Clause 6(5) of the TBM regulations requires that EPA ensures commercially sensitive information in an EMP is not published without consent. WST has not consented to publishing the redacted material on the basis that it is commercially sensitive under the regulations. In the interests of transparent decision making, EPA will again seek consent to publish this material at the conclusion of the competitive process to select a site.

WESTERN
SOIL TREATMENT

# Tunnel Boring Machine Spoil Environmental Management Plan

| | |
|---|---|
| Project | Western Soil Treatment Facility |
| Title | Tunnel Boring Machine Spoil Environmental Management Plan |
| Site | East Maddingley Road, Bacchus Marsh, VIC 3340 |
| Version | 11 |
| Date | 12 April 2021 |
| Author | Western Soil Treatment Pty Ltd |

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WESTERN SOIL TREATMENT PTY LTD

**Date: 12 April 2021**

**Attention:** Tim Farragher
Director - Development & Infrastructure
Regulatory Standards, Assessments & Permissioning
Environment Protection Authority Victoria

**RE: Declaration of Accuracy, Tunnel Boring Machine Spoil Containment Environmental Management Plan, Western Soil Treatment Facility, East Maddingley Road, Bacchus Marsh, VIC 3340**

I, Donald Calleja (Chief Executive Officer) of Western Soil Treatment Pty Ltd, have reviewed this Tunnel Boring Machine Spoil Containment Environmental Management Plan related to the proposed operations of the Western Soil Treatment Facility[1] (reference: WST TBMS-EMP Rev11) and declare that all information contained in this document is, to the best of my knowledge, accurate.

**Yours sincerely,**

**Donald Calleja**

**Chief Executive Officer, Western Soil Treatment Pty Ltd**

[1] Western Treatment Facility is referred as *Maddingley Spoil Processing Facility* in Moorabool Planning Scheme Amendment C95moor.

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# ABBREVIATIONS

| Abbreviation | Definition |
|---|---|
| AAQMS | Ambient air quality monitoring station |
| BCM | Bank cubic meters |
| EMS | Environmental management system |
| EPA | Environment Protection Authority Victoria |
| ERA | Environmental risk assessment |
| GDE | Groundwater dependent ecosystems |
| GITA | Geotechnical inspection and testing authority |
| GCL | Geosynthetic clay liner |
| HELP | Hydrologic evaluation of landfill performance |
| HHERA | Human health and ecological risk assessment |
| IWRG | Industrial waste resource guideline |
| JV | CPB - John Holland Joint Venture |
| MBC | Maddingley Brown Coal |
| WST Facility | Western Soil Treatment Facility |
| PFAS | Per- and poly-fluoroalkyl substances |
| PFOS | Perfluoro octane sulphonate |
| PFOA | Perfluorooctanoic acid |
| PFHxS | Perfluoro hexane sulphonate |
| PIW | Prescribed Industrial Waste |
| SAQP | Sampling and analysis quality plan |
| SEPP | State environment protection policy |
| TBMS-EMP | Tunnel boring machine spoil environmental management plan |
| TBM Spoil | Tunnel boring machine spoil |
| TBM Spoil Regulations | Environment protection (management of tunnel boring machine spoil) regulations 2020 |
| WGTP | Westgate tunnel project |
| WST | Western Soil Treatment Pty Ltd |

# GLOSSARY

| Term | Definition |
|---|---|
| Amenity | Attractiveness or overall quality of a geographic location. For the purposes of this document, amenity includes visual amenity, noise levels and air quality. |
| Approval | Any licence, permit, consent, or other authorisation required under any environmental law for the development of the project. |
| Alluvial | Sediments deposited by flowing surface water. |
| Aquifer | A geological formation including porous or fractured rock, unconsolidated sediment, sand, or gravel that is saturated with water and sufficiently permeable to transmit economic quantities of water to wells, bores, and springs. |
| Aquitard | Saturated geological unit with a low permeability that can store water but does not readily transmit or yield significant quantities of water to wells, bores, or springs. An aquitard can sometimes, if very low permeability, be called an aquiclude. |
| A-weighting | A frequency weighting devised to attempt to take into account the fact that human response to sound is not equally sensitive to all frequencies; it consists of an electronic filter in a sound level meter, which attempts to build in this variability into the indicated noise level reading so that it will correlate, approximately, with human response. |
| Background noise level | Total silence does not exist in the natural or built environment, only varying degrees of noise. The Background Noise Level is the typical minimum level of noise measured in the absence of the noise under investigation and excluding other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. It is generally quantified by the noise level that is exceeded for 90% of the measurement period 'T' (LA90, T). |
| Baseline | A basic standard or level, usually regarded as a reference point for comparison. |
| Bore | A constructed facility, usually drilled or bored, for the purpose of extracting groundwater from an aquifer. Can also be used to inject water into an aquifer. Includes wells, boreholes, or piezometers. |
| Bund | A retaining wall constructed around a defined area. Used to protect locations where hazardous or potentially polluting substances are handled, processed, or stored. |
| Clay | Deposit of particles with a diameter less than 0.002 mm, typically contain variable amounts of water within the mineral structure and exhibit high plasticity. |
| Containment system | As per the TBM Spoil Regulations, a "containment systems" means a system used for the containment of tunnel boring spoil. |
| Containment Cell | As per the PFAS NEMP, a Containment Cell is an engineered containment facility with a low permeability liner, leachate drain and sump. Following completion of filling is covered with a low permeability cap and topsoil.<br>This is equivalent to a "containment system" as defined in the TBM Spoil Regulations. |
| Contamination | The condition of land or water where any chemical substance or waste has been added as a direct or indirect result of human activity at above background level and represents, or potentially represents, an adverse health or environmental impact. |
| Decibel | The decibel (dB) is a logarithmic scale that allows a wide range of values to be compressed into a more comprehensible range, typically 0 dB to 120 dB. Noise levels in decibels cannot be added arithmetically because they are logarithmic numbers. The human ear has a vast sound-sensitivity range of over a thousand billion to one, so the logarithmic decibel scale is useful for acoustical assessments. |
| Ecological community | An assemblage of species occupying a particular area. |
| Environmental Management Plan | Means an environmental management plan (EMP) submitted to the Authority for approval under TBM Regulation r.6. |

| Term | Definition |
|---|---|
| Groundwater | Water occurring in a geological formation in the subsurface in the saturated zone below the water table or in an aquifer confined by an overlying aquitard. |
| Habitat | An area or areas occupied, or periodically or occasionally occupied, by a species, population, or ecological community, including any biotic or abiotic components. |
| Hydraulic conductivity | Measure of the ease with which water will pass through earth material; defined as the rate of flow through a cross-Section of one square metre under a unit hydraulic gradient (metres per day). |
| Hydrogeology | The study of the occurrence, movement and chemistry of groundwater and its use as a resource or an engineering problem and its interrelationships with geological materials and surface waters including groundwater dependent ecosystem environments. |
| Investigation levels and screening levels | Concentrations of a contaminant above which further appropriate investigation and evaluation will be required. Investigation and screening levels provide the basis of Tier 1 risk assessment. |
| $L_{Aeq}$ | The A-weighted sound pressure level in decibels of a continuous steady sound that has, within a specified time interval, T, the same energy as the sound being measured. It can be considered the 'average' noise over time interval, T. |
| $L_{A10}$ | The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. |
| $L_{A90}$ | The A-weighted sound pressure level in decibels exceeded for 90% of a given time interval, T. LA90 is typically considered to be representative of background noise. |
| Likely | Taken to be a real chance or possibility. |
| Management measure | A design refinement or process undertaken to ensure that project-related activities are managed appropriately and in accordance with relevant regulations, standards, policies, and guidelines. |
| Modelling | The creation of a mathematical representation of aspects of the environment using manual or computer-based simulations of natural and altered environments, that allows assessment of project outcomes. |
| Monitoring bore | A bore used to monitor groundwater levels or quality. |
| $PM_{10}$ | 'Coarse particles' are those between 10 and 2.5 micrometres (µm) in diameter. |
| $PM_{2.5}$ | 'Fine particles' are those with a diameter of 2.5µm (PM2.5) or less. Particles that are smaller than 0.1µm are called ultrafine particles. Being smaller, PM2.5 particles can be transported further and persist for longer in the atmosphere. |
| Processing area | As per the TBM Spoil Regulations, a processing area is an area within the site coved by the EMP for the receipt, consolidation, and dewatering of tunnel boring machine spoil. |
| Receptor | A place, location or point at which exposure to particular effects (such as noise, vibration, or airborne pollutants) is measured. 'Sensitive receptors' are those that are identified as likely to be more susceptible to adverse effects, such as schools, hospitals, day care facilities and residences. |
| Risk Register | A full list of all risks identified for the project. |

# References

## Legislation, Regulations and Guidelines

ANZECC, 2000 - Australian and New Zealand Guidelines for Fresh & Marine Water Quality – Aquatic Ecosystems, 2000.

EPA, 1996 - Environmental guidelines for major construction-sites. Publication 480, EPA Victoria, 6 February 1996

EPA, 2000 - Groundwater Sampling Guidelines. Publication 669, EPA Victoria, April 2000.

EPA, 2007 - State Environment Protection Policy (Air Quality Management) Protocol for Environment Management - Mining and Extractive Industries. Publication 1191, EPA Victoria, December 2007.

EPA, 2009 - Industrial Waste Resource Guidelines Soil Hazard Categorisation and Management. Publication IWRG621, EPA Victoria, 2009.

EPA, 2009 - Industrial Waste Resource Guidelines Sampling and Analysis of Waters, Wastewaters, Soils and Wastes. Publication IWRG701, June 2009.

EPA, 2009 - Industrial Waste Resource Guidelines Soil Sampling. Publication IWRG702, EPA Victoria, 2009.

EPA 2009 - Industrial Waste Resource Guidelines Acid Sulfate Soil and Rock. Publication 655.1, EPA Victoria, July 2009.

EPA 2011 - Noise from Industry in regional Victoria. Publication 1411, EPA Victoria, October 2011.

EPA, 2016 - Industrial Waste. Publication 1624, EPA Victoria, May 2016.

EPA, 2017 - Scheduled Premises Regulations. Environment Protection (Scheduled Premises) Regulations, EPA Victoria, 2017.

EPA, 2018 - Contaminated Soil Management and Reuse on Major Infrastructure Projects, EPA Victoria, 3 May 2018.

EPA, 2018 - Soil Management Plan. EPA Victoria, 1 August 2018.

EPA, 2018 - Environment Protection (Residential Noise) Regulations. EPA Victoria, 2018.

EPA, 2021 - Interim Position Statement on PFAS. Publication 1669.4, EPA Victoria, October 2021.

EPA, 2018 - Vehicle guidance - Non-tanker vehicles/trailers. Publication IWRG814.2, EPA Victoria, April 2018.

HEPA, 2020 - PFAS National Environmental Management Plan, Version 2.0., Heads of Environmental Protection Authorities, January 2020.

International Organization for Standardization, 1998 - ISO 31000:2018 Risk Management – Principles and Guidelines.

NEPC, 1998 - National Environment Protection (Ambient Air Quality) Measure. National Environment Protection Council, 1998.

NEPC, 2013 - National Environment Management (Assessment of Site Contamination) Measure 1999. National Environment Protection Council, amended 2013.

Standards Australia, 1998 - Australian /New Zealand Standard – AS/NZS 5667.11:1998 Water Quality – Sampling Guidance on Sampling of Groundwaters, 1998.

Standards Australia, 2005- Australian Standard (2005) Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds, 2005.

Standards Australia, 2016 - AS/NZS 3580.1.1:2016 Methods for siting and analysis of ambient air. Part 1.1: Guide to siting air monitoring equipment.

Standards Australia, 2016 - AS/NZS 3580.10.1:2016: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited matter – Gravimetric Method.

State of Victoria, 1970 - Environment Protection Act 1970.

State of Victoria, 1987 - Planning and Environment Act 1987.

State of Victoria, 1994 - Catchment and Land Protection Act 1994.

State of Victoria, 1999 - State Environment Protection Policy (Ambient Air Quality), 10 February 1999.

State of Victoria, 2001 - State Environment Protection Policy (Air Quality Management), 21 December 2001.

State of Victoria, 2009: - Environment Protection (Industrial Waste Resource) Regulations 2009, 2009.

State of Victoria, 2011 - State Environment Protection Policy (Control of noise from commerce, industry, and trade) No. N-1, 31 October 2011.

State of Victoria, 2013 - State Environment Protection Policy (Prevention and Management of Contamination of Land, 2013.

State of Victoria, 2017 - Environment Protection (Scheduled Premises) Regulation, 2017.

State of Victoria, 2017 - Environment Protection Act 2017.

State of Victoria, 2020 - Environment Protection (Management of Tunnel Boring Machine Spoil) Regulations 2020.

US EPA (1984), Hydrologic Evaluation of Landfill Performance (HELP) Model, Publication No. EPA/530/SW-84/009, 1984.

## Site specific references

Avisure, 2020 - Assessment and Recommendation to Restrict Birds from the on-site Leachate Ponds, December 2020.

ADE Consulting Group, 2020 - PFAS Baseline Site Investigation Report, Maddingley Brown Coal, 11 Tilleys Road, Maddingley VIC, 28 August 2020.

Agon, 2020 - WGTP Sampling and Analysis Quality Plan prepared for the JV, 2020.

Chadwick Geotechnics, 2020 - Undisturbed Permeability Tests from the Storage Bays Imported PFAS from WGTP, May 2020.

Chadwicks Geotechnics, 2020 - Undisturbed and Disturbed Permeability Tests from the Storage Bays and Soil Containment Cell Imported PFAS from WGTP, May 2020.

EnRiskS, 2020 - Human Health and Ecological Risk Assessment: Re-Use of Spoil with PFAS at MBC, June 2020.

Paul Fridell of ERM, 2018 - s53V Environmental Audit Report - Southern Leachate Pond Construction Audit (CARMS 64662-20), ERM, 7 August 2018.

Paul Fridell of ERM, 2019 - S53V Audit of Landfill Cell Construction - Landfill Cell 6, Stage 2 – East Maddingley Road Landfill, Bacchus Marsh, 12 September 2019.

Chadwicks, 2020 - Geotechnical and permeability investigation Undisturbed Permeability Tests from the Storage Bays Imported PFAS from WGTP (1012657.000.L4), 2020.

Chadwicks, 2020 - Undisturbed and Disturbed Permeability Tests from the Storage Bays and Soil Containment Cell Imported PFAS from WGTP (1012657.000.L5), 2020.

FSG Geotechnics + Foundations, 2021 – Maddingley Containment Cell Geotechnical Investigation, 20 January 2021.

Golder, 2020 - Geotechnical Review of Westgate Tunnel Spoil Handling Facility at Maddingley Coal Site (19136175-005-L-Rev0), 30 March 2020.

Traffix Group, 2020 - Traffic Impact Assessment (G27822R-01iG), 11 March 2020.

Traffix Group, 2020 – Traffic Management Plan, Proposed Spoil Processing Facility, 11 Tilleys Road, Maddingley, 11 March 2020.

Mackenzie Environmental, 2020 - WGTSPF construction staging concept_V3, 2020.

Mackenzie Environmental, 2020 - Proposed Scope of Design Assessment and Construction Audit (191042_025_L_Rev2), 2020.

Mackenzie Environmental, 2021 - Leachate Water Balance (191042_027_L_Rev5), 8 February 2021.

Mackenzie Environmental, 2020 – 191042_030_L_Rev0_Leachate Pump Review, 14 September 2020.

Mackenzie Environmental, 2020 – 191042-039-L-Rev0_Holding Bays Compacted Clay Layer Construction Methodology, 2020.

Mackenzie Environmental, 2020 - 191042_002_R_Rev9_Containment Cell Design Report, 30 November 2020.

Mackenzie Environmental, 2021 - 191042_001_R_Rev13_Containment Cell Technical Specification, 20 January 2021.

Mackenzie Environmental, 2020 - 191042 - 100 Maddingley Spoil Processing Facility Containment Cell Rev H, 18 November 2020 (Drawings).

Mackenzie Environmental, 2021 - 191042_002_R_Rev9_Containment Cell Cap Design Report, 13 January 2021.

Mackenzie Environmental, 2021 - 191042_010_R_Rev9_Containment Cell Cap Technical Specification, 11 March 2021.

Mackenzie Environmental, 2021 - 191042 -300 Maddingley Spoil Processing Facility Containment Cell Cap Rev E, 11 January 2021 (Drawings).

Mackenzie Environmental, 2021 - 191042_008_R_Rev7_Leachate Sedimentation Pond Design Report, 25 November 2020.

Mackenzie Environmental, 2021 - 191042_007_R_Rev8_Leachate Sedimentation Pond Technical Specification, 20 January 2021.

Mackenzie Environmental, 2020 - 191042 - 200 Maddingley Spoil Processing Facility Leachate Sedimentation Pond Rev F, 19 November 2020 (Drawings).

Mackenzie Environmental, 2021 - 191042_005_R_Rev9_Holding and Drying Bays Design Report, 20 January 2021.

Mackenzie Environmental, 2021 - 191042_004_R_Rev14_Holding and Drying Bays Technical Specification, 8 February 2021.

Mackenzie Environmental, 2021 - 191042 - 400 Maddingley Spoil Processing Facility Holding Bays and Drying Bays Rev H, 24 March 2021 (Drawings).

Mackenzie Environmental, 2020 - 191042 - 500 Maddingley Spoil Processing Facility Contingency Drying Bays Rev C, 4 September 2020 (Drawings).

Mackenzie Environmental, 2020 - Maddingley Spoil Processing Facility Containment Cell Aftercare Management Plan, 16 December 2020.

Mackenzie Environmental, 2020 – Maddingley Spoil Processing Facility Containment Cell Rehabilitation Plan, 16 December 2020.

Nature Advisory, 2020 - 11 Tilleys Road, Maddingley Flora and Fauna Assessment, February 2020.

Nature Advisory, 2020 – 11 Tilleys Road, Maddingley Vegetation Management Plan, February 2020.

Nature Advisory, 2021 – 11 Tilleys Road, Maddingley, Victoria, Growling Grass Frog Targeted Survey, 17 March 2021.

SLR, 2020 - PFAS Leachate Estimates and Assessment of Risk to Groundwater (ref: 640.12131-L01-v5.0), 12 August 2020.

SLR, 2020 – PFAS Concentrations in WGTP TBM Spoil (ref: 640.12131-L01-v1.0), 4 September 2020.

SLR, 2021 - Groundwater Depth at Containment Cell: Implications for Assessment of Risk (640.30080-L01-v2.0), 11 March 2021.

SLR, 2020 - PFAS Baseline Assessment (Surface Water, Groundwater and Sediment) (ref: 640.12131-R05-v3.0), 6 March 2020.

SLR, 2021 - Factual Monitoring Bore Installation & Decommissioning Report (ref: 640.12131-R30_v2.0). 9 February 2021.

SLR, 2020 - Noise Impact Assessment and Management (ref: 640.12131-R02_v6.1), 23 December 2020.

SLR, 2020 - Low Frequency Noise Assessment (ref: 640.12131-M33_v1.0), 23 December 2020.

SLR, 2020 - Air Quality Impact Assessment (ref: 640.12131-R01_v7.0), 7 December 2020.

SLR, 2021 - Holistic Water Balance Development Report (ref: 640.12131-R31_v4.0), 11 March 2021.

SLR, 2021 - Environmental Auditor Review of Technical Specification and Construction Quality Assurance Plan Containment Cell (ref: 640.12131-L02_v4.0), 15 March 2021.

SLR, 2021 – Environmental Auditor Review of Technical Specification and Construction Quality Assurance Plan Holding Bays (ref: 640.12131-L03_v5.0), 25 March 2021.

SLR, 2021 – Environmental Auditor Review of Technical Specification and Construction Quality Assurance Leachate Sedimentation Pond (ref: ref: 640.12131-L04_v6.0), 12 April 2021.

SLR, 2021 – Environmental Auditor Review of Containment Cell Cap (ref: 640.12131-L05_v4.0), 25 March 2021.

SLR, 2021 – Environmental Auditor Review of Monitoring Program (ref: 640.12131-L06_v5.0), 9 April 2021.

SLR, 2021 – Environmental Auditor Review of Pollution Incident Plan (ref: 640.12131-L07_v4.0), 25 March 2021.

SLR, 2021 – Environmental Auditor Review of Aftercare Management Plan (ref: 640.12131-L08_v4.0), 25 March 2021.

SLR, 2021 – Western Soil Treatment Facility Baseline Soil Contamination Assessment (ref: 640.12131-R23-v3.0), 15 March 2021.

Tonkin & Taylor, 2020 – Review of Analytical Testing Data for Proposed PFAS Storage Bays, Maddingley Brown Coal (ref: 1012657), 7 January 2020.

# 1 Introduction

This Tunnel Boring Machine Spoil Environmental Management Plan (TBMS-EMP) has been prepared by the Proponent, Western Soil Treatment Pty Ltd (WST), to support an application to the Environment Protection Authority Victoria (EPA) for approval to receive tunnel boring machine spoil (TBM Spoil) from West Gate Tunnel Project (WGTP) operations at the Western Soil Treatment Facility, located in East Maddingley Road, Bacchus Marsh, Victoria (the "WST Facility", or "the site"). The Proponent, WST, is an occupier of the premises that is the subject of this application.

The WST Facility is also referred to as Maddingley Spoil Processing Facility in the Moorabool Planning Scheme Amendment C95moor.

## 1.1 Background

The TBM Spoil from the WGTP may be subject to several on-site processes at the WST Facility, including receipt, storage, handling, treatment, reprocessing, containment, or disposal to an off-site EPA licensed facility.

The WGTP is being constructed on behalf of the WGTP project owner, Transurban. The contractor responsible for construction of the WGTP and generation of TBM Spoil is the CPB - John Holland Joint Venture (JV).

The TBMS-EMP has been prepared in accordance with the requirements in the Environment Protection (Management of Tunnel Boring Machine Spoil) Regulations 2020 (TBM Spoil Regulations). A summary of the TBM Spoil Regulations requirements and where they have been addressed in the TBMS-EMP is included in Table 1-2.

## 1.2 TBMS-EMP Approval Requirements

A previous revision of this TBMS-EMP (version 5.1) was issued and approved by EPA on 1 September 2020. The EPA approval was subject to the provision of additional information, which was outlined in a letter also dated 1 September 2020.

The approval was subsequently withdrawn. EPA requested via email on 9 December 2020 that when the TBMS-EMP is resubmitted, the following is included:

"• An EMP that contains all of the material required by reg 6(2). The application should clearly detail where in the EMP the requirements of reg 6(2) are addressed.

• All the requirements (items 1 to 6) detailed in the previous approval letter dated 01 September 2020, including:

  o Auditor letter of endorsement.

  o Final detailed design and CQA specification documents for the Holding Bays, containment cell and leachate and sedimentation ponds that have been provided to EPA to address items in the previous letter.

  o For items that cannot be completed prior to construction, such as noise assessment, site rehabilitation plan and Auditor assessment of the construction, details of how and when these will be provided must be clearly defined in your application.

• Update Table 1-1 in the current EMP to reflect the changes made to the EMP and where relevant information to each element of reg 6(2) can be found."

EPA also requested via email on 11 December 2020 that when the TBMS-EMP is resubmitted, the following is included:

"(a) all of the material required by reg 6(2) of the Regulations; and

(b) all of the material identified in items 1 to 6 of the EPA's letter dated 1 September 2020.

In addition:

(a) the fresh application should clearly specify where in the new EMP each requirement of reg 6(2) is addressed;

(b) any reports or documents prepared by third parties should be included in the new EMP as annexures; and

(c) if there are matters specified in items 1 to 6 of the EPA's letter dated 1 September 2020 that are not requirements of reg 6(2) and that cannot be provided prior to construction (for example, noise assessment, site rehabilitation plan, auditor assessment of the construction), the fresh application should provide details of how and when those matters will be addressed."

Table 1-1 presents a roadmap to the proponent's proposed method of responding to each requirement or recommendation in the EPA approval letter dated 1 September 2020.

Table 1-1 Roadmap to TBMS-EMP Approval Requirements Response

| EPA Approval Requirements or Recommendation | TBMS-EMP Section |
|---|---|
| EPA Approval Letter Dated 1 September 2020 | |
| Prior to commencement of construction of the liner of the containment cell, detailed designs for the containment cell, including auditor review [to be provided separately] must be submitted, and include: | Section 4.5<br>ANNEX R<br>ANNEX S |
| a. detailed technical specifications and CQA plan for all materials to ensure they meet the design objectives using EPA Publications 788.3 and 1323.2 as guidance | Section 4.5<br>ANNEX R |
| b. detailed designs, technical specifications and a CQA plan using EPA Publication 788.3 as guidance for the leachate collection components of the cell, including the pumping capacity of the sump pump and the pipe capacity to ensure it meets the minimum requirements of the containment cell, noting only one sump is proposed for the cell. | Section 4.6<br>ANNEX R |
| c. design of temporary stormwater management infrastructure for the operational phase | Section 4.7<br>ANNEX R |
| d. Auditor review of detailed design technical specification and CQA Plans | ANNEX S |
| e. the development of a holistic site water balance to ensure sufficient leachate management capacity to enable continual compliance with the maximum leachate depth of 300mm in the containment cell; and | Section 2.11.1<br>Section 4.6<br>ANNEX O<br>ANNEX P |
| f. during detailed designs the separation distance between the containment cell liner and groundwater should be confirmed and if the minimum separation distance is lower than modelled, the findings of the hydrogeological risk assessment should be re-evaluated against the spoil acceptance criteria for the containment cell. | Section 3.4.3<br>Section 5.3<br>ANNEX L |
| Prior to commencement of construction of Holding Bays submission of auditor reviewed (subsequent report), detailed designs, technical specifications and a CQA plan for the Holding Bays; | Section 4.4<br>ANNEX R<br>ANNEX S |

| EPA Approval Requirements or Recommendation | TBMS-EMP Section |
|---|---|
| • Prior to commencement of construction of leachate management infrastructure, the submission of auditor reviewed detailed designs (subsequent report), technical specifications and a CQA plan for the leachate management infrastructure. | Section 4.6<br>ANNEX R<br>ANNEX S |
| Prior to depositing spoil in the containment cell: | |
| a. provision to the Authority of verification of the containment cell construction by an environmental auditor appointed pursuant to the Environment Protection Act 1970 and third-party geotechnical verification; | Verification will be completed once construction has been completed. This is anticipated to occur approximately six months after approval is provided for the WST Facility by EPA. |
| b. details of management controls to maintain a maximum leachate head in the containment cell of 300mm at all times; and | Section 4.6<br>ANNEX R |
| c. there should be monitoring of the effectiveness of the liner performance in the EMP to ensure its ongoing integrity. Contingency plans (which include trigger values for impacts to groundwater) should be in place to respond to incidents (assess risk and remediate where necessary) involving significant groundwater water impacts if they occur. | Section 7.1<br>Section 7.8<br>ANNEX Y |
| 4. Prior to receipt of spoil: | |
| a. provision to the Authority of verification of Holding Bays and leachate management infrastructure construction by an environmental auditor appointed pursuant to the Environment Protection Act 1970 and third-party geotechnical verification; | Verification will be completed once construction has been completed. This is anticipated to occur approximately six months after approval is provided for the WST Facility by EPA. |
| b. further clarity on how the appropriate policy for the treatment and disposal of waste acid sulfate soils and potential waste acid sulfate soils (EPA publication 655) will be followed; | Section 3.5.2<br>Section 3.7.1<br>Section 3.7.4<br>ANNEX U |
| c. a trigger level to trigger treatment of the leachate in the leachate pond to remove PFAS; and | Section 3.6<br>Section 4.6.5<br>Section 6.6 |
| d. further clarity of the record keeping method for the information required to be recorded and retained under regulation 5(p) of the TBM Regulations | Section 6.5<br>Section 9.2<br>ANNEX AF |
| 5. The completion of a follow-up noise assessment to verify compliance with Noise from Industry in Regional Victoria (NIRV) once the spoil processing and management facility is operational to confirm the effective implementation of noise mitigation measures. | This will be completed once the WST is operational. This is anticipated to occur approximately six months after approval is provided for the WST Facility by EPA. |
| 6. Preparation of a detailed rehabilitation and after-care management plan including:<br>a. detailed designs for the containment cell cap including surface water and stormwater management infrastructure. The final cap contours should be between 5% and 20% unless an alternative can be suitably justified and supported by EPA. This should also include auditor review in accordance with regulation 6(2)(s) of the TBM Regulations;<br>b. leachate management and monitoring during aftercare; and<br>c. cap erosion inspection and remediation. | Section 8<br>ANNEX AB |
| In addition to the above requirements, EPA recommends the following:<br>• restrict access of birdlife to the on-site leachate ponds; | Section 2.7<br>ANNEX Y |

| EPA Approval Requirements or Recommendation | TBMS-EMP Section |
|---|---|
| • no leachate should be intentionally stored in the holding and Drying Bays for an extended period to ensure seepage is minimised; | Section 4.6.1<br>Section 6.9.1<br>ANNEX R |
| • the inclusion of a PFAS concentration at which treatment of leachate would be initiated for leachate from the containment cell and the leachate ponds to ensure that higher PFAS concentrations do not remain in the leachate ponds; | Section 3.6<br>Section 4.6.5<br>Section 6.6 |
| • potential dust issues be monitored and assessed in real time, and triggers implemented to activate additional controls if there is risk of off-site migration of dust, PM10 and PM2.5; and | Section 7.5<br>ANNEX F<br>ANNEX V |
| • prior to commissioning of the facility – a low frequency noise assessment should be undertaken, and a report prepared to show low frequency noise has been designed out. | ANNEX G |
| EPA Email Dated 9 December 2020 | |
| An EMP that contains all of the material required by reg 6(2). The application should clearly detail where in the EMP the requirements of reg 6(2) are addressed. | Table 1-2 |
| All the requirements (items 1 to 6) detailed in the previous approval letter dated 01 September 2020, including: | See above. |
| Auditor letter of endorsement | This is understood to relate to Auditor review of designs (and not the TBMS-EMP), included in ANNEX S. |
| Final detailed design and CQA specification documents for the Holding Bays, containment cell and leachate and sedimentation ponds that have been provided to EPA to address items in the previous letter. | Section 4<br>ANNEX R |
| For items that cannot be completed prior to construction, such as noise assessment, site rehabilitation plan and Auditor assessment of the construction, details of how and when these will be provided must be clearly defined in your application. | See above items in this table under sub-heading “EPA Approval Letter Dated 1 September 2020” |
| Update Table 1-1 in the current EMP to reflect the changes made to the EMP and where relevant information to each element of reg 6(2) can be found. | Updated |
| EPA Email Dated 11 December 2020 | |
| “(a) all of the material required by reg 6(2) of the Regulations; and | Table 1-2 |
| (b) all of the material identified in items 1 to 6 of the EPA’s letter dated 1 September 2020; | See above items in this table under sub-heading “EPA Approval Letter Dated 1 September 2020” |
| In addition:<br>(a) the fresh application should clearly specify where in the new EMP each requirement of reg 6(2) is addressed; | Table 1-2 |
| (b) any reports or documents prepared by third parties should be included in the new EMP as annexures; and | ANNEX A to ANNEX T, ANNEX Z to ANNEX AB, ANNEX AD to ANNEX AE. |
| (c) if there are matters specified in items 1 to 6 of the EPA’s letter dated 1 September 2020 that are not requirements of reg 6(2) and that cannot be provided prior to construction (for example, noise assessment, site rehabilitation plan, auditor assessment of the construction), the fresh application should provide details of how and when those matters will be addressed.” | See above items in this table under sub-heading “EPA Approval Letter Dated 1 September 2020” |

The scope of the TBMS-EMP is defined in the TBM Spoil Regulations, and in particular, the requirements specified in the TBM Spoil Regulations checklist. The checklist and relevant Sections where these requirements have been addressed in the TBMS-EMP are summarised in Table 1-2.

Table 1-2 TBM Spoil Regulations - EMP Requirement Checklist

| EPA Regulations 5 and 6 (2) - S.R. No. 62/2020 | TBMS-EMP Section | Check |
|---|---|---|
| Regulation 5 | | |
| (a) tunnel boring machine spoil is managed and disposed of in accordance with the environment management plan; and | TBMS-EMP and its subsidiary documents | Yes |
| (b) the receipt, consolidation and dewatering of the tunnel boring machine spoil occurs on an impervious surface ("the processing area"); and | Section 1.3<br>Section 4 | Yes |
| (c) tunnel boring machine spoil is received in the processing area | Section 1.3<br>Section 4 | Yes |
| (d) no liquids, slurry or sludge escapes, spills, or leaks from the processing area | Section 4.6.1<br>Section 6.9.1<br>ANNEX R | Yes |
| (e) the processing area is secured to prevent public access | Section 4.3 | Yes |
| (f) the boundary of the processing area is at least 200 metres from any building that is a sensitive land use, including a residential dwelling, a health service, a childcare centre, or an education centre | Table 2-1<br>Section 2.5 | Yes |
| (g) tunnel boring machine spoil is not removed from the processing area until it is determined, in accordance with the methodology set out in the environment management plan, if it meets the specifications for containment of tunnel boring machine spoil | Section 3.4<br>Section 3.8 | Yes |
| (h) any spoil that does not meet the specifications for containment of tunnel boring machine spoil is assessed to determine if it is prescribed industrial waste and, if it is prescribed industrial waste within the meaning of the Environment Protection (Industrial Waste Resource) Regulations 2009 , categorised in accordance with those Regulations | Section 3.5<br>Section 3.8 | Yes |

| EPA Regulations 5 and 6 (2) - S.R. No. 62/2020 | TBMS-EMP Section | Check |
|---|---|---|
| (i) subject to paragraph (j), any tunnel boring machine spoil that does not meet the specifications for containment of tunnel boring machine spoil is, once removed from the processing area, deposited at a site licensed to accept industrial waste of that kind | Section 3.5<br>Section 3.8 | Yes |
| (j) leachate generated in the processing area, including liquid generated from dewatering of tunnel boring machine spoil, is analysed in accordance with the requirements for leachate sampling and analysis set out in the environment management plan and removed from the processing area<br>(i) if the analysis determines that the leachate meets the specifications for reuse set out in the environment management plan, for the purposes of reuse<br>(ii) for discharge or deposit into the sewerage system of a water corporation within the meaning of the Water Act 1989 if the discharge or deposit occurs in accordance with a trade waste agreement under that Act<br>(iii) for deposit at a site licensed to accept industrial waste of that kind | Section 3.6<br>Section 7.2<br>Section 7.8<br>ANNEX U<br>Section 4.6.5<br>Section 6.6 | Yes |
| (k) no dust generated by the receipt, storage, treatment, reprocessing, containment, handling or discharge or deposit onto the premises of tunnel boring machine spoil is discharged or emitted beyond the boundary of the premises that results in a risk of harm to human health or the environment | Section 5.6<br>Section 7.5<br>Section 7.8<br>ANNEX V | Yes |
| (l) the containment system is designed and constructed in accordance with the environment management plan | Section 4.5.2<br>ANNEX R | Yes |
| (m) the containment system is not used to contain any waste that is not tunnel boring machine spoil | Section 3.8<br>Section 3.4 | Yes |
| (n) the containment system is not used to contain tunnel boring machine spoil that does not meet the specifications for containment of tunnel boring machine spoil | Section 3.8<br>Section 3.4 | Yes |

| EPA Regulations 5 and 6 (2) - S.R. No. 62/2020 | TBMS-EMP Section | Check |
|---|---|---|
| (o) the containment system is not used to contain tunnel boring machine spoil that contains free liquid as determined by Method 9095B - Paint Filter Liquids Test (Revision 2) published by the United States Environmental Protection Agency in November 2004 | Section 4.3<br>Section 4.4.1 | Yes |
| (p) the following information is recorded and retained at the premises for at least 2 years –<br>(i) the quantity of tunnel boring machine spoil received at the processing area and the date on which it was received<br>(ii) the quantity of tunnel boring machine spoil removed from the processing area for deposit in the containment system and the date on which it was removed and deposited<br>(iii) the quantity of leachate removed from the processing area for the purposes of reuse and the date on which it was removed<br>(iv) the quantity of leachate removed from the processing area for discharge or deposit into the sewerage system of a water corporation<br>(v) the quantity of tunnel boring machine spoil and leachate removed from the processing area for deposit at a site licensed to accept industrial waste of that kind and the date on which it was removed | Section 6.5<br>Section 9.2<br>ANNEX AF | Yes |
| (q) any pollution incident at the premises or escape, spill or leak of waste outside the processing area is reported to the Authority in writing as soon as is practicable and that the report includes the following information<br>(I) the time, date and location of the incident<br>(ii) the nature of the incident<br>(iii) the circumstances in which the incident occurred (including the cause of the incident, if known)<br>(iv) the name of the person reporting the incident | Section 6.9<br>ANNEX AC | Yes |
| (r) a copy of the environment management plan is available at the premises | Not Applicable | A hard copy of this TBMS-EMP will be available at the premise |
| Regulation 6 (2) | | |

| EPA Regulations 5 and 6 (2) - S.R. No. 62/2020 | TBMS-EMP Section | Check |
|---|---|---|
| (a) a description and map of the location of the premises at which tunnel boring machine spoil is to be received | Figure 1-1<br>Figure 1-2 | YES |
| (b) a plan of the premises identifying the location of the processing area for the purposes of receipt, consolidation and dewatering of the tunnel boring machine spoil and the location of the containment system | Figure 1-2 | YES |
| (c) a description of the physical characteristics of the premises and elements or segments of the environment adjacent to the premises | Section 2 | YES |
| (d) the existing and proposed uses of the premises and elements or segments of the environment adjacent to the premises | Section 2.3<br>Section 2.4 | YES |
| (e) a description of the activities to be undertaken at the premises | Section 2.4<br>Section 4 | YES |
| (f) a description of the tunnel boring machine spoil to be received at the site | Sections 3.1 | YES |
| (g) the specifications for containment of tunnel boring machine spoil at the premises | Section 3.8 | |
| (h) the methodology for determining if tunnel boring machine spoil meets the specifications for containment of tunnel boring machine spoil | Section 3.8 | YES |
| (i) an assessment of the risk of adverse impacts from the receipt, storage, treatment, reprocessing, containment, handling or discharge or deposit onto the premises of tunnel boring machine spoil ("the Activities") on any beneficial uses of the environment | Section 5<br>ANNEX T | YES |
| (j) management arrangements and operating conditions designed to minimise the risk of adverse impacts from the Activities on any beneficial uses of the environment | Section 6 | YES |
| (k) detailed designs and technical specifications of the processing area for the purposes of regulation 5(b) and the containment system at the premises, including features intended to minimise the risk of adverse impacts from the Activities on any beneficial uses of the environment | Section 4.3.1 to 4.3.4<br>Section 4.4<br>Section 4.6.1<br>ANNEX R | YES |

| EPA Regulations 5 and 6 (2) - S.R. No. 62/2020 | TBMS-EMP Section | Check |
|---|---|---|
| (l) a construction quality assurance plan for the containment system at the premises | Section 4.5.2<br>ANNEX R | YES |
| (m) requirements for leachate sampling and analysis | Section 7.2<br>Section 7.8<br>ANNEX Y | YES |
| (n) the specifications of the qualities and characteristics of leachate that is suitable for reuse and an identification of activities for which that leachate can be reused | Section 3.6<br>Section 4.6.5<br>Section 6.6 | YES |
| (o) details of the method to be used to measure and record the information required to be recorded and retained under regulation 5(p) | Section 6.5<br>Section 9.2<br>ANNEX AF | YES |
| (p) a monitoring program to demonstrate compliance with the environment management plan | Section 7<br>ANNEX V to Y | YES |
| (q) requirements for an environmental auditor to audit the risk of harm actually or potentially arising from the Activities at the frequency specified in the environment management plan; | Section 6.10 | YES |
| (r) a pollution incident plan setting out how any pollution incident will be responded to | Section 6.9<br>ANNEX AC | YES |
| (s) a report prepared by an environmental auditor assessing the suitability of the detailed designs, technical specifications, construction quality assurance plan, monitoring program and pollution incident plan in achieving the requirements and objectives of these regulations | Section 6.10<br>ANNEX R<br>ANNEX AE | YES |
| (t) how the environment management plan is to be reviewed. | Section 9 | YES |

## 1.3 Site Setting and Features

The WST Facility is located in Maddingley, approximately 3.5 km south of the Bacchus Marsh Township in Victoria, 60 km north-west of the Melbourne CBD (Figure 1-1).

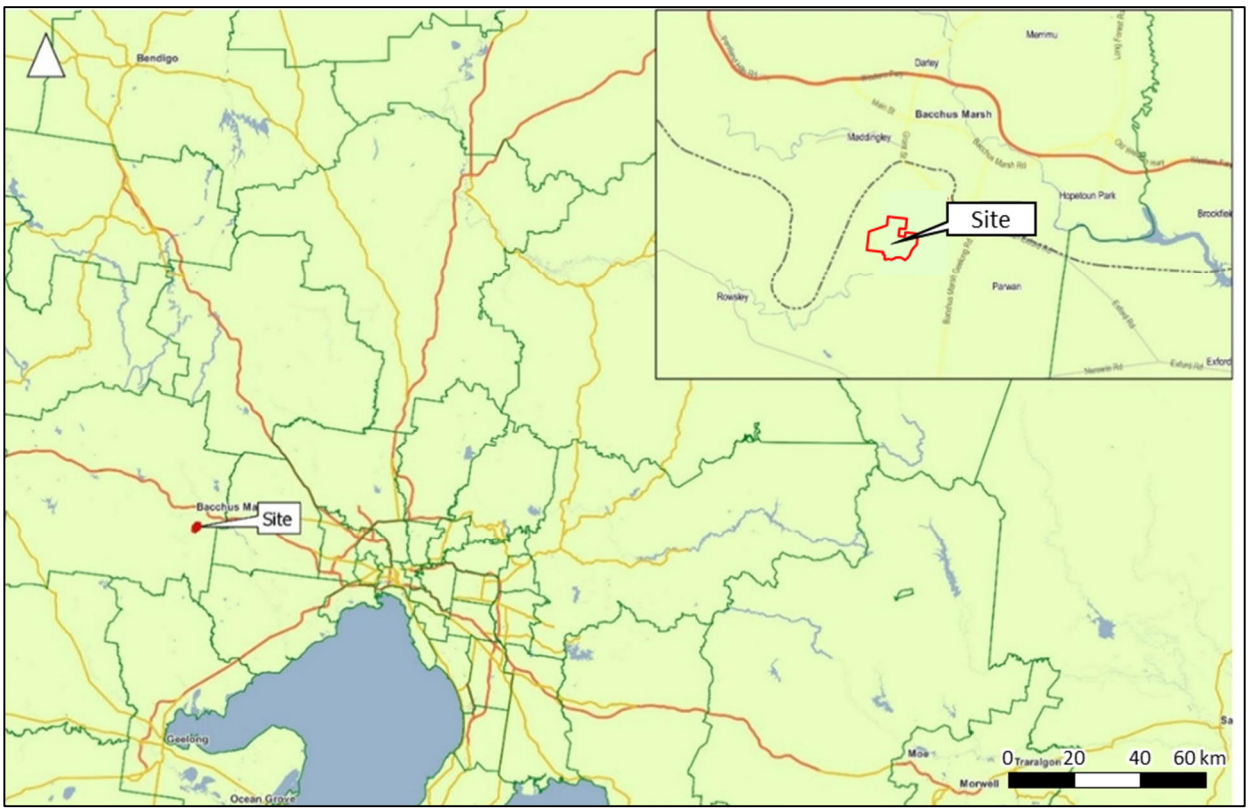


Figure 1-1 WST Facility Regional Setting

The WST Facility site boundary is shown in red on Figure 1-2. The WST Facility is an irregular shaped parcel of land that is approximately [redacted] in size. Most of the WST Facility is located in the south-western portion part of the MBC Landfill premises. The remainder of the WST Facility includes a portion of farmland west of Gullines Road. It is noted that the site boundary was revised on 1 March 2021 to include the Southern Leachate Pond and revised again on 25 March 2021 to remove the existing MBC Leachate Treatment Plant. Documents annexed to this TBMS-EMP that were issued prior to these dates show the outdated site boundary.

The northern boundary of the WST Facility is defined by the part of Kerrs Road between Gullines Road and East Maddingley Road. The eastern boundary of the WST Facility is irregular in shape and is defined by part of East Maddingley Road, the edges of parts of the MBC coal mine and the MBC Landfill. The eastern boundary of the WST Facility extends around the Northern Leachate Pond (which remains on the landfill premises), between the Northern and Southern Leachate Pond to include the Southern Leachate Pond (which is within the WST Facility). The existing MBC Leachate Treatment Plant remains in the MBC Landfill premises; and the proposed WST Leachate Treatment Plant will be located north of the Northern Leachate Pond within the WST Facility site boundary. The south-eastern and southern boundary of the WST Facility is aligned with but offset north-west of Parwan Creek, then extends westward to the corner of Rowsley Station Road and Gullines Road. The part of the WST Facility west of Gullines Rod is bounded by a line extending approximately 500 m to the west from Gullines Road, then northward for 500 m, then north-easterly for approximately 600m to Gullines Road, then to the intersection of Kerrs Road and South Maddingly Road.

The WST Facility is located on the parcel of land shown as SC01 on the Scheme maps, forming parts of the Moorabool Planning Scheme Amendment C95moor.

Figure 1-2 WST Facility Site Boundary and Layout

The WST Facility when constructed will comprise areas for receiving, processing, and classifying TBM Spoil for either placement in a Containment Cell or disposal offsite to an EPA licensed facility.

The WST Facility "processing area" (defined in Section 5 [b] of the TBM Spoil Regulations) is the area where TBM spoil is received, consolidated, and dewatered and this includes: Holding Bays; Drying Bays; Contingency Drying Bays; Leachate Sedimentation Pond; Southern Leachate Pond and Treatment Plant. The WST "containment system" is defined in the TBM Spoil Regulations as a system used for the containment of TBM Spoil; this is referred to in this TBMS-EMP (including in Figure 1-2) as the "Containment Cell".

In addition to these facilities there are: interconnecting haul roads; attached unloading ramps; stormwater drains; leachate management facilities (including: leachate conveyance lines, the Leachate Sedimentation Pond and the Southern Leachate Pond and the Leachate Treatment Plant); and support facilities (including the driver control station, carparking/non-conforming loads area and construction materials stockpile areas).

More detailed information on the layout and operations of the WST Facility is presented in Section 4.

## 1.4 Planning Scheme Amendment

The majority of the WST Facility is zoned as Special Use Zone Schedule 1 under the Moorabool Planning Scheme. The provisions of Special Use Zone Schedule 1 cover the regulation of mining operations, land management practices, mining rehabilitation and control of development. A small portion of the south-western portion of the WST Facility is zoned Farming Zone.

The Moorabool Planning Scheme identifies the Maddingley Waste and Resource Recovery Hub (including the coal mine, landfill, and associated activities) as an existing strategically important land use, which it seeks to protect.

In addition to the approval being sought from EPA, MBC also requested that a planning scheme amendment be undertaken by the Minister for Planning to facilitate the WST Facility development. It is noted that the purpose of the TBMS-EMP is not to address the planning scheme amendment application – as this is addressed under a separate cover.

## 1.5 Objectives of the TBM Spoil Regulations

The main objectives of the TBM Spoil Regulations are to provide a mechanism for management and disposal of TBM Spoil and to make a consequential amendment to the Environment Protection (Scheduled Premises) Regulation 2017.

It is also stated in the TBM Spoil Regulations that:

- Sections 19A and 20(1) of the Environment Protection Act 1970 (in relation to Works Approvals) do not apply to the occupier of scheduled premises in respect of the receipt, storage, treatment, reprocessing, containment, handling, or discharge or deposit of TBM Spoil onto land, if an EMP is provided and approved by the Authority (i.e. EPA).
- Section 27A(2) of the Environment Protection Act 1970 (in relation to offences for depositing waste) does not apply, if a permit is held for the deposition of TBM Spoil at a premise which has an EMP approved by the Authority.

To comply with the TBM Spoil Regulations the TBMS-EMP must include an assessment the risk of adverse impacts from the receipt, storage, treatment, reprocessing, containment, handling, or discharge or deposit onto the premises of the TBM Spoil Management arrangements and operating conditions are required to be designed to minimise the risk of adverse impacts.

## 1.6 Purpose and Objective of the TBMS-EMP

The purpose of this TBMS-EMP is to address Regulation5 and 6 of the EPA requirements, as provided in the TBM Spoil Regulations.

The objective of this TBMS-EMP is to provide a framework to manage any potential risk of harm to human health (including project workers) and the environment and impacts from the construction, operation, and closure phases of the WST Facility project.

The TBMS-EMP falls under WST's Environmental Management System (EMS) for site activities.

## 1.7 Scope of the TBMS-EMP

The scope of the TBMS-EMP is defined in the TBM Spoil Regulations, and in particular, the requirements specified in the TBM Spoil Regulations checklist (see Section 1.2).

## 1.8 Legislative Framework

Development of this TBMS-EMP is primarily guided by the TBM Spoil Regulations. Where appropriate and consistent with the intent of the TBM Spoil Regulations reference is made to the following additional relevant legislation, policy, and guidelines:

- Catchment and Land Protection Act 1994
- Environment Protection Act 1970
- Environment Protection Act 2017
- Planning and Environment Act 1987
- National Environment Management (Assessment of Site Contamination) Measure 1999 (amended 2013) (NEPM)
- National Environment Protection Council (1998) National Environment Protection (Ambient Air Quality) Measure (Ambient Air NEPM)
- Heads of Environmental Protection Authorities (January 2020) PFAS National Environmental Management Plan, Version 2.0 (PFAS NEMP)
- State Environment Protection Policy (Air Quality Management), 21 December 2001 (SEPP [AQM])
- State Environment Protection Policy (Ambient Air Quality), 10 February 1999
- State Environment Protection Policy (Control of noise from commerce, industry and trade) No. N-1, 31 October 2011
- State Environment Protection Policy (Prevention and Management of Contamination of Land, 2013
- EPA Environment Protection (Residential Noise) Regulations 2018
- EPA Scheduled Premises Regulations – Environment Protection (Scheduled Premises) Regulations 2017
- Environment Protection (Industrial Waste Resource) Regulations 2009
- EPA (July 2009) Publication IWRG655.1 Acid Sulfate Soil and Rock (IWRG655)
- EPA (June 2009) Publication IWRG701 Sampling and Analysis of Waters, Wastewaters, Soils and Wastes (IWRG701)
- EPA (2009) Publication IWRG702 Industrial Waste Resource Guidelines Soil Sampling (IWRG702)
- EPA (2009) Publication IWRG621 Soil Hazard Categorisation and Management 2009 (IWRG621)
- EPA (28 October 2011) Publication 1411: Noise from Industry in regional Victoria (EPA Publication 1411)
- EPA (6 February 1996) Publication 480: Environmental guidelines for major construction-sites
- EPA (October 2021) Publication 1669.4 Interim Position Statement of PFAS
- EPA (3 May 2018) Contaminated Soil Management and Reuse on Major Infrastructure Projects
- EPA (1 August 2018) Soil Management Plan.

## 1.9 Supporting Technical Study Documents

The development of this TBMS-EMP has been informed by the specialist supporting studies, summarised in Table 1-3. It is noted here that due to timing of issue, in some of these reports prepared by others the Proponent is referred to as MBC and the site is referred to as the Maddingley Spoil Processing Facility (MSPF) or similar. The reader is directed to assume where other similar definitions are used, they are referring to WST and the WST Facility.

Table 1-3 Relevant Specialist Studies

| Technical Area | Document title | Author company | ANNEX |
|---|---|---|---|
| Risk | Human Health and Environmental Risk Assessment: Re-Use of Spoil with PFAS at MBC (HHERA) | EnRiskS | ANNEX J |
| | PFAS Leachate Estimates and Assessment of Risk to Groundwater | SLR | ANNEX N |
| | PFAS Concentration in WGTP TBM Spoil | SLR | ANNEX M |
| | Groundwater Depth at Containment Cell: Implications for Assessment of Risk | SLR | ANNEX L |
| Air Quality | Air Quality Impact Assessment | SLR | ANNEX F |
| Noise | Noise Impact Assessment and Management | SLR | ANNEX G |
| | Low Frequency Noise Assessment | SLR | ANNEX G |
| Groundwater, Surface Water and Sediment | Review of Analytical Testing Data for Proposed PFAS Storage Bays | Tonkin & Taylor | ANNEX C |
| | PFAS Baseline Assessment (Surface Water, Groundwater and Sediment) | SLR | ANNEX A |
| | PFAS Baseline Site Investigation Report | ADE | ANNEX B |
| | Baseline Soil Contamination Assessment | SLR | ANNEX D |
| | Factual Groundwater Bore Installation Report | SLR | ANNEX E |
| Hydrology | Holistic Sitewide Water Balance | SLR | ANNEX P |
| | Leachate Water Balance | Mackenzie Environmental | ANNEX O |
| Geotechnical and Permeability Investigation | Undisturbed Permeability Tests from the Storage Bays Imported PFAS from WGTP | Chadwick Geotechnics | ANNEX K |
| | Undisturbed and Disturbed Permeability Tests from the Storage Bays and Soil Containment Cell Imported PFAS from WGTP | Chadwick Geotechnics | ANNEX K |
| | Geotechnical Review of Westgate Tunnel Spoil Handling Facility at Maddingley Coal Site | Golder | ANNEX K |
| | Geotechnical Investigation | FS Geotechnics | ANNEX K |
| Traffic | Traffic Impact Assessment | Traffix Group | ANNEX H |

| Technical Area | Document title | Author company | ANNEX |
|---|---|---|---|
| Flora and Fauna | Flora and Fauna Assessment<br>Growling Grass Frog Targeted Survey | Nature Advisory | ANNEX I |
| Construction Design | Construction and Audit Staging Documents:<br>WGTSPF Construction Staging Concept<br>Proposed Scope of Design Assessment and Construction Audit<br>Containment Cell Documents:<br>Containment Cell Design Report<br>Containment Cell Technical Specification<br>Containment Cell Drawings<br>Containment Cell Cap Documents:<br>Containment Cell Cap Design Report<br>Containment Cell Cap Technical Specification<br>Containment Cell Cap Drawings<br>Holding and Drying Bays Documents:<br>Holding and Drying Bays Design Report<br>Holding and Drying Bays Technical Specification<br>Holding Bays and Drying Bays Drawings<br>Contingency Drying Bays Documents:<br>Contingency Drying Bays Drawings<br>Leachate Infrastructure Documents:<br>Leachate Sedimentation Pond Design Report<br>Leachate Sedimentation Pond Technical Specification<br>Leachate Sedimentation Pond Drawings<br>Leachate Pump Review<br>Southern Leachate Pond (appended to ERM Construction Audit) | Mackenzie Environmental<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>SMEC | ANNEX R<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>ANNEX AG |
| Management Plans | Acid Sulfate Soil Management Plan<br>Air Quality Management Plan<br>Noise Management Plan<br>Soil Management Plan<br>Water Management Plan<br>Birdlife Management Plan<br>Vegetation Management Plan<br>Rehabilitation End Use Plan<br>Aftercare Management Plan<br>Pollution Incident Plan<br>Traffic Management Plan | WST<br>WST<br>WST<br>WST<br>WST<br>Avisure<br>Nature Advisory<br>Mackenzie Environmental<br>Mackenzie Environmental<br>WST<br>Traffix Group | ANNEX U<br>ANNEX V<br>ANNEX W<br>ANNEX X<br>ANNEX Y<br>ANNEX Z<br>ANNEX AA<br>ANNEX AB<br>ANNEX AB<br>ANNEX AC<br>ANNEX AD |

# 2 Environmental Setting

## 2.1 Site Ownership

The majority of the WST Facility is owned by MBC. The portion of the WST Facility west of Gullines Road is owned by JBD Industrial Park Pty Ltd.

## 2.2 Historical Site Use

Vines (2009) reports from the mid to late 1940s, at a time of fuel shortages in Victoria, several companies commenced open cut mining operations in the Bacchus Marsh area south of the Werribee River, south and east of the VR Railway, where the overburden is free of basalt.

The Maddingley Open Cut Number Two mine (located within the current MBC Landfill) was commenced in March 1948. The operating company was Maddingley Brown Coal Pty Ltd, largely (or totally) owned by Australian Paper Manufacturers Limited. Uncrushed coal was delivered from the mines to the Maddingley Mine rail siding. By 1950, the mine had reached an output of over 4,000 tonnes per week, mainly supplying coal by rail direct to the APM mill in Fairfield, Melbourne.

Figure 2-1 shows the Star No. 1 (circa 1950) and Lucifer open cuts in the northern part of the adjacent MBC Landfill, and the Maddingley No. 2 open cut in the centre of the adjacent MBC Landfill. Parwan Creek ran through the WST Facility. The Star No 1 and Lucifer open cuts were subsequently filled with overburden from Maddingley No. 2.

Figure 2-1 Locations of open cut mines in 1950 (extracted from Vines (2009) Dwg 8.4/1)

Two other former open cut mines; Boxlea adjacent to the north east corner of the current MBC Landfill; and the Star Open Cut No.2 south of the current MBC Landfill, are both now water filled.

Nolan (2019) states "The Star Dam, also known as the No 2 (Colliery Dam) was an open cut coal mine that was filled with water in the late 1950s following a fire." The source for this statement is not reported. Vines (2009) notes the last reported output from the Star Open Cut No.2 was in 1978. URS (2014) infers the base of the pit would be similar to the Maddingley No.2, i.e. at elevation of approximately 55 mAHD.

The Maddingley No. 2 open cut extent expanded to the east (Parwan Creek was relocated), south to Parwan Creek and to the north east.

Coal extraction is currently occurring in the north central part of the MBC Landfill.

## 2.3 Existing Site Use

The northern and western part of the WST Facility is currently used by MBC for soil product blending as part of its recycling activities. WST is now preparing the site for development of the WST Facility, and this material will be removed by MBC. The eastern and western parts of the WST Facility are currently used for cropping. The central-southern portion is an undeveloped grassed and treed paddock.

The WST Facility has six groundwater monitoring wells within its boundary, three in the Fyansford Formation, two in the Lower Werribee Formation and one in perched water. The monitoring wells and current site condition are shown on Figure 2-2.

Figure 2-2 Existing Groundwater Monitoring Bores within the WST Facility

## 2.4 Proposed Future Site Use

The following provides a summary of the proposed future land use:

- The WST Facility will receive TBM Spoil from the WGTP for processing and either on-site containment within a Containment Cell, or disposal to an off-site EPA licensed facility.
- TBM Spoil Drying Bays to the west of Gullines Road are to be located on land currently used for cropping. (see Figure 2-2). This land will be returned to agricultural use at the conclusion of the Project (subject to assessment of its suitability for this land use and regulatory approval).
- TBM Spoil Holding Bays and Drying Bays to the east of Gullines Road are to be located on land currently used for cropping in the south and resource recovery work in the north (See Figure 2-2). This land will be returned to its current uses at the conclusion of the project, subject to an assessment of suitability for the proposed use and regulatory approval.

- The WGTP will produce approximately 1.2 million bank cubic metres (BCM) of TBM Spoil, originating from Zone 302 of the WGTP (i.e. the tunnel section). The total potential capacity of the Containment Cell is [redacted] of TBM Spoil (which allows for bulking). An additional 700,000 tonnes of non-TBM Spoil from other zones of exception at the WGTP may be brought to the WST Facility if it is deemed acceptable from both a contamination perspective (i.e. according to IWRG621 – refer to Section 3.4 for acceptance criteria) and is suitable for use as structural fill in the Containment Cell or for reclamation works.
- The TBM Spoil will be placed in the Containment Cell in a fashion that utilises the geotechnical characteristics of the TBM Spoil in an appropriate manner. Where practicable, the gravel and cobble material will be placed on the steeper sections of the existing gully slopes and outward facing edges of the newly formed face of the filled area. This placement will provide a landform that, while steeper than the existing gully, will be stable during construction and in the long term. Where practicable, the clays and soils will be placed and compacted into the core of the constructed landform.
- In the future following capping and rehabilitation, it is proposed that the Containment Cell land area will be used for waste hub activities (organics, construction, and demolition waste processing), potentially a solar farm or agricultural activities. This is subject to assessment of the suitability of the land for these uses and regulatory approval. It is to be noted that the immediately abutting acreage to the west and south of the gully land is currently already used by the Calleja Group for agricultural purposes.

Details of the proposed operations are further detailed in Section 4.

## 2.5 Surrounding Land Uses

The land uses surrounding the WST Facility are indicated below:

- Landfill to east and north east owned and operated by MBC or related entities.
- Farming to west, south west, and south across Parwan Creek (much of the land to the west is owned by MBC related entities).
- Rural residential properties directly to the north.
- Residential properties in the southern part of Bacchus Marsh (north west of the rural residential area).

## 2.6 Potential Sensitive Receptors

### 2.6.1 Sensitive Human Receptors

Sensitive off-site human receptors include occupants of houses, caretakers' cottages, hospitals, hotels, and residences (as defined in EPA Publication 1411, Schedule C of the SEPP (AQM) and 5(f) of the TBM Spoil Regulations). A total of 30 nearby rural residences and the Bacchus Marsh Grammar School have been identified as sensitive receptors (as listed in Table 2-1).

Table 2-1 Nearest Sensitive Receptors

| ID | Address | UTM co-ordinates (Zone 55: mE, mS) | Approximate distance from dwelling to nearest site border (m) |
|---|---|---|---|
| R-01 | Cummings Road, Parwan 3340 | 274789, 5822858 | 1,285 |
| R-02 | 4164 Geelong-Bacchus Marsh Road, Parwan 3340 | 275442, 5822402 | 2,065 |
| R-03 | 6 Smiths Road, Parwan 3340 | 275244, 5822337 | 1,921 |
| R-04 | 4115 Geelong-Bacchus Marsh Road, Parwan 3340 | 275126, 5821986 | 2,028 |
| R-05 | 135 Smiths Road, Parwan 3340 | 274236, 5822030 | 1,431 |
| R-06 | 163 Smiths Road, Parwan 3340 | 273885, 5822030 | 1,309 |
| R-07 | 179 Smiths Road, Parwan 3340 | 273620, 5822078 | 1,226 |
| R-08 | 210 Smiths Road, Parwan 3340 | 273386, 5822259 | 1,059 |
| R-09 | 227 Smiths Road, Parwan 3340 | 273160, 5822160 | 1,179 |
| R-10 | 229 Smiths Road, Parwan 3340 (Lot 1) | 272449, 5822171 | 1,416 |
| R-11 | 229 Smiths Road, Parwan 3340 (Lot 2) | 272268, 5821949 | 1,702 |
| R-12 | Bacchus Marsh-Balliang Road, Maddingley 3340 | 272140, 5824780 | 1,376 |
| R-13 | 5 Tenth Mews, Maddingley 3340 | 272339, 5824918 | 1,287 |
| R-14 | 141 Osborne Street, Maddingley 3340 | 272798, 5824366 | 601 |
| R-15 | 134 South Maddingley Road, Maddingley 3340 | 273190, 5824506 | 421 |
| R-16 | 144 South Maddingley Road, Maddingley 3340 | 273249, 5824300 | 208 |
| R-17 | 144 South Maddingley Road, Maddingley 3340 | 273306, 5824382 | 270 |
| R-18 | 124 South Maddingley Road, Maddingley 3340 | 273350, 5824576 | 461 |
| R-19 | 10 East Maddingley Road, Maddingley 3340 | 274070, 5825322 | 1,338 |
| R-20 | 6 East Maddingley Road, Maddingley 3340 | 274092, 5825448 | 1,465 |
| R-21 | 51 Geelong-Bacchus Marsh Road, Maddingley 3340 | 274476, 5825156 | 1,360 |
| R-22 | 9 Vallence Road, Maddingley 3340 | 274789, 5825054 | 1,486 |
| R-23 | 137 Woolpack Road, Maddingley 3340 | 275922, 5824713 | 2,316 |
| R-24 | 90 Parwan-Exford Road, Parwan 3340 | 276844, 5823616 | 3,160 |
| R-25 | 46 Parwan-Exford Road, Parwan 3340 | 276368, 5823627 | 2,684 |
| R-26 | 8 Browns Lane, Parwan 3340 | 276361, 5823820 | 2,662 |
| R-27 | 73 Cummings Road, Maddingley 3340 | 275160, 5823835 | 1,463 |
| R-28 | 4256 Geelong-Bacchus Marsh Road, Parwan 3340 | 275797, 5823278 | 2,145 |
| R-29 | Geelong-Bacchus Marsh Road, Parwan 3340 | 275498, 5823339 | 1,841 |
| R-30 | 4265 Geelong-Bacchus Marsh Road, Parwan 3340 | 275679, 5823368 | 2,018 |
| R-31 | Bacchus March Grammar, Maddingley 3340 | 273,799, 5,825,210 * | 1,150 |

These nearby sensitive human receptors are also shown on Figure 2-3.

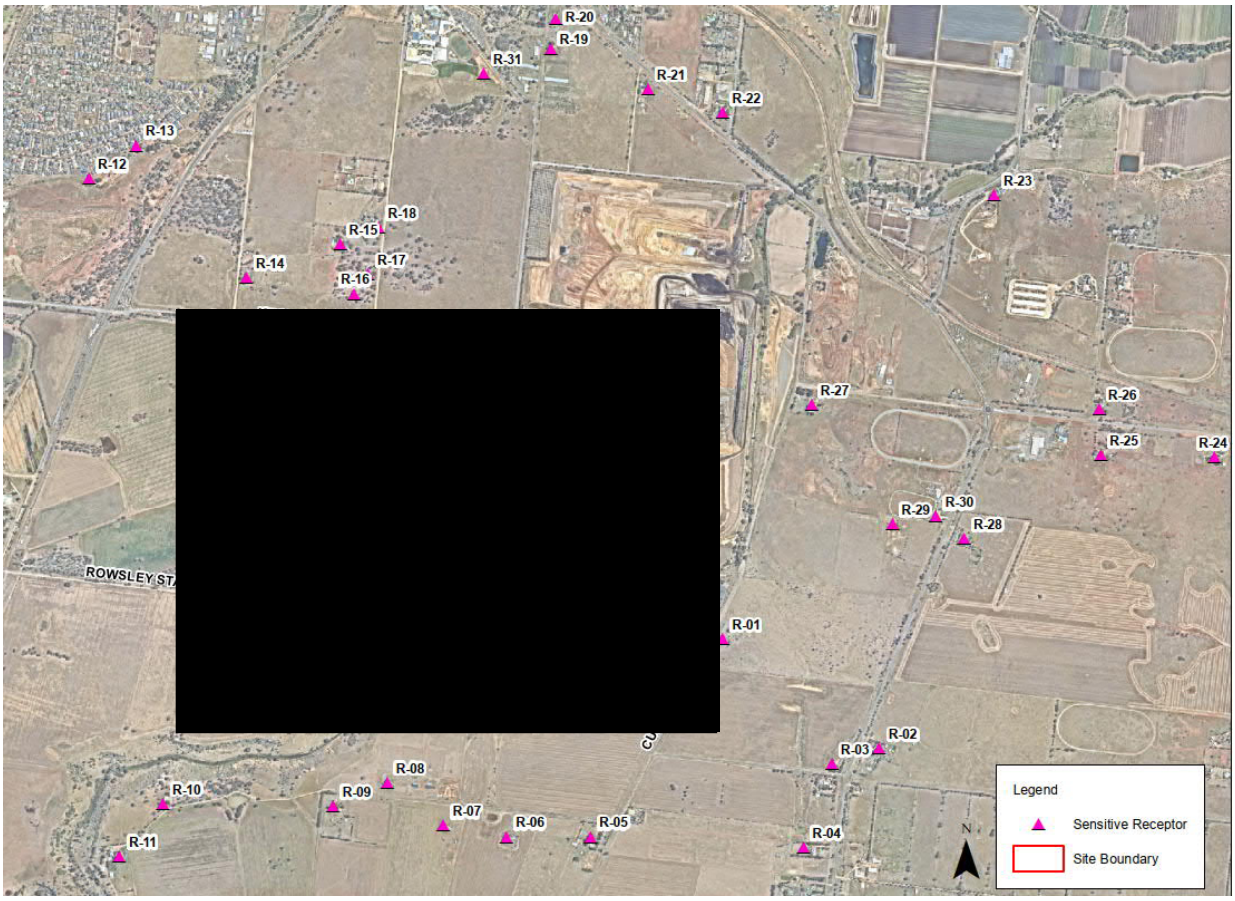


Figure 2-3 Nearby Sensitive Human Receptors

In addition, on-site workers at WST Facility during construction, operation and closure were identified as potential receptors in the HHERA (refer to ANNEX J). The HHERA indicates that all personnel on-site will be covered by workplace health and safety management systems and practices (including normal hygiene practices of washing hands prior to eating, drinking, smoking or toileting). In addition, consideration will be given to the need for personal protective equipment, subject to the laboratory test results of received TBM Spoil.

The HHERA also considered the risk posed by Per- and poly-fluoroalkyl substances (PFAS) to humans in the following exposure scenarios to Parwan Creek water downstream of the WST Facility:

- human consumption of cattle accessing and drinking water from Parwan Creek.
- human consumption of fish species in Parwan Creek.
- public could come into incidental direct contact with Parwan Creek water.

The HHERA concluded that these exposure pathways are very unlikely to be complete or relevant.

In summary, the design for the WST Facility described in Section 4 and management and control measures indicated in Section 5 are considered appropriate to mitigate potential risks.

### 2.6.2 Sensitive Ecological Receptors

The HHERA (ANNEX J) identified that there are no on-site terrestrial or aquatic ecological receptors present at the WST Facility. There are no natural water bodies with aquatic ecosystems that require protection. In addition, no terrestrial flora or fauna that require protection were identified. Further, the HHERA concluded that it is not expected that new fauna would visit the WST Facility during the proposed activities.

The Nature Advisory 2020 Flora and Fauna Assessment (ANNEX I) identified scattered native trees and some small areas of Plains Woodland to the north and south of the Holding Bays; and that a total of four trees would be removed during WST Facility construction which would be offset elsewhere. The Nature Advisory 2021 Growling Grass Frog Assessment (ANNEX I) identified that growling grass frogs are unlikely to be present, however there are three farm dams that are located on the WST Facility close to Gullines Road that could be accessed by them.

Potential off-site ecological receptors are located in the ephemeral Parwan Creek, immediately downstream of the WST Facility, which include aquatic and riparian plants and invertebrates (aquatic insects, crustaceans, and macro-invertebrates). The design for the WST Facility indicated in Section 4 and management and control measures indicated in Section 5 are considered appropriate to mitigate potential risks.

Following completion of activities, the WST Facility site will be rehabilitated. This will involve removal of the infrastructure and any impacted soil and replacement with previously stockpiled sub-soil and topsoil, and placement of a cap over the Containment Cell and the planting of grasses. These procedures will prevent direct exposure to terrestrial vertebrates and invertebrates that may occupy the WST Facility site. Any flora with shallow root systems will not come into direct contact with the contained TBM Spoil and the geotextile separation layer will prevent exposure to soil dwelling invertebrates. Additional discussion of closure strategies is included in Section 4.10 and Section 8.

## 2.7 Segment and Elements of the Environment

Section 4 of the Environment Protection Act 1970 defines “Segment” as any portion or portions of the environment expressed in terms of volume, space area, quantity, quality, or time or any combination thereof. In addition, an “element” means any of the principal constituent parts of the environment.

For the purposes of the project, the segment of the environment is defined as the boundary of the WST Facility and sensitive human receptors that could potentially be impacted by WST Facility activities (as shown in Figure 2-3).

The elements of the environment considered relevant to beneficial uses and receptors that could be impacted by the project are:

- Waters (groundwater, leachate, and surface water).
- Land (soil).
- Atmosphere (air quality).
- Noise.

Issues relating to flora and fauna, weeds, pests and pathogens, traffic, aboriginal and historical heritage, social environment, visual, public safety, and visual impacts, have been addressed in the Environmental Management Plan prepared to support a Moorabool Planning Scheme amendment application. These will not be considered in the TBMS-EMP. An exception is that EPA have requested in the approval letter that access to the leachate ponds by bird life is mitigated, which will be undertaken via netting (as outlined in the Birdlife Management Plan, ANNEX Z).

## 2.8 Meteorology

EPA operates an ambient air quality monitoring station (AAQMS) in Melton, located approximately 14 km east of the WST Facility. In addition to air quality parameters, the AAQMS also monitors temperature (°C), wind speed (m/s) and wind direction (°), discussed further below. Given the proximity and lack of significant terrain features between Melton and the WST Facility, it is likely that weather at the Melton would be similar to that experienced at the WST Facility.

### 2.8.1 Temperature

Temperature statistics for Melton AAQMS between 2014 and 2018 are summarised in Figure 2-4. Mean maximum temperatures range from 18.4°C in winter to 42.0°C in summer, while mean minimum temperatures range from 0.2°C in winter to 10.5°C in summer. Longer periods of higher temperatures can dry out soil resulting in both higher background dust and on-site dust emissions.

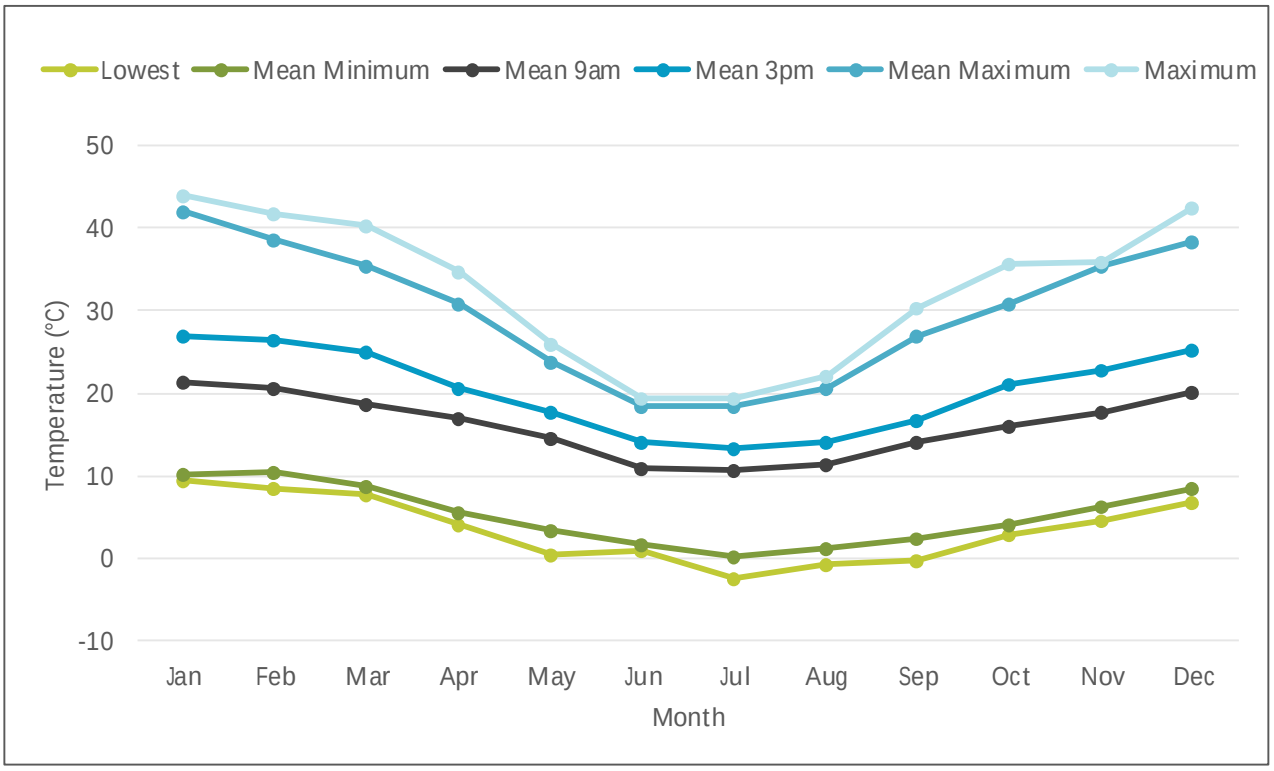


Figure 2-4 Temperature Trends for Melton AAQMS (2014 – 2018)

### 2.8.2 Wind

Annual and seasonal wind roses for Melton AAQMS for the years 2014 to 2018 are presented in Figure 2-5. The wind roses show that overall, winds from the north-western quadrant are predominant, with very few winds from the east. Winter sees this pattern strengthen, with a higher proportion of winds from the north-western quadrant. Spring and autumn winds are similar to the overall distribution, while summer sees more winds from the southern quadrant.

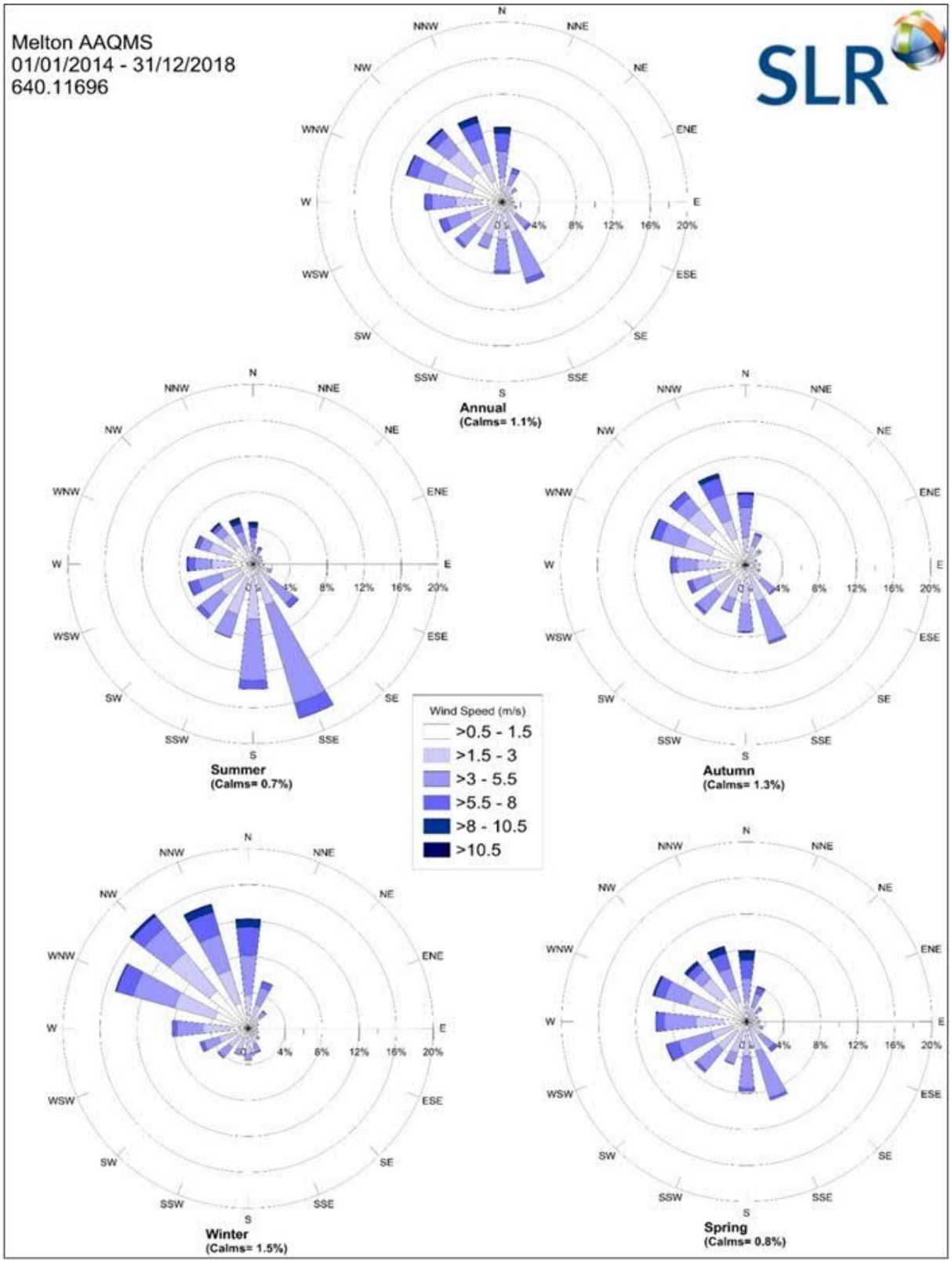


Figure 2-5 Annual and seasonal wind roses – Melton AAQMS (2014 – 2018)

### 2.8.3 Rainfall

Rainfall at the site is considered relative to measuring conducted at Melbourne Airport, approximately 35 km east of the WST Facility. Rainfall statistics for Melbourne Airport for the years 2014 to 2018 are summarised in Figure 2-6. In summary, the mean annual rainfall is 499 mm. The average monthly rainfall is relatively high in late spring and early summer with the highest average monthly rainfall of 81 mm/month in December and an average of 11.2 rain days recorded in this month. The lowest average of 18.4 mm/month, and 5.8 days of rain occurs in February. The highest monthly rainfall recorded over the time period examined was 124.4 mm recorded in December 2017. The maximum daily rainfall of 62.8 mm was recorded on 30 December 2016.

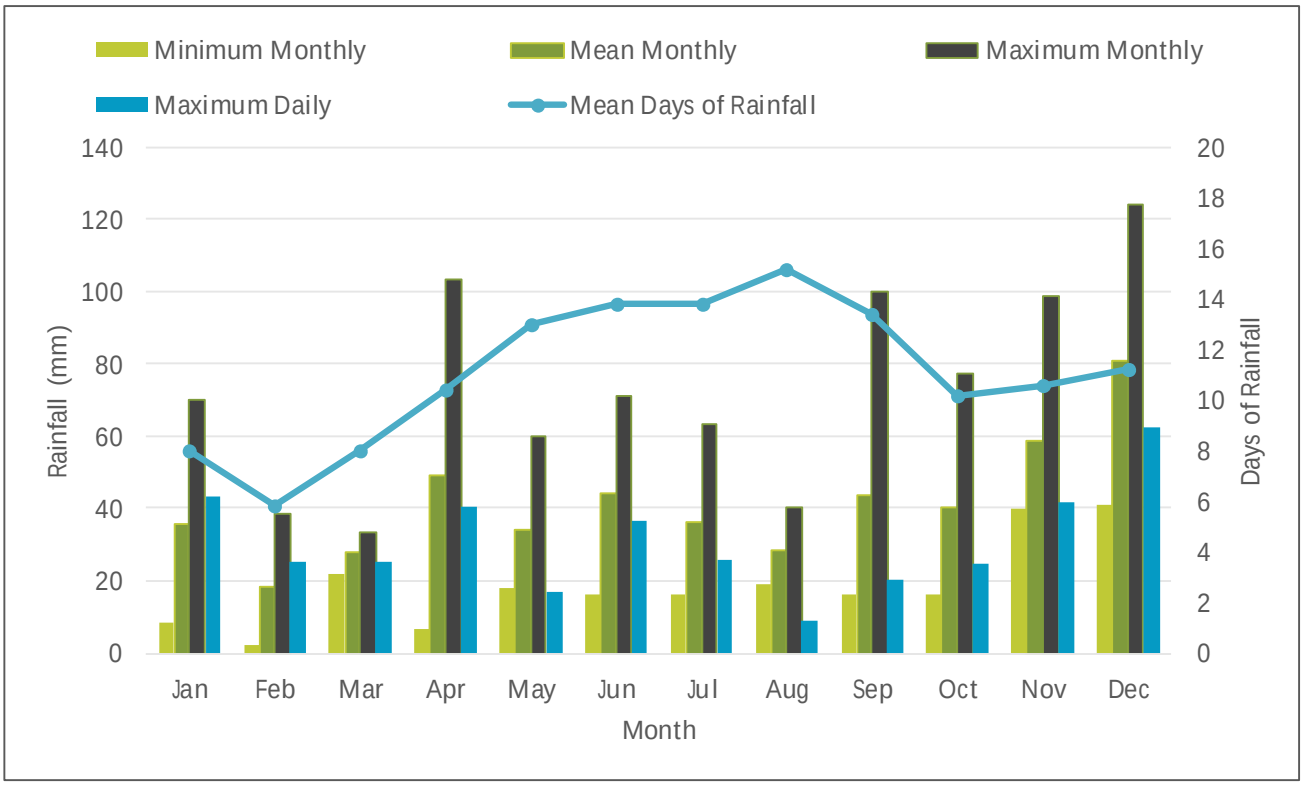


Figure 2-6 Long Term Monthly Rainfall Data for Melbourne Airport

### 2.8.4 Humidity

Humidity statistics (9 am and 3 pm monthly averages) for Melbourne Airport (2014 – 2018) are summarised in Figure 2-7. In summary, morning humidity levels range from an average of around 80 % in winter to around 55 % in summer. Afternoon humidity levels are lower, at around 65 % in winter dropping to around 40 % in summer.

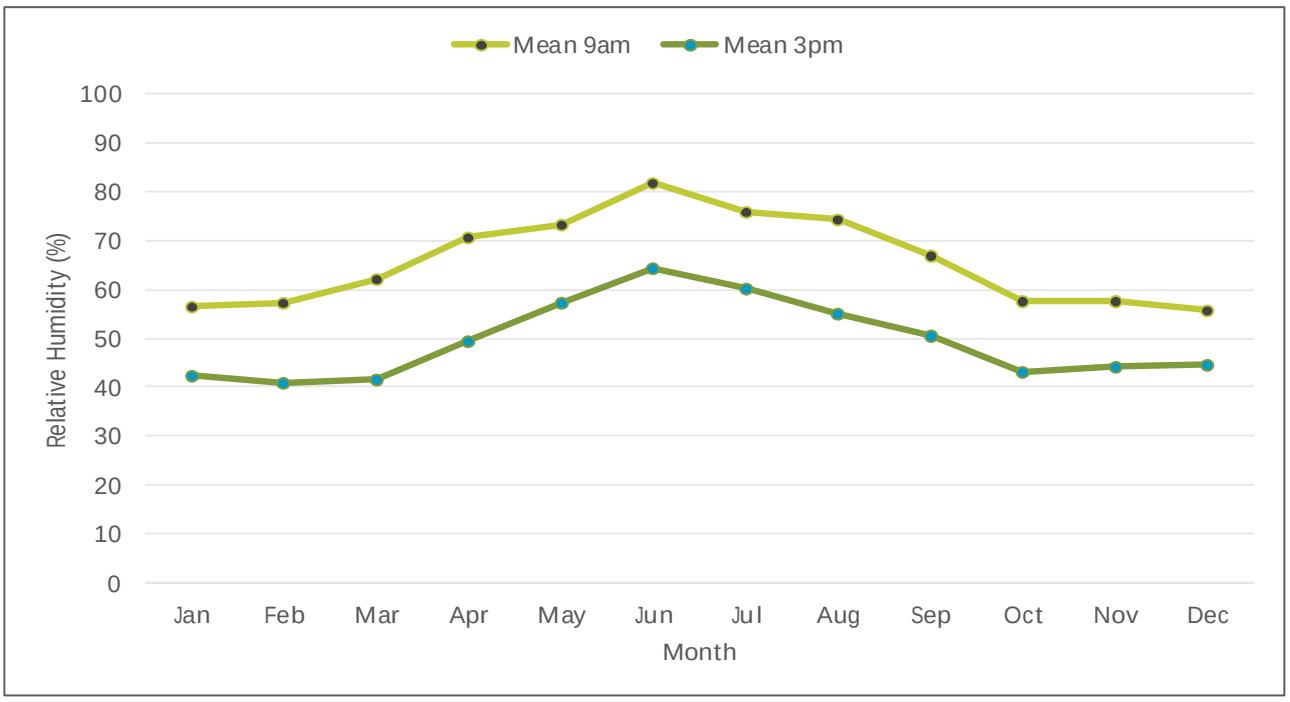


Figure 2-7 Humidity Data for Melbourne Airport

## 2.9 Geology

The regional geological setting is shown in Figure 2-8 and summarised in Table 2-2. The MBC Landfill is constructed in the void created by a currently operational coal mine. The mine and landfill are below the regional water table which is within the Fyansford Formation Aquifer. The base of the landfill is close to the base of the Maddingley Coal Seam. The WST Facility is located upslope from the MBC Landfill.

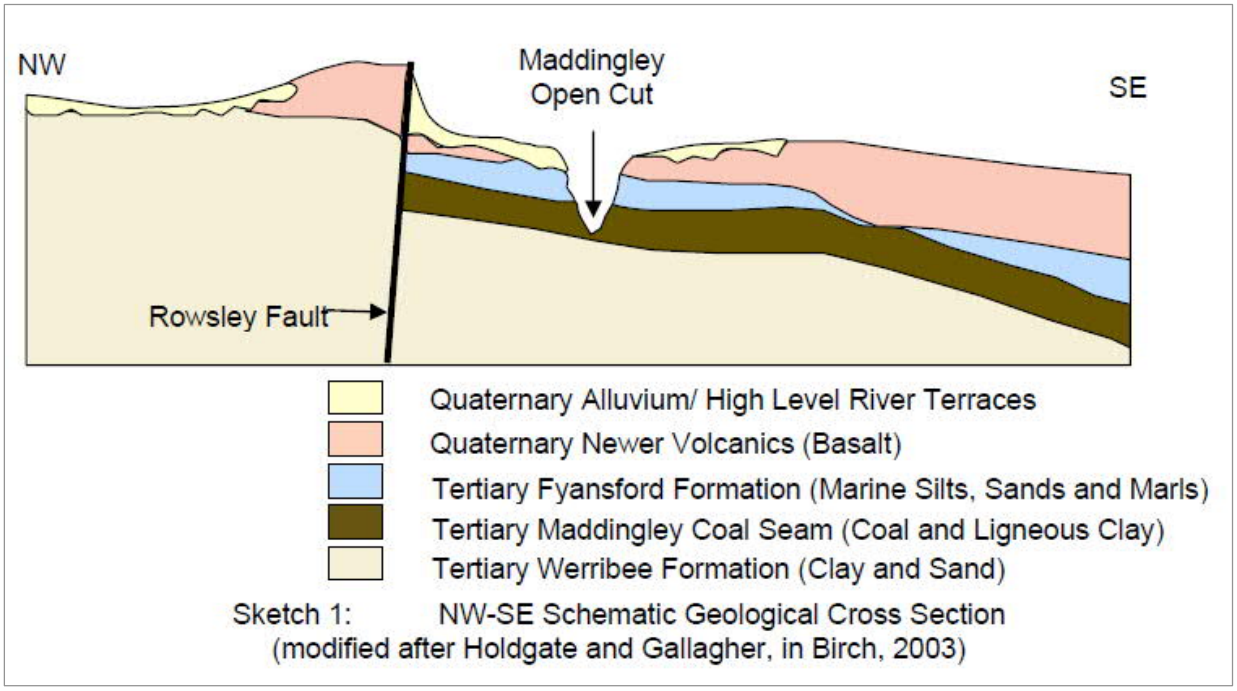


Figure 2-8 Typical Geological Profile

The Fyansford Formation outcrops over undisturbed areas of the WST Facility and comprises a highly variable sedimentary unit of laterally discontinuous gravels, silts, sands, and clays which are commonly calcareous. The Werribee Formation consists of non-marine silty sands, sands, and sandy clays with minor gravels. Deposited in terrestrial estuarine, fluvial and some paludal environments. The Maddingley Coal Seam is the uppermost member of the Werribee Formation. The Werribee Formation unit is thought to extend up to 200 m below the WST Facility.

Table 2-2 Description of the Geological Units

| Geological units | Description |
|---|---|
| Alluvial Deposits (Quaternary) | Low level river terraces associated with the present-day Werribee River, Lederberg River and Parwan Creek and also high-level terraces 10 m to 40 m above current drainage. Comprise dark red brown to yellow-brown clay, silt, sand, and gravel. Up to 8.0 m thick. |
| Newer Volcanic Basalt (Quaternary) | Olivine basalt, dark to light grey, coarsely vesicular and interbedded with minor silty sands and baked soils outcrop west of the WST Facility, and in the walls of the Parwan Creek valley.<br>The thickness of the Newer Volcanics beneath the southern part of the WST Facility is not known. The geological map and bore log from Parwan 57 (north west corner of WST Facility) and at the leachate ponds (BH19, BH28) suggest Newer Volcanics is absent in the northern half of the WST Facility. |
| Fyansford Formation (Tertiary) | Predominantly brown-orange, brown to grey marine silt, sand, and clay. May interfinger with the Maddingley Coal Seam / Upper Werribee Formation. Nolan (2019) reports drilling in the vicinity of the leachate ponds (adjacent the WST Facility) indicates the Fyansford Formation is mainly clay and silty clay with infrequent clayey sand lenses up to 1.5 m thick. This formation is approximately 40 m thick beneath the WST Facility. |
| Maddingley Coal Seam (Tertiary) | Predominantly dark brown lignite, with abundant plant remains, and may be locally pyritic and clayey, with minor gravel and sand interbeds. This unit is approximately 60 m thick beneath the WST Facility. |
| Lower Werribee Formation (Tertiary). | Near the WST Facility, predominantly silty and clayey quartz sand, and sandy gravel, clay, and silty sand, fine to medium grained sand and minor sandy gravel. Overall, fine grained with layers of coarser sand and sandy gravel less than 2.0 m thick. An extensive unit, the base has not been intercepted at the WST Facility. |

## 2.10 Hydrogeology

The Fyansford Formation Aquifer is an unconfined water table aquifer and could receive recharge from rainfall in wet years. Nolan (2019) suggests a hydraulic conductivity of up to 0.009 m/day. URS (2014) reports a wide range of estimates of hydraulic conductivity for the Fyansford Formation Aquifer from 0.001 m/day to 1.0 m/day.

The groundwater elevation and inferred groundwater flow direction in the Fyansford Formation Aquifer are shown in Figure 2-9. Water table elevation is 104.6 mAHD on the western boundary of the WST Facility and 102.8 mAHD east of the south leachate storage pond, indicating the overall groundwater flow direction is towards the east.

Figure 2-9 Groundwater flow direction in the Fyansford Formation

The Lower Werribee Formation aquifer is a confined to semi-confined aquifer which occurs 100 m beneath the WST Facility and potentially extends to more than 200 m below the WST Facility. The Lower Werribee Formation Aquifer is separated from the Fyansford Formation Aquifer by the confining layer of the 60 m thick Maddingley Coal Seam.

The groundwater potentiometric level and inferred groundwater flow direction in the Lower Werribee Formation Aquifer are shown in Figure 2-10. This suggests overall groundwater flow direction beneath the site is toward the east, into the area where there is extraction of groundwater from the Lower Werribee Formation Aquifer at the mine and the MBC Landfill.

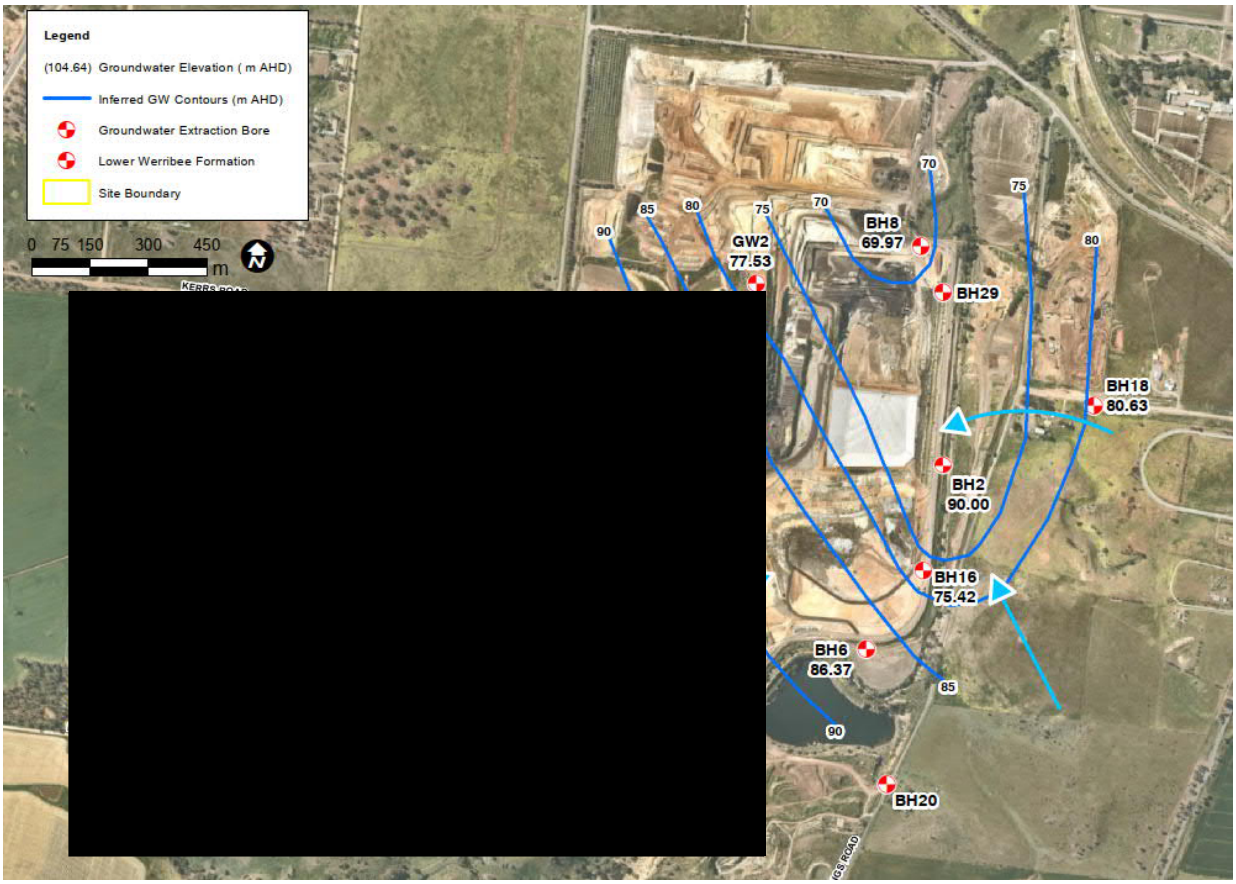


Figure 2-10 Groundwater contours and flow directions – Lower Werribee Formation

Pumping of groundwater from bores and sumps in the floor of the coal mine has resulted in dewatering of the Fyansford Formation Aquifer to some extent and the Lower Werribee Formation Aquifer is depressurised adjacent to the coal mine and MBC Landfill. This has accentuated the inward flow of groundwater to the mine. In future, when the mine and MBC Landfill are closed and pumping of groundwater ceases, there will be some recovery (rise) of these water levels. The recovery of the water table in the Fyansford Formation Aquifer would be appreciable although, based on first principles of groundwater hydraulics in unconfined aquifers, this recovery is expected to be not much above the 105 mAHD. As the Lower Werribee Formation Aquifer is confined by 60 m of the MBC Landfill and effectively hydraulically disconnected from the Fyansford Formation Aquifer, any recovery in pressure level in the Lower Werribee Formation Aquifer would not affect the water table level appreciably in the Fyansford Formation Aquifer at the WST Facility.

## 2.11 Topography and Drainage

The northern half of the WST Facility east of Gullines Road is relatively flat with a gentle slope from west to east, from approximately 148 mAHD to 142 mAHD. The western side of the southern part of the WST Facility is a similar elevation, also sloping to the east. The land in the south east part of the WST Facility has been eroded, and the south eastern edge of the WST Facility is approximately 110 mAHD. To the south and south east of the Containment Cell the land surface slopes toward Parwan Creek.

Parwan Creek, south of the WST Facility, flows north east and then north along the eastern side of the MBC Landfill and open cut mine. Parwan Creek is a tributary of the Werribee River, discharging to the river approximately 4.0 km north east of the WST Facility. The bed elevation of Parwan Creek south and south east of the WST Facility is approximately 105 mAHD to 100 mAHD.

### 2.11.1 Stormwater Drainage

A holistic site wide water balance has been undertaken for the WST Facility and MBC Landfill (ANNEX P). In summary, all surface water runoff from the WST Facility and MBC Landfill generally flows in an easterly direction, where it is conveyed to a number of water storage areas that are contained within the MBC Landfill. The water storage areas and their catchments are shown in Figure 2-11.

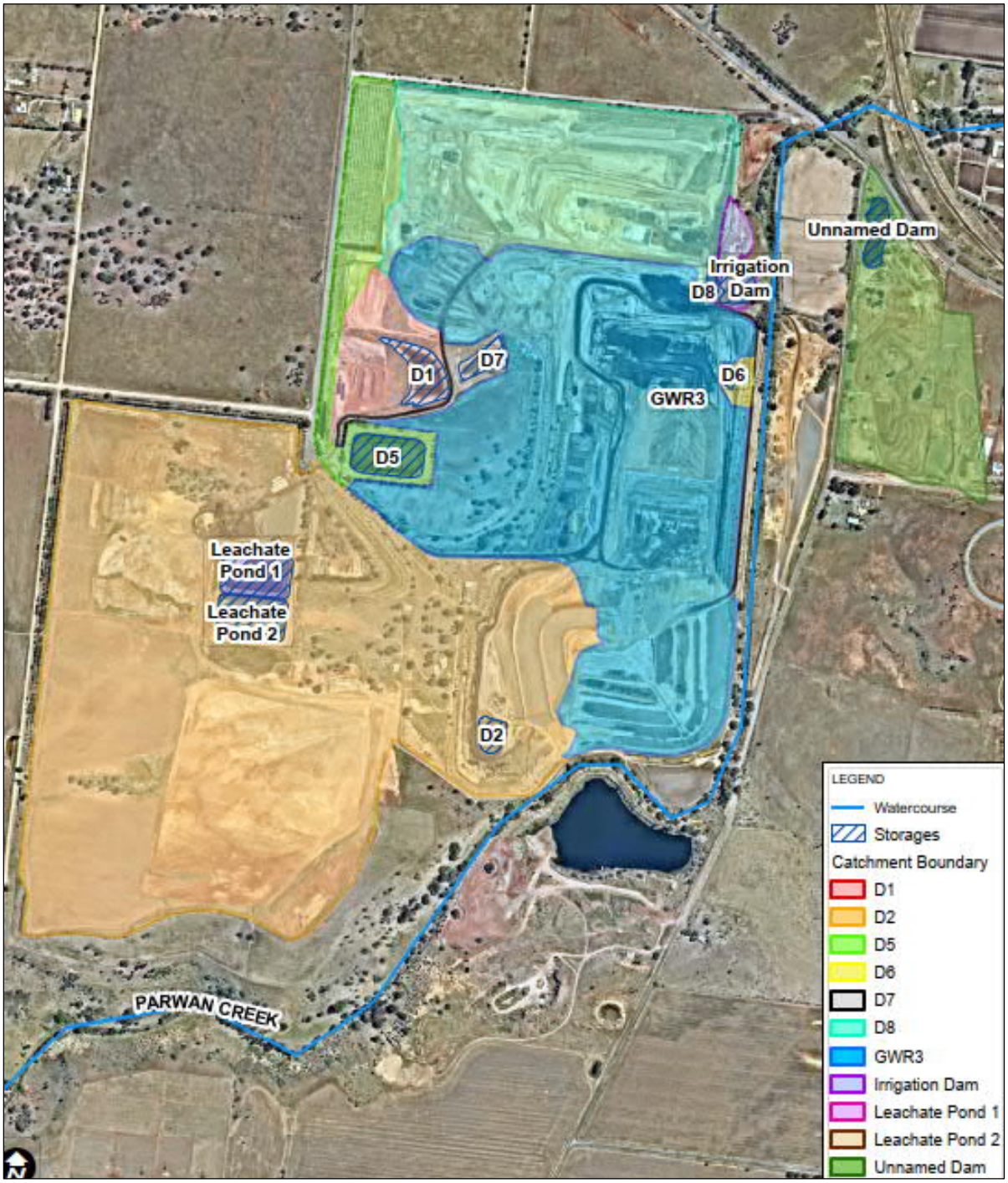


Figure 2-11 MBC Landfill and WST Facility Catchment Areas (note: Leachate Pond 1 and Leachate Pond 2 refer to the Northern and Southern Leachate Ponds respectively).

The WST Facility is entirely within the Dam D2 catchment area. Stormwater from the WST Facility is collected in Dam D2, which is then pumped into Dam D5 for use for dust suppression activities within the adjacent MBC Landfill. Dam D2 also receives water from a number of other water storages in the MBC Landfill.

If Dam D2 and D5 are above their storage capacities, then Dam D2 water can be pumped to the Irrigation Dam. MBC transfers water between water storages as required and to the Irrigation Dam when all water storages are approaching freeboard. Stormwater from the Irrigation Dam is permitted to be discharged into Parwan Creek via a control valve, overflow pipe and channel. The stormwater capture system is entirely separate to the leachate capture system from the WST Facility and as such, no discharge of leachate into Parwan Creek will occur.

## 2.12 Background Air Quality

An air quality assessment was conducted by SLR to establish background air quality conditions at the WST Facility (ANNEX F). EPA conducts long term ambient air quality monitoring at AAQMS to meet its obligations under the Ambient Air NEPM. The results are compared with SEPP (AAQ) Environmental Quality Objectives (Table 2-3).

Table 2-3 SEPP (AAQ) – Environmental Quality Objectives

| Contaminant | 24-Hour Averaging Period | Annual Averaging Period |
|---|---|---|
| $PM_{2.5}$ | 25 µg/cubic metres | 8 µg/cubic metres |
| $PM_{10}$ | 50 µg/cubic metres | 20 µg/cubic metres |

In general, air quality at all of AAQMS has been in the 'good' to 'very good' air quality categories at least 75 % of the time, meaning air quality in Victoria is typically good (EPA, 2018).

Air quality in rural areas is generally less impacted by anthropogenic sources such as traffic emissions and industrial emissions, however it may be impacted on occasion by bushfires and prescribed planned fuel reduction burns that have the potential to result in elevated concentrations of $PM_{2.5}$, while windblown dust may lead to elevated $PM_{10}$ concentrations. Domestic wood burning heaters are commonly used all over Victoria and are another source of $PM_{2.5}$.

The relatively low population density and light industry in the surrounding area suggests the WST Facility air quality would not be significantly impacted by vehicular traffic emissions, domestic wood burning emissions or industrial emissions.

Due to the limited nearby ambient air quality monitoring data with which to describe the MBC Landfill, data from EPA's Footscray AAQMS and Alphington AAQMS, approximately 40 km and 55 km east of the MBC Landfill, located in urban residential environments, are presented here to characterise the potential $PM_{10}$ and$PM_{2.5}$ concentrations that, conservatively, may be experienced at the WST Facility.

An overview of the Footscray and Alphington AAQMS is provided in Table 2-4, which also indicates the AAQMS datasets that have been used to conservatively represent the MBC Landfill background air quality, in consultation with EPA[2,3].

[2] Q. Cooke, Team Leader – Approvals, Development Assessments (personal communication, 4 September 2019)
[3] J. Choi, Specialist Applied Scientist - Air & Odour (personal communication, 1 October 2019)

Table 2-4 Footscray and Alphington AAQMS details

| EPA AAQMS | Description | Location Relative to MBC Landfill | Key Relevant Pollutants Monitored | Outcome |
|---|---|---|---|---|
| Alphington | Performance monitoring station classified as "residential/ light industrial" | 55 km east | $PM_{10}$ | - |
| | | | $PM_{2.5}$ | The $PM_{2.5}$ results for Alphington show that there were several instances when the 24-hour average exceeded the SEPP(AAQ) EQO.<br>Annual average $PM_{2.5}$ concentrations demonstrate three non-compliances with the SEPP(AAQ) EQO for 2014 to 2018. |
| Footscray | Performance monitoring station classified as "industrial/ residential" | 42 km east-southeast | $PM_{10}$ | The $PM_{10}$ results for Footscray show that there were several instances when the 24-hour average exceeded the SEPP(AAQ) EQO. EPA attribute the February 2014 results to bushfires that occurred in many parts of Victoria.<br>Annual average $PM_{10}$ concentrations demonstrate compliance with the SEPP(AAQ) EQO for 2014 to 2018. |
| | | | $PM_{2.5}$[2] | The $PM_{2.5}$ results for Footscray show that there were several instances when the 24-hour average exceeded the SEPP(AAQ) EQO.<br>Annual average $PM_{10}$ concentrations demonstrate compliance with the SEPP(AAQ) EQO for 2014 to 2018. |

## 2.13 Background Noise

Baseline noise monitoring (unattended monitoring) was conducted to establish existing background noise levels at a representative noise-sensitive receptor (SLR, 2019) to characterise the noise environment in the vicinity of the WST Facility. The monitoring locations are shown in Figure 2-12 and results are presented in Table 2-5.

The monitoring locations were selected such that they were representative of the background noise experienced by the group of residents in the immediate vicinity. A selection of monitoring positions was ultimately decided in the field, considering all relevant circumstances, including permission from the resident and availability of a secure location for the noise loggers.

Figure 2-12 Noise Monitoring Locations

Table 2-5 Summary of Measured Background Noise Levels

| Monitoring location | Latitude | Longitude | Period | Long-term, 60-minute measured background noise levels (dBA) |
|---|---|---|---|---|
| 106 S Maddingley Road, Parwan (M01) | 37°43'14" S | 144°26'5" E | Daytime | 38 dBA |
| | | | Evening | 33 dBA |
| | | | Night | 30 dBA |
| 163 Smiths Road, Maddingley (M02) | 37°41'45" S | 144°25'42" E | Daytime | 38 dBA |
| | | | Evening | 35 dBA |
| | | | Night | 29 dBA |
| 37 Rowsley Station Road West (M03) | 37°42'33" S | 144°23'59" E | Daytime | 40 dBA |
| | | | Evening | 37dBA |
| | | | Night | 33dBA |

Operator-attended noise measurements were also undertaken in order to qualify the results obtained with the unattended noise loggers and to identify the likely sources of noise emission in the area. During the attended noise measurements, observations were made as to the acoustically significant ambient noise sources, which are detailed in Table 2-6.

Modelling was used to provide an indication of potential noise impacts on receptors from the proposed activities. The assessment indicates that noise from the WST Facility will comply with the EPA Publication 1411 criteria.

Table 2-6 Summary of Operator Attended Measurements

| Date and Time | LAeq | LA1 | LA10 | LA90 | Observations |
|---|---|---|---|---|---|
| 13/12/2019 12:45 pm | 53.5 | 53.7 | 49.2 | 39.8 | Monitoring location: end of driveway on East Maddingly Road.<br>Dominant traffic noise: distant environmental noise and wind.<br>Bird noise intermittent constant<br>Gentle to moderate* wind at the monitoring location. |
| 13/12/2019 1:30 pm | 48.3 | 56.7 | 50.6 | 38.2 | Monitoring location: end of driveway on Smiths Road.<br>Dominant traffic noise from dogs in adjacent property and wind.<br>Gentle to moderate* wind at the monitoring location. |

*As defined by the Beaufort Wind Scale

## 2.14 Soil Geotechnical Investigations

Geotechnical and permeability investigations were undertaken by Chadwicks (included in ANNEX K). The investigations included the excavation of 14 test pits in the Holding Bays and Drying Bays area and nine test pits in the vicinity of the Containment Cell. Representative samples of the clay from varying depths (maximum depth of 1.5 m to 1.9 m) in the test pits were collected for geotechnical classification testing (Atterberg Limits, Particle size distribution and moisture content), compaction testing (maximum dry density and optimum moisture content) and cation exchange. The laboratory test results indicated that compaction of the clay to MDD at OMC resulted in permeabilities ranging from $5 \times 10^{-9}$ m/sec to $9 \times 10^{11}$ m/sec in the storage bay area and $3 \times 10^{-9}$ m/sec to $2 \times 10^{-10}$ m/sec in the Containment Cell area. Moisture content ranged from 16.3 % to 33.7 %.

The investigations also included the drilling of five boreholes to collect undisturbed samples from the design floor level of the Holding Bay and Drying Bay areas. An undisturbed sample was obtained from the base of three boreholes (at 2.5 m, 2.5 m, and 3.5 m depth). The boreholes were advance to refusal of the augers which occurred at depths ranging from 2.25 m to 3.75 m depth. The material encountered in all boreholes comprised a 0.1 m thick topsoil layer overlying high plasticity grey-brown and brown clay with traces of sand and gravel size particles. No groundwater was encountered in any of the boreholes. The laboratory testing indicated the undisturbed clay has a permeability ranging from $3 \times 10^{10}$ m/sec to $5 \times 10^{-11}$ m/sec.

## 2.15 Baseline PFAS Contamination Status of the WST Facility

A factual baseline assessment of the PFAS condition of groundwater, surface water and sediment condition of the WST Facility and the nearby surface water bodies was completed by SLR (ANNEX A) and the following was reported:

- 19 groundwater monitoring wells across the MBC Landfill were monitored and PFAS was reported at the majority of locations. The levels were highest at BH11 in a shallow perched aquifer adjacent to the Northern Leachate Pond.
- Surface water was sampled at three locations in on-site dams, two locations in Parwan Creek and two locations in Werribee River. PFAS was reported in every location and highest in the on-site Dam D5.
- Sediment sampling of five on-site surface water bodies and two off-site locations in Werribee River (at Woolpack Bridge, upstream of the confluence with Parwan Creek and at Hopetoun, downstream of the confluence with Parwan Creek). PFAS was reported in every location. The highest levels were reported in Werribee River at Woolpack Bridge, upstream of the confluence with Parwan Creek.

A baseline assessment of PFAS in groundwater, surface water and sediment at the WST Facility, adjacent MBC Landfill and nearby surface water bodies was completed by ADE Consulting (ANNEX B) and the following was reported:

- 20 groundwater monitoring wells across the MBC Landfill were sampled and PFAS was reported at the majority of locations.
- Surface water was sampled in seven on-site dams and PFAS was reported at every location.
- Surface water and sediment was sampled in four locations in Werribee River (Parwan Creek was dry at the time) and no solid PFAS was reported however leachable PFAS was reported in one location WRW-3_B which is upstream of the WST Facility.

A baseline assessment of the soil contamination status was also completed by Tonkin & Taylor (ANNEX C) and the following was reported:

- 14 test pits were advanced across the footprint of the Holding Bays and Drying Bays up to 1.8 m in depth.
- Concentrations of COPC in soil samples analysed were generally below the limit of reporting with the exception of select metals and fluoride. In addition, high pH was reported – all attributed to natural soil geochemistry.

A baseline assessment of the soil contamination status of the WST Facility was also completed by SLR (ANNEX D) and the following was reported:

- 53 test pits were advanced generally on a grid across the footprint of the Holding Bays and Drying Bays at the WST Facility and one soil sample collected in the top 300 mm (an attempt to be representative of the final land surface following stripping at closure of the WST Facility).
- No COPC were reported above the adopted criteria for assessing commercial and industrial land uses (NEPM), with the exception of PFAS in excess of EPA Publication 1669 Interim Criteria at one surface sample location in the northern portion of WST used for soil product blending (TP29). This sample also reported TPH above the IWRG621 Fill Material Upper Limits. Several soil samples contained metals and fluoride above the IWRG621 Fill Material Upper Limits.

We note that further assessment of the baseline contamination status of the WST Facility will be completed. This has been completed in part (see the SLR Factual Groundwater Bore Installation Report included in ANNEX E). Details of the additional soil, groundwater, leachate and surface water assessment to be completed to establish the baseline conditions is outlined in the environmental monitoring program in Section 7.

# 3 Tunnel Spoil Management and Disposal

This Section presents a summary of relevant information pertaining to the nature of the spoil generated by the project, including that which is TBM derived spoil and that which is non-TBM Spoil. This Section sets out the criteria for acceptance of spoil at the WST Facility and the methodology to be followed to ensure these criteria are properly applied both at the WST Facility and when spoil needs to be exported from the WST Facility due to its unsuitability for placement in the Containment Cell.

This information is provided in the context of the current arrangements or agreements between WST and the JV, in which the responsibility for obtaining or assigning waste classification for TBM Spoil taken to WST Facility is the responsibility of the JV. Nevertheless, this TBMS-EMP provides guidance for sampling, testing and classification of TBM Spoil at the WST Facility by WST which is to occur by agreement with the JV or as a result of EPA requirements.

Section 3.8 sets out the specification for containment of TBM Spoil at the WST Facility and the methodology to determine if TBM Spoil meets the specification for containment. This includes the site-specific criteria for PFAS in TBM Spoil to be accepted for placement in the Containment Cell.

## 3.1 Description of the TBM Spoil

### 3.1.1 Spoil Origin and Quantity

The spoil material that originates from the WGTP is a waste produced by the JV. Section 3 of the Agon (2020) WGTP Sampling and Analysis Quality Plan (Agon [2020] SAQP) prepared for the JV provides details on quantities and characteristics of the prospective spoil. The spoil includes TBM-derived spoil and non-TBM Spoil, namely:

- TBM Spoil is defined as originating from Zone 302 of the WGTP, being the tunnel section, which comprises some 1.2 million BCM. It is estimated that an average of 2,500 BCM of TBM Spoil per day will be transported to the WST Facility (if the WST Facility accepts 100 % of TBM Spoil generated and the duration of the project is 16 months).
- In addition, 700,000 tonnes of non-TBM Spoil from other zones of the WGTP (i.e. the portal area) will be brought to the WST Facility if categorised as suitable from a contamination (i.e. according to IWRG621 – refer to Section 3.4 for acceptance criteria) and structural fill perspective and used in the Containment Cell and other site reclamation works.

Additional fill may be imported from the adjacent MBC landfill or other sites if it is deemed suitable from a contamination (i.e. according to IWRG621 – refer to Section 3.4 for acceptance criteria) or structural fill perspective.

### 3.1.2 Components of TBM Spoil

The TBM Spoil will be a mixture of:

- Mechanically disturbed rock fragments and soil - The particle size distribution in the produced TBM Spoil will differ from that of the insitu ground and may contain a greater proportion of smaller particles by virtue of the action of the TBM. The particle size distribution will also vary with the geology of the tunnelled ground and will variably comprise sandy silty clay, clayey silty sand, gravelly silty sand, and sandy silty gravel, depending on where along the tunnel alignment it has come from.

- Groundwater that was contained in the insitu soil and rock before tunnelling - It is noted that the tunnelling process is pressurised so that minimal groundwater will enter the tunnelling face from outside the tunnelled volume.
- Water that is added by the tunnelling process.
- Polymer foaming agents added in the tunnelling process (non-PFAS).

Some of the water in the produced TBM Spoil will drain out before TBM Spoil is loaded out for transport to the WST Facility. The rate at which water will drain out will vary with the physical composition of TBM Spoil, i.e. it will be faster in coarse grained spoil containing more gravel and sand and slower in spoil with a greater clay content.

### 3.1.3 TBM Spoil Characteristics

A contamination assessment of the Spoil was completed by Golder and AJJV, which was based on multiple phases of investigations. The assessment included the development of a Conceptual Site Model including Domains based on the geology along the tunnel alignment. The reports reviewed indicate that investigations were undertaken in accordance with relevant guidelines and regulations including NEPM, PFAS NEMP, AS4482.1, relevant SEPP and IWRG.

The contamination assessment concluded that all domains are potentially contaminated with PFAS dissolved in groundwater, with the soil and rock in Domains 8 and 9 contaminated with adsorbed phase PFAS.

Apart from Zone 1 (where the tunnel alignment intersects the original North Yara Main Sewer), none of the Zones are potentially contaminated with other anthropogenic chemicals. At Zone 1 the tunnel alignment intersects the original North Yarra Main Sewer and as a result, spoil from this area is potentially contaminated due to: sewer leakage; groundwater entering the sewer; backfill grout used around the sewer; as well as solid inert waste material such as red brick and timber fragments.

Elevated metals were reported in a number of soil samples collected across the entire tunnel alignment. It was concluded that with the exception of Zone 1, where concentrations exceed the limiting criteria for IWRG621 “Fill Material” classification, these were due to the natural geochemistry of the soil/rock.

Potential acid sulfate soils could be intersected in a small portion of the tunnel face that intersects the Newport Formation (in Domains 7 and 8). The contamination assessment concluded that there was sufficient capacity in other soils to neutralise the acidity potential.

The Conceptual Site Model for the WGTP suggests that volatile organic compounds and hydrocarbon chemical are not present in the tunnel alignment at levels that represent contamination. As the tunnelling process aerates TBM Spoil with added water and foaming agents and raises the temperature towards 50 $^{o}$C it is expected that concentrations of volatile organic compounds and hydrocarbons, if present, would be greatly reduced in produced TBM Spoil.

The investigations indicate the absence of dense non-aqueous phase liquid in groundwater in the tunnel alignment.

The conclusion from the contamination assessment is that apart from TBM Spoil in Zone 1, the disposal classification is determined by the total and leachable PFAS concentrations in groundwater in the tunnel alignment. TBM Spoil apart from Zone 1 classifies as “Not Potentially Contaminated – Except for PFAS”.

### 3.1.4 TBM Spoil Foaming Agent

TBM Spoil will also contain polymer foaming additives diluted in water and supplementary water (Tamsoil). The Tamsoil products are all reported to be readily biodegradable. The assessment by the JV indicated Tamsoil products could have the least impact on the environmental quality of the water phase in TBM Spoil. The Tamsoil products do not contain (in the mix of constituent polymers) surfactants listed in the Australian and New Zealand Guidelines for Fresh & Marine Water Quality – Aquatic Ecosystems (ANZG 2018). The JV is continuing to evaluate candidate foaming agents to identify others that, like the Tamsoil products, will not affect TBM Spoil's disposal classification.

## 3.2 PFAS in Groundwater Near WGTP

The investigations to date show that PFAS is present in the groundwater on or near the alignment of the WGTP and inferred to be present in some of the TBM Spoil to be produced (Agon, 2020).

Of the approximately 104 groundwater bores identified for investigation, only three contained PFAS greater than 0.07 µg/L in groundwater. Given the nature of the tunnel boring machinery used (pressurised ground), it was concluded that there is unlikely to be any appreciable drawdown of groundwater levels or consequent inflow to the tunnel of contaminated groundwater from the vicinity of the alignment.

The assessment of risk to groundwater from TBM Spoil received at WST Facility found that the PFAS in spoil could be sources from contaminated groundwater in parts of the tunnel alignment but that the observed concentrations would be unlikely to generate measurable concentrations of PFAS in most spoil (SLR, 2020).

## 3.3 Waste Soil Categorization Criteria

This Section provides an overview of the relevant guidance documents used for waste soil/spoil classification that is generally applicable in Victoria and could be applied to TBM Spoil generated by the WGTP.

### 3.3.1 Industrial Waste Resource Guidelines

Waste soil or spoil produced in Victoria must be classified in accordance with IWRG in order to meet EPA requirements and to assist in selecting the appropriate management option for spoil to be received at the WST Facility. PFAS is not included as a chemical group in IWRG621 and therefore cannot be included in categorisation using that framework. Classification of spoil containing PFAS is discussed separately in Section 3.3.2.

The main waste soil categories under IWRG are Fill Material and Prescribed Industrial Waste (PIW), which are divided into Categories A, B and C contaminated soil, depending on their hazard level. The soil hazard categories are:

- Fill Material – concentrations less than the upper limits specified for 'Fill Material'. EPA does not regulate the use of Fill Material and re-use of this soil does not require EPA approval. However, other authorities such as local councils, may have individual requirements. Use of Fill Material on any site must consider general obligations (under the Environment Protection Act 1970 or the General Environmental Duty of the new Environment Protection Act commencing 2021) to prevent adverse impacts on the environment and human health. Natural geologic materials not suspected of being impaired by a potentially contaminating activity and demonstrated to be uncontaminated, and potentially containing natural constituents exceeding the Fill Material criteria, can be deemed Fill Material without need for the sampling frequency required of PIW waste soil. IWRG state:
    - "any elevated level of metals (such as arsenic) or other constituents can be demonstrated to be of natural origin. Where it can be demonstrated that the constituents of concern are naturally elevated, EPA does not consider these soils to be 'contaminated' and therefore can be classified as fill material". Such material must also be managed in a manner to avoid adverse environment impacts at the place of use.
- Category C – contaminated soil with concentrations exceeding the upper limits for 'Fill Material' but not exceeding the upper limits for 'Category C' classification. This is the lower level of PIW contaminated soil classification for disposal and is accepted at several EPA licensed landfills in Victoria, subject to satisfying proper categorisation and transport requirements in accordance with IWRG:
- Category B – contaminated soil with concentrations exceeding the upper limits set out for 'Category C' but not exceeding the upper limits for 'Category B'. This is the higher level of PIW contaminated soil classification for disposal and is accepted at only one EPA licensed landfill and/or a limited number of EPA licensed treatment facilities in Victoria. Category B contaminated soil is regulated by EPA and is subject to the same categorisation, transport, and landfill acceptance requirements as Category C contaminated soil.
- Category A – contaminated soil with concentrations exceeding the upper limits set out for 'Category B'. Category A contaminated soils are regulated by EPA are subject to the same categorisation and transport regulations as Category B or Category C contaminated soils, however soils with this higher level of contamination cannot be disposed of to landfill. The soils must be treated either on or off-site or stored pending availability of an appropriate treatment technology. Once treated (or partially treated) the soils may be reclassified and, if appropriate, retained on-site or disposed of to an EPA licensed facility.

The upper limits for general contaminants in IWRG621 are listed below in Table 3-1.

The Agon (2020) SAQP indicates that sampling and analysis of TBM Spoil may report select metals at concentrations that exceed the upper limit for IWRG621 Fill Material classification as a result of natural geochemistry of the soil/rock along the alignment of the WGTP. It is understood that the upper limit for some metals may differ to those shown in Table 3-1 (please refer to the Agon (2020) SAQP for more information). On this basis, TBM Spoil with naturally elevated concentrations of select metals may not be considered "contaminated" and may be classified as "Fill Material" (and can be reused on the WST Facility, subject to PFAS meeting the required acceptance criteria). In addition, sampling and IWRG621 analysis may not be required to classify TBM Spoil as "Fill Material" if it is sourced from natural soil/rock. PFAS sampling is however required at all locations due to the potential presence of PFAS associated with groundwater.

Table 3-1 IWRG621 Waste Soil Classification Criteria

| Category | Fill Material upper limits | | Category C upper limits | | Category B upper limits | | |
|---|---|---|---|---|---|---|---|
| Contaminant concentration thresholds (dry weight) | | TC0 | ASLP1[1] | TC1 | ASLP2[1] | TC2 | |
| Units | | (mg/kg) | (mg/L) | (mg/kg) | (mg/L) | (mg/kg) | |
| **Inorganic species** | | **Inorganic species** | **Inorganic species** | | **Inorganic species** | | |
| Arsenic | | 20 | 0.7 | 500 | 2.8 | 2,000 | |
| Cadmium | | 3 | 0.2 | 100 | 0.8 | 400 | |
| Chromium (VI) | | 1 | 5 | 500 | 20 | 2,000 | |
| Copper | | 100 | 200 | 5,000 | 800 | 20,000 | |
| Lead | | 300 | 1 | 1,500 | 4 | 6,000 | |
| Mercury | | 1 | 0.1 | 75 | 0.4 | 300 | |
| Molybdenum | | 40 | 5 | 1,000 | 20 | 4,000 | |
| Nickel | | 60 | 2 | 3,000 | 8 | 12,000 | |
| Tin | | 50 | - | 500 | - | - | |
| Selenium | | 10 | 1 | 50 | 4 | 200 | |
| Silver | | 10 | 10 | 180 | 40 | 720 | |
| Zinc | | 200 | 300 | 35,000 | 1,200 | 140,000 | |
| **Anions** | | **Anions** | **Anions** | | **Anions** | | |
| Cyanide | | 50 | 8 | 2,500 | 32 | 10,000 | |
| Fluoride | | 450 | 150 | 10,000 | 600 | 40,000 | |
| **Organic species** | | **Organic species** | **Organic species** | | **Organic species** | | |
| Phenols (halogenated)[2] | | 1 | 2 | 10 | 8 | 320 | |
| Phenols (non-halogenated)[3] | | 60 | 14 | 560 | 56 | 2,200 | |
| Monocyclic aromatic hydrocarbons[4] | | 7 | - | 70 | - | 240 | |
| Benzene | | 1 | 0.1 | 4 | 0.4 | 16 | |
| Polycyclic aromatic hydrocarbons[5] | | 20 | - | 100 | - | 400 | |
| Benzo(a)pyrene | | 1 | 0.001 | 5 | 0.004 | 20 | |
| C6-C9 petroleum hydrocarbons | | 100 | - | 650 | - | 2,600 | |
| C10-C36 petroleum hydrocarbons | | 1,000 | - | 10,000 | - | 40,000 | |
| Polychlorinated biphenyls[6] | | 2 | see note 6 | | see note 6 | | |
| Chlorinated hydrocarbons[7] | | 1 | | | | | |
| Hexachlorobutadiene | | | 0.07 | 2.8 | 0.28 | 11 | |
| Vinyl chloride | | | 0.03 | 1.2 | 0.12 | 4.8 | |
| Other chlorinated hydrocarbons[8] | | | - | 10 | - | 50 | |
| **Pesticides** | | **Pesticides** | **Pesticides** | | **Pesticides** | | |
| Organochlorine pesticides[9] | | 1 | | | | | |
| Aldrin + dieldrin | | | 0.03 | 1.2 | 0.12 | 4.8 | |
| DDT + DDD + DDE | | | 2 | 50 | - | 50 | |
| Chlordane | | | 0.1 | 4 | 0.4 | 16 | |
| Heptachlor | | | 0.03 | 1.2 | 0.12 | 4.8 | |
| Other organochlorine pesticides[10] | | | - | 10 | - | 50 | |

FILL MATERIAL | CATEGORY C CONTAMINATED SOIL | CATEGORY B CONTAMINATED SOIL | CATEGORY A CONTAMINATED SOIL

### 3.3.2 Criteria for PFAS in Waste Soil

The IWRG621 do not provide criteria for PFAS. The following guidance has been relied upon, to inform waste management options:

- EPA (October 2020) Publication 1669.4 Interim Position Statement on PFAS (EPA Publication 1669).
- PFAS NEMP.

EPA Publication 1669 provides interim criteria for reuse of PFAS-impacted soils on-site of less than 0.004 mg/kg for three compounds, PFOS, PFHxS and PFOA. It is understood from discussions with EPA that the guidance in EPA Publication 1669 provides criteria for unregulated use. However, it is also understood that EPA Publication 1669 does not necessarily allow for totally unrestricted off-site use as leachate criteria are not provided, and there is the general requirement to consider the risk posed by contaminants in TBM Spoil to the receiving environment.

Table 3-2 presents the waste soil classification criteria from the PFAS NEMP in addition to those from the EPA Interim Position on PFAS in Publication 1669. It includes a column indicating the landfill considered in the PFAS NEMP as suitable for each class of waste.

Table 3-2 Waste Soil Classification Criteria for PFAS

| Unit of reporting | Interim criteria – upper limits | | | | | Landfill cell types |
|---|---|---|---|---|---|---|
| | PFOS | PFHxS | PFOS+ PFHxS | PFOA | PFOS+ PFHxS+ PFOA | |
| EPA Publication 1669 | | | | | | |
| Total concentration | 0.002 mg/kg | 0.001 mg/kg | - | 0.001 mg/kg | 0.004 mg/kg | Not established |
| PFAS NEMP | | | | | | |
| ASLP leachable concentration | - | - | 0.07 µg/L | 0.56 µg/L | - | Unlined |
| Total concentration | - | - | 20 mg/kg | 50 mg/kg | - | |
| ASLP leachable concentration | - | - | 0.7 µg/L | 5.6 µg/L | - | Clay/single composite lined |
| Total concentration | - | - | 50 mg/kg | 50 mg/kg | - | |
| ASLP leachable concentration | - | - | 7 µg/L | 56 µg/L | - | Double composite lined |
| Total concentration | - | - | 50 mg/kg | 50 mg/kg | - | |

### 3.3.3 WGT Project-specific EPA Waste Classification for PFAS

EPA issued project-specific waste classifications to CPB Contractors (a member of the JV) including leachable PFAS criteria for "classification of soil as prescribed industrial waste" and "classification of soil as non-prescribed industrial waste" (ANNEX Q). EPA has issued three waste classification specific to the generation of spoil (not limited to TBM Spoil) for the WGTP, for management at any unlined and EPA-licensed lined landfills as opposed to containments with site-specific risk-based criteria such as at the WST Facility. These criteria are not intended for use in classifying TBM Spoil for acceptance at the WST Facility Containment Cell but can be used to inform management options for spoil that is rejected as unsuitable for acceptance at WST Facility on the basis of IWRG constituents. These classifications are:

- Classification number 2019/404 for non-PIW containing leachable PFAS (0.07 µg/L PFOS+PFHxS).

- Classification number 2019/405 for Category C PIW containing leachable PFAS (0.7 µg/L PFOS+PFHxS).
- Classification number 2019/406 for Category B PIW containing leachable PFAS (7 µg/L PFOS+PFHxS).

These classifications, which reflect the leachable limits proposed by the PFAS NEMP, also refer to the relevant limits for non-PFAS contaminants listed in IWRG621. These classifications make it permissible for TBM Spoil not acceptable in the WST Facility Containment Cell to be taken to an EPA licensed landfill or treatment facility in the case of Category B and Category C waste or Fill Material containment site (including the WST Facility or adjacent MBC Landfill) where such leachable PFAS would not cause an adverse effect, consistent with the general environmental duty.

## 3.4 TBM Spoil Acceptance Criteria

### 3.4.1 Fill Material Criteria for TBM Spoil

TBM Spoil that has concentrations of compounds that meets the criteria for Fill Material classification as defined in the IWRG621 (refer to Table 3-1) and PFAS levels that are less than the limits for PFAS species nominated in EPA Publication 1669.3 will be classified as Fill Material and could be accepted into the Containment Cell (refer to Table 3-2).

The 700,000 tonnes of spoil from the portal areas (non-TBM Spoil), will be sampled at the WGTP and will only be transported to the WST Facility for restoration or use as structural fill in the Containment Cell if classified as Fill Material as defined in Table 3-1 and Table 3-2.

### 3.4.2 EnRiskS Risk-Based PFAS Criteria

Risk-based criteria were derived for the WST Facility by the consultant Environmental Risk Sciences (EnRiskS) in the HHERA (ANNEX H). These criteria are the upper limits of PFAS in TBM Spoil for acceptance and placement in the Containment Cell (refer to Table 3-3). These are also referred to as the WST Facility spoil containment acceptance criteria. These criteria may appear high however they are based on a site-specific assessment of risk and are not generic criteria such as those for landfill disposal proposed by the PFAS NEMP which must be much more conservative.

It is noted above that, the TBM Spoil is considered to be very unlikely to have PFAS concentrations approaching these criteria. This assessment has been made on the basis of the data available for PFAS concentrations in groundwater which are low within or proximal to the WGTP as no data is available from investigations of the in-situ rock in the alignment (that is available to WST) likely to be excavated by the TBM.

Table 3-3 Overall PFAS Risk-Based Criteria for Soil and Leachate (EnRiskS 2020)

| Matrix | Risk-based criteria adopted as WST Facility spoil containment acceptance criteria | |
|---|---|---|
| | PFOS + PFHxS | PFOA |
| Soil | [redacted] | [redacted] |
| Soil Leachability | [redacted] | [redacted] |

### 3.4.3 Final Adopted TBM Spoil Acceptance Criteria

#### Context

This section discusses the proposed Containment Cell acceptance criteria, with the context of a cell liner design to a standard equivalent of a Type 2 landfill (as per the Landfill BPEM) as presented in Section 4.5.

This submission presents the key lines of evidence that support an acceptance criteria of [redacted] PFOS + PFHxS, as being appropriate for TBM Spoil accepted into the Type 2 Containment Cell design, under site-specific conditions.

#### Containment Cell Design and Seepage

The groundwater risk assessment (ANNEX N) identified very low risk of unacceptable impact on groundwater from PFAS in leachate from estimated leakage rates from the Containment Cell.

WST proposes a containment cell design with equivalent performance to a Landfill BPEM [redacted]. The proposed [redacted] provides a lower potential leakage rate than a [redacted]

The design leachate rate due to theoretical defects in the geomembrane, for a [redacted] is 10 L/ha/day. The modelled leakage for the proposed liner was 1.64 L/ha/day (refer to Containment Cell Design Report in ANNEX P), which is nearly an order of magnitude below the design guideline level. In comparison the estimated leakage rate for a Type 3 design is 907 L/ha/day.

#### TBM Spoil PFAS Acceptance Criteria

Acceptance criteria for an industrial waste and spoil is considered as such, are defined by the total concentration and leachable (Australian Standard Leaching Procedure (ASLP)) content for a range of contaminants provided in the publication entitled EPA Victoria (1 July 2009) Publication IWRG631 Solid Industrial Waste Hazard Categorisation and Management (IWRG631, refer to Table 2).

However, no acceptance criteria are provided in IWRG631 for PFOS, PFOA, PFHxS or any other PFAS.

One approach that can be adopted for a contaminant without an acceptance criterion (e.g. ASLP1 or a threshold 'Category C Upper Limit' for leachate results) is to propose a suitable value for EPA approval and use at a Landfill BPEM compliant landfill sites.

The principle behind the derivation of acceptance criteria (such as ASLP1) is provided in EPA Publication 631 as follows "Where not otherwise specified ASPL1 criteria are derived from the NHMRC Australian Drinking Water Guidelines (1996) Guideline Health Values, multiplied by 100" (refer to footnote 1 of Table 2, IWRG631).

Applying this approach for PFAS acceptance criteria at [redacted] landfills in the EPA Assessment Report (EPA, 2020a; p.45), where it is stated "If a landfill BPEM [redacted] liner was proposed from the containment cell, then a criteria adopting the ADWG [Australian Drinking Water Guidelines] values multiplied by [redacted] could be applied".

Using site-specific risk assessment, the acceptance criteria at the Containment Cell that has been adopted is [redacted]/L for PFOS + PFHxS and [redacted] for PFOA (based on available drinking water guidelines of 0.07 µg/L and 0.56 µg/L respectively from DoH, 2017). The same criteria for PFOS+PFHxS and PFOA are proposed in EPA Assessment Report (EPA 2020a, Table 4).

### Assessed Risk of PFAS to Groundwater

The expected leachable PFAS concentration in TBM Spoil is expected to be very much less than [redacted] PFOS + PFHxS. It is noted that a maximum leachable PFAS content of 0.7 µg/L is discussed in the EPA Assessment Report on the EMP (EPA 2020a) based on the data provided in the Agon (2020) SAQP on behalf of the JV. The assessment of these same data by SLR (ANNEX M), applying a sensitivity analysis as a mass-weighting to each geological material excavated, has resulted in an estimate of maximum spoil leachability of less than the reporting limit by commercial laboratories of 0.001 µg/L PFOS.

In addition to the above, the assessed risks to groundwater are low due to attenuation process in the unsaturated zone and the mixing of seepage with groundwater through flow.

The separation distance between the base of the Containment Cell and groundwater was also discussed in the EPA assessment report (EPA, 2020a). In the EPA Approval letter (EPA, 2020b), requirement 1e requires:

"during detailed designs the separation distance between the containment cell liner and groundwater should be confirmed and if the minimum separation distance is lower than modelled, the findings of the hydrogeological risk assessment should be re-evaluated against the spoil acceptance criteria for the containment cell."

The drilling program for installation of new groundwater monitoring bores, has been partial completed and provided additional information on the separation distance between the base of the Containment Cell and groundwater (ANNEX E). A supplementary report on the hydrogeological assessment for the Containment Cell separation distance, has confirmed this to be between 40 m and 15 m (ANNEX L), which confirms the hydrogeological risk assessment previously reported (ANNEX N).

### Conclusion

EPA (2020; p.46) Table 4: EPA proposed containment cell acceptance criteria lists for a [redacted] acceptance criteria of [redacted] for PFOS + PFHxS.

Based on the above discussion of the cell liner design, and the accompanying lines of evidence, WST proposes to use the acceptance criteria detailed in Table 3-4.

Table 3-4 PFAS criteria adopted for the WST Facility

| | PFOS | PFHxS | PFOS+ PFHxS | PFOA | Comments |
|---|---|---|---|---|---|
| WST Adopted Criteria | | | | | |
| Spoil accepted to WST containment cell | - | - | [redacted] | [redacted] | IWRG631 limits also apply to zones of exception |
| EPA Waste Classification to Licenced Landfill for WGT Project (ANNEX O) | | | | | |
| Non-Prescribed Industrial Waste to Solid Inert Waste Landfill | - | - | 0.07 µg/L | 0.56 µg/L | IWRG631 Industrial Waste ASLP limits also apply |
| Prescribed Industrial Waste (N121) to Cat C landfill | - | - | 0.7 µg/L | 5.6 µg/L | IWRG631 Cat C ASLP and TC limits also apply |
| Prescribed Industrial Waste (N120) to Cat B Landfill | - | - | 7 µg/L | 56 µg/L | IWRG631 Cat B ASLP and TC limits also apply |
| EPA Publication 1669 | | | | | |
| Interim criteria for reuse of PFAS-impacted soil | <0.002 mg/kg | <0.001 mg/kg | - | <0.001 mg/kg | Based on laboratory limit of reporting |

## 3.5 Anomalous TBM Spoil

### 3.5.1 Anomalous TBM Spoil – IWRG or PFAS

TBM Spoil that does not satisfy the criteria for acceptance at the Containment Cell would be managed in accordance with IWRG and the Project-specific EPA waste classifications as follows:

- If PFAS levels comply with EPA Publication 1669 and concentrations of other contaminants exceed the Fill Material upper limits, then concentrations would be compared to the IWRG621 Category C criteria and the Project-specific EPA waste classifications for Category C. If below the Category C upper limits, it could then be classified and disposed of at the adjacent MBC Landfill or other suitably licenced off-site landfill.
- If the concentrations exceed the IWRG621 Category C criteria or the Project-specific EPA waste classification upper limits for Category C, the material would be classified and transported as either Category A or Category B to an appropriately EPA licensed facility, subject to availability for treatment and available storage space.
- If TBM Spoil exceeds the Containment Cell acceptance criteria for PFAS then TBM Spoil could not be accepted at any EPA licenced landfill in Victoria and must be diverted under waste transport certificates to a suitably licence waste treatment facility. This is due to the criteria for acceptance at the WST Facility containment exceeding the upper limit for Category B in the Project-specific EPA waste classifications, classifying it as Category A PIW.

### 3.5.2 Anomalous TBM Spoil – Acid Sulfate Soil

The criteria for determining whether TBM Spoil from the WGTP is actual acid sulfate soil, potential acid sulfate soil or non-acid forming will be initially based on undertaking field pH tests and generally in correlation with the criteria in Table 3-5 and with final conformation using either the 'suspension peroxide oxidation combined acidity sulfur' (SPOCAS) or 'chromium reducible sulfur' (SCR) suite methods to determine net acidity. The chromium reducible sulfur' (SCR) suite is considered more accurate. If the net acidity is less than 0.03%S, ASS are not present.

If potential acid sulfate soil or waste acid sulfate soil is identified by the JV and classification provided that it is acceptable for placement in the Containment Cell, then it would be subject to a defined lime treatment (with the rate determined based on results) as part of placement in the Containment Cell. Further assessment is not possible in Holding Bays given time constraints.

Table 3-5 Interpretation of field pH Results

| $pH_f$ | $pH_{fox}$ | Delta pH | Reaction rate | Action required |
|---|---|---|---|---|
| ≥ 5.0 | ≤ 5.0 | ≤ 2.0 | 1 - 2 | If no other field indicators or acid sulfate soil risk indicators are present, no further action is required. |
| > 4.0 and < 5.0 | > 3.0 and < 5.0 | > 2.0 | ≥ 2.0 | Potential ASS may be present, further assessment is required to confirm the presence of Potential ASS and if present the required liming rate to achieve neutralisation. |
| ≤ 4.0 | ≤ 3.0 | > 2.0 | ≥ 2.0 | Actual ASS or Potential ASS may be present, further assessment is required to confirm the presence of Actual ASS or Potential ASS and if present the required liming rate to achieve neutralisation. |

An acid sulfate soil management plan with further detail is included in ANNEX U.

## 3.6 Leachate Reuse Criteria

Leachate may only be used for dust suppression and construction purposes subject to it meeting drinking water trigger levels for PFAS and other COPC. The PFAS drinking water trigger levels are summarised in Table 3-6.

Table 3-6 Drinking Water Trigger Level for PFAS

| Health based guidance value | Total PFOS + PFHxS (µg/L) | PFOA (µg/L) |
|---|---|---|
| Drinking water quality guideline value | 0.07 | 0.56 |

Drinking water trigger levels for other COPC are those specified in the Australian Drinking Water Guidelines (last updated in May 2019). If necessary, additional drinking water guidelines will be sourced from the US EPA Regional Screening Levels for tap water (which were last updated in November 2020).

### 3.6.1 Dust Suppression

Dust suppression may be required at the WST Facility during operation. Water from the Southern Leachate Pond may be used for dust suppression in the following circumstances:

- Leachate may only be used only for dust suppression in specified areas of the WST Facility[4].
- Leachate may only be used in this manner if PFAS and other COPC concentrations meets the drinking water trigger levels (defined at the start of Section 3.6)[5]. The other COPC would be those identified as a result of IWRG621 broad suite analysis of leachate. This will be completed on a monthly basis on select leachate samples; or in cases where other contaminants have been identified in TBM Spoil that exceed the TBM Spoil Acceptance Criteria (defined in detail on the leachate monitoring program is included in Section 7.2 and in the Water Management Plan in ANNEX Y.
- Leachate may be treated to achieve drinking water trigger levels for PFAS and other COPC, if proposed to be reused for dust suppression(defined at the start of Section 3.6)[4].
- Leachate suitable for such reuse may only be used on the WST Facility on the Holding Bays, Drying Bays and Containment Cell or internal trafficked areas[6] such as roads.

[4] Addition of PFAS to land/soil that does not contain PFAS is inconsistent with SEPP Land (and the PFAS NEMP) therefore dust suppression should be limited to specified areas. These are trafficked and operational surfaces within the WST Facility (Containment Cell, Holding Bays, Drying Bays and internal routes). These are considered built environments and will be removed upon closure via stripping and placing within the Containment Cell, thus preserving the intent to policy.

[6] Upon closure of the WST Facility these areas will be stripped of road base material and disposed in the Containment cell in accordance with waste soil categorisation criteria discussed in Section 3.3. However, if the materials have concentrations less than PFAS of IWRG 621 criteria, the road base will not be required to be disposed of in the Containment Cell.

### 3.6.2 Construction Water

The Holding Bays, Drying Bays and Containment Cell area will be developed in stages to fit in with TBM Spoil generation rates from the WGTP. Therefore, establishment of the [redacted] lining systems for the Holding Bays, Drying Bays and Containment Cell will also be developed in stages. If the concentration of PFAS and other COPC in the leachate is less than the drinking water trigger levels it is proposed to utilise water from the Southern Leachate Pond to condition the clay soil prior to compaction. Other potential source of construction water is recycled water, subject to testing and meeting the drinking water trigger levels, from Western Water.

## 3.7 Sampling and Analysis Methodology

In summary:

- Sampling, analysis, and waste categorisation of TBM Spoil is the responsibility of the JV.
- The sampling, analysis and waste categorisation must comply with the requirements of the EPA Classification issued to the JV prior to transport of TBM Spoil to the WST Facility.
- The EPA Classification will specify that the sampling and analysis protocols and the SAQP (i.e. the Agon [2020] SAQP) and the EPA Classification would be aligned in this regard.
- WST is permitted to sample and arrange for testing of the TBM Spoil in certain and select circumstances only, where categorisation of the TBM Spoil and soil in the Holding Bays are not available or is incomplete (for example, should there be missing tracking documentation or sample analysis data is lost). The categorisation of waste spoil still remains the responsibility of the JV.

The sub-sections below present a high-level summary of the sampling and analysis of the TBM Spoil by the JV. It is noted that where any discrepancy exists, the EPA Classification issued by EPA and the Agon (2020) SAQP takes precedence over sampling and analysis methodology summarised in this TBMS-EMP.

### 3.7.1 TBM Spoil Sampling and Analysis Outline

In accordance with the Agon (2020) SAQP, and consistent with Schedule 1: Waste sampling and method of analysis, of the EPA Classification of TBM Spoil (2020/476 S0 9042848) included in ANNEX Q, the TBM Spoil will be consolidated at the Pivot site near the northern tunnel portal prior to transportation to the WST Facility. The TBM Spoil will be sampled using methods to ensure representativeness and to avoid cross contamination. The TBM Spoil will be initially sampled at a target frequency in the range of 1 per 250 $m^3$ and 1 per 350 $m^3$. The test results will be analysed using statistical methods and categorisation will include comparison with the criteria and specification for tunnel spoil acceptance at the WST Facility, with potential to reduce sampling frequency rates based on data trends. The Agon (2020) SAQP also includes details on:

- Options for sampling locations (i.e. Pivot site, Holding Bays).
- Laboratory analysis based on soil sources.
- Sampling methodology.
- The quality assurance and control processes.
- Sample preparation and analysis methods.
- Material tracking systems.

- Scope of reporting.
- Spoil management decision making rules.

### 3.7.2 Non-TBM Spoil from Tunnel Portal, TBM Spoil from Zones of Exception and Anomalous TBM Spoil

As indicated previously, approximately 700,000 tonnes of non-TBM Spoil from the tunnel portal may be placed in the Containment Cell if not required to be stored in the Holding Bays or Drying Bays. TBM Spoil from zones of exception (zone 1, zone 2, zone 3 and zone 4) will be generated as part of the WGTP and can only be received at the WST Facility if it meets Fill Material criteria (defined in Section 3.4).

The criteria and management of each type of waste in the TBM Spoil zones of exception are as follows. Consideration of best practice for industrial waste management as per EPA (May 2016) Publication 1624 Industrial Waste will be made in managing materials:

- Zone 1 (North Yarra Main Sewer): This comprises IWRG621 classified PIW and Solid Inert Material (bricks, timber material etc.). This would be required to be disposed to landfill subject to classification. If WST are required to test the spoil to assess whether it is suitable for placement in the Containment Cell, PFAS and IWRG621 testing would be undertaken.
- Zone 2: This comprises grout block (i.e. construction and demolition waste). This would be required to be disposed to landfill subject to classification. If WST are required to test the spoil to assess whether it is suitable for placement in the Containment Cell, PFAS testing would be undertaken.
- Zone 3: This comprises acid sulfate soil (potential or actual). Placement in the Containment Cell would be subject to lime dosing. The lime dosage rate will be based on the criteria and results of the JV's classification, with dosing to occur in the Containment Cell. No further assessment of acid sulfate soils is required, but evidence of application required and grid location within Containment Cell identified. An acid sulfate soil management plan with further detail is included in ANNEX T. If WST are required to test the spoil to assess whether it is suitable for placement in the Containment Cell, PFAS and acid sulfate soil testing would be undertaken.
- Zone 4: This comprises construction and demolition waste. This would be required to be disposed to landfill subject to classification. If WST are required to test the spoil to assess whether it is suitable for placement in the Containment Cell, PFAS testing would be undertaken.

The non-TBM Spoil from the portal area, from the zones of exception and anomalous TBM Spoil are required to be sampled and tested at the source or in accordance with Section 3.7.

Transport to the WST Facility would only occur with prior approval by WST of the waste categorisation report provided by the JV.

TBM Spoil from the identified zones of exception or TBM Spoil with visual/odour indicators of contamination observed during loading or delivery will be managed in accordance with the Agon (2020) SAQP and EPA Classification.

### 3.7.3 TBM Spoil Water Sampling

Water derived from TBM Spoil will be also sampled and analysed.

The sampling procedures (in terms of QA/QC and compliance with regulatory guidelines) will be consistent with the approach outlined in the Agon (2020) SAQP and EPA Classification.

### 3.7.4 Laboratory Analysis

TBM Spoil from Zone 1 (where the tunnel alignment it intersects Zone 1 - the North Yarra Main Sewer) will also be tested for total and leachable concentrations of PFAS (PFOS, PFHxS and PFOA) and for contaminants specified in IWRG621.

TBM Spoil from Zone 3 (areas where acid sulfate soils may be present) will be tested for total and leachable concentrations of PFAS (PFOS, PFHxS and PFOA) and for acid sulfate soil indicators using the methods and criteria listed in EPA Publication 655.1. An acid sulfate soil management plan with further detail is included in ANNEX U.

All other TBM Spoil will be analysed only for total and leachable concentrations of PFAS (PFOS, PFHxS and PFOA) in accordance with the classification to be issued by EPA to the JV.

## 3.8 Specification for Containment and Methodology

The TBM Spoil Regulations require the TBMS-EMP to include a specification for containment of TBM Spoil (TBM Spoil Regulations r.62) (g)); and a methodology to determine if TBM Spoil meets the specification for containment (TBM Spoil Regulations r.6(2)(h)). This Section addresses this requirement.

### 3.8.1 Specification for Containment

In accordance with TBM regulation 6(2)(g), the specification for containment of TBM Spoil is the level of contamination by PFAS in spoil that is able to be accepted into the Containment Cell as proposed in the facility design described in Section 4 and in design documents by Mackenzie Environmental included in ANNEX R. The acceptable levels of PFAS and other contaminants, where relevant, are set out in Section 3.4.

The methodology for determining if the TBM Spoil meet the specification for containment is understood to mean the process and steps involved to determine that the contamination levels in TBM Spoil comply with the criteria for TBM Spoil acceptance at the Containment Cell proposed as part of the WST Facility. This also include the decision rules and TBM Spoil management process to be adopted at the WST Facility to ensure the only suitable TBM Spoil is placed in the Containment Cell or is diverted to alternate appropriately licenced waste facilities.

### 3.8.2 Methodology for Application of Waste Criteria

Spoil produced by the TBM operations will conveyed to the former Pivot site and sampled by the JV prior to loading into trucks and transportation to the WST Facility (Agon, 2020).

Following receival of weighbridge data of the trucks from the Pivot site, the TBM Spoil will be placed in the Holding Bays at the WST Facility. The decision rules for the application of criteria to the management of TBM Spoil in the bays include the following:

- On the basis of a waste spoil classification/categorisation provided by the JV, TBM Spoil that satisfies the WST Facility acceptance criteria (see Section 3.4) for PFAS and where applicable the IWRG621 Fill Material classification criteria, will be directed for placement in the Containment Cell.
- Spoil that is classified by the JV as IWRG621 Classified Category C Contaminated Soil and has PFAS levels less than the upper limits for leachable PFAS in the EPA site-specific waste classification for Category C can be disposed at the EPA licensed MBC Landfill or other landfill EPA licensed to receive such category of waste soil.

- TBM Spoil that has PFAS levels exceeding the TBM Spoil Containment Cell acceptance criteria must be transported off-site under waste transport certificates to a suitably EPA licensed facility.

Table 3-7 summarises the management options for TBM Spoil containing IWRG, PFAS and waste acid sulfate soil.

Table 3-7 Spoil Management Options for PFAS with IWRG and /or Waste Acid Sulfate Soil

| IWRG Classification | PFAS | WASS | Spoil Management Options |
|---|---|---|---|
| Category A | NL[1] | NL | Must be sent to a Category A EPA licensed waste treatment facility |
| Category B | EPA Project-specific Category B or C | NL | Must be sent to a Category B EPA licensed landfill or EPA licensed waste treatment facility |
| Category C | EPA Project-specific Category B or C | NL | Must be sent to an EPA licensed (Category B or Category C) landfill |
| Fill Material | Less than WST Facility spoil acceptance criteria | Non-WASS | Accepted at WST Facility Containment Cell |
| Fill Material | Less than WST Facility spoil acceptance criteria | WASS | Accepted at WST Facility Containment Cell after WASS treatment |

1. NL = Not Limiting parameter – see other parameters.

A summary of the Agon (2020) SAQP TBM Spoil sampling methodology and laboratory analysis to be undertaken by the JV are included in Section 3.7.

# 4 Description of the WST Facility

The design and operation information described in this Section has been developed as required to satisfy the objectives of the TBM Spoil Regulations to ensure the protection of human health and the environment while facilitating the management and disposal of TBM Spoil.

The main infrastructure of the WST Facility is presented in Figure 4-1.

Figure 4-1 Site Boundary and Layout of the WST Facility

The design of the WST Facility proposed herein provides for management of all spoil received, stormwater runoff from the facility as well as deemed contaminated leachate water in contact with spoil. The facilities proposed are design to prevent contaminated water and sediment from impacting the external environment including Parwan Creek and Werribee River. The design is also protective of the underlying groundwater.

## 4.1 WST Facility Design Revisions and Completeness

A full list of the reports produced that outline the design of the WST Facility are presented in Table 1-3. The Mackenzie design documents for the Containment Cell, Containment Cell Cap, Leachate Sedimentation Pond and Bays are included in ANNEX R and the SMEC design documents for the existing Southern Leachate Pond are appended to the ERM 2018 Construction Audit included in ANNEX AG. The Mackenzie design documents have been assessed and reviewed by an EPA accredited Environmental Auditor, which are included in ANNEX S. The SMEC design documents have also been assessed and reviewed by an EPA accredited Environmental Auditor, which is included in the Construction Audit in ANNEX AG.

## 4.2 Main WST Facility infrastructure

The following are the main infrastructure components of the WST Facility[7]:

- Containment Cell with leachate pump sump
- Holding Bays
- Drying Bays
- Contingency Drying Bays
- Leachate Sedimentation Pond
- Leachate Treatment Plant
- Southern Leachate Pond
- Construction Materials Stockpile Area.

In addition to the main infrastructure components, the following additional infrastructure will form part of the WST Facility:

- Driver Control station and Dallas tag reader
- Site hut, offices, and amenities
- Light vehicle car park
- Receival truck short term park
- Offices and amenities
- Lighting
- Signage
- RFID scanner and automated weighbridge
- Wheel wash

Cyclone fencing will be located along the Kerrs Road and Gullines Road boundaries to address Regulation 5 (e) restricting public access.

[7] The Southern Leachate Pond which has already been constructed forms part of the related infrastructure not included within the WST Facility site but located within the adjacent MBC Landfill.

## 4.3 Overview of WST Facility infrastructure and Operations

The WST Facility operations and infrastructure are detailed further in Table 4-1.

Table 4-1 WST Facility Operations and Infrastructure

| Facility | Description |
|---|---|
| WST Facility entrance and exit | The main access road to the WST Facility is via the Geelong-Bacchus Marsh Road to Kerrs Road, at the intersection with East Maddingley Road. The WST Facility exit is on Gullines Road near the intersection with Rowley Station Road. |
| Driver control station | Located in the northern part of the WST Facility near the site entrance. |
| Car parking/site compound | Located in the northern part of the WST Facility near the site entrance adjacent to Kerrs Road. This will also include a site compound for non-conforming loads. |
| Holding Bays and Drying Bays | TBM Spoil will be received and temporarily contained in Holding Bays while awaiting testing and classification of the TBM Spoil.<br>The primary Holding Bays are located at the north-western corner of Kerrs and Gullines Road (273388 m E, 5823443 m S).<br>Contingency Drying Bays for either storage or drying are located west of Gullines Road and would be used if necessary. |
| Containment Cell | TBM Spoil that meets the specification for containment shall be subject to placement in the Containment Cell or off-site disposal at an EPA licensed facility.<br>The Containment Cell (273827 mE, 5823000 mS), has capacity of approximately, [redacted] |
| Leachate Sedimentation Pond and Southern Leachate Pond | A pond to dropout sediment from leachate drained from the Holding Bays and/or Drying Bays and the Containment Cell prior to pumping into the Southern Leachate Pond. |

The Agon (2020) SAQP describes the transportation of TBM Spoil from the WGTP in Yarraville to the WST Facility in Bacchus Marsh.

The WGTP is responsible for complying with the EPA Vehicle Safety Standards for Prescribed Industrial Waste Transportation from the WGTP site to the WST Facility.

Transport of prescribed industrial waste from the WST Facility to an off-site EPA licensed facility, will comply with the provisions in EPA (April 2018) Publication IWRG814.2 Vehicle guidance: Non-tanker vehicles/trailers. Transport to the adjacent MBC Landfill via internal roads will be undertaken in accordance with a methodology agreed with EPA.

Sampling of TBM Spoil is to be undertaken as indicated in Section 3.3.

The trucks will enter the WST Facility via a gate located at the corner of East Maddingley and Kerrs Roads; then proceed west to the drive control station equipped with Dallas tag reader and automated weighbridge. It is expected that the loads information, e.g. truck registration number, load ID or source and pre-classification details will be provided to WST Facility prior to the trucks leaving the Pivot site. In response, WST Facility will also confirm the availability of the Holding Bays prior to TBM Spoil arriving at the facility.

Any trucks arriving at WST Facility without the necessary information or non-conforming loads will be diverted to the car parking/site compound/non-conforming area. The trucks will be stationed here until all the information has been received and verified, otherwise it will be diverted back to its origin.

Trucks with conforming loads information will proceed to the designated Holding Bays. After unloading the truck will leave the facility using the Gullines Road exit.

Upon receiving TBM Spoil categorisation reports and definition of TBM Spoil category, WST Facility will transport the TBM Spoil to either the Containment Cell, the adjacent MBC Landfill (EPA licensed to receive Category C contaminated soil) or other EPA licensed facility.

In the event that TBM Spoil is extremely wet and takes longer to dry, it will be spread out onto the Drying Bays to allow drying from sun and wind and drainage of free water released from TBM Spoil through the designed leachate containment system. A series of [redacted]d. Additional drying would also occur as a result of placement and spreading of TBM Spoil received in the Containment Cell.

The receiving and processing operations flow chart is illustrated in Figure 4-2.

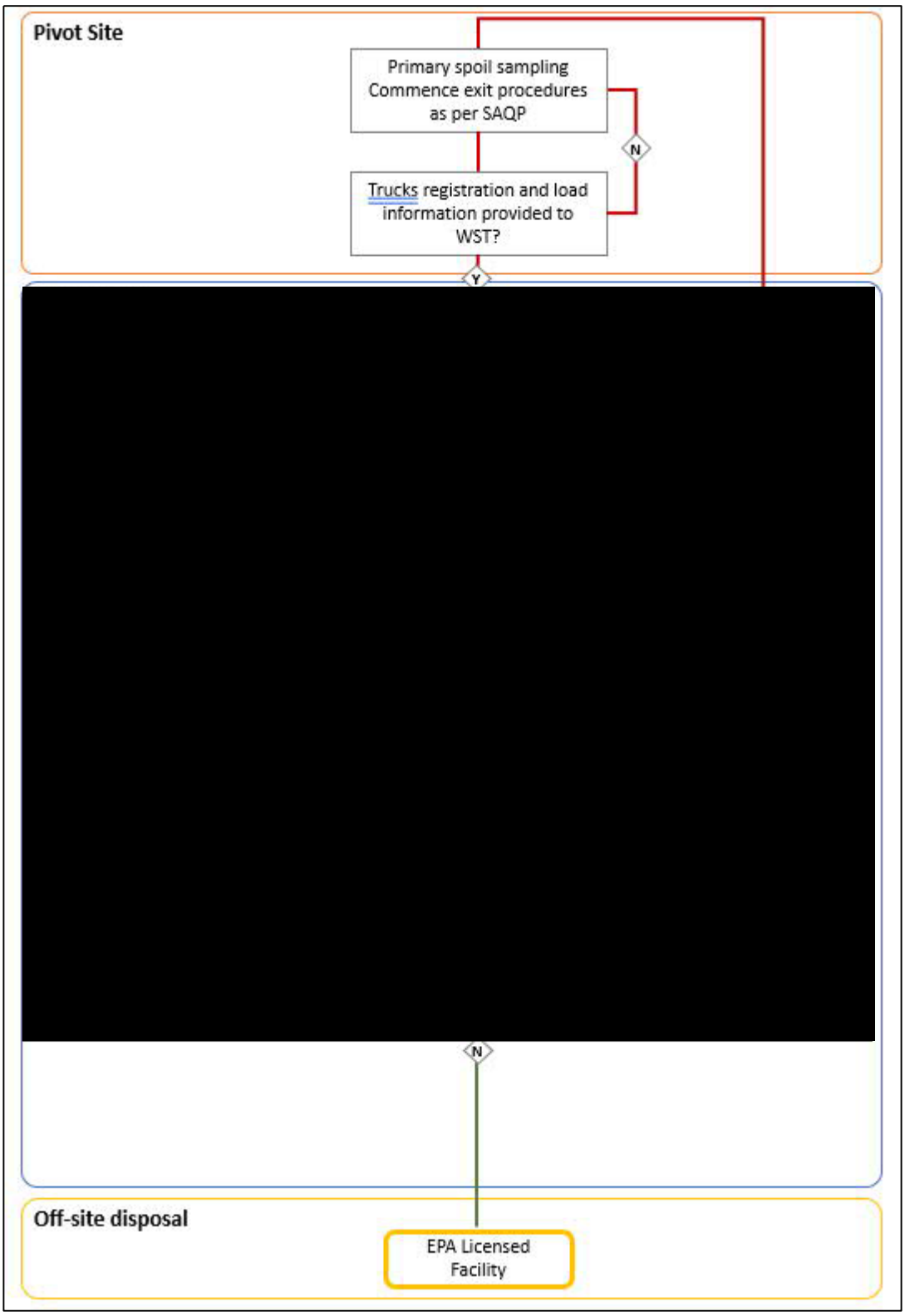


Figure 4-2 Flowchart of Receiving and Processing Operations

### 4.3.1 Holding Bay and Drying Bay Preparation

The footprint for the Holding Bays and Drying Bays will be stripped of all vegetation and topsoil to the satisfaction of the Geotechnical Inspection and Testing Authority (GITA). Stockpiled topsoil will be used to construct temporary bunding around the WST Facility for reuse in the reinstatement of TBM Spoil bay footprint on closure of the WST Facility project.

On completion of stripping, the in-situ clay surface will be cut to the approximate design floor relative levels. Materials won from the cut will be utilised in the construction of the Haul roads. The in-situ clay materials have previously been demonstrated by confirmatory geotechnical testing (ANNEX K) to produce a low permeability liner.

### 4.3.2 Finished Holding Bay and Drying Bay Floor

To improve the trafficability within the Holding Bays, Drying Bays, and haul roads a nominal [redacted] layer will be placed over the compacted clay layer. The compacted clay liner will be lime and cement stabilised prior to compaction. The specification for the stabilisation machinery is outlined in Section 4.3.5 of the Holding Bay Technical Specification and will comply with the relevant sections of the VicRoads Standard Specification (ANNEX R). The trafficking layer will be maintained and topped up/replaced as required throughout the duration of the WST Facility project.

[redacted] and restoration undertaken as required.

### 4.3.3 Holding Bay Filling Protocol

Unloading of trucks will occur under the supervision of the bay operator. The bay operator will be present 24 hours a day during unloading operations and instruct drivers to unload via a UHF radio. The bay operator will direct the truck to deposit TBM Spoil in the Holding Bays such that TBM Spoil is not trafficked out onto the internal haul roads. Incoming TBM Spoil trucks will reverse over the wheel stop bund and into the unloading zone for tipping. Mobile plant will push the TBM Spoil filling the bay opposite the deposition point.

The bay operator will regularly assess the capacity of the bay during filling operations. Each bay will continue to be filled until full. Once a bay is deemed full, brigade tape will be used to close the bay.

### 4.3.4 Holding Bay Load Out Protocols

Removal of classified TBM Spoil from the Holding Bays will occur using an excavator located along the loading bund. Dump trucks will utilise the loading waiting bay zone once directed by the Radio Frequency Identification scanner. Loaded trucks will exit via the automated weighbridge. Spilled TBM Spoil from the loading activities will be cleaned to the extent practicable and loaded onto the trucks. The loading bund is designed to capture TBM Spoil water run-off.

TBM Spoil will be unloaded from the Holding Bays by an [redacted] BM Spoil loading point is on a 1:3 batter and as such free draining water will drain away from the loading point to the base of the Holding Bay. This will ensure that TBM Spoil excavated from the Holding Bays does not contain free draining water and run-off will not discharge into the stormwater. After TBM Spoil has been removed from the Holding Bays the water retained in the bays will be removed utilising a hydro excavation truck and transported to the Leachate Sedimentation Pond.

[redacted]

Trucks will be loaded with TBM Spoil by the [redacted] and will not enter the bays to avoid the trafficking of TBM Spoil onto internal roadways. There will be continuous monitoring of all internal roads to ensure the prompt removal of any spillage.

Subject to an assessment of traffic interaction with TBM Spoil receival operations, a contingency load-out point will be located at the tipping zone entrance of the bay. [redacted] will be used for TBM Spoil removal operations when loading out from the bay entrance, should trucks be required to enter the Holding Bay for contingency load out, TBM Spoil will be removed from areas required for trafficking prior to commencement.

### 4.3.5 TBM Spoil Placement in Containment Cell

The objective of TBM Spoil placement process in the Containment Cell is to create a landform that is stable in the short and long term where all potential environmental impacts are minimised. Procedures for management of impacts to surface water, air quality and other receptors are detailed in Section 6 but critical elements relating to the Containment Cell include:

- All surface water is diverted from running into the Containment Cell by perimeter bunding and diversion drains.
- All leachate runoff from TBM Spoil is directed into the leachate sump by internal bunds that prevent runoff from the Containment Cell area until after placement of the final cap.
- Use of water carts as required to eliminate dust generation potential within the Containment Cell and internal access roads. All vehicle movements in the Containment Cell will be minimised to reduce dust generation.

While the TBM Spoil transported to the Containment Cell will not contain free water, TBM Spoil may have a moisture content above that would be desirable for long term Containment Cell stability.

The water content of TBM Spoil produced by the TBM is stated in the Agon (2020) SAQP as varying between a low of 24.5 % for course grained Newport Formation to a high of 56 % for extremely weathered Older Volcanics. The volume of water added to the formation being excavated varies between 5 % to 17.5 %. It is expected that TBM Spoil will behave as a saturated soil/rock mix rather than a wet clay slurry with saturation above the clay liquid limit. WGTP has advised that TBM Spoil received at the WST Facility may still have entrained water held in suspension within TBM Spoil matrix by the drilling foam additives used by the WGTP. This foam agent will break down within a few days of arrival at the WST Facility potentially releasing water entrained within the soil matrix into the Holding Bay drainage system. Holding Bays are designed to grade to a drainage point to encourage the runoff of free water released from TBM Spoil enabling its removal from TBM Spoil Holding Bays as leachate. Free water will not be transported from the Holding Bays to the Containment Cell.

The degree of saturation and amount of effort required to dry TBM Spoil at the WST Facility will vary considerably. Some TBM Spoil will be relatively free draining and will not require any mechanical assistance to dry to the point where it can be placed in the Containment Cell with no further work required. TBM Spoil with a higher clay and water content mixed with larger particles will require mechanical assistance to dry.

TBM Spoil will be spread in 500 mm lifts across the Containment Cell. Each Holding Bay contains approximately [redacted] as such once classified the contents of a Holding Bay will be spread across [redacted] of the Containment Cell. TBM Spoil will be progressively placed in 500 mm lifts across the Containment Cell progressively raising the level of cell.

The TBM Spoil surface in the Containment Cell will only work until it has a moisture content that allows for another layer to be placed above. This moisture content would be above that where dust generation is likely to occur.

If required, additional drying would also occur as a result of placement and spreading of TBM Spoil received in the Containment Cell. Drying is more rapidly achieved by turning TBM Spoil with earthmoving equipment to ensure that sun and wind action has the best opportunity to evaporate water from the surface of the soil mass. [redacted]

The goal of the drying activities is to create TBM Spoil dried to the point such that it is mechanically stable and trafficable with earthmoving equipment. [redacted]

[redacted]

Golder was commissioned by MBC to undertake a review of the proposed design aspects relating to TBM Spoil handling and storage/disposal in the Containment Cell (ANNEX K). Golder indicated that it is of importance to note that the material produced by a TBM are ideally suited to soft cohesive ground types (relatively weak clays or silts) where TBM Spoil is conditioned to a firm consistency. Hence the ideal TBM Spoil consistency is a paste and is not a slurry (i.e. TBM Spoil has some inherent strength and is not a liquid).

In assessing the types of materials that would be produced by the WGTP, Golder indicated that it was likely that TBM Spoil would consist of a “rubble” of chunks of intact stronger clayey material within a matrix of wetter softened soil. The geotechnical condition of TBM Spoil would assist with handling and drying of TBM Spoil. In its assessment Golder concluded that a significant proportion of TBM Spoil would be derived from the less weathered rocky Older Volcanics and Newer Volcanics and therefore would have better TBM Spoil handling and placement characteristics.

[redacted]

Golder compared the proposed TBM production rate and allowing for bulking of the bank TBM Spoil volumes, calculated there was about four to five months of short-term storage capacity. This suggested that the contingency storage was a reasonable buffer if tunnelling operations commenced in winter.

A sensitivity check assuming adverse conditions, was undertaken by Golder to assess the impact of wet weather on the storage capacity versus production rate from the WGTP. The sensitivity check indicated there could be a shortfall of storage capacity in the Holding Bays of about [redacted] This would require implementation of the contingency Drying Bays which would enable enough capacity to deal with TBM Spoil during wetter periods.

It should be noted that Golder considered that the sensitivity check represented a comparatively extreme set of circumstances that was probably unlikely to occur.

Golder concluded that the design generally has significant contingency capacity if the peak of TBM Spoil production occurs in the drier months. The short-term processing capacity of the WST Facility was unlikely to be critically impacted by wet weather delays and therefore the design was considered adequate.

Golder indicated additional controls that could be implemented to reduce operational delays:

- Accelerating laboratory turn-around times to free-up Holding Bays sooner than the design 21 days
- Using some of the Drying Bays as temporary stockpile areas
- Using the Contingency Drying Bays west of Gullines Road
- Making use of the Containment Cell surface area as an additional drying area provided that no free draining liquid is transported with TBM Spoil into the Containment Cell
- Accelerating TBM Spoil drying by lime treatment of TBM Spoil in the Drying Bays.

Details of the rectification procedures for the Holding Bays and Drying Bays is provide in Section 4.3.6. The placement of a [redacted] layer over the [redacted] provides for protection of the underlying [redacted].

### 4.3.6 Integrity Assessment and Rectification

On completion of load out operations, Holding Bays, Drying Bays, and adjoining access roads will be assessed by suitably trained personnel using a checklist procedure to determine required maintenance measures. The procedure will include an assessment of:

- Depression or soft spots on the surface of the Holding Bays, Drying Bays, and internal roads
- Trafficability
- Bund integrity
- Unloading zone and wheel bund surfaces
- Leachate and stormwater management infrastructure
- Residual TBM Spoil requiring removal.

As indicated in the Section 4.4, [redacted]

A work order for construction maintenance of the holding and Drying Bays and road design elements will be issued for immediate rectification if the assessment determines that the minimum standard defined in the design documentation has not been met. [redacted] will be stockpiled on-site for use on as required basis. It is anticipated that the integrity assessment and rectification process will take not more than two days.

All damage and rectification works will be tracked in the Workflow database system that will not release Holding Bays for refilling until any rectification works have been completed and verified.

### 4.3.7 Management of Anomalous TBM Spoil

Anomalous TBM Spoil will be segregated and managed separately. The anomalous TBM Spoil initially will be assessed if the materials originated from the pre-identified zones of exception in the WGTP alignment.

The anomalous TBM Spoil will then be further characterised, which may include additional laboratory analysis and assessment against the spoil acceptance criteria to inform whether the material is suitable for placement in the Containment Cell or alternatively disposed of off-site to an EPA licensed facility. As noted previously, characterisation is the responsibility of the JV (refer to Section 3.7 for further information).

## 4.4 Design and Construction of Holding Bays and Drying Bays

### 4.4.1 Design Details of the Bays

A total of [redacted] Holding Bays, covering an area of approximately [redacted], is proposed. The Holding Bays are located to the east of Gullines Road and are arranged into three rows in a north-south orientation on the WST Facility.

Each Holding Bay is designed with capacity between [redacted] and [redacted] with 0.5 m of freeboard, subject to free water content of the TBM Spoil. The capacity of the Holding Bay will be in part determined by the physical characteristics of TBM Spoil. High moisture content slurry material will not be able to be pushed up into a mound and as such will require more storage area than lower moisture granular material. Unsaturated soil will be stockpiled at the angle of repose with a height not exceeding [redacted]

[redacted]

A total of [redacted] Drying Bays with total area of approximately [redacted] are also located to north, south, and west of the primary Holding Bays. These Drying Bays will used to accommodate sloppy loads, in the event that all the Holding Bays are fully utilised. The construction of the Drying Bays will be similar to the primary Holding Bays but with larger dimensions.

The Holding Bays and Drying Bays will be constructed with [redacted] The [redacted] ayer will be [redacted] will be overlain by a [redacted] The design and construction would result in a low permeability barrier and a performance standard that would prevent any risk of harm to the beneficial use of land, groundwater, or surface water.

The [redacted] for the Holding Bays and Drying Bays will be [redacted]

### 4.4.2 Technical Specification and CQA for the Bays

The Technical Specifications provide details of the following materials (and properties) that will be used, including:

- [redacted]

The properties of materials proposed to be used in construction of the Holding Bays are provided in Section 2 of the Technical Specification.

The requirements for pre-construction quality assurance and quality control testing for the proposed materials to confirm that they meet the specifications are indicated in Section 3 of the Technical Specification (ANNEX R). The CQA testing will be competed in general accordance with the Landfill BPEM or better.

The construction methods and testing requirements for and during construction of each component indicated above are specified in Section 4.1 to 4.3 of the Technical Specification (ANNEX R).

Construction of the Holding Bays and associated infrastructure will be carried out under Level 1 GITA supervision and will be subject to independent audit of construction by a person accredited as an environmental auditor by EPA. The scope of the audit is limited to aspects of the facility that relate to the protection of the environment (lining system, leachate collection and management system and stormwater management).

Following completion of each component, a GITA report will be prepared documenting works completed and assessing if the works meet the requirements of the Design documents and Technical Specification.

## 4.5 Design and Construction of the Containment Cell

The Containment Cell will be located to the south-east of the Holding Bays and has an approximate footprint of [redacted]. The Containment Cell design optimises on the existing landform and drainage providing a TBM Spoil disposal capability of approximately [redacted]

The design of the Contaminant Cell is based on a BPEM Type 2 landfill cell as detailed in EPA Publication 788.3 and EPA Publication 1323.3 as guidance. It is noted that the design and audit scope is not required to comply absolutely with the Landfill BPEM as the cell design for TBM Spoil is ultimately risk-based. Nevertheless, it is intended that any departures from BPEM are to be justified – on the basis of risk.

### 4.5.1 Design Details of the Containment Cell

The design of the Containment Cell liner profile comprises the following (described from top down) with details included in the design report in ANNEX R:

- [redacted]

A typical cross section of the lining system is included in Figure 4-3. Additional design details and drawings are included in ANNEX R.

[redacted]

Figure 4-3 Lining System Cross Section

The Landfill BPEM specifies a liner performance for a [redacted] (i.e. composite lined cell) as seepage not exceeding [redacted]. The seepage rate through the [redacted] is effectively zero, with seepage being governed by construction defects (holes, wrinkles, inadequate joins). Calculations were undertaken by Mackenzie Environmental and indicated flows of [redacted], which is nearly an order of magnitude below the design guideline level (ANNEX O). In comparison the estimated leakage rate for a Type 3 liner (i.e. single lined cell) is 907 L/ha/day.

The field performance of lining systems comprising [redacted] has indicated they provide lower seepage rates than a compacted clay and HDPE lining system (Rowe 2011).

Further calculations and an assessment of risk to groundwater was undertaken by SLR, which has shown that the seepage from the liner would be much less than the designer's estimates and the potential impact on groundwater quality would be negligible (ANNEX N).

The lining system is considered to have equivalence performance to the Landfill BPEM [redacted].

The [redacted] around the perimeter of the Containment Cell will be anchored in trenches varying from 400 mm to 600 mm in depth. Design details of the bunds and anchor trench are included in Figure 4-4 and drawings in ANNEX R.

Figure 4-4 Containment Cell Bund and Anchor Trench Details

Initial tipping and spreading of TBM Spoil within the Containment Cell will occur from the upgradient perimeters of the Containment Cell footprint including the top of the northern, western, and southern batters. Batter grades will be utilised to spread and dry TBM Spoil in lifts, subject to the trafficability of the Containment Cell. When TBM Spoil lifts have filled to the top of the batters, all weather access roads will be constructed within the Containment Cell to allow tipping and spreading of TBM Spoil at multiple locations. This will allow the maximum time available for TBM Spoil lifts to dry before the next lift of TBM Spoil is placed. Care will be taken to ensure there is no damage to the underlying liner and leachate collection system.

### 4.5.2 Technical Specification and CQA for Containment Cell

The technical specifications and CQA for the Containment Cell are included in ANNEX R. The Technical Specifications provide details of the following materials (and properties) that will be used, including:

- [redacted]

The properties of materials proposed to be used in construction of the Containment Cell are provided in Section 2 of the Technical Specification.

The CQA testing will be competed in general accordance with the Landfill BPEM or better. The testing regime is indicated in Section 3 of the Technical Specification (ANNEX R).

The construction methods and testing requirements for and during construction of each component indicated above are specified in Section 4.1 to 4.5 of the Technical Specification (ANNEX R).

Suppliers of the [redacted] are required to provide the manufacturer's quality control documentation for approval by the CQA.

An additional quality control step has been added in lieu of materials testing to assure the materials delivered to site are representative of materials characterised in the CQA documentation.

Construction of the Containment Cell will be carried out under fulltime supervision of the Level 1 GITA and CQA Inspector where applicable and will be subject to independent audit of construction by a person accredited as an environmental auditor by EPA.

Supervision of the subgrade construction will be carried out at Level 1 Responsibility (full time supervision) by the GITA in accordance with Section 8 of AS3798-2007 Guidelines on Earthworks for Commercial and Residential Developments (where applicable). Installation of the [redacted] will be carried out under fulltime supervision of the CQA Inspector. The GITA and CQA Inspector shall be independent of the Contractor.

Following completion of each component, the GITA or CQA Inspector (as applicable) shall provide an assessment of compliance of the as-built works against the requirements of the Technical Specification (ANNEX R).

## 4.6 Design and Construction of Leachate Infrastructure

MBC currently use leachate as a means of dust suppression on the adjacent MBC Landfill in certain circumstances in accordance with the Landfill BPEM requirements and only within the landfill cells, to ensure it does not contaminate stormwater runoff. TBM Spoil derived leachate could also be used for dust suppression purposes within the WST Facility only, to benefit storage capacities and promote evaporation, where deemed suitable for reuse for this purpose (as per the criteria specified in Section 3.6).

Leachate is currently extracted from the adjacent MBC Landfill and pumped to the Northern Leachate Pond. From the Northern Leachate Pond, leachate is pumped into a leachate cart and used for dust suppression only on the MBC Landfill. Stormwater is collected in Dam D2 and a number of other water storages across the MBC Landfill and pumped to Dam D5 for use for dust suppression in non-landfill areas.

The WST Facility will maintain the same system of segregation of leachate and stormwater. All stormwater will be diverted from the WST Facility into Dam D2 where it will be tapped into the existing stormwater network at the MBC Landfill.

Leachate will be managed separately and will maintain the following closed system:

- Leachate will be pumped from the Containment Cell, the Holding Bays and Drying Bays into the Southern Leachate Pond via the Leachate Sedimentation Pond. The Containment Cell, the Holding Bays and Drying Bays will not be used for storage of excess leachate. From the Southern Leachate Pond, leachate (subject to analysis and results being less than the drinking water trigger levels outlined at the start of Section 3.6) will be pumped to the tank farm or standpipe. The tank farm comprises [redacted] storage tanks ([redacted] in total). From the tank farm or standpipe, it will be transferred to carts from where it can be used for dust suppression or construction water purposes within the WST Facility only (Holding Bays, Drying Bays, Containment Cell, internal traffic routes – i.e. areas where the surface soil will be scraped and put into the Containment Cell at the end of operations).
- Should the leachate head in the Containment Cell approach 0.3 m, the freeboard approaches 0.5 m from the lowest hinge point in the Southern Leachate Pond and the tanks are full, leachate will be transported off-site to an EPA licensed facility.

A schematic of the stormwater and leachate capture system for the MBC Landfill and WST Facility is presented in Figure 4-6.

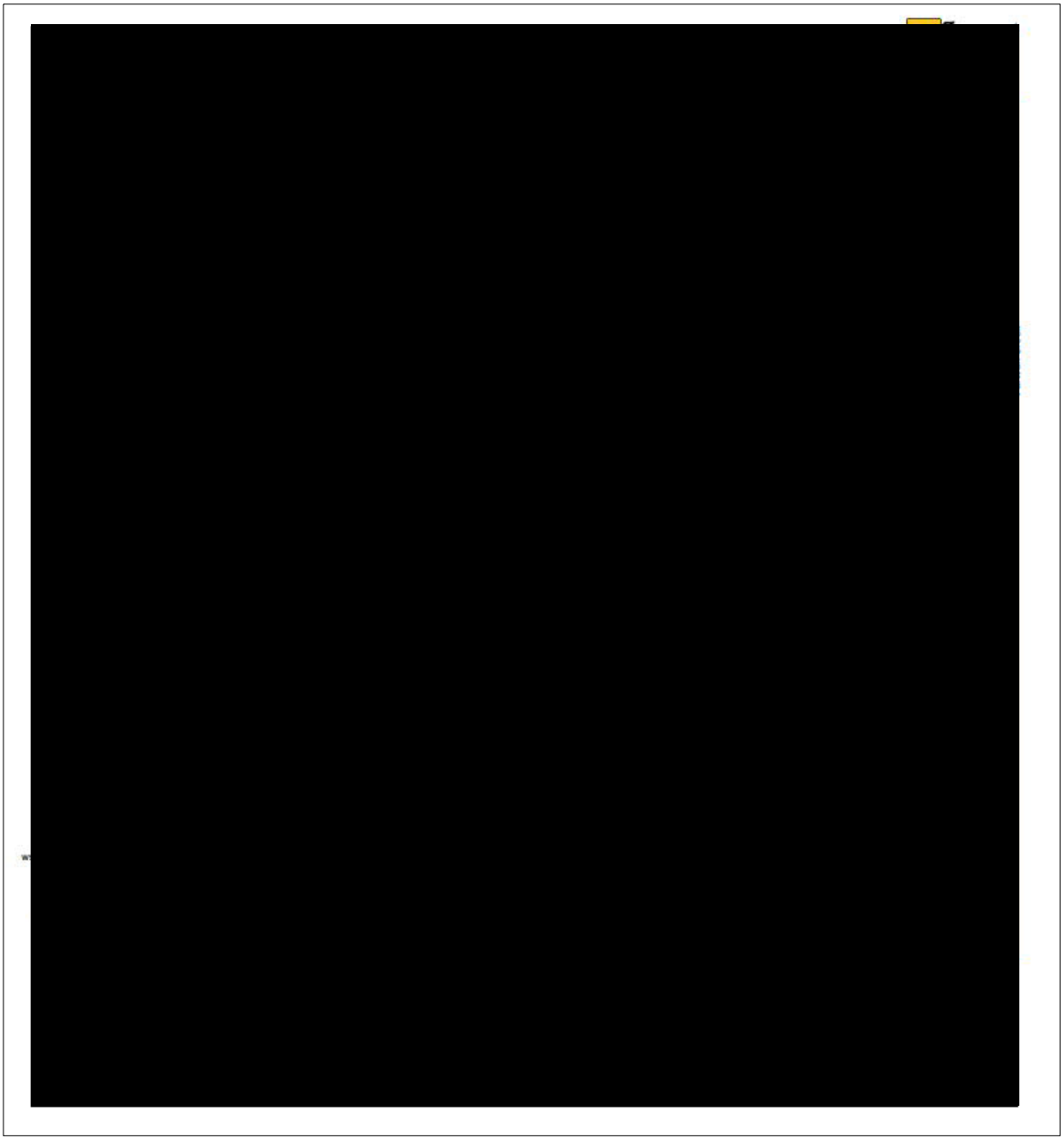

Figure 4-5 Surface Water and Leachate Management Schematic

A leachate water balance was undertaken to assess the leachate generation across the entire WST Facility (Holding Bays, Drying Bays and Containment Cell) and the capacity of the system to manage the expected volume of leachate (ANNEX O).

The model was a spreadsheet-based model that was simulated on a monthly time step period of two years. Median Rainfall Data from the Merrimu Reservoir BOM weather station (Station No. 087161) between years 1974 to 2019 was used. Evaporation data from the Melbourne Airport BOM Weather Station (Station No. 086282) between the years 1970 to 2020 was used.

Based on the modelled base case scenario, the total capacity of the Southern Leachate Pond is [redacted] L, the operational capacity is [redacted] and the maximum volume stored is [redacted] (allowing for a 0.5 m freeboard). Based on the modelled two consecutive wet years scenario, the maximum volume stored is [redacted] Both the base case and two consecutive wet years scenario are less than the operational capacity of [redacted] of the Southern Leachate Pond (refer to the Mackenzie Leachate Water Balance Report in ANNEX O).

In addition, an assessment was undertaken of the impact of extreme rainfall events. Design rainfall depths for the WST Facility were obtained from the BOM Meteorology Rainfall Intensity Frequency Duration Data System. It was assumed that 50 % of the incident rainfall event was collected as leachate.

The modelled maximum volumes of leachate stored in the Southern Leachate Pond for significant rainfall events are:

- 22 ML for two consecutive wet years (90$^{th}$ percentile).
- An additional 8.3 ML for a 1 in 20-year (24 hour) rainfall event.

Mackenzie Environmental concluded that at all times (in the modelled period), the Southern Leachate Pond would have sufficient capacity to manage leachate generation during the modelled rainfall events. In addition, the Holding Bays and Drying Bays are designed with a 0.5 m freeboard for the modelled rainfall events.

### 4.6.1 Holding Bays and Drying Bays

Leachate extracted from the processing area will not be deposited as a liquid waste in the Containment Cell.

Leachate (with or without sediment), comprising water from within TBM Spoil and from incident rainfall falling into the Holding Bays and Drying Bays, will drain to leachate collection trenches which enable flow to leachate collection sumps located at low points. The trenches will be [redacted] deep and constructed with a [redacted] A layer of [redacted] will be placed across the surface of the trench and covered by [redacted] to enable trafficking of plant and vehicles. The leachate collection trenches will have a 1 % grade to the leachate collection sumps.

Leachate that collects in the sumps will be pumped via polyethylene conveyance pipes to the Leachate Sedimentation Pond. Where necessary the pipes will be installed beneath the haul roads and Holding Bays so as not to be compromised by the truck movements on the surface above.

Should extreme rainfall events occur (1 % AEP), the WST Facility has the provision of additional temporary leachate pump, or pumps, which will be available on-site to ensure excess leachate is captured and pumped into the Leachate Sedimentation Pond. This provision is in place to ensure excess leachate accumulating within Holding Bays and Drying Bays does not overflow outside of the containment system.

Inspection and clean-out points will be installed at regular intervals along the leachate conveyance pipes.

Based on the SLR assessment (included in ANNEX N), seepage calculations and an assessment of risk to groundwater has shown that the seepage from the base of the Holding Bays would be minimal and the potential impact on groundwater quality would be negligible.

### 4.6.2 Containment Cell

This section provides information on; the design, specifications and CQA plan for the leachate collection system for the Containment Cell. The design is based on a [redacted] as detailed in EPA Publication 788.3 and EPA Publication 1323.2.

#### Design of Containment Cell Leachate Collection System

The design of the leachate collection system is included in the Containment Cell design report (ANNEX R). The leachate collection system comprises installation of leachate collection pipes at a maximum spacing of 25 m. The leachate collection pipes will be installed in accordance with the alignment and grades shown in the Design Report and are specified to comprise 160 mm outer diameter PE100 PN10 SDR17 pipes (Figure 4-6 and drawings in ANNEX R).

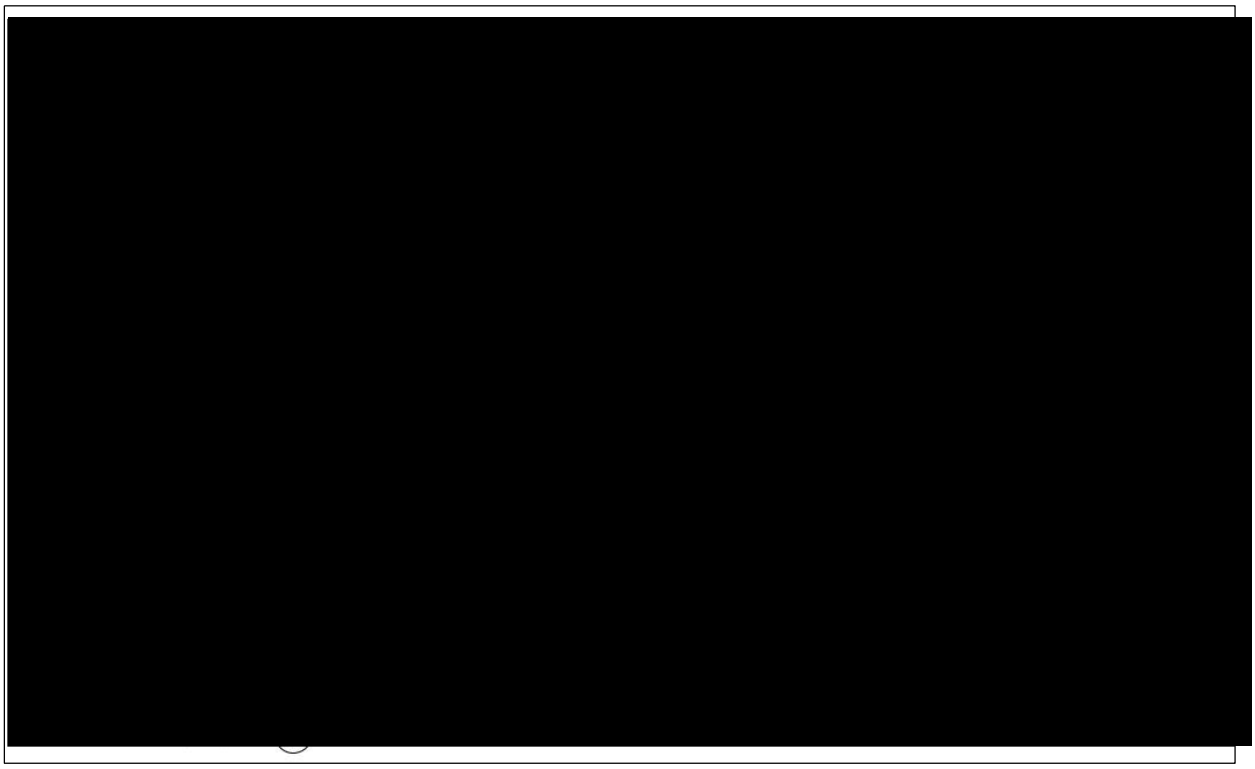


Figure 4-6 Containment Cell Leachate Collection Pipe Details

The leachate pipes will be located in a free draining aggregate layer with a thickness of [redacted] Based on the specified particle size distribution of the material the leachate collection layer is expected to have a permeability of $1.1 \times 10^{-2}$ m/s.

A [redacted] separation layer will be placed over the leachate collection aggregate to prevent clogging from the overlying TBM Spoil. A [redacted] protection layer will be placed beneath the leachate collection aggregate to prevent damage to the underlying [redacted] liner.

#### Leachate Collection Sump

Leachate will drain to the leachate collection sump and will be extracted by a submersible pump installed down a leachate sump riser and pumped to the Southern Leachate Pond. Details are included in Figure 4-7 and Drawings in ANNEX R.

Figure 4-7 Leachate Collection Sump Riser Details

### Technical Specifications and CQA for Leachate System

The Technical Specifications and CQA for the leachate collection system are included in ANNEX R. The Technical Specifications provide details of the following materials (and properties) that will be used, including:

- [redacted]

The properties of materials proposed to be used in in the leachate collection system are indicated in Sections 2.5 to 2.9 of the Technical Specification.

Pre-construction QA/QC requirements (including manufacturer's certificates or delivery dockets, technical data sheets and compliance testing of the aggregate) for the proposed materials are discussed in Sections 3.5 to 3.9 of the Technical Specifications.

The construction methods and testing requirements for and during construction of each component indicated above are specified in Section 4 of the Technical Specification.

Installation of the leachate collection system will be carried out under fulltime supervision of the CQA Inspector. As a minimum the CQA Inspector will undertake the following:

- Verify the compliance of the materials against the requirements of this Technical Specification.

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- Communicate design variations and non-conformances to the Superintendent in a timely manner during construction, so that the Superintendent may undertake consultation with appropriate stakeholders and minimize any delays in construction.

Following completion of each component the CQA Inspector will provide an assessment of compliance of the as-built works against the requirements of the Technical Specification.

The technical specification indicate that the leachate sump pump shall meet the following performance criteria:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

The leachate pump will be supplied with all associated pipework, cables, and fittings for installation of the pump in the riser pipe.

### Leachate Sump Pump

The proposed leachate sump pump is an [redacted] manufactured from stainless steel (refer to Attachment R5 in ANNEX R). The pump contains two

conductivity probes which trigger the pump to cycle only when the water level reaches the top of the pump and will be controlled by a solar powered controller.

The pump performance specification indicates the pump flow rate ranges from [redacted] which meets the Technical Specification of [redacted]

A temporary leachate pump or pumps will be installed to manage potential higher leachate flow rates during the operational phase, which will have a minimum capacity of [redacted]

Based on a review of the pump manufacturer's design drawing, performance specification and manual, Mackenzie Environmental concluded that proposed pump meets the requirements of the Technical Specifications.

### Leachate Pipe Capacity

The hydraulic capacity of each of the 160 mm diameter leachate collection pipes has been estimated using Manning's equation in accordance with the requirements of the BPEM. The analysis indicated that the proposed pipe design has sufficient capacity to manage the expected volumes of leachate.

The leachate collection system will be constructed following installation of the first layer of separation geotextile. Construction of the leachate collection system shall comprise installation of the leachate collection pipes (with a maximum spacing of 25 m), leachate collection sump riser pipe and placement and spreading of the leachate collection aggregate layer over the pipes.

The aggregate will provide a minimum of [redacted] Aggregate with these material properties will be free draining and will collect leachate and minimise the head on the liner.

The liner system design (Attachment R5, ANNEX R) illustrates the [redacted]

The lining system is overlain by a leachate drainage layer consisting of aggregate and pipework overlain by a separation geotextile.

The geotextile separation layer over the leachate collection aggregate will prevent clogging from the overlying TBM Spoil.

The leachate collection pipes will be installed in accordance with the alignment and grades shown in the Design Report to enable them to be inspected and cleaned out. The pipes will be joined by butt fusion welding or electrofusion couplers; and installed so that the alignment of the drilled holes is aligned at the 45-degree angle.

The leachate collection sump riser pipe will be installed carefully on the inclined sideliner of the Containment Cell to avoid damaging the protection layer and underlying [redacted] The riser pipe is specified to have the strength to resist the crushing force of emplaced spoil and provide clear passage of the sump pump for maintenance purposes. The riser pipe will be supported at the crest of the slope as shown on the drawings with two-star pickets installed either side of the pipe or using an approved alternative. The pipe will be securely tied to the star pickets using UV resistant rope.

The leachate sump pump discharge and conveyance pipes will be installed in the alignment shown in the Design Report. The leachate conveyance pipes will be installed above ground, except for crossing access roads where the pipes will be installed in culverts. Prior to placement of the leachate conveyance pipes, the ground surface will be flat and free of materials that could damage the pipes, such as large rocks. A non-return valve will be installed at the connection to the leachate sump pump.

The leachate pump will be installed in the leachate collection sump riser pipe and connected to the leachate conveyance pipe. The leachate pump will be installed to maintain leachate at a maximum depth of 300 mm above the lowest point of the liner outside the leachate collection sump (i.e. 117.3 m AHD).

Analysis by Mackenzie Environmental has demonstrated that with the proposed [redacted] spacing of the leachate collection pipes on the base of the Containment Cell the leachate head on the liner will be less than 300 mm. The leachate pump and monitoring system will be operated to achieve this objective.

### 4.6.3 Leachate Sedimentation Pond

The design of the Leachate Sedimentation Pond liner comprises the following (described from top down):

- [redacted]

The Leachate Sedimentation Pond will be located to the east of the Holding Bays, south of the existing Southern Leachate Pond located on the adjacent MBC Landfill. The subgrade will comprise a [redacted] will be installed over the completed subgrade and overlain by a [redacted]. A [redacted] ayer will be placed in segments 1A and 1B.

The Leachate Sedimentation Pond has segments to promote removal of sediment from the leachate. Leachate will flow from west to east through the pond with internal spillways between each of the pond segments. The total depth of the Leachate Sedimentation Pond is [redacted] comprising a [redacted] m operational depth and [redacted] freeboard to prevent overtopping.

The ponds have been sized to provide adequate retention times. The retention time will vary according to the intensity of a given rainfall event. Sediment retention relates to the head above the liner, and since the Leachate Sedimentation Pond requires a [redacted] the retention time is not as relevant as an indicator of infrastructure performance. The head above the liner is stated in the flow calculations.

The purpose of the two parallel ponds for the first settling pond is to allow for coarse sediments to drop out in the first pond and periodically take one pond out of service to allow for sediment removal. The second and third ponds allow for additional sediment removal prior to pumping to the main leachate pond. The normal sequencing will be water flow into pond 1a, then to pond 2 and pond 3 with pond 1b not in service. When pond 1a requires desludging, sequencing will be water flow into pond 1b, then to pond 2 and pond 3, while pond 1a is being de-sludged. It is however unlikely that the ponds 2 and pond 3 will require cleaning over the period of operation of the WST Facility.

Leachate will be pumped from the eastern end of the Leachate Sedimentation Pond to the existing Southern Leachate Pond. The pump will be fitted with a float switch to control leachate levels in the Leachate Sedimentation Pond.

### 4.6.4 Southern Leachate Pond

The existing Southern Leachate Pond in the adjacent MBC Landfill was designed, constructed, and now operates as an EPA-approved Landfill BPEM compliant leachate storage pond. This is detailed in the Section 53V environmental audit report entitled Paul Fridell of ERM (8 August 2018) Southern Leachate Pond Construction Audit Bacchus Marsh Landfill (ANNEX AG).

The design of the pond and the construction QA documents were assessed and verified by an EPA-accredited environmental auditor. The appendices of the Southern Leachate Pond Construction Audit (ERM, 2018) include the EPA approved construction documents including the Technical Specification, Construction Quality Assurance plan, as constructed drawings, and all relevant geotechnical reports (Annex AG).

The construction was also audited as detailed in the Section 53V environmental audit report entitled Paul Fridell of ERM (12 September 2019) S53V Audit of Landfill Cell Construction - Landfill Cell 6, Stage 2 – East Maddingley Road Landfill, Bacchus Marsh. A copy of the report can be found on the EPA website.

The typical profile of the pond incorporates (from bottom up) subgrade, [redacted]

### 4.6.5 Leachate Water Treatment Plant

In the event that the concentrations of PFAS in leachate exceed the drinking water trigger level (defined at the start of Section 3.6) and thereby not suitable for re-use for dust suppression or construction water, there will be a need to undertake specific treatment. An investigation of potential treatment options demonstrated that the [redacted] was the preferred option. The following Section discusses the treatment process. A process layout diagram for the treatment plant is presented as Figure 4-8 (2D model) and Figure 4-9 (3D model).

Figure 4-8 Treatment Plant 2D Process Layout

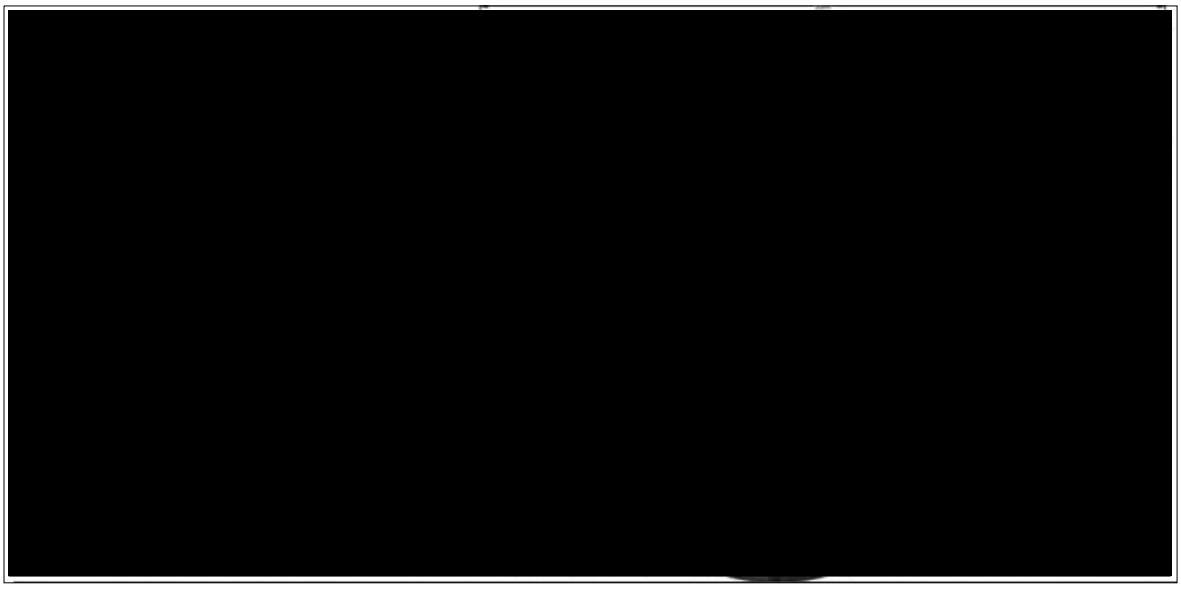

Figure 4-9 Treatment Plant 3D Process Layout

### Preferred Treatment Option

The treatment plant comprises an [redacted], using a combination of [redacted] to treat leachate at the WST Facility. The system will be assembled in two main sections: pre-treatment system (skid) which includes a chemical storage and dosage system; and a PFAS treatment module (containerised). Overall specifications of the treatment plant include a maximum design flow rate of [redacted]) which can be upgraded to [redacted] tank if required. It is noted that the capacity of the treatment plant is flexible given uncertainties associated with leachate generation rates and leachate water quality. All pipe work will be uPVC. The system design also incorporates a treated water monitoring station to confirm the treated water meets drinking water trigger levels (defined at the start of Section 3.6) for reuse for dust suppression.

It is proposed that flow balance will be contained within the Southern Leachate Pond. The treatment plant will incorporate [redacted] will be undertaken using proprietary [redacted] Hydrocarbon and PFAS absorption will be undertaken using proprietary [redacted] and PFAS removal/polishing will be completed using proprietary [redacted]. The treatment plant will also include an option for sludge dewatering and dissolved metals removal/polishing. In the event sludge dewatering option is required sludge cake will be collected and removed to an EPA licensed facility.

Based on anticipated analytical results for wastewater produced from a typical site the following discharge criterion can be expected from the treatment plant (Table 4-2).

Table 4-2 Expected Analytical Results for Discharge Water from Treatment Plant

| Analyte (µg/L) | Raw/Feed Water (µg/L) | Treated/discharge water (µg/L) |
|---|---|---|
| Sum of PFHxS and PFOS | [redacted] | [redacted] |
| PFOA | [redacted] | [redacted] |

Establishment of the treatment plant will be carried out in two phases:

- Engineering and design.
- Construction, installation, commissioning, and testing.

The commissioning phase will involve dry testing of all valves and instruments for correct functionality and initial wet commissioning of the system using clean/potable water. This will be followed by process proving involving the treatment of three batches of wastewater (each of 20 kL). One raw/feed water sample and one treated water sample will be collected from each wastewater test batch and analysed at a NATA accredited laboratory. If analytical results indicate treated water from all batches consistently meet the treated discharge criteria indicated in Table 4-2 (health based drinking water quality for PFAS) the treatment plant will be commissioned for operational purposes.

## 4.7 Design and Construction of Temporary Stormwater Management

This section provides information on the temporary stormwater management infrastructure for the operational phase to address requirement 1c. in the EPA letter of approval for the TBMS-EMP.

The stormwater management system comprises a network of stormwater swale drains along the haul roads. The haul roads will be constructed with cross fall away from the Holding Bays and Drying Bays, to assist in segregating stormwater from leachate, and to direct stormwater to the stormwater swale drains. Drawings showing the layout of the Holding Bays and Drying Bays are indicated in ANNEX R with Figure 4-10 providing an example of the stormwater layout of the northern section of the Holding Bays.

Figure 4-10 Holding Bays and Drying Bays Stormwater Layout

The stormwater swale drains associated with the Holding Bays will connect to stormwater pipes, to convey stormwater via gravity in an easterly direction beneath the Holding Bays. Stormwater pits will be installed at the junction between the stormwater swale drains and stormwater pipes. Typical sections of the stormwater swales; catch pits and pumping pit are provided in Figure 4-11, Figure 4-12 and Figure 4-13.

Due to the lack of fall to enable gravity flow, a stormwater pump will be installed in the stormwater pit located to the west of Holding Bays 4 and 5. The stormwater pump will convey stormwater collected in that catchment area to the east where the stormwater pipe will discharge into another stormwater swale drain.

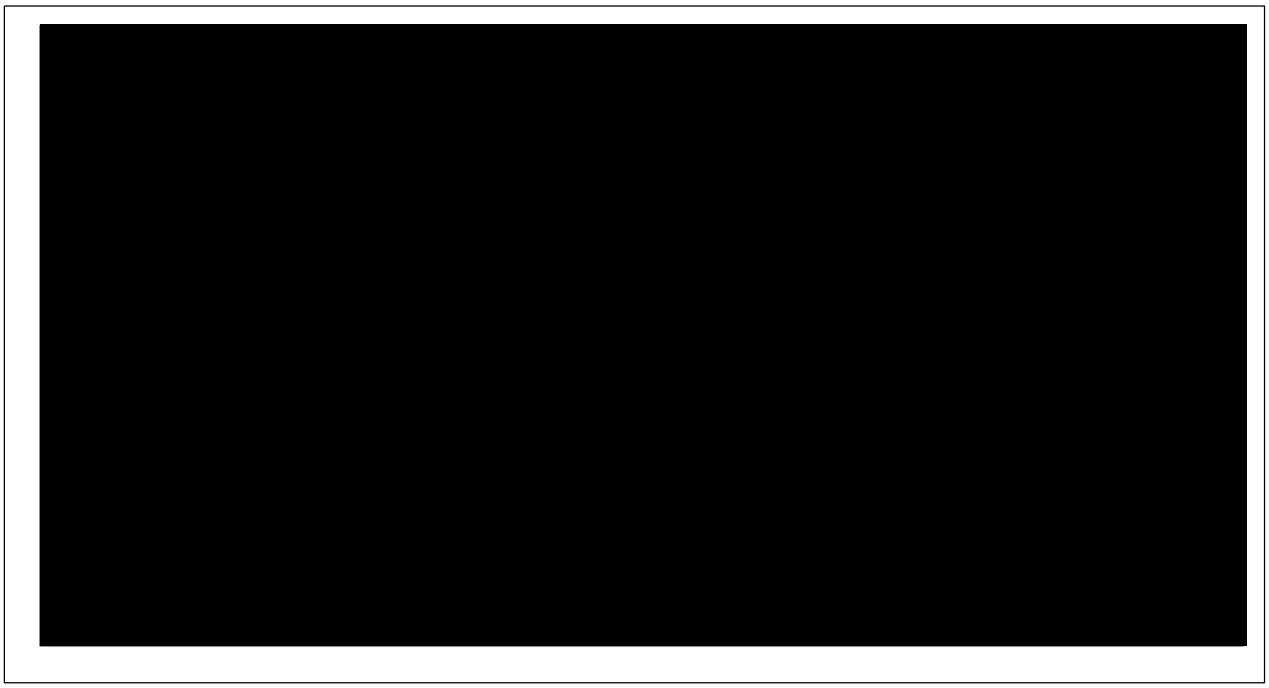

Figure 4-11 Surface Water Pumping Pit

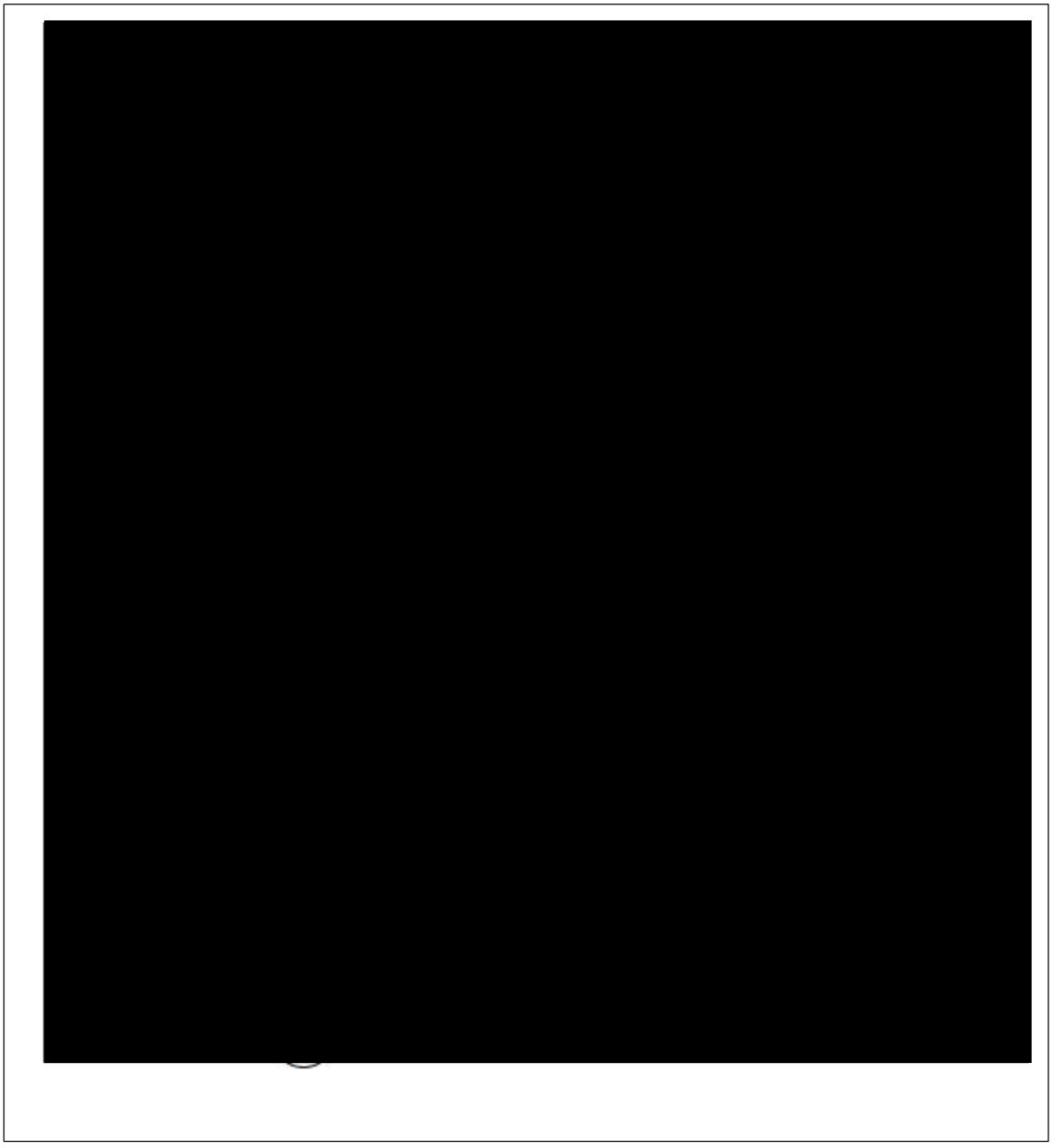

Figure 4-12 Stormwater Swale Drains

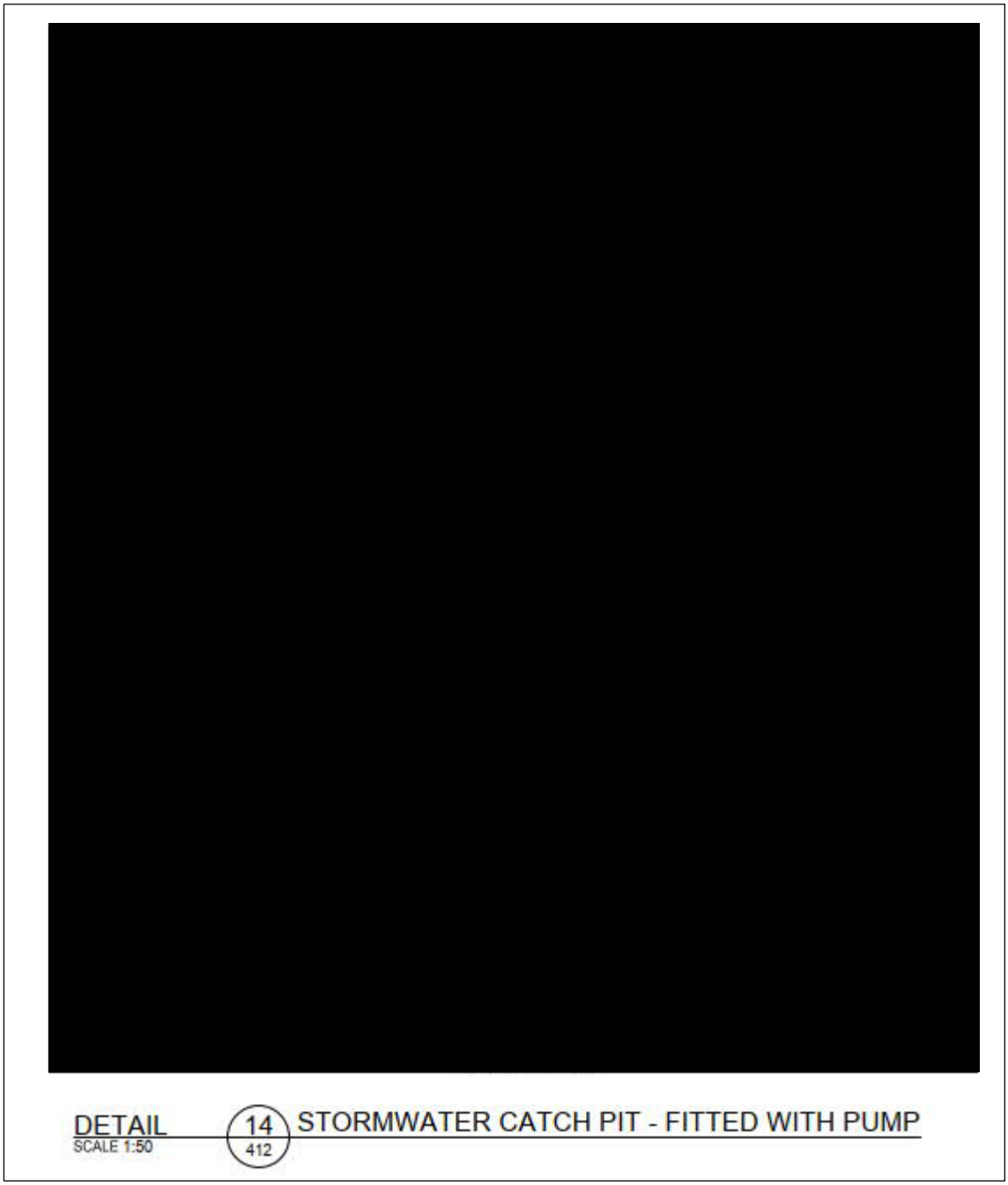


Figure 4-13 Stormwater Catch Pit

The stormwater swale drains, and pipes will connect into the existing site wide stormwater management system, which comprises a series of dams. Stormwater from the dams is reused on-site for a range of purposes.

## 4.8 Internal Traffic Routes within WST Facility

Details of the traffic routes/truck movements at the WST Facility are indicated on Figure 4-14. A copy of the traffic assessment report is included in ANNEX H.

Haul roads will be established from the site entrance and around/within the operation area of the site to manage the movement of TBM Spoil delivery trucks and haulage into/from the Holding Bays and Drying Bays and to the Containment Cell.

Trucks will enter the WST Facility from East Maddingley Road. Trucks which are found to have non-complying loads or documentation will be directed along a separate access road to the car/truck parking area. Trucks will then travel to the Holding Bay area via the internal access roads with unloading occurring on the western side of the Holding Bays. Following unloading the trucks will proceed south along the internal access roads to a wheel wash facility prior to exiting at the Gullines Road exit.

In the event that conditions in the Containment Cell are deemed too wet, the classified TBM Spoil from Holding Bays will be loaded into articulated dump trucks on the eastern side of the Holding Bays. The dump trucks will transport TBM Spoil to specified Drying Bay and unload accordingly.

TBM Spoil that will be placed in the Containment Cell will be loaded into articulated dump trucks from the eastern side of the Holding Bay. The loaded trucks will traverse a weighbridge before unloading in the Containment Cell.

The trafficking layer on the haul road will comprise a [redacted] material overlain by a further [redacted].

The trafficking layers within the Holding Bays and Drying Bays will comprise a nominal [redacted] material. The [redacted] prior to placement and compaction to increase durability of the layer. The trafficking layer will be maintained and topped up/replaced as required throughout the duration of the project. The trafficking layer in the Holding Bays and Drying Bays may comprise alternative material such as [redacted].

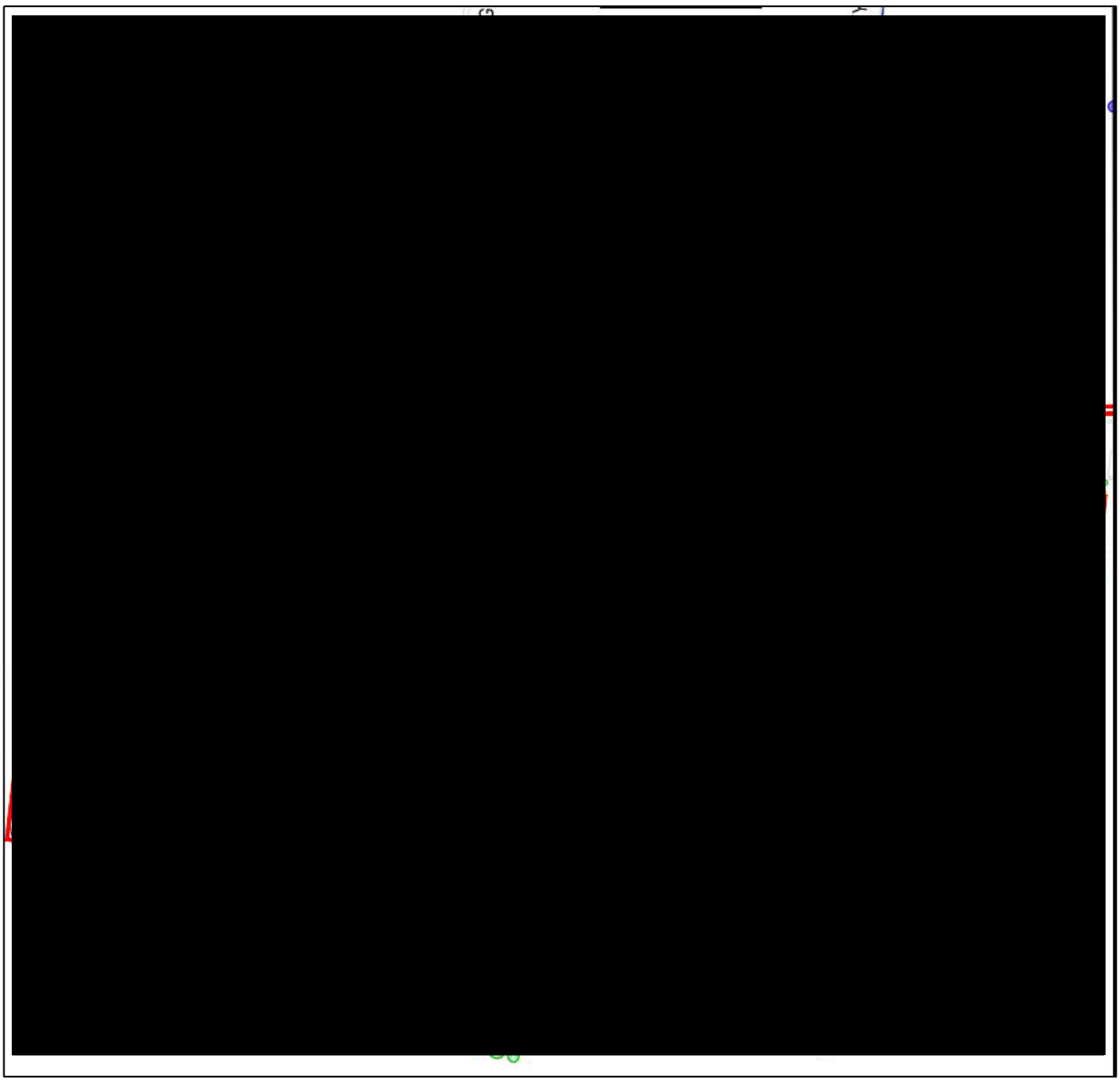

Figure 4-14 Truck Routes within the WST Facility (source: Traffix Group 2020 Traffic Management Plan, ANNEX AD).

## 4.9 Surveys

As-built surveys will be completed using combinations of drones and manual survey measurements to confirm CQAP requirements and for the evaluation of as-built surveys against design documents. Oversight will be provided by the GITA/CQA.

## 4.10 WST Facility Closure

The following outlines the process for rehabilitating the WST Facility at closure.

### 4.10.1 Holding Bays and Drying Bays

At completion of the project, the Holding Bays and Drying Bays lining systems and Leachate Sedimentation Pond will be removed and disposed of within the Containment Cell subject to confirmatory laboratory testing. Samples will be collected below the design stripping profile, at the frequency prescribed in IWRG702 and analysed for PFOS/PFHxS and PFOA and leachability for PFAS compounds. Clay liner assessment and validation of final surface samples will also be tested for IWRG621 suite if, and only if, the samples are from the bays where TBM Spoil from a Zone of Exception was handled. The analytical method will be similar or compatible with those used by the WGT owner (or an agreed third party) for the sampling and testing of TBM Spoil.

In the event soil samples collected from the stripped areas of the Holding Bays and Drying Bays contain contaminant levels in excess of those reported in the baseline soil assessment and criteria adopted for assessing impacts to land uses allowed under the WST Facility's Special Use Zone and Farming Zone, corrective actions shall be developed. The actions will be defined in a Clean Up Plan, and will include to the extent practicable, actions to define and delineate impacted areas. Further sampling, analysis, assessment against HIL/EIL and IWRG, and decisions for suitability for use or appropriate disposal thereof may be required. Prior to implementation, the Clean Up Plan will be reviewed, and Environmental Auditor review verification letter issued. EPA will also be consulted/involved with development of the Clean Up Plan.

To inform the Clean Up Plan, a conventional contaminated sites assessment approach will be applied. A site-specific HHERA would be required if the soil baseline values are exceeded. The framework for the HHERA would follow NEPM Schedule B5a (ecological risk assessment) and Schedule B4 (human health risk assessment). In the Farming Zone portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to agricultural land uses. In the Special Use Zone (mining authority) portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to surface water and groundwater.

Prior to performing any HHERA, a scoping technical memorandum would be prepared that is reviewed by the Auditor and an Auditor review letter issued. EPA will be consulted/involved with development of the scope of the HHERA.

A Stock Management Plan or other risk mitigation measure may be a required outcome of the HHERA in the Farming Zone portion of the WST Facility. If this is the case, EPA would also be consulted/involved in its development.

All laboratory analysis of samples will be undertaken by a NATA accredited laboratory.

TBM Spoil Holding Bays and Drying Bays will be cut and filled to blend in with the natural topographic features.

The voids will be backfilled using either soils from the amenity bund (previously stockpiled subsoil and topsoil) or from borrow areas, which have been confirmed as clean fill. The completed surface will be seeded with grasses.

### 4.10.2 Containment Cell Capping

Upon closure of the WST Facility the Containment Cell the proposed after use is for waste hub activities, such as organics or construction and demolition waste processing. Other potential uses include a solar farm or agricultural activities (subject to soil cover suitability). An engineered cap comprising the following from top down is proposed:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Hydrologic Evaluation of Landfill Performance (HELP) modelling was undertaken by the designers for the purpose of assessing the seepage rate through the capping profile (and is appended to the Containment Cell Design Report in ANNEX R). The Containment Cell was designed to meet the requirements for a [redacted] of the Landfill BPEM with the maximum design seepage through the cap being less than 75 % of the calculated design seepage rate through the cell liner.

The Containment Cell pre-capping pre-settlement design contours and filling sequence has been designed to accommodate minimum and maximum TBM Spoil volumes classified for placement in the Containment Cell (Figure 4-15). Minimum TBM Spoil volumes will result in lower final Relative Levels and a larger graded plateau compared with maximum design contours. The pre-settlement top of cap profile grades from approximately 5% in the flatter areas to approximately 20 % on the slopes. Mackenzie Environmental has noted that differential settlement of the essentially soil/rock fill is not an issue for the Containment Cell as opposed to landfills receiving domestic/putrescible waste, where much greater settlement typically occurs. Regular settlement monitoring and maintenance of the cap will be completed to ensure ponding does not occur.

A stormwater management system comprising a network of swale drains on the cap surface and around the perimeter of the cap and haul road. The stormwater drains will be formed at the completion of capping. From the perimeter drains surface water runoff will be directed to the existing site wide stormwater management system.

The cap for the Containment Cell will be installed progressively to reduce the area of TBM Spoil that is exposed to incident rainfall and subsequently collects in the leachate drainage system.

Disposal of TBM Spoil into the Containment Cell will be focussed on filling from the lowest eastern- most point around the leachate collection sump. When TBM Spoil reaches final design contours the area will be progressively capped to reduce the infiltration of stormwater into the leachate drainage system.

The construction of the cap will be completed under Level 1 GITA supervision and independent audit. The topsoil layer will be established by WST.

The completed surface will be seeded with grasses.

Regular inspection and maintenance of the cap will be undertaken to prevent, control and remediate erosion, restore depressions, and maintain vegetation. Details are provided in the aftercare management plan (ANNEX AB). Inspections will be undertaken biannually and all repairs due to erosion and depressions shall be repaired with material similar to that of the cap. If the current design erosion control measures require a noticeable increase in maintenance frequency, the sediment control measures will be re-assessed, and additional control measures implemented. Vegetation inspections will be undertaken to assess the success of vegetation establishment and to identify the need for repairs.

Figure 4-15 Containment Cell – Completion Contours

### 4.10.3 Slope Stability

A long-term stability assessment was undertaken and is reported in the Containment Cell Design Report (ANNEX R). The assessment considered three critical cross sections, two through the northeast part of the Containment Cell, where the final slope is at its steepest and longest, and, the steepest and longest part in the southern part. The assessment assumed the leachate level is at the top of the leachate collection aggregate. The analysis demonstrated a minimum factor of 1.5 for peak strength conditions and 1.3 for residual strength conditions for the proposed layout and material properties.

A review by Golder (ANNEX K) indicated:

- The effective stress spoil parameters adopted for TBM Spoil appear reasonably conservative for the long-term slope stability condition, assuming pore pressures are equalised, and TBM Spoil contains a significant proportion of rocky material.
- As TBM Spoil contains high plasticity clay and silt material care in placement will be required to manage the build-up of excess pore pressures within the fine-grained TBM Spoil.

- The Mackenzie analysis did not consider undrained conditions and the effect of excessive pore pressures.

Golder recommended that consideration be given to sequencing of TBM Spoil placement. The more rocky, free draining TBM Spoil should be ideally placed towards the centre of the Containment Cell, thereby forming a surrounding buttress to the more clayey TBM Spoil. Golder also indicated it would be prudent for the fine-grained TBM Spoil to be:

- Placed near the centre of the cell where their strength has a lesser effect on the stability of the final landform.
- Dried to the extent practical before being placed in the central part of the Containment Cell, away from the other edges.

A slope stability assessment was undertaken to assess the factor of safety during and following spoil placement in the Containment Cell. The modelling was conducted with the objective of assessing the required geometry and material properties required to achieve a short-term factor of safety of 1.3. The assessment is reported in the Containment Cell Filling Plan (ANNEX R) and included five cross section and sixteen scenarios. The assessment indicated factors of safety ranging from 1.3 for the critical undrained conditions to 2.79 for a typical interim spoil slope.

### 4.10.4 Infrastructure Decommissioning

Infrastructure not required for long term monitoring and management of the Containment Cell will be decommissioned and demobilised from site. This infrastructure includes:

- The Driver Control Station, RFID scanner and automated weighbridge
- Lighting and signage
- Offices and amenities.

The final surface will be covered with subsoil and/or topsoil as appropriate and establishment with grasses.

### 4.10.5 Ongoing Leachate Management

On completion of the Containment Cell Cap, the infiltration of stormwater is greatly reduced, thereby reducing the volume of leachate production. Monitoring of leachate levels via the pipe extraction riser will provide an indication of the volumes generated which would then inform the requirement to extract leachate. Regular monitoring of leachate levels and extraction requirements is incorporated into an aftercare management plan (ANNEX AB) and Water Management Plan (ANNEX Y).

# 5 Environmental Risk Assessment

The TBM Spoil Regulations 6(2)(i) requires:

"an assessment of the risk of adverse impacts from the receipt, storage, treatment, reprocessing, containment, handling or discharge or deposit onto the premises of tunnel boring machine spoil on any beneficial uses of the environment".

The following sections and related annexures present assessments of risk to each relevant environmental element as follows:

- A qualitative environmental risk assessment (ERA) has been undertaken for the WST Facility (and is included in ANNEX T). The ERA enables identification of potential risk of adverse impacts of construction, operation, and closure activities (including from the receipt, storage, treatment, reprocessing, containment, handling, or discharge onto the WST Facility of TBM Spoil).
- An assessment of the risks to beneficial uses of groundwater from leachate in the processing area and containment system was completed as discussed in Section 5.3 (details included in ANNEX N) and the findings further characterised in terms of the improved controls in the final design of the WST Facility.
- Impact assessments for surface water (Section 5.4), land/soil (Section 5.5), air quality (Section 5.6) and noise (Section 5.7) have also been completed and the risks to receptors assessed after consideration of appropriate control measures.

## 5.1 Environmental Risk Assessment Approach

### 5.1.1 Definitions

The project defines impact and risk as:

- Environmental impact is described as any change to the environment as a result of project activities.
- Environmental risk reflects the potential for negative change, injury, or loss with respect to environmental assets. This is consistent with ISO 31000: 2018, which defines risk as "the effect of uncertainty of [environmental] objectives". Both definitions reflect the fact that risk is normally expressed in terms of the likelihood of a change occurring and the consequence of that change.

### 5.1.2 Project Phases Considered

The project phases which are considered in the ERA process include the construction, operation and closure phases, detailed in Table 5-1.

Table 5-1 Assessed Project Phases

| Project phases | Main activities for each phase | Examples of aspects in each activity |
|---|---|---|
| Construction | Clearing, earthworks, excavation, and other construction activities. | Clearing of vegetation, stripping, and stockpiling of soils. |

| Project phases | Main activities for each phase | Examples of aspects in each activity |
|---|---|---|
| | | Compaction of earth-fill materials, establishment of TBM Spoil bund, leachate collection systems, surface water drainage, site infrastructure (weighbridge, entry, parking, offices, etc).<br>Management of groundwater, surface water, traffic management, emergency preparedness/response, monitoring of emissions (air quality, dust, noise impacts). |
| Operation | Receival, storage, treatment, reprocessing, containment, or disposal, handling, or discharge of TBM Spoil and management of leachate. | Management of groundwater, surface water, leachate control, traffic management, emergency preparedness/response, monitoring of emissions (air quality, dust, noise, groundwater, and surface water). |
| Closure | Removal of all infrastructure, rehabilitation, and revegetation. | Management of groundwater, surface water, leachate control, traffic management, emergency preparedness/response, monitoring of emissions (air quality, dust, noise, groundwater, and surface water). |

### 5.1.3 Environmental Elements/Values Considered

For the purpose of the assessment of environmental impacts, the meaning of 'environment' can include physical, biological, heritage, cultural, social, health, and safety aspects.

The environmental elements/values which were considered that are relevant to this TBMS-EMP include:

- Groundwater and leachate.
- Surface water.
- Land/soil.
- Air.
- Noise.

It is noted that flora and fauna, weeds, pests and pathogens, greenhouse gases, traffic, aboriginal and historical heritage, public safety, social environment and visual aspects were also considered as relevant to the WST Facility project and therefore form part of the ERA included in ANNEX T. These aspects are however addressed to meet regulatory requirements to inform the EMP developed in support of a Moorabool Planning Scheme amendment approved by Minister for Planning. These aspects have not been considered further herein.

### 5.1.4 Project Inputs Considered

- The project inputs that have informed the ERA are:
- The proposed footprint for TBM Spoil receival, processing and Containment Cell
- Construction management procedures
- Environmental protection measures for construction
- Reports on existing environmental conditions

- Reports prepared to support the application for EPA approval.

#### 5.1.5 Other Environmental Aspect

The risk assessment recognised the intersection between the environmental aspects to be addressed for the purpose of the TBM Regulations (under the Environment Protection Act 1970) and those aspects including flora and fauna (including plants and animals sustained in aquatic ecosystems such as Parwan Creek) to be addressed for the purposes of the planning scheme amendment under the Planning and Environment Act 1985. Ecological aspects of potential significance under the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 have also been assessed separately and included fauna in aquatic ecosystems namely the Growling Grass Frog (ANNEX I).

### 5.2 Information on the Likely Characteristics of TBM Spoil

#### 5.2.1 Source, Pathway and Receptors

In the ERA potential impact events need to be considered, and these are those events that may be caused by the proposed operations and may result in an adverse impact to an environmental receptor.

A potential impact event is the combination of a source, pathway, and receptor, outlined below:

- Source of the potential impact event means a source which has the potential to cause harm to the environment.
- Pathway describes the means or route by which an identified environmental receptor can be exposed to or may reasonably be expected to be impacted by the identified source.
- Receptor is an environmental value that may reasonably be expected to be adversely impacted by the source.

An impact event can only occur if a source, pathway, and receptor are all present. Potential impact events are not considered further if the assessment demonstrates that an environmental receptor could not reasonably be expected to be adversely affected by the source.

#### 5.2.2 Primary Risk Level

The primary risk level of the identified value was considered without considering any management and mitigation measures that will be employed on the project. The ERA considers impacts during all stages of the WST Facility project (i.e. construction, operations, and closure). Identification of the potential impacts is based on knowledge of the existing environment, experience with similar operations elsewhere and issues of concern to key stakeholders.

#### 5.2.3 Control and Management Measures

In undertaking the ERA, consideration has been given to avoidance, mitigation and/or management strategies that are technically and economically feasible and reflect a commitment to minimising environmental impact and adopting an approach to the project that demonstrates best practice environmental management.

### 5.2.4 Residual Risk Level

The final component of the assessment process involves describing the residual risk level associated with each of the identified values. The residual risk level is developed in the same way as the primary risk level by examining the potential consequences (measure of severity of environmental impact and the likelihood that those impacts will occur).

### 5.2.5 Risk Assessment Methodology

The risk assessment criteria used for determining the significance of risks of the project are a product of the likelihood and consequences factors for project-related environmental risks.

#### Likelihood Rating

The likelihood of each event occurring is determined, based on information such as past experience, known meteorological data/site conditions as well as the effectiveness of proposed control measures. The likelihood of the event is categorised as presented in Table 5-2.

Table 5-2 Likelihood Categories

| Category | Likelihood | Definition |
|---|---|---|
| E | Rare | The event may occur only in exceptional circumstances |
| D | Unlikely | The event could occur but is not expected |
| C | Possible | The event could occur |
| B | Likely | The event will probably occur in most circumstances |
| A | Almost Certain | The event is expected to occur in most circumstances |

#### Severity/Consequence Rating

The severity of each event occurring is determined, based on information such as the potential scale of the event, the range of stakeholders who may be affected, the duration of the event, the difficulty in remediating the impact. The severity/consequence of the event is categorised as presented in Table 5-3.

Table 5-3 Severity/Consequences

| Category | Severity | Consequence |
|---|---|---|
| 1 | Catastrophic | Extreme permanent changes to the social or natural environment (not able to be practically or significantly rehabilitated or alleviated); deaths or widespread health and economic effects on public, major public outrage or the consequences are unknown. |

| Category | Severity | Consequence |
|---|---|---|
| 2 | Major | Substantial and significant changes; will attract significant public concern; only partially able to be rehabilitated or alleviated. May be doubtful that can be successfully rehabilitated; major costs involved. Changes will be substantial if cumulative effects are considered. |
| 3 | Moderate | Significant local changes, but these can be rehabilitated or alleviated with difficulty at significant cost and with outside assistance. |
| 4 | Minor | Very local consequence with no significant long-term changes; may be simply rehabilitated or alleviated at some cost without assistance; not significant concern to the community. |
| 5 | Insignificant | Possible impacts but without noticeable consequence. |

#### Risk Determination and Categories

The risk associated with each event is determined using the matrix presented Table 5-4.

Table 5-4 Risk determination and categories

| Risk categories | | Likelihood | | | | |
|---|---|---|---|---|---|---|
| Consequence Severity | Category | Rare | Unlikely | Possible | Likely | Almost certain |
| Catastrophic | 5 | Medium | High | High | Extreme | Extreme |
| Major | 4 | Medium | Medium | High | High | Extreme |
| Moderate | 3 | Low | Medium | Medium | High | High |
| Minor | 2 | Negligible | Low | Low | Medium | Medium |
| Insignificant | 1 | Negligible | Negligible | Negligible | Low | Low |

## 5.3 Groundwater and Leachate Risk Assessment

A groundwater risk assessment was completed, which is included in ANNEX N. A summary on the findings is presented below.

### 5.3.1 Groundwater Quality Objective

The objective is to ensure that there is minimal impact to groundwater from construction, operation, and post closure, in particular relating to the management of leachate.

### 5.3.2 Site-Specific Groundwater Risk Assessment

#### Groundwater Risk Assessment Approach

Estimates of leachate generation and potential rates for leachate seepage through base liners have been assessed and modelled at the various TBM Spoil handling and containment facilities (and is included in ANNEX L). The leachate generation estimation was made using the HELP[8] model for the purpose of ensuring TBM Spoil Containment Cell (ANNEX O) was designed to handle the expected leachate volumes, especially the size of leachate holding ponds and transfer sumps and pumps. The purpose of estimating hypothetical seepage rates of leachate through the base of each facility is as input to an assessment of impact to the quality of groundwater underlying the site. These seepage estimates are largely theoretical as they assume that a continuous supply of leachate is available at the base of the liner – whereas the leachate generation estimates show this to be minimal and discontinuous.

The leachate generation estimates for the Containment Cell made with HELP use climate data to estimate the excess soil moisture following rainfall and after evapotranspiration, a condition that only occurs at Maddingley in the wettest years. This moisture is assumed to percolate down through the contained TBM Spoil and then to accumulate on the base liner and to flow to the leachate sump for extraction to the Leachate Sedimentation Pond. This model has shown that there is minimal opportunity for accumulation of large quantities of leachate on the liner as it is drained laterally by the leachate collection layer and pipes conducing it to the sump.

The modelling of leachate seepage through bases and liners was performed by [redacted] This means the modelled attenuation of PFAS from the Containment Cell is underestimated, and therefore the risk of harm to the beneficial uses of groundwater is less than concluded for the modelling against the earlier design.

The impact of PFAS contaminated leachate on groundwater was first assessed b [redacted] would be attenuated by the throughflow and not exceed drinking water quality in the aquifer.

[8] US EPA (1984) Hydrologic Evaluation of Landfill Performance (HELP) Model, Publication No. EPA/530/SW-84/009

A further stage of screening risk assessment was completed to compare resultant water quality in the underling aquifer with a range of water quality criteria applying to beneficial uses of groundwater protected by SEPP Waters.

Given that these calculations were extremely conservative and some attenuation factors in some scenarios indicated a potential to exceed criteria, additional risk characterisation or "reality checks" were undertaken to consider the potential for PFAS to be attenuated in the vadose zone and given the short duration of the WST Facility (2 years), the unreality of leachate continuing to be generated and sustain downward seepage of sufficient time to enable PFAS (or another contaminants in leachate) from reaching the water table in the underlying Fyansford Formation Aquifer.

### Findings of the Groundwater Risk Assessment

This assessment sets out to address the following objectives:

- Estimate potential rates of leachate leakage from the base of the longest-term spoil operating facilities, the Containment Cell and Leachate Sedimentation Pond, and also the short-term spoil Holding Bays.
- Estimate the potential for impacts on groundwater quality by PFAS from leachate from these potential sources.
- Comment on potential consequent risk of harm posed by PFAS reaching groundwater beneath the WST Facility facilities based on these seepage estimates and also the dilution factors proposed by EnRiskS.

The assessment has found in relation to rates of leachate leakage:

- Estimates of leachate generation based on climatic data and modelling (using HELP model) soil moisture storage and percolation after evapotranspiration loses had been calculated by the facility designers Mackenzie Environmental (the leachate water balance is included in ANNEX O). These provide a constraint (or reality check) on the maximum quantity of leachate available to leak through liners of these facilities.
- Calculation of potential scenarios of leachate seepage through the base of the spoil and leachate handling facilities have been undertaken using an analytical Darcian flow model, and the HELP model and Darcian flow results by facility designers Mackenzie Environmental. SLR made independent check calculations of leachate seepage by Darcian flow.
- The assumptions made for modelling were highly conservative and addressed leakage scenarios of "as designed", "high" and extreme" considered relevant based on a range of values for hydraulic conductivity through liners and leachate heads.
- The estimated seepage from the 'as designed' Holding Bays, Leachate Sedimentation Pond, Containment Cell Sump and the whole Containment Cell (when closed) for saturated flow [redacted]
- The estimated seepage from the 'as designed' Holding Bays, Leachate Sedimentation Pond, Containment Cell Sump and the whole Containment Cell (prior to closure) for unsaturated flow was [redacted]

- The Drying Bays are considered to present a minimal opportunity for leachate seepage, given their relatively likely intermittent use.

The groundwater risk assessment has found in relation to potential impacts on groundwater:

- One key assumption which may not be realistic and ultra conservative is that seepage below sources would immediately transfer to the underlying aquifer (saturated flow assumption above), whereas in reality it would be attenuated by the 40m thick unsaturated zone of clayey Fyansford Formation at the Leachate Sedimentation Pond and Holding Bays and average 27 m beneath the Containment Cell and 14 m[9] at the Containment Cell Sump (unsaturated flow assumptions).
- A reality check calculation of the volume of water needed to have percolated from the sources to provide for the commencement of mixing of leachate with groundwater indicates that at least 52 months of infiltration of PFAS contaminated water would extend only 1 m below the Holding Bays, where the greatest annual volumes of seepage was estimated, before the groundwater would be impacted by PFAS. As the facility is planned to operate for only 2 years, this further indicates the low likelihood of PFAS impacting the underlying Fyansford Formation Aquifer.
- The Lower Werribee Formation Aquifer which occurs at 100 m below ground at the WST Facility, on the basis of hydrogeological first principles, is much less vulnerable to contamination impact than the Fyansford Formation Aquifer. The potential for movement of PFAS contaminated leachate seepage from the Containment Cell, Leachate Sedimentation Pond or Holding Bay, across an approximately 100 m thickness of low permeability Fyansford Formation and Maddingley Coal Seam, and then into the more transmissive Lower Werribee Formation Aquifer, is considered non-existent for all practical purposes and therefore was not assessed further.
- Given the calculated leachate seepage rates and the dilution rates by lateral groundwater through flow in the Fyansford Formation Aquifer, PFAS concentration in spoil leachate would need to be orders of magnitude greater than that indicated from data available in the SAQP by the JV's consultant Agon in order to be detected in seepage water. Indeed, leachate at the risk-based criteria concentration of [redacted] which is vastly greater than expected from the tunnel spoil, would be adequately attenuated using these seepage estimates with further attenuation of PFAS by adsorption in the vadose zone.
- The assumptions in the modelling to estimate leachate seepage rates contribute to an underestimate in the calculated attenuation.
- The assessment was conducted without allowance for retardation or attenuation of PFAS movement relative to water movement in the vadose zone. Recent literature shows that PFAS compounds of interest (PFOS, PFHxS and PFOA) can attenuate strongly by adsorption variously by interaction with ionic charges on surfaces on soil; organic content of soil; or more particularly at the air-water interface in soil moisture; and preferentially retained by residual water below field capacity. Retardation factors of approximately 187 could apply to PFOS for water-soil partitioning due to organic carbon content of soil, whereas a factor of up to 2500 could apply due to the air-water interfacial area effect.

[9] This distance was confirmed by subsequent drilling and testing to show it to be 14.97 m below ground as set out in a report in ANNEX L.

- The attenuation factors determined in this report, based on seepage estimates, and assessment of partitioning retardation effects support the conservativeness of Dilution Factors used by EnRiskS (2020) in derivation of Risk Based Criteria for the Containment Cell.

The groundwater risk assessment has found in relation to potential consequent risk of harm from PFAS:

- A screening risk assessment was performed by calculating the required attenuation for expected leachate concentrations to meet groundwater quality criteria based on the attenuation rates estimated from seepage estimates. [redacted]
- [redacted] Significantly, this also includes the conservative assumptions of direct mixing with groundwater without any partitioning of PFAS to the soil in the thick vadose zone.
- The risk from PFAS entering groundwater, migrating to surface water, and then people or ecological receptors being exposed is negligible.
- It is considered highly unlikely that leachate concentrations would reach the risk-based criteria derived by EnRiskS ( [redacted] , although such high values provide a useful upper limit for short term "spikes" in leachate data should they occur.

### 5.3.3 Potential Construction, Operation, and Closure Groundwater Impacts

Potential groundwater impact events during construction, operation and closure include the following:

- Contamination of groundwater by leachate as a result of seepage from the leachate containment system at the Holding Bays, Drying Bays, Leachate Sedimentation Pond, Southern Leachate Pond and Containment Cell, impacting groundwater dependent ecosystems
- Contamination of groundwater by leachate as a result of seepage from the leachate containment system at the Holding Bays, Drying Bays, Leachate Sedimentation Pond, Southern Leachate Pond and Containment Cell, impacting down-gradient bore users.
- Contamination of groundwater and impact on groundwater users due to the storage and use of fuels, oils, and chemicals.
- Contamination of groundwater and impact on groundwater dependent ecosystems due to the storage and use of fuels, oils, and chemicals.

### 5.3.4 Groundwater Impacts Control and Management Strategies

The underlying groundwater in the Lower Werribee Formation is protected by approximately 40 m of low permeability Fyansford Formation Aquifer and 60 m of Maddingley Coal Seam which include low permeability geologic materials. The risk of adverse impacts to groundwater, particularly by PFAS has been assessed by SLR (included in ANNEX N) and is summarised in Section 5.3.2. This found there was negligible risk of harm to groundwater users or related groundwater dependent ecosystems.

The following additional control and management strategies are proposed:

### Holding Bays and Drying Bays

- TBM Spoil Holding Bays and Drying Bays [redacted]
- TBM Spoil Holding Bays will contain a leachate collection trenches which enable flow to sumps at several low points.
- Leachate that collects in the sumps will be pumped via [redacted]. Where necessary the pipes will be installed beneath the haul roads and TBM Spoil storage bays.
- Leachate will then be pumped to the Southern Leachate Pond, which was constructed in accordance with the Landfill BPEM, was Auditor verified, and has a [redacted]
- Construction of low permeability [redacted] where TBM Spoil is to be handled and stored restricts leachate migration pathways into groundwater.

### Leachate Sedimentation Pond

The liner comprises the following:

- [redacted]

### Containment Cell

The liner comprises the following:

- [redacted]

### Other Controls

- Any liquid wastes, fuels and oils stored on-site will be sufficiently bunded to contain any potential spills. Accidental spillage or poor management of fuels, oils, lubricants, hydraulic fluids, solvents and other chemicals during the construction phase will be controlled through spill management actions (including the availability of spill kits) to prevent water quality and ecological impacts and no further mitigation measures are considered necessary. Captured liquid wastes, fuels and oils should be pumped out by a liquid waste contractor and disposed of at an EPA licensed facility.
- Implementing an effective monitoring and maintenance program for the WST Facility.

### Closure

- Final capping will be installed on areas of the Containment Cell that have reached final levels to reduce the area that receives rainfall, thereby reducing the amount that infiltrates into the soil mass and reports to the leachate drainage system.
- The cap will comprise the following: [redacted] Where the rehabilitated Containment Cell will be used for a waste hub or other uses the final surface will comprise crushed rock or suitable alternative material.
- The surface of the completed Containment Cell will be convex to discharge stormwater, thereby preventing excessive infiltration of incident rainfall.
- All Holding Bay and Drying Bay infrastructure will be removed, and the site restored with previously stockpile subsoil and topsoil. Prior to restoration a soil sampling program will be implemented to determine whether the operations have resulted in contamination of the liner and subgrade.

### 5.3.5 Potential Residual Groundwater Impacts and Risks

The likelihood of any adverse effects on the beneficial uses of groundwater at the WST Facility is negligible based on the findings of the impact assessment modelling included in ANNEX N. This is based on the design at that time which has been upgraded, as has the level of construction quality assurance, to include a more highly specified cap with a [redacted] While the earlier modelling was based on assumed liner defect and leakage rates consistent with EPA Publication 788.3 BPEM, the upgraded cap further limits the available infiltration to generate leachate post closure, thus reducing the potentially contaminating life of the containment system. This has the effect of reducing the volume of leachate that could possibly leak from the cell, thus reducing the risk to groundwater beneficial uses even further than concluded in ANNEX N.

Using the qualitative risk assessment framework, the identified residual impacts and risks associated with WST Facility impacting groundwater is shown in Table 5-5 which identifies all related risk to be low..

Table 5-5 Potential Residual Groundwater Impacts and Risks

| Impact event | Level of impact | Level of risk |
|---|---|---|
| Contamination of groundwater by leachate as a result of seepage from the leachate management system at receival bays, leachate sediment pond and Containment System/Cell impacting groundwater users. | Minor | Low |
| Contamination of groundwater by leachate as a result of seepage from the leachate management system at receival bays, leachate sediment pond and Containment System/Cell impacting groundwater dependent ecosystems. | Minor | Low |
| Contamination of groundwater and impact on groundwater users due to the storage and use of fuels, oils, and chemicals. | Insignificant | Low |
| Contamination of groundwater and impact on groundwater dependent ecosystems due to the storage and use of fuels, oils, and chemicals. | Insignificant | Low |

## 5.4 Surface Water Risk Assessment

### 5.4.1 Surface Water Quality Objective

The objective is to ensure that the proposed project as far as practicable maintains existing water flows and minimises the potential for impact on surface water quality and surface water dependent ecosystems during operation, operation and closure (including from the receipt, storage, treatment, reprocessing, containment, handling or discharge onto the WST Facility of TBM Spoil) at the WST Facility.

### 5.4.2 Potential Construction, Operation, and Closure Surface Water Impacts

Potential impact events associated with construction and operation of the project that could affect surface water include:

- Alteration of existing stormwater flow regimes.
- Increase water flows in existing drainage lines.
- Sediment in surface water runoff from the site following rainfall events results in a reduction in water quality of Parwan Creek (and ultimately Werribee River).
- Contamination of surface water from spills leaks from storage and use of fuels, oils, and chemicals.
- Contamination of soil by contaminated runoff.

### 5.4.3 Surface Water Impacts Control and Management Strategies

The following control and management measures are proposed:

- Conduct best practice land clearing procedures for all proposed disturbance areas. Land to be cleared progressively as required.
- Undertake disturbance works, as much as is practically possible, during periods when good weather is forecast.

- Minimise the disturbance footprint.
- Install stabilised rock pads (vibration grid) and/or wheel wash facilities at all site entry / exit points.
- Install swales, bunds, and water management measures to divert clean water around TBM Spoil receival and drying areas into the existing surface water management infrastructure.
- Separation/diversion of 'clean' water catchment runoff from disturbed areas (where practical) to minimise sediment-laden runoff volumes requiring treatment.
- Stormwater runoff from the Containment Cell (during operation and post-closure) to be collected in swale drains at the toe of the landform and conveyed into the existing stormwater management system.
- Undertake regular inspection program to audit and monitor sediment control structures such as swales, bunds, and ponds.
- Store fuels, oils in accordance with EPA guidelines and AS1940-2004, including appropriate bunding.
- Maintain appropriate spill/kit/clean-up material. Captured liquid wastes, fuels and oils should be pumped out by a liquid waste contractor and disposed of at an EPA licensed facility.
- Undertake regular inspection program to audit and monitor fuel, oils, and chemical storage areas to ensure integrity, housekeeping, and correct use.
- Progressive rehabilitation and revegetation of Containment Cell and areas of the site no longer required for operations.
- Implement an effective monitoring and maintenance program for the site.
- Complete sampling and analysis of soil if impacted by contaminated runoff.

### 5.4.4 Potential Residual Surface Water Impacts and Risks

A summary of the identified residual surface water impacts and risks associated with WST Facility are shown in Table 5-6.

Table 5-6 Potential Residual Surface Water Impacts and Risks

| Impact event | Level of impact | Level of risk |
|---|---|---|
| Alteration of existing stormwater flow regimes | Minor | Low |
| Increase water flows in existing drainage lines | Minor | Low |
| Sediment in surface water runoff from the site following rainfall events results in a reduction in water quality of Parwan Creek (and ultimately Werribee River). | Minor | Low |
| Contamination of surface water from spills and leaks from storage and use of fuels, oils, and chemicals | Minor | Low |

## 5.5 Land/Soil Risk Assessment

### 5.5.1 Land/Soil Quality Objective

The objective is to ensure that the proposed project as far as practicable maintains existing land/soil quality and there are no adverse impacts due to construction, operation and closure (including from the receipt, storage, treatment, reprocessing, containment, handling or discharge onto the WST Facility of TBM Spoil) at the WST Facility.

### 5.5.2 Potential Construction, Operation, and Closure Land/Soil Impacts

Potential impact events associated with construction and operation of the project that could affect land include:

- Natural soils impacted from potential acid sulfate soils and other contaminants in TBM Spoil.
- Natural soils impacted by leachate during operation and closure.
- Natural soils impacted from spills leaks from storage and use of fuels, oils, and chemicals.

### 5.5.3 Land/Soil Impacts Control and Management Strategies

The following control and management measures are proposed:

- Establishment lining and leachate management systems in the Holding Bays, Drying Bays, and Containment Cell (refer to Section 4.4 and Section 4.5).
- Establish acid sulfate soil management practices to be employed should significant volumes be present in TBM Spoil material. An acid sulfate soil management plan with further detail is included in ANNEX U.
- The storage of fuels, oils in accordance with EPA guidelines and AS1940-2004, including appropriate bunding.
- Maintain appropriate spill/kit/clean-up material. Captured liquid wastes, fuels and oils should be pumped out by a liquid waste contractor and disposed of at an EPA licensed facility.
- Undertake regular inspection program to audit and monitor fuel, oils, and chemical storage areas to ensure integrity, housekeeping, and correct use.
- Progressive rehabilitation and revegetation of Containment Cell and areas of the site no longer required for operations.
- Undertake a pre and post WST Facility sampling and analysis program (or if any environmental incidents occur that could result in land contamination).

### 5.5.4 Potential Residual Land/Soil Impacts and Risks

The likelihood of any adverse effects on the beneficial uses of the land, particularly in the processing area, at the WST Facility is negligible based on the findings of the leachate seepage impact assessment modelling included in ANNEX N. This is based on the design at that time which has been upgraded to increase level of construction quality assurance. This upgrade will have the effect of further minimising the leakage of the base lining of the TBM Spoil Holding Bays and Drying Bays and thus the risk of adverse impacts to the quality of the underlying soil. Residual soil impacts will be assessed and remediated as necessary following decommissioning of the facility as set out in Section 8.

Using the qualitative risk assessment framework, the identified residual impacts and risks associated with WST Facility impacting land/soil is shown in Table 5-7 which identifies all related risk to be low.

Table 5-7 Potential Residual Land/Soil Impacts and Risks

| Impact event | Level of impact | Level of risk |
|---|---|---|
| Natural soil impacted due to presence of acid sulfate soil | Minor | Low |
| Natural soils impacted by leachate during operation and closure | Minor | Low |
| Natural soil impacted by spills and leaks from storage and use of fuels, oils, and chemicals | Minor | Low |

## 5.6 Air Quality Risk Assessment

### 5.6.1 Air Quality Protection Objective

The objectives of air quality management are to:

- Comply with statutory requirements
- Avoid or minimise adverse impacts to sensitive receptors through appropriate management measures.

### 5.6.2 Potential Construction, Operation, and Closure Air Quality Impacts

SLR conducted an Air Quality Impact Assessment for the WST Facility. The proposed activities and environmental impacts identified for air are summarised in Table 5-8.

Table 5-8 Air Quality Source and Impacts

| Key activities | Impacts |
|---|---|
| Dust generation from truck haulage, e.g. between truck entry and exit, TBM Spoil storage and Drying Bays, and Containment Cell. | Nuisance and reduced air quality at the Project boundary and/or at nearby sensitive receptors, with impacts to human health. |
| Dust generation from loading and unloading at TBM Spoil storage and Drying Bays and Containment Cell. | Nuisance and reduced air quality at the Project boundary and/or at nearby sensitive receptors, with impacts to human health. |
| Dust generation from clearing, grading, compacting, and bulldozing. | Nuisance and reduced air quality at the Project boundary and/or at nearby sensitive receptors, with impacts to human health. |
| Wind erosion mobilising dusts from TBM Spoil storage and Drying Bays, and Containment Cell. | Nuisance and reduced air quality at the Project boundary and/or at nearby sensitive receptors, with impacts to human health. |
| Combustion emissions from plant and equipment. | Increase in regional greenhouse gas emissions. |
| Use of diesel fuel, on-site toilets, and waste generated from site offices and lunchrooms. | Nuisance odours |

A total of 31 sensitive receptors are present near the site (between 210 m and 3,160 m from the WST Facility boundary) were modelled.

The air quality impact assessment predicted no exceedances of the dust deposition rate criterion at any of the nearby sensitive receptors. No excessive nuisance dust impacts are expected at these receptors as a result of dust emissions from the WST Facility.

### 5.6.3 Air Quality Control and Management Strategies

The following control measures (Table 5-9) have been developed to minimise potential impacts to air quality at the WST Facility.

Table 5-9 Control Measures for Air Quality Management

| Potential issues / impacts | Control Measures |
|---|---|
| Dust generation from site operations | Water carts will operate across the site and will spray any exposed dry surfaces, unsealed roads, or any other areas where deemed necessary.<br>Visual dust inspection of work areas to determine if addition dust suppression measures are required.<br>Monthly review of Air Quality and Dust Management Plan performance.<br>Register of complaints relating to dust discharging off-site and records of response actions. |
| Wind erosion | Visual dust inspection of work areas to determine if addition dust suppression measures are required.<br>Deployment of depositional dust gauges collection, replacement, and laboratory assessment (NATA accredited) if necessary. Assessment of dust mitigation measures and laboratory data.<br>Monthly review of Air Quality and Dust Management Plan performance. |
| Emissions from plant, trucks and vehicles cause environmental nuisance | Combustion equipment meets EPA requirements and are serviced in accordance with manufacturers requirements. |
| Odour from food waste and portable toilets | Waste from crib rooms, offices, weighbridge to be segregated and stored in lidded receptacles.<br>Regular collection of waste from portable toilets. |

### 5.6.4 Potential residual air quality impacts and risks

A summary of the identified residual impacts and risks associated with air quality is shown in Table 5-10. Following closure, cessation of operations and successful rehabilitation of the site there would be no adverse impacts relating to air quality from the WST Facility site.

Table 5-10 Potential Residual Air Quality Impacts and Risks

| Impact Event | Level of impact | LEVEL of Risk |
|---|---|---|
| Dust impacts in the surrounding area from construction, operations and closure activities impacting amenity and health of the community. | Minor | Low |
| Combustion emissions from trucks, vehicles, plant, and equipment. | Insignificant | Negligible |
| Odours from inappropriately stored waste. | Insignificant | Negligible |

## 5.7 Noise Risk Assessment

### 5.7.1 Noise Objective

The objectives are to:

- Comply with statutory requirements.
- Avoid or minimise adverse noise impacts to receptors through appropriate management measures.

### 5.7.2 Potential Construction, Operation, and Closure Noise Impacts

SLR conducted a Noise Assessment for the proposed WST Facility (included in ANNEX G). In addition, a Low Frequency Noise Assessment was completed (also included in ANNEX EG. A baseline noise monitoring assessment was undertaken to establish background noise levels at representative noise-sensitive receptors. Modelling was used to provide an indication of potential noise impacts on receptors from the proposed activities. A summary of the source and potential impacts identified is summarised in Table 5-11.

Table 5-11 Noise Source and Impacts

| Key activities | Impacts |
|---|---|
| Noise generation from clearance, construction, operation, and closure of WST Facility | Disturbance to sensitive receptors due to noise from vehicles, equipment, and plant operation |

### 5.7.3 Noise Control and Management Strategies

The assessment indicates that noise from the WST Facility will comply with the EPA Publication 1411 criteria, based on the variety of assumptions detailed in the noise report. Notwithstanding the predicted compliance, the following broad management measures would be implemented if EPA Publication 1141 levels are not achieved and where feasible and practicable. The implementation would be based on a risk assessment using EPA Publication 1413. The following noise control and management strategies will be undertaken:

- An amenity bund will be installed around operational areas.
- The use of shipping containers as localised barriers may be considered for specific operations.
- Use the lowest-noise work practices and equipment that meet the requirements of the job, particularly when working to the north of the site (nearest the residences).
- If feasible, loading and unloading of TBM Spoil should be planned to minimise the need for reversing of vehicles. Occupational health and safety requirements for the use of warning systems must be followed.
- Where possible mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression or hush-kits devices, including devices such as engine enclosures, fan louvres and high-performance mufflers will be required to selected mobile plant and should be maintained to the manufacturer's specifications.
- Turn off or throttle down the plant and trucks and when not being used.

- Where it is feasible, plant working on the Holding Bays should operate towards the southern portion of the holding cells, during the late evening and night-time periods.
- If feasible, the scheduling and delivery of TBM Spoil, should minimise unnecessary night-time operations in the north of the site.
- Restrict truck speeds on haul roads to minimise the potential for excessive noise levels.
- Consider using "light-only" reversing alarm or alternative measures; such as a broadband alarm which produces noise across a range of frequencies, smart alarms which can be set to operate at ~5dB above the ambient level and, combination alarms that incorporate both the broadband function and are also self-adjusting.
- To avoid exceedances of the noise targets, the noise assessment provides some specific recommendations regarding the sequencing of work through the various project phases, which must be considered when planning for the receipt of TBM Spoil.

### 5.7.4 Potential Residual Noise Impacts and Risks

A summary of the identified residual impacts and risks associated with noise emissions is shown in Table 5-12. With careful selection of the plant and equipment and the scheduling of operations (during the evening and night) there should be no adverse impacts relating to noise from the WST Facility.

Table 5-12 Potential Residual Noise Impacts and Risks

| Impacts | Level of Impact | Level of Risk |
|---|---|---|
| Disturbance to sensitive receptors due to noise from vehicles, equipment, and plant operation during the operational phase | Minor | Low |
| Construction works during the night-time period | Minor | Low |
| EPA penalties for tonality or low frequency noise | Minor | Low |

# 6 Environmental Management Program

## 6.1 Environmental Management System

This Section provides details of the environment management program as required by the TBM Spoil Regulations to mitigate the risk of adverse impacts from the WST Facility project.

An Environmental Management System Manual (EMS) is being developed for the proposed operations at the WST Facility.

## 6.2 Sustainable Development Management Approach

WST is committed to managing the impacts of its activities on the environment, including the local community by adopting the following approach:

- A target of zero harm to the environment
- A commitment to meet all legislative requirements and seek to continuously improve
- A management of environmental risks
- The setting and achievement of targets and the efficient use of resources including the reduction and prevention of pollution
- Respect for the traditional rights of indigenous people and value of cultural heritage
- Development of relationships that foster the sustainable development of our local communities.

Beyond the statements within the Sustainable Development Policy, WST management provides support for the effective management of environmental issues by:

- Providing adequate resources for the management of environmental aspects
- Ensuring integration of environmental management requirements throughout business processes, e.g. risk assessment, procurement, and acquisition, use of natural resources
- Communication of environmental performance and conformance with environmental requirements, e.g. Quarterly HSE Board Reports, leadership team presentations & Business-wide Communication
- Ensuring that environmental management is reflected across business and departmental objectives, through the development of objectives and targets during the annual business planning process.

## 6.3 Roles and Responsibilities for the TBMS-EMP

The WGTP is responsible for management of the loading and transport of TBM Spoil from the WGT site to the WST Facility. As indicated in Section 3, WGTP personnel will be responsible for sampling and analysis to characterise TBM Spoil and WST Facility will be responsible for sampling and analysis for QC (including duplicate samples, etc). The WST Facility requirements for receival, documentation and management of TBM Spoil once received and analysed have been documented in Section 4.

The roles and responsibilities of key WST Facility personnel are indicated below:

- Overall implementation of the TBMS-EMP – WST Facility Project Manager and operational personnel

- Implement management measures – WST Facility Project Manager and operational personnel
- Maintenance of environmental management mitigation measures (stormwater, wastewater and leachate management controls, air quality, noise and potential impacts on flora and fauna, and impact on the amenity of local residents and the public – WST Facility Project Manager and operational personnel
- Undertake inspection of stormwater, wastewater, and leachate management controls – WST Facility Project Manager or Environmental Officer or nominee
- Facilitate training programs – WST Facility Project Manager or WST Environmental Officer or nominee
- Identify non-conformances and notify WST Facility Manager/ Safety Health Environment Quality (SHEQ) Representative – WST Facility Environmental Officer or nominee
- Authorise and confirm the implementation of mitigation measures – WST Facility Project Manager or WST Facility Environmental Officer or nominee
- Coordinate monitoring and compile reports – WST Facility Environmental Officer or nominee
- Maintain internal records of monitoring – WST Facility Environmental Officer or nominee
- Collate and maintain records of complaints, respond to complainants – WST Facility Environmental Officer or nominee
- Overseeing on-site construction activities – Project Construction Manager
- Ensuring compliance of construction activities with conditions of approval, licences, permits and environmental requirement during construction – Project Construction Manager.

## 6.4 Environmental Training and Awareness

All personnel, contractors, sub-contractors, consultants working on the project will be assessed for competency in the tasks they will be required to undertake.

Prior to the start of construction and operations all personnel involved on-site at the WST Facility project will be required to undertake an environmental induction to ensure they understand their role in protecting and minimising impacts to the environment and the local community. This induction will be part of the general induction process and will also include safety procedures. The induction will include education of environmental objectives and environmental requirements and include details of any site-specific environmental material. A record of induction and attendees will be maintained.

It will be the responsibility of the WST Facility Project Manager or Environmental Officer to provide the induction and environmental training to WST Facility staff and contractors on stormwater, wastewater, and leachate management issues at the WST Facility. The training would include, toolbox talks and presentation of this management plan. Specific training should be provided to operators and site contractors prior to site works and TBM Spoil stockpiling to ensure effective management procedures are implemented. Any environmental issues discovered as part of the monitoring program, should be raised at the toolbox talks.

Specifically, the training will address:

- Background to the project
- Approval conditions, and the role of the TBMS-EMP

- Legislative requirements of WST Facility and individuals
- Key personnel and roles
- Environmental issue at the site and relevant management plans and procedures
- The hygiene and applicable personal protective required for the project
- Community issues related to the project
- Penalties for non-compliance
- Hazard and incident reporting and mitigation measures.

Environmental training of personnel that are involved in off-site activities will not be the responsibility of the WST Facility operator.

Further, the control and management strategies identified in the ERA and summarised in the ERR (ANNEX T) are provided for guidance purposes and will be considered together with those arising from the assessment of environment risks and mitigation measures for environmental aspects (including the plants and animals sustained by aquatic ecosystems including the growling grass frog) when developing content for environmental training and awareness.

## 6.5 Material Tracking and Record Keeping Procedures

Cradle to Grave Spoil tracking data systems will be implemented to ensure individual loads of unclassified TBM Spoil can be reconciled against individual loads of classified TBM Spoil and their corresponding containment or disposal locations. Data management personnel will be allocated defined and restricted user privileges to update fields in the weighbridge data management system.

The information obtained will be retained in a digital format for a period of at least two years.

### 6.5.1 Driver Control Station

Entry via the DCS is controlled by an automated boom 24 hours a day. On entry, trucks' Dallas tag will be scanned to retrieve the following fields:

- Outgoing Gross and tare weights
- Date and time of weighbridge recording
- TBM ID
- Domain (TBC).

The automated DCS system will ensure the following fields are assigned during registration:

- Pre-registered Holding Bay ID for the load, including a unique ID to specify the number of times a given Holding Bay has been filled
- Date and time of registration
- Classification of TBM Spoil (unclassified).

Designation of the Holding Bay ID will be determined by the TBM ID and associated domains. Holding Bay IDs will be categorised as:

- Empty - available
- Filling - operational
- Full - unavailable
- Emptying - loading out (post classification).

The DCS operator will provide a thermal paper or electronic docket with the Holding Bay ID no. and direct the driver with instructions to proceed to the unloading zone. All Data will be stored electronically and backed up daily. Incoming weighbridge data will be checked against chain of responsibility requirements and Dallas tag ID attributes, non-compliant loads will be required to park in the waiting zone for further instruction.

### 6.5.2 Holding Bay Classification Data Management

Sampling of TBM Spoil (primary samples) will be undertaken at the WST Facility by WGTP personnel/consultants to achieve 1:350 cubic metres sampling density) with field duplicate and triplicate samples to achieve 1:250 cubic metres sampling density undertaken by WST Facility personnel in accordance with the Agon (2020) SAQP.

Laboratory certificates, ESdat data comparison tables, 95 % UCL calculations and Holding Bay classification documentation will be reviewed by suitably qualified personnel and assessed against the acceptance criteria in Tables 3-1 and 3-2. Only a user with the Environmental Manager login can confirm the Test Results and allocate the type of Spoil based on those test results. They will then update the classification field in the weighbridge data management system and issue a work order to TBM Spoil Removal Operations Manager.

### 6.5.3 Classified TBM Spoil Dispatch Data Management

Prior to load out operations of classified TBM Spoil destined for placement in the Containment Cell or off-site disposal to an EPA licensed facility, dump truck RFIDs will be allocated to the classified TBM Spoil bay by TBM Spoil Removal Operations Manager. Dump Trucks will enter the WST Facility via the RFID scanner to obtain instruction on TBM Spoil Holding Bay number via a display mounted in the truck cabin. On exiting the WST Facility, the driver will stop at the automated weighbridge for data capture of recorded weight, date, and time. TBM Spoil bay classification and destination will be assigned to the load in the system and the driver will receive instruction on the location of unloading. The driver will be required to acknowledge TBM Spoil load classification and destination prior to exiting the weighbridge.

### 6.5.4 Spoil Classified as Prescribed Industrial Waste

Prior to load out operations of TBM Spoil that has been classified as prescribed industrial waste, PART A and PART B of Electronic Waste Transport Certificates will be completed for the calculated number of loads required to be removed from the Holding Bay.

Category C PIW destined for off-site disposal in an EPA licensed facility will include completion of PART C of the transport certificate. Upon completion of TBM Spoil removal, automated weighbridge data will be used to reconcile generated WTC and excess electronic WTCs will be cancelled in the online system. Transportation of Category A or B PIW destined for off-site treatment and/or disposal will be completed using EPA licensed trucks and require WTC completion of PART A & B only. PART C will be completed by the off-site EPA licensed facility. Electronic weighbridge dockets will be completed prior to trucks leaving site to ensure chain of responsibility requirements are complied with. Weighbridge dockets will be obtained from the off-site EPA licensed facility for reconciliation against on-site weighbridge data.

To facilitate the off-site treatment and/or disposal of TBM Spoil, the project construction company, as the waste producer, will provide waste categorisation reports while WST Facility will arrange for transport of the material to the off-site EPA licensed facility.

### 6.5.5 Recording Leachate Extraction, Treatment, and Reuse

The following record keeping provisions will be included for the leachate extraction, treatment, and reuse:

Installation of telemetry meters on each storage and transfer pump.

The leachate level in the Southern Leachate Pond will be continuously monitored and reported to the site data management system.

The volume of leachate transfers will be recorded:

- From the Holding Bay sumps to the Leachate Sedimentation Pond;
- From the Containment Cell leachate sump to the Leachate Sedimentation Pond;
- From the Leachate Sedimentation Pond to the Southern Leachate Pond;
- From the Southern Leachate to the tank farms and carts;
- From the Southern Leachate Pond to the treatment plant;
- From the treatment plant to the tank farms and carts;
- From the Southern Leachate Pond to off-site disposal; and
- From the treatment plant to off-site disposal.

Leachate extraction from Drying bays D1 to D17 will occur via hydro excavation trucks, this leachate will be recorded via field sheets.

EPA will be advised if the volume of leachate in storage exceeds 50 % of total capacity (i.e. 19.6 ML) and be provided with weekly reports on volume until the level falls below 50 % of total capacity again.

## 6.6 Triggers and Rules for Leachate Treatment and Reuse

### 6.6.1 Leachate Reuse Demand

The water balance modelling by the designers of the processing area and containment system to assess leachate accumulation in the Southern Leachate Pond, assumes leachate (of suitable quality as set out in Section 3.6) extraction from the Pond of [redacted]) (ANNEX O), which is reused on-site. This re-use would be for dust suppression and also in construction works.

Water is required during construction of the processing area and containment system during conditioning/compaction of clay during the [redacted] period. The daily demand varies throughout the [redacted] as construction occurs in stages. The first stage of construction, prior to spoil being received at the site, will not have leachate available as a source until the Stage 2 construction phase, and until leachate is generated from the spoil placed in the areas constructed in Stage 1. The demand for dust suppression water is dependent on weather, however dust remains a problem during most times of the year on the clay soils of the WST Facility. Dust suppression is necessary soon after rain events as unsealed surfaces dry out quickly and generate dust.

The total peak demand for construction water, based on estimates from experienced Contractors, and for dust suppression water is estimated to be approximately [redacted] which could reduce to [redacted] following completion of construction.

The leachate water balance adopts a conservative (low) assumed reuse volume of up to [redacted] ([redacted] which is significantly lower than the estimated minimum demand for water after construction is completed ([redacted]).

Leachate may only be used for dust suppression in the following areas:

- Internal trafficked areas such as roads within the WST Facility.
- The Holding Bays and Drying Bays, if needed.
- The Containment Cell during filling, if needed.

### 6.6.2 Leachate Pond Operation and Contingencies

The Southern Leachate Pond has a full-service level (beyond which it would overflow) of [redacted] It is planned to operate the pond with a freeboard of 0.5 m, making the maximum operational capacity [redacted] The leachate water balance (ANNEX O) concluded that the maximum operational capacity of would not be exceed at any time, including the extreme wet climatic condition assumed in the model.

Leachate will be transferred, subject to meeting quality controls (see Section 3.6), from the Southern Leachate Pond to a transfer and storage tank farm at which road tankers can take water for use for construction or dust suppression purposes. This tank farm will nominally comprise of [redacted] tanks, providing storage of [redacted].

Leachate meeting the drinking water trigger levels (treated or untreated) will generally be used immediately (i.e. within one day), as water will be required continuously throughout construction and operation of the WST Facility. Only leachate that is deemed suitable for reuse (i.e. either treated or untreated leachate that has been tested and contains contaminant levels less than the drinking water trigger levels defined at the start of Section 3.6).

The contingency if the volume of leachate exceeds expected volumes that can be effectively managed on-site, is to truck water off-site to an EPA licensed facility. The trigger for off-site disposal would be: if the 0.3 m leachate head in the Containment Cell is being approached; the 0.5 m freeboard in the Leachate Sedimentation Pond and Southern Leachate Pond is being approached, and if the tanks are full. Water would be transported using a liquid waste transport vehicle off-site to an appropriate facility based on the contamination status of the water, i.e. leachate would be transported to an EPA licensed facility. No leachate will enter the irrigation dam or be discharged into Parwan Creek (treated or untreated).

### 6.6.3 PFAS Leachate Quality Criteria for Reuse

The EPA letter of 1 September 2020 requested that the TBMS-EMP include "the inclusion of a PFAS concentration at which treatment of leachate would be initiated for leachate from the containment cell and the leachate ponds to ensure that higher PFAS concentrations do not remain in the leachate ponds" (EPA 2020a).

As is outlined in Section 3.6, the acceptable quality for leachate for reuse (dust suppression or construction) adopted by WST is that the PFAS concentration must be less than the Australian criteria for drinking water. The Australian health-based drinking water quality guideline for PFAS are those published in the PFAS NEMP, which are 0.07 µg/L for the sum PFOS+PFHxS and 0.56 µg/L for PFOA (HEPA, 2020).

It is noted that the applicable aquatic ecological protection criteria for PFAS based on 95 % species protection levels is 0.13 µg/L for PFOS and 220 µg/L for PFOA (HEPA 2020) which is greater than the drinking water criteria. Therefore, PFAS in any unplanned release of leachate in the Southern Leachate Pond that meets the drinking water criteria would not cause harm to the protected beneficial uses of Parwan Creek or groundwater. As was noted above, no leachate will be discharged into the irrigation dam or Parwan Creek (treated or untreated).

### 6.6.4 Triggers Conditions for Leachate Treatment

WST has been advised that the spoil water or leachate derived from TBM Spoil received from the WGTP is unlikely to have PFAS content exceeding the drinking water trigger levels (defined at the start of Section 3.6), and is also unlikely to exceed the laboratory limit of reporting (0.001 µg/L) (ANNEX M). Nevertheless, as required by EPA, a precautionary approach must be applied to the TBM Spoil as some of the groundwater in the path of the WGTP contains low levels of PFAS. A monitoring program will be implemented to record the quality (including PFAS and other COPC) of the water in the Southern Leachate Pond as described in Section 7.2. The following set of trigger conditions are proposed to be used in the decision process to start and stop treatment of leachate stored in the Southern Leachate Pond:

- The water level and volume in the Southern Leachate Pond must be sufficient to supply a treatment plant and that a representative set of data for average leachate quality is obtained by the monitoring regime. A level of [redacted] has been selected as the trigger condition for considering leachate quality and the need for treatment.
- If the leachate contaminant levels for three consecutive monitoring events are in excess of the drinking water trigger levels (defined at the start of Section 3.6) then the treatment plant will start to treat leachate. Following treatment, it will be retested and if the leachate contains contaminant levels less than the drinking water trigger levels, it will be discharged to storage or direct reuse. If the leachate contaminant levels are still in excess of drinking water trigger levels and there is no capacity to further treat the leachate, it will be transported off-site to an EPA licensed facility.
- If the leachate contaminant levels from a five-point moving mean start to trend above the drinking water trigger levels (defined at the start of Section 3.6), then the water treatment plant will also start to treat the leachate. This trigger is needed in the event the data has wide fluctuations.
- Conversely, in the event that contaminant levels in leachate in the Southern Leachate Pond fall, then these trigger conditions will apply in reverse.

The expectation is that the treatment plant is unlikely to be used, as the PFAS content of the TBM Spoil will be very low.

It is noted here that the PFAS water treatment plant using [redacted] requires pre-treatment including [redacted] and that will also treat other COPC such as metals, organics, and suspended materials in the leachate.

There is an option to undertake a site-specific HHERA of other COPC that exceed drinking water trigger levels (defined at the start of Section 3.6), to assess whether treatment is required prior to reuse. Prior to performing any HHERA, a scoping technical memorandum would be prepared that is reviewed by the Auditor and an Auditor review letter issued. EPA will be consulted/involved with development of the scope of the HHERA. The framework for the HHERA would follow NEPM Schedule B5a (ecological risk assessment) and Schedule B4 (human health risk assessment).

## 6.7 Dust Suppression and Construction Water

Water used for dust suppression and construction water at the WST Facility may be sourced from a number of sources (in the following order of priority), subject to it meeting drinking water trigger levels for PFAS and other COPC (defined at the start of Section 3.6):

- Treated leachate from the treatment plant.
- Water sourced from on-site water storages (the tank farm and the Southern Leachate Pond and).
- The Calleja irrigation entitlement from the Werribee River.
- Western Water recycled water (subject to suitability assessment).

## 6.8 Construction Quality Assurance Plan

Construction of the Holding Bays, Drying Bays, Containment Cell, leachate collection systems and Containment Cell Cap will be carried out under the full-time supervision of the GITA/CQA Officer.

Supervision of the subgrade construction, compacted clay layer and liner, clay bunds and leachate collection system shall be carried out at Level 1 Responsibility (full time supervision) by the GITA in accordance with Section 8 of AS3798-2007 Guidelines on Earthworks for Commercial and Residential Development. This is the highest level of earthworks control and provides for the number and type of geotechnical tests required during construction. The GITA will be independent of the Contractor.

All geosynthetic materials (e.g. [redacted]), sampling and construction shall be undertaken under supervision of the Construction Quality Assurance Officer.

Following completion of each component, the GITA/CQA Officer as applicable will provide an assessment of compliance of the as-built works against the requirements of the Technical Specifications (ANNEX R). The requirements of the reports are detailed in the Technical Specifications.

The GITA report will include the following minimum information:

- Review and assessment of the properties of the engineered fill.
- Description of the methodologies employed by the Contractor to construct the subgrade.
- Estimates of the total volume of engineered fill used to construct the Containment Cell.
- Estimates of extent of uncontrolled fill located at subgrade design level and description of the methodology used to rework the material.

- An assessment of whether the required frequency of testing was achieved based on the total volume of engineered fill material used in construction of the Containment Cell.
- Details of any failed tests, including a description of the rectification procedures and results of re-tests.
- As-built surveys of the subgrade and an assessment of whether the geometry and grades of the subgrade meet the requirements of the Technical Specification. Oversight will be provided by the GITA/CQA.
- Sufficient detail to demonstrate that all works completed meet the requirements of the design documents.
- GITA's opinion on compliance of the works with the requirements of the design documents.

The earthen and geosynthetic materials used in construction will be subject to manufacturer/supplier testing, as well as independent testing in general accordance with BPEM requirements. Full details are contained in the technical Specifications. The Auditors assessment of design summarises the testing requirements and details any variations from BPEM.

## 6.9 Pollution Incident Plan

This Section provides information on the project pollution incident assessment and management. More detail is provided in the Pollution Incident Plan. A Pollution Incident Plan is a requirement in the Environment Protection (Management of Tunnel Boring Machine Spoil) Regulations 2020, which states that 'any pollution incident at the premises escape, spill or leak of waste outside the processing area is reported to the Authority in writing as soon as is practicable'. The Pollution Incident Plan was prepared to enable WST to:

- Minimize the risk of pollution due to an incident occurring at the WST Facility;
- Identify the risks and actions proposed to minimize and manage risks;
- Establish clear and effective notification process, communication procedures to ensure the correct staff and authority are notified; and
- Provide adequate training and incident management operation available at all time to ensure any incident that may occur, its adverse impact is reduced to a minimum.

### 6.9.1 Incident Management, Recording and Corrective Actions

#### Pollution Incidents

Pollution incidents are defined for the purposes of the plan, consistent with the Environment Protection Act 1970, as incidents that involve the emission, release or deposition of waste, liquids, solids or gaseous substances to the extent that they potentially cause detrimental effects or changes in any elements of the environment (air, surface water, groundwater or land) or emission of noise which cause any of the following effects beyond the boundary of the WST Facility will be deemed to be pollution incidents and managed accordingly.

Those detrimental effects or changes make or be reasonably expected to make those environmental elements:

a. noxious or poisonous or offensive to the senses of human beings

b. harmful or potentially harmful to the health, welfare, safety, or property of human beings

c. poisonous, harmful, or potentially harmful to animals, birds, wildlife, fish, or other aquatic life

d. poisonous, harmful, or potentially harmful to plants or other vegetation

e. detrimental to any beneficial use, protected by policy and relevant to the receptor location, that is made of those environmental elements.

The Manager – HSE will have the authority to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and to direct that relevant actions be ceased immediately should an adverse impact on the environment is likely to occur.

WST Facility and its contractors will have a system in place to record environmental incidents, near misses and hazards, to track the implementation and close out of corrective actions and allow analysis of such incidents to identify areas requiring improvement.

If corrective actions are identified as a result of monitoring activities, audit and inspection results, compliance tracking, community complaints the Manager – HSE will determine appropriate management strategies and implementation of contingency measures.

### Mitigation and Response

Upon detecting an exceedance or incident of the limits/performance criteria for surface water, groundwater or leachate, or the occurrence of an incident that causes (or may cause) harm to the environment, the Manager will notify the EPA in writing as soon as practicable, as per the Pollution Incident Form provided in the Pollution Incident Plan, ANNEX AC, thereafter of the exceedance/incident. Within six days of notifying the EPA of an exceedance/incident, the Manager will provide EPA with a written report that:

- Describes the time, date, and location of the incident.
- The nature of the incident.
- The circumstances in which the incident occurred (including the cause of the incident if know).
- The name of the person reporting the incident.

Monitoring results, including any actual or potential significant off-site impacts on people or the environment will be included within the written report.

Depending on the nature of the exceedance and potential contamination the following mitigation may be implemented (Table 6-1).

Table 6-1 Mitigation and Response Measures

| Element | Triggers | Response measures |
|---|---|---|
| Groundwater | Groundwater results showing increasing trend for PFAS concentration. | Check level of leachate in the sumps, the Leachate Sediment Pond and the Southern Leachate Pond; investigate potential sources of the contamination; resample groundwater bores within the WST Facility which shows increasing trend for PFAS concentration and develop management strategy in consultation with EPA and the Auditor. |
| Leachate | Leachate concentration exceeds the drinking water trigger levels | Treatment will be instigated if concentrations exceed drinking water trigger levels (defined at the start of Section 3.6). |

| Element | Triggers | Response measures |
|---|---|---|
| | | Reuse of leachate for dust suppression and construction water purposes at the WST Facility will occur if analysis indicates concentrations are below the drinking water trigger levels. |
| | Exceedance of allowable leachate level in the Containment Cell (0.3 m leachate head) | Extract leachate from Containment Cell and transfer to the Leachate Sedimentation Pond for storage, provided the Leachate Sedimentation Pond's 0.5 m freeboard is not exceeded |
| | Exceedance of allowable leachate level in Southern Leachate Pond (0.5 m freeboard) | Daily monitoring of the level in the Southern Leachate Pond will confirm capacity is below the pond's 0.5 m freeboard.<br>If the leachate levels in the Leachate Sedimentation Pond and/or Southern Leachate Pond have reached the 0.5 m freeboard, the steps to reduce leachate levels may include one or more of the followings:<br>• If concentration in leachate is less than drinking water trigger levels it will be discharged for direct reuse.<br>• If concentrations in leachate is more than the drinking water trigger levels, then it may be pumped to the treatment plant.<br>• In the event that there is insufficient capacity in the tank farm, Southern Leachate Pond and treatment plant, the leachate will be trucked off-site to an EPA licensed facility. |
| | Excessive leachate generation in the Holding Bays and Drying Bays. | Check stormwater control measures and amend as appropriate.<br>Use additional the temporary leachate pump, or pumps to ensure excess leachate is captured and pumped into the Leachate Sedimentation Pond. This provision is in place to ensure excess leachate accumulating within Holding Bays and Drying Bays does not overflow outside of the containment system. |
| | Uncontrolled seepage from the Southern Leachate Pond and Leachate Sedimentation Pond due to damage. | Repair the liners in the Southern Leachate Pond and Leachate Sedimentation Pond. |
| | Rupture of leachate transfer pipelines. | Regular inspections of the leachate transfer pipelines examining for leaks. |
| | Containment Cell void contains stormwater. | Extract stormwater from the Containment Cell when below grade and manage as either stormwater or leachate depending on water quality. |
| Surface water | PFAS increasing levels over time. | Triplicate samples of surface water, sediment, leachate, and groundwater should be collected from the sample location that show an increasing trend for PFAS to confirm the results. If the levels are still elevated, in the first instance, PFAS levels in surface water should be compared to the PFAS levels in groundwater and leachate at the WST Facility to evaluate if it may be the source. Other factors such as discharge events from the WST Facility should also be considered to assess if there is any potential migration pathway from the WST Facility.<br>In the event that WST facility is considered the potential source of increasing PFAS levels in Parwan Creek and/or Werribee River, then further evaluation of whether biota sampling from these receptors (at the monitoring locations) is necessary to investigate the risks to the surrounding environment.<br>A management strategy shall be developed in consultation with EPA and the Auditor, if WST Facility is found to be the source of PFAS impacts in Parwan Creek and/or Werribee River. |

| Element | Triggers | Response measures |
|---|---|---|
| | Leachate spills and loss of containment discharge to surface water drainage.<br>Mixing of leachate with clean surface water. | Install earth bund downstream of spill to contain spill.<br>Pump leachate to Leachate Sedimentation Pond.<br>Assess storage capacity of leachate holding areas. Increase freeboard if necessary and feasible.<br>Inspect bunds and leachate storage ponds to confirm integrity and repair required. |
| Land/soil | Samples exceeds the adopted TBM Spoil acceptance criteria in the stripped areas. | Corrective actions and a Clean Up Plan implemented to define, delineate, and validate impact. |
| | Uncontrolled discharge of TBM Spoil outside storage and processing area or Containment Cell. | Investigate causes, collect TBM Spoil and return to storage and processing rea and Containment Cell.<br>Review on-site processes and amend as required to minimise potential for future incidents.<br>Investigate whether contamination has occurred, and clean-up as required. |
| Air quality | Site visual inspection indicates uncontrolled discharge of dust from WST Facility.<br>Dust deposition rate exceeds the criterion of 4 g/m$^2$/month (or 2 g/m$^2$/month over background). | Assess which processes have caused the emission and develop and implement improvements.<br>Inspect adjacent roads and residences to see if dust deposition has occurred and clean-up as required.<br>Dust controls implemented to reduce dust levels to within this guideline. |
| Noise | Exceedance of the regulatory levels (EPA Publication 1411 criteria) or a complaint is received. | An assessment of whether WST Facility is the source of the noise issue will be undertaken. Should exceedances be recorded, a review of operations will be conducted, and reasonable and feasible mitigation measures will be implemented. |

The proposed measures for any exceedance event will be described in written report to be provided to EPA in accordance with the TBMS-EMP.

### 6.9.2 Environmental Complaints

WST Facility will adopt a complaints policy to:

- Enable WST Facility to respond to issues raised by the community and stakeholders in a timely manner
- Ensure public confidence in the project
- Provide information that can be used by WST Facility to deliver improvements.

The complaints policy provides guidance to WST Facility staff and contractors on the key principles and concepts of our complaint management system. All complaints are recorded on the complaints register.

Upon receipt of a complaint WST Facility will undertake the following:

- Within two working days of complaint been registered provide an initial response to the complainant
- Assess and prioritise complaints in accordance with the urgency and/or seriousness of the issues raised
- If a matter concerns an immediate risk to safety or security the response will be immediate and will be escalated appropriately.

The outcome of the complaint is recorded in the complaints register, including:

- Including action taken
- If no action taken, the reason why.

WST Facility is committed to managing stakeholder expectations, and will inform them as soon as possible, of the following:

- Expected time frames for actions
- Progress of the complaint
- Possible or likely outcome of the complaint.

WST Facility will advise people as soon as possible when unable to deal with any part of their complaint if the complaint is not related to WST Facility activities and indicate where such issues and/or complaints may be directed (if known and appropriate).

WST Facility will also advise people as soon as possible when unable to meet time frames for responding to their complaint and the reason for delay.

WST Facility will record complaints received and responses provided for reporting and transparency purposes.

### 6.9.3 Contingency Planning

During normal operations, there is always the potential for environmental incidents and accidents to occur. To manage these incidents, contingency plans will be developed to guide actions to be taken to minimise the impacts of accidents and incidents. The contingency plans will be reviewed and updated on a regular basis to incorporate new information arising from any incidents, near misses and hazards, and incident response simulation training sessions. These plans will also include the facilitation of fire danger season restrictions and requirements.

## 6.10 TBM Spoil Regulation Audit Requirements

### 6.10.1 Auditing Regulatory Requirements

The TBM Spoil Regulations includes two requirements for audit of the TBM Spoil management process, namely that the TBMS-EMP must include:

- r.6(2)(q) requirements for an environmental auditor to audit the risk of harm actually or potentially arising from the Activities at the frequency specified in the environment management plan.
- r.6(2)(s) a report prepared by an environmental auditor assessing the suitability of the detailed designs, technical specifications, construction quality assurance plan, monitoring program and pollution incident plan in achieving the requirements and objectives of these Regulations.

In discussions with EPA prior to submission of this TBMS-EMP some key aspects of this regulation were clarified, namely:

- The audit of risk of harm which, in EPA remedial notices, is often a requirement to undertake a statutory audit under s53V of the Environment Protection Act 1970. A statutory audit is not required to comply with this regulation.

- The frequency of the audits (the audit program) is for the proponent to nominate in the TBMS-EMP but should include an audit at completion of the activities to manage TBM Spoil at the WST Facility.
- The audit of the suitability of the detailed design, technical specification, construction quality assurance plan, monitoring program and pollution incident plan was not intended to be a statutory construction audit such as required for a landfill cell but was intended to be an independent review of each of the documents prior to operation of the relevant part of the facility.
- The auditor must be a suitably qualified person with experience in the development, operation and closure of containment facilities including landfill cells. This must be a person accredited as an EPA environmental auditor.

### 6.10.2 TBM Spoil Audit Program

An auditor will be appointed to undertake the following audit program:

- Initial audit of the design and plans – an audit the detailed design, technical specification, construction quality assurance plan, monitoring program and pollution incident plan prior to the commencement of TBM Spoil acceptance at the site.
- Staged construction audits – an audit of a construction activity or a stage of construction at its completion.
- Periodic performance audits – an audit the performance of the WST Facility and its operational compliance with the TBMS-EMP, on a quarterly basis and at WST Facility project completion.
- Final Audit of risk of harm - an audit of the risk of harm due to the manner in which the WST Facility was constructed, operated, and closed.

### 6.10.3 Audit Scope and Criteria

#### Initial Audits of Design and Plans

The initial audit of the detailed design, technical specification, construction quality assurance plan, monitoring program and pollution incident plan have been completed. The reviews included the following components of scope and criteria:

- Completion of an initial site inspection of the WST Facility to become familiar with the site conditions and how the proposed facility will be configured on the land.
- Reviewed the detailed design comprising the drawings, design reports and the technical specification against the design objectives and for compliance with the objectives of the TBM Spoil Regulations to protect the environment and human health.
- Reviewed the CQAP proposed for use in delivering the Containment Cell as designed and assess it adequacy in accordance with design objectives and those of the TBM Spoil Regulations.
- Reviewed the monitoring program against the risk assessment provided in the TBMS-EMP and assess its adequacy to allow the proponent to demonstrate compliance with the plan and protection of the environment (included in ANNEX AE).

- Reviewed the pollution incident plan including its response and contingency plan and assess its adequacy to prevent and mitigate pollution potentially arising from the operation of the facility (included in ANNEX AE).
- Preparation of audit reports to document the findings of the initial audit prior to commencement of TBM Spoil acceptance at the WST Facility (included in ANNEX S).

### Construction Audits

#### Construction Staging

While the design is based on the receipt of all TBM Spoil generated from the WGTP at this time, a decision has not been made on the final volume of TBM Spoil that will be received at the WST Facility. On this basis total construction of the WST Facility project elements will not occur initially and construction will be undertaken in stages to fit in with the allocated TBM Spoil volumes. Therefore, the construction audits will be undertaken for each completed stage to confirm that each component has been constructed in accordance with the approved design and specifications.

Based on an assumed schedule of receipt of TBM Spoil, Table 6-2 outlines the construction stages and associated construction audits that will be required (documentation of this is included in ANNEX R). It is noted here that the capping has been included here (however it would be completed after the periodic performance auditing and prior to the final audit).

Table 6-2 Construction Staging and Audits

| Construction Stage | WST Facility Component Construction Audit |
|---|---|
| 1 | [redacted] |
| 2 | [redacted] |
| 3 | [redacted] |
| 4 | [redacted] |
| 5 | [redacted] |
| 6 | [redacted] |
| 7 | [redacted] |
| 8 | [redacted] |

| Construction Stage | WST Facility Component Construction Audit |
|---|---|
| 9 | [redacted] |
| 10 | [redacted] |

Figure 6-1 shows the proposed staging for construction and auditing.

Figure 6-1 Construction Stages and Auditing Stage (Source: Mackenzie 2020 Proposed Audit Scope Document, ANNEX R)

## Construction Audit Scope

The construction audits will review the consolidated as built reports to confirm that there has been compliance with the approved design and specifications. The scope of the audits will conform to that set out in Appendix 18 of EPA Publication 1323.3 (Landfill Licensing), with the exception of not being s53V audits (explained below), which is paraphrased and elaborated upon as follows and which will be described in the construction audit report:

- Activity to be audited (i.e. the WST Facility Components in each of the ten stages of construction listed in Table 6-2 that are being audited).

- Component of the activity considered (i.e. assessment of each of the ten stages of the WST Facility Items being constructed, confirmation of appropriate construction of separable items such as sub-grade preparation for example – see inspections detail below for a more complete list. In particular for the Containment Cell, the construction of the single cell has [redacted]).
- Segment of the environment to be considered (i.e. the area of land the WST Facility Items are being constructed on and surrounding land and water environment, in particular Parwan Creek).
- Element of the environment to be considered (i.e. groundwater, surface water, land/soil, and air quality).
- Beneficial uses to be considered are those for each of the elements considered as specified in the relevant SEPP (after 30 June 2021 this includes the Environmental Values within the Environmental Reference Standards)
- Risk assessment to be conducted (i.e. qualitative or semi-quantitative assessment of the risk of harm to the environment associated with the construction of the staged facilities).
- Period of time over which the audit is conducted (i.e. from commencement to completion of each of the ten stages of construction of the WST Facility Items in Table 6-2).
- Exclusions from the scope of the audit (i.e. limited to construction of the WST Facility Items in Table 6-2).

Notably, construction audit reports issued in conformance with Publication 1323.3 are environmental audits by and EPA accredited environmental auditor with reports issued under section 53V of the Environment Protection Act 1970, however this is not a requirement of the TBM Regulations nor of EPA's directions in their letter of 1 September 2020. Therefore, these construction audit reports will be prepared by an EPA accredited auditor however the reports will not be issued under the Environment Protection Act 1970 or under the new audit provision of the new act commencing after 30 June 2021.

Construction Audit Inspections

The auditor will also undertake selected visual inspections of the separable items, where applicable, which may include but not be limited to:

a. [redacted]

Construction Audit Report

For each of the ten stages of completion of the WST Facility component listed in Table 6-2, the auditor will provide a succinct summary construction audit report.

### Periodic Performance Audits

Periodic auditing of the performance of the WST Facility and its operational compliance with the TBMS-EMP will be completed. The periodic performance audits will include:

- Quarterly Site Inspections

  Inspect the WST Facility site and operations on a quarterly basis (as well as at WST Facility closure).

  The inspections will be completed to observe the implementation of each aspect of the TBMS-EMP, gather data and evaluate compliance with the environmental protection aspects of the TBMS-EMP.

- Quarterly Data Review

  Review the WST Facility site and operations data on a quarterly basis (as well as at project closure).

  The data review will comprise obtaining and reviewing data on TBM Spoil, leachate and the environmental monitoring data collected and reported, including:

  a. TBM Spoil volumes received and classified.
  b. TBM Spoil volumes placed in the Containment Cell.
  c. TBM Spoil volumes diverted to an EPA licensed facility.
  d. Leachate volumes collected in the leachate storage dam.
  e. Quality of leachate in the leachate storage dam.
  f. Volume of leachate treated and reused.
  g. Quality of treated leachate.
  h. groundwater, leachate, surface water (including depth and monitoring data), land/soil, air quality (dust) and noise monitoring results and quality (including leachate level).
  i. Complaints register.

- Biannual Summary Audit Report

  Provide a summary audit report each six months following first acceptance of TBM Spoil at the WST Facility.

  The Biannual summary audit report will be in a succinct tabulated form of the key findings against each of the key criteria, including:

  a. Compliance with monitoring program (groundwater, leachate, surface water, land/soil, air quality [dust] and noise).
  b. Instances of monitoring results exceeding triggers for contingency actions.
  c. Recommended improvements to operations or monitoring.
  d. Recommended revisions to the TBMS-EMP.

### Final Audit of Risk of Harm

The final audit will be of the risk of harm to the environment and human health due to the way the WST Facility was constructed, operated, and closed. The audit will be performed upon closure of the WST Facility, at the completion of TBM Spoil placement and decommissioning of the WST Facility. The scope and criteria of the final audit will include:

- A final site inspection when TBM Spoil Holding Bays and ancillary facilities are decommissioned and demolished and the Containment Cell is closed and capped (refer to cap construction audit reports).
- Review all environmental monitoring data gathered during the life of the WST Facility; review the periodic performance audits and assess or evidence of environmental impacts.
- Assess the risks of harm to each element of the environment from PFAS in the TBM Spoil received, handled, stored, and contained at the WST Facility at the completion of site works.
- Prepare a final audit report making conclusions on risk of harm.

## 6.11 Reporting (Non-Compliance, Pollution Incidents, Audits)

The proponent (WST) will notify EPA as soon as reasonably practicable after any non-compliance with the TBMS-EMP that has a potential to cause an impact on the environment to the extent of being a pollution incident.

The proponent (WST) will provide all audit reports to EPA within seven days of receipt of these reports from the auditor.

# 7 Environmental Monitoring Program

This Section provides information on the required monitoring for the defined elements of the environment to assess risks of adverse impacts. Additional information on closure and post closure management is included in Section 8. It is noted that the monitoring program details are intentionally high-level only herein, more detailed management plans have been prepared and are annexed to this TBMS-EMP (air quality (dust) – ANNEX V, noise – ANNEX W, soil – ANNEX X, groundwater, surface water and leachate – ANNEX W). The Auditor has reviewed the monitoring program, and the review is included in ANNEX AE.

## 7.1 Groundwater Monitoring Program

The groundwater monitoring well network to be monitored at the WST Facility is shown on Figure 7-1.

Figure 7-1 Groundwater Monitoring Well Network

The groundwater monitoring well network details and location rationale are detailed in Table 7-1.

Table 7-1 Groundwater Monitoring Well Network Rationale

| Bore ID | Depth of Bore (mBGL) | Depth of Bore (mAHD) | Aquifer Monitored | Notes |
|---|---|---|---|---|
| Existing Groundwater Monitoring Wells | | | | |
| BH2 | 61.5 | 37.6 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH4 | 83.5 | 29.0 | Lower Werribee Formation Aquifer | Existing downgradient location. |

| Bore ID | Depth of Bore (mBGL) | Depth of Bore (mAHD) | Aquifer Monitored | Notes |
|---|---|---|---|---|
| BH6 | 78.0 | 23.1 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH7 | 7.0 | 92.7 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH8 | 59.0 | 40.1 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH11 | 12.2 | 127.2 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH12 | 100.5 | 10.8 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH15 | 8.2 | 91.7 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH16 | 65.2 | 39.4 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH17 | 41.0 | 97.6 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH18 | 71.0 | 44.7 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH20 | 75.5 | 33.1 | Lower Werribee Formation Aquifer | Existing downgradient location. |
| BH24 | 9.5 | 89.8 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH25 | 11.0 | 91.4 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH26 | 10.0 | 94.6 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH27 | 10.0 | 91.5 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH28 | 42.0 | 97.8 | Fyansford Formation Aquifer | Existing downgradient location. |
| BH30 | 82 | 28.3 | Lower Werribee Formation Aquifer | Newly installed groundwater monitoring bore |
| BH31 | 15.0 | 95.3 | Fyansford Formation Aquifer | Newly installed groundwater monitoring bore |
| BH32R | 46.7 | 94.5 | Fyansford Formation Aquifer | Newly installed groundwater monitoring bore |
| BH33 | 6.0 | 135.2 | Quaternary Sediment | Newly installed groundwater monitoring bore |
| GW1 | 17.3 | 51.0 | Maddingley Coal Seam Aquifer | Existing downgradient location. |
| GW2 | 73.0 | 44.0 | Maddingley Coal Seam Aquifer | Existing downgradient location. |
| Proposed Groundwater Monitoring Wells | | | | |
| A | | | Fyansford Formation Aquifer | North west corner of the WST Facility.<br>Background, upgradient of Holding Bays. |
| B1 | | | Lower Werribee Formation Aquifer | South west corner of the WST Facility between Containment Cell and Parwan Creek.<br>Currently no baseline data in this area and addresses uncertainty about potential for groundwater flow toward Parwan Creek.<br>Provides baseline aquifer condition data. |
| B2 | | | Fyansford Formation Aquifer (and potentially Newer Volcanics if encountered and capable of being an aquifer) | |
| E | | | Fyansford Formation Aquifer | North west of leachate pond, adjacent BH19<br>BH19 monitors Lower Werribee Formation Aquifer. Provide baseline data and monitoring in the spoil storage area - construct even if Fyansford Formation Aquifer is unsaturated. |

| Bore ID | Depth of Bore (mBGL) | Depth of Bore (mAHD) | Aquifer Monitored | Notes |
|---|---|---|---|---|
| F | | | Fyansford Formation Aquifer (and potentially Newer Volcanics if encountered and capable of being an aquifer) | South of the Drying Bays area<br>Baseline data, possibly downgradient of Drying Bays. Potential for groundwater flow toward Parwan Creek |
| G | | | Fyansford Formation Aquifer (and potentially Newer Volcanics if encountered and capable of being an aquifer) | West, background, upgradient of Drying Bays. |
| H | | | Fyansford Formation Aquifer (and potentially Newer Volcanics if encountered and capable of being an aquifer) | Between the fill disposal area and the Drying Bays area<br>Background, upgradient of fill disposal area, and downgradient of Drying Bays. Baseline data and potential for groundwater flow toward Parwan Creek. |

Prior to acceptance of TBM Spoil at the WST Facility, groundwater will be monitored monthly until two consecutive months of monitoring with reproducible results within 5.0 % are reported. During operation and for a period of five years after closure, groundwater will be monitored quarterly (with results and consideration of whether monitoring can cease be made by an Auditor at that time).

Groundwater will be sampled and analysed for water quality parameters (pH, EC, DO and TDS), standing water levels and PFAS (PFOS, PFOA and PFHxS) and IWRG621 parameters for which baseline soil was tested (see Section 7.4) at a NATA accredited laboratory for the analysis requested. Other testing may be required depending on the results of TBM Spoil testing.

The sampling will be conducted by a suitably qualified person in accordance with the EPA Publication 669, IWRG701 and AS5667.11 and the PFAS NEMP.

The laboratory analytical data will be reviewed, assessed, and reported biannually an experienced hydrogeologist. Additional groundwater monitoring bores may be required depending on the findings.

The trigger level will be monitoring results exceeding the baseline water quality concentrations. The contingency plan would be to: check level of leachate in the sumps, Leachate Sedimentation Pond and Southern Leachate Pond; resample groundwater bores; investigate potential sources of the contamination; and to develop a management strategy in consultation with EPA and the Auditor.

## 7.2 Leachate Monitoring Program

Leachate will be sampled from the Leachate Sedimentation Pond (one location), the Southern Leachate Pond (one location) and the leachate collection sumps (five locations: LS1 to LS5). Monitoring locations are shown on Figure 7-2.

Figure 7-2 Leachate Monitoring Locations

Leachate samples will be analysed for PFAS (PFOS, PFOA and PFHxS) at a NATA-accredited laboratory for the analysis requested. Other testing may be required depending on the results of TBM Spoil testing. Selected samples (at least one per month per location) for IWRG621 parameters.

Leachate levels in the Containment Cell sump will be continuously monitored using a pressure transducer or air bubbler (Airwell). WST will check and record the leachate levels on a daily basis.

A gauge board and rating table will be established for the Southern Leachate Pond to enable the reporting of leachate level and volume in the storage.

Record keeping requirements associated with leachate monitoring are provided in Section 7.7.

Leachate samples will be collected at the following frequency:

- Southern Leachate Pond: weekly during the operation and closure period, then three-monthly following closure for a period of five years.
- Leachate Sedimentation Pond and Leachate Collection Sumps: weekly during the first three months of operation, then three-monthly during the remainder of the operation, closure, and five-year post-closure period.

Results and consideration of whether monitoring can cease be made by an EPA Environmental Auditor at the completion of the five-year post closure period.

The sampling will be conducted by a suitably qualified person in accordance with the EPA Publication 669, IWRG701, AS5667.11 and the PFAS NEMP.

## 7.3 Surface Water Monitoring Program

The pink crosses in Figure 7-3 represent the surface water monitoring well network that has been monitored at the WST Facility as part of the Factual PFAS Baseline Assessment. Figure 7-4 and Figure 7-5 illustrate the proposed surface monitoring locations for the monitoring program.

Figure 7-3 Surface Water Monitoring Network (source: SLR March 2020 March 2020 Baseline in Surface Water, Groundwater and Sediment Assessment, ANNEX A)

Figure 7-4 Surface Water Monitoring Network (Adjacent MBC Landfill)

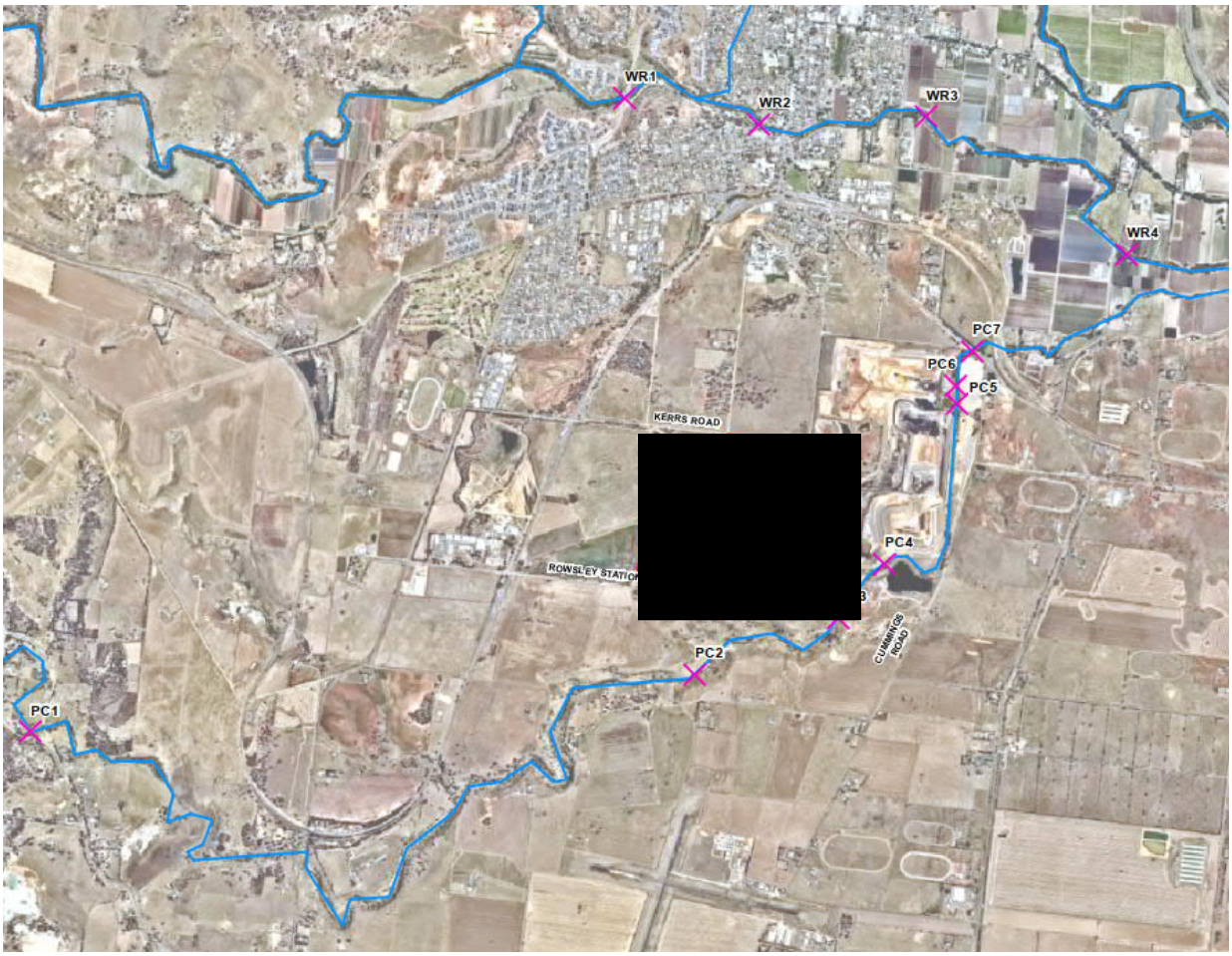


Figure 7-5 Surface Water Monitoring Network (Parwan Creek and Werribee River)

As indicated in Section 7.1, it is proposed to install a groundwater bore down hydraulic gradient of the Containment Cell. This is effectively a sentinel bore which will provide an early detection of the potential for contamination of Parwan Creek. The data from this bore will also be considered in surface water monitoring results that will be reported to the Auditor for consideration as part of the periodic performance auditing program.

The surface water monitoring program will comprise biannual monitoring prior to construction, during operation, operation and post closure for a period of five years for water quality parameters (pH, EC, DO and TDS) and PFAS (PFOS, PFOA and PFHxS) and potentially other testing as required depending on the TBM Spoil analytical results, at a NATA accredited laboratory. The baseline surface water samples will also be tested for IWG621 parameters. Water levels in on-site dams will also be monitored following heavy rainfall events.

Sampling will be conducted by a suitably qualified person in accordance with the IWRG701, AS5667.11, EPA Publication 669 and the PFAS NEMP.

If concentrations of PFAS levels show a demonstrated trend of increasing levels over time which are attributable to the WST Facility, triplicate samples of surface water, sediment, leachate, and groundwater should be collected to confirm the results. If the levels are still elevated, biota samples should be collected from both Parwan Creek and Werribee River monitoring locations to investigate the risks to the surrounding environment.

## 7.4 Land/Soil Monitoring Program

Prior to and as part of construction:

- Prior to the preparation of the Holding Bays and Drying Bay footprints, test pits are to be excavated and samples collected from within 300 mm of the design surface of the compacted clay floor of the Holding Bays and Drying Bays. Test pits will be excavated on an approximate grid of 100 m x 100 m. This frequency is considered appropriate to characterise the soil contamination status, given the uniformity of soil across the WST Facility, an approach which is in general accordance with AS4482.1
- Samples will be analysed for PFAS (PFOS, PFHxS and PFOA) and IWRG621 suite at a NATA accredited laboratory.
- Sampling will be conducted by a suitably qualified third party in accordance with relevant guidelines and standards (IWRG701, PFAS NEMP, NEPM and AS4482.1).

Given that migration pathways to the underlying in-situ soil will be restricted by installation of compacted clay liners and leachate collection systems, soil monitoring does not form part of the monitoring program for the operational activities.

On completion of the project:

- Clay liners on the Holding Bays and Drying Bay will be stripped and disposed of within the Containment Cell. Natural soils beneath the temporary infrastructure will be sampled at 250 mm beneath the stripping profiles and validated at the same frequency as baseline assessment (i.e. 1 per hectare).
- Samples will be and analysed for IWRG621, PFAS (PFOS, PFHxS and PFOA) and leachability for PFAS compounds. Clay liner assessment and validation of final surface samples will also be tested for the IWRG621 suite if, and only if, the samples are from bays where TBM Spoil from a Zone of Exception was handled.
- The analytical method will be similar or compatible with those used by the JV (or an agreed third party) for the sampling and testing of TBM Spoil.
- This material is deemed to be residual waste from the TBM Spoil and therefore as discussed with EPA would not require additional approval for placement in the Containment Cell. Sampling and analysis would be undertaken to confirm the material met the criteria for placement in the Containment Cell.

In the event soil samples collected from the stripped areas of the Holding Bays and Drying Bays contain contaminant levels in excess of those reported in the baseline soil assessment and criteria adopted for assessing impacts to land uses allowed under the WST Facility's Special Use Zone and Farming Zone, corrective actions shall be developed. The actions will be defined in a Clean Up Plan, and will include to the extent practicable, actions to define and delineate impacted areas. Further sampling, analysis, assessment against HIL/EIL and IWRG, and decisions for suitability for use or appropriate disposal thereof may be required. Prior to implementation, the Clean Up Plan will be reviewed, and Environmental Auditor review verification letter issued. EPA will also be consulted/involved with development of the Clean Up Plan.

To inform the Clean Up Plan, a conventional contaminated sites assessment approach will be applied. A site-specific HHERA would be required if the soil baseline values are exceeded. The framework for the HHERA would follow NEPM Schedule B5a (ecological risk assessment) and Schedule B4 (human health risk assessment). In the Farming Zone portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to agricultural land uses. In the Special Use Zone (mining authority) portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to surface water and groundwater.

Prior to performing any HHERA, a scoping technical memorandum would be prepared that is reviewed by the Auditor and an Auditor review letter issued. EPA will be consulted/involved with development of the scope of the HHERA.

A Stock Management Plan or other risk mitigation measure may be a required outcome of the HHERA in the Farming Zone portion of the WST Facility. If this is the case, EPA would also be consulted/involved in its development.

## 7.5 Air Quality (Dust) Monitoring Program

The air quality impact assessment predicted no exceedances of the dust deposition rate criterion at any of the nearby sensitive receptors. No excessive nuisance dust impacts are expected at these receptors as a result of dust emissions from the WST Facility.

### 7.5.1 Dust Deposition Monitoring

Dust deposition monitoring will be conducted to indicate the effectiveness of site management practices and the potential for off-site nuisance. Monitoring will be conducted at the locations shown in Figure 7-6.

Figure 7-6 Air Quality (Dust) Monitoring Locations

Monitoring will be conducted as follows:

- at site boundary locations at which the potential for off-site dust emissions (i.e. dust crossing the site boundary) has been identified.
- at locations on the site boundary conservatively representative of sensitive receptors near to the site boundary (e.g. residences)[10].
- at sites conservatively representative of sensitive receptors (e.g. residences) near to unsealed public roads along which site haulage traffic is to use.

Proposed monitoring locations informed by prevailing wind conditions (primarily northerlies, southerlies and westerlies), haulage routes and site activities are provided in Table 7-2 and Figure 7-6.

[10] In general, access to third party sensitive receptors near to the site boundary is unavailable.

Table 7-2 Air Quality Monitoring Location Rationale

| DDG ID | Description | Rationale |
|---|---|---|
| DDG_1 | Kerrs Road (north site boundary) | Downwind location during southerly winds. Monitoring impacts from Holding Bay area activity and from haulage along unsealed public roads. |
| DDG_2 | West site boundary | Background during westerly and northerly winds. Monitoring Drying Bay area activity during southerlies. |
| DDG_3 | South site boundary | Downwind location during northerly winds, background location during southerly winds |
| DDG_4 | Cummings Road | Downwind location during westerly winds – cumulative impacts from site and neighbouring landfill. |
| DDG_5 | Tilleys Road | Downwind location during southerly winds – cumulative impacts from site and neighbouring landfill. Monitoring impacts from haulage along unsealed public roads. |
| DDG_6 | Background | Background location but also conservatively representative of impacts in Bacchus Marsh including at Bacchus Marsh Grammar. |
| DDG_7 | Background | Background location but also conservatively representative of impacts in Bacchus Marsh including at Bacchus Marsh Grammar. |

Monitoring will be conducted in accordance with AS/NZS 3580.1.1:2016 Methods for siting and analysis of ambient air. Part 1.1: Guide to siting air monitoring equipment (AS/NZS 35801.1) and AS/NZS 3580.10.1:2016: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited matter – Gravimetric Method.

Sample collection will be conducted by suitably qualified person(s) holding NATA accreditation for the monitoring method (AS/NZS 3580.10.1), generally on a three-monthly basis.

Sample analysis will be conducted by a NATA accredited laboratory for reporting total insoluble solids and ash content.

The total insoluble solids deposition rate will be assessed against a criterion of 4 g/m$^2$/month (or 2 g/m$^2$/month over background)[11]. If the dust deposition rate exceeds this value, site management practices will be reviewed, and dust controls implemented to reduce dust levels to within this guideline.

### 7.5.2 Visual Monitoring

Daily visual monitoring of dust generation will be conducted at the site and appropriate mitigation measures taken (e.g. increased haul road watering and reduced speed limits for site vehicles (road trucks) on unsealed public and site roads). The dust inspection checklist and meteorological information will be recorded daily.

Dust deposition and visual monitoring results will be reported quarterly during construction and operation.

## 7.6 Noise Monitoring Program

The noise monitoring locations are shown in Figure 7-7.

[11] EPA (December 2007) Publication 1191 State Environment Protection Policy (Air Quality Management) Protocol for Environment Management: Mining and Extractive Industries.

Figure 7-7 Noise Monitoring Locations

The monitoring network will comprise attended and unattended noise monitoring at two locations, north and south of the WST Facility (to assess impacts to sensitive receptors) as well as a third location within the WST Facility likely around the Holding Bays (to assess the WST Facility operations).

The noise monitoring programme will be a staged undertaking:

- Permanent noise loggers will be deployed in the initial phase of the works to monitor the noise level so that an assessment can be made to confirm that the measured noise levels should be attributable to the WST Facility works.
- The monitoring will allow for the determination of key acoustical parameters, which can be used to identify whether EPA character penalties apply to the measured levels.
- Noise monitoring will be conducted for the whole duration of the construction works. The monitoring can be in the form of attended or un-attended monitoring (using loggers). The type of monitoring will depend on the outcomes of the monitoring during the initial phase of works, during peak operations and during wind-down operations.
- Daily observations of the noise level will be monitored during operation.
- Noise levels during night works as part of the works will also be monitored to evaluate the impacts on the sensitive receptors.

This monitoring of the construction and operation activities will allow verification that the levels are within regulatory levels (EPA Publication 1411 criteria). Where an exceedance of the regulatory levels (EPA Publication 1411 criteria) or a complaint is received, an assessment of whether WST Facility is the source of the noise issue will be undertaken. Should exceedances be recorded, a review of operations will be conducted, and reasonable and feasible mitigation measures will be implemented.

## 7.7 Records of Monitoring

Copies of all monitoring reports will be kept by WST Facility throughout the duration of the project. The above monitoring reports should be reviewed monthly by WST Facility and/or its consultants to ensure that any adverse impacts on the environment are proactively manage and that there are continuous efforts to improve environmental management of the site.

The WST Facility will maintain records and undertake reporting in accordance with the requirements of the Environment Protection, and reporting of pollution incidents outside the processing area in accordance with the provisions in the TBM Spoil Regulations relating to record keeping requirements (i.e. requirement 5 [p] as detailed below):

"p) the following information is recorded and retained at the premises for at least 2 years.

i. the quantity of TBM Spoil received at the processing area and the date on which it was received

ii. the quantity of TBM Spoil removed from the processing area for deposit in the containment system and the date on which it was removed and deposited

iii. the quantity of leachate removed from the processing area for discharge or deposit into the sewerage system of a water corporation

iv. the quantity of TBM Spoil and leachate removed from the processing area for deposit at a site licensed to accept industrial waste of that kind and the date on which it was removed."

## 7.8 Summary of Monitoring and Reporting

Table 7-3 summarises the inspection and monitoring requirements during construction and operation of the WST Facility. Additional triggers and actions are summarised in Table 7-3.

Table 7-3 Summary of Proposed Monitoring

| Type of monitoring | Monitoring details | Frequency and stage | Triggers and Actions | Responsible person |
|---|---|---|---|---|
| Groundwater | Water levels<br>pH, EC, DO and TDS.<br>PFAS.<br>IWRG621 and/or other testing as required depending on the TBM Spoil results. | Monthly prior to commencement of construction and acceptance of TBM Spoil until such time as there are two consecutive months of reproducible results.<br>Three-monthly during operation and thereafter for a period of five years after closure.<br>To be reviewed after five years. | The trigger level will be monitoring results indicating increasing trend or exceedance for PFAS concentrations. | WST Facility and its consultant |

| Type of monitoring | Monitoring details | Frequency and stage | Triggers and Actions | Responsible person |
|---|---|---|---|---|
| | | | The contingency plan would be to: check level of leachate in the sumps, the Leachate Sedimentation Pond and the Southern Leachate Pond; resample groundwater bores identified as showing an exceedance or increasing trend; investigate potential sources of the contamination; and to develop management strategy in consultation with EPA and the Auditor. | |
| Leachate | PFAS.<br>Other testing as required depending on the TBM Spoil results.<br>Select samples will be analysed for IWRG621 on a monthly basis.<br>Leachate level.<br>The quantity of leachate removed from the WST Facility. | Southern Leachate Pond: weekly during the operation and closure period, then three-monthly following closure for a period of five years.<br>Leachate Sedimentation Pond and Leachate Collection Sumps: weekly during the first three months of operation, then three-monthly during the remainder of the operation, closure, and five-year post-closure period.<br>To be reviewed after five years. | Treatment will be instigated if concentrations exceed drinking water trigger levels (defined at the start of Section 3.6).<br>Reuse of leachate for dust suppression and construction water purposes at the WST Facility will occur if analysis indicates concentrations are below the drinking water trigger levels.<br>If the leachate levels in the Containment Cell approach the 0.3 m leachate head; the 0.5 m freeboard in the Leachate Sedimentation Pond and the 0.5 m freeboard in the Southern Leachate Pond; then actions will be undertaken by WST to monitor and manage to ensure levels are reduced to the acceptable level. The steps to reduce leachate levels will include one or more of the following:<br>• If concentrations in leachate are less than drinking water trigger level, leachate will be discharged for direct reuse.<br>• If concentrations in leachate is more than drinking water trigger level, then it may be pumped to the treatment plant. | WST Facility and its consultant |

| Type of monitoring | Monitoring details | Frequency and stage | Triggers and Actions | Responsible person |
|---|---|---|---|---|
| | | | • In the event that there is insufficient capacity in the Southern Leachate Pond, tank farm and treatment plant, the leachate will be trucked off-site to an EPA licensed facility.<br>In addition, additional pumps have been installed in the Holding Bays and Drying Bays that can be used to pump leachate to the Leachate Sedimentation Pond in extreme rain events.<br>EPA will be advised if the volume of leachate in storage exceeds 50 % of total capacity (i.e. 19.6 ML) and be provided with weekly reports on volume until the level falls below 50 % of total capacity again. | |
| Surface water | pH, EC, TDS.<br>PFAS.<br>Other testing as required depending on the TBM Spoil results.<br>Water level. | One baseline monitoring round before accepting TBM spoil.<br>Bi-annual monitoring during construction, operation and closure and post closure for a period of 5 years<br>Water level only following heavy rainfall (i.e. more than 20 mm of rainfall in a 24-hour period).<br>To be reviewed after 5 years | PFAS increasing levels over time.<br>Triplicate samples of surface water, sediment, leachate, and groundwater should be collected from the sample location that show increasing trend for PFAS to confirm the results. If the levels are still elevated, in the first instance, PFAS levels in surface water should be compared to the PFAS levels in groundwater and leachate at the WST Facility to evaluate if the WST Facility may be the source. Other factors such as discharge events from the WST Facility should also be considered to assess if there is any potential migration pathway from the WST Facility. | WST Facility and its consultant |

| Type of monitoring | Monitoring details | Frequency and stage | Triggers and Actions | Responsible person |
|---|---|---|---|---|
| | | | In the event that WST Facility is considered the potential source of increasing PFAS levels in Parwan Creek and/or Werribee River, then further evaluation of whether biota sampling from these receptors (at the monitoring locations) is necessary to investigate the risks to the surrounding environment. A management strategy shall be developed in consultation with EPA and the Auditor, if WST facility is found to be the source of PFAS impacts in Parwan Creek and/or Werribee River. | |
| Land/soil | PFAS<br>IWRG621 Suite | Prior to construction<br>At completion of project following stripping and placement in Containment Cell. | In the event soil samples collected from the stripped areas of the Holding Bays and Drying Bays contain contaminant levels in excess of those reported in the baseline soil assessment and criteria adopted for assessing impacts to land uses allowed under the WST Facility's Special Use Zone and Farming Zone, corrective actions shall be developed. The actions will be defined in a Clean Up Plan, and will include to the extent practicable, actions to define and delineate impacted areas. Further sampling, analysis, assessment against HIL/EIL and IWRG, and decisions for suitability for use or appropriate disposal thereof may be required. Prior to implementation, the Clean Up Plan will be reviewed, and Environmental Auditor review verification letter issued. EPA will also be consulted/involved with development of the Clean Up Plan. | WST Facility and its consultant |

| Type of monitoring | Monitoring details | Frequency and stage | Triggers and Actions | Responsible person |
|---|---|---|---|---|
| | | | To inform the Clean Up Plan, a conventional contaminated sites assessment approach will be applied. A site-specific HHERA would be required if the soil baseline values are exceeded. The framework for the HHERA would follow NEPM Schedule B5a (ecological risk assessment) and Schedule B4 (human health risk assessment). In the Farming Zone portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to agricultural land uses. In the Special Use Zone (mining authority) portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to surface water and groundwater.<br><br>Prior to performing any HHERA, a scoping technical memorandum would be prepared that is reviewed by the Auditor and an Auditor review letter issued. EPA will be consulted/involved with development of the scope of the HHERA.<br><br>A Stock Management Plan or other risk mitigation measure may be a required outcome of the HHERA in the Farming Zone portion of the WST Facility. If this is the case, EPA would also be consulted/involved in its development. | |
| TBM Spoil | The quantity of TBM Spoil received at the processing area and the date. | As received. | - | WST Facility |
| | The quantity of TBM Spoil removed from the processing area for deposit in the containment system. | At time of transfer to Containment Cell. | - | WST Facility |

| Type of monitoring | Monitoring details | Frequency and stage | Triggers and Actions | Responsible person |
|---|---|---|---|---|
| | The quantity of TBM Spoil removed from the processing area for deposit at an EPA licensed facility. | At time of transfer. | - | WST Facility |
| Dust | Visual observations. | Daily during construction and operation. | Increased visible dust then implement mitigation measures (e.g. increased haul road watering and reduced speed limits for road trucks on unsealed public roads and site roads). | WST Facility |
| | Total insoluble solids and ash content. | 3-monthly during construction and operation. | If WST generated dust deposition rate exceeds the criterion of 4 g/m$^2$/month (or 2 g/m$^2$/month over background), site management practices will be reviewed, and dust controls implemented to reduce dust levels to within this guideline. | WST Facility and its consultant |
| Noise | Noise loggers will be deployed in the initial phase of the works to monitor the noise level so that an assessment can be made to confirm that the measured noise levels should be attributable to the WST Facility works.<br>Noise monitoring will be conducted for the whole duration of the construction works. The monitoring can be in the form of attended or un-attended monitoring (using loggers).<br>Daily observations of the noise level will be monitored during operation.<br>Noise levels during night works as part of the works will also be monitored to evaluate the impacts on the sensitive receptors. | Prior to construction, during construction and operation and during night works.<br>Daily monitoring during operation. | Where an exceedance of the regulatory levels (EPA Publication 1411 criteria) or a complaint is received, an assessment of whether WST Facility is the source of the noise issue will be undertaken. Should exceedances be recorded, a review of operations will be conducted, and reasonable and feasible mitigation measures will be implemented. | WST and its consultant |

# 8 Closure and Post-closure Management and Monitoring

This Section provides information on the closure and post-closure provisions as required by the TBM Spoil Regulations in order to mitigate the risk of adverse impacts.

## 8.1 WST Facility Closure Environmental Site Assessment and Management

On completion of the project, the [redacted] from the Holding Bays and Drying Bay area will be stripped and disposed of within the Containment Cell. Samples taken below the 300 mm stripping profile will be collected and analysed for IWRG621 and PFOS/PFHxS and PFOA.

In the event soil samples collected from the stripped areas of the Holding Bays and Drying Bays contain contaminant levels in excess of those reported in the baseline soil assessment and criteria adopted for assessing impacts to land uses allowed under the WST Facility's Special Use Zone and Farming Zone, corrective actions shall be developed. The actions will be defined in a Clean Up Plan, and will include to the extent practicable, actions to define and delineate impacted areas. Further sampling, analysis, assessment against HIL/EIL and IWRG, and decisions for suitability for use or appropriate disposal thereof may be required. Prior to implementation, the Clean Up Plan will be reviewed, and Environmental Auditor review verification letter issued. EPA will also be consulted/involved with development of the Clean Up Plan.

To inform the Clean Up Plan, a conventional contaminated sites assessment approach will be applied. A site-specific HHERA would be required if the soil baseline values are exceeded. The framework for the HHERA would follow NEPM Schedule B5a (ecological risk assessment) and Schedule B4 (human health risk assessment). In the Farming Zone portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to agricultural land uses. In the Special Use Zone (mining authority) portion of the WST Facility, the HHERA would address whether the contamination identified poses a risk to surface water and groundwater.

Prior to performing any HHERA, a scoping technical memorandum would be prepared that is reviewed by the Auditor and an Auditor review letter issued. EPA will be consulted/involved with development of the scope of the HHERA.

A Stock Management Plan or other risk mitigation measure may be a required outcome of the HHERA in the Farming Zone portion of the WST Facility. If this is the case, EPA would also be consulted/involved in its development.

All laboratory analysis of samples will be completed by a NATA accredited laboratory.

Following sampling an analysis the voids will be backfilled using either soils from the amenity bund, previously stockpiled subsoil, and topsoil or from borrow areas, which have been confirmed as acceptable. The completed surface will be seeded with grasses.

## 8.2 WST Facility Closure Infrastructure Decommissioning

Detailed information on the rehabilitation and aftercare management of the WST Facility is presented in the Mackenzie Plans, included in ANNEX AB. A high-level summary is presented below.

Infrastructure not required for long term monitoring and management of the Containment Cell will be decommissioned and demobilised from site. This infrastructure includes:

- The driver control station, RFID scanner and automated weighbridge

- Lighting and signage
- Offices and amenities.

## 8.3 WST Facility Closure Surface Reinstatement and Revegetation

Spoil storage/Holding Bays and TBM Spoil Drying Bays will be cut and filled to blend in with the natural topographic features.

The Containment Cell will be capped and graded to enable control of runoff to perimeter swales located at the toe. The final surface will be covered with topsoil and vegetated mainly with grasses. The containment cell cap design documents are included in ANNEX R.

## 8.4 Additional Monitoring of Infrastructure

Additional surface water monitoring infrastructure will be installed following capping of the containment cell, as per the requirements of the water management plan in ANNEX Y. Additional groundwater monitoring infrastructure will only be installed if groundwater results suggests this is required.

## 8.5 Containment Cell Aftercare Cap Condition Monitoring and Maintenance

Regular monitoring of the final cap and cap vegetation is incorporated into the aftercare management plan. The cap will be monitored for cracks, erosion, vegetation dieback, depression and surface water pooling and where identified remedial actions undertaken such as infilling and replanting.

## 8.6 Containment Cell Aftercare Leachate Monitoring and Management

On completion of the Containment Cell Cap, the infiltration of stormwater is greatly reduced, thereby reducing the volume of leachate production. Monitoring of leachate levels will provide an indication of the volumes generated which would then inform the requirement to extract leachate.

Leachate and groundwater monitoring requirements during capping and post-closure are specified in the water management plan included in ANNEX Y. Triggers and contingencies are included should elevated levels of contaminants of potential concern be reported during the aftercare management period.

The necessity to treat leachate prior to reuse on-site for dust suppression as a result of PFAS or other COPC exceeding the drinking water trigger levels (defined at the start of Section 3.6) will also be assessed based on results received.

# 9 TBMS-EMP Review

## 9.1 Frequency

The TBMS-EMP will be subject to regular review and continuous improvement in the form of an adaptive risk management process.

Specifically, WST as the duty holder (under their General Environmental Duty) will continuously monitor their performance and evaluate the adequacy and appropriateness of the TBMS-EMP to minimise risks of environmental harm to the extent practicable.

The performance auditing program, undertaken on a quarterly basis and reported on a biannual basis will address the adequacy and appropriateness of the assessed risks, monitoring and risk management protocols, based on the evidence of environmental performance. The auditor's findings or recommendations will be provided to EPA.

## 9.2 Document Distribution and Approval

In accordance with the EMS, records will be kept of monitoring results to assess the environmental performance of the project. The following document controls will be implemented:

- Documents are reviewed, revised as necessary and approved for adequacy by authorized personnel
- The current version of relevant documents shall be available at all locations where operations essential to the effective functioning of the environmental management plan
- Documents of external origin determined to be necessary for the planning and operation of the TBMS-EMP are identified and their distribution controlled
- Obsolete documents shall be promptly removed from all points of issue and use, or are otherwise assured against unintended use
- Any obsolete documents retained for legal and / or knowledge preservation purposes shall be suitably identified.

All documentation shall be legible, dated (with dates of revision) and readily identifiable, maintained in an orderly manner, and retained for a specified period. WST shall establish, implement, and maintain a procedure for the creation and modification of the various types of documents and the respective responsibilities for such creation and modifications.

A copy of the record keeping documentation to be used at the WST Facility is included in ANNEX AF.

## 9.3 Containment Cell Aftercare Environmental Management

An aftercare environmental management plan has been developed, which is included in ANNEX AB. The Auditor has reviewed the Aftercare Management Plan, and the review is included in ANNEX AE.