentially hazardous to humans. As a result, the risk of exposure to offsite bore users is considered moderate.
- Overall, the risk to offsite residents has remained unchanged since 2023 and should continue to be managed in accordance with the Site Management Plan.

8.1.3 Ecological Risks

- Shallow PFOS impacts have not been delineated to the west of the site, so PFOS levels above the NEMP Marine Water Interim Protection Value are likely to extend offsite, hydraulically downgradient. Without wells located downgradient, it remains unclear whether the PFOS plume could impact the Indian Ocean, approximately 1.8 km from the site. Therefore, the risk of exposure to the ecosystem is considered moderate, consistent with the previous audit.

8.2 EPN-10 Requirement (c)

EPN-10 specifically requested the auditor's opinion on the following:

> *c) Assess the likely risks to groundwater quality from any increased risk of seepage through the landfill liner.*

Auditor's Opinion

Groundwater quality has been shown to be impacted leachate seepage through the landfill liner. This seepage is controlled by:

a) the head of leachate over the liner;
b) the liner configuration and performance; and
c) the aquifer properties (saturated and unsaturated beneath and downgradient of the landfill.

The later two variables cannot be controlled now, and thus the only viable control measure remaining is the level of leachate above the liner.

The leachate acts a constant source of contamination that is forced through the liner by advection which is governed by the depth of leachate over the top of the lining system.

The aquifer has been impacted by leachate as shown by analytes occurring at elevated concentrations in the groundwater, in particular ammonia. This impact will continue until all leachate has been removed, an outcome that will never be achieved. However, it is possible to reduce the head of leachate and thus better control of leachate is required to achieve compliance levels as suggested in the LMP (Talis, 2025) and the recommendations of this MAR (including more pumping stations and alternative management such as evaporation).

Overall, it is agreed that ongoing management is continued to minimise offsite impacts from leachate impacted groundwater plume.

Reducing the leachate head is the only logical control available and will decrease leachate impacts and thus reduce the risk of groundwater impacts. Improvements to groundwater quality following leachate reduction will be slow and the plume may continue to expand due to the mass of contamination already in the aquifer so monitoring will need to continue as per the SAQP – Groundwater Monitoring (SLR, 2024a) or as updated.

9. CSM

The revised CSM is shown in Table 18, and a diagrammatic representation of the CSM for the area is included Figure 9A and 9B of SLR (2025c). The following CSM is a reproduction of the SLR CSM.

Table 18: Revised CSM

Potential Source		Primary Release Mechanism	Secondary		Migration Pathway	Receptor	Exposure Route	Environmental Values			Rationale
Source	COPCs		Source	Release Mechanism				Exposure Pathway	Onsite Groundwater	Offsite groundwater	
Landfill Waste	Heavy metals, Nutrient, TRH, BTEX, PFAS, Methane, Pathogens.	Movement of chemicals into groundwater from landfill leachate	Groundwater	Dispersion, diffusion, and advection of COPCs in the saturated zone Lateral movement of dissolved contaminants via groundwater flow. Migration of mobile contaminants via groundwater abstraction bore.	**Groundwater Pathway:** • The groundwater flow direction is generally towards the west. • Leachate impacts in the shallow and intermediate portion of the aquifer are migrating in a westerly direction together with the predominant groundwater flow direction • Leachate impacts in the deeper portion of the aquifer are migrating towards the north	<u>Onsite Human Health:</u> Subsurface worker	• Direct Contact • Accidental ingestion • Inhalation (vapour)	**Incomplete**	**Potentially compromised**	**N/A**	• Groundwater is deep (11 mbgl to 46 mbgl) and therefore subsurface workers are unlikely to be in contact with groundwater. *The risk of exposure to impacted groundwater is considered **negligible** under current site conditions.*
						<u>Onsite Human Health:</u> Site worker	• Direct Contact • Accidental ingestion • Inhalation (vapour)	**Potentially Complete**			• A groundwater production bore is operated at the Landfill site and used for dust suppression purposes. • Chloride, ammonia, arsenic, cobalt, iron, nickel exceeded the ADWG and/or NPUG criteria whilst PFOS, PFHxS and sum of PFHxS+PFOS exceeded the NEMP drinking water criteria in some of the onsite wells and onsite bore. • No volatile hydrocarbon fractions were detected indicating that hydrocarbons in groundwater are unlikely to present a risk from vapour inhalation. *Based on the leachate risk assessment (SLR, 2023), the occupational health risk from exposure to chloride is considered very low or negligible, to nickel is considered low, to ammonia, arsenic, E-coli and PFAS is considered moderate. These risks can however be mitigated in line with the SMP (SLR, 2024a) developed for the site.*
						<u>Current and Future Human Health – Affected Site</u>: Groundwater Bore Users (groundwater abstracted)	• Direct Contact • Accidental ingestion	**Incomplete**	**N/A**	**Potentially compromised**	• Chloride, ammonia, arsenic, cobalt, iron, nickel, exceeded the ADWG and/or NPUG criteria whilst PFOS, PFHxS and sum of PFHxS+PFOS exceeded the NEMP drinking water criteria in some of the wells located within the affected site. • Catalina Bore 5 is located on the edge of the affected site and reported concentrations of PFHxS+PFOS above Drinking Water levels and ammonia above NPUG. It is understood however that the bore is not currently in use. • The affected site is currently undeveloped *In the absence of current human health receptors within the affected site, the risk of exposure to human health from impacted bore water is considered **negligible**.* *Shall the affected site be redeveloped for residential purposes; groundwater use restrictions will apply.*
						<u>Current and Future Offsite Human Health – Catalina Residential Area</u>: Groundwater Bore Users (groundwater abstracted)	• Direct Contact • Accidental ingestion	**Incomplete**	**N/A**	**Not Compromised**	• Leachate impacts (above criteria) do not appear to extend beyond the *affected site*. *The risk of exposure to impacted groundwater is currently considered **Negligible**. The risk may however increase to **moderate** shall the groundwater be abstracted again by Water Corporation at Q40 located northeast of the site as it will divert the flow direction to the north towards the* *abstraction bore.*

Potential Source		Primary Release Mechanism	Secondary		Migration Pathway	Receptor	Exposure Route	Environmental Values			Rationale
Source	COPCs		Source	Release Mechanism				Exposure Pathway	Onsite Groundwater	Offsite groundwater	
					Groundwater Pathway: • Leachate impacts beneath the landfill appear to be migrating in a westerly direction together with the predominant groundwater flow direction	<u>Offsite Marine Water Ecology</u>: Aquatic Life of the Indian Ocean located 1.8km west of the site	• Biotic uptake • Ingestion • Dermal absorption	**Potentially Complete**		**Potentially compromised**	• Based on the general westerly groundwater flow direction observed during the 2024 monitoring period, concentrations of PFOS were reported above the Interim Water protection level criterion in most of the bores, including the shallow, intermediate and deep bores located along the western site boundary. • The leachate plume also remains undelineated to the west of the site and therefore has a potential to impact the marine environment of the Indian Ocean as PFAS compounds can travel very far. • There are no offsite groundwater wells to the west of the site to delineate the leachate plume extent. *The risk of exposure to impacted groundwater is considered **moderate.***
						<u>Offsite Terrestrial Ecology</u>: Bushland Forever regions located both inside the boundary of and adjacent to the site to the west, north and east	• Biotic uptake • Ingestion • Dermal absorption	**Incomplete**			• Groundwater is deep (11 mbgl to 46 mbgl) and therefore roots from terrestrial vegetation are not considered as a credible receptor to impacted groundwater. *The risk of exposure to impacted groundwater is therefore considered **negligible.***

Auditor's Opinion

- The CSM has been updated based on investigations completed and a risk assessment undertaken in 2024.
- The areas of concern and CoPC adequately reflect likely Site sources and contaminant migration.
- The primary and secondary sources, along with release mechanisms, have been well defined, and migration pathways and receptors have been included.
- Overall, the CSM provides a reasonable assessment of key S-P-R linkages based on the information collected to date.

10. Community Consultation

Details of community consultation undertaken by MRC were communicated to the auditor during the meeting held on 27 March 2025. Community consultation has included:

- Regular consultation with the Catalina Regional Council and provision of copies of relevant reports;
- Host monthly online meetings with all 7 member Councils. Attendees are officers from member Councils, with the information then fed back into the communities;
- Liaison with the Water Corporation, including sharing of information relevant for groundwater bore Q40.

Whilst MRC does not have direct contact with neighbouring residents, this contact is managed by the relevant Councils, including Catalina Regional Council.

MRC also regularly liaise with DWER relevant departments including Licencing (copies of groundwater and landfill gas monitoring reports are provided) and the Site Contamination branch (copies of all relevant site contamination reports are provided).

The Annual Monitoring and Compliance Reports are submitted to DWER by 31 March each year. These reports include:

- Summary of works undertaken by consultants, including hydrogeological reviews, a geophysical survey, groundwater models, investigated remediation options and the results of the contamination investigations.
- The results and interpretation of analytical data obtained from water and groundwater samples taken quarterly within the investigation area.
- Installation details of additional monitoring wells and groundwater recovery wells.
- The appointment of a DWER Accredited Auditor.

Auditor's Opinion
The Auditor is satisfied that adequate Community Consultation has been undertaken by MRC.

11. Parcel-Specific Information

The following table presents parcel-specific information with regard to key compliance details as defined under Section 3.3.2 of DWER's *Contaminated Sites Guideline (DWER July 2024) Requirements for Mandatory Auditors' Reports*.

Table 19: Parcel-Specific Information – Source Site – Part of Lot 9020 on Plan 408820 (TPWMF Prescribed Premise)

Information	*Tamala Park Waste Management Facility (Part of Lot 9020)*
Contamination status and whether the contamination poses or potentially poses a risk of harm to public health, the environment or any environmental value.	***Groundwater beneath the site contains concentrations of ammonia, chloride, iron, and arsenic that exceed drinking water and NPUG criteria. Additionally, concentrations of nickel, FHxS, and the sum of PFHxS and PFOS also exceeded drinking water criteria. The benzene concentration at one on-site location also exceeded drinking water criteria. Furthermore, concentrations of nickel, cobalt, zinc, ammonia, and PFOS were reported above marine water criteria.*** ***The metals present on-site and downgradient in groundwater are regionally common and align with upgradient/background conditions. They are typically associated with acid sulphate soils and are prevalent in the local geology. The impact on groundwater use is mainly aesthetic, causing staining and clogging of pipework, rather than posing health risks.*** ***The Auditor considers they are a low risk to human health or the environment.***
Assessment as to whether the condition of the Site is impacting surrounding land and/or land uses.	***Groundwater results indicate that the NPUG ammonia plume and PFHxS, PFOS, and PFOA in drinking water remain within the site boundary, posing no immediate risk to northern residents. However, the PFHxS plume is not fully mapped northwest, where new residential plots exist, posing a potential risk.*** ***Catalina Bore 5 showed PFHxS+PFOS above drinking water levels and ammonia above NPUG, while Catalina Bore 4 also had elevated ammonia. However, these bores are not in use except for monitoring due to the presence of contamination.***
Assessment as to whether any further investigation is required, recommended or necessary.	***Ongoing monitoring in accordance with SMP should be continued to meet obligations under the CS Act. Specific recommendations for further works are provided in* Section 12 *of this MAR.***
Assessment as to whether any remediation or risk mitigation/management measures are required at the Site.	***Groundwater management is ongoing in the form of active remediation – leachate extraction and passive remediation – monitored natural attenuation.***
Suitability or appropriateness of a management plan.	***The Site is subject to management under the SMP and LMP.***
Evaluation of the suitability of the Site (parcel-specific where relevant) for the proposed land uses.	***The Site is suitable for the current commercial/industrial use and configuration.***
Recommendation for the classification of each land parcel and recommended restrictions relating to the use of the land parcels/Site.	***No change in classification is proposed.*** • ***Tamala Park Waste Management Facility (inclusive of Part of Lot 9020 on Plan 408820) to remain 'Contaminated-Remediation Required'*** ***No change in restrictions proposed:*** • ***The land use is restricted to the current commercial/industrial use and configuration and shall not be developed for any other purposes without further contamination assessment or remediation.*** • ***Groundwater should not be abstracted for drinking purposes without appropriate treatment and testing to confirm its suitability.***

Table 20: Parcel-Specific Information – Affected Site – Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903

Information	*Affected Site (Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903)*
Contamination status and whether the contamination poses or potentially poses a risk of harm to public health, the environment or any environmental value.	***Groundwater beneath the site contains concentrations of ammonia, chloride, iron, arsenic, sum of PFHxS and PFOS that exceed drinking water. Concentrations of chloride and ammonia exceed the NPUG criteria.. Furthermore, concentrations of nickel, cobalt, zinc, ammonia, and PFOs were reported above marine water criteria.*** ***The metals present on-site and downgradient are regionally common and align with upgradient/background conditions. They are typically associated with acid sulphate soils and are prevalent in the local geology. The impact on groundwater use is mainly aesthetic, causing staining and clogging of pipework, rather than posing health risks.*** ***The Auditor considers they are a low risk to human health or the environment.***
Assessment as to whether the condition of the Site is impacting surrounding land and/or land uses.	***Groundwater results indicate that the NPUG ammonia plume and PFHxS, PFOS, and PFOA in drinking water remain within the site boundary, posing no immediate risk to northern residents. However, the PFHxS plume is not fully mapped northwest, where new residential plots exist, posing a potential risk.*** ***Catalina Bore 5 showed PFHxS+PFOS above drinking water levels and ammonia above NPUG, while Catalina Bore 4 also had elevated ammonia. However, these bores are not in use except for monitoring due to the presence of contamination.***
Assessment as to whether any further investigation is required, recommended or necessary.	***Ongoing monitoring in accordance with SMP should be continued to meet obligations under the CS Act. Specific recommendations for further works are provided in* Section 12 *of this MAR.***
Assessment as to whether any remediation or risk mitigation/management measures are required at the Site.	***Groundwater management is ongoing in the form of passive remediation – monitored natural attenuation.***
Suitability or appropriateness of a management plan.	***The Site is subject to management under the SMP.***
Evaluation of the suitability of the Site (parcel-specific where relevant) for the proposed land uses.	***The Site is suitable for current zone as a development "buffer zone".***
Recommendation for the classification of each land parcel and recommended restrictions relating to the use of the land parcels/Site.	***No change in classification is proposed.*** • ***Affected Site (Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903) to remain 'Contaminated-Restricted use'*** ***No change in restrictions proposed:*** • ***The land use is restricted to current zone as a development ''buffer zone'' and shall not be developed for any other purposes without further contamination assessment or remediation.*** • ***Groundwater should not be abstracted for drinking purposes without appropriate treatment and testing to confirm its suitability.***

12. Auditor's Conclusions and Recommendations

12.1 Conclusions

The following presents the Auditor's conclusions following auditing of the contaminated site works undertaken by SLR and Talis:

- The Auditor is satisfied that the current reviewed reporting is complete, reliable and compliant with the requirements of the DWER Contaminated Sites Guidelines and other relevant published technical guidance.
- The scope of works and methodology undertaken are considered adequate to determine groundwater and LFG quality at the Site.
- Correspondence regarding non-compliances or recommendations to improve the quality of the information collected and reports has been provided to MRC and MRCs consultants (SLR and Talis) for consideration in future monitoring events.

Based on the review, the Auditor provides the following conclusions:

- Leachate impacted groundwater beneath the Site contains concentrations of ammonia, chloride, iron, and arsenic that exceed drinking water and NPUG criteria. Additionally, concentrations of nickel, iron, FHxS, and the sum of PFHxS and PFOS also exceeded drinking water criteria. Benzene concentrations at one on-site location also exceeds drinking water criteria. Furthermore, concentrations of nickel, cobalt, zinc, ammonia, and PFOs were reported above marine water criteria.
- Groundwater beneath the affected site contains concentrations of ammonia, chloride, iron, and arsenic that exceed drinking water and NPUG criteria. Additionally, concentrations of nickel, iron, FHxS, and the sum of PFHxS and PFOS also exceeded drinking water criteria. Furthermore, concentrations of nickel, cobalt, zinc, ammonia, and PFOs were reported above marine water criteria.
- The metals present in groundwater on-site and downgradient are regionally common and align with upgradient/background conditions. They are typically associated with acid sulphate soils and are prevalent in the local geology. The impact on groundwater use is mainly aesthetic, causing staining and clogging of pipework, rather than posing health risks. The Auditor considers they are a low risk to human health or the environment.
- The Site is capable of generating a significant quantity of landfill gas, including methane, carbon dioxide, hydrogen sulfide, and carbon monoxide. Methane levels in boreholes outside the waste mass exceed 1% v/v, reaching nearly 62% v/v along the northern wall of the landfill cell. The extraction system appears to be effectively mitigating methane, with minimal detections outside of the extraction well network.
- Fugitive emissions with methane concentrations above 200 ppm were reported in the western final capping area, while four locations with intermediate cover recorded concentrations above 500 ppm.
- No methane has been detected in monitoring wells outside the site boundary during 2024 events.
- The landfill gas investigation was extended to include trace gases, in response to the DoH request (6 November 2023) to '*conduct periodic assessments of trace gases, commonly associated with Class III landfill sites (ie esters, phenols, organic acids, volatile organic chloride compound solvents and sulphur compounds). Guidance on trace gases may be found in UK Environment Agency LFTGN04 v3'*. The auditor understands the SAQP was updated to include trace gases and approved by the previous auditor. Based on advice from the auditor's landfill gas expert (Mr Stuart Thurlow), it is flagged that the assessment of traces gases in individual wells especially those outside of waste is not considered best practice aligned with the "Guidance for monitoring trace components in landfill gas" UK

LFTGN04 v3. It is also highlighted from SLR (2024d) that there were a number of limitations faced regarding sampling methodology, laboratory analysis and absence of some trace gas analysis.

12.2 Recommendations

12.2.1 Groundwater Monitoring (SLR, 2025c)

The auditor generally concurs with the recommendations provided in Section 11.2 of the SLR (2025c) 2024 Groundwater Monitoring Report as summarised in the table below:

Table 21: Recommendations: Groundwater Monitoring

Item	Source	Recommended Action	Auditor opinion, comments
GW-R1	SLR (2025c)	Monitoring to be continued biannually to assess groundwater quality changes and seasonal trends.	✓Agreed
GW-R2	SLR (2025c)	Due to the presence of groundwater exceedances to the nominated risk assessment criteria in Catalina Bore 5, the bore should not be used for any abstraction/ dust suppression purposes.	✓Agreed
GW-R3	SLR (2025c)	Update the SAQP: Monitoring sampling methodology to use Hydrasleeves for all groundwater monitoring wells.	✓Agreed Noting NEPM 3.0 no longer lists hydrasleeves in the sampling methodology list, the auditor is satisfied hydrasleeves are suitable, noting that any future reporting and trend analysis should account for any potential impacts resulting from this change in sampling methodology.
GW-R4	SLR (2025c)	Update the SAQP: PFAS analysis to be conducted for key intermediate and/or deep wells which are showing increasing trends or where data gaps exist in the understanding of plume migration including BB19B, BB20C, BB21B/C, BB24B/C, BB25B. BB28C, BB35B/C, TP1A/B and CB07C.	✓Agreed
GW-R5	SLR (2025c)	Update the SAQP: Since nutrients were reported to be more elevated in the shallow wells compared to the deep wells, the full suite of nutrients should be analysed for the shallow wells only.	✓Agreed
GW-R6	SLR (2025c)	Update the SAQP: MTBE should be removed from the list of CPOCs in the absence of historical detections.	✓Agreed
GW-R7	SLR (2025c)	Delineation wells series (shallow, intermediate, deep) should be installed offsite to the west of the site, along a transect between BB24 and TPL1 and to the south of BB35 to determine the extent of the leachate plume in those directions.	✓Agreed
GW-R8	SLR (2025c)	As bore BB27A is consistently dry, consideration should be given to drilling it deeper to permanently intercept the groundwater and allow sample collection (that is to depth between 16 mbgl and 22 mbgl).	✓Agreed, in addition, consider the maintenance or replacement of BB31B which has also been dry.

Item	Source	Recommended Action	Auditor opinion, comments
GW-R9	SLR (2025c)	Annual leachate risk assessments should be undertaken to confirm the risk status of using water abstracted from the onsite bore for dust suppression purposes.	✓ Agreed
GW-10	SLR (2025c)	If the Water Corporation bore becomes operational, additional groundwater monitoring will be required to determine if the leachate plume originating from the site is impacting on groundwater resources.	✓ Agreed

12.2.2 Landfill Gas Assessment (SLR, 2025d)

The auditor generally concurs with the recommendations provided in the SLR (2025d) 2024 Landfill Gas Assessment report summarised below:

Table 22: Recommendations: Landfill Gas Assessment

Item	Source	Recommended Action	Auditor opinion
LFG-R1	SLR (2025d)	Completion of the western capping works and compaction of the cap to create an impermeable surface and reinstatement of the landfill gas extraction system across the western capping area.	✓ Agreed
LFG-R2	SLR (2025d)	Undertake a repeat fugitive emission survey across the final cap in Winter (July/August) to monitor the effectiveness of the final western cap and landfill gas extraction system and to ensure that gas levels remain controlled.	✓ Agreed
LFG-R3	SLR (2025d)	Continue with LGMRs as per the 2024 SAQP (SLR, 2024) at the site to confirm that the landfill gas concentrations observed are within historical trends and that the risk profile of the site is not changing.	✓ Agreed
LFG-R4	SLR (2025d)	Further investigation or monitoring should be considered to determine the cause of the slight increase in CH_4 and CO_2 in NEM during May and December 2024.	✓ Agreed
LFG-R5	SLR (2025d)	Continue reviewing landfill gas monitoring and extraction results to determine if the wellfield needs to be optomized or expanded.	✓ Agreed
LFG-R6	SLR (2025d)	Additional capping material is required in the eastern portion of the Intermediate Cover Area to limit fugitive landfill gas emissions.	✓ Agreed
LFG-R7	SLR (2025d)	Consideration should be made to reintegrate some of the WEM locations to the extraction network to limit diffusive flow towards the west.	✓ Agreed
LFG-R8	SLR (2025d)	Consideration should be made to having additional extraction wells in the southern portion of the landfill to mitigate the elevated landfill gas concentrations reported in monitoring well SLE19 and SEM220, SEM	✓ Agreed

Item	Source	Recommended Action	Auditor opinion
LFG-R9	SLR (2025d)	Drilling of a background landfill gas well as part of a future drilling campaign is recommended to provide assessment of background gas conditions.	✓ Agreed
LFG-R10	SLR (2025d)	Completion of periodic inspections to assess potential odour impacts from H_2S offsite and determine the need for mitigation measures.	✓ Agreed
LFG-R11	SLR (2025d)	Ongoing yearly monitoring of the final cap integrity to identify cracks and/or eroded areas by MRC as per the SMP requirements.	✓ Agreed
LFG-R12	SLR (2025d)	Regular maintenance of the landfill surface, including regrading and erosion control, will help future settlement and cap degradation by MRC as per the SMP requirements.	✓ Agreed
LFG-R13	SLR (2025d)	Upgrades/ changes to the gas extraction system as required to accommodate changing gas migration patterns and ensure effective collection.	✓ Agreed
LFG-R14	SLR (2025d)	Conduct yearly onsite building and fugitive emission surveys and an offsite utility pit survey. Conduits into building should be included in future events.	✓ Agreed
LFG-R15	SLR (2025d)	If intrusive works are proposed on the landfill or directly adjacent to it, the risk of mitigation actions depicted in the SMP must be implemented to reduce the risk of exposure.	✓ Agreed
LFG-R16	SLR (2025d)	The workshop continuous monitoring sensors should remain set at 1%v/v methane as per the relevant guidelines.	✓ Agreed
LFG-R17	SLR (2025d)	Areas surrounding the landfill should be added to the Before you Dig Australia (BYDA) register for subsurface gas risk.	✓ Agreed
LFG-R18	Auditor recommendation	The assessment of trace gases (whilst recommended by DoH) in individual wells, especially those outside of waste, is not considered best practice aligned with the guidance (UK LFTGN04 v3). The auditor recommends trace gas assessment is removed from the SAQP in locations outside of the waste mass to align with best practice.	New auditor recommendation.
LFG-R19	Auditor recommendation	It is recommended that LFG monitoring events be consolidated as much as possible and conducted on the same day using multiple personnel, rather than being spread over three days, in order to minimize the impact of weather variations.	New auditor recommendation.
LFG-R20	Auditor recommendation	For all future monitoring events, it is recommended that field calibration of instruments should be undertaken whenever drift is apparent.	New auditor recommendation.

12.2.3 Leachate Management Plan (Talis, 2025)

The auditor generally concurs with the leachate management strategy as provided in section 6 of the Talis (2025) Leachate Management Plan, noting these actions were developed in consultation with DWER, separate to auditor involvement. Where relevant to this MAR, and in particular in relation to potential impact to leachate generation, further comments are provided below.

Table 23: Leachate Management Plan Strategy

Item	Source	Recommended Action	Auditor opinion
Short Term Solutions			
LMP S1-S2	Talis (2025)	(these actions relate to Batter 1 pond which has subsequently been decommissioned)	NA
LMP-S3.1	Talis (2025)	Continue application of cover material: Excessive cover material will continue to be applied on the landfill area to help minimis leachate generation and odours.	✓ Agreed
LMP-S4	Talis (2025)	Reactivate lined leachate evaporation mats.	✓ Agreed Consider including odour suppressants to reduce odour.
LMP-S5	Talis (2025)	Resumption of leachate irrigation	✓ Agreed This is supported by the auditor as it will assist in reducing leachate levels.
LMP-S6	Talis (2025)	Construction of Temporary Leachate Evaporation Ponds.	✓ Agreed This is supported noting that temporary ponds should only be constructed on existing lined cells.
LMP-S7	Talis (2025)	Leachate to sewer option – Pilot Trial	✓ Agreed This is supported by the auditor as any strategy to treat/reduce/remove leachate will assist in reducing leachate levels.
Long – Term Solutions			
LMP-L1	Talis (2025)	Future acceleration of progressive capping.	✓ Agreed This is supported as it should reduce leachate generation (and minimise landfill gas emissions).
LMP-L2	Talis (2025)	Delivery and capping of the proposed Southern Piggyback Cell.	✓ Agreed
LMP-L3	Talis (2025)	Construct the Permanent Leachate Ponds.	✓ Agreed This strategy is supported to improve management of leachate.
LMP-L4	Talis (2025)	Leachate to sewer assessment (based on findings of Pilot Trial, LMP-S7 above)	✓ Agreed This is supported by the auditor as it will assist in reducing leachate levels.

Item	Source	Recommended Action	Auditor opinion
LMP-L5	Auditor recommendation	It is understood the action of tankering away leachate for off-site disposal has been reviewed previously and considered unfeasible due to the quality of leachate (not accepted) and/or the financial cost limitations. The auditor recommends this option is re-evaluated following the results of the leachate pilot trial.	New auditor recommendation.

12.2.4 EPN:10: Groundwater Risk Assessment Recommended actions and Timeline

The auditor is required to address the following requirement of EPN-10:

- *d: Include recommended actions to mitigate any assessed increased risk to groundwater and a proposed timeline for implementing the recommendations.*

The following table summarises the recommended actions and timeframes as presented in Table 23 of SLR (2025e) and additional recommendations/comments where required.

Table 24: Summary of EPN-10 (d) Recommendations and Timeframes

Item	Source	Recommended Action	Auditor Opinion
Timeframe: Immediate (2 weeks)			
1	SLR (2025d)	Measures to manage leachate levels outlined in the LMP (Talis, 2025) should be implemented as suggested.	✓ Agreed
2	SLR (2025d)	Due to the presence of groundwater exceedances to the nominated risk assessment criteria in Catalina Bore 5, the bore should not be used for extraction or dust suppression. However, it is understood that the bore is currently not in use, and potential mislabelling may have led to erroneous results.	✓ Agreed
Timeframe: Short Term (1 Year)			
3	SLR (2025d)	Delineation wells (shallow, intermediate, and deep) should be installed offsite to the west of the Premises along a transect between BB24 and TPL1, and to the south of BB35, to determine the extent of the leachate plume in those directions.	✓ Agreed
4	SLR (2025d)	As part of ongoing GMEs, it is recommended to include iron speciation and analysis of both total and dissolved manganese in leachate and groundwater. This will support the differentiation of potential source contributions and enhance evaluation of monitored natural attenuation (MNA) processes in groundwater.	✓ Agreed
Timeframe: Medium to Long Term (>1 Year)			
5	SLR (2025d)	Groundwater monitoring should continue under the SMP/SAQP to evaluate the stability of the leachate plume.	✓ Agreed
6	SLR (2025d)	Annual leachate risk assessments should be undertaken to confirm the risk status of using water from the onsite bore for dust suppression.	✓ Agreed

Item	Source	Recommended Action	Auditor Opinion
7	SLR (2025d)	If the Water Corporation bore becomes operational, additional groundwater monitoring will be necessary to assess whether the leachate plume from the site is impacting on groundwater resources.	✓ Agreed
8	SLR (2025d)	If required due to a change in the site's risk profile, additional groundwater monitoring wells should be installed to enable differentiation between leachate sources originating from Stage 1 and Stage 2. This should be informed by a groundwater monitoring network integrity assessment (i.e. review of well construction details, surveys, piezometric contours etc) to ensure that any monitoring wells are ideally located to help differentiate between the two leachate sources.	✓ Agreed

12.2.5 Parcel-Specific Recommendations for Classifications

The following parcel-specific classification recommendations are based on information reviewed regarding the groundwater contamination plume and LFG impacts. Contamination relating to soil, soil vapour, surface water (such as onsite sumps and ponds etc.) and sediments have not been considered. Hence this is specific to groundwater and LFG contamination only.

Table 25: Source Site – Parcel-Specific Recomendations for Classification – Part of Lot 9020 on Plan 408820 (TPWF Prescribed Premise)

Current Nature and Extent of Contamination **Part of Lot 9020 on Plan 408820 (Volume 4007, Folio 807)**					
Groundwater	**Landfill Gas**	**Soil**	**Soil Vapour**	**Surface Water**	**Sediments**
Nutrients: ammonia **Major Anions:** Chloride **PFAS:** PFOS, PFHxS and Sum of PFOS and PFHxS **Metals:** arsenic, nickel, cobalt, iron and zinc **BTEXN:** Benzene **Other:** E.coli is noted to be sporadically present in groundwater at isolated locations. **Refer to Table 16 and Table 17 and Section 7.4 for specific exceedances**	CH_4, H_2S, CO_2 and CO **Refer to Section 7.4.3 for specific exceedances** The extraction system appears to be effectively mitigating methane with negligible detections outside of the extraction well network.	NA	NA	NA	NA
Suitability for use					
Suitable for ongoing use as a Class II landfill, subject to implementation of a site management plan to prevent exposure to landfill gas, soil and groundwater contamination. The land use is restricted to the current commercial/industrial use and configuration and shall not be developed for any other purposes without further contamination assessment or remediation. Ongoing assessment of landfill gas and groundwater should be conducted as part of an ongoing SMP to inform long term trends and to inform the need or otherwise for mitigation measures.					
Proposed Classification					
No change in classification *'Contaminated-Remediation Required'*					

Restrictions on Use {for Contaminated-Remediation Required, Remediated for Restricted Use, Contaminated-Restricted Use}
The land use is restricted to current commercial/industrial use and configuration and shall not be developed for any other purposes without further contamination assessment or remediation. *Groundwater should not be abstracted for drinking purposes without appropriate treatment and testing to confirm its suitability.*

Table 26: Affected Site – Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903

Current Nature and Extent of Contamination **Previously known as portion of Lot 9043 – Subject Area N1 on Deposited Plan 424903**					
Groundwater	**Landfill Gas**	**Soil**	**Soil Vapour**	**Surface Water**	**Sediments**
Nutrients: ammonia **Metals**: arsenic, cobalt, iron and zinc **PFAS:** PFOS, and Sum of PFOS and PFHxS **Refer to Table 16 and Table 17 and Section 7.4 for specific exceedances**	CH_4, H_2S, CO_2 and CO. No methane has been recorded in recent events at monitoring wells outside the Site boundary. **Refer to Section 7.4.3 for specific exceedances**	NA	NA	NA	NA
Suitability for use					
Site remains suitable for its *current use as a development ''buffer zone''.* May not be suitable for more sensitive uses without further investigation and remediation.					
Proposed Classification					
No change in classification *Contaminated-Restricted use*					
Restrictions on Use {for Contaminated-Remediation Required, Remediated for Restricted Use, Contaminated-Restricted Use}					
The land use is restricted to current zone as a development ''buffer zone'' and shall not be developed for any other purposes without further contamination assessment or remediation. *Groundwater should not be abstracted for drinking purposes without appropriate treatment and testing to confirm its suitability.*					

13. Compliance with EPN-10

This MAR has been prepared to specifically address the requirements of EPN-10. Table 27 below summarises the auditor's opinion on the compliance with achieving EPN-10:

Table 27: Auditor Opinion of Compliance with EPN-10

EPN-10 Requirement: The groundwater risk assessment must:	Report reference/ relevant Section of MAR	Compliance achieved
a: Be undertaken by a **contaminated sites auditor**	*MAR has been prepared and delivered in accordance with EPN-10 requirements.*	✓
b: Include an update to the Mandatory Auditors Report (MAR) that includes specific discussion around risk to groundwater from elevated leachate head, including a review of the historic MAR data, with a specific focus on potential trends in leachate head and plume characteristics	*Refer MAR Section 7 and 8.2.*	✓
c: assess the likely risks to groundwater quality from any increased risk of seepage through the landfill liner.	*Refer MAR Section 8.2*	✓
d: Include recommended actions to mitigate any increased risk to groundwater and a proposed timeline for implementing the recommendations	*Refer MAR Section 12.2.4*	✓

14. Statements

The following signed statements are included in Appendix A:

- A statement identifying and signed by the person who engaged the auditor to product the MAR (DWER Form H);
- A statement signed by the auditor in relation to the accuracy of information in the MAR (DWER Form I); and
- A statement signed by the auditor's supporting expert (Stuart Thurlow) in relation to expert advice provided during the audit (DWER Form J).

15. References

The following documents have either been referred to in this report or the document noted as being relevant for obtaining further information.

Legislation and Guidelines

Australian Drinking Water Guidelines 6 2011, Version 3.8 Updated September 2022 (ADWG, 2022).

ANZECC (2000) Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), Australian and New Zealand Guidelines for Marine and Freshwater.

AS4482.1 (2005) Australian Standard AS4482.1, Guide to the Sampling and Investigation of Potentially Contaminated Soils: Part 1 Non-Volatile and Semi Volatile Substances (recently withdrawn).

AS4482.2 (2005) Australian Standard AS4482.2, Guide to the Sampling and Investigation of Potentially Contaminated Soils: Part 2 Volatile Substances (recently withdrawn).

ASC NEPM (1999) National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013). National Environmental Protection Council (NEPC).

AS/NZS 5667.1 (1998) Australian/New Zealand Standard AS/NZS 5667.1, Water Quality –Sampling, Part 1: Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples.

AS/NZS 5667.11 (1998) Australian/New Zealand Standard (AS/NZS 5667.11), Water Quality –Sampling, Part 11: Guidance on Sampling of Groundwaters.

British Standards Institution (2019) – BS 8485:2014+A1:2019 Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings (BSI, 2019).

BS 8576 (2013) Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).

CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings (Publication C665).

CRC CARE (2019): National Remediation Framework, Guideline on performing remediation options assessment, August 2019.

DoH (2021) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia.

DWER (2021) Assessment and Management of Contaminated Sites.

DWER (2024a) Requirements for Mandatory Auditors' Reports, July 2024, Department of Water and Environmental Regulation, Perth, Western Australia.

DWER (2024b) The Western Australian Contaminated Sites Auditor Scheme, Contaminated Sites Guidelines, July 2024, Department of Water and Environmental Regulation, Perth, Western Australia.

DWER (2024c) Accreditation of Contaminated Sites Auditors, Contaminated Sites Guidelines, July 2024, Department of Water and Environmental Regulation, Perth, Western Australia.

DWER (2021) Assessment and Management of Contaminated Sites, Contaminated Sites Guidelines, November 2021, Department of Water and Environment Regulation, Perth, Western Australia.

Environment Agency Wales (2010) Guidance for monitoring trace components in landfill gas (LFTGN04 v 3.0) (2010).

EPA Victoria (2015) Best practice environmental management – Siting, design, operation and rehabilitation of landfills, (Publication 788.3).

Government of WA *Contaminated Sites Act 2003.*

Government of WA *Contaminated Sites Regulations 2006.*

HEPA (2020) PFAS National Environmental Management Plan (NEMP) 2.0, Heads of EPA Australia and New Zealand 2020 (now superseded).

HEPA (2025) PFAS National Environmental Management Plan (NEMP) 3.0, Heads of EPA Australia and New Zealand 2025.

NEPC (1999) (as amended 2013) National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM).

New South Wales Environment Protection Authority (2020) – Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases (NSW EPA, 2020).

NHMRC, NRMMMC (2011) Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

NSW EPA (2016) Environmental Guidelines for Solid Waste Landfills.

NSW EPA (2020) Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gases.

VIC EPA (2015) Siting, design, operation and rehabilitation of landfills. Best Practice Environmental Management (BPEM), publication 788.3.

World Health Organisation (WHO) (2011) Guidelines for Drinking-water Quality.

Technical Reports

360 Environmental (2023) 2022 Landfill Gas Assessment, Tamala Park Waste facility, 1700 Marimon Avenue, Tamala Park, WA, Rev2, dated 28 September 2023.

Energy Developments Pty Ltd (2023) Tamala Park Landfill Gas Management Plan, Rev 0, dated 27 February 2023.

Energy Developments Pty Ltd (2024) Tamala Park LFG Infrastructure Report Overview, Rev 0, dated 12 December 2024.

Senversa (2023) Mandatory Auditor's Report, Tamala Park Landfill, 1700K Marmion Ave, Tamala Park, 19 October 2023 (2023 MAR).

SLR Consulting Australia (2024a) Sampling and Analysis Quality Plan – Groundwater Monitoring, Tamala Park waste Facility – 1700 Marmion Avenue, Tamala Park, WA, Revision 02, dated 8 February 2024.

SLR Consulting Australia (2024b) Sampling and Analysis Quality Plan – Landfill Gas Investigation, Tamala Park waste Facility – 1700 Marmion Avenue, Tamala Park, WA, Revision 01, dated 30 May 2024.

SLR Consulting Australia (2024c) Site Management Plan, Tamala Park Landfill waste Facility, Revision 02, dated 8 August 2024.

SLR Consulting Australia (2025a) Response to Environmental Protection Notice Item 3 – Tamala Park Waste Facility, dated 13 January 2025.

SLR Consulting Australia (2025b) EPN-5 Landfill Gas System Review, Tamala Park Waste Management Facility, Revision 0.1, dated 12 February 2025.

SLR Consulting Australia (2025c) 2024 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Revision 0.2, dated 12 February 2025.

SLR Consulting Australia (2025d) 2024 Landfill Gas Assessment Tamala Park waste Facility, Revision 02, dated 17 March 2025.

SLR Consulting Australia (2025e) EPN-10: Groundwater Risk Assessment, Tamala Park Waste Facility, Revision 4, dated 28 March 2025.

Talis Consultant (2023) 2022 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Version 4.0, dated 29 September 2023.

Talis Consultants (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, Version 4, dated 28 February 2025.

16. Limitations of the Report

The conclusions presented in this report are relevant to the condition of the Site and the state of legislation currently enacted as at the date of this report. They depend on the accuracy and truthfulness of the environmental reports provided by SLR and Talis on behalf of MRC.

I have used a degree of skill and care required as an Auditor under DWER's Contaminated Sites Guidelines, The Western Australian Contaminated Sites Auditor Scheme (DWER 2024b). Conclusions are based on representative samples of locations at the Site, the intensity of those samples being in accordance with the usual levels of testing carried out for this type of investigation.

The overall objectives of this MAR are specified in Section 1.5. In reaching conclusions, I have not made an unsupported or unreasonable technical assumptions. The MAR relates only to below groundwater contamination and off-site impacts from soil, groundwater and landfill gas and does not include evaluation of geotechnical issues or any other issues associated with the Site not otherwise specified in the report.

Figures

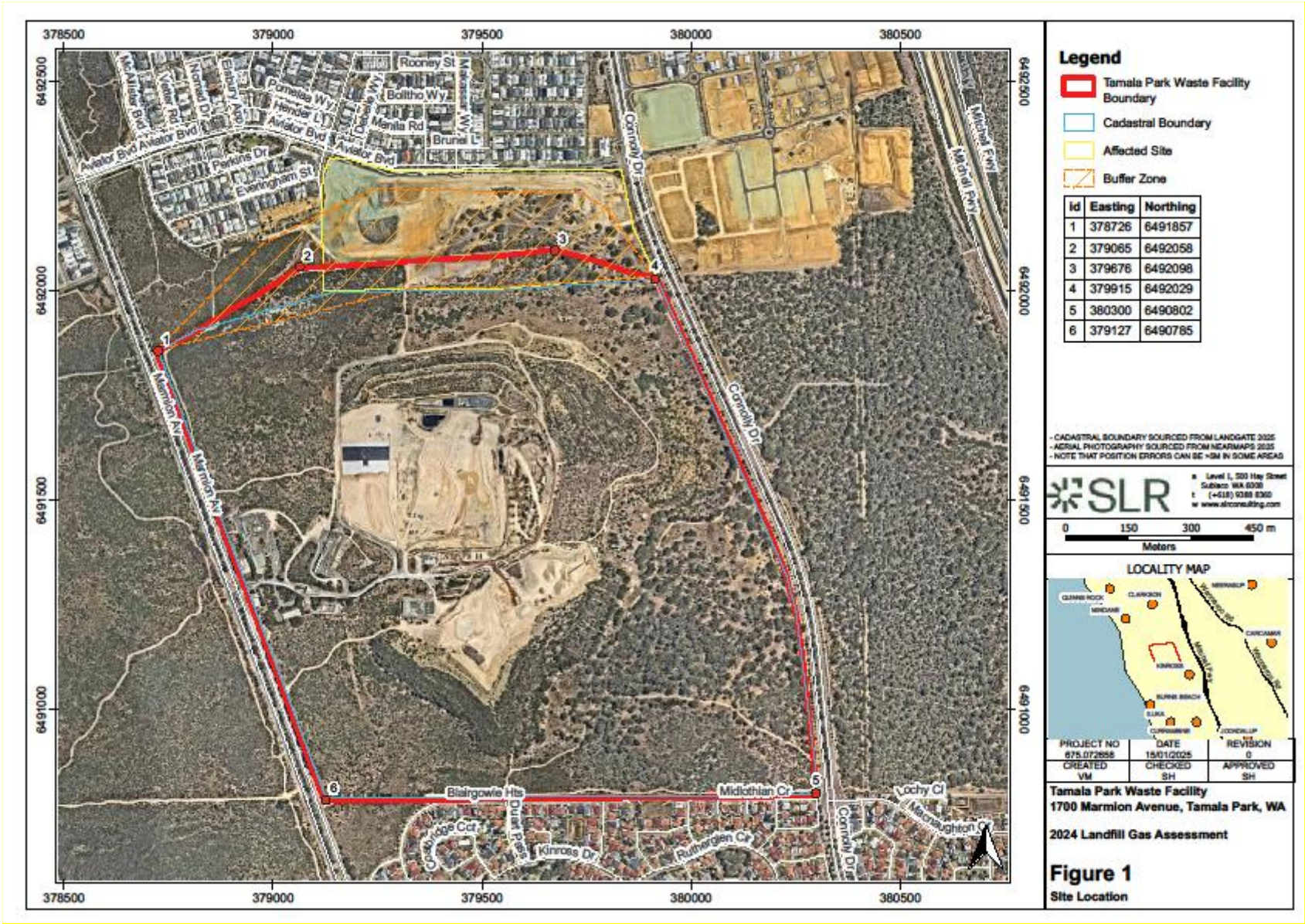

Figure 1: Site Location
(Source: SLR, 2025d)

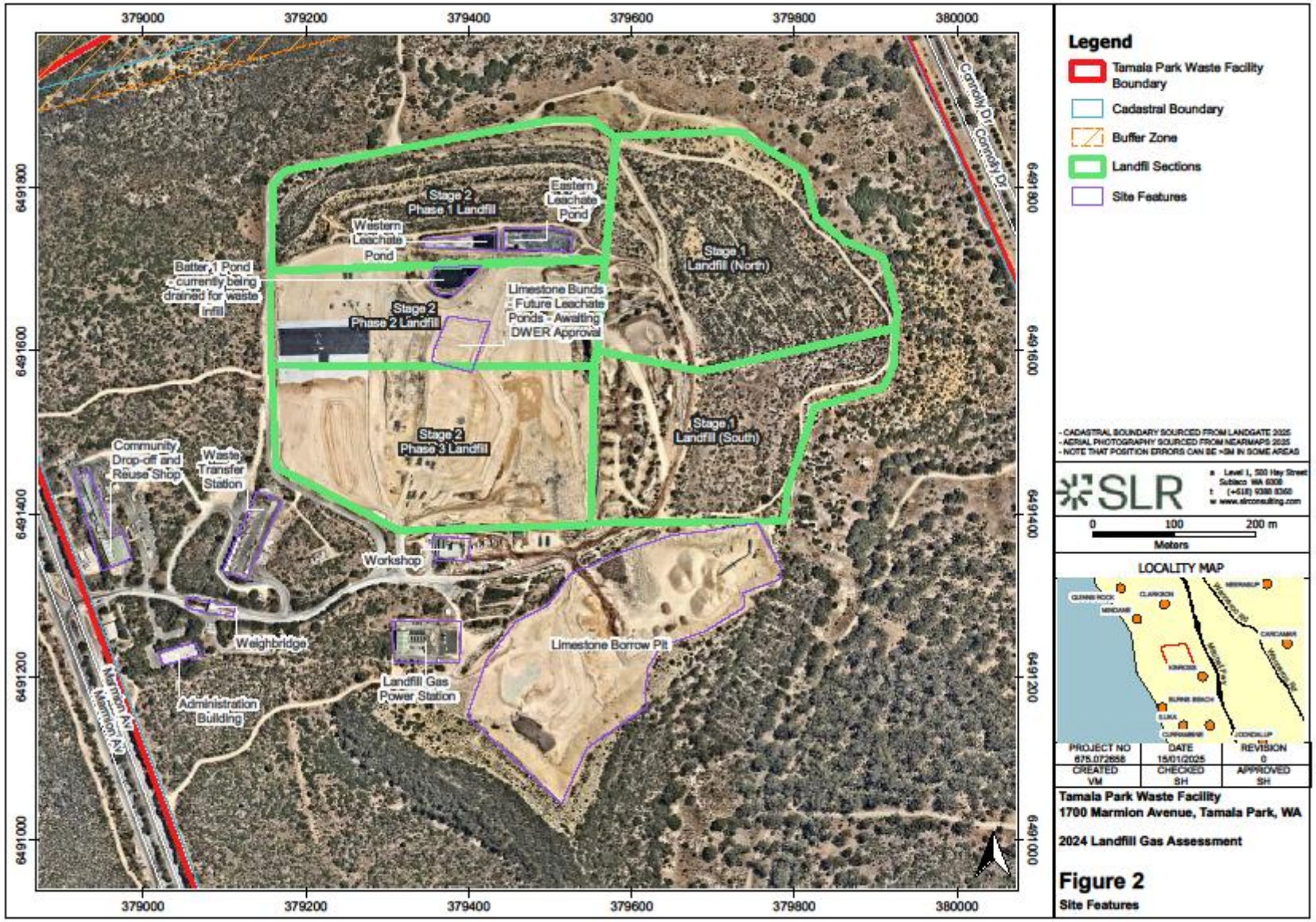

Figure 2: Site Layout
(Source: SLR, 2025d)

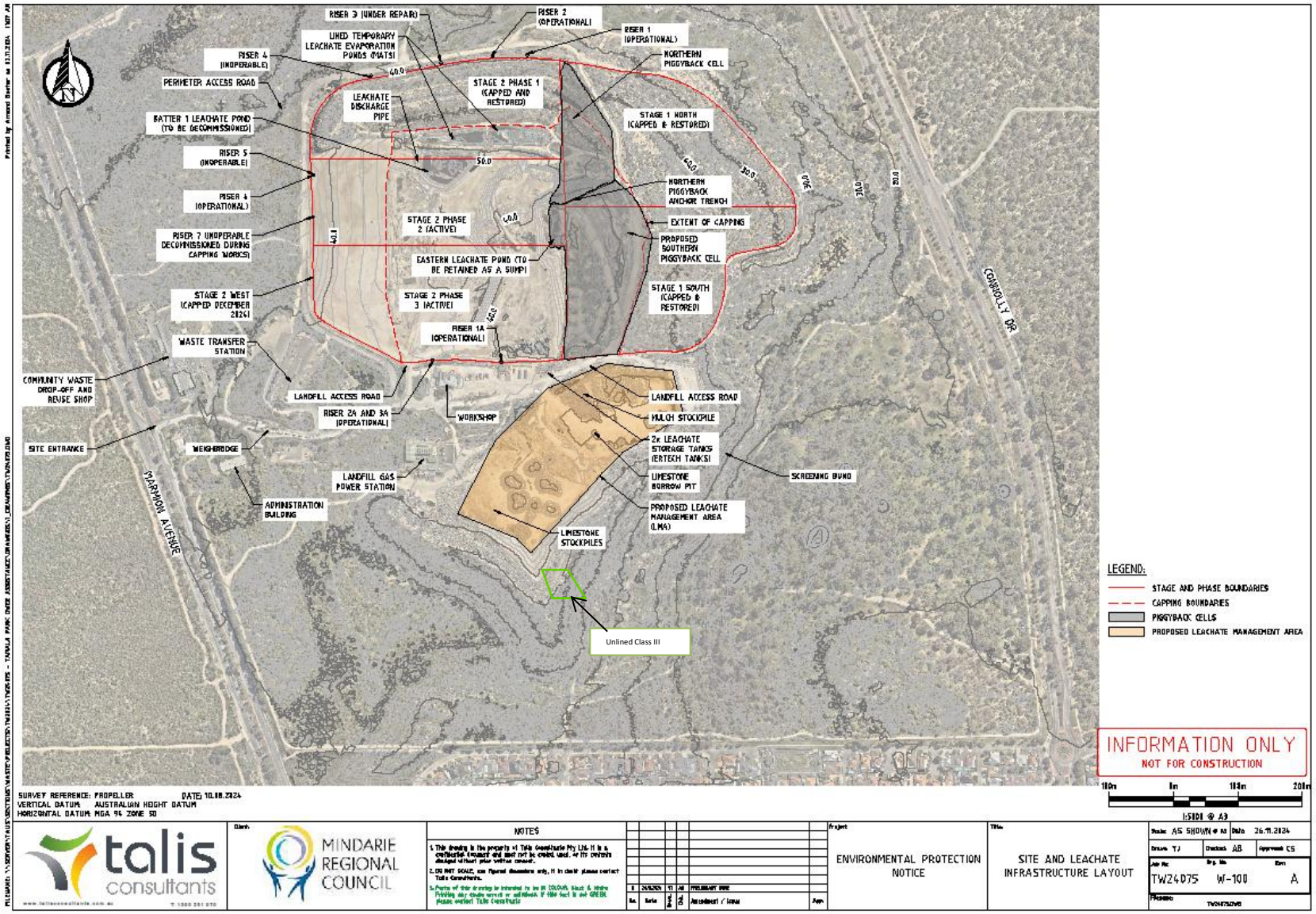

Figure 3: Leachate Infrastructure Layout
(Source: Talis, 2025)

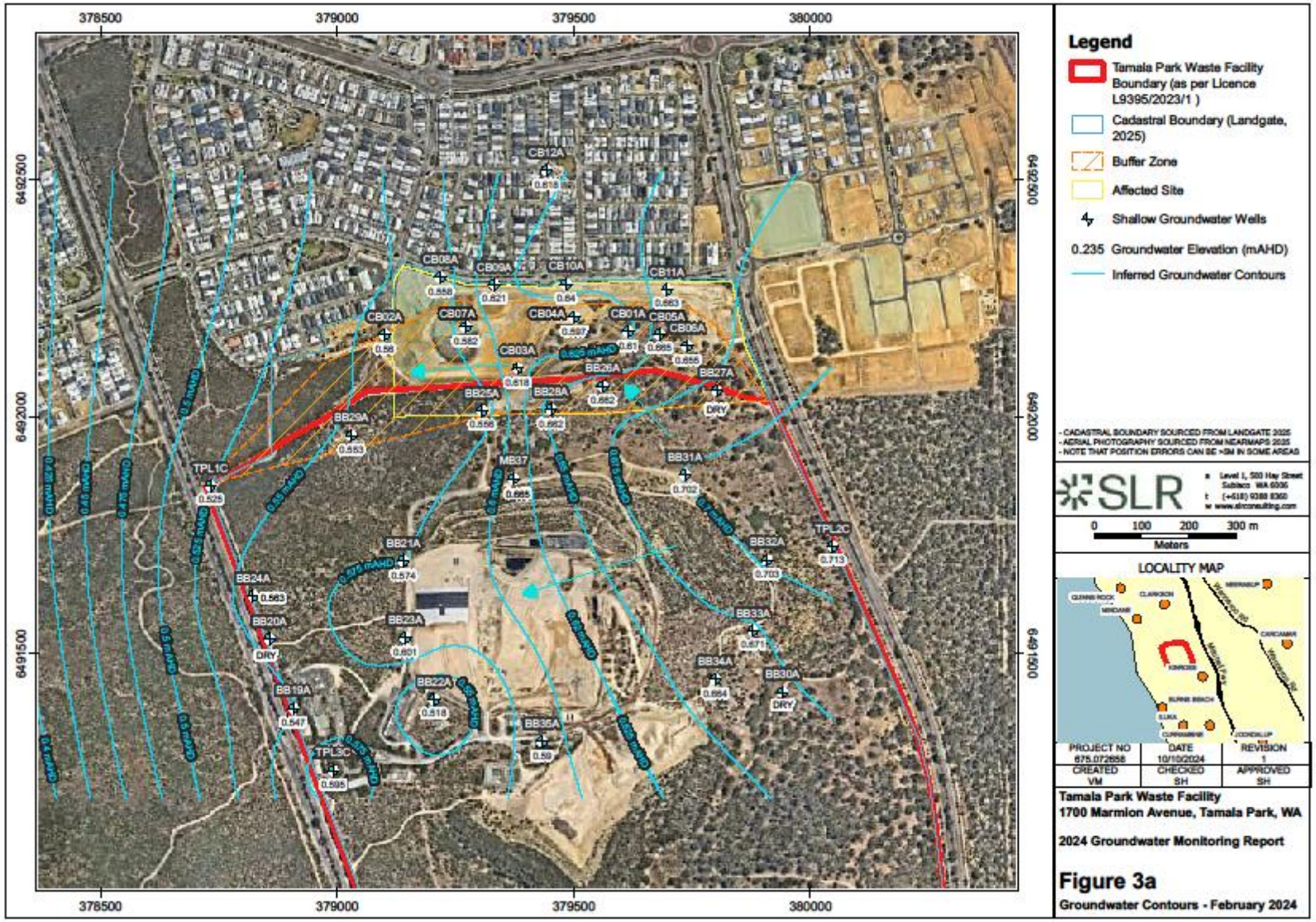

Figure 4: Groundwater Contour Plan – February 2024
(Source: SLR, 2025c)

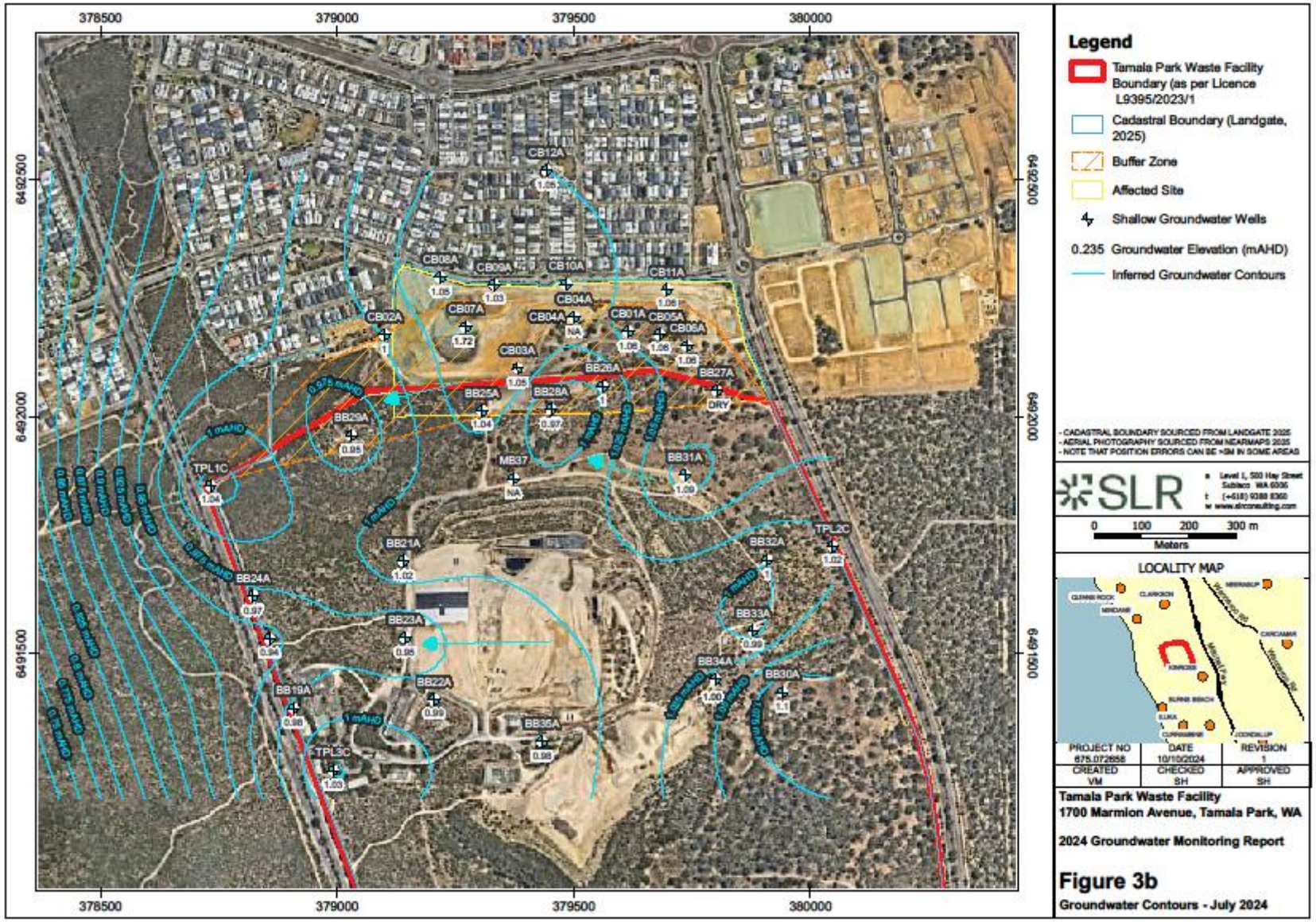

Figure 5: Groundwater Contour Plan – July 2024
(Source: SLR, 2025c)

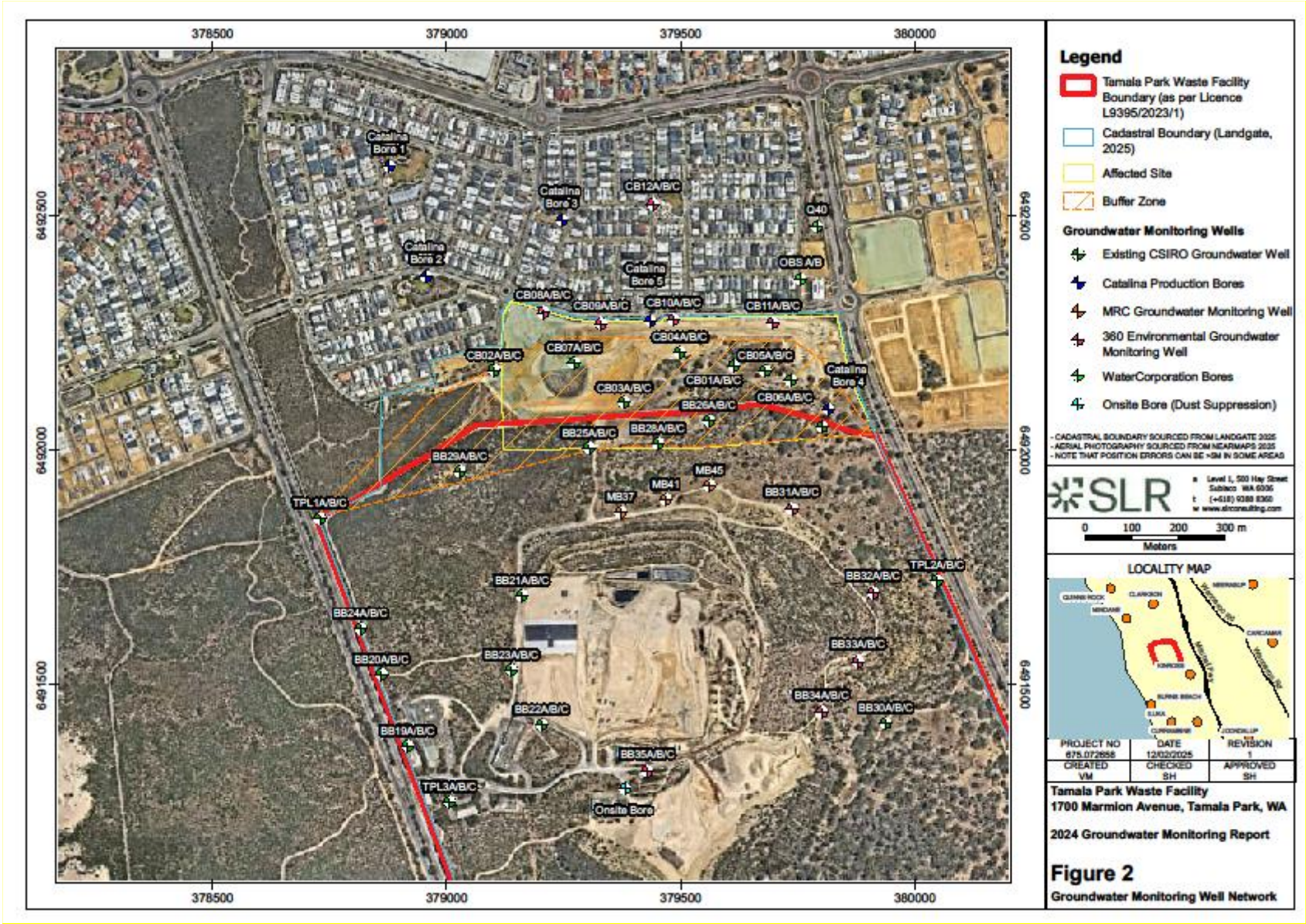

Figure 6: Groundwater Monitoring Well Network
(Source: SLR, 2025c)

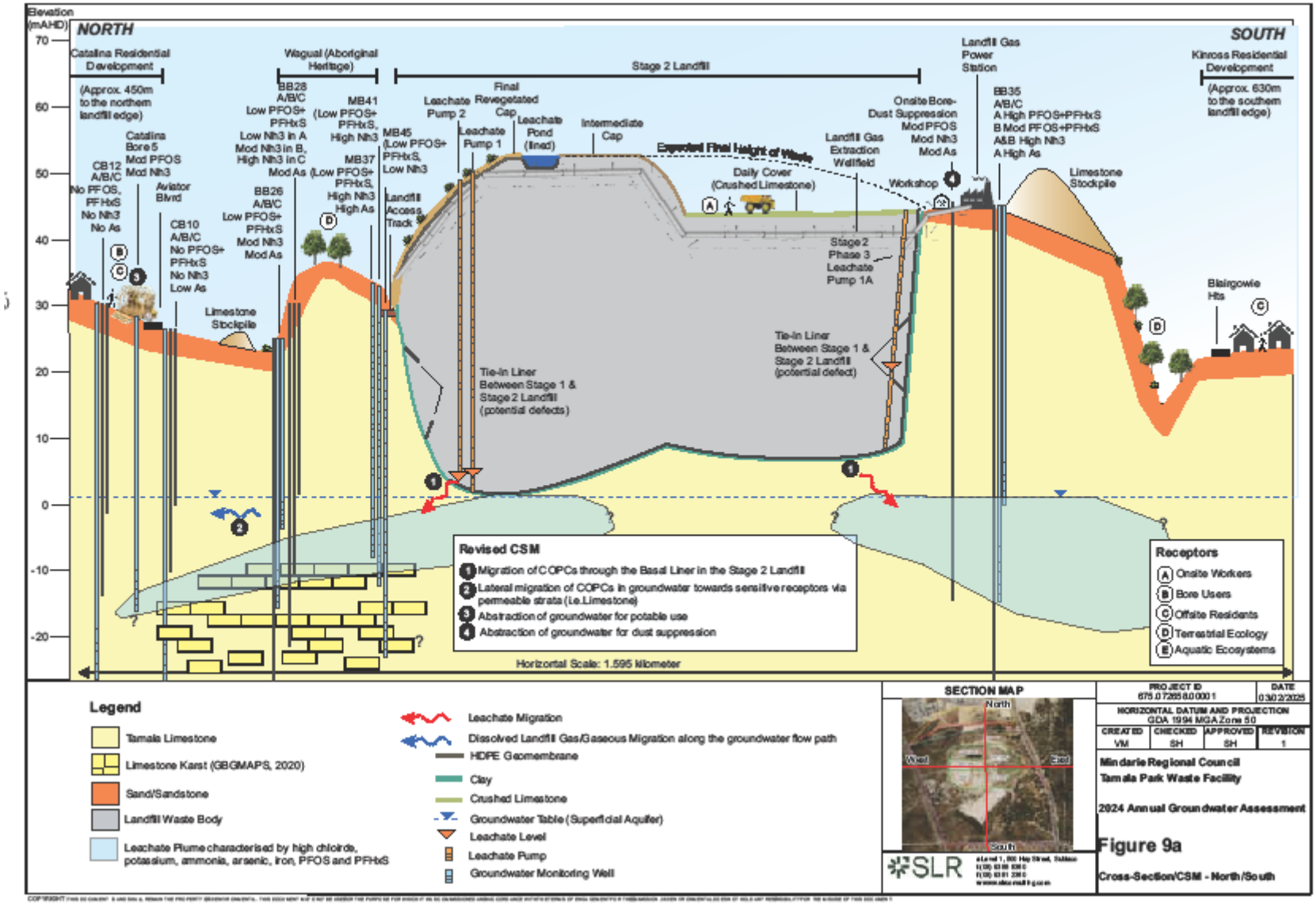

Figure 7: Groundwater Cross-Section/Conceptual Site Model – North – South
(Source: SLR, 2025c)

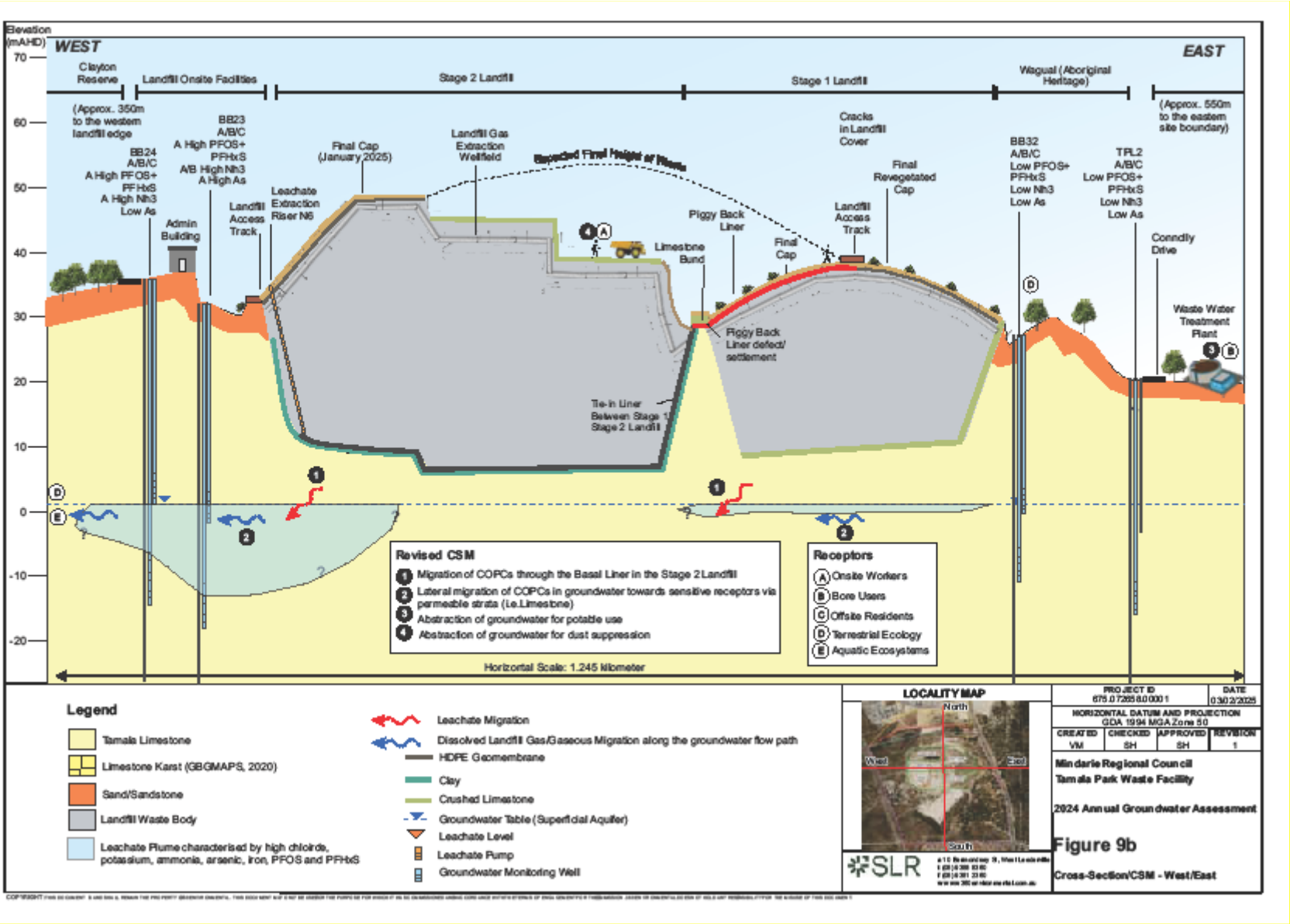

Figure 8: Groundwater Cross-Section/Conceptual Site Model – West – East
(Source: SLR, 2025c)

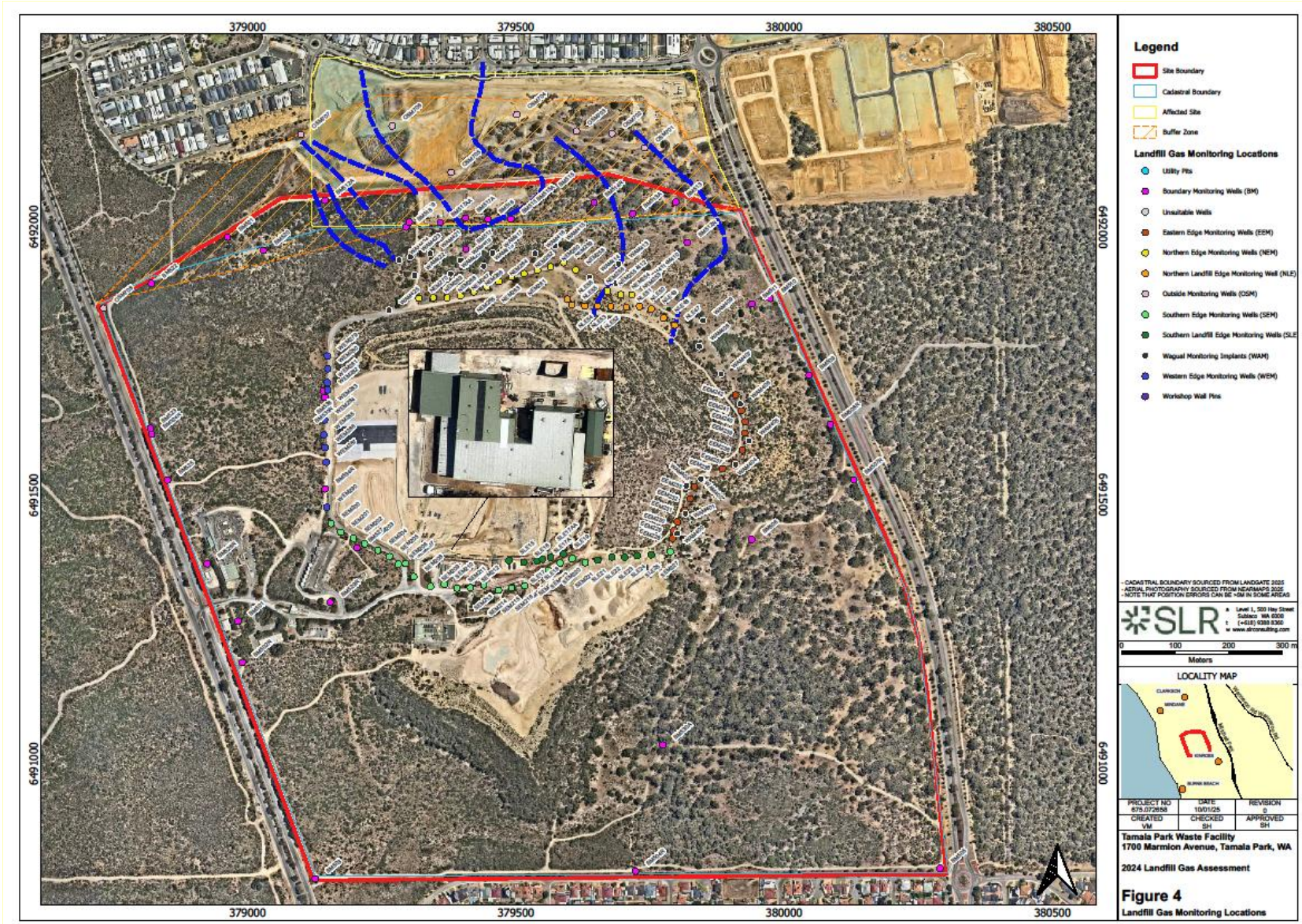

Figure 9: Landfill Gas Monitoring Locations
(Source: SLR, 2025d)

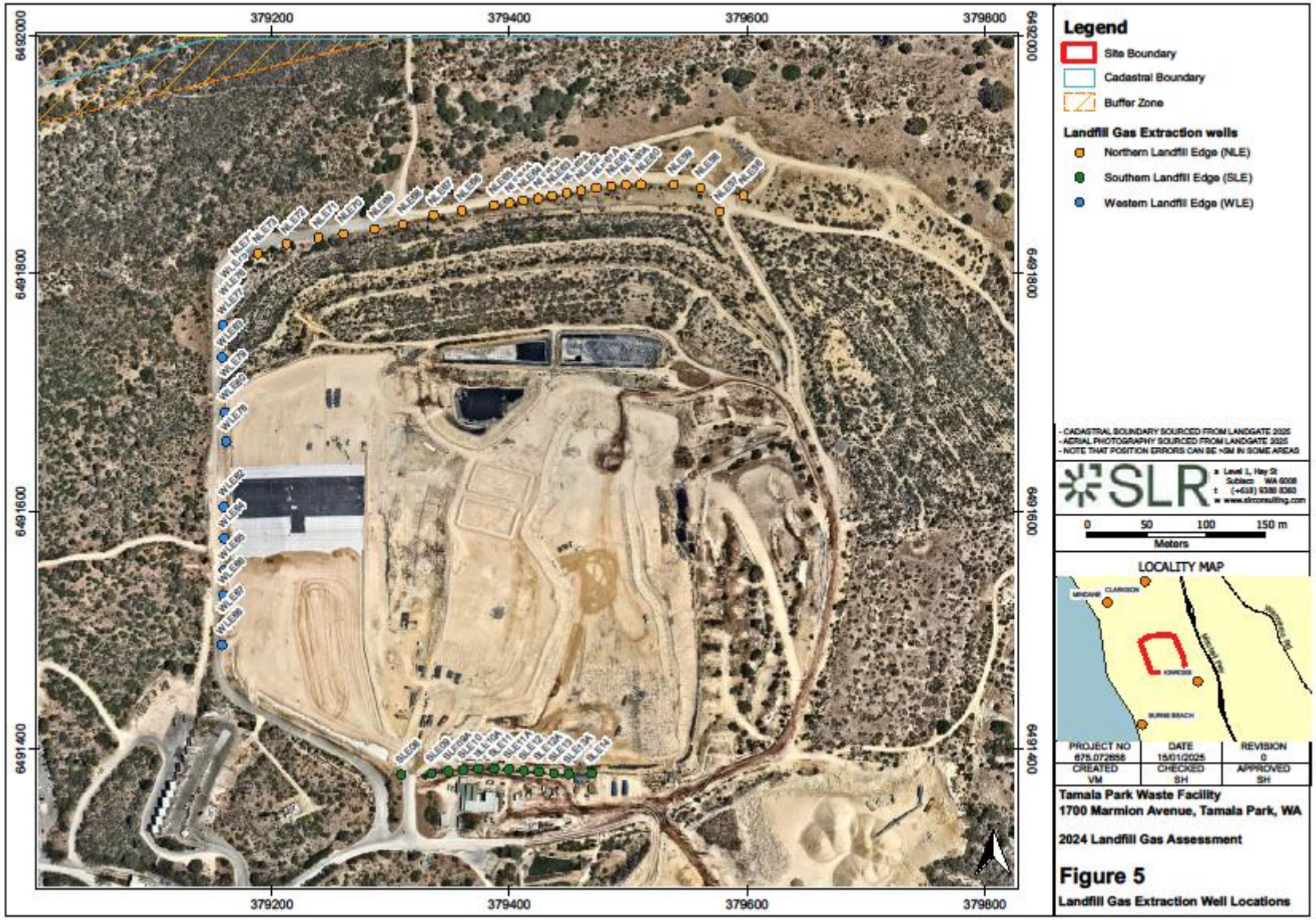

Figure 10: Landfill Gas Extraction Well Locations
(Source: SLR, 2025d)

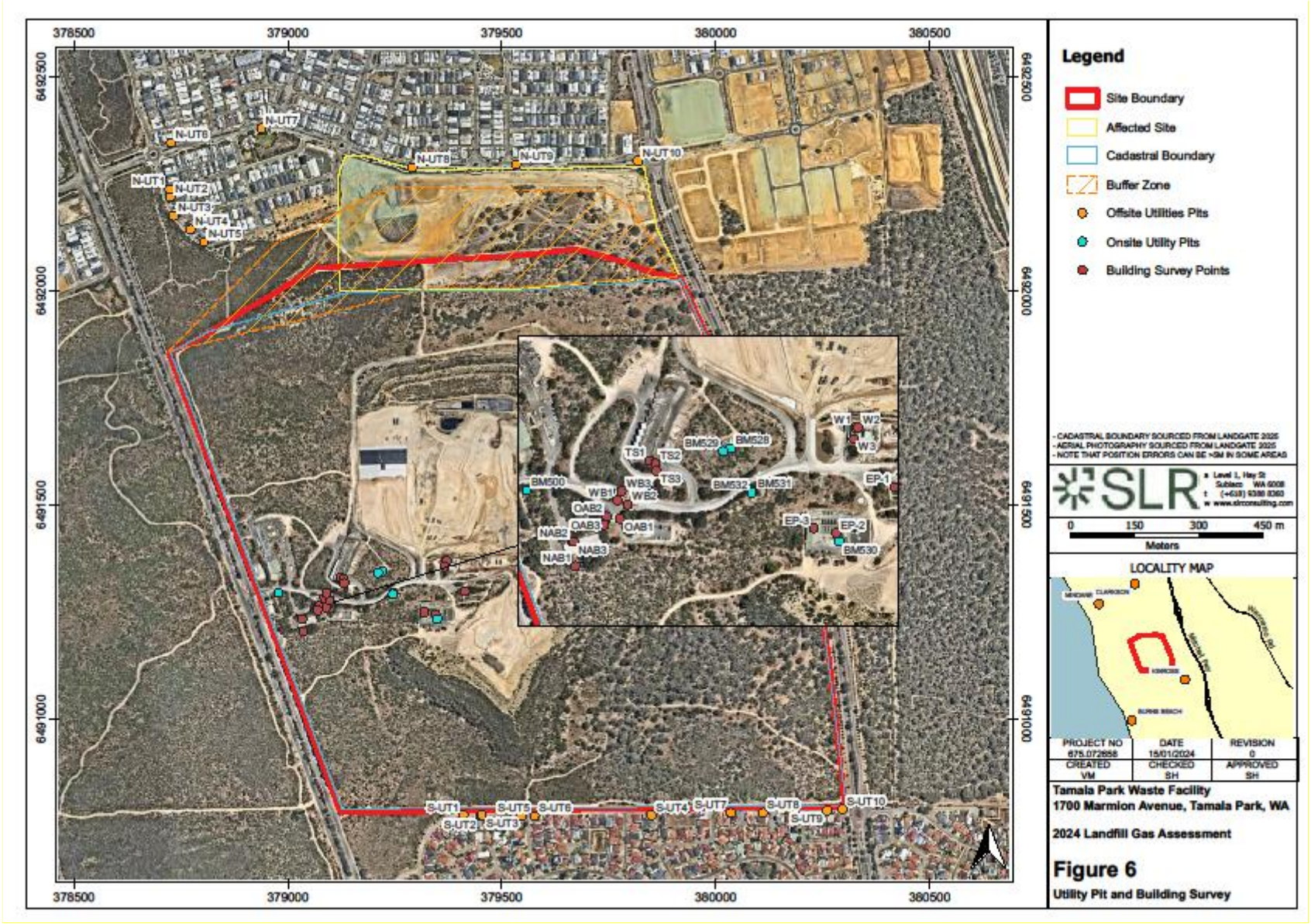

Figure 11: Utility pit and Building Survey
(Source: SLR, 2025d)

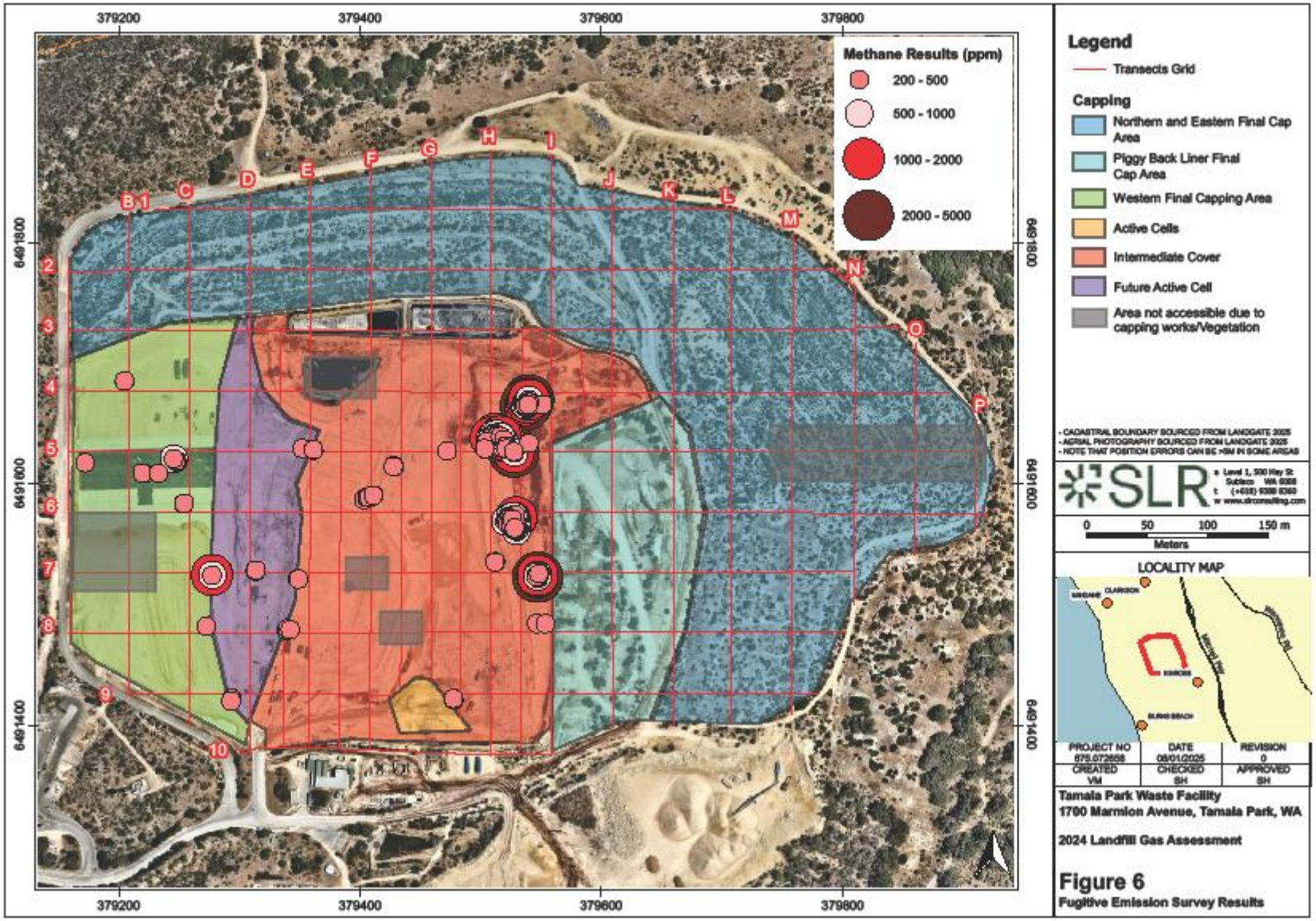

Figure 12: Fugitive Emission Survey Results
(Source: SLR, 2025d)

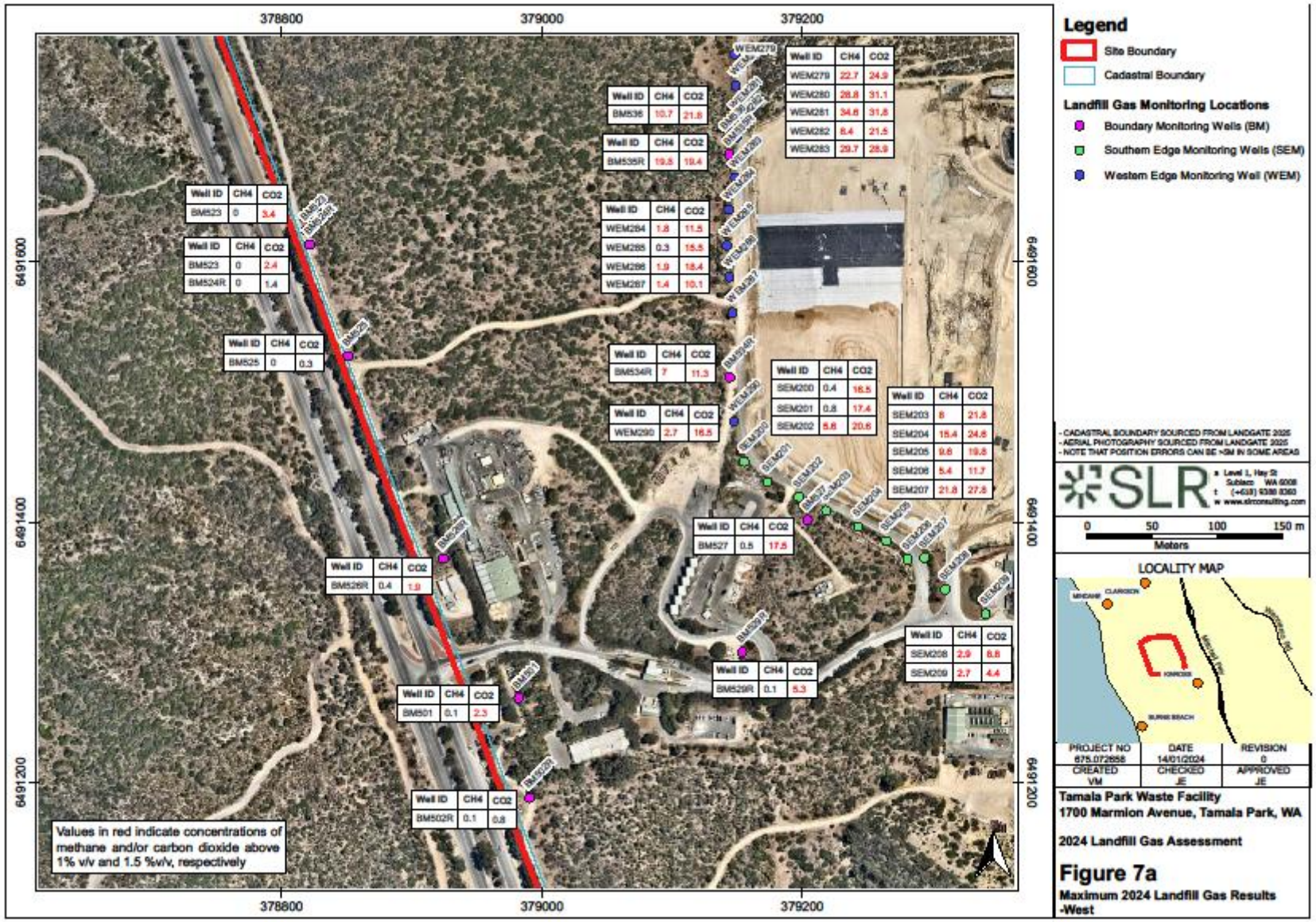

Figure 13: Maximum 2024 Landfill Gas Results – West
(Source: SLR, 2025d)

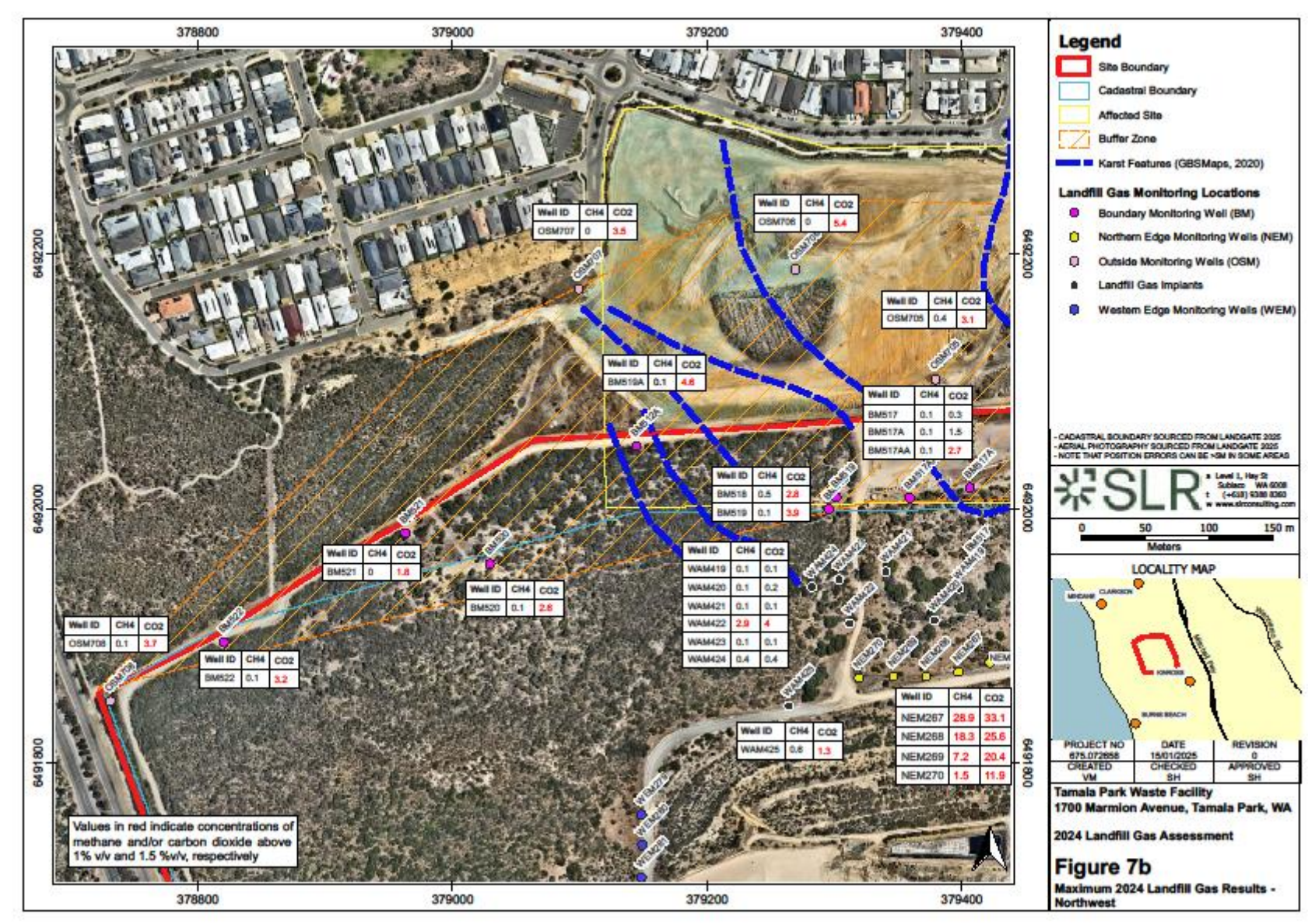

Figure 14: Maximum 2024 Landfill Gas Results – Northwest
(Source: SLR, 2025d)

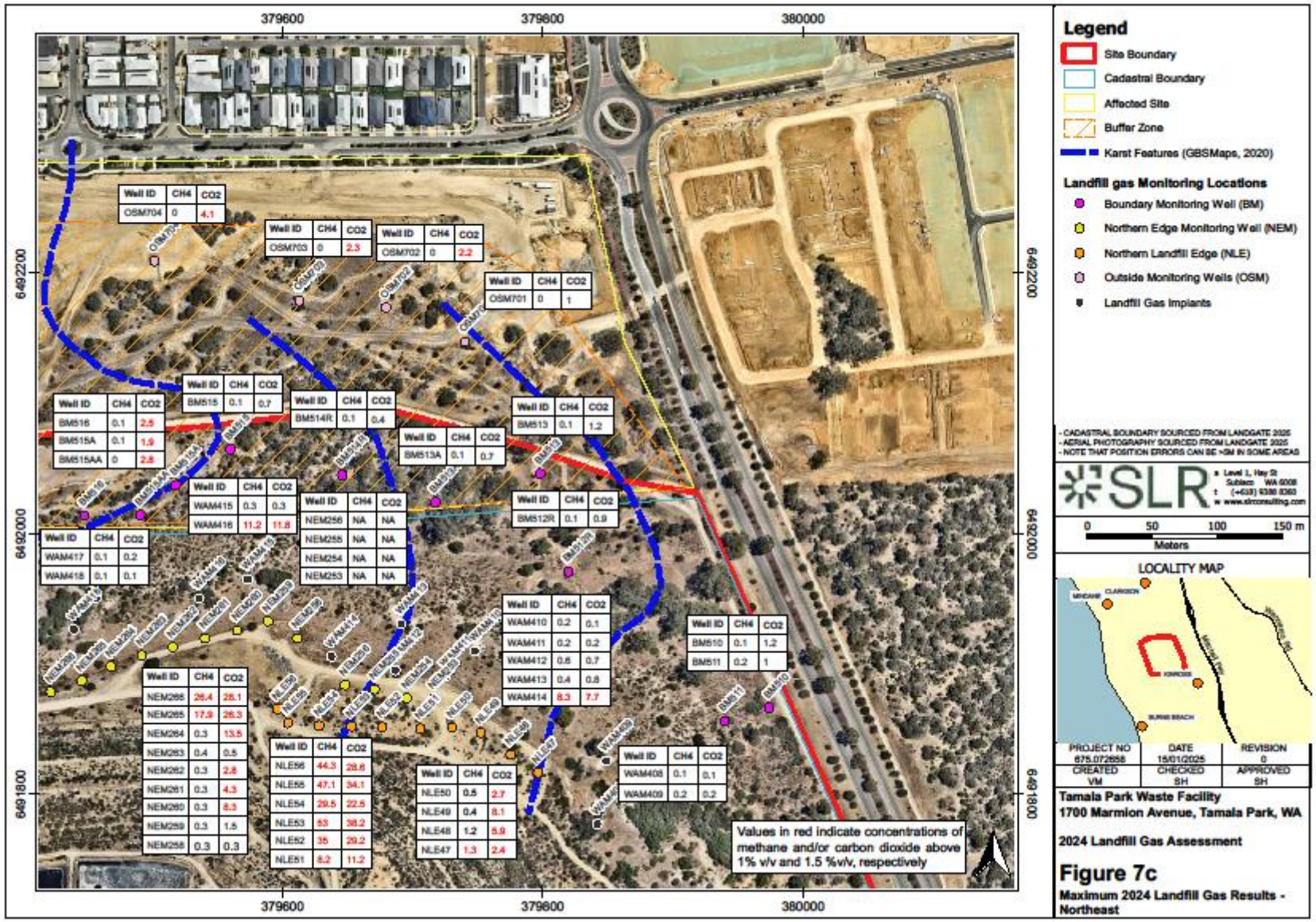

Figure 15: Maximum 2024 Landfill Gas Results – Northeast
(Source: SLR, 2025d)

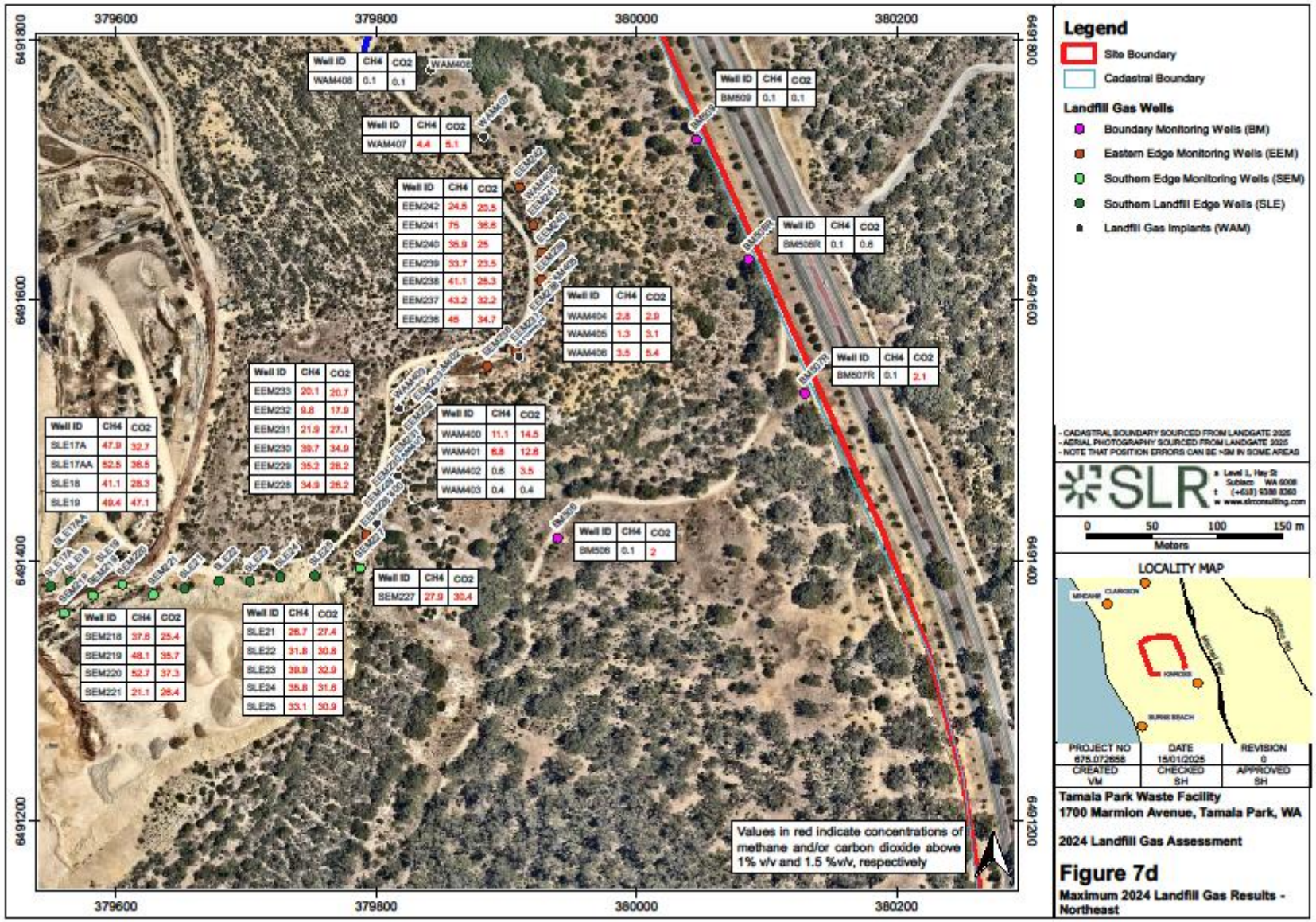

Figure 16: Maximum 2024 Landfill Gas Results – Northeast
(Source: SLR, 2025d)

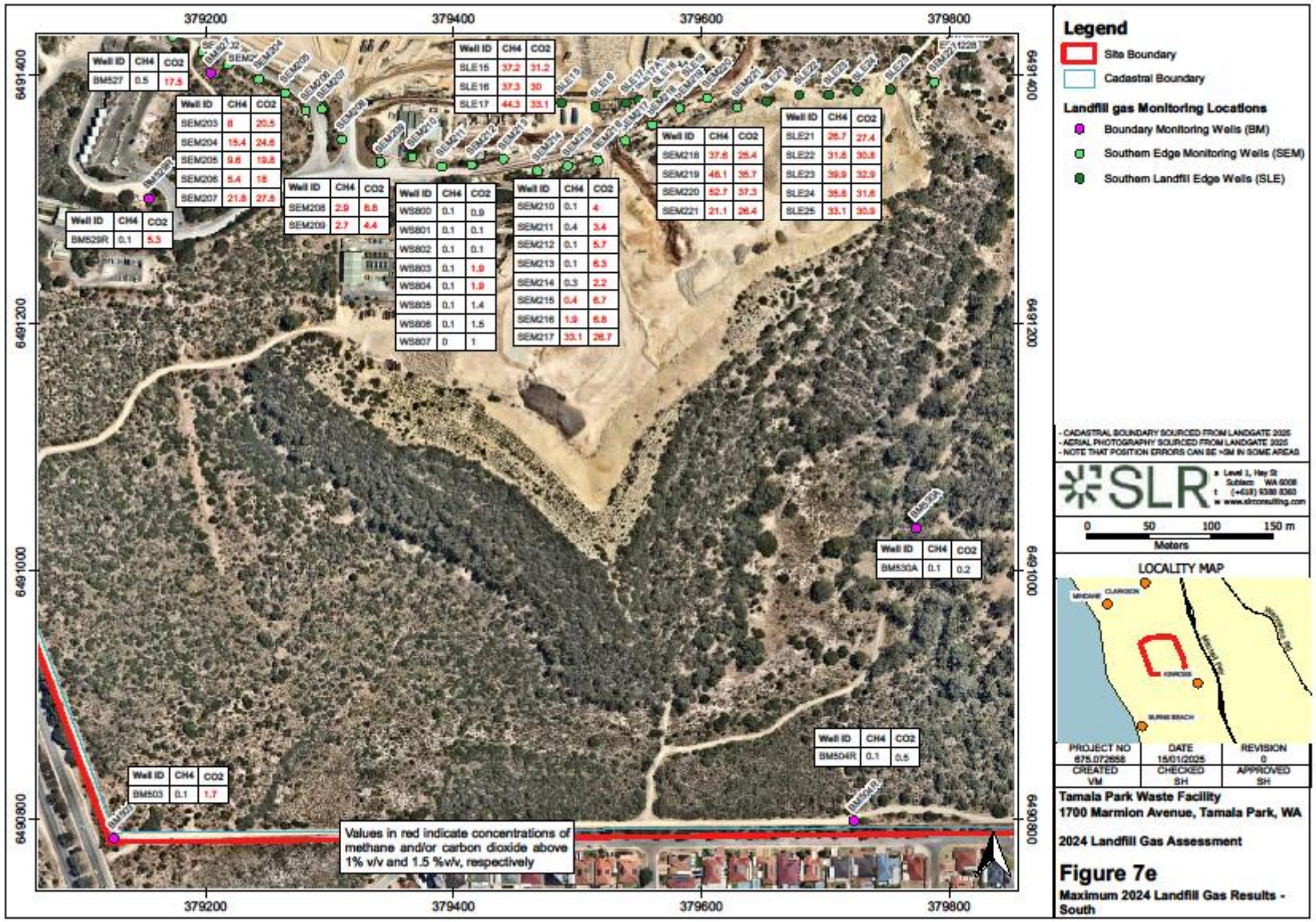

Figure 17: Maximum 2024 Landfill Gas Results – South
(Source: SLR, 2025d)

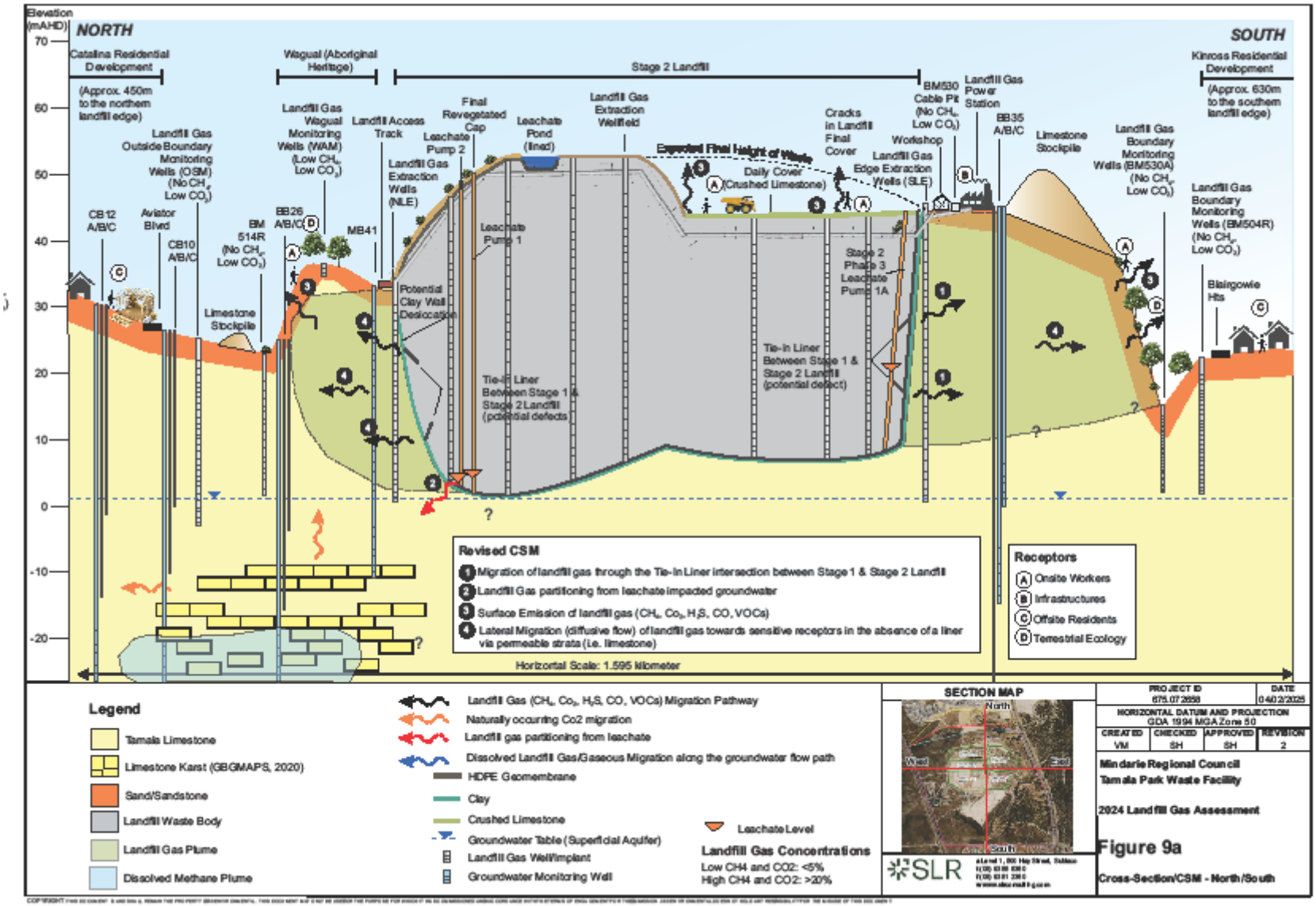

Figure 18: LFG Cross-Section/Conceptual Site Model – North – South
(Source: SLR, 2025d)

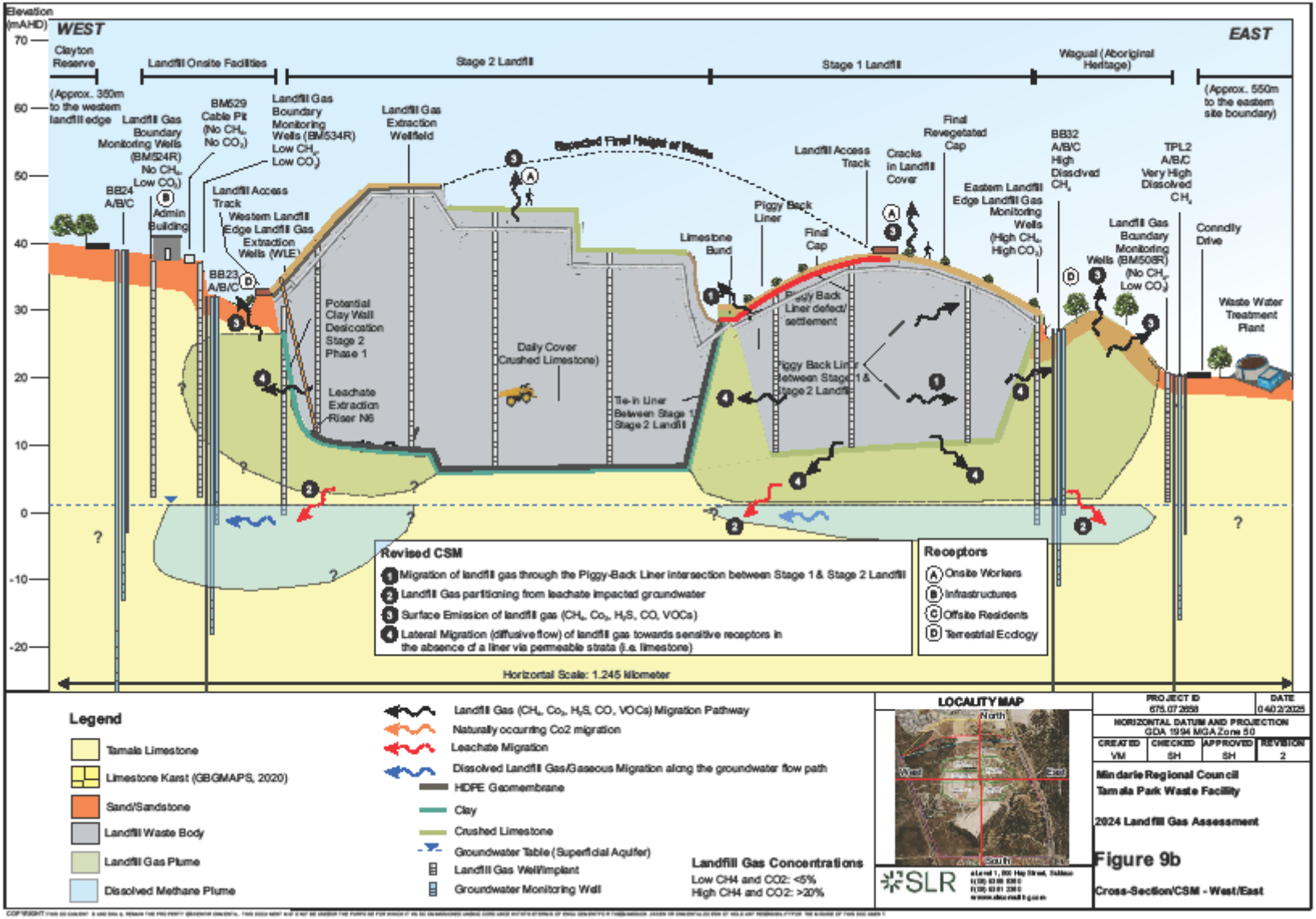

Figure 19: LFG Cross-Section/Conceptual Site Model – West – East
(Source: SLR, 2025d)

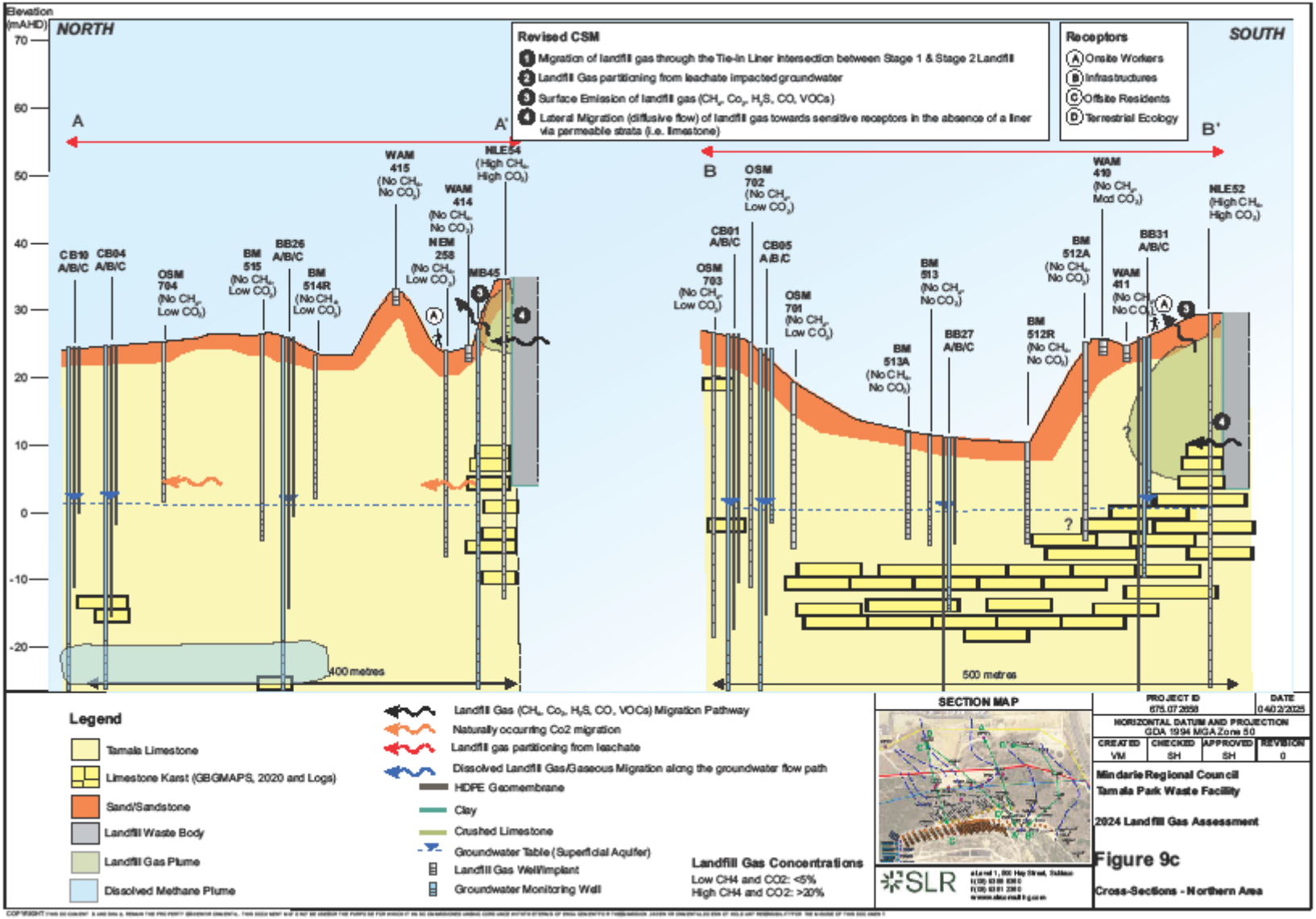

Figure 20: LFG Cross-Section/Conceptual Site Model – Northern Area
(Source: SLR, 2025d)

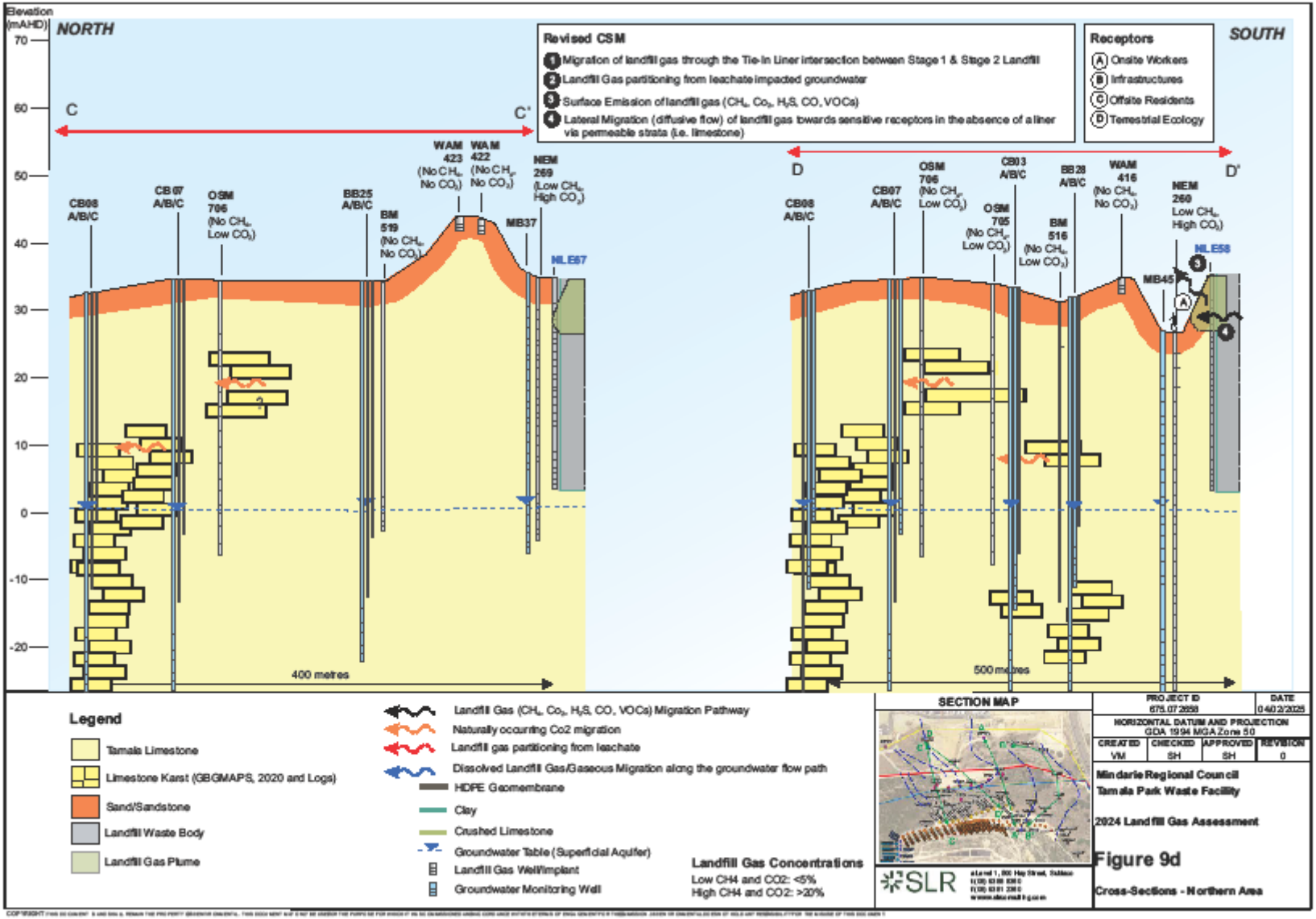

Figure 21: LFG Cross-Section/Conceptual Site Model – Northern Area
(Source: SLR, 2025d)

APPENDICES

Appendix A

MAR Declaration Forms

Government of **Western Australia**
Department of **Water and Environmental Regulation**

[DWER reference no.]
DMO:

Contaminated sites auditor scheme

Contaminated Sites Act 2003 section 73(a)

Form H: Mandatory auditor's report—commissioner's statement

This form is to be prepared by **the person commissioning the mandatory auditor's report**.

Part 1 Details of person commissioning auditor's report	
Full name	Ms Kathrine Goldsmith
Contact address	1700 Marmion Ave, Tamala Park, WA 6030
Postal address (if different from above)	PO Box 2746, Clarkson WA 6030
Telephone	08 9306 6315
Mobile	0413 257 864
Fax	
Email	KGoldsmith@mrc.wa.gov.au
Current employer: (company name)	Mindarie Regional Council
In accordance with s 73(a) of the *Contaminated Sites Act 2003* I formally advise the CEO of the Department of Water and Environmental Regulation that I have engaged an accredited auditor to prepare a mandatory auditor's report in respect of the following site.	
Site address	1700 Marmion Ave, Tamala Park, WA 6030
Certificate of title details (parcel/lot number)	Portion of Lot 9043 on DP 424903: Vol 4037, Fol 49
Site description (attach site plan as appropriate)	Tamala Park Waste Management Facility
Name of accredited auditor engaged to provide a mandatory auditor's report	Larissa Willoughby
Date of engagement	19 December 2024

Part 2 Declaration and signature

Under s 73(a) of the *Contaminated Sites Act 2003*, a mandatory auditor's report cannot be accepted unless it is accompanied by a statement identifying and signed by the person who engaged the auditor to prepare the mandatory auditor's report.

I declare that

I Kathrine Goldsmith (the person described in this statement)

am the person who engaged the auditor to prepare this mandatory auditor's report, relating to

certificate of title details (parcel/lot number)	Portion of Lot 9043 on DP 424903: Vol 4037 Fol 49
site description	Tamala Park Waste Management Facility
site address	1700K Marmion Ave, Tamala Park, WA 6030

and, that

- I have not provided information to the auditor that I know is false or misleading in a material particular;
- I have not provided information with reckless disregard as to whether or not the information is false or misleading in a material particular; and
- I have disclosed to the auditor all information that I know is materially relevant.

_____ Date 4/04/2025

(Signature—person who commissioned the mandatory auditor's report)

KATHRINE GOLDSMITH

(Full name in block capitals)

Government of **Western Australia**
Department of **Water and Environmental Regulation**

[DWER reference no.]
DMO:

Contaminated sites auditor scheme

Contaminated Sites Act 2003 section 73(a)

Form I: Mandatory auditor's report—auditor's statement

This form is to be prepared by **the contaminated sites auditor**.

Part 1 Details of accredited auditor	
Full name	Larissa Willoughby
Contact address	335 Carrington St, Adelaide SA 5000
Postal address (if different from above)	As above
Telephone	08 8223 3488
Mobile	04088560299
Fax	
Email	lwilloughby@envaud.com.au
Current employer: (company name)	Australian Environmental Auditors Pty Ltd
In accordance with s 73(b) of the *Contaminated Sites Act 2003* I formally advise the CEO of the Department of Water and Environmental Regulation that I have prepared the attached mandatory auditor's report in respect of the following site.	
Site address	1700 Marmion Ave, Tamala Park, WA 6030
Certificate of title details (parcel/lot number)	Portion of Lot 9043 on DP 424903: Vol 4037, Fol 49
Site description (attach site plan as appropriate)	Tamala Park Waste Management Facility
Name of person engaging the auditor to provide a mandatory auditor report	Ms Katherine Goldsmith
Date of engagement	19/12/2024

Part 2 Declaration and signature

Under s 73(b) of the *Contaminated Sites Act 2003*, a mandatory auditor's report cannot be accepted unless it is accompanied a statement identifying, and signed by the auditor to the effect that the report is accurate.

I declare that

I, Larissa Willoughby (the auditor described in this statement)

am the auditor engaged to prepare this mandatory audit report, relating to

certificate of title details (parcel/lot number)	Portion of Lot 9043 on DP 424903: Vol 4037, Fol 49
site description	Tamala Park Waste Management Facility
site address	1700 Marmion Ave, Tamala Park, WA 6030

and, that

- I have not provided information in the report that I know is false or misleading in a material particular;
- I have not provided information in the report with reckless disregard as to whether or not the information is false or misleading in a material particular; and
- I have disclosed in the report all information that I know is materially relevant.

(Accredited auditor's signature)

Date 9/04/2025

LARISSA WILLOUGHBY
(Full name in block capitals)

Government of Western Australia
Department of Water and Environmental Regulation

Ref No.

Contaminated sites auditor scheme

Contaminated Sites Regulations 2006 regulation 32(2)

Form J: Mandatory auditor's report—supporting expert's statement

This form is to be prepared by **the supporting expert**.

Part 1 Details of Supporting Expert	
Full name	Mr Stuart Thurlow
Contact address	Suite 21, 1 Ricketts Rd, Mt Waverley, VIC 3149
Postal address (if different from above)	As above
Telephone	03 8542 7500
Mobile	0410 980 816
Fax	
Email	sthurlow@envaud.com.au
Current employer: (company name)	Australian Environmental Auditors Pty Ltd
In accordance with r 32(2) of the *Contaminated Sites Regulations 2006* I formally advise the CEO of the Department of Water and Environmental Regulation that I have been engaged as a Supporting Expert to prepare part of the attached mandatory auditor's report in respect of the following site.	
Site address	1700 Marmion Ave, Tamala Park, WA 6030
Certificate of title details (parcel/lot number)	Portion of Lot 9043 on DP 424903: Vol 4037, Fol 49
Site description (attach site plan as appropriate)	Tamala Park Waste Management Facility
Name of accredited auditor engaged to provide the mandatory auditor's report	Larissa Willoughby
Date of supporting expert engagement	January 2025 – current
Nature and extent of work undertaken	Review and provide comments on SLR Groundwater Risk Assessment Report, SLR Landfill Gas Assessment Report and Talis Leachate Management Plan.

Relevant report section reference(s)	

Part 2 Declaration and signature

Under r 32(2) of the *Contaminated Sites Regulations 2006*, where part of a mandatory auditor's report has been prepared, and is based on work undertaken by a person other than the auditor, or a person employed by the auditor, the report cannot be accepted unless it is accompanied by a statement identifying, and signed by that person, to the effect that that part of the report is accurate.

I declare that I, Stuart Thurlow (The supporting expert described in this statement)

am the supporting expert engaged to prepare part of this mandatory audit report, relating to

certificate of title details (parcel/lot number)	Portion of Lot 9043 on DP 424903: Vol 4037, Fol 49
site description	Tamala Park Waste Management Facility
site address	1700 Marmion Ave, Tamala Park, WA 6030

and, that

- the part of the report described above is accurate; and
- I have not provided information in the part of the report described above that I know is false or misleading in a material particular; and
- I have not provided information, in the part of the report described above, with reckless disregard as to whether or not the information is false or misleading in a material particular; and
- I have disclosed, in the part of the report described above, all information that I know is materially relevant.

Date 5/04/2025

(Supporting expert signature)

STUART THURLOW

(Full name in block capitals)

Appendix B

Certificates of Title, Ministerial Statements and DWER Licence

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
4037	**49**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 9043 ON DEPOSITED PLAN 424903

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

TOWN OF CAMBRIDGE OF 1 BOLD PARK DRIVE FLOREAT WA 6014
IN 1/12 SHARE
CITY OF PERTH OF 27 ST GEORGES TERRACE PERTH WA 6000
IN 1/12 SHARE
CITY OF WANNEROO OF 23 DUNDEBAR ROAD WANNEROO WA 6065
IN 2/12 SHARE
CITY OF JOONDALUP OF BOAS AVENUE JOONDALUP WA 6027
IN 2/12 SHARE
CITY OF STIRLING OF 25 CEDRIC STREET STIRLING WA 6021
IN 4/12 SHARE
CITY OF VINCENT OF 244 VINCENT STREET LEEDERVILLE WA 6007
IN 1/12 SHARE
TOWN OF VICTORIA PARK OF 99 SHEPPERTON ROAD VICTORIA PARK WA 6100
IN 1/12 SHARE
AS TENANTS IN COMMON

(AF P399135) REGISTERED 22/6/2023

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 7033/1940
2. L818099 CAVEAT BY LANDFILL GAS & POWER PTY LTD - AS TO PORTION ONLY LODGED 22/12/2011.
3. EASEMENT BURDEN CREATED UNDER SECTION 167 P. & D. ACT FOR DRAINAGE/IRRIGATION/WATER SUPPLY/SEWERAGE PURPOSES TO WATER CORPORATION - SEE DEPOSITED PLAN 424903 AS CREATED ON DEPOSITED PLAN 402391
4. EASEMENT BURDEN CREATED UNDER SECTION 167 P. & D. ACT FOR ELECTRICITY SUPPLY PURPOSES TO ELECTRICITY NETWORKS CORPORATION - SEE DEPOSITED PLAN 424903 AS CREATED ON DEPOSITED PLAN 402391
5. EASEMENT BURDEN CREATED UNDER SECTION 167 P. & D. ACT FOR GAS SUPPLY OR ACCESS TO GAS SUPPLY WORK PURPOSES TO WA GAS NETWORKS PTY LTD - SEE DEPOSITED PLAN 424903 AS CREATED

END OF PAGE 1 - CONTINUED OVER

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Landgate
www.landgate.wa.gov.au

ON DEPOSITED PLAN 402391

6. O424409 MEMORIAL. CONTAMINATED SITES ACT 2003 AS TO PORTION ONLY - SEE DEPOSITED PLAN 424903 REGISTERED 12/6/2020.
7. O648431 MEMORIAL. CONTAMINATED SITES ACT 2003 AS TO PORTION ONLY - SEE DEPOSITED PLAN 424903 REGISTERED 19/2/2021.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP424903
PREVIOUS TITLE:	4026-843
PROPERTY STREET ADDRESS:	1700K MARMION AV, TAMALA PARK.
LOCAL GOVERNMENT AUTHORITY:	CITY OF WANNEROO

LANDGATE COPY OF ORIGINAL NOT TO SCALE 05/04/2024 08:13 AM Request number: 66426196

Landgate
www.landgate.wa.gov.au

Government of Western Australia
Department of Water and Environmental Regulation

Licence

Licence number	L9395/2023/1
Licence holder	Mindarie Regional Council
Registered business address	1700 Marmion Avenue CLARKSON WA 6030
DWER file number	DER2023/000416
Duration	21/07/2023 to 20/07/2030
Date of issue	21/07/2023
Date of amendment	10 November 2023
Premises details	Tamala Park Waste Management Facility 1700 Marmion Avenue CLARKSON WA 6030 Being part of Lot 9020 on Plan 408820 as depicted in Schedule 1.

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed production / design capacity**
Category 12: Screening, etc. of material	1,500,000 tonnes per annual period
Category 57: Used tyre storage (general):	500 tyres (at any one time)
Category 61: Liquid waste facility:	500 tonnes per annual period
Category 61A: Solid waste facility:	1,500 tonnes per annual period
Category 62: Solid waste depot	15,000 tonnes per annual period
Category 64: Class II or III putrescible landfill site	350,000 tonnes per annual period
Category 77: Concrete batching or cement products manufacturing	30,000 tonnes per annual period

This licence is granted to the licence holder, subject to the attached conditions, on 10 November 2023, by:

A/MANAGER WASTE INDUSTRIES
REGULATORY SERVICES
Officer delegated under section 20 of the Environmental Protection Act 1986

Licence and Works Approval History

Instrument	Issued	Description
L6963/1997/5	30/06/2000	Licence re-issue
L6963/1997/6	30/06/2001	Licence re-issue
W3396/1997/1	18/07/2001	Construction of Stage 2 cells (13-22)
L6963/1997/7	30/06/2002	Licence re-issue
L6963/1997/8	30/06/2003	Licence re-issue
W3690/1997/1	26/08/2003	Construction of Stage 2A North cells (16-17 & 21-22) and Stage 2B North Cells (26-27 & 31-32)
L6963/1997/9	30/06/2004	Licence re-issue
L6963/1997/10	29/06/2005	Licence re-issue
L6963/1997/11	29/06/2006	Licence re-issue
L6963/1997/12	25/06/2007	Licence re-issue
L6963/1997/13	26/06/2008	Licence re-issue
W4502/2008/1	06/03/2009	Stage 1/2 liner tie in (lining the area of Stage 1; an area of old landfill that is currently unlined to allow waste to be placed over previously landfilled waste).
W4582/2009/1	17/12/2009	Stage 2 – Phase 3; installation of basal liner system and side slope liner above RL 9.6m and associated leachate collection infrastructure
W4658/2010/1	17/06/2010	Tarpomatic system for daily coverage of waste
W5397/2013/1	13/05/2013	Stage 2 – Phase 3; side slope liner (incremental side slope lifts)
L6963/1997/14	26/06/2013	Licence re-issue
L6963/1997/14	24/12/2015	Licence amendment to authorise acceptance and disposal of Class III coarse heavy residue waste and conversion to new licence format
L6963/1997/14	01/07/2016	DER initiated amendment to update premises address details and implement administrative changes
L6963/1997/14	20/07/2017	Amendment Notice 1 – Increasing the maximum vertical height of the active tipping face
L6963/1997/14	22/03/2018	Amendment Notice 2 – Acceptance and storage of paint and processing of green waste
L6963/1997/14	03/09/2018	Amendment Notice 3 – Acceptance, storage of CCA timber products and removal to an off-site higher class of landfill

Instrument	Issued	Description
L6963/1997/14	12/05/2022	Licence amendment for Stage 2 West capping works including the requirement to review and submit a consolidated leachate, stormwater and landfill gas management plans
L6963/1997/14	14/03/2023	Acceptance and processing of Hazardous Household Waste (HHW), e-waste, waste mineral oil, used lead and dry cell batteries, polystyrene, scrap metal, cardboard, furniture and other recyclable materials
L9395/2023/1	21/07/2023	New licence as L6963/1997/14 ceased due to non-payment of annual fees within specified timeframes
L9395/2023/1	10/11/2023	Licence amendment to require MRC to ensure that waste is no longer accepted over-night,

Interpretation

In this licence:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning (refer to Table 13), any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this licence:

  (i) if dated, refers to that particular version; and

  (ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This licence requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this licence.

Licence conditions

The licence holder must ensure that the following conditions are complied with:

Waste Acceptance

1. The Licence Holder must only accept waste on to the Premises if:

(a) it is of a type listed in Table 1; and

(b) it is received between 0600 hours and 1800 hours (western standard time), excluding Good Friday, Christmas Day and New Years Day; and

(c) the quantity accepted is below any quantity limit listed in Table 1 for the corresponding category; and

(d) it meets any specification listed in Table 1; and

(e) in the case of contaminated solid waste is supported by documentation that demonstrates compliance with the acceptance criteria for Class II/III landfills (and in accordance with the Landfill Definitions).

Table 1: Waste acceptance

Waste type	Category	Quantity limit	Specification[1]
Clean Fill	64	350,000 tonnes per annual period (cumulative)	None Specified
Inert Waste Type 1			
Inert Waste Type 2			Tyres and plastic only
Putrescible waste			None Specified
Special Waste Type 1			Asbestos and asbestos containing materials (ACM)
Special Waste Type 2			Biomedical / clinical (excluding radioactive waste[2])
Contaminated Solid Waste – Class II			Must meet the acceptance criteria for Class II landfills
Contaminated Solid Waste – Class III		6,500 tonnes per annual period	Limited to coarse heavy residue waste only which must meet the acceptance criteria for Class III landfills.
Hazardous Liquid Waste	61	500 tonnes per annual period	Limited to hazardous waste types as listed in Schedule 4: Hazardous Household Wastes (up to a maximum of 20 litres or 20 kilograms per package/item).
Waste mineral oil		Limited to a maximum of 150 tonnes per annual period	Limited to domestic quantities of waste Oils, hydrocarbons and oil and water mixtures or

Waste type	Category	Quantity limit	Specification[1]
			emulsions, up to 20 litres or 20 kilograms per package/item
Clean Fill	62	15,000 tonnes per annual period (cumulative)	None Specified
Inert Waste Type 1			
Inert Waste Type 2			Tyres and plastic only
Putrescible waste			Limited to cardboard, furniture and other recyclable materials e.g. clothes
Hazardous Waste			Limited to chromated copper arsenate (CCA) treated timber, HHW as listed in Schedule 4: Hazardous Household Wastes, used lead and dry cell batteries, polystyrene.
e-waste		Limited to a maximum of 250 tonnes per annual period	Waste electronic items
Scrap Metal		Limited to a maximum of 2500 tonnes per annual period	Limited to Scrap metal

Note 1: Additional requirements for the acceptance of controlled waste (including asbestos and tyres) are set out in the *Environmental Protection (Controlled Waste) Regulations 2004*.

Note 2: Information relating to the classification of radioactive waste can be found in the West Australian *Radiation Safety Act 1975*.

2. The Licence Holder must ensure that where waste does not meet the waste acceptance criteria set out in condition 1 it is removed from the Premises by the delivery vehicle or, where that is not possible, stored in a quarantined storage area or container and removed to an appropriately authorised facility as soon as practicable.

Waste Processing

3. The Licence Holder must ensure that wastes accepted onto the Premises are only subjected to the process(es) set out in Table 2 and in accordance with any process limits described in that Table.

Table 2: Waste processing

Waste type	Process(es)	Process limits[1]
All waste types corresponding to Category 64 as specified in Table 1	Disposal of waste by landfilling	(a) Disposal of waste by landfilling shall only take place within the following areas of the landfill: (i) Stage 2 Phase 2 West; (ii) Stage 2 Phase 2 East; and (iii) Stage 2 Phase 3; as depicted on the Landfill Area and Site Layout Map in Schedule 1; (b) Shall ensure that the tipping face is no greater than 5 m in vertical height; (c) Shall restrict the tipping area to a maximum linear length of 50 m; (d) The separation distance between the base of the landfill and the highest level of the phreatic surface of groundwater shall not be less than 2 m; (e) Shall maintain an internal buffer distance of 50 m from the boundary of the premises; and (f) Shall not landfill tyres at the premises.
Clean Fill	Receipt, handling and associated storage prior to reuse or disposal by landfilling	None specified.
Inert Waste Type 1		
Inert Waste Type 2		(a) No more than 500 tyres shall be stored at the premises at any one time; (b) A 2 m separation distance shall be maintained between the tyre stack/pile and adjacent bushland; (c) Vehicle access to the tyre stack/pile shall be maintained on three sides; (d) Tyres must be collected and removed to an appropriate authorised facility as soon as practicable; and (e) Individual tyre stacks shall not exceed (i) 2 m in height; and (ii) 75 m^2 in area.
Putrescible waste		(a) Putrescible waste received at the transfer station shall: (i) Only be stored in sealed containers or on a hardstand area bunded to prevent run-off; and (ii) Shall not be stored on the site for longer than 48 hours. (b) Green waste received for processing shall: (i) Only be stored on a 1 m thick compacted and bunded limestone hardstand; (ii) The stockpile size will be limited to the following dimensions: 50 m (length) x 15 m (width) x 5 m (height); (iii) Unprocessed green waste is to be directly removed after chipping or only stored in the designated

Waste type	Process(es)	Process limits[1]
		processing area (within the landfill area) for less than 2 weeks prior to removal; and (iv) The compacted and bunded limestone hardstand shall be located >60 m from an active tipping face of a cell.
Special Waste Type 1	Receipt, handling and disposal by landfilling	(a) Waste shall only be disposed of into a designated asbestos disposal area within the landfill. The disposal area(s) for any more than one cubic metre of asbestos material must be defined by grid references on a premises plan; (b) A copy of the premises plan marked with the locations used for waste disposal, as described above, shall be kept as a permanent record; (c) Not to be deposited within 2 m of the final tipping surface of the landfill; and (d) No works shall be carried out on the landfill that could lead to a release of asbestos fibres.
Special Waste Type 2		(a) Only to be disposed of into a designated biomedical or clinical waste disposal area within the landfill. The disposal area(s) must be defined by grid references on a premises plan; (b) A copy of the premises plan marked with the locations used for waste disposal, as described above, shall be kept as a permanent record; (c) Not to be deposited within 2 m of the final tipping surface of the landfill; and (d) No works shall be carried out on the landfill that could lead to biomedical or clinical wastes being excavated or uncovered.
Contaminated Solid Waste		(a) Course heavy residue waste meeting acceptance criteria for Class III landfills shall only be disposed of to Stage 2 Phase 2 West, Stage 2 Phase 2 East and Stage 2 Phase 3 as depicted on the Landfill Area and Site Layout Map in Schedule 1.
Hazardous Liquid Waste	Receipt, handling and associated storage prior to offsite disposal	(a) Paint shall be stored in dedicated paint stillages; and (b) Paint shall not be decanted or fixated on the Premise.
e-waste		(a) e-waste to be stored in sea containers or self contained on bitumen prior to transport off-site
Scrap Metal		(a) Scrap Metal to be stored in dedicated bins or on landfill. (b) The license holder shall ensure that waste accepted onto the premises is transported to an approved facility for processing such waste. (c) No greater than 200 tonnes of material shall be stored on-site at anyone time.
Hazardous Waste		(a) CCA treated timber shall only be stored in the designated storage bin under cover at the Transfer Station; (b) No CCA treated timber shall be buried on site; and

Waste type	Process(es)	Process limits[1]
		(c) CCA treated timber must be removed off-site prior to the designated bin being full.
		(d) Used lead acid batteries to be stored in fully sealed - self bunded bins within designated lead acid battery storage area. (e) The licence holder shall ensure that used lead acid batteries accepted onto the premises are collected and transported to an approved waste facility for storage and processing. (f) Used dry cell and lithium ion batteries shall be stored in a designated storage area and transported to an approved waste facility for storage or processing of such waste. (g) Polystyrene is stored within a self contained building and/or sea container for processing and then removal off-site
Waste mineral oil		(a) Waste oil - contained within a self-bunded tank and located on a concrete hardstand; and (b) Waste oil - must not be processed or treated on-site

Note 1: Additional requirements for the acceptance and landfilling of controlled waste (including asbestos and tyres) are set out in the Environmental Protection (Controlled Waste) Regulations 2004.

General Landfill Operations

4. The Licence Holder must manage the landfilling activities to ensure:
(a) waste is levelled and compacted as soon as practicable after it is discharged; and
(b) waste is placed and compacted to ensure all faces are stable and capable of retaining rehabilitation material; and
(c) rehabilitation of a cell or phase takes place within 6 months after disposal in that cell or phase has been completed.

5. The Licence Holder must recover and recycle leachate from the Stage 2 Landfill by irrigation over, or injecting into, the Stage 2 landfilling area.

6. The Licence Holder must inspect and monitor the leachate management system weekly to monitor leachate levels in all ponds and sumps, and manage movement of leachate between sumps and ponds and the recirculation system.

7. The Licence Holder must ensure that cover is applied and maintained on landfilled wastes in accordance with Table 3 and that sufficient stockpiles of cover are maintained on-site at all times.

Table 3: Cover requirements

Waste Type	Cover requirements
Inert Waste Type 1	No cover required
Inert Waste Type 2	To be covered by the end of the working day in which the waste was deposited with sufficient quantities (at least 150 mm) of inert waste type 1, or clean fill, or other appropriate cover material to control odour, reduce fire-risk and prevent the spread and harbouring of disease vectors.
Putrescible wastes	
Contaminated Solid Waste	
Special Waste Type 1	To be covered with a 1000 mm of inert waste type 1, clean fill, or putrescible waste as soon as practicable after deposit and before being compacted to prevent the release of asbestos fibres as a result of compaction and other landfilling activities.
Special Waste Type 2	To be covered with 1000 mm of inert waste type 1 or clean fill as soon as practicable and before compaction.

8. The Licence Holder must submit capping information and undertake capping works in accordance with the requirements of Table 4.

Table 4: Capping requirements

Cell Number(s)	Specification	Timescales
Stage 2 Phase 2 West, Stage 2 Phase 2 East and Stage 2 Phase 3	A capping plan is to be submitted to the CEO including, but not limited to: detailed design, material specifications, proposed landfill gas collection infrastructure, current and finished surveyed levels and details on construction quality assurance.	At least 3 months prior to the completion of waste disposal in each cell.
	Complete capping works in accordance with Capping Plan submitted to the CEO.	No later than 6 months after the completion of waste disposal in each cell

9. The Licence Holder must install, operate and maintain a system for controlling landfill gas generated on the Premises to prevent lateral migration of landfill gas outside the boundary of the Premises.

10. The Licence Holder must implement the following security measures at the site:
(a) erect and maintain suitable fencing to prevent unauthorised access to the site; and
(b) ensure that any entrance gates to the premises are securely locked when the premises are unattended; and
(c) undertake regular inspections of all security measures and repair damage as soon as practicable.

11. The Licence Holder must install and maintain a sign at the entrance to the Premises which clearly displays the following information;

(a) hours of operation;
(b) contact telephone number;
(c) warning indicating penalties for people lighting fires; and

(d) list of materials accepted for recycling and the location of where they can be deposited on the premises where practical.

12. The Licence Holder must implement control measures to prevent infestations of pests, flies and vermin at the Premises.

13. The Licence Holder must ensure that no windblown waste escapes from the Premises and that windblown waste is collected on at least a weekly basis and returned to the tipping area or appropriately contained.

14. The Licence Holder must maintain a vehicle wash-down facility to avoid the potential for vehicles to track waste or matter from the landfill outside the premises boundary.

15. The Licence Holder must ensure that no waste is burnt on the premises.

16. The Licence Holder must ensure an adequate water supply and a means of distribution be provided at all times, to extinguish a fire at any part of the premises.

17. The Licence Holder must:
(a) divert stormwater from the landfilled areas of the site to dedicated stormwater drains; and
(b) remove waste from stormwater drains to allow effective draining.

18. The licence holder must recover or remove and dispose of any spills or leaks of liquid hazardous waste as soon as practicable.

19. The licence holder must ensure that any accumulated liquids, and residues from the recovery of spills or leaks, are stored in an impervious container prior to disposal at an appropriately authorised facility.

20. The licence holder must for the Tansfer Station and Recycling centre (as depicted in Schedule 1 – Map 2 and Schedule 3 – Map 7) areas:

(a) ensure that firefighting equipment and systems are in good working order, and capable of controlling a loose material fire;
(b) ensure that any unauthorised fire on the premises is extinguished as soon as possible;
(c) collect and remove all accumulated and recoverable fire wash-water and other waste that may result from firefighting on the premises within 24-hours of a fire event;
(d) ensure that any firefighting wastewater is removed without delay by a carrier licenced under the *Environmental Protection (Controlled Waste) Regulations 2004*; and
(e) remove all fire impacted waste for disposal to a suitably licensed premises.

21. The licence holder must implement the Tamala Park Surface Water Management Strategy[1] and Leachate Management Plan[2].

Note 1 and 2: where construction works or new equipment and/or infrastructure is required to implement the respective plans, additional approvals under Part V, Division 3, of the EP Act may be required.

Specified Actions

22. The Licence Holder must submit to the CEO the Information in Table 5 in accordance with the Requirements and Timescale outlined in Table 5.

Table 5: Specified actions

Information		Requirement(s)	Timescale
3	Landfill Gas Management Plan	A consolidated and detailed management plan including but not limited to: (a) engineering information and detailed drawings of the landfill gas system design for the existing development stage at the landfill site; (b) engineering information and detailed drawings of the landfill gas system design for Stage 2 West at the completion of the capping works; and (c) engineering information and detailed drawings of the proposed completed state of the landfill gas system design.	31 March 2024

Works Specifications

23. The Licence Holder must ensure that the construction works specified in Table 6 meet or exceed the specifications in the corresponding schedule as noted in Table 6.

Table 6: Works specifications

Works Type	Works description	Timing	Specifications
Landfill capping works	Construction of the Stage 2 West landfill cap	The works must commence no later than 6 months after disposal of waste into the Stage 2 West Phase has been completed.	In accordance with Schedule 2: Table 12

24. The Licence Holder must within 45 calendar days of an item of infrastructure required by condition 23 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 23; and

(b) prepare and submit to the CEO an Environmental Compliance Report which must include as a minimum the following:

(i) certification by a Suitably Qualified Engineer that the items of infrastructure or component(s) thereof, as specified in condition 23, have been constructed in accordance with the relevant requirements specified in that condition;

(ii) if relevant, a summary of all revisions and changes made to subsequent versions of the reference documents listed in Schedule 2 Table 12;

(iii) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 23; and

(iv) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Monitoring

General monitoring

25. The Licence Holder must ensure that:

(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;

(b) all groundwater sampling is conducted in accordance with AS/NZS 5667.11; and

(c) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in the relevant table.

26. The Licence Holder must ensure that:

(a) monitoring is undertaken in each monthly period such that there are at least 15 days in between the days on which samples are taken in successive months;

(b) six monthly monitoring is undertaken at least 5 months apart; and

(c) annual monitoring is undertaken at least 9 months apart.

27. The Licence Holder must ensure that all monitoring equipment used on the Premises to comply with the conditions of this Licence is calibrated in accordance with the manufacturer's specifications.

28. The Licence Holder must, where the requirements for calibration cannot be practicably met, or a discrepancy exists in the interpretation of the requirements, bring these issues to the attention of the CEO accompanied with a report comprising details of any modifications to the methods.

Monitoring of inputs and outputs

29. The Licence Holder must undertake the monitoring in Table 7 according to the specifications in that table.

Table 7: Monitoring of inputs and outputs

Input/Output	Parameter	Units	Averaging period	Frequency
Waste Inputs	Clean Fill, Inert Waste Type 1, Inert Waste Type 2, Putrescible waste, Special Waste Type 1, Special Waste Type 2, Contaminated Solid Waste, Liquid Hazardous Waste and Hazardous Waste	tonnes (where a weighbridge is present on the site) m^3 (where no weighbridge is present)	N/A	Each load arriving at the Premises
Waste Outputs	Waste type as defined in the Landfill Definitions			Each load leaving or rejected from the Premises

Ambient environmental quality monitoring

30. The Licence Holder must undertake the monitoring in Table 8 according to the specifications in that table.

Table 8: Monitoring of ambient groundwater quality

Monitoring point reference and location	Parameter	Units	Averaging period	Frequency
TP1 TP2 TPL1 A - C TPL2 A - C TPL3 A - C TP19 A - C TP20 A - C BB21 A - C BB22 A - C BB23 A - C BB24 A - C BB25 A - C BB26 A - C BB27 A - C As depicted in the Map of monitoring locations in Schedule 1: Map 3	Standing water level	m(AHD)	Spot sample	Six monthly
	pH[1]			
	Electrical conductivity[1]	µS/cm		
	Major ions Calcium, Chloride, Bicarbonate, Potassium, Magnesium, Sodium, Sulfate,	mg/L		
	Ammonium, Nitrate			
	Total Organic Carbon			
	Organophosphorus Pesticides	mg/L	Spot sample	Annual
	Organochlorine pesticides			
	Polychlorinated Biphenyls (PCBs)			
	Polyaromatic hydrocarbons (PAHs)			
	BTEX (Benzene, Ethylbenzene, Toluene, Xylene) Total BTEX			
	Total Recoverable Hydrocarbons (TRH)			
	Metals – Dissolved Aluminium, Boron, Barium, Cadmium, Cobalt, Copper, Iron, Manganese, Molybdenum, Nickel, Lead, Vanadium, Zinc			
	Metals – Total Arsenic, Chromium			

Note 1: In-field non-NATA accredited analysis permitted.

Landfill gas monitoring

31. The Licence Holder must undertake the monitoring of parameters specified in Table 9 according to the specifications in that table.

Table 9: Landfill gas monitoring

Monitoring point reference and location	Parameter	Units	Frequency
Each well, as depicted in Schedule 3: Map 6	Volumetric flow rate	m^3/hr	Within four weeks of completion of construction of each well and flare and monthly thereafter
	Methane	Volume %	
	Carbon dioxide	Volume %	
	Oxygen	Volume %	
	Nitrogen	Volume %	
	Carbon monoxide	ppm	
	Gas temperature	ºC	
	Pressure	Pa	

Records and reporting

32. All information and records required by the Licence shall:

(a) be legible;

(b) if amended, be amended in such a way that the original and subsequent amendments remain legible or are capable of retrieval; except for records listed in 32(d) be retained for at least 6 years from the date the records were made or until the expiry of the Licence or any subsequent licence; and

(c) for those following records, be retained until the expiry of the Licence and any subsequent licence:

(i) off-site environmental effects; or

(ii) matters which affect the condition of the land or waters.

33. The Licence Holder must:

(a) implement a complaints management system that shall record the following information (if known or provided) about complaints received at the Premises concerning any environmental impact of the activities undertaken at the Premises:

(i) name and address of the complainants (if consented);

(ii) date and time of complaint;

(iii) date and time of alleged incident;

(iv) alleged source of the incident;

(v) general description of the alleged incident, including any environmental or health impacts reported by the complainant;

(vi) wind direction, wind speed and temperature at time of alleged incident;

(vii) likely source of the alleged incident; and

(viii) actions taken by the Licence Holder to address the complaint, including the outcome of any investigation(s) and action(s) to verify any impacts.

(b) complete an annual analysis and review of complaints recorded under 35(a) to identify any common factors and root cause of complaints and proposals to address these.

34. The Licence Holder must record the following information for all unauthorised fires at the premises:
(a) details of the date, time and location of the fire;
(b) measures used to control the fire;
(c) the cause, or suspected cause, of the fire; and
(d) any residual issues related to the fire.

35. The Licence Holder must:
(a) undertake an audit of their compliance with the conditions of this licence during the preceding annual period; and
(b) prepare and submit to the CEO by no later than 90 days after the end of that annual period an Annual Audit Compliance Report in the approved form.

36. The Licence Holder must submit to the CEO by no later than 90 days after the end of each annual period, an Annual Environmental Report for that annual period for the conditions listed in Table 10, and which provides information in accordance with the corresponding requirement set out in Table 10.

Table 10: Annual Environmental Report

Condition or table (if relevant)	**Parameter**	**Format or form**
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
29 (Table 7)	Summary of Inputs and Outputs	
	Summary of materials processed under Category 12	
30 (Table 8)	Monitoring of ambient groundwater quality. Summary of the ambient groundwater quality monitoring results must be presented.	Tabulated form within the body of the annual report as well as all raw data provided in an accompanying Microsoft Excel spreadsheet digital document/file (or a compatible equivalent digital document/file)
31 (Table 9)	Landfill gas monitoring. Summary of the landfill gas monitoring results must be presented.	
33	Complaints summary	None specified

Condition or table (if relevant)	Parameter	Format or form
34	A summary of all fire incidents that have occurred during the annual period.	

37. The Licence Holder must submit to the CEO by no later than six months after the end of each annual period, a detailed groundwater monitoring report in relation to condition 30 and a landfill gas monitoring report in relation to condition 31. The reports must include an assessment of monitoring results against previous monitoring results and relevant assessment levels for water and landfill gas, as published in the *Assessment and management of contaminated sites guidelines*.

38. The Licence Holder must comply with a Department Request, within 14 days from the date of the Department Request or such other period as agreed to by the Inspector or the CEO.

Notification requirements

39. The Licence Holder must ensure that the parameters listed in Table 11 are notified to the CEO in accordance with the notification requirements of the table.

Table 11: Notification requirements

Condition or table (if relevant)	Parameter	Notification requirement[1]	Format or form
-	Breach of any limit specified in the Licence	Part A: As soon as practicable but no later than 1800hrs of the next working day. Part B: As soon as practicable.	Refer to Schedule 5 for details required in the notification.
5 and 6	Failure or malfunction of the leachate collection and management system	As soon as practicable, but no later than 1800 hrs of the next working day	None specified
28	Calibration report	As soon as practicable	None specified
30 (Table 8)	Any groundwater monitoring bores listed in Table 8 are destroyed or otherwise made unserviceable	Within 7 days of identifying destroyed or unserviceable groundwater monitoring bores	None specified
34	Any unauthorised fire that: (a) In accordance with AS 3543, contains smoke with a smoke shade of less than or equal to shade 1; and (b) Is extinguished in less than 4 minutes.	As part of the Annual Environmental Report required by condition 36	None specified

Condition or table (if relevant)	Parameter	Notification requirement[1]	Format or form
	Any unauthorised fire that: (a) In accordance with AS 3543, contains smoke with a smoke shade greater than shade 1; and (b) Is not extinguished in less than 4 minutes.	As soon as practicable, but no later than 14 days after the fire event	

Note 1: Notification requirements in the Licence shall not negate the requirement to comply with s72 of the Act

Schedule 1: Maps

Map 1 - Premises map

The Premises is shown in the map below. The pink line depicts the Premises boundary.

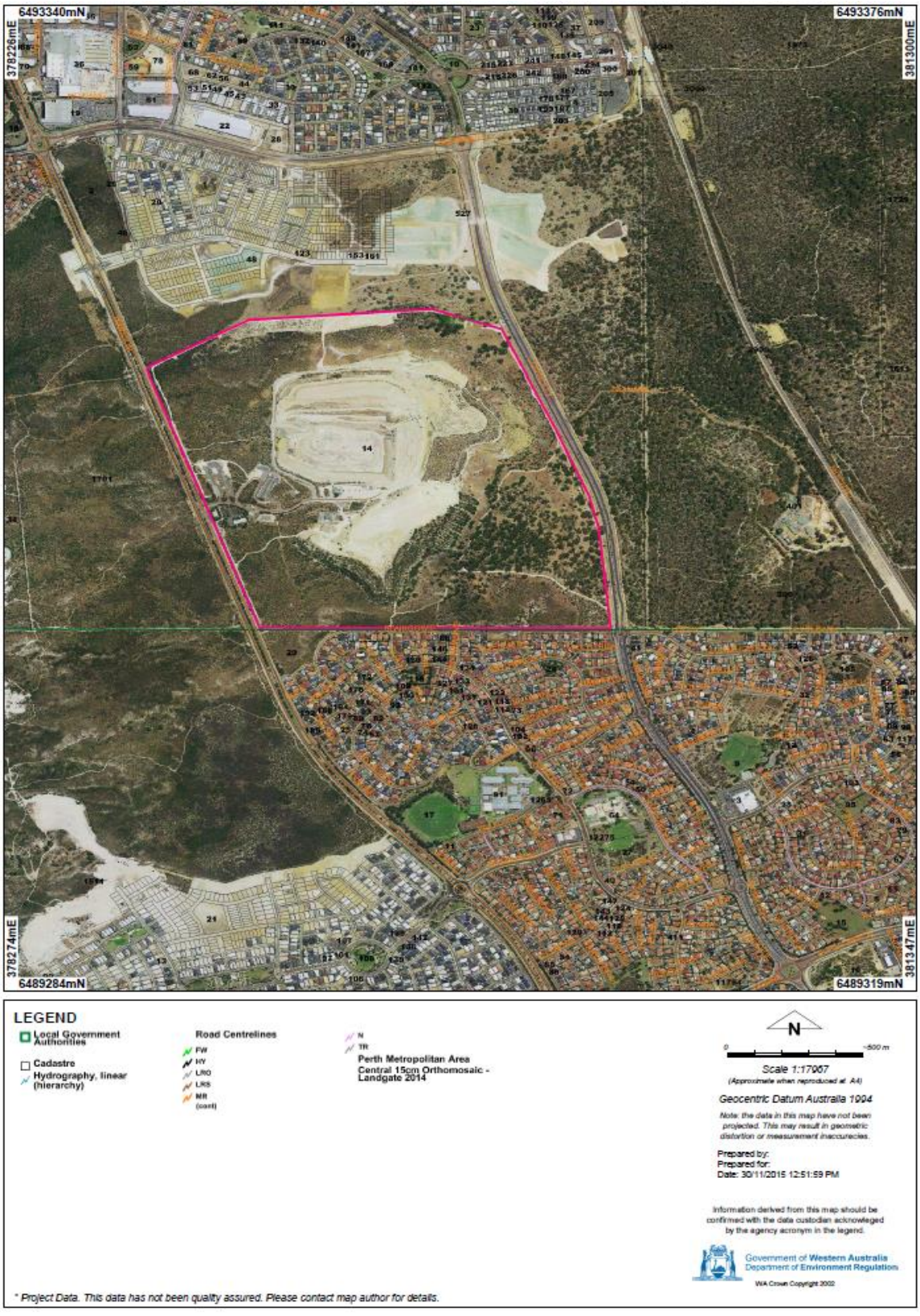

Figure 1: Premises boundary map

Map 2 - Landfill Area and Site Layout Map

2012 Aerial of Mindarie Regional Council – site layout – D/13/1060 – Current Hazardous Waste Area as of October 2017

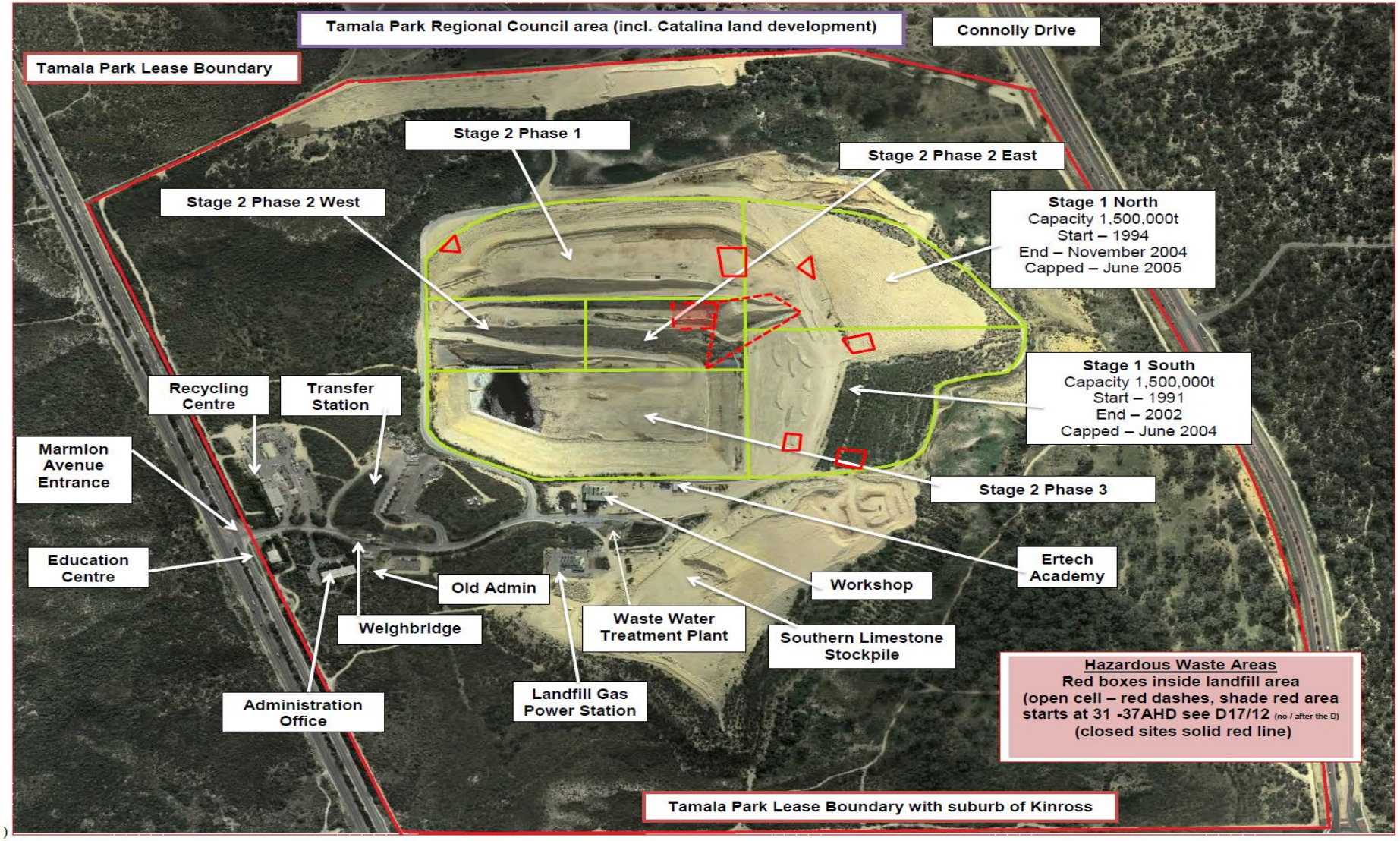

Figure 2: Site layout

Map 3 - Map of monitoring locations

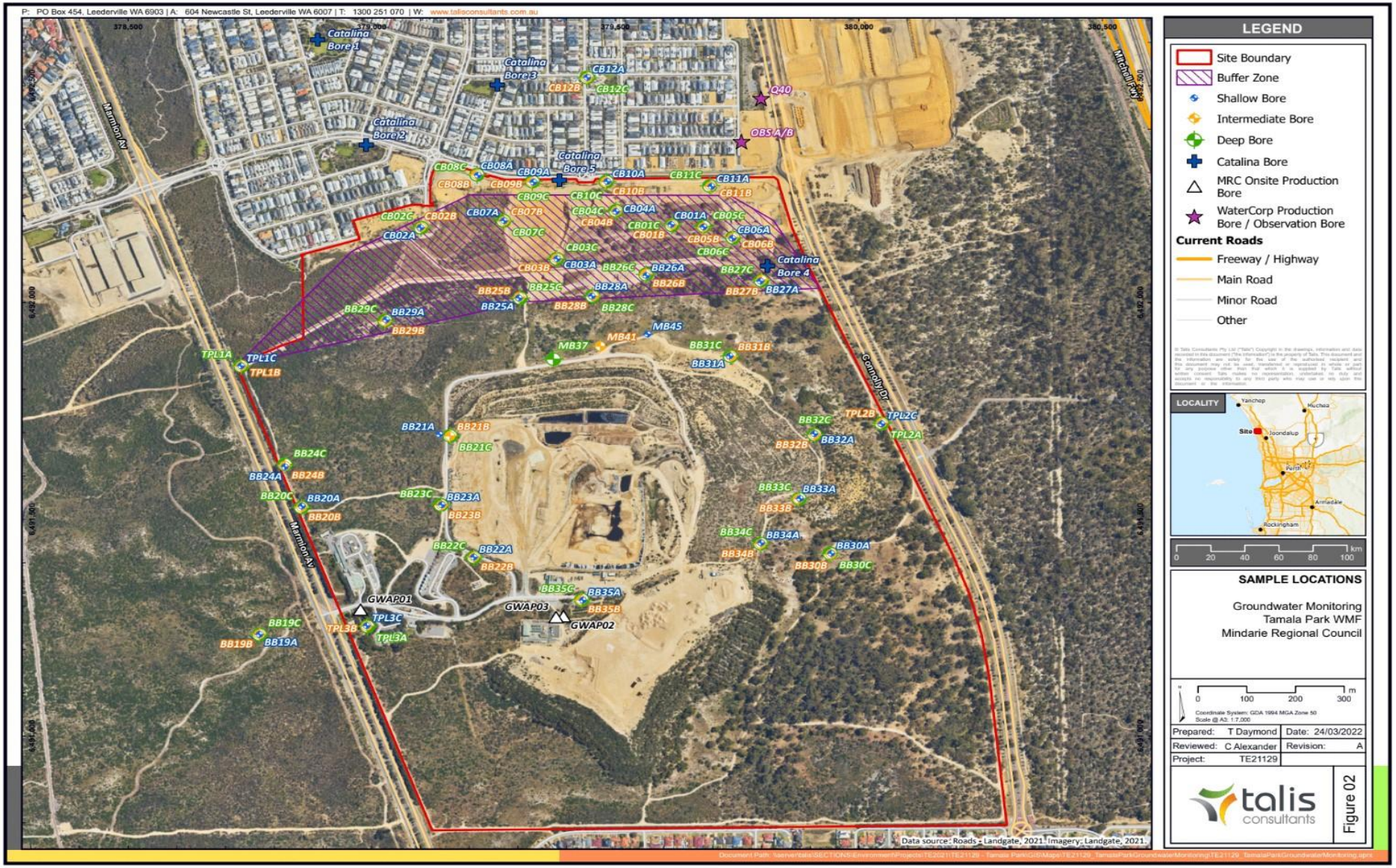

Figure 3: Bore locations specified in Table 8

Map 4 - Capping location Phase 2 West

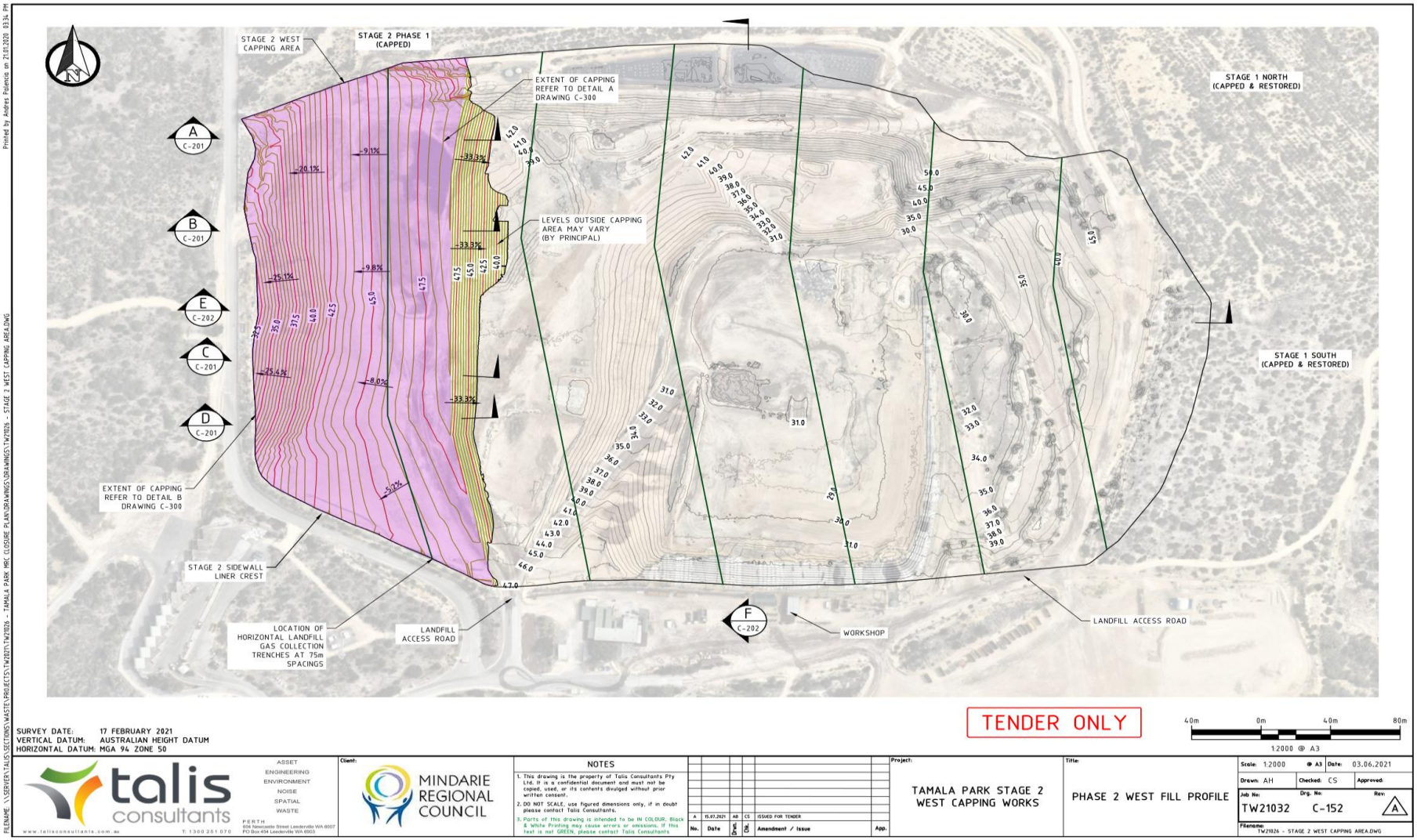

Figure 4: Capping locations

Schedule 2: Work Specifications- Landfill closure and capping works

Table 12: Works specifications

Infrastructure / Equipment		Requirements (design and construction)	Reference documents
1	Final profile	(a) Final fill profile and slopes are to be between 5% and 20%	• Schedule 1 - Map 4 – Capping Location Phase 2 West
2	Capping system Stage	(a) Capping system design and construction to be undertaken in accordance with the specifications set out in the reference documents listed in column 3 of this table; (b) Capping system to comprised of (bottom to top): (i) 200mm Regulating layer; (ii) Sub-cap Gas Collection Layer (geocomposite); (iii) 1.5mm thick double textured Linear Low-Density Polyethylene (LLDPE) Geomembrane Layer; (iv) Sub-surface Drainage Layer (geocomposite); (v) 1200mm of Restoration Layer, comprising: (vi) 1000mm thick layer of Site won subsoils; and (vii) 200mm thick layer of topsoil/growing medium; (viii) Vegetation Layer incorporating hydromulch / seeding to reduce erosion and advance revegetation.	• Schedule 1 - Map 4 – Capping Location Phase 2 West • Stage 2 West Capping Works Technical Specifications • Stage 2 West Capping Works Quality Assurance Plan
3	Surface water management	(a) Landfill cap side slopes must not exceed a 1:5 (V:H) gradient.	• Schedule 1 - Map 4 – Capping Location Phase 2 West
4	Leachate management	(a) Seepage through landfill cap is to be no more than 75% of the anticipated seepage rate through the basal liner.	• Schedule 1 - Map 4 – Capping Location Phase 2 West
5	Landfill Gas Management	(a) All horizontal gas collection infrastructure, gas collection systems and terminating pipework to be completed in accordance with the capping technical specifications and quality assurance plan (see specification and plan reference in column 3 of this table); (b) Excavation of landfill gas collection trenches at the locations and to the depths shown on the capping technical specifications and quality assurance plan (see specification and plan reference in column 3 of this table); (i) Installation of solid and perforated HDPE horizontal pipework; (ii) Backfill of trenches with 20-40mm nominal gravel with separation geotextile surround;	• Schedule 3 - Landfill Gas Extraction System (Map 5) • Stage 2 West Capping Works Technical Specifications • Stage 2 West Capping Works Quality Assurance Plan

Infrastructure / Equipment		Requirements (design and construction)	Reference documents
		(iii) Construction of gravel filled condensate sumps at the toe of the slopes to return condensate into the landfill; (iv) Sealing of pipe penetrations through the capping system with neoprene wraps with stainless (v) steel banding to seal the future geomembrane pipe boot to the side of the gas well/pipework; and (vi) Terminating pipes with an airtight welded end cap / blanking plate for future connection to the landfill gas main.	

Schedule 3: Landfill Gas Extraction System

Map 5- Landfill gas system layout

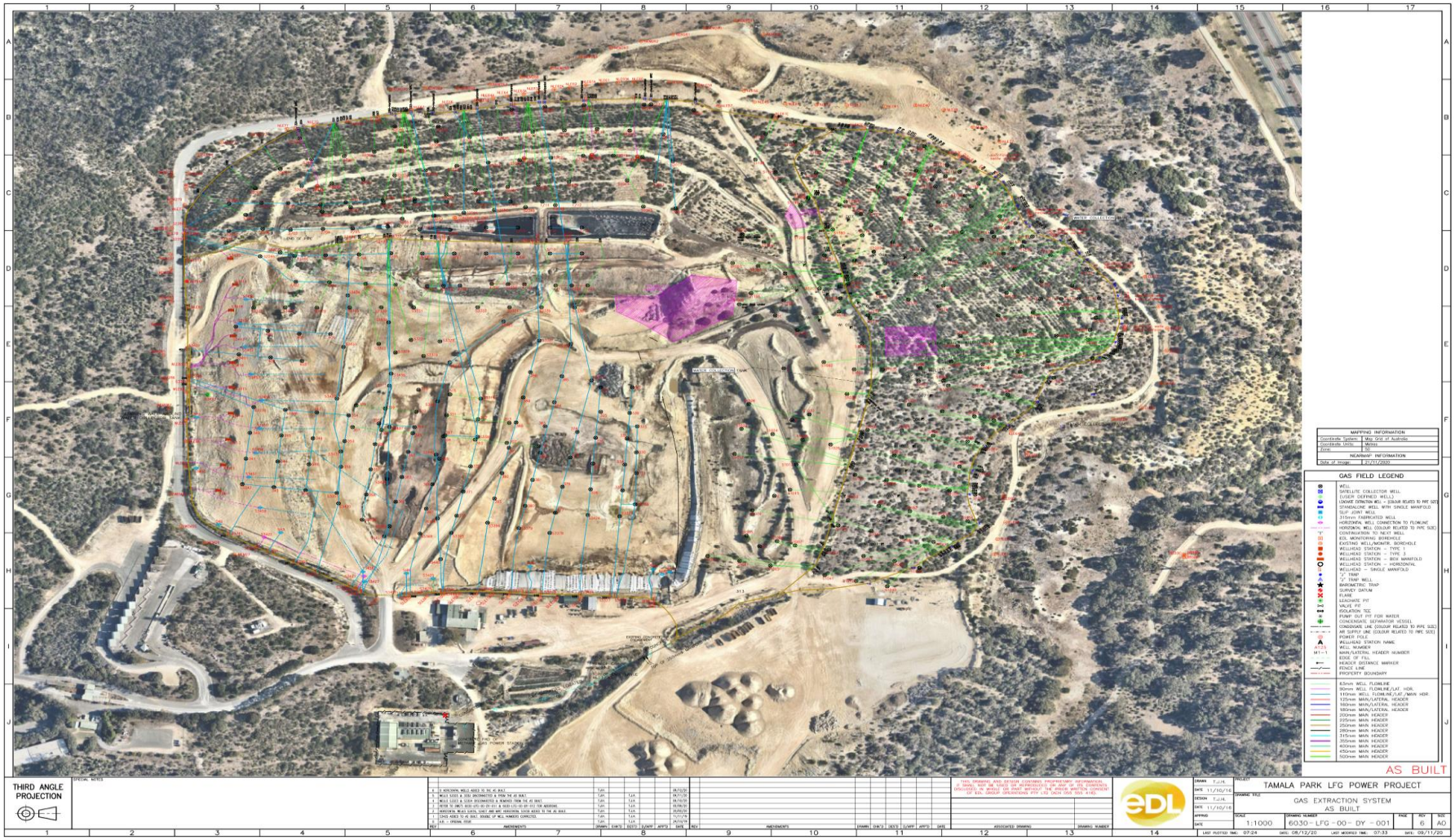

Figure 5: Landfill gas extraction system layout

Map 6- Landfill gas monitoring point locations

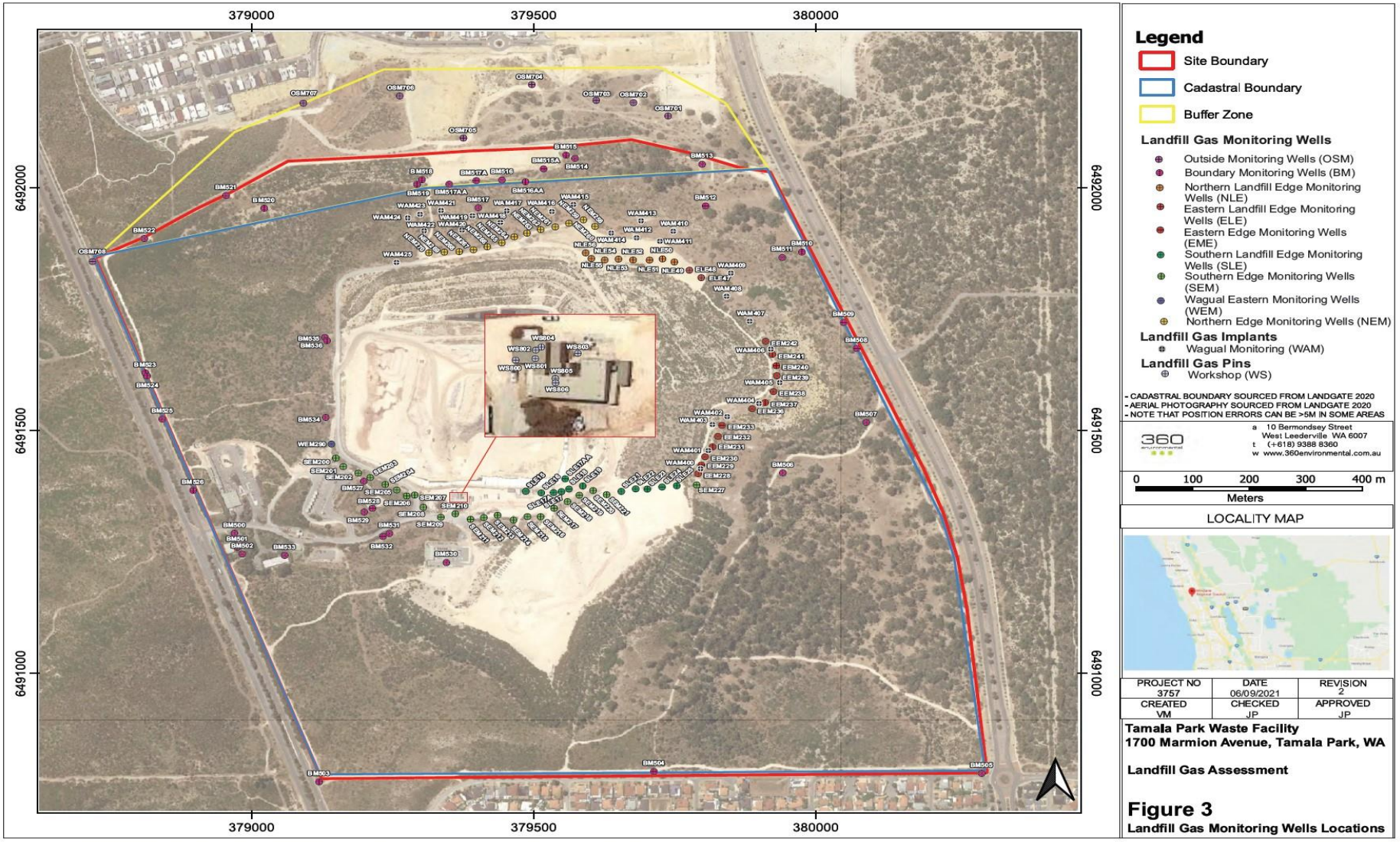

Figure 6: Landfill gas monitoring point locations

Schedule 4: Hazardous Household Wastes

Acids
Aerosols – CFC based
Aerosols, flammable – paint and lacquers
Aerosols, flammable - pesticide
Alkalis
Arsenic based products
Batteries - household, dry cell
Cyanides
Engine coolants and glycols
Fire extinguishers – non-Halon
Flammable liquids – hydrocarbons and fuels
Flammable solids
Flares
Fluorescent tubes, compact fluorescent lights and light fittings
Gas cylinders – other
Gas cylinders – propane
General household chemicals e.g., cleaners
Heavy metal compounds
Inorganic oxidising agents – e.g., pool chlorine
Low level radioactive substances e.g., smoke detectors
Mercury – elemental
Organic peroxides
Paint – metal based
Paint – other, including isocyanates and amines
Paint – recyclable
Paint – solvent based, including resins and adhesives
Paint – water based
PCB materials
Pesticides – non-Schedule X
Pesticides – Schedule X
Solvents – halogenated
Toxics

Map 7- Dangerous Goods and Recyclable Waste Site Plan

Mindarie Regional Council – Waste Management Facility

Edited Site Plan: Original Source: DGS 020256

Dangerous Goods & Recyclable Waste Site Plan
1700 Marmion Avenue, TAMALA PARK WA 6030

Rev. 1, 01 June 2019

HOLDING AREA DETAILS

# No	Holding Area	DG Class
1	DG Compound	Class 2.1 Class 2.2 Class 3 Class 8
2	Staff Sorting Area	Minor Packages
3	Main Packaged Goods Store	Class 2.1 Class 2.2 Class 3 Class 5.1 Class 6 Class 8 Class 8 Class 9 Unknowns
4	Oil Sump	C1 2000lt
5	Corrective Services Department	Minor – Packages Class 2.1 Class 8
6	Admin Cleaning Store	Minor Packages Class 2.1 Class 3 Class 9
7	Transfer Gas Cages	Class 2.2 - Minor
8	Transfer Temporary Storage	Minor – Packages Class 2.2 Class 2.1 Class 5.1
9	Workshop	Class 2.1, 3, 8, NDG
10	Diesel Tank - Workshop	5kL– Bulk self bunded
11	Diesel Tank - Landfill	Portable store 5kl, self bunded

Refer to Dangerous Goods Manifest for further detail.

Map Legend

Icon	Item	Comments
	Site Boundary	Chain wire fence. Primarily surrounds by natural bushland.
H2	Fire Hydrant	Site fire hydrants.
	Power Isolation	Main site distribution board.
W-1	Water Isolation x 2	Site mains water isolation.
	Fire Extinguishers	51 Dry Chem, 6 foam and 11 Co2 fire extinguishers strategically located and maintained around site.
Fire Tenders	Fire Fighting Trucks	1 x 10k lt water truck, 1 x 10k lt water cart, 1 x 3k lt fire truck, 1 x 500lt fire ute. Principally stored at the workshop.

Recyclable Waste

12 Polystyrene
13 Cardboard
14 Metal & E-waste

Notes:

1. *All office buildings are of brick construction with steel roofs.*
2. *Workshop and Ruse Shop are constructed from steel only.*

Schedule 5: Notification requirements for limit breaches

Notifications can be provided to the Department at info@dwer.wa.gov.au

(note this email is subject to change therefore please consider the contact details on the Departments website: www.dwer.wa.gov.au.

Notifications must include as a minimum

a) which condition/limit was not complied with;

b) the time and date when the non-compliance occurred;

c) if any environmental impact occurred as a result of the non-compliance and if so, what that impact is and where the impact occurred;

d) the details and result of any investigation undertaken into the cause of the non-compliance;

e) what action has been taken and the date on which it was taken to prevent the non-compliance occurring again; and

f) what action will be taken and the date by which it will be taken to prevent the non-compliance occurring again.

Definitions

In this licence, the terms in Table 13 have the meanings defined.

Table 13: Definitions

Term	Definition
ACN	Australian Company Number
ACM	means asbestos containing material and has the meaning defined in the Guidelines for Assessment, Remediation and Management of Asbestos Contaminated Sites, Western Australia, (DOH, 2009)
Acceptance Criteria	has the meaning defined in Landfill Waste Classification and Waste Definitions 1996 (As amended December 2009), published by the CEO and as amended from time to time; 'Act' means the *Environmental Protection Act 1986*
Annual Audit Compliance Report (AACR)	means a report submitted in a format approved by the CEO (relevant guidelines and templates may be available on the Department's website)
annual period	a 12 month period commencing from 1 January until 31 December
AS 3543	means the Australian Standard AS 3543 *Use of standard Ringelmann and Australian Standard miniature smoke charts*
AS/NZS 5667.1	means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples*
AS/NZS 5667.4	means the Australian Standard AS/NZS 5667.4 *Water Quality – Sampling – Guidance on sampling from lakes, natural and man-made*
AS/NZS 5667.11	means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters*
asbestos	means the asbestiform variety of mineral silicates belonging to the serpentine or amphibole groups of rock-forming minerals and includes actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite and any mixture containing two or more of those
Assessment and management of contaminated sites guidelines	means the document titled "Guideline: Assessment and management of contaminated sites" published by the Chief Executive Officer of the Department of Water and Environmental Regulation as amended from time to time
averaging period	means the time over which a limit is measured or a monitoring result is obtained
CEO	means Chief Executive Officer of the Department of Water and Environment Regulation
CEO	means Chief Executive Officer of the Department. "submit to / notify the CEO" (or similar), means either: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 or: info@dwer.wa.gov.au
Clean Fill	has the meaning defined in Landfill Definitions
Clinical Waste	has the meaning defined in Landfill Definitions

Term	Definition
coarse heavy residue waste	means the coarse heavy fraction of process residue wastes from the Mindarie Regional Council - Resource Recovery Facility (RRF) located at Lot 801on Plan 57533 Pederick Road, Neerabup, Western Australia
Contaminated Solid Waste	means contaminated solid waste meeting the Acceptance Criteria for Class II/III landfills, as specified in the Landfill Definitions
Department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3
discharge	has the same meaning given to that term under the EP Act
emission	has the same meaning given to that term under the EP Act
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
green waste	means waste that originates from flora and which does not contain or has not been treated or coated with, preserving agents, biocides, fire retardants, paint, adhesives or binders
hardstand	means a surface with a permeability of 10^{-9} metres/second or less
internal buffer distance	means the distance from the boundary of the premises to any area on the premises used for disposal, storage or transfer of waste
Inert Waste Type 1	has the meaning defined in Landfill Definitions
Inert Waste Type 2	has the meaning defined in Landfill Definitions
Landfill Definitions	means the document titled “Landfill Waste Classification and Waste Definitions 1996” published by the Chief Executive Officer of the Department of Environment as amended from time to time
leachate	means liquid released by or water that has percolated through waste and which contains some of its constituents
licence	refers to this document, which evidences the grant of a licence by the CEO under section 57 of the EP Act, subject to the specified conditions contained within.
licence holder	refers to the occupier of the premises, being the person specified on the front of the licence as the person to whom this licence has been granted
NATA	means the National Association of Testing Authorities, Australia
NATA accredited	means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis
premises	refers to the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map Figure 1 in Schedule 1 to this licence
prescribed premises	has the same meaning given to that term under the EP Act
Putrescible	has the meaning defined in Landfill Definitions

Term	Definition
quarantined storage area or container	means a hardstand storage area or sealed-bottom container or an area on a lined landfill that is separate and isolated from authorised waste disposal areas and is capable of containing all non-conforming waste and its constituents; these areas must be clearly marked and their access restricted to authorised personnel
Schedule 1	means Schedule 1 of this Licence unless otherwise stated
Schedule 2	means Schedule 2 of this Licence unless otherwise stated
Schedule 3	means Schedule 3 of this Licence unless otherwise stated
Schedule 4	means Schedule 4 of this Licence unless otherwise stated
Schedule 5	means Schedule 5 of this Licence unless otherwise stated
sealed container	means a sealed-bottom container, either lidded or unlidded, that is capable of containing deposited waste and its constituents
Special Waste Type 1	has the meaning defined in Landfill Definitions
Special Waste Type 2	has the meaning defined in Landfill Definitions
spot sample	means a discrete sample representative at the time and place at which the sample is taken
Stage 2 Landfill	means the areas labelled Stage 2 in Schedule 1 Map 2
spot sample	means a discrete sample representative at the time and place at which the sample is taken
Stage 2 West Capping Works Quality Assurance Plan	means version 1 of the unpublished document titled *Construction Quality Assurance Plan: Tamala Park Waste Management Facility – Stage 2 West Capping Works* created by Talis Consultants on 24 June 2021
Stage 2 West Capping Works Technical Specifications	means version 2 of the unpublished document titled *Technical Specification: Tamala Park Waste Management Facility – Stage 2 West Capping Works* created by Talis Consultants on 30 June 2021
Suitably Qualified Engineer	means a person who: (a) holds a Bachelor of Engineering recognised by Engineers Australia; and (b) has a minimum of five years of experience working in a supervisory area of geotechnical and/or civil engineering; and (c) is employed by an independent third party external to the Licence Holder's business.
waste	has the same meaning given to that term under the EP Act
working day	means 0600 – 1800 hours, seven days a week, excluding Good Friday, Christmas Day and New Years Day.

END OF CONDITIONS

GOVERNMENT OF
WESTERN AUSTRALIA

Section 65
Environmental Protection Act 1986.

ENVIRONMENTAL PROTECTION NOTICE

Reference No: 202405

PERSON TO WHOM THIS NOTICE IS GIVEN:

Mindarie Regional Council (ABN 17 015 003 687)
1700 Marmion Avenue
TAMALA PARK WA 6030
In its capacity as occupier of the **Premises**

PREMISES TO WHICH THIS NOTICE RELATES (the Premises):

The **Premises,** the subject of this Environmental Protection Notice (**Notice**) is situated on 1700 Marmion Avenue TAMALA PARK WA 6030, being part of Lot 9043 on Plan 424903 as depicted in Appendix 2 of this Notice.

Reasons for which this notice is issued:

This Environmental Protection Notice (the Notice) is given to the **Occupier**, being Mindarie Regional Council, under section 65 of the *Environmental Protection Act 1986* (EP Act), because I have reasonable grounds to suspect there is, or is likely to be an emission or emissions from the Premises and that the emissions have caused or are likely to cause pollution.

The nature of the suspected pollution is:

1. The emission of odour from the premises into the environment. I have reason to believe that the pollution that is or is likely to be caused is the direct or indirect alteration of the environment to the detriment of an environmental value. The relevant environmental value is the beneficial use of the portion of the environment (air quality) that is conducive to public amenity, public health and aesthetic enjoyment of the environment surrounding residential premises.

   The Department of Water and Environmental Regulation (the **Department**) has identified that landfill leachate stored in ponds at the Premises, leachate seepage from the face of landfill cells and landfill gas generated at the Premises are the likely key sources of odour emissions to the environment.

2. The emission of leachate from the premises into the environment. I have reason to believe that the pollution that is or is likely to be caused is the direct or indirect

alteration of the environment to the detriment of an environmental value. The environmental value is the beneficial use of the portion of the environment (groundwater) for potable and non-potable uses.

The Department has been advised by Mindarie Regional Council that leachate levels within the landfill are significantly elevated. This is likely to be increasing the seepage of leachate emission through the landfill liner and impacting groundwater quality.

Therefore, this Notice has been given to require the occupier to take measures to prevent, control and abate the pollution; and to investigate the extent and nature of the environmental harm and its consequences; and to report to the Department on actions taken to comply with the requirements.

I am satisfied that because Mindarie Regional Council is the Occupier of the Premises from which odour emissions have occurred to the environment that you are the appropriate **Person**(s) to give this Notice.

REQUIREMENTS OF THIS NOTICE:

Odour emission requirements

1. The **Person** to whom this Notice is given must, within 28 days of this Notice being given, provide to the CEO for approval, a plan to manage leachate volumes on the Premises. The plan must identify:

   a) The volume of leachate currently held at the premises and the methodologies used to arrive at the volume.
   b) The chemical characteristics of the leachate.
   c) A detailed methodology including times, dates and meteorological conditions under which any process involving leachate may be undertaken.
   d) The measures that will be taken to ensure that implementation of the plan does not cause odour emissions outside the premise boundary.
   e) Details of the monitoring that will be undertaken to assess the effectiveness of controls in preventing odour emissions outside the premises boundary.
   f) Records relating to the monitoring must be provided to the CEO every 14 days post implementation of the approved plan.

2. The **Person** to whom this Notice is given must within 7 days of this Notice being given, provide and thereafter maintain additional cover on any areas of the landfill where leachate seepage is visible, to minimise odour emissions from areas where leachate seepage has occurred.

3. The **Person** to whom this Notice is given must within 30 days of this Notice being given:

   a) Inspect the integrity of any areas of the landfill with final capping for visible defects such as cracks which may allow for uncontrolled emissions landfill gas.

b) Identify remedial action which can be taken to mitigate uncontrolled emissions of landfill gas resulting from any defects.
c) Provide a report for the CEO's approval on the findings of the inspections, details of any remedial measures recommended and a timescale for the implementation of any recommendations.
d) Implemented the recommendations once they are approved by the CEO.

4. The **Person** to whom this Notice is given must, within 21 days of this Notice being given, provide to the **CEO** a review of the landfill gas (LFG) collection and management system, in the form of a report, to ensure it is appropriately optimised and working effectively to maximise gas collection. The report must contain:
    a) A map identifying the operational and non-operational wells.
    b) Details on the physical condition of each element of the collection and management system including collections wells, condensate traps, gas flare and gas engines.
    c) A maintenance schedule outlining any maintenance required for any element of the landfill gas collection and management system to ensure the on-going effectiveness of the system.

5. The **Person** to whom this Notice is given must, within 60 days of this Notice being given, submit a report to the CEO that contains a review of the existing landfill gas collection and management system to assess whether it is sufficient to control emissions of landfill gas to prevent them causing odour impacts on receptors outside of the Premises. The review must:
    a. Be undertaken by a **suitably qualified landfill gas consultant**;
    b. Detail the operational landfill gas infrastructure in each landfill stage;
    c. Identify the current landfill gas volumes being generated from each stage of the landfill, the collection and management capacity of the current system of each landfill stage and the estimated future gas generating potential of each landfill stage.
    d. Provide information to support the identification and estimation of landfill gas volumes required in c);
    e. Identify any necessary improvements including landfill gas collection and management infrastructure to prevent odour impacts outside the Premises as a result of landfill gas emissions with a timescale for completion of the recommended improvements.

6. The **Person** to whom this Notice is given must implement the recommended improvements identified under requirement 5e) in accordance with a direction to do so by the **CEO**.

7. The **Person** to whom this Notice is given must install a pilot scale leachate treatment unit (leachate treatment unit) by the end of February 2025 and trial its effectiveness at treating leachate generated on the site for disposal to sewer, for a period of up to 12 weeks as detailed in the Critical Infrastructure Plan entitled, "Critical Infrastructure Plan CIP, Mindarie Regional Council" (Mindarie Regional Council, May 2024). At least 14 days prior to installation of the leachate treatment unit, the following information must be submitted to the CEO:
    a. The detailed specification of the leachate treatment unit;

b. The proposed location of the leachate treatment unit;
c. Details of how odour emissions from the construction and operation of the leachate treatment will be mitigated during the trial;
d. Criteria by which the effectiveness of the trial will be measured.

8. The **Person** to whom this Notice is given must, within 28 days of the completion of the trial in requirement 7, submit to the CEO a report that documents and provides evidence of the effectiveness of the trial against the trial criteria.

9. The **Person** to whom this Notice is given must, if directed to do so by the **CEO** to further mitigate the impact of odour emissions from the Premises on the local community and only if the CEO has afforded Mindarie Regional Council an opportunity in writing of not less than 7 days to show cause why a direction should not be made, take further action to manage odour emissions on the site in accordance with the CEO's direction.

Groundwater emission requirements

10. The **Person** to whom this Notice is given must, within 60 days of this Notice being given, provide a groundwater risk assessment that assesses the risk to groundwater from elevated leachate heads within the site. The groundwater risk assessment must:
    a. Be undertaken by a **contaminated sites auditor**;
    b. Include an update to the Mandatory Auditors Report (MAR) that includes specific discussion around the risk to groundwater from elevated leachate head, including a review of the historic MAR data, with a specific focus on potential trends in leachate head and plume characteristics.
    c. Assess the likely risks to groundwater quality from any increased risk of seepage through the landfill liner.
    d. Include recommended actions to mitigate any assessed increased risk to groundwater and a proposed timeline for implementing the recommendations.

Other Requirements

11. The CEO may vary the requirements of this Notice, including the specified requirements and timeframes where they consider sufficient justification has been provided, and it can be demonstrated that such variation will not result in an unacceptable risk to human health, the environment or any environmental value.

_____

Ruth Dowd
Executive Director Assurance
Department of Water and Environmental Regulation

For the Chief Executive Officer under Delegation No. 162

28 November 2024

IMPORTANT INFORMATION:

Subject to section 65(4) of the Act:

- The CEO may vary the requirements of this Notice, including the specified requirements and timeframes where they consider sufficient justification has been provided, and it can be demonstrated that such variation will not result in an unacceptable risk to human health, the environment or any environmental value.

A **PERSON** WHO IS BOUND BY THIS ENVIRONMENTAL PROTECTION NOTICE AND WHO DOES NOT COMPLY WITH THIS NOTICE COMMITS AN OFFENCE UNDER THE *ENVIRONMENTAL PROTECTION ACT 1986*.

Under section 103 of the *Environmental Protection Act 1986:*

- a **person** who is aggrieved by a requirement contained in this environmental protection notice may within 21 days of being given this notice lodge with the Minister for Environment an appeal in writing setting out the grounds of that appeal; and

- any other **person** who disagrees with a requirement contained in this environmental protection notice may within 21 days of the making of that requirement lodge with the Minister for Environment an appeal in writing setting out the grounds of that appeal.

PENDING THE DETERMINATION OF AN APPEAL REFERRED TO ABOVE, THE RELEVANT REQUIREMENTS CONTAINED IN THIS ENVIRONMENTAL PROTECTION NOTICE CONTINUE TO HAVE EFFECT.

Note that under section 118A of the *Environmental Protection Act 1986* each **person** who is a director or who is concerned in the management of the body corporate may be taken to have also committed the same offence.

APPENDIX 1: DEFINITIONS

In this Notice, unless the contrary intention appears –

'*Act*' means the *Environmental Protection Act 1986* (WA);

'*CEO*' means Chief Executive Officer, Department of Water and Environmental Regulation or their delegate;

'*CEO*' for the purposes of correspondence means;

Chief Executive Officer
Department of Water and Environmental Regulation
Locked Bag 10
JOONDALUP DC WA 6919
Telephone: (08) 6364 7000
Fax: (08) 6364 7001
Email: compliance@dwer.wa.gov.au

'Contaminated sites auditor' means a contaminated land consultant accredited by the Department of Water and Environmental Regulation under the *Contaminated Sites Act 2003*.

'Days' include Monday to Friday, but exclude public holidays and weekends.

'Department' means the Department of Water and Environmental Regulation

'*Occupier*' for the purposes of this Notice means: Mindarie Regional Council

'*Person*' for the purpose of this Notice means:
Mindarie Regional Council (ABN 17 015 003 687)
1700 Marmion Avenue
CLARKSON WA 6030

'Suitably qualified landfill gas consultant' means a person who:

1. holds a Bachelor of Science or Bachelor of Engineering; and
2. has a minimum of 5 years of experience working in the field of landfill design and landfill gas management.

Appendix **2 - Premises Map**

Appendix C

Correspondence

Government of Western Australia
Department of Water and Environmental Regulation

Your ref:
Our ref: DMO 1607
Enquiries: Justin Ritchie
Phone: 1300 762 982
Fax: (08) 6364 7001
Email: info@dwer.wa.gov.au

Chief Executive Officer
Mindarie Regional Council
PO Box 2746
Clarkson WA 6030

Dear Sir/Madam

NOTICE OF A CLASSIFICATION OF A KNOWN OR SUSPECTED CONTAMINATED SITE GIVEN UNDER SECTION 15 OF THE *CONTAMINATED SITES ACT 2003*

The site detailed below **(the site)**, was classified by the Department of Water and Environmental Regulation (the department) under the *Contaminated Sites Act 2003* (the Act) on 29 July 2020 as *'contaminated - remediation required'*:

- Parcel 39285 = That portion of Lot 9030 on Deposited Plan 420860 as shown as Subject M on Deposited Plan 420860 on certificate of title 4007/807, known as 1700 Marmion Ave, Clarkson WA 6030

Following the submission of additional information, the site has been re-classified.

This notification is being sent to you in accordance with section 15(1) of the Act on the grounds that you, as the recipient, are one or more of the following:

(a) owner of the site (contact details sourced from the current certificate of title);
(b) occupier of the site;
(c) relevant public authority;
(d) person who, in the CEO's opinion, there is particular reason to notify;
(e) person who made the report under section 11 or 12; and
(f) person who, in the CEO's opinion, may be responsible for remediation of a site classified as *contaminated – remediation required.*

Site Re-classification

Category of site classification: Contaminated - remediation required

Date of site classification: 02/12/2021

Reasons for classification: Tamala Park Landfill, shown as 'Subject M' on Deposited Plan 420860 Marmion Drive, Clarkson (the site), was reported to the Department of Water and Environmental Regulation (the department) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003' (the Act), which commenced on 1 December 2006. The site was first classified under section 13 of the Act based on information submitted to the department by May 2007. The site has been classified again under section 13 of the Act to reflect additional technical information submitted to the department by November 2021.

The site was reported because it is used as a putrescible landfill and investigations identified a plume of landfill leachate in groundwater migrating beyond the site boundary.

A soil investigation was undertaken in June 2020. The investigation focused on the quality of soil around the boundary of the landfill body and within the commercially used areas (such as the recycling centre, wastewater treatment plant, transfer station, power station, training academy and the maintenance shed) south and west of the landfill body. With the exception of the detection of E.coli and nutrients above background levels in an isolated location adjacent the wastewater treatment plant, no soil contamination was identified exceeding Health Investigation Levels for commercial and industrial land, as published in the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM).

The site is currently used as a Class II licenced putrescible landfill site (Licence number L6963/1997/14) and has been used as a landfill since 1991. Landfills are a land use that has the potential to cause contamination, as specified in the guideline 'Assessment and management of contaminated sites' (Department of Environment Regulation [DER], 2014).

Multiple groundwater investigations have been conducted on the site since 1988 (three years prior to the site being used for landfill operations), with the most recent in December 2020. The investigations identified per- and poly-fluoroalkyl substances (PFAS) in groundwater at concentrations exceeding health-based guidance levels for drinking water, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2020), as well as arsenic, nickel, benzene and ammonia at concentrations exceeding assessment levels for drinking water and/or non-potable use of groundwater (NPUG), as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014). These criteria are relevant as the site is within close proximity to a drinking water production bore and the site is located within a Priority 3 Public Drinking Water Source Area. These investigations indicate that the leachate plume is migrating in a north-easterly and westerly direction and extends off-site. Further groundwater investigations are required off-site to inform long term trends of groundwater quality.

A licenced onsite abstraction bore is located south of the landfill area and up hydraulic gradient of the groundwater flow. The licence (GWL68672[5]) restricts the use of abstracted groundwater to industrial purposes only which excludes the use of abstracted groundwater for irrigation of lawn, garden or grass-covered areas. However, the approved use of the groundwater may include handheld hose watering or reticulated water for the establishment of plants, renovated grass or maintenance of reticulation systems.

The licenced abstraction bore was sampled in January, June, September and December 2020. PFAS was not detected at concentrations that exceeded health-based guidance levels for drinking water, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2020) and in the guideline 'Assessment and management of contaminated sites' (DER, 2014). Additionally, PFAS compounds were identified in groundwater taken from the bore for which no current guideline values are available. During the sampling events, ammonia and E.coli were noted in samples collected from the licenced abstraction bore at concentrations exceeding (NPUG), as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014). However, based on the use of the abstracted water for controlled industrial purposes, while not considered suitable for potable or domestic non-potable uses, ongoing use of the bore for dust suppression, firefighting, irrigation for revegetation programs and cleaning of trucks) is not considered to pose an unacceptable risk. Therefore, ongoing monitoring and assessment of abstracted groundwater from this bore is required to assess its suitability prior to its use for industrial purposes (such as dust suppression, firefighting, irrigation for revegetation programs and cleaning of trucks). This is consistent with standard advice from Department of Health (DoH) which recommends regular testing of groundwater to ensure it is suitable for its intended use.

Soil gas investigations have been undertaken at the site since 1997. Based on the quantity and composition of landfill waste in the deposit, the site is considered capable of generating a significant quantity of landfill gas (such as methane, carbon dioxide, carbon monoxide and hydrogen sulphide).

Soil gas is being remediated through the use of landfill gas extraction wells installed between March 2010 and January 2013 along the northern boundary of the landfill area. The extraction wells are designed to act as a barrier to prevent the migration of landfill gases off-site towards the residential area north of the landfill. The extracted gas is used to produce electricity at the onsite power station. Condensate from the gas collection is re-injected back into the landfill.

The most recent soil gas sampling event conducted in March 2021 detected methane in monitoring wells between the extraction well and the northern wall of the landfill at concentrations and rates that characterise the site as "low risk" or Characteristic Situation 2, as specified in the guideline 'Assessment and management of hazardous ground gases' (New South Wales Environment Protection Authority, 2020). However, there were negligible detections of methane north of the extraction well network. Therefore, it appears the extraction system is operating effectively to mitigate the risk of the migration of methane towards the northern residential area.

It is unclear whether landfill gas is migrating in other directions particularly towards residential area properties to the south of the site as the screening depths of the sentinel monitoring wells is either unknown or are not at an appropriate depth to monitor landfill gas generated by the waste body. Therefore, additional landfill gas monitoring is required both on and off-site to confirm containment of landfill gas, as well as to assess the potential for migration through preferential pathways and to inform long-term trends.

A surface landfill gas survey was undertaken April 2021. Although some areas of the site were not accessible, no significant amount of landfill gas was detected across the assessed area.

A risk assessment for substances present in groundwater and landfill gas has indicated that further investigation is required to determine the potential risk posed by the substances of concern at the site to human health, the environment or any environmental value.

Groundwater is contaminated and landfill gases (such as methane, carbon dioxide, hydrogen sulfide and carbon monoxide) are present beneath the site. Ongoing remediation of landfill gas is required to reduce risks to human health and environmental values to acceptable levels. Therefore, the site is classified as 'contaminated - remediation required'.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes the department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Where the land is part of a transaction - sale, mortgagee or lease agreement, the land owners MUST PROVIDE WRITTEN DISCLOSURE (on the prescribed Form 6) of the site's status to any potential owner, mortgagee (e.g financial institutions) or lessee at least 14 days before the completion of the transaction. A copy of the disclosure must also be forwarded to the department.

As a landfill, the site is currently licensed under Part V of the 'Environmental Protection Act 1986'.

Action Required:

Further groundwater and landfill gas investigations are required to adequately delineate and characterise the nature and extent of groundwater and landfill gas contamination on the site and off-site. This should also include an assessment of the adequacy of the landfill gas monitoring network including confirmation of screening intervals, assessment of potential for off-site migration of landfill gas particularly in relation to preferential pathways, and ongoing assessment of landfill gas and groundwater to inform long-term trends. The results of these assessments should be submitted to the auditor on an annual basis. A detailed site investigation report documenting the results of these investigations should be submitted to the appointed auditor by 1 June 2022.

Investigations should meet the standards outlined in the department's Contaminated Sites Guidelines and the NEPM. PFAS investigations and assessment are also to be carried out in accordance with the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2020). Landfill gas assessments should be undertaken with reference to the guideline, 'Assessing risks posed by hazardous ground gases to buildings' (Construction Industry Research and Information Association (CIRIA), 2007).

Ongoing half yearly monitoring and assessment of abstracted groundwater from the licenced abstraction bore is required to assess its suitability prior to its use for industrial purposes (such as dust suppression, firefighting, irrigation for revegetation programs and cleaning of trucks).

A risk assessment is required to determine potential risk to human health, the environment or any environmental value, both on-site and/or off-site, and should include an assessment of all potential receptors, including site users, residents, down-gradient groundwater users. If as a result of the risk assessment it is determined that remedial works should be undertaken, then a remediation action plan should be developed for the site. The risk assessment should be submitted to the appointed auditor by 1 June 2022.

The department understands a site management plan (SMP) was prepared and provided to the auditor. However, it is understood the SMP requires further revision before it is considered suitable for the monitoring and mitigation of landfill gas and groundwater migration both on and off-site and to address potential health risks to workers at the site. The revised SMP should be submitted to the appointed auditor by 1 June 2022.

General Information

The nature and extent of contamination and any restrictions on the use of the land, if applicable, are listed in Attachment A.

Information in relation to the classification of the site is available free of charge as a summary of records via the Contaminated Sites Database at www.der.wa.gov.au/contaminatedsites.

In some instances the department has had to classify sites based on historical information. A site may be re-classified at any stage when additional information becomes available, for example where a new investigation or remediation report completed in accordance with the department's 'Contaminated Sites Guidelines' and the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, is submitted to the department. The current site classification is the classification most recently conferred on the site.

Memorials

In accordance with section 58 (1), the department has already lodged memorial(s) against the Certificate(s) of Title relating to the site.

Given that the memorial(s) lodged against the site will remain, the Western Australian Planning Commission (WAPC) may not approve the subdivision of the land under Section 135 of the *Planning and Development Act 2005*, or the amalgamation of that land with any other land without seeking, and taking into account, the advice of the department as to the suitability of the land for subdivision or amalgamation. Furthermore, a responsible authority (e.g. Local Government Authorities) may not grant approval under a scheme for any proposed development of the land without seeking, and taking into account, advice from the department as to the suitability of the proposed development.

Disclosure upon sale / lease / mortgage of the site

Where the land is part of a transaction – sale, mortgage or lease agreement – and is classified as

- *contaminated – remediation required;*
- *contaminated – restricted use; or*
- *remediated for restricted use;*

land owners MUST PROVIDE WRITTEN DISCLOSURE (on the prescribed Form 6 enclosed) of the site's status to any potential owner, mortgagee (e.g. financial institutions) or lessee at least 14 days before the completion of the transaction. A copy of the disclosure must also be forwarded to the department.

Important note: Failure to provide written notice is an offence and carries a penalty of up to $125,000 and a daily penalty of $25,000.

Transferring responsibility for remediation

This site has been classified *'contaminated – remediation required'*. Where transfer of responsibility for remediation is proposed, the person responsible for remediation must obtain written agreement from the person to whom the whole or part of that responsibility will transfer, and seek written approval of that agreement from the department in accordance with section 30 of the Act. If it is proposed to transfer responsibility for remediation to the State, then written approval from the Minister for Environment must be obtained.

Appealing the Site Classification

All site classifications given by the department are appealable. However, only certain people can lodge a valid appeal. The people who can lodge a valid appeal varies, depending on the classification category, as detailed in Fact Sheet 4: *Site classifications and appeals*. Appeals need to be lodged in writing with the Contaminated Sites Committee at Forrest Centre, Level 22, 221 St Georges Terrace, Perth WA 6000, within **45 days** of being given this notification. The appeal should set out the appellant's relationship to the site, and must include the grounds and facts upon which it is based. An appeal fee (currently $45) applies.

To find out more about the appeal process, see the Contaminated Sites Committee website at www.csc.wa.gov.au or contact the office of the Committee on (08) 6364 7264.

For further information on all aspects of site classification, please refer to Fact Sheet 4 and the 'Contaminated Sites Guidelines', which are available from the department's website at www.der.wa.gov.au/contaminatedsites or by contacting the Contaminated Sites Information Line on 1300 762 982.

Yours sincerely

Penny Woodberry, Manager

CONTAMINATED SITES REGULATION
Delegated Officer under section 91
of the *Contaminated Sites Act 2003*

07/12/2021

Enc. Attachment A – Nature and Extent and Restrictions on Use.

Fact Sheet 4: *Site classifications and appeals*
Fact Sheet 5: *Buyer beware – buying and selling contaminated land*
Form 6 – Land Owner's Disclosure Before Completion of Land Transaction

- Parcel 39285 = That portion of Lot 9030 on Deposited Plan 420860 as shown as Subject M on Deposited Plan 420860 on certificate of title 4007/807, known as 1700 Marmion Ave, Clarkson WA 6030

Nature and Extent: A landfill leachate plume is present in groundwater migrating in a north-westerly direction. Landfill gas has been detected on site and is being intercepted to prevent off-site migration in a northerly direction.

Restriction on Use: The land use of the site is restricted to commercial/industrial use, which excludes sensitive uses with accessible soil such as childcare centres, kindergartens, pre-schools and primary schools. The site should not be developed for a more sensitive use such as recreational open space, residential use or childcare centres without further contamination assessment and/or remediation.

Other than for analytical testing or remediation, groundwater abstraction is not permitted at this site because of the nature and extent of groundwater contamination. This excludes the abstraction of groundwater from the licenced abstraction bore (licence GWL68672[5]).

The licenced abstraction bore may be used provided ongoing monitoring and assessment of abstracted groundwater from this bore is undertaken to assess its suitability prior to its use for industrial purposes (such as dust suppression, firefighting, irrigation for revegetation programs and cleaning of trucks).

Government of Western Australia
Department of Water and Environmental Regulation

Your ref: P19505_001_RPT_Rev1
Our ref: DMO 1607 & 11598, DER2018/000537
Enquiries: George Burke, Ph 6364 7177
Email: george.burke@dwer.wa.gov.au

Vanessa Bryant
Senior Principal
Senversa Pty Ltd
Level 18, 140 St Georges Terrace
Perth WA 6000

Dear Vanessa

MANDATORY AUDITOR'S REPORT – TAMAL PARK LANDFILL

Thank you for submitting the report 'Mandatory Auditor's Report – Tamala Park Landfill, 1700K Marmion Avenue, Tamala Park' (Senversa, 19 October 2023) (the MAR) and supporting consultants' reports to the Department of Water and Environmental Regulation (the department). The MAR and reports were received on 20 October 2023.

It is understood that the MAR was prepared in accordance with regulation 31(1)d of the Contaminated Sites Regulations 2006. The MAR enables the department to appropriately classify the Tamala Park Landfill at 1700K Marmion Avenue (defined as subject M on Deposited Plan 424903) [the landfill] and the northern adjacent site (defined as Subject N1 on Deposited Plan 424903) [the buffer zone] which forms a 500-metre buffer between the landfill and the northern residential estate under the *Contaminated Sites Act 2003* (the Act).

The department has reviewed the MAR and provides the following comment.

Based on the information provided, the department concurs with the Auditor's conclusions that the investigations were carried out in accordance with the department's contaminated sites guidelines and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999'. The department agrees with the conclusions of the MAR that the landfill is suitable for ongoing use as a Class II landfill subject to implementation of the site management plan.

The department agrees with the auditor's recommendation that further investigations are required to continue to assess the magnitude and extent of contamination including risks to human health, the environment and environmental values. Ongoing assessment of landfill gas and groundwater should be conducted as part of the ongoing site management plan to inform long term trends and to inform the need or otherwise for mitigation measures. Advice from the Department of Health (DoH) is included in Attachment 1 and includes recommendations for ongoing monitoring including assessments of trace gases (i.e. esters, phenols, organic acids, volatile organic chloride compound solvents and sulphur compounds), commonly associated with Class III landfill sites.

The landfill site is considered capable of generating a significant quantity of landfill gas which is currently managed through a landfill gas extraction system used to produce power at the on-site power station which doubles as a form of active remediation. The ground gas extraction system remains effective and the likelihood of ground gas to migrate off-site is low. The landfill gas extraction systems are to remain operational for as long as landfill gas is generated from the site.

Based on the available information, the northern adjacent site is considered suitable for continued use as a buffer zone between the landfill and the residential development along the northern boundary. The buffer zone is not considered to be suitable for residential development. No enclosed structures are to be constructed on the public open space and any proposed sealed areas should be limited to prevent accumulation of landfill gas that could migrate laterally to impact the residential areas.

The classification of the landfill is likely to remain *contaminated – remediation required* under the Act. The classification of the buffer zone is likely to remain *contaminated – restricted use* under the Act.

If you have any further queries, please contact Environmental Officer, George Burke, on 6364 7177.

Yours sincerely

Andrew Miller
SENIOR MANAGER
CONTAMINATED SITES

15 November 2023

c.c. Mindarie Regional Council (admin@mrc.wa.gov.au and kgoldsmith@mrc.wa.gov.au)
Tony Arias - Chief Executive Officer Tamala Park Regional Council (tony.arias@tamalapark.wa.gov.au)

Attachment 1: DoH advice (6 November 2023)

Nina Alavi

From: Vanessa Bryant <vanessa.bryant@senversa.com.au>
Sent: Friday, 3 May 2024 4:05 PM
To: Kathrine Goldsmith
Cc: Morne Hattingh; Sheryl Inkster
Subject: FW: MAR Response Letter - Tamala Park Landfill

Hi Kathrine

For your records. No need for a MAR this year.

If Talis and SLR make updates/changes to their reports please send these through to Sheryl who (also with David my LFG support) can review and close these out while I'm away.

If anything else arises during my absence, Sheryl should be able to point you in the right direction or organise any additional assistance you may need.

Kind regards
Vanessa

Vanessa Bryant (she/her)
Senior Principal, Contaminated Sites Auditor (WA and Qld)
My working days are Tue-Wed-Fri
M: **+61 419 951 532**
www.senversa.com.au
Level 18, 140 St Georges Terrace,
Whadjuk, Noongar Country
Perth, WA, 6000, Australia

From: Penny Woodberry <Penny.Woodberry@dwer.wa.gov.au>
Sent: Friday, May 3, 2024 1:36 PM
To: Vanessa Bryant <vanessa.bryant@senversa.com.au>; George Burke <George.Burke@dwer.wa.gov.au>
Subject: RE: MAR Response Letter - Tamala Park Landfill

OFFICIAL

OFFICIAL

Hi Vanessa

Responding on George's behalf as he is not in today – I think your suggestion is appropriate.

Thanks
Penny

From: Vanessa Bryant <vanessa.bryant@senversa.com.au>
Sent: Friday, May 3, 2024 10:15 AM
To: George Burke <George.Burke@dwer.wa.gov.au>
Cc: Penny Woodberry <Penny.Woodberry@dwer.wa.gov.au>
Subject: RE: MAR Response Letter - Tamala Park Landfill

Hi George

I've just completed a review of the latest groundwater and landfill gas monitoring reports for Tamala Park. I note that the reasons for classification haven't been updated following the 2023 MAR so the Action Required section is no longer relevant. MRC are seeking clarification as to whether another MAR is required for the site now or at what time in the future.

My thoughts on this are that MRC should continue to provide the auditor with updated information as it becomes available (ie at least a 6 monthly update following sampling and annual reporting (plus immediate notification if things change)). However, as there has been no change in the risk profile and nothing to indicate that restrictions should change, a MAR should be submitted in 2025 following 2 years of monitoring.

Does this sound appropriate? Would welcome any advice or suggestions on this.

Kind regards
Vanessa

Vanessa Bryant (she/her)
Senior Principal, Contaminated Sites Auditor (WA and Qld)
My working days are Tue-Wed-Fri
M: +61 419 951 532
www.senversa.com.au
Level 18, 140 St Georges Terrace,
Whadjuk, Noongar Country
Perth, WA, 6000, Australia

From: George Burke <George.Burke@dwer.wa.gov.au>
Sent: Friday, November 17, 2023 8:39 AM
To: Vanessa Bryant <vanessa.bryant@senversa.com.au>
Cc: admin@mrc.wa.gov.au; kgoldsmith@mrc.wa.gov.au; tony.arias@tamalapark.wa.gov.au
Subject: MAR Response Letter - Tamala Park Landfill

Hi Vanessa,

Please find attached a letter in response to the MAR (October 2023) for Tamala Park Landfill.

Kind regards,

George Burke
Environmental Officer
Contaminated Sites

Department of Water and Environmental Regulation
Prime House, 8 Davidson Terrace, JOONDALUP WA 6027
Locked Bag 10, Joondalup DC, WA 6919
T: (08) 6364 7177
E: george.burke@dwer.wa.gov.au | www.dwer.wa.gov.au
Twitter: @DWER_WA

Happy National Recycling Week!

Be a GREAT Sort and make landfill the last resort by recycling the five. For more information, visit WasteSorted.

Disclaimer: This e-mail is confidential to the addressee and is the view of the writer, not necessarily that of the Department of Water and Environmental Regulation, which accepts no responsibility for the contents. If you are not the addressee, please notify the Department by return e-mail and delete the message from your system; you must not disclose or use the information contained in this email in any way. No warranty is made that this material is free from computer viruses.

Disclaimer: This e-mail is confidential to the addressee and is the view of the writer, not necessarily that of the Department of Water and Environmental Regulation, which accepts no responsibility for the contents. If you are not the addressee, please notify the Department by return e-mail and delete the message from your system; you must not disclose or use the information contained in this email in any way. No warranty is made that this material is free from computer viruses.

Government of **Western Australia**
Department of **Health**

Your Ref: DMO11598 DER2018/537
Our Ref: FAA71162
Enquiries: David E Jackson, 9222 2000

Mr Andrew Miller
Senior Manager Contaminated Sites
Department of Water and Environmental Regulation
Locked Bag 10
Joondalup WA6919

Dear Andrew,

CLARKSON TAMALA PARK LANDFILL & BUFFER ZONE, MARMION AVE – MAR

Thank you for your correspondence of 26 October 2023 requesting the Department of Health (DOH) review the current assessment for the site under the *Contaminated Sites Act 2003* (*CS Act*). Relevant officers from the Environmental Health Directorate have considered the information provided in the following reports in the context of the *Public Health Act, 2016.*

- Mandatory Auditor Report (MAR): Tamala Park Landfill, Marmion Ave, Clarkson (Senversa, October 2023)
- Groundwater Sampling and Analysis Quality Plan (GW SAQP) – Tamala Park Marmion Ave, (360Env, February 2023)
- Groundwater Monitoring Report (Talis, August 2022)
- Groundwater Monitoring Report (Talis, September 2023)
- Landfill Gas SAQP Tamala Park, Marmion Ave, (360Env, April 2022)
- Landfill Gas Assessment – Tamala Park Marmion Ave (360Env, September 2023)

DOH has previously provided advice dated 30 June and 29 September 2020, and 15 November 2021 recommending and reaffirming that the Tamala Park landfill site be classified as *Contaminated – Remediation Required*. In addition, and critically, the undeveloped part of the Catalina Residential Estate along the north of the landfill site should be classified as *Contaminated – Restricted Use*; "*to provide a clear and unambiguous restriction on the land as an undeveloped protective buffer zone, and place a restriction on the use (and monitoring) of groundwater from the site, whilst ensuring that the buffer zone is maintained after the closure of the landfill site, and to provide the additional safeguards under s.68 of the CSAct; and inclusion on the DWERs Contaminated Sites database, to inform unsuspecting developers and purchasers*". It is understood that this recommendation was adopted in June 2020.

The Tamala Park landfill site is operated under an *EP Act* Part V Licence which requires that groundwater and gaseous emissions are monitoring and managed such that there is no impact or public health risks beyond the site boundary. Whilst the operating licence is in force, it will be the principal regulatory mechanism for controlling emissions from the landfill site. DoH notes that the Tamala Park landfill site has a minimum estimated 15-year operating life and will be subject to post-closure controls, including measures to minimise groundwater and ground gas emissions from the site as-long-as-is-required. This post-closure monitoring and management period could be decades.

189 Royal Street East Perth Western Australia 6004
Telephone (08) 9222 2000 TTY 133 677
PO Box 8172 Perth Business Centre Western Australia 6849
ABN 28 684 750 332
www.health.wa.gov.au

The current assessments indicate that the licensed landfill site (source) continues to generate leachate/groundwater and ground gas impacts, exceeding health risk screening levels, and the site is only suitable for continued use as a landfill site subject to regulation under *EP Act* Part V licence. The Auditor has reaffirmed an earlier recommendation, that the licensee improves the groundwater and ground gas monitoring network to allow further understanding of magnitude and extent of contamination, including risks to human health. We recommend that these improvements be enshrined in and enforced using existing *EP Act* operating license conditions.

Groundwater beneath the Buffer Zone (N1) (Affected) continues to be impacted by ammonia, chloride, sulphate, iron, manganese, and total dissolved solids at levels above the Australian Drinking Water Guidelines, but below the non-potable use guidelines. The Auditor has contended that although these contaminants are typical of landfill leachate, they may also be indicative of local groundwater conditions. Nonetheless the underlying groundwater is not suitable for potable supply (drinking water) and is aesthetically (odour, staining) unsuited to any other household uses including garden irrigation.

The landfill site (source) continues to generate large volumes and concentrations of hazardous gases and it is likely to continue to do so for an extended period. The Auditor has concluded that whilst the ground gas extraction system operated within and along the northern perimeter of the landfill site, it remains effective and the likelihood that ground gas will migrate into surrounding land, including the Buffer Zone (N1) to the north, is low. It is imperative however that a) the landfill gas extraction systems remain operational and effective and b) the Buffer Zone remains undeveloped and protected for as long as landfill gas is generated from the site. The Auditor also recommends that damage to the landfill cap should be repaired and maintained. We further recommend regulation of these matters through the existing operating licence, if they have not already been done so.

In addition to the monitoring of bulk gases (i.e methane, carbon dioxide, oxygen (balance), carbon monoxide, hydrogen sulpfide) at the site, DoH recommend that the proponent conduct periodic assessments of trace gases, commonly associated with Class III landfill sites (i.e esters, phenols, organic acids, volatile organic chlorine compound solvents and sulphur compounds). Guidance on trace gas analysis may be found in UK Environment Agency (LFTGN04 v3).

Based on the information provided the Auditor recommends that the *EP Act* licensed landfill site (Source) remain classified as *Contaminated – Remediation Required*, and the Buffer Zone (N1) (Affected) remain classified as *Contaminated – Restricted Use*. DoH concurs with the Auditor's conclusions.

The DoH requests that the above comments are provided to the consultant and auditor for their information and consideration. Please do not hesitate to contact David E Jackson on 9222 2000 if you need further information.

Yours sincerely

Lindy Nield
MANAGING SCIENTIST – CHEMICAL HAZARDS
ENVIRONMENTAL HEALTH DIRECTORATE

cc. george.burke@dwer.wa.gov.au
Date: 6 November 2023

AUSTRALIAN
ENVIRONMENTAL AUDITORS

AEA Ref: EA1191_C1a_GME 2024 25 February 2025

Kathrine Goldsmith
Environmental Supervisor
Mindarie Regional Council
1700 Marmion Avenue
Tamala Park WA 6030
Email: KGoldsmith@mrc.wa.gov.au

Interim Audit Advice – 2024 Groundwater Monitoring Event Report, Tamala Waste Management Facility

Dear Kathrine,

1 Introduction

Larissa Willoughby of Australian Environmental Auditors Pty Ltd (AEA) was engaged by Mindarie Regional Council (MRC) as a Western Australia (WA) Department of Water and Environmental Regulation (DWER) Accredited Contaminated Sites Auditor under the *Contaminated Sites Act 2003* (CS Act) to undertake an audit for the Tamala Park Waste Management Facility located at 1700K Marmion Avenue, Tamala Park (Lot 9043 on Deposited Plan, 424903) (hereafter referred to as the Site) including the affected site to the north (Subject Area N1).

2 Background

The Site has operated as a Class II putrescible landfill since 1991 and has been subject to multiple environmental investigations since circa. 1998 (including prior to its use as a landfill). The current licence (L9395/2023/1) dated 16/7/2024, refers to the Site as Part of Lot 9020 on Plan 408820.

Various ongoing investigations for soil, groundwater and landfill gas have been completed and submitted to DWER accompanied by the associated Mandatory Auditor's Report (MAR). A MAR was last submitted for the Site in October 2023 by the former Auditor (Ms Vanessa Bryant). The Site is currently classified '*Contaminated – remediation required (C-RR)*'. The Site is also considered to be a source site with the affected site, comprising a portion of the lot to the north of the landfill (Subject site N1 on Deposited Plan 420860), currently classified as '*Contaminated – restricted use*' (C-RU).

The MAR (2023) reviewed various investigation reports prepared for the Site including:

- Talis Consultants (2022) 2021 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Rev 4, 12 August 2022;

- 360 Environmental (2022) Tamala Park Waste Facility, 1700 Marmion Avenue, Tamala Park, WA , Sampling and Analysis Quality Plan – Landfill Gas Investigation, Rev 2, April 2022;
- 360 Environmental (2023a) Tamala Park Waste Facility, 1700 Marmion Avenue, Tamala Park, WA , Sampling and Analysis Quality Plan – Groundwater, Rev 3, February 2023;
- 360 Environmental (2023b) Tamala Park Waste Facility, 1700 Marmion Avenue, Tamala Park, WA , 2022 Landfill Gas Assessment, Rev 2, 28 September 2023; and
- Talis Consultants (2023) 2022 Groundwater Monitoring Report, Tamala Park Waste Facility, Rev 4, 29 September 2023.

In the context of the overall assessment of the Site the milestone MAR (2023) concluded:

- The assessments were sufficient to define the potential extents and types of contaminated media with an appropriate level of confidence;
- Investigation methodologies were sufficient to assess and manage risk; and
- Ongoing assessment of landfill gas and groundwater was required as part of an ongoing Site Management Plan (SMP) to inform long term trends and inform the need or otherwise for mitigation measures.

Ongoing groundwater investigations have been conducted with the results of sampling conducted in February and July 2024 compiled and reported by SLR Consulting Australia Pty Ltd (SLR) (2025).

3 Review Objective

To objective of the review was to provide auditor advice in relation to the quality and validity of SLR (2025), particularly in relation to its consistency with relevant guidance and the veracity of its conclusions and recommendations.

4 Scope of Audit

The scope of the work was limited to a review of the following document:

- SLR (2025) 2024 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Rev 0.2 (reference 675.072658.00001), dated 12 February 2025.

The review focuses on the completeness and suitability of the report and its compliance with the DWER *Contaminated sites guidelines* (DWER 2021) and other key documents in a manner consistent with guidance provided in *The Western Australian Contaminated Sites Auditor Scheme* (DWER 2016).

I reviewed a previous version of this document and provided a response via Auditor correspondence (Ea1191_C1_SLR_GME 2024_14Jan25) and Audit Issues Register (AIR_01_14Jan25). The updated document, SLR (2025) has adequately addressed my comments.

5 Review Findings

The SLR (2025) report generally follows the requirements and format recommended by DWER in the document Assessment and Management of Contaminated Sites (DWER 2021) applicable for a groundwater investigation/groundwater monitoring event (GME).

6 Concluding Statement

It is important to note that the comments in this document represent interim audit advice only and this does not constitute a MAR in accordance with the CS Act. This advice does not pre-empt or constrain the final outcome(s) of the Audit or any conditions that may be placed by the Auditor in a subsequent MAR.

Should you have any questions regarding the above, please do not hesitate to contact me 0408 856 299 or lwilloughby@envaud.com.au.

Yours faithfully,

Larissa Willoughby

WA DWER Accredited Contaminated Sites Auditor

DOCUMENT CONTROL	
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LW 25/02/2025	NA 25/02/2025

AUSTRALIAN
ENVIRONMENTAL AUDITORS

AEA Ref: EA1191_C2a_LFG 2024 24 March 2025

Kathrine Goldsmith
Environmental Supervisor
Mindarie Regional Council
1700 Marmion Avenue
Tamala Park WA 6030
Email: KGoldsmith@mrc.wa.gov.au

Interim Audit Advice – 2024 Landfill Gas Assessment, Tamala Waste Management Facility

Dear Kathrine,

1 Introduction

Larissa Willoughby of Australian Environmental Auditors Pty Ltd (AEA) was engaged by Mindarie Regional Council (MRC) as a Western Australia (WA) Department of Water and Environmental Regulation (DWER) Accredited Contaminated Sites Auditor under the *Contaminated Sites Act 2003* (CS Act) to undertake an audit for the Tamala Park Waste Management Facility located at 1700K Marmion Avenue, Tamala Park (Lot 9043 on Deposited Plan, 424903) (hereafter referred to as the Site) including the affected site to the north (Subject Area N1).

2 Background

The Site has operated as a Class II putrescible landfill since 1991 and has been subject to multiple environmental investigations since circa. 1998 (including prior to its use as a landfill). The current licence (L9395/2023/1) dated 16/7/2024, refers to the Site as Part of Lot 9020 on Plan 408820.

Various ongoing investigations for soil, groundwater and landfill gas have been completed and submitted to DWER accompanied by the associated Mandatory Auditor's Report (MAR). A MAR was last submitted for the Site in October 2023 by the former Auditor (Ms Vanessa Bryant). The Site is currently classified '*Contaminated – remediation required (C-RR)*'. The Site is also considered to be a source site with the affected site, comprising a portion of the lot to the north of the landfill (Subject site N1 on Deposited Plan 420860), currently classified as '*Contaminated – restricted use*' (C-RU).

The MAR (2023) reviewed various investigation reports prepared for the Site including:

- Talis Consultants (2022) 2021 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Rev 4, 12 August 2022;

- 360 Environmental (2022) Tamala Park Waste Facility, 1700 Marmion Avenue, Tamala Park, WA , Sampling and Analysis Quality Plan – Landfill Gas Investigation, Rev 2, April 2022;
- 360 Environmental (2023a) Tamala Park Waste Facility, 1700 Marmion Avenue, Tamala Park, WA , Sampling and Analysis Quality Plan – Groundwater, Rev 3, February 2023;
- 360 Environmental (2023b) Tamala Park Waste Facility, 1700 Marmion Avenue, Tamala Park, WA , 2022 Landfill Gas Assessment, Rev 2, 28 September 2023; and
- Talis Consultants (2023) 2022 Groundwater Monitoring Report, Tamala Park Waste Facility, Rev 4, 29 September 2023.

In the context of the overall assessment of the Site the milestone MAR (2023) concluded:

- The assessments were sufficient to define the potential extents and types of contaminated media with an appropriate level of confidence;
- Investigation methodologies were sufficient to assess and manage risk; and
- Ongoing assessment of landfill gas and groundwater was required as part of an ongoing Site Management Plan (SMP) to inform long term trends and inform the need or otherwise for mitigation measures.

Ongoing groundwater investigations have been conducted with the results of sampling conducted in February and July 2024 compiled and reported by SLR Consulting Australia Pty Ltd in the 2024 Groundwater Monitoring Report (SLR) (2024).

A Landfill Gas Risk Assessment (LFGRA) was undertaken in 2022 by 360 Environmental/SLR Consulting. Subsequently, landfill gas monitoring events have been conducted at the site in eight landfill gas monitoring events between March 2024 and December 2024.

3 Review Objective

To objective of the review was to provide auditor advice in relation to the quality and validity of the document reviewed, particularly in relation to its consistency with relevant guidance and the veracity of its conclusions and recommendations.

4 Scope of Audit

The scope of the work was limited to a review of the following document:

- SLR (2025) 2024 Landfill Gas Assessment, Tamala Park Waste Management Facility, Rev 02 (reference 675.072658.00001), dated 17 March 2025.

The review focuses on the completeness and suitability of the report and its compliance with the DWER *Contaminated sites guidelines* (DWER 2021) and other key documents in a manner consistent with guidance provided in *The Western Australian Contaminated Sites Auditor Scheme* (DWER 2016).

I reviewed a previous version of this document and provided a response via Auditor correspondence (EA1191_C2_SLR_LFG 2024_24Feb25) and Audit Issues Register (AIR_02_24Feb25). The updated document, SLR (2025) has adequately addressed my comments.

5 Specialist Support/ Expert

I have sought support from my Audit Specialist/ Expert member, Mr Stuart Thurlow for the review of the SLR (2025) report.

6 Review Findings

The SLR (2025) report generally follows the requirements and format recommended by DWER in the document Assessment and Management of Contaminated Sites (DWER 2021) applicable for landfill gas assessment.

7 Concluding Statement

It is important to note that the comments in this document represent interim audit advice only and this does not constitute a MAR in accordance with the CS Act. This advice does not pre-empt or constrain the final outcome(s) of the Audit or any conditions that may be placed by the Auditor in a subsequent MAR.

Should you have any questions regarding the above, please do not hesitate to contact me 0408 856 299 or lwilloughby@envaud.com.au.

Yours faithfully,

Larissa Willoughby

WA DWER Accredited Contaminated Sites Auditor

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LW 24/03/2025	NA 24/03/2025

AUSTRALIAN
ENVIRONMENTAL AUDITORS

AEA Ref: EA1191_C3a_GW RA 4 April 2025

Kathrine Goldsmith
Environmental Supervisor
Mindarie Regional Council
1700 Marmion Avenue
Tamala Park WA 6030
Email: KGoldsmith@mrc.wa.gov.au

Interim Audit Advice – EPN-10: Groundwater Risk Assessment, Tamala Waste Management Facility

Dear Kathrine,

1 Introduction

Larissa Willoughby of Australian Environmental Auditors Pty Ltd (AEA) was engaged by Mindarie Regional Council (MRC) as a Western Australia (WA) Department of Water and Environmental Regulation (DWER) Accredited Contaminated Sites Auditor under the *Contaminated Sites Act 2003* (CS Act) to undertake an audit for the Tamala Park Waste Management Facility located at 1700 Marmion Avenue, Tamala Park (Lot 9043 on Deposited Plan, 424903) (hereafter referred to as the Site) including the affected site to the north (Subject Area N1).

1.1 Environment Protection Notice 202405 (EPN-10)

An Environmental Protection Notice (EPN) was issued by the DWER for the Site on the basis that *"(DWER) suspects on reasonable grounds that there is, or is likely to be, an emission or emissions from the Premises and that the emissions have caused or are likely to cause pollution*."

Groundwater Emission Requirement 10 of the EPN (EPN-10) requires that:- within 60 days of this Notice, the Person to whom this Notice is given must: "*provide a groundwater risk assessment to assess the risk to groundwater from elevated leachate heads within the site*". MRC requested additional time to comply with EPN-10 via correspondence issued to DWER (24 January 2025). MRC received confirmation from DWER (7 February 2025) that the request had been acknowledged and in accordance with the provisions of requirement 11 of the EPN, DWER extended the submission date to **10 April 2025**.

2 Background

The Site has operated as a Class II putrescible landfill since 1991 and has been subject to multiple environmental investigations since circa. 1998 (including prior to its use as a landfill). The current licence (L9395/2023/1) dated 16/7/2024, refers to the Site as Part of Lot 9020 on Plan 408820.

Various ongoing investigations for soil, groundwater and landfill gas have been completed and submitted to DWER accompanied by the associated Mandatory Auditor's Report (MAR). A MAR was last submitted for the Site in October 2023 by the former Auditor (Ms Vanessa Bryant). The Site is currently classified '*Contaminated – remediation required (C-RR)*'. The Site is also considered to be a source site with the affected site, comprising a portion of the lot to the north of the landfill (Subject site N1 on Deposited Plan 420860), currently classified as '*Contaminated – restricted use*' (C-RU).

The MAR (2023) reviewed various investigation reports prepared for the Site. In the context of the overall assessment of the Site the milestone MAR (2023) concluded:

- The assessments were sufficient to define the potential extents and types of contaminated media with an appropriate level of confidence;
- Investigation methodologies were sufficient to assess and manage risk; and
- Ongoing assessment of landfill gas and groundwater was required as part of an ongoing Site Management Plan (SMP) to inform long term trends and inform the need or otherwise for mitigation measures.

Ongoing groundwater and landfill gas investigations have been conducted and reports provided to the Auditor for review including:

- SLR (2025a) 2024 Landfill Gas Assessment, Tamala Park Waste Management Facility, Rev 0.2 (reference 675.072658.00001), dated 12 February 2025; and
- SLR (2025b) 2024 Groundwater Monitoring Report, Tamala Park Waste Management Facility, Rev 0.2 (Final) (reference 675.072658.00001), dated 17 March 2025.

3 Review Objective

The objective of the review was to provide auditor advice in relation to the quality and validity of the document reviewed, particularly in relation to its consistency with relevant guidance and the veracity of its conclusions and recommendations.

4 Scope of Audit

The scope of the work has included a review of the following primary document:

- SLR (2025c) EPN-10: Groundwater Risk Assessment, Tamala Park Waste Management Facility (reference 675.072658.00007) (Rev 0.4), dated 4 April 2025.

In addition to this primary document, several supporting documents were obtained for reference to supplement the information, including:

- Talis (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, (reference TW24075) (Rev 4.0), dated 28 February 2025.

Auditor review of Talis (2025) has been provided in separate correspondence.

The review of SLR (2025c) focuses on the completeness and suitability of the report and compliance with the DWER *Contaminated sites guidelines* (DWER 2021) and other key documents in a manner consistent with guidance provided in *The Western Australian Contaminated Sites Auditor Scheme* (DWER 2016).

I reviewed a previous version of this document and provide a response via Auditor correspondence (EA1191_C3_SLR-GW RA_13Mar25) and Audit Issues Register (AIR_03_13Mar35). The updated document, SLR (2025c) has adequately addressed my comments.

5 Specialist Support/ Expert

I have sought support from my Audit Specialist/ Expert member, Mr Stuart Thurlow for the review of the SLR (2025c) report. Comments have been incorporated directly into the review findings as described below.

6 Review Findings

The SLR (2025c) report generally follows the requirements and format recommended by DWER in the document Assessment and Management of Contaminated Sites (DWER 2021).

In addition, the Auditor agrees with the recommendations and timeframes presented in Table 23 to address EPN-10 requirements. This will be documented in the MAR as required.

7 Concluding Statement

It is important to note that the comments in this document represent interim audit advice only and this does not constitute a MAR in accordance with the CS Act. This advice does not pre-empt or constrain the final outcome(s) of the Audit or any conditions that may be placed by the Auditor in a subsequent MAR.

Should you have any questions regarding the above, please do not hesitate to contact me 0408 856 299 or lwilloughby@envaud.com.au.

Yours faithfully,

Larissa Willoughby

WA DWER Accredited Contaminated Sites Auditor

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AUSTRALIAN
ENVIRONMENTAL AUDITORS

AEA Ref: EA1191_C4a_LMP 7 April 2025

Kathrine Goldsmith
Environmental Supervisor
Mindarie Regional Council
1700 Marmion Avenue
Tamala Park WA 6030
Email: KGoldsmith@mrc.wa.gov.au

Interim Audit Advice – Leachate Management Plan, Tamala Waste Management Facility

Dear Kathrine,

1 Introduction

Larissa Willoughby of Australian Environmental Auditors Pty Ltd (AEA) was engaged by Mindarie Regional Council (MRC) as a Western Australia (WA) Department of Water and Environmental Regulation (DWER) Accredited Contaminated Sites Auditor under the *Contaminated Sites Act 2003* (CS Act) to undertake an audit for the Tamala Park Waste Management Facility located at 1700 Marmion Avenue, Tamala Park (Lot 9043 on Deposited Plan, 424903) (hereafter referred to as the Site) including the affected site to the north (Subject Area N1).

2 Background

An Environmental Protection Notice (EPN) was issued by the DWER for the Site on the basis that *"(DWER) suspects on reasonable grounds that there is, or is likely to be, an emission or emissions from the Premises and that the emissions have caused or are likely to cause pollution*."

Talis Consultants Pty Ltd (Talis) was commissioned by MRC to assist with providing a response to Requirement 1 of the EPN (EPN-1) which requires that:- within 28 days of this Notice, the Person to whom this Notice is given must provide to the CEO for approval: "*a plan to manage leachate volumes on the Premises*".

EPN-1 required MRC to submit a detailed plan addressing concerns relating to leachate management, odour prevention, and monitoring to measure the performance of mitigating measures, ensure compliance, and ultimately mitigate environmental pollution. Talis prepared a Leachate Management Plan (LMP) to meet the short-term and long-term needs of the site with an increased focus on the odour management aspect.

An earlier version (Version 3.0) of the LMP was submitted to DWER for review, and on 13 February 2025, MRC and Talis met with DWER to focus on improvements to the LMP to better monitor, report and manage the performance/ efficacy of the phase leachate management activities with respect to predetermined performance indicators. DWER requested the inclusion of limits, which might trigger mitigation measures or corrective actions, to be more clearly defined. Subsequently, Talis updated the document and submitted Version 4.0 of the LMP:

- Talis (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, (reference TW24075) (Rev 4.0), dated 28 February 2025.

Talis (2025) is relevant to EPN-10 which requires:-*provide a groundwater risk assessment to assess the risk to groundwater from elevated leachate heads within the site*" for the completion of the following:

- A groundwater risk assessment of leachate seepage from the landfill-lined area.
- An updated Mandatory Auditors Report (MAR) that includes a review of the reports submitted to satisfy the MAR as well as the groundwater risk assessment.
- An Auditor review of the recommended actions to mitigate the risk to groundwater and a proposed timeline for implementing the recommendations.

3 Scope of Audit Review

The scope of the work has included a review of the following primary document:

- Talis (2025) Leachate Management Plan, Environmental Protection Notice – Item 1, (reference TW24075) (Rev 4.0), dated 28 February 2025.

In addition to this primary document, several supporting documents were obtained for reference to supplement the information, including:

- SLR (2025) EPN-10: Groundwater Risk Assessment, Tamala Park Waste Management Facility (reference 675.072658.00007) (Rev 0.2), dated 4 April 2025.

Auditor review of SLR (2025) has been provided in separate correspondence.

The review of Talis (2025) focused on the completeness and suitability of the report and compliance with the DWER *Contaminated sites guidelines* (DWER 2021) and other key documents in a manner consistent with guidance provided in *The Western Australian Contaminated Sites Auditor Scheme* (DWER 2016).

The review has focussed on comments relating to:

- An Auditor review of the recommended actions to mitigate the risk to groundwater and a proposed timeline for implementing the recommendations.

I previously provided Auditor correspondence (EA1191_C4_Talis LMP_13Mar25) and Audit Issues Register (AIR_04_13Mar25).

4 Specialist Support/ Expert

I have sought support from my Audit Specialist/ Expert member, Mr Stuart Thurlow for the review of the Talis (2025) report.

5 Review Findings

The Talis (2025) report generally follows the requirements and format recommended by DWER in the document Assessment and Management of Contaminated Sites (DWER 2021).

6 Concluding Statement

It is understood the LMP (Version 4) prepared by Talis (2025) is currently with DWER for review. Based on the meeting held between MRC, DWER and the auditor (27 March 2025), whilst the auditor has provided an advice letter to MRC regarding Talis (2025), any outstanding items for resolution will be held pending a response from DWER and any additional updates and recommendations can be consolidated into a subsequent version.

The auditor generally concurs with the leachate management strategy as provided in section 6 of Talis (2025), noting these actions were developed in consultation with DWER, separate to auditor involvement.

It is important to note that the comments in this document represent interim audit advice only and this does not constitute a MAR in accordance with the CS Act. This advice does not pre-empt or constrain the final outcome(s) of the Audit or any conditions that may be placed by the Auditor in a subsequent MAR.

Should you have any questions regarding the above, please do not hesitate to contact me 0408 856 299 or lwilloughby@envaud.com.au.

Yours faithfully,

Larissa Willoughby

WA DWER Accredited Contaminated Sites Auditor

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AUSTRALIAN
ENVIRONMENTAL AUDITORS

Victoria
Suite 21, 1 Ricketts Road
Mount Waverley VIC 3149
(Wurundjeri Country)
T 03 8542 7500

South Australia
335 Carrington Street
Adelaide SA 5000
(Kaurna Country)
T 08 8223 3488

Western Australia
7/80 Colin Street
West Perth WA 6005
(Whadjuk Country)
T 08 6268 0181

Queensland
(Turrbal Country)
T 07 3074 9422

New South Wales & Australian Capital Territory
(Gadigal Country and Ngunnawal Country)
T 02 8644 0681

Tasmania
(Palawa Country)
T 03 6289 8918

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Australian Environmental Auditors Pty Ltd
ABN 84 161 362 214
www.environmental-auditors.com.au