



HI-QUALITY GROUP

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## **Hi-Quality Quarry Products Pty Ltd**

### Hi Quality Sunbury Waste Management Facility Environment Management Plan

This document contains commercially sensitive information as defined in regulation 6(6) of the Environment Protection (Management of Tunnel Boring Machine Spoil) Regulations 2020. It is provided to the EPA for information purposes only and its content must not be made publicly available or disclosed to any third party without prior consultation with, and approval from GHD and Hi-Quality Quarry Products Pty Ltd.

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# Table of contents

1.	Introduction .....	1
1.1	Description of report.....	1
1.2	Purpose of this report.....	7
1.3	Limitations.....	7
2.	Project delineation.....	8
2.1	Current operations .....	8
2.2	Planning scheme information .....	8
2.3	Planning approval .....	8
2.4	Surrounding land use and current land use.....	10
2.5	Topography and drainage.....	10
2.6	Geology.....	11
2.7	Hydrogeology.....	11
2.8	Groundwater .....	11
3.	Contaminated spoil source, location, quantity and characteristics .....	13
3.1	Quantity and characteristics of spoil.....	13
3.2	Potential contaminants of concern.....	13
4.	Human health and ecological risk assessment.....	15
4.1	Conclusions of HHERA.....	15
4.2	Specification for containment cell .....	16
5.	Sampling Analysis Quality Plan .....	18
5.1	Liquid testing.....	19
6.	Containment bays .....	20
6.1	Site layout and containment bays.....	20
6.2	Pre-treatment holding ponds .....	21
6.3	Supporting modelling .....	21
7.	Containment cell .....	25
7.1	Disposal of spoil material.....	25
7.2	Detailed design containment cell.....	26
8.	Wastewater treatment.....	29
8.1	Treatment process.....	29
8.2	Plant operation and maintenance.....	32
8.3	Treated water management and reuse .....	32
9.	Baseline groundwater quality .....	35
10.	Transport.....	36
10.1	Tracking of spoil.....	36
10.2	Proposed transport routes .....	36
11.	Current and future uses of the project area .....	37

11.1	Current land uses.....	37
11.2	Future land uses .....	37
12.	Stakeholder assessment and consultation .....	38
12.1	Purpose of stakeholder engagement.....	38
12.2	Engagement context.....	38
13.	Operational management procedures .....	41
13.1	Management requirements.....	41
13.2	Complaints, non-compliance and corrective actions .....	50
13.3	Monitoring and inspection program .....	50
13.4	Reporting .....	62
13.5	Pollution incident plan.....	63
13.6	OMP review .....	65
14.	Auditor review .....	66
14.1	EMP review.....	66
14.2	Construction of SWMF infrastructure.....	66
14.3	Risk of harm audits .....	67
14.4	Independent verification.....	67
15.	References .....	68

## Table index

Table 1	Documentation Table for EMP requirements .....	2
Table 2	Documentation Table for receipt of TBM spoil at premises with an approved EMP .....	4
Table 3	Surrounding land use.....	10
Table 4	Beneficial uses of groundwater.....	12
Table 5	Site specific trigger levels .....	15
Table 6	HHERA acceptance criteria containment cell.....	17
Table 7	Proposed treated water uses.....	33
Table 8	Interested and affected stakeholders.....	39
Table 9	Environmental objectives and management requirements .....	42
Table 10	Groundwater monitoring program.....	51
Table 11	Trigger levels for potential COCs based on CSM of Tunnelled Ground (AJJV 2019).....	55
Table 12	Surface water and leachate monitoring program.....	56
Table 13	Treated water monitoring program .....	59
Table 14	Treated water specifications for potential COCs .....	60
Table 15	Dust monitoring program .....	61

# Figure index

Figure 1	Preliminary process flow diagram.....	31
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## Appendices

Appendix A of the EMP Report – Figures	
Appendix B of the EMP Report – Human health and ecological risk assessment	
Appendix C of the EMP Report – Containment bay and pre-treatment pond detailed design	
Appendix D of the EMP Report – Containment bay and pre-treatment pond modelling and holistic water balance modelling	
Appendix E of the EMP Report – Containment cell detailed design	
Appendix F of the EMP Report – Containment cell modelling	
Appendix G of the EMP Report – Water treatment plant solution	
Appendix H of the EMP Report – Operational Management Procedures	
Appendix I of the EMP Report – Baseline PFAS monitoring memorandum	
Appendix J of the EMP Report – Proposed transport routes	
Appendix K of the EMP Report – Monthly spoil volumes	
Appendix L of the EMP Report – Auditor verifications	

# 1. Introduction

## 1.1 Description of report

Spoil material will be generated from the Tunnel Boring Machines (TBMs) used in the construction of the major infrastructure project West Gate Tunnel (WGTP). Hi Quality Quarry Products Pty Ltd (Hi-Quality) proposes to process, classify and dispose of the spoil material at the dedicated Sunbury Waste Management Facility (SWMF) at their Bulla site (the site), which will be separate to their existing landfill and resource recovery operations. The site is known as a hub of State importance in the Statewide Waste and Resource Recovery Infrastructure Plan (2018) and the Metropolitan Waste and Resource Recovery Implementation Plan (2016). The operation of the SWMF represents an expansion of the existing resource recovery and waste management activities being undertaken at the site, which is consistent with its designation as a hub of State importance.

The SWMF may also be utilised for other major State significant infrastructure projects, which produce spoil of a similar nature to that generated by the WGTP, however additional approvals from EPA would be required for the SWMF to be used by other State significant projects.

Spoil material generated at the TBMs may be contaminated with per- and poly-fluoroalkyl substances (PFAS) and other contaminants (refer section 3), and require waste classification prior to disposal. The proposed works for the SWMF are:

- a. Construction of engineered lined containment bays (falling within the definition of “processing area” set out in section 6.1), where the spoil will be stored temporarily for classification and dewatering
- b. Construction of an engineered lined containment cell for placement of spoil where PFAS concentrations are below the limits of the Human Health and Ecological Risk Assessment (HHERA)
- c. Construction of engineered lined leachate holding ponds, which will collect the drained water (leachate) from the spoil temporarily stored in the containment bays
- d. Construction of a Water Treatment Plant (WTP) for treatment of the spoil leachate, which is expected to contain PFAS

The Environment Protection Authority Victoria (EPA) requires that an Environment Management Plan (EMP) be prepared for the SWMF in accordance with the Environment Protection (Management of Tunnel Boring Machine Spoil) Regulations 2020, Statutory Rules No. 62/2020 (Regulations (2020)). The Regulations (2020) came into operation on 30 June 2020. EPA will be responsible for approving this EMP for temporary storage and disposal of spoil at Hi Quality's SWMF.

The objectives of the Regulations (2020) are to provide a mechanism for the management and disposal of TBM spoil to protect human health and the environment, and to make a consequential amendment to the Environment Protection (Scheduled Premises) Regulations 2017. The Regulations (2020) have the effect that the requirements of Sections 19A and 20 (1) of the Environment Protection Act 1970 (EP Act) regarding the scheduled premises do not apply to the occupier of a scheduled premises in respect of the receipt, storage, treatment, reprocessing, containment, handling or discharge or deposit onto land of TBM spoil if the occupier submits an EMP for the premises to the EPA and the EPA approves that EMP. The Regulations (2020) also note that there is an exemption to Section 27A (2) of the EP Act relating to dumping, depositing, discarding or abandoning a particular kind of industrial waste at a place not being licensed to accept industrial waste of that kind, or without the knowledge or consent of the licence holder.

The requirements for an EMP in accordance with the Regulations (2020), along with where they have been addressed within this EMP, are outlined in Table 1. The requirements for receipt of TBM spoil to be satisfied by an occupier at premises with an approved EMP are outlined in Table 2. Any references to the reuse area or reuse containment area contained within some of the reports attached as appendices to this EMP are considered to be replaced by the containment cell and any references to the site's Soil Management Plan (GHD, 2020) contained within some of the reports attached as appendices to this EMP are considered to be replaced by the requirements of this EMP for the purposes of the SWMF operations.

Any references to the terms 'reuse area' or 'reuse containment area' contained within any of the reports attached as appendices to this EMP should be read and replaced with the term 'containment cell' for the purposes of this EMP. Any references to the site's Soil Management Plan (GHD, 2020) contained within any of the reports attached as appendices to this EMP should be read and replaced with the term 'Environment Management Plan' (or EMP as appropriate) for the purposes of the SWMF operations.

**Table 1 Documentation Table for EMP requirements**

Element	Regulations (2020) reference	Requirement	Section / Appendix	Responsible party
Location	6(2)(a)	A description and map of the location of the premises at which tunnel boring machine spoil is to be received.	Section 2 and Figure 1 in Appendix A	N/A
Premises plan	6(2)(b)	A plan of the premises identifying the location of the processing area for the purposes of regulation 5(b) and the location of the containment system.	Figure 2 in Appendix A (the processing area (within the meaning given by the Regulations 2020) is comprised of the facilities/structures shown as the containment bays, pre-treatment ponds, the water treatment plant and the treated water discharge pipe. The containment system (within the meaning given by the Regulations (2020)) is shown as the containment cell).	N/A
Elements or segments of the environment	6(2)(c)	A description of the physical characteristics of the premises and elements or segments of the environment adjacent to the premises.	Section 2, Appendix B and Appendix H	N/A
Existing and proposed uses	6(2)(d)	The existing and proposed uses of the premises and elements or segments of the environment adjacent to the premises.	Sections 2, 11 and Appendix B	N/A
Activities to be undertaken	6(2)(e)	A description of the activities to be undertaken at the premises.	Sections 3 to 10	N/A

Element	Regulations (2020) reference	Requirement	Section / Appendix	Responsible party
Tunnel boring machine spoil	6(2)(f)	A description of the tunnel boring machine spoil to be received at the site.	Section 3	N/A
Containment of material	6(2)(g)	The specifications for containment of tunnel boring machine spoil at the premises.	Section 4.2	Hi Quality
Material compliance methodology	6(2)(h)	The methodology for determining if tunnel boring machine spoil meets the specifications for containment of tunnel boring machine spoil.	Sections 4.2, 5 and 7.1	CPB Contractors and John Holland Joint Venture (CPBJH JV)
Risk to beneficial uses	6(2)(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 material ("the Activities") on any beneficial uses of the environment.	Section 4 and Appendix B	Hi Quality
Risk minimisation	6(2)(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 13 and Appendix H	Hi Quality
Detailed design and technical specification	6(2)(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 6, 7, Appendix C and Appendix E	Hi Quality
Construction quality assurance plan	6(2)(l)	A construction quality assurance plan for the containment system at the premises.	Appendix C and Appendix E	Hi Quality
Leachate sampling and analysis	6(2)(m)	Requirement for leachate sampling and analysis.	Sections 5, 1.1 and Appendix H	CPBJH JV
Leachate reuse	6(2)(n)	The specification of the qualities and characteristics of leachate that is suitable for reuse and an identification of activities for which that leachate can be reused.	Sections 8 and 13	Hi Quality

Element	Regulations (2020) reference	Requirement	Section / Appendix	Responsible party
Document management	6(2)(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 9 of the Operational Management Procedures (OMP) (Appendix H)	Hi Quality
Monitoring program	6(2)(p)	A monitoring program to demonstrate compliance with the EMP.	Section 13 and Appendix H	Hi Quality
Environmental audit	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.	Section 14 and Section 12 of OMP (Appendix H)	Hi Quality
Pollution incidents	6(2)(r)	A pollution incident plan setting out how any pollution incident will be responded to.	Section 13.5 and Appendix H	Hi Quality
Audit of detailed designs	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.	An Environmental Auditor has prepared a letter of assessment to address this requirement; including the detailed design documents, the water balance, the environmental monitoring program, and the pollution incident plan. This letter is provided in Appendix L	Hi Quality
Review of EMP	6(2)(t)	How the EMP is to be reviewed.	Section 13	Hi Quality

**Table 2 Documentation Table for receipt of TBM spoil at premises with an approved EMP**

Regulations (2020) reference	Requirement	Section / Appendix	Responsible party
5(a)	Tunnel boring machine spoil is managed and disposed of in accordance with the environment management plan	EMP document	Hi Quality
5(b)	The receipt, consolidation and dewatering of the tunnel boring machine spoil occurs on an impervious surface ("the processing area")	Section 6	Hi Quality
5(c)	Tunnel boring machine spoil is received in the processing area	Sections 6 and 10	Hi Quality
5(d)	No liquids, slurry or sludge escapes, spills or leaks from the processing area	Section 6 and Appendix H	Hi Quality

Regulations (2020) reference	Requirement	Section / Appendix	Responsible party
5(e)	The processing area is secured to prevent public access	Section 6	Hi Quality
5(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	Section 2.4	Hi Quality
5(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	Sections 4, 5 and 7	Hi Quality and CPBJH JV
5(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	Sections 4, 5 and 7	Hi Quality and CPBJH JV
5(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 7	Hi Quality and CPBJH JV
5(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— (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; or (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; or (iii) for deposit at a site licensed to accept industrial waste of that kind	Sections 5, 13.3 and Appendix H	Hi Quality and CPBJH JV
5(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	Sections 4.2 and 11.4 of OMP (Appendix H)	Hi Quality

Regulations (2020) reference	Requirement	Section / Appendix	Responsible party
5(l)	The containment system is designed and constructed in accordance with the environment management plan	Sections 6 and 7	Hi Quality
5(m)	The containment system is not used to contain any waste that is not tunnel boring machine spoil	Sections 5 and 7	Hi Quality
5(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	Sections 4.2 and 7	Hi Quality and CPBJH JV
5(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 5.1	Hi Quality and CPBJH JV
5(p)	The following information is recorded and retained at the premises for at least 2 years— (i) the quantity of tunnel boring machine spoil received at the processing area and the date on which it was received; (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 (iii) the quantity of leachate removed from the processing area for the purposes of reuse and the date on which it was removed; (iv) the quantity of leachate removed from the processing area for discharge or deposit into the sewerage system of a water corporation; (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 13 and Appendix H	Hi Quality
5(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— (i) the time, date and location of the incident; (ii) the nature of the incident; (iii) the circumstances in which the incident occurred (including the cause of the incident, if known); (iv) the name of the person reporting the incident	Section 13 and Appendix H	Hi Quality and CPBJH JV
5(r)	A copy of the environment management plan is available at the premises.	Section 13 and Appendix H	Hi Quality

## 1.2 Purpose of this report

This report has been prepared for Hi-Quality, to seek approval from EPA for the SWMF at Hi Quality's Bulla site for processing, management and disposal of TBM spoil generated from the WGTP and other major State significant infrastructure projects, which produce TBM spoil of a similar nature to that generated by the WGTP. Additional approvals from EPA would be required for the SWMF to be used by other State significant projects.

## 1.3 Limitations

*This report: has been prepared by GHD for Hi Quality Quarry Products Pty Ltd and may only be used and relied on by Hi Quality Quarry Products Pty Ltd for the purpose agreed between GHD and the Hi-Quality Quarry Products Pty Ltd as set out in Section 1.2 of this report.*

*GHD otherwise disclaims responsibility to any person other than Hi-Quality Quarry Products Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report throughout the report. GHD disclaims liability arising from any of the assumptions being incorrect.*

*GHD has prepared this report on the basis of information provided by Hi-Quality Quarry Products Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.*

*All documents prepared by third parties (other than Hi-Quality Quarry Products Pty Ltd) and referenced in this document (including but not limited to any classification to be made under regulation 11(1)(b) of the Environment Protection (Industrial Waste Resource) Regulations relating to tunnel boring machine spoil generated as part of the West Gate Tunnel Project and the document titled "West Gate Tunnel Project – Zone 302 Sampling Analysis Quality Plan for Tunnel Spoil for Transport to Site X for Reuse or for Disposal" prepared by Agon Environmental dated 25 March 2020) have been prepared without GHD or Hi-Quality Quarry Products Pty Ltd having provided any information or otherwise having contributed in any manner to the preparation of such documents.*

*The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.*

*Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.*

*Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.*

*The EPA publications referenced within this report are current at the time of the preparation of the report. The EPA is reviewing all publications and its publications are subject to replacement on or from 1 July 2021 in accordance with the commencement of the Environment Protection Amendment Act 2018. Accordingly all EPA publication references within this report should be read as being subject to amendment or replacement from time to time.*

## 2. Project delineation

The site is located at 570 – 650 Sunbury Road, Bulla VIC 3428, approximately 30 km north-west of Melbourne CBD and 6 km south-east of Sunbury (refer Figure 1 in Appendix A). It comprises three Lots (Lots 1, 2 and 3 PS 645017K) that have an approximate area of 261 ha. The SWMF (being the premises at which TBM spoil will be received) will be located within the site at Lots 1, 2 and 3 SP 645017K (refer Figure 2, Appendix A) and this land is owned by Hi Quality. Easting and northing coordinates for the SWMF and environmental monitoring locations are shown on Figure 3, Appendix A.

The site is surrounded by farmland and open bushland, with Emu Creek forms the northern and eastern boundaries of the property. It is accessed from Sunbury Road, which forms the western boundary of the property.

### 2.1 Current operations

Hi-Quality currently accommodates six operations, most of which are located within Lot 1 (Lot 1 PS 645017K):

- A landfill (Bulla Landfill), which is operated under EPA licence 45279 as a Schedule Category A05 and Schedule Category A01 premises
- A waste resource recovery facility, which is operated under EPA Licences 129589 and 136116 as a Schedule Category A01 premises to recover solid inert material from the prescribed industrial waste (Category C contaminated soil), and to sample and analyse soils as part of the inert waste recovery process
- A basalt, sand and clay quarry, which is operated under Work Authority 1123 (WA1123)
- An organic waste processing facility, which is operated by Veolia Environmental Services under EPA Licence 101952 as a Schedule Category A07 premises
- Receipt and use of clean fill in accordance with the planning permit 4131.04 and WA1123.
- Receipt and treatment of acid sulphate soil pursuant to an EPA approved Acid Sulphate Soil Environmental Management Plan (ASS EMP)

### 2.2 Planning scheme information

The site is within the municipality of the Hume City Council. It is zoned as 'Special Use' Schedule 1 (SUZ1) under the Hume Planning Scheme and is subject to an Environmental Significance (ESO1) Overlay. The site is zoned as Urban Growth Zone – Schedule 9 in the southwest and Special Use Zone – Schedule 1 in the central, eastern and northern part of the site. The northern and eastern boundary is zoned as Rural Conservation Zone.

### 2.3 Planning approval

Planning approval is to be obtained via an Amendment to the Hume Planning Scheme. The Amendment is to be approved by the Minister for Planning likely utilising the process in Section 20(5) of the Planning and Environment Act 1987 and will include site specific controls detailed in an Incorporated Document for the SWMF.

The Amendment applies to land comprising 570-600 Sunbury Road Bulla, 630-650 Sunbury Road Bulla, and adjoining land (identified as the subject land) and inclusive of:

- Lot 1 on Plan of Subdivision 645017K
- Lot 2 on Plan of Subdivision 645017K

- Lot 3 on Plan of Subdivision 645017K
- Crown Allotment 2A, Section 24, Parish of Bulla; and
- Lot 2 on Plan of Subdivision 203247Y

The Amendment facilitates the use and development of the subject land for the SWMF including the construction and operation of a purposes built facility for receipt, testing, treatment, storage and disposal of spoil, the construction of a containment cell, earthworks and landform support, alteration and upgrade to Sunbury Road and ancillary activities without the requirement for planning permits provided the use and works are undertaken in accordance with the “Sunbury Waste Management Facility Incorporated Document, July 2020” (or any relevant Incorporated Document approved and gazetted by the Minister for Planning) (Incorporated Document).

The Incorporated Document is required to provide planning permission for soil assessment, classification, treatment management and disposal of surplus spoil material associated with the WGTP. As part of the Incorporated Document, particular plans and documents are required to be prepared and/or updated and it is intended that they will be approved by the Minister for Planning (or responsible authority) to facilitate the disposal of spoil arising from the WGTP.

The Amendment designates the subject land within Specific Control Overlay (SCO) maps in the Hume Planning Scheme to identify where the Incorporated Document and its specific planning conditions apply.

- More specifically, the amendment:
- Amends the Schedules to Clause 45.12 (Specific Controls Overlay) and Clause 72.04 (Documents incorporated into the scheme) to include reference to Incorporated Document
- Amends the Schedule to Clause 72.01 (Responsible Authority for this Planning Scheme) to make the Minister for Planning the responsible authority for administering and enforcing the planning scheme on the subject land
- Amends Planning Scheme Map Nos 7SCO and 14SCO to apply the Specific Control Overlay to the subject land
- Applies Specific Control Overlay – Schedule 12 (SCO12) to the subject land
- The Incorporated Document will require the use and development of the subject land to be conducted in accordance with an Environment Management Plan (which will be a separate document to this EMP)
- Amends Schedule 1 to Clause 45.11 (Infrastructure Contributions Overlay) to exempt the Sunbury Waste Management Facility from payment of infrastructure contributions
- Amends the Schedule to Clause 72.04 to delete the incorporated document “*Sunbury South and Lancefield Road Infrastructure Contributions Plan, November 2019*” and replace it with a new incorporated document titled “*Sunbury South and Lancefield Road Infrastructure Contributions Plan, November 2019 (Amended July 2020)*”

## 2.4 Surrounding land use and current land use

The current land uses surrounding the site are described in Table 3.

**Table 3 Surrounding land use**

Direction from site	Land use
North	Farmland and open grazing. Emu Creek forms the northern boundary of the Lot 1 of the Site.
East	Farmland and open grazing. Emu Creek forms the eastern boundary of the property.
South	Farmland and open grazing. Bulla tip and Quarry approximately 1 km south-east of the SWMF Area. Melbourne Airport is located approximately 8 km south-east of the SWMF Area.
West	Farmland and open grazing. Sunbury Golf Range, approximately 1 km west of the Site. Goonawarra Public Golf course, approximately 2.5 km north-west of the SWMF Area.

Following are the closest residential land uses to the SWMF Area:

- Residential dwelling (excluding the Daameeli homestead located on the Landfill Site) is approximately 360 m west of the SWMF Area
- Residential area Goonawarra, is approximately 2.2 km north-west of the SWMF

The two land lots (Lots 2 and 3 PS 645017K) where the SWMF is proposed to be constructed, have been largely cleared, and used for the last few decades for farming purposes.

## 2.5 Topography and drainage

The site generally slopes in a north/north-easterly direction. The topography is gently undulating on the western part of the site, and is deeply incised in the north and east where Emu Creek has eroded into the basalts and underlying bedrock.

Emu Creek is a small ephemeral feature to the immediate east of the site. Emu Creek joins Deep Creek approximately 1.4 km to the southeast of the site. Deep Creek is slightly larger, and may offer limited fishing opportunities to the south at the Bulla Crossing, approximately 2 km south (direct distance) of the confluence with Emu Creek, although access is limited. It is noted that the Bulla Tip and Quarry (approximately 1 km southeast of the site) lies between the site and Deep Creek. Deep Creek is a tributary of the Maribyrnong River which it joins approximately 7 km south of the site.

As part of the Sunbury South Precinct Structure Plan a future drainage channel is proposed to be constructed through Hi Quality's site to manage 1:100 year rainfall events. The drainage channel will flow generally from north to south and along western edge of the containment cell for TBM spoil. The maximum level of final landform of the containment cell will align with levels of the future 1:100-year drainage channel. Construction works on the 1:100-year drainage diversion channel will be taken after the proposed containment cell reaches final capacity.

## 2.6 Geology

The geological units within the site from youngest to oldest are (Nolan 2019):

Alluvial sediments: Alluvial or swamp deposits along Emu Creek banks and low lying depressions (unconsolidated Quaternary sediments).

Newer Volcanics: Quaternary age basalts outcrop across much of the site and are exposed on the quarry walls.

Brighton Group: Logged as a 10 m thick interval in bores MB10A and MB10B which are near the mapped Brighton Group outcrop in the north-east of the site (Geological Survey, 1973). The clayey sands pinch and swell between the basalt flows of the Newer and Older Volcanics.

Older Volcanics: Exposed in the quarries where they overlie the Werribee Formation. They outcrop in Emu Creek near the central eastern boundary of the site.

Werribee Formation: Tertiary age sandy to gravelly sediments that are exposed below the Older Volcanic in the site quarries.

Ordovician: Siltstone and sandstone sediments that outcrop at north-east of the site along Emu Creek, the western part of the site, and at the base of the southern quarry pit.

## 2.7 Hydrogeology

The regional aquifers from youngest to oldest are (Nolan, 2019):

Quaternary Alluvium Aquifer (QAA): porous, intergranular, water table aquifer; limited thickness and areal extent

Newer Volcanics Aquifer (NVA): fractured rock, water table aquifer; mostly dry at the Site

Brighton Group Aquifer (BGA): porous, intergranular, water table aquifer; thin to absent in some areas

Older Volcanics Aquifer (OVA): fractured rock, water table aquifer; outcrops at the Site

Werribee Formation Aquifer (WFA): porous, intergranular, water table aquifer; more significant in areas to the west of the site where it is thicker

Devonian Granodiorite Aquifer (DGA): fractured rock, water table aquifer; outcrops to the south of Site

Silurian Bedrock Aquifer (SBA): fractured bedrock, water table aquifer; outcrops to the south and south-east of the Site

Ordovician Bedrock Aquifer (OBA): fractured bedrock, water table aquifer; outcrops at the Site

The main aquifers at the site are the Older Volcanics Aquifer (OVA), the Werribee Formation Aquifer (WFA) and the bedrock aquifers.

## 2.8 Groundwater

On a regional scale, groundwater flow is inferred to be in a southerly direction towards Port Phillip Bay. At the site scale, the pre-landfilling groundwater flow direction is inferred to be in an east-south-easterly direction from the ridge lines to Emu Creek. At the local scale, the occurrence and movement of groundwater at the site is not well defined given the multiple aquifers present and the limited number of groundwater monitoring bores in each aquifer. (Nolan 2019), but is expected to flow in the general direction of Emu Creek.

Groundwater salinity within the site is variable due to multiple aquifers intersected and their different proximity to recharge sources. Groundwater monitoring bores installed at the site are screened within the Older Volcanics aquifer (OVA), Werribee Formation aquifer (WFA) and Silurian bedrock aquifer (SBA). Based on the salinity range observed in the up-gradient monitoring bores, the site's groundwater has been conservatively classified as being within Segment B, precluding potable beneficial use. Additional up gradient bores have reported salinity ranges classifying the groundwater unit within Segment C.

Six groundwater bores were identified with 1000 m of the proposed containment cell. Two wells are associated with domestic and stock at a minimum depth of 67 m bgl. One well was designated for commercial purposes and the purpose of three wells were unknown<sup>1</sup>.

A summary of the beneficial uses of groundwater on and offsite are summarised in Table 4.

**Table 4 Beneficial uses of groundwater**

Beneficial use	Existing use	Relevance
Water dependent ecosystems and Species	Onsite: Yes Offsite: Yes	Yes
Potable mineral water supply	Onsite: No Offsite: No	No
Agriculture and irrigation (Irrigation)	Onsite: No Offsite: Yes	Yes
Agriculture and irrigation (Stock watering)	Onsite: No Offsite: Yes	Yes
Industrial and commercial	Onsite: No Offsite: Yes	Yes
Water based recreational (Primary contact recreation)	Onsite: No Offsite: Yes	Yes
Traditional Owner cultural values	Onsite: No Offsite: Potentially	Potentially
Cultural and spiritual values	Onsite: No Offsite: Potentially	Potentially
Buildings and structures	Onsite: Unlikely Offsite: Yes	No
Geothermal	Onsite: No Offsite: No	No

<sup>1</sup> [https://www.vvq.org.au/vvq\\_map.php?](https://www.vvq.org.au/vvq_map.php?)

# 3. Contaminated spoil source, location, quantity and characteristics

## 3.1 Quantity and characteristics of spoil

Information on the anticipated quantity and characteristics of the spoil from tunnelling is included in the Agon Environmental report “*West Gate Tunnel Project – Zone 302 Sampling Analysis Quality Plan for Tunnel Spoil for its Transport to Hi Quality, Bulla, for Reuse or for Disposal as Prescribed Industrial Waste*”, dated 25 March 2020 (SAQP). The SAQP is subject to revision and change.

The West Gate Tunnel involves tunnelling a length of approximately 7 km to a maximum depth of 27.2 m. It is understood that the TBMs will be operating up to 24 hours per day and it is estimated that the spoil will comprise approximately 2.4 million in-situ tonnes of tunnelled clay sand, gravel and groundwater, with the volume of water estimated to be between 50-58% of the total spoil volume (Agon 2020).

A purpose-built storage shed has been constructed on land occupied by the former Pivot site. The shed has been fitted with four purpose built storage bays. Spoil from the tunnelling will be transported via a covered conveyor system to temporary storage bays. From the Pivot site the spoil will be transported to Hi Quality’s SWMF.

The SAQP states that the “*average daily production in the peak month of TBM production is estimated to be about 5,000 bank cubic metres (BCM) per day. This equates to about 11,000 tonne per day or 7,600 loose cubic metres (LCM) per day. The average daily production in the two months before and the 4 months after the peak month is estimated to be about 3,800 BCM/day. This equates to 8,400 tonnes per day or 5,900 LCM/day.*”

A summary of the monthly volumes of spoil expected to be excavated including estimates of water volumes is provided in Appendix K.

Maximum daily spoil volumes received at the SWMF are anticipated to be 11,000 tonne per day. Average daily spoil volumes received at the SWMF are anticipated to be 8,400 tonnes. (Subregulation 6(2)(f)) A description of the tunnel boring machine spoil to be received at the site.)

## 3.2 Potential contaminants of concern

Information on the anticipated contaminants of potential concern (COPCs) along the tunnel alignment is included in the SAQP. Attachment 2 of the SAQP includes information of the COPCs in the spoil as part of the Aurecon and Jacobs Joint Venture (AJJV) report Conceptual Site Model of Ground to be Tunnelled (AJJV 2019).

PFAS are the anticipated contaminants of potential concern (COPCs) along the tunnel alignment. It is considered that PFAS is likely to be associated with groundwater across the domains, with potential soil sorbed PFAS in Domains 8 and 9 (AJJV 2019).

Prescribed Industrial Waste (PIW) contaminated soils are not expected to be received, as known PIW will not be transported to the SWMF. However, there is potential for isolated contamination associated with the original North Yarra Main Sewer (NYMS) in Domain 2 and from the grout blocks at the tunnel portals. The grout blocks refer to the cement stabilising activities to be undertaken as the TBM enters the ground. The cement used will potentially increase the pH of the spoil.

In summary the AJJV (2019) report concludes that:

- All Domains (PFAS Zones A-D) – Given the presence of PFAS reported in groundwater within the tunnel alignment, four additional zones have been assigned based on the likelihood of PFAS being encountered in the groundwater during TBM operation. A conservative approach has been taken with regards to PFAS detections in groundwater, considering the high mobility within groundwater. Based on the data available, the possibility of encountering PFAS in the groundwater during TBM operation cannot be ruled out based on the available information. PFAS detected in the soil or groundwater at any level is a potential issue for disposal and management of spoil, based on EPA’s current guidance
- Domain 2 – NYMS, a potential contamination source that will be tunnelled through (i.e. directly intersects tunnel alignment). Therefore a “potentially contaminated” domain has been assigned to this area and ground to be tunnelled should be sampled and categorised as per the SAQP and Schedule 1 of EPA’s Classification of tunnel boring machine spoil
- Domains 7 and 8 - The tunnels will intersect the Newport Formation (a naturally occurring geology), which may require management as PASS during excavation
- With the exception of the above, all domains were assessed to have either reported concentrations below EPA Fill Material criteria, or if elevated concentrations were reported, they were assessed to be likely reflective of ambient / natural conditions (including natural enrichment processes)

Polymer foaming additives diluted in supplementary water will be added during tunnelling for operation of the TBMs. The SAQP states that *“the supplementary mains water may contain trihalomethanes, chlorine, and its use may form chloroform. These chemical (given that mains water is a potable water supply) are unlikely to be present in in the spoil water in concentrations that could affect the waste categorisation of the spoil solids. It is also noted that the TBM processes will mix and aerate the spoil mixture and also raise its temperature. In these circumstances, it is envisaged that concentrations of volatile chemicals would be rapidly attenuated, such that they are unlikely to impact the environmental management requirements of the spoil water.”*

The Agon Environmental report *“West Gate Tunnel Project Zone 302 Information on Foaming Agents for Tunnel Spoil*, dated 16 September 2019 (Agon 2019), provides information on possible polymer foaming additives that will be used during tunnel boring. The report concludes that the preferred foaming agents are Tamsoil 287AC and Tamsoil 267CF, or other foaming agents that do not contain surfactants belonging to groups listed in Table 3.4.1 of the ANZECC (2000) Water Quality Guidelines. These surfactants should not pose a measurable risk to protected beneficial uses of the environment at the spoil receiving sites, including to groundwater and surface water segments (Agon 2019).

PFOS, PFHxS and PFOA are the anticipated contaminants of potential concern (COPCs) likely to be found in the spoil.

*(Subregulation 6(2)(f)) A description of the tunnel boring machine spoil to be received at the site.)*

## 4. Human health and ecological risk assessment

A human health and ecological risk assessment (HHERA) (GHD 2021) for per- and polyfluoroalkyl substances (PFAS) that may be associated with impacted spoil from the WGTP is provided in Appendix B.

The primary objectives of the HHERA are as follows:

- Develop a CSM that characterises plausible mechanisms (pathways) by which people and sensitive environments or species at the site (receptors) may be exposed to PFAS in the WGTP spoil (sources)
- Undertake a human health and ecological risk assessment to understand the risk to receptors in the context of the CSM as a result of onsite storage and disposal of spoil originating from the WGTP. This HHERA has derived site specific trigger levels (SSTLs) as a means to re-evaluate risk potential as analytical results are obtained during active operations

### 4.1 Conclusions of HHERA

This assessment qualitatively considered a number of sources, pathways and receptors that may be present at the site. It is assumed that engineering controls associated with active operations and placement of spoil in the containment cell will prevent offsite migration associated with fugitive dust, surface water runoff and leaching to groundwater. Therefore, only three complete SPR linkages were identified at the site. These include:

- Exposure of Hi-Quality workers and contractors to spoil
- Exposure of Hi-Quality workers and contractors to leachate originating from WGTP spoil
- Ingestion of leachate contained in the onsite storage ponds by waterfowl

The absence of significant information on the PFAS concentrations that may be associated with spoil originating from the WGTP precludes conclusive assessment of potential for leaching from the containment cell and standard risk characterisation approaches for receptors at the site. As such, highly conservative assumptions have been adopted to estimate SSTLs that can be used as a marker to re-evaluate direct risk potential as the project progresses.

The SSTLs protective of workers and waterfowl are summarised in Table 5. Management measures may be required (e.g., donning of PPE or restricting access to the leachate ponds) if concentrations in soils or leachate exceed these SSTLs.

**Table 5 Site specific trigger levels**

Media	PFASs	PFCAs
Onsite workers		
Soil (mg/kg)	■	■
Leachate (µg/L)	■	■
Waterfowl		
Leachate holding ponds (µg/L)	■	■
Notes:		
PFASs include, PFBS, PFPeS, PFHxS, PFHpS, PFOS, PFNS and PFDS.		
PFCAs include PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDODA, PFTrDA and PFTeDA.		

The outcomes of the containment cell liner performance modelling informs the concentrations of PFAS in soils (and associated leachable fraction) entering the containment cell, to ensure effective engineering controls of the containment cell are in place to prevent leaching and offsite migration of PFAS.

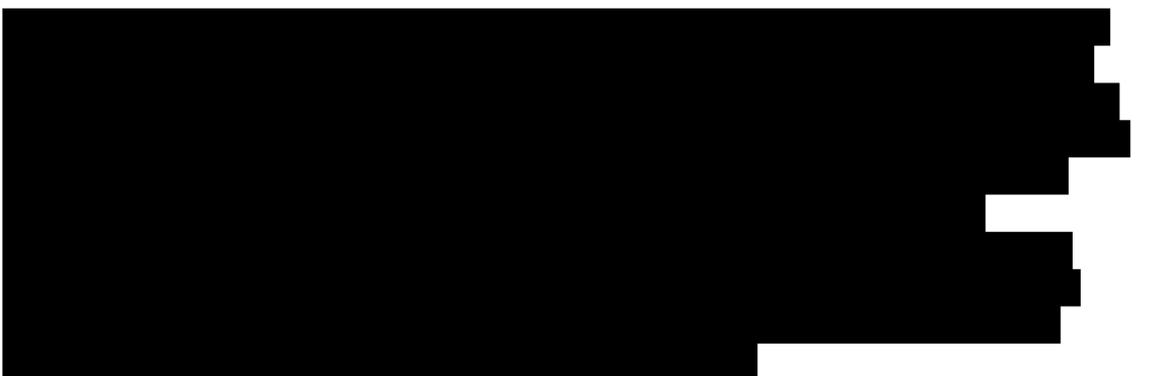
Initial investigations conducted along the WGTP alignment suggest that PFAS concentrations in soils are significantly below the SSTL derived for soil (maximum PFOS+PFHxS concentrations around 3 mg/kg have been reported along the alignment), and the SSTL for leachate is anticipated to be in the 80<sup>th</sup> percentile of leachable PFAS along the alignment. It is generally expected that the concentrations reported in soils along the alignment to date represent likely among the highest concentrations along the alignment, by nature of the investigations being conducted at surface level. It is not anticipated that significant PFAS impact will be observed in spoil originating from depth. However, as this is uncertain at present, returned spoil analysis results should be considered in the context of this HHERA and in the context of the designed containment cell to ensure that PFAS impacted spoil is appropriately managed at the site.

In conclusion, on the basis of the available information at the time of this report it is anticipated that risk is low and acceptable to workers at the site, as reported PFAS concentrations along the WGTP alignment are generally below these values. The risk potential across the broader site is similarly expected to be low on the basis of the qualitative assessment considered in the HHERA, where limited complete SPR linkages were identified. Information gaps resulted in adoption of highly conservative assumptions to estimate SSTLs that can be used as a marker to re-evaluate direct risk potential as the project progresses.

*(Subregulation 6(2)(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 material ("the Activities") on any beneficial uses of the environment.)*

## 4.2 Specification for containment cell

GHD has undertaken POLLUTEv7 modelling to demonstrate that the adopted engineered liner for the containment cell will provide suitable containment of PFOS and PFOA.



[Redacted]

[Redacted]

**Table 6 HHERA acceptance criteria containment cell**

	HHERA acceptance criteria (ASLP leachable concentration)	
	Sum of PFOS + PFHxS (µg/L)	PFOA (µg/L)
Containment cell	■	■

EPA reviewed the HHERA and EMP documentation and in an email dated 20 July 2020 stated the following:

*“EPA notes that some conservative assumptions have been included in deriving the proposed acceptance criteria (specification) for the spoil from the West Gate Tunnel project. However, EPA has noted some additional uncertainties given the risks associated with the limited evidence base available at this time on PFAS behaviour, noting the conservatism elsewhere in the proposed approach. EPA has therefore has applied additional conservatism to the proposed acceptance criteria (specification). Based on the information provided to date, EPA can approve the following ASLP leachable concentration acceptance criteria (specification):*

- *Sum of PFOS + PFHxS = 7 µg/L*
- *PFOA = 56 µg/L”*

The specification (ASLP leachable concentration acceptance criteria) for placement of spoil in the containment cell is:

- Sum of PFOS + PFHxS = 7 µg/L
- PFOA = 56 µg/L

*(Subregulation 6(2)(g) The specifications for containment of tunnel boring machine spoil at the premises.)*

## 5. Sampling Analysis Quality Plan

The sampling, analysis and waste categorisation of TBM spoil will comply with the requirements of the EPA Waste Classification issued under regulation 11(1)(b) of the Environment Protection (Industrial Waste Resource) Regulations 2009 to CPB Contractors and John Holland Joint Venture (CPBJH JV) for the transport of the TBM spoil from the West Gate Tunnel Project site to EPA Approved Premises<sup>2</sup>, and its sampling, analysis and waste categorisation (Waste Classification). This Waste Classification requires that the sampling, analysis, and waste categorisation is done in accordance with the SAQP as defined in the Waste Classification. The SAQP and Waste Classification are subject to revision and change.

CPBJH JV is required to undertake sampling, analysis of spoil solids, spoil solids (ALSP) and dewatered leachate from spoil at Hi Quality's temporary spoil storage area in accordance with the SAQP and Waste Classification. A summary of sampling requirements for the ALSP is listed in the SAQP.

The outputs from the implementation of the SAQP will include reports from sampling, and analysis:

1. Waste categorisation reports to confirm whether TBM spoil in each holding bay may be placed in the containment cell pursuant to the Waste Classification.
2. Further waste categorisation reports that assess TBM spoil for appropriate alternate management if TBM spoil cannot be placed within the containment cell pursuant to the Waste Classification.
3. Reports on the results of the sampling and analysis of the water that drains from the TBM spoil – provided to inform the management of that water pursuant to this EMP.

Please refer to the above referenced SAQP.

Hi Quality will be responsible for sampling leachate from the containment cell sump/s further details are provided in section 13.3.4.

Sampling and analysis of spoil solids, spoil solids (ALSP) and leachate from spoil will be undertaken in accordance with the EPA Classification Schedule 1: Spoil sampling and method of PFAS analysis.

*(Subregulation 6(2)(h) The methodology for determining if tunnel boring machine spoil meets the specifications for containment of tunnel boring machine spoil.)*

*(Subregulation 6(2)(m) Requirement for leachate sampling and analysis.)*

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<sup>2</sup> EPA Approved Premises are premises for which the occupier holds an environment management approved by EPA (EPA Approved EMP) under the *Environment Protection (Management of Tunnel Boring Machine Spoil) Regulations 2020*. This EMP has been prepared to be an EPA Approved EMP.

## 5.1 Liquid testing

Stockpiles of spoil will be kept on containment bays for approximately 21 days whilst spoil is classified and dewatered (the minimum time will be [REDACTED] days and the maximum time will be [REDACTED]). During this time the spoil will be actively dewatered [REDACTED]. Once the spoil has been classified and testing results allow for the spoil to be placed in the containment cell an assessment will be made to ascertain whether the spoil contains any 'free liquid' (leachate). [REDACTED]

Once a fortnight the spoil will be tested to validate that the spoil is spadeable. The validation test will be undertaken via Method 9095B - Paint Filter Liquids Test (Revision 2) published by the United States Environmental Protection Agency in November 2004 or a [REDACTED].

[REDACTED] . Once a fortnight the spoil will be tested to validate that the spoil is spadeable. The validation test will be undertaken via US EPA Method 9095B - Paint Filter Liquids Test (Revision 2) or a [REDACTED].

*(Regulation 5(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.)*

# 6. Containment bays

## 6.1 Site layout and containment bays

The Regulations (2020) under regulation 5(b) require that “the receipt, consolidation and dewatering of the tunnel boring machine spoil occur on an impervious surface (“the processing area”)”. For the purpose of this report and its associated figures and plans the “processing area” within the meaning given by the Regulations (2020) is defined and comprises all of the following facilities/structures described, labelled or functioning as:

- “containment bays”
- “pre-treatment holding ponds”
- “water treatment plant”
- “treated water discharge pipe” and
- any other impervious components of the SWMF where leachate or treated water is held, stored or transported prior to being removed for the purposes of reuse or for deposit at a site licensed to accept industrial waste of that kind.

A basis of design report and detailed design documents, including a technical specification, construction quality assurance (CQA) plan and performance specification, have been prepared for storage of the spoil material on containment bays and pre-treatment leachate holding ponds for leachate drainage (refer Appendix C).

As detailed in Appendix C, the design is

- [REDACTED]
- [REDACTED]

The spoil material generated from the TBMs, will be transported to the SWMF through a dedicated entrance/exit road where it will be weighed on a dedicated weighbridge for the SWMF. The containment bay area will have a 4 metre high bund parallel to Sunbury Road for visual screening and containment of surface water runoff. The SWMF will also be secured to prevent public access.

Entry and exit to the site is located at the southernmost point of the site off Sunbury Road. All entering vehicles will be checked at the weighbridge, and wheel washing will occur for all vehicles prior to exiting the site to Sunbury Road. Operations are expected to occur 24 hours per day, 7 days per week while the TBMs are active. Information on the anticipated quantity and characteristics of the spoil from tunnelling is included in section 3.1.

Hi-Quality is proposing to construct the containment bays

- [REDACTED]

The liner profile of the containment bays will consist of [REDACTED]. Any changes to the liner profile will be assessed in general accordance with Publication 1323.3 Landfill Licensing Appendix 19: Criteria for determining degree of variation.

*(Subregulation 6(2)(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.)*

*(Subregulation 6(2)(l) A construction quality assurance plan for the containment system at the premises.)*

## 6.2 Pre-treatment holding ponds

The containment bays will be [REDACTED]. Detailed design documents, including a technical specification, CQA Plan and performance specification, for the pre-treatment ponds to cater for the volumes of leachate expected to be produced from the containment bays and for a [REDACTED] have been prepared (refer section 6.3.3 and Appendix D).

The adopted pond liner will consist of [REDACTED].

The pre-treatment holding ponds will be constructed along the eastern boundary of the containment bays to allow for natural fall of the area. Leachate from the holding ponds [REDACTED] to be developed to the north of the SWMF (refer section 8).

The liner profile of the leachate ponds will consist of [REDACTED]. Any changes to the liner profile will be assessed in general accordance with Publication 1323.3 Landfill Licensing Appendix 19: Criteria for determining degree of variation.

*(Subregulation 6(2)(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.)*

*(Subregulation 6(2)(l) A construction quality assurance plan for the containment system at the premises.)*

## 6.3 Supporting modelling

GHD has undertaken modelling to demonstrate that the proposed engineered liners for the contaminant bay and pre-treatment holding pond liners will provide suitable containment of PFOS and PFOA at significantly elevated leachable concentrations. A summary of the modelling results is provided below. The modelling is provided in Appendix D.

[REDACTED]

[REDACTED]

**6.3.1 Containment bay modelling**

The containment bay is intended to reduce infiltration of PFAS impacted liquid to the underlying aquifer. The performance of the containment layer has been assessed for compliance with Australian Drinking Water Standards (ADWG) 2011.

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

The adopted design profile for the containment bay is discussed in section 6.1. The above detailed alternative designs may be adopted should the preferred design becomes unviable due to issues concerning material availability and/or other site specific constraints.

### 6.3.2 Pre-treatment leachate pond modelling

The proposed pre-treatment pond design profile has been assessed for compliance with Australian Drinking Water Standards in the underlying aquifer. The leachate source concentrations adopted for the model were derived from PFAS National Environmental Management Plan (NEMP) landfill acceptance criteria (2020) and Human Health and Ecological Risk Assessment (HHERA) (refer Appendix B) site specific trigger values.

[REDACTED]

- [REDACTED]

- [REDACTED]

- [REDACTED]

- [REDACTED]

### 6.3.3 Water balance modelling

A holistic site water balance was developed to allow sufficient leachate management capacity to enable continual compliance with the maximum leachate depth of 300 mm in the containment cell.

[REDACTED] The two options are detailed in Figure 3 and Figure 4 within the memorandum provided in Appendix D, along with the holistic water balance for both options.

The water balance assessment indicates a minimum total pre-treatment holding pond capacity

[REDACTED]

The water balance assessment indicates that [REDACTED]

[REDACTED]

[REDACTED]



# 7. Containment cell

## 7.1 Disposal of spoil material

All spoil that is classified to contain PFOS, PFHxS and PFOA at or below acceptance criteria in accordance with the EPA approved EMP will be placed in the containment cell (refer section 4.2 for acceptance criteria). The spoil will not be classified as PIW. Spoil that is classified to contain PFOS, PFHxS and PFOA above the acceptance criteria will be deposited to a site licensed to accept such waste.

As discussed in section 3.2, PIW contaminated soils are not expected to be received, as known PIW will not be transported to the SWMF. However, there is potential for isolated contamination associated with the original NYMS in Domain 2 and from the grout blocks at the tunnel portals. The grout blocks refer to the cement stabilising activities to be undertaken as the TBM enters the ground. The cement used will potentially increase the pH of the spoil.

The natural geochemistry may give rise to elevated metal concentrations, or potential acid sulfate soil (PASS) in limited locations along the alignment (Agon 2020). In summary, except for the former sewer line in Domain 2 and the grout blocks, spoil is expected to be “Not Potentially Contaminated – Except for PFAS”.

Hi Quality, will manage potential PIW and PASS material as follows:

- Potential Category C PIW from the NYMS, the grout blocks and any section of the tunnel domains will be processed at Hi Quality’s Site B licensed facility (Licence 136116) and disposed as Category C (sewer waste) and solid inert waste (grout blocks) in a licensed cell under EPA Licence 45279. At the Site B facility the spoil material from the NYMS will be screened to separate construction and demolition waste. Should the NYMS and the grout blocks material be identified as Category A or B PIW it will need to be transported to a facility licenced to accept Category A or B PIW.
- Potential PASS material will be sampled and classified before delivery to site, [REDACTED]

PIW from the NYMS, the grout blocks, identified PIW and PASS material will be weighed at the dedicated SWMF weighbridge.

- Spoil that is classified to contain PFOS, PFHxS and PFOA at or below acceptance criteria in accordance with the EPA approved EMP will be placed in the containment cell. Spoil that is classified to contain PFOS, PFHxS and PFOA above the acceptance criteria will be deposited to a site licensed to accept such waste.
- Potential Category C PIW from the North Yarra Main Sewer, the grout blocks and any section of the tunnel domains will be processed at Hi Quality’s Site B licensed facility (Licence 136116) and disposed as Category C (sewer waste) and solid inert waste (grout blocks) in a licensed cell under EPA Licence 45279. Should this material be identified as Category A or B PIW it will need to be transported to a facility licenced to accept this waste.
- Potential PASS material will be disposed [REDACTED]

*(Subregulation 6(2)(h) The methodology for determining if tunnel boring machine spoil meets the specifications for containment of tunnel boring machine spoil.)*

## 7.2 Detailed design containment cell

GHD has prepared a basis of design memorandum and detailed design documents, including the technical specification and CQA Plan for the proposed containment cell for storage of spoil that is classified to contain PFOS, PFHxS and PFOA at or below the EPA approved acceptance criteria. The basis of design report and detailed design documents are provided in Appendix E. The design of the containment cell takes into consideration the holistic water balance discussed in section 6.2 and provided in Appendix D.

The total airspace of the indicative landform is approximately [REDACTED], excluding liner and capping. Initial filling works, shall comprise of [REDACTED]. Additional materials, such as those required to be used for construction purpose (e.g. construction of haul roads, internal bunds and seal bearing layers for the cell capping and the cell liner) may also be used within the containment cell.

The placement of the spoil within the containment cell is intended to facilitate longer term development of this area in accordance with the Sunbury South Precinct Structure Plan, which includes achieving a final landform that is able to accommodate the future 1:100-year drainage channel along the western edge of the containment cell. Use of the spoil will replace the need to use clean fill as part of this infilling project, which can then be used towards other uses on the site or elsewhere.

### 7.2.1 Liner profile

The liner profile for the containment cell will consist of (from bottom layer to top layer):

- [REDACTED]

The adopted liner profile is in accordance with EPA Publication 788.3 Siting, design, operation and rehabilitation of landfills (Landfill BPEM) Type 2 cell liner profile. Alternative designs modelled for the containment cell may be adopted should the preferred design becomes unviable due to issues concerning material availability and/or other site specific constraints.

A leachate sump will also be constructed and comprise an extraction system in which the seepage rate can be periodically measured and, if necessary, extracted.

- The sump is intended to collect leachate and the volume of leachate within the sump shall be kept to the minimum amount practical during and following filling of the containment cell
- The sump will include a permanent depth monitoring device including an automated alarm system and appropriate response procedure on activation once the maximum design storage depth of the sump is reached. The maximum leachate level to be maintained in the sump will be 0.3 m above the cell drainage layer. Further as discussed in section 6.3.3 above, the site's holistic water balance modelling confirms that the proposed leachate management capacity will be sufficient to enable continual compliance with this requirement.

[REDACTED]

The proposed liner profile is in general accordance with Landfill BPEM Type 2 cell liner profile. Any changes to the liner profile will be assessed in general accordance with EPA Publication 1323.3 Landfill Licensing Appendix 19: Criteria for determining degree of variation.

*(Subregulation 6(2)(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.)*

*(Subregulation 6(2)(l) A construction quality assurance plan for the containment system at the premises.)*

### 7.2.2 Final capping profile

The containment cell will be capped and rehabilitated once the final fill contours have been achieved. The final capping profile (from bottom to top) for rehabilitation consists of:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

A technical specification and CQA Plan have been prepared for the containment cell final cap and are attached in Appendix E. Drawings for the final cap profile (Drawing No. 12522193-C011) and top of cap final levels (Drawing No. 12522193-C016) are also attached in Appendix E. The final cap will be reviewed based on any changes arising out of the filling of the containment cell. Although it is not expected that the final cap profile will change, some cap design documents may need to be refined and/or adjusted accordingly.

### 7.2.3 Supporting modelling of proposed liner

GHD has undertaken POLLUTEv7 modelling to demonstrate that the proposed engineered liner for the containment cell will provide suitable containment of PFOS and PFOA. The proposed containment cell liner design profile has been assessed for compliance with Australian Drinking Water Standards in the underlying aquifer. [REDACTED]

The modelling output, indicates [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The modelling is provided in Appendix F, which includes responses to EPA's request for additional information. The EPA's technical assessors requested some additional information to help with their assessment of potential concentrations to be received. GHD provided a response in an email dated 22 May 2020, which is provided as an addendum to Appendix F.

## 8. Wastewater treatment

The leachate generated in the containment bays and containment cell will likely be contaminated with varying levels of PFAS, which will require treatment. Hi-Quality propose to install at the SWMF a WTP that will treat all leachate generated in the processing area and handle up to a [REDACTED]. Based on the water balance modelling (refer section 6.3.3 and Appendix D), this proposed treatment capacity is sufficient to handle the estimated peak leachate generation.

The leachate drainage from the spoil will be tested prior to treatment at the WTP. The main anticipated COPC along the tunnel alignment is PFAS and therefore the WTP has been designed for treatment of PFAS. The WTP will comprise [REDACTED]. The acceptance criteria for PFAS in the treated water will be in accordance with ADWG (2011) (refer to Table 14 for further details), however, Hi Quality's service providers have indicated that the product water quality will be from [REDACTED] Total PFAS. Following treatment by the WTP, the treated water (comprising all leachate generated in the processing area) will either be deposited at a site licensed to accept industrial waste of that kind or reused if the analysis of the treated water determines that it meets the specifications for reuse set out in Table 14.

The WTP will be custom-built and tested at the manufacturer's site. For installation at the SWMF, some materials will be prefabricated offsite and transported to the facility. The equipment will be delivered to site and the WTP will be installed and tested onsite. The WTP will be ready for commissioning once the mechanical and electrical installation has been completed, feedwater is available and any required chemicals are onsite.

### 8.1 Treatment process

The WTP will contain a series of pre-and post-treatment stages as shown in the preliminary process flow diagram for the WTP (refer Figure 1 below). The WTP process equipment includes the following:

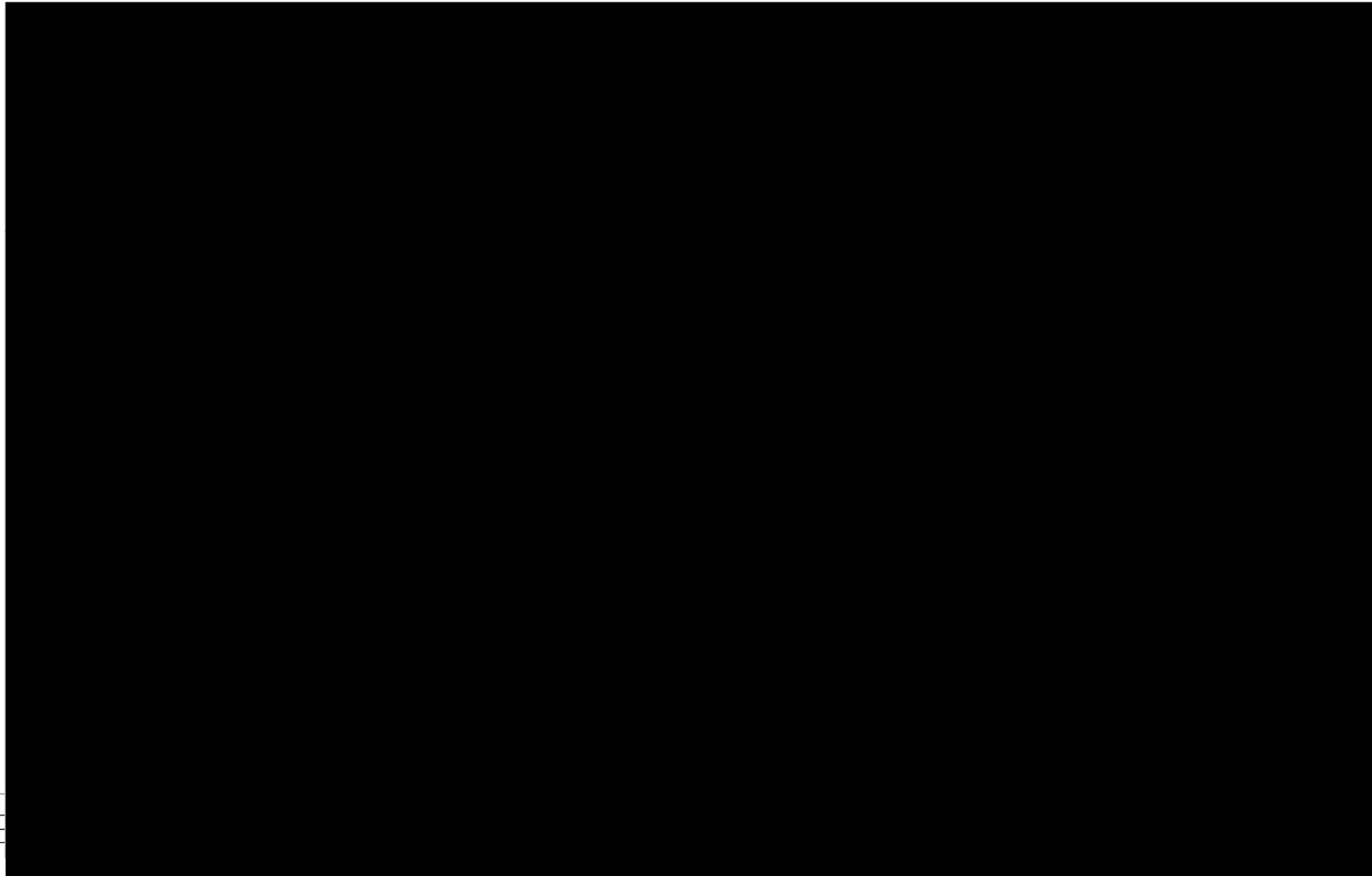
- [REDACTED]

[REDACTED]

Dewatered sludge (~20% w/w dry solids) will be tested and based on the test results an appropriately licenced facility will be selected for the disposal of the dewatered sludge. The filtrate will be returned to one of the raw water storage tanks. Any free phase hydrocarbons/oil/LNAPL and floating scum will be collected in an IBC/s, tested, and will also have to be disposed of to a licensed facility. The selection of the licenced facility will be determined based on test results of the material.

Refer to Appendix G for further documentation on the proposed WTP from two service providers.

The WTP will comprise coagulation/flocculation in conjunction with clarification, dissolved air flotation, media filtration, adsorption, and reverse osmosis. Hi Quality's service providers have indicated that the product water quality will be from [REDACTED].  
*(Subregulation 6(2)(e) A description of the activities to be undertaken at the premises.)*



**Figure 1 Preliminary process flow diagram**





**Table 7 Proposed treated water uses**

Site operation and proposed location for reused water	Proposed uses
[Redacted]	[Redacted]



*(Regulation 5(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 —*

*(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; or...*

*(iii) for deposit at a site licensed to accept industrial waste of that kind)*

*(Subregulation 6(2)(m) Requirement for leachate sampling and analysis.)*

*(Subregulation 6(2)(n) The specification of the qualities and characteristics of leachate that is suitable for reuse and an identification of activities for which that leachate can be reused.)*

## 9. Baseline groundwater quality

Groundwater, leachate and surface water monitoring is undertaken at the Hi Quality Landfill as per the Auditor-verified 2019 Risk Assessment and Monitoring Plan (RAMP). During the May 2020 routine monitoring event, all water samples collected were analysed for PFAS in addition to the analytical suite as defined in the RAMP in order to obtain background concentrations of PFAS. The Baseline PFAS data memorandum provided in Appendix I details the PFAS concentrations found in the water samples collected from the site, and compares them to the ANZECC (2000) Ecosystem Fresh Water 95% guideline trigger values and the NHMRC (2019) recreational water quality guideline values.

The results indicate an exceedance of the NHMRC guideline criteria for the total sum of PFOS and PFHxS in leachate sample LS1. The ANZECC Ecosystem Freshwater guideline value for PFOS was exceeded in one groundwater sample (MB2). A concentration of 0.15 µg/L was recorded, which exceeds the guideline trigger value of 0.13 µg/L.

Leachate samples (LP, LS1, LS3, LS4 and LS5) also recorded concentrations above the ANZECC Ecosystem Freshwater guideline value for PFOS, however, the guideline criteria is not applicable for leachate and the presence of PFAS such as PFOS within leachate is common. In 2017 and 2018 EPA sampled leachate at 22 landfills across Victoria and found PFAS present at all landfill locations (EPA 2020). Ongoing groundwater and surface water monitoring will be undertaken during operation and post operation of the SWMF. Refer to the OMP in Appendix H for further details.

# 10. Transport

## 10.1 Tracking of spoil

From the WGTP pivot site the spoil will be transported in tip trucks with tipping dog trailers each with a carrying capacity between 28 tonne and 37 tonne. The spoil will be placed in the truck and trailer bodies by excavator or front end loader and covered with a tarpaulin before departure from site. The truck will be weighed upon exiting the pivot site at a weighbridge. The truck will also have a dedicated fob which will be scanned at the weighbridge upon exiting the pivot site. CPBJH JV will be responsible in managing the tip trucks until entering at Hi Quality's site.

Upon entering the dedicated entrance at the SWMF the tip truck and trailer will be weighed at the weighbridge and assigned a designated containment bay to unload the spoil. The truck will also have the fob scanned upon arrival.

At the SWMF the trucks and trailers will be unloaded by opening the tail gates of the truck and trailer and raising the bodies to allow the spoil to fall out onto the designated containment bay for the truck. The tail gates on the truck and trailer bodies will be sealed to prevent saturated spoil from escaping during transport.

## 10.2 Proposed transport routes

A map of the preferred truck route (from the Pivot Site) and alternative routes to Hi Quality's Site is provided in Appendix J.

The preferred truck route is as follows:

- Head northbound on Whitehall Street when exiting the Pivot Site
- Turn right onto Moreland Street
- Turn right onto Footscray Road
- Turn onto Citylink headed northbound
- Continue onto Tullamarine Freeway
- Continue onto Sunbury Road
- Continue on Sunbury Road before turning right into the site

# 11. Current and future uses of the project area

## 11.1 Current land uses

The SWMF will be located within the site at Lots 1, 2 and 3 SP 645017K. Lot 1 is zoned as Special Use Zone – Schedule 1 for the majority of the SWMF and Special Use Zone – Schedule 9 for the southern portion of the SWMF. Lot 2 and 3 is zoned as Urban Growth Zone – Schedule 9 for the majority of the SWMF and Special Use Zone – Schedule 1 in the remaining portions.

Current land uses at the SWMF consist of Hi Quality's waste resource recovery facility, which is operated under EPA Licences 129589 and 136116 as a Schedule Category A01 premises to recover solid inert material from the prescribed industrial waste (Category C contaminated soil), and to sample and analyse soils as part of the inert waste recovery process. This facility will need to be relocated for construction of the containment cell.

## 11.2 Future land uses

The Victorian Planning Authority (VPA) released the Sunbury South Precinct Structure Plan in 2018 (refer to Figure 4 in Appendix A), which was subsequently incorporated into the Hume Planning Scheme in January 2019. Significant residential development is proposed to the west and southwest of the site, however, areas currently controlled by Hi-Quality are proposed for industrial, restricted retail, landscaped or stormwater assets (VPA 2018). Therefore, it is not anticipated that any residences will be built directly over the containment cell, nor the locations of the operational containment bays.

# 12. Stakeholder assessment and consultation

A robust and strategic approach is required to effectively manage community and stakeholder relations for the project. With this in mind, Hi Quality is committed to undertake stakeholder engagement primarily focusing on promoting the benefits and vital importance of the project by creating clear understanding, building advocates, addressing community expectations, making relevant information readily available and involving stakeholders (where possible and at the appropriate level).

This section provides an outline of Hi Quality's stakeholder engagement process, noting that Hi Quality prepared a detailed communication and stakeholder engagement plan as part of the planning approval process and has undertaken robust community and stakeholder engagement with key stakeholders in accordance with that plan to date.

## 12.1 Purpose of stakeholder engagement

The purpose of the stakeholder engagement is to:

- Inform relevant stakeholders about the project
- Provide an opportunity for stakeholders to give feedback
- Provide stakeholders with an opportunity to ask questions and to identify areas of concern with respect to the project
- Demonstrate that all concerns and issues raised by the stakeholders are considered, recorded and responded to in the appropriate manner
- Outline the process and protocols to be followed in order to effectively develop timely communication materials and responses
- Identify key risks and how to manage these during delivery

## 12.2 Engagement context

### 12.2.1 Communication and consultation

A stakeholder is any individual, group or organisation that may be impacted by or have an interest in the project. A review of key stakeholders has been undertaken to bring rigour to the communication process. By understanding key stakeholders and their likely issues communications can be more tailored and pre-empt likely questions and concerns, enabling a more proactive approach to communication.

It should be noted that the stakeholder landscape is constantly evolving and changing, and the individual stakeholders and/or issues identified today may change in the future. Stakeholder identification and analysis are ongoing processes that will continue through the life of the project for communication to remain effective.

Table 8 below outlines interested and affected stakeholders, and the communications and engagement approaches that have been taken to date with each. All meetings and interactions were documented to allow the views of stakeholders to be captured and incorporated into an engagement summary report. Hi-Quality proposes to conduct further targeted communications to enable relevant and interested parties to be informed of key project developments.

**Table 8 Interested and affected stakeholders**

Stakeholder	Engagement plan
<p>Adjoining owners / occupiers</p>	<p>Phone calls with landholders of adjoining properties to inform of project, answer questions and discuss concerns.</p> <p>Provided project materials and reports.</p> <p>Provided specific updates at key project milestones.</p> <p>Use of a telephone hotline to enable owners/occupiers to share feedback</p> <p>A dedicated project website was developed to capture and share key information and updates about the project</p> <p>Use of an external online engagement hub to share a project overview, Q&amp;As, capture feedback and to enable interested people to sign up for ongoing project updates</p>
<p>Local businesses, including:</p> <ul style="list-style-type: none"> <li>•Alan McKenzie</li> <li>•Villawood</li> <li>•Capitol Property Group</li> <li>•Kingsfield Developments</li> <li>•Melbourne Airport</li> <li>•Wildwood Equestrian Park</li> <li>•Bulla Trout Fishing Farm</li> </ul>	<p>Conducted one-to-one phone calls to inform of project, answer questions and record concerns.</p> <p>Provided project materials and reports.</p> <p>Provided specific updates at key project milestones. Use of a telephone hotline to enable local businesses to share feedback</p> <p>A dedicated project website was developed to capture and share key information and updates about the project</p> <p>Use of an external online engagement hub to share a project overview, Q&amp;As, capture feedback and to enable interested people to sign up for ongoing project updates</p>
<p>Community groups:</p> <ul style="list-style-type: none"> <li>•Sunbury Resident Association</li> <li>•Wurundjeri</li> </ul>	<p>Conducted one-to-one phone calls to inform of project, answer questions and record concerns.</p> <p>Provided project materials and reports.</p> <p>Provided specific updates at key project milestones.</p> <p>Use of a telephone hotline to enable community grounds to share feedback</p> <p>A dedicated project website was developed to capture and share key information and updates about the project</p> <p>Use of an external online engagement hub to share a project overview, Q&amp;As, capture feedback and to enable interested people to sign up for ongoing project updates</p>
<p>Waterways:</p> <ul style="list-style-type: none"> <li>•Melbourne Water</li> <li>•Western Water</li> </ul>	<p>Conducted one-to-one phone calls to inform of project, answer questions and record concerns</p> <p>Provided project materials and reports.</p>
<p>Emergency services:</p> <ul style="list-style-type: none"> <li>•CFA</li> <li>•SES</li> </ul>	<p>Conducted one-to-one phone calls to inform of project, answer questions and record concerns.</p> <p>Provided project materials and reports.</p>
<p>Land management authorities:</p> <ul style="list-style-type: none"> <li>•Port Phillip &amp; Westernport Catchment Management Authority</li> <li>•Metropolitan Waste and Resource Recovery Group</li> <li>•Sustainability Victoria</li> </ul>	<p>Conducted one-to-one phone calls to inform of project, answer questions and record concerns.</p> <p>Provided project materials and reports.</p>

Stakeholder	Engagement plan
<p>Environmental groups:            Jacksons Creek EcoNetwork            Friends of Moonee Ponds Creeks</p>	<p>Use of a telephone hotline to enable environmental groups to share feedback</p> <p>A dedicated project website was developed to capture and share key information and updates about the project</p> <p>Use of an external online engagement hub to share a project overview, Q&amp;As, capture feedback and to enable interested people to sign up for ongoing project updates</p> <p>Monitored and responded to local forums for questions and concerns.</p>
<p>Hume City Council</p>	<p>Conducted briefing with Hume City Council CEO, Dominic Isola (and other key Council administrators), to inform Council of the project, address questions and concerns.</p> <p>Provided project materials and reports.</p>
<p>Other local councils</p>	<p>A dedicated project website was developed to capture and share key information and updates about the project</p> <p>Use of an external online engagement hub to share a project overview, Q&amp;As, capture feedback and to enable interested people to sign up for ongoing project updates</p> <p>Fact sheets and information to be provided on request.</p>

# 13. Operational management procedures

An Operational Management Procedures (OMP) (GHD 2021a) has been prepared for the SWMF. This is provided in Appendix H. A copy of the EMP and OMP will be available at the premises.

## 13.1 Management requirements

The Regulations (2020) require management arrangements and operating conditions designed to minimise the risk of adverse impacts from the activities on any beneficial uses of the environment.

The OMP includes management and corrective measures, and a detailed monitoring/inspection requirements based on these potential impacts from operation of the SWMF and risks identified in the HHERA. The management and monitoring requirements documented in the OMP are designed to minimise the risk of adverse impacts from the activities at the SWMF on beneficial uses of the environment. 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 is provided in Appendix L.

The OMP also provides other management requirements that Hi-Quality is expected to comply with. These include staff training and induction, internal and external reporting, handling of complaints, incident and emergency management, documents and records control, and auditing of compliance of the OMP.

Table 8 outlines the environmental objectives, and management and monitoring requirements that must be complied with.

Procedures for complaints, non-compliance and corrective actions are outlined in section 13.2.

Management measures designed to minimise the risk of adverse impacts from the activities at the SWMF are included in the OMP (Appendix H).

*(Subregulation 6(2)(j) Management arrangements and operating conditions designed to minimise the risk of adverse impacts from the activities on any beneficial uses of the environment.)*

**Table 9 Environmental objectives and management requirements**

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<p><b>1. Air quality</b></p> <p><i>Minimise air pollution (e.g. dust and exhaust gases from machinery and equipment, and odour from spoil) during operations.</i></p> <p><i>Ensuring dust and odorous emissions are not beyond the boundary of the premises</i></p>	<p>1.1</p>	<ul style="list-style-type: none"> <li>• All mobile and fixed plant will be maintained to ensure exhaust emissions comply with State regulatory requirements.</li> <li>• All vehicles are to be fitted with emissions control devices and comply at all times with the relevant Australian Design Rules for the type and year of vehicle.</li> <li>• Schedule works to minimise vehicle movements within the facility</li> <li>• The number of stockpiles will be minimised. Stockpiles will be located where they are protected from wind and risk of fire.</li> <li>• It is expected that dust emissions will be minimal as the soil stockpiles will be wet (estimated at 50% to 58% moisture content on being unloaded at the SWMF). However, to minimise exposure to winds that may increase generation dust emissions, the height of the stockpiles will be no more than 3 to 5 m. (This is taken EPA South Australia Publication - Guideline for stockpile management: Waste and waste derived products for recycling and reuse (June 2019))</li> <li>• During construction and operation of the SWMF, landfill water carts will be deployed to control dust during dry and windy conditions</li> <li>• Burning of any materials is prohibited.</li> <li>• Spoil with hydrocarbon odours received at the SWMF will be treated as PIW and taken to Site B for processing</li> <li>• Any odorous sources located within the WTP will be covered if necessary, to minimise odorous emissions.</li> <li>• All unsealed haul roads will be regularly watered to settle dust and to wash off any traces of silt tracking</li> <li>• The containment cell will have intermediate cover place following filling and the final cap will be vegetated as soon as practical</li> </ul>	<p>Daily visual inspection for dust, odour at the facility. Refer to Appendix D of the OMP for daily inspection checklist.</p> <p>Monthly monitoring of dust deposition gauges located at the perimeter of the Hi Quality's property; refer to section 13.3.6 for monitoring details.</p> <p>In assessing the air quality, the following policies are of relevance.</p> <ul style="list-style-type: none"> <li>• SEPP (Ambient Air Quality)</li> <li>• SEPP (Air Quality Management)</li> </ul> <p>For nuisance dust and general odour the relevant design criteria for the SWMF are listed in Schedule A of the SEPP (Air Quality Management).</p> <p>For siting of monitoring locations or measuring air quality/dust the following standards are of relevance:</p> <p><u>Siting of Sampling Equipment</u> AS/NZS 3580.1.1:2007, Methods for sampling and analysis of ambient air – Part 1.1: Guide to siting air monitoring equipment.</p> <p><u>Dust Deposition Gauges</u> AS/NZS 3580.10.1:2003, Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method.</p> <p><u>Meteorology</u> AS/NZS 3580.14:2011: Methods for sampling and analysis of ambient air – Part 14: Metrological monitoring for ambient air quality monitoring applications.</p>

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>2. Fuel and hazardous substance management</b>			
<p><i>Safely manage the risks to the existing environmental values, including surrounding land uses associated with the operation of machinery and use of fuel and hazardous materials</i></p>	2.1	<ul style="list-style-type: none"> <li>• Where possible, minimum quantities of hazardous substances necessary for the project will be used on site.</li> <li>• All mobile equipment will be refuelled and maintained offsite.</li> <li>• Absorbent booms or socks will be placed at stormwater drains.</li> <li>• First aid and firefighting equipment (hand held extinguishers and fire hoses) will be available at the site</li> <li>• All relevant staff will be trained in appropriate handling, storage and containment practices for chemicals and dangerous goods to be utilised at the site.</li> <li>• Transport, storage and use of any of these materials will be undertaken in accordance with relevant Australian standards (AS), guidelines and legislation, including:               <ul style="list-style-type: none"> <li>– Dangerous Goods (Storage and Handling) Regulations 2012;</li> <li>– Regulatory requirements</li> <li>– Safety Data Sheets (SDS) requirements. SDS for products kept onsite will be readily available.</li> </ul> </li> </ul> <p>All complaints relating to fuels, chemicals or hazardous materials use will be investigated promptly by the Site Manager upon receipt. Appropriate actions will be taken to remediate depending on nature of product (Site Manager to advise correct procedure). Immediate action should include:</p> <ul style="list-style-type: none"> <li>• Small hydrocarbon spill: apply absorbent material.</li> <li>• Large hydrocarbon spill: install containment (e.g. block drains, surround with sandbags and dig earthen bund) and apply absorbent material.</li> <li>• Chemical spill: application of appropriate absorbent material and containment.</li> <li>• Disposal of absorbent material and potentially impacted soils below the spill area.</li> </ul>	<p>Daily inspection for leakage of fuel or hazardous substances. Refer to Appendix D of the OMP for the daily inspection checklist.</p> <p>Preventing liquid leaks and spills from entering the environment will be in accordance with VIC EPA Publication 1700.</p> <p>Chemical or fuel contaminant in the sorbent material and any soil contaminated will be classified and categorised in accordance with VIC EPA guidelines IWRG621 – Soil hazard categorisation and management</p>
		<p>In the event of a spill of dangerous goods, work procedures and control measures will be reviewed to ensure they are fit for purpose and revised where necessary.</p> <p>In the event of an environmental incident, corrective or remedial action will be taken as is required to render the area safe and avoid or minimise environmental harm.</p> <p>If required, report the incident to the relevant regulatory authority.</p>	

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>3. Disturbance of terrestrial flora and fauna</b>			
<i>Minimise the impact on the ecological values of the facility and the adjacent areas</i>	3.1	<ul style="list-style-type: none"> <li>• Utilise areas of non-native vegetation for vehicle access, parking and equipment laydown.</li> <li>• Follow weed management and hygiene protocols (refer to Weed and Pest Management ref 10.1)</li> </ul>	Refer to Weed and pest management ref 10.1.
<b>4. Noise and vibration</b>			
<i>Minimise impacts to local amenity and native fauna from noise and vibration</i>	4.1	<p>Refer to the Quantitative Noise Assessment Report for details of noise management controls.</p> <ul style="list-style-type: none"> <li>• Noise will be managed in accordance with SEPP (Control of Noise from Commerce, Industry and Trade). Noise control procedures must include consideration of:</li> <li>• Location of noise generating works</li> <li>• Utilising quieter work practices</li> <li>• Reducing noise from machinery and vehicles, particularly machinery and equipment that may operate outside of normal working hours</li> <li>• Informing neighbours and relevant authorities of potential noise impacts</li> <li>• Responding to any noise complaints</li> </ul>	Noise monitoring and assessment will be undertaken to verify compliance with SEPP N-1 once the SWMF is in operation to confirm the effective implementation of noise mitigation measures. Refer section 13.5.6.

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>5. Management of spoil</b>			
<i>Classification and disposal of spoil is in accordance with EMP</i>	5.1	<p><i>Tracking spoil material at the weighbridge</i> Establish procedures for accepting spoil at the weighbridge. This must include:</p> <ul style="list-style-type: none"> <li>• Tracking waste transport certificate for every load of spoil received at the facility. Only spoil from the West Gate Tunnel Project (WGTP) is accepted at the SWMF. Loads that have certificates showing names other than WGTP must be turned away.</li> <li>• Tracking waste transport certificate for every load of PIW leaving the Hi Quality Site to be transported to an EPA Licensed facility</li> </ul>	Refer to section 5.
	5.2	<p><i>Soil Sampling and Classification</i></p> <ul style="list-style-type: none"> <li>• Stockpiles of spoil will be kept on containment bays for approximately [REDACTED] before the spoil is classified. The minimum time will be [REDACTED] and the maximum time will be [REDACTED]</li> <li>• Testing and classification of spoil stockpiles and disposal of any contaminated material will be in accordance with Industrial Waste Resource Regulations 2009 (IWRG621 – Soil hazard categorisation and management)</li> </ul> <p>Following classification and removal of the spoil the processing bay will be decontaminated by cleaning the bay. Any water used in the cleaning process will drain to the leachate pre-treatment holding pond. The Sampling Quality and Analysis Plan provided in EMP provides further details.</p>	<p>Refer to section 5.</p> <p>Runoff from the spoil processing areas is addressed in section 6.</p>
<i>Decontamination of containment bays after use.</i>	5.3	<p>Following removal of spoil from the containment bays, the bays will be inspected to assess if any damage has occurred or if the bays require washdown before the next load of spoil is placed in the bay. Any water used to wash the bay will drain to pre-treatment holding bays.</p>	Refer to Appendix D of the OMP for the daily inspection checklist that includes an item for inspecting the containment bays.

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>6. Groundwater management</b>			
To prevent contamination of groundwater from [REDACTED]	6.1	[REDACTED] and deposit at a licensed site <ul style="list-style-type: none"> <li>[REDACTED]</li> </ul>	Refer Table 13 for the treated water monitoring program
	6.2	<ul style="list-style-type: none"> <li>Leachate drainage areas, leachate holding dams and all equipment (e.g. pumps and holding tanks) in the WTP are located inside secondary containment areas (bunded).</li> </ul>	
<b>7. Surface water, erosion and sedimentation management</b>			
Prevent erosion, contamination and sedimentation of local drainage lines and waterways.  Control the quality of surface water leaving the work areas such that no unacceptable impact occurs to adjoining waterways.  Prevent deposition of sediment on the public road network and surface water	7.1	<i>Reuse of treated water for on-site operations</i> <ul style="list-style-type: none"> <li>Treated water must be tested prior to being approved for use for on-site operations.</li> <li>Drains will collect all surface water runoff from within the containment bays and water runoff will flow to the pre-treatment holding ponds</li> <li>The WTP will include pre-treatment (ie. will occur to reduce the total suspended solids in the leachate)</li> </ul>	Monitoring of surface water and treated water (Refer section 13.3). [REDACTED]
	7.2	<ul style="list-style-type: none"> <li>Wheel washes will be used to ensure vehicles leaving the facility will be free of mud.</li> </ul>	Wheel washes will be inspected (refer to Appendix D of the OMP)

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>8. Management of leachate/treated water</b>			
<p><i>To prevent loss of leachate or treated water from the leachate treatment system (i.e. leachate drainage system, holding ponds and WTP)</i></p> <p><i>To prevent contamination of groundwater, surface water and land by leachate or treated water</i></p>	8.1	<ul style="list-style-type: none"> <li>• The storage and handling of leachate and treated water within the facility will be in accordance with EPA Publication 1698 - Liquid storage and handling guidelines.</li> <li>• All liquid storage containers/tanks, piping, handling areas, delivery areas and process tanks will be located within secondary containment areas.</li> <li>• All loading and unloading of liquid will be undertaken in designated areas.</li> <li>• Uncovered areas (such as leachate drainage areas) will have a system to accommodate rainwater.</li> <li>• Level indicators will installed such that they can be easily seen from the unloading area.</li> </ul> <p>Electronic level indicators with alarms and automatic shut off may be required. If using nozzles for filling containers, fit a shut-off valve. If overfilling does occur, the overflow spill will flow into a secondary containment area.</p>	<p>Monitoring of surface water and treated water (Refer Table 12).</p> <p>Weekly checks include (but are not limited to):</p> <ul style="list-style-type: none"> <li>• Condition of primary containers/tanks – including label, signs, secured lids for small containers</li> <li>• Transfer connections for tight fittings, leaks, damage, etc.</li> <li>• All taps, valves are closed</li> <li>• Floor areas for spills or drips</li> <li>• Level indicators, pumps, switches, sensors and alarms for proper function for treated water monitoring program.</li> </ul>
	8.2	<ul style="list-style-type: none"> <li>• Whenever it is safe to do so, spills should be prevented from leaving the site and cleaned up immediately</li> <li>• Use the Decision diagram for managing liquids that accumulate in pollution prevention systems (Figure 16) of EPA Publication 1698 to manage the liquids (rainwater or split material) that accumulated inside secondary containment areas or systems.</li> <li>• Stormwater inlets will be isolated from the secondary containment areas.</li> <li>• No wastewaters or reclaimed water will be discharged to waterways or the stormwater system, except for the treated water that has been approved for discharge to the stormwater system (refer to ref 7.1).</li> </ul>	

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>9. Waste minimisation and management (for wastes other than spoil)</b>			
<p><i>To avoid, whenever possible, the generation of wastes;</i>  <i>To achieve waste minimisation and reduction;</i>  <i>To prevent pollution and damage to the environment; and</i>  <i>To protect the safety and health of site staff and the public.</i></p>	<p>9.1</p>	<ul style="list-style-type: none"> <li>• All works are managed in accordance with the Environmental Protection (Industrial Waste Resource) Regulations 2009 and Environmental Protection Act 1970.</li> <li>• General litter, particularly litter that is able to be windblown, will be stored in a lidded bin from which material cannot escape.</li> <li>• Bins will be located near work zone, particularly in areas where food is consumed. Bins will be regularly emptied to ensure litter does not overflow.</li> <li>• Litter collection should be undertaken on a daily basis when litter is observable on site.</li> <li>• Site operators will be responsible for the daily cleaning of their respective work areas and placing of their waste in the correct bins. The work area will be kept clean and tidy.</li> <li>• Waste collection areas will be located as close to the work zone as possible in order to minimise waste spillage and to identify when enough waste has accumulated for disposal.</li> <li>• Review waste management and minimisation procedures and amend as required.</li> <li>• Disposal of residual solid waste produced from the reject water (in WTP) will be at a facility licenced to accept the waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily inspection of general site area, and surrounds for litter.</li> <li>• Daily inspection of onsite waste collection and storage areas for litter</li> </ul>

Environmental issue and objectives	Ref	Management requirements	Monitoring/inspection requirement
<b>10. Weed and pest management</b>			
<i>Avoid and effectively manage potential impacts associated with weeds and pests.</i>	10.1	<ul style="list-style-type: none"> <li>• In the event any unknown plant species is noted as having weedy growth habit on site, Site Manager must be contacted.</li> <li>• Any weed infestation will be treated at earliest stage while small and manageable. If chemical treatment is required, chemicals may be used only in accordance with manufacturer's specifications.</li> <li>• Minimise water ponding or build up on-site to reduce the likelihood of providing suitable environments for mosquito breeding.</li> <li>• Food scraps to be disposed of into bins with closed lids and removed from site weekly to minimise vermin infestations.</li> <li>• If found, weeds must be removed in accordance with best practice guidance.</li> </ul>	<ul style="list-style-type: none"> <li>• Visual inspection of all areas within the facility.</li> <li>• Inspection of any vehicles arriving at the facility carrying materials</li> </ul>

## 13.2 Complaints, non-compliance and corrective actions

Hi-Quality will nominate a representative to whom all community complaints will be directed. Investigation into the nature and cause of the complaint, including contacting any relevant parties and/or undertaking additional environmental monitoring, are undertaken to ascertain the cause of the complaint.

If necessary, an action plan would be prepared to resolve the cause of the complaint and actions are implemented accordingly. Where appropriate the relevant authorities will be consulted and involved in developing or reviewing the plan.

Hi-Quality will notify any complaint to the relevant stakeholders, should this be required.

Hi-Quality will document in a complaint register all complaints received from the community and corrective actions undertaken in response to complaints. Information documented the complaint register include:

- The name and contact details of the complainant
- The date and time of the complaint
- Location from which complaint arose
- General description of the nature of the complaint
- Specific area of concern
- Approximate wind direction and temperature at the time of the complaint (where applicable)
- The likely source of the complaint
- Details of investigations into the complaint carried out by Hi-Quality
- Details of any action taken by Hi-Quality to rectify the cause of any substantiated complaint

## 13.3 Monitoring and inspection program

The OMP includes an environmental monitoring program and inspection program, which outlines the works required to continually assess any environmental impact from the proposed operations at the SWMF. The monitoring works involve:

- Groundwater and leachate level and quality monitoring
- Surface water level and quality monitoring
- Treated water
- Dust
- Noise

Groundwater, leachate, surface water, treated water, dust and noise monitoring requirements are outlined in sections 13.3.2 to 13.3.7.

An environmental monitoring program is provided in the OMP (Appendix H).

*(Subregulation 6(2)(p) A monitoring program to demonstrate compliance with the EMP.)*

*(Subregulation 6(2)(m) Requirement for leachate sampling and analysis.)*

*(Subregulation 6(2)(n) The specification of the qualities and characteristics of leachate that is suitable for reuse and an identification of activities for which that leachate can be reused.)*

### 13.3.1 Site inspection program

The site inspection program involves daily inspection for a number of aspects including air, noise, treated water, leachate, waste and litter, and fuel and hazardous substances. It also includes a weekly inspection of weeds and pests. The daily and weekly inspection checklists are provided in Appendix D of the OMP.

The environmental inspections will be carried out by Hi-Quality staff. The inspections will review all environmental controls that are relevant at the time of the inspections. The date and time of the inspections will be recorded, as well as comments on non-compliance and corrective actions taken. Copies of the site inspection checklist will be signed and maintained on site.

### 13.3.2 Groundwater monitoring

#### Monitoring objectives

- To assess whether groundwater is contaminated with leachate due to the proposed operations
- To gain understanding of groundwater and leachate characteristics
- To provide inputs to enable revision and update of the OMP as necessary

#### Proposed monitoring network

Currently, there is one bore up-gradient of the assumed groundwater flow direction (MB13) installed on the western boundary of the facility. It is screened in the Silurian/Upper Ordovician Bedrock and is part of the Landfill groundwater monitoring network. The bore is proposed to be used as an up-gradient bore for the SWMF groundwater monitoring network. Figure 3, Appendix A shows the location of four additional monitoring bores (MB16 to MB19) to be installed to monitor groundwater quality upgradient and downgradient of the SWMF. The groundwater bores will be installed into the uppermost water bearing aquifer beneath the SWMF.

#### Proposed monitoring program

The proposed groundwater and leachate monitoring program is summarised in Table 10.

**Table 10 Groundwater monitoring program**

Groundwater monitoring	
Item	Details
Monitoring locations	<p>The following groundwater bores will be monitored for standing water level and sampled for field and laboratory analysis:</p> <ul style="list-style-type: none"> <li>• Groundwater bore locations MB1 to MB19 (refer Figure 3, Appendix A). Groundwater bores MB1 to MB15 are existing bores at the site and groundwater bores MB16 to MB19 are proposed to be installed.</li> </ul>
Monitoring frequency	<ul style="list-style-type: none"> <li>• Quarterly for water quality for all groundwater bores MB1 to MB19</li> <li>• Quarterly for standing water levels (SWLs) for all groundwater bores MB1 to MB19</li> <li>• [REDACTED]</li> </ul>

Groundwater monitoring	
Item	Details
Baseline monitoring	<p>It is recommended that baseline monitoring is undertaken from groundwater bores MB1 to MB19 for following parameters prior to receiving the WGTP TBM spoil:</p> <ul style="list-style-type: none"> <li>• pH, redox, dissolved oxygen</li> <li>• Total dissolved solids</li> <li>• Total suspended solids</li> <li>• Major ions: calcium, potassium, magnesium, sodium, chloride, bicarbonate (as bicarbonate), sulphate, fluoride</li> <li>• PFOS, PFHxS, PFOA</li> </ul>
Water levels	<ul style="list-style-type: none"> <li>• All bores should be gauged prior to disturbance, at the commencement of each groundwater monitoring event with an electronic water level meter</li> <li>• The depth of each bore should be measured</li> </ul> <p>All water levels should be converted to reduced levels (m AHD).</p>
Field parameters	<p>All groundwater monitoring bores are to be tested for the following parameters during monitoring:</p> <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Electrical Conductivity</li> <li>• Dissolved Oxygen</li> <li>• Oxidation – Reduction Potential</li> <li>• pH</li> <li>• Physical appearance (turbidity, sheen, odour, sediment load, etc)</li> </ul>
Groundwater Laboratory parameters	<p>All groundwater monitoring bore samples are to be analysed for the following parameters:</p> <ul style="list-style-type: none"> <li>• pH, redox, dissolved oxygen</li> <li>• Total dissolved solids</li> <li>• Total suspended solids</li> <li>• Major ions: calcium, potassium, magnesium, sodium, chloride, bicarbonate (as bicarbonate), sulphate, fluoride</li> <li>• PFOS, PFHxS, PFOA</li> <li>• Metals (Arsenic, Chromium (VI), Copper, Mercury, Nickel, Zinc)</li> <li>• Nutrients (Nitrate as N, Ammonia as N)</li> </ul> <p>The sampling suite is based on the requirement in the SAQP to sample leachate for these parameters.</p>
Laboratory limits of reporting for PFAS	<p>PFOS – 0.0002 µg/L  PFHxS – 0.0005 µg/L  PFOA – 0.0005 µg/L  Sum of PFOS+ PFHxS – 0.0005 µg/L</p>
Procedures	<p>Monitoring is to be generally undertaken in compliance with EPA Publication 699 (2000) <i>Groundwater Sampling Guidelines</i>.</p> <p>Where possible, all bores are to be monitored using the <i>low flow</i> methodology outlined in EPA Publication 699.</p> <p>Example field record sheets can be found in the guidelines.</p>

Groundwater monitoring	
Item	Details
Field records	<p>Field records for each bore should be recorded. Records should show at a minimum:</p> <ul style="list-style-type: none"> <li>• Monitoring date and time</li> <li>• Standing water level</li> <li>• Depth of bore</li> <li>• Field Parameters</li> <li>• Purging Rate</li> <li>• Bore and headworks condition (e.g. damage, disturbance)</li> <li>• If low flow sampling is being undertaken, SWL measurements during sampling should be taken (to monitor drawdown).</li> </ul>
QA/QC	<p>The QA/QC program should contain the following components as a minimum:</p> <ul style="list-style-type: none"> <li>• Water sampling should be undertaken by qualified, experienced personnel, in accordance with appropriate EPA guidelines and standard industry practice</li> <li>• Filtration and preservation of water samples</li> <li>• Sample preservation, containers and holding periods for groundwater samples should be in accordance with Appendix A of IWRG701</li> <li>• Use of chain of custody documentation</li> <li>• Use field recording sheets</li> <li>• Field equipment calibration records</li> <li>• Annual review of sampling methodology, sampler experience and training</li> <li>• Use of consistent sampling techniques</li> <li>• NATA endorsement of laboratory reports</li> <li>• Collection of QA/QC samples in accordance with the guidance outlined in EPA Publication 699 (2000) <i>Groundwater Sampling Guidelines</i>: <ul style="list-style-type: none"> <li>– x 1 blind duplicates (for intra-laboratory analysis) for every 20 primary water (includes groundwater, leachate and surface water) samples collected</li> <li>– x 1 field split (for inter-laboratory analysis) for every 20 primary water (includes groundwater, leachate and surface water) samples collected</li> <li>– x 1 rinsate blank per day that reusable equipment (e.g. micro purge pump) is used to collect a water sample</li> </ul> </li> <li>• Calculation of Relative Percent Differences (RPDs) as per the guidance in AS 4482.1-2005 <ul style="list-style-type: none"> <li>– Undertaking data validation checks (laboratory receipted data, digital data entry)</li> </ul> </li> </ul>
PFAS groundwater sampling procedures	<ul style="list-style-type: none"> <li>• Use dedicated PFAS groundwater sampling equipment that does not have Teflon coated tubing or bladders</li> <li>• Avoid wearing new clothing / wearing waterproof clothing, as these can be sources of PFAS cross-contamination)</li> <li>• Follow water only decontamination approach</li> </ul>

### Groundwater assessment criteria

The HHERA (GHD 2021) found that the source pathway receptor linkages were complete for two receptor types:

- Hi-Quality personnel and contractors that may encounter soil and leachate over the life of the project
- Transient birds that may utilise the leachate holding ponds prior to processing at the WTP

Other SPR linkages for groundwater beneficial uses water dependent ecosystems, primary contact recreation, irrigation and stock watering were found to be incomplete, as it relates to containment and beneficial reuse of soils on-site, given that appropriate engineering controls are expected to be employed to prevent offsite migration of PFAS. However, for the purposes of assessing groundwater monitoring results at the SWMF, criteria for PFOS, PFOA and PFHxS and other contaminants have been adopted for the existing groundwater beneficial uses at the Site as shown in Table 11 below. Reasoning for the use of the 95% species protection guideline values for PFOS and PFOA is provided in the HHERA.

Other potential COCs have been included based on the findings of CSM of Tunnelled Ground (AJJV 2019). GHD has adopted 90% trigger values for freshwater ecosystems for the other potential COCs based on the existing groundwater quality at Hi Quality's site.

Currently, groundwater at the SWMF Area is assumed to be Segment B and based on the beneficial uses, the following guidelines are recommended as trigger levels:

- Maintenance of ecosystems – Australian and New Zealand Environment and Conservation Council (ANZECC), National Water Quality Management Strategy, Australian and New Zealand Guidelines for Freshwater and Marine Water Quality; 90% trigger values for Freshwater, 2000
- Agriculture, parks and gardens – ANZECC, National Water Quality Management Strategy, Australian and New Zealand Guidelines for Long-Term Irrigation, 2000
- Stock Watering – Australian and New Zealand Environment and Conservation Council (ANZECC), National Water Quality Management Strategy, Australian and New Zealand Guidelines for Stock Watering, 2000
- Primary contact recreation – NHMRC, Guidelines for Managing Risk in Recreation Water, 2008
- Commercial and industrial water use – ANZECC, National Water Quality Management Strategy, Australian and New Zealand Guidelines for Industrial Water Use (Fresh Water)
- Buildings and structure – Australian Standard 2159-2009, Piling-Design and Installation (AS2159-2009), 2009

**Table 11 Trigger levels for potential COCs based on CSM of Tunnelled Ground (AJJV 2019)**

Indicator	Unit	Method detection limit	ANZECC Ecosystem fresh water (90%) <sup>1</sup>	ANZECC Agriculture parks and gardens <sup>2</sup>	ANZECC Stock watering <sup>3</sup>	NHMRC Recreational waters – Aesthetic criteria <sup>5</sup>	Industrial water use <sup>3</sup>	Piling-design and installation (AS2159-2009) <sup>6</sup>
PFOS	µg/L	0.002	0.13 (95%)					
Total sum of PFOS and PFHxS (µg/L)	µg/L	0.002				2		
PFOA (µg/L)	µg/L	0.002	220 (95%)			10		
pH	-	0.1	-	6.0-8.5	5.0-9.0	6.5-8.5 (aesthetic)	6.0-8.3	>5.5
Nitrate (as N)	mg/L	0.01	8.7	-	90.3	112	-	-
Fluoride	mg/L	0.05	-	-	2	15	-	-
Arsenic (As V)	mg/L	0.0005	0.042	0.1	0.5	0.5	-	-
Chromium (VI)	mg/L	0.001	0.006	0.1	1	0.5	-	-
Copper	mg/L	0.0005	0.0018	0.2	0.4 (sheep)	-	-	-
Mercury	mg/L	0.0001	0.0019	0.002	0.002	0.01	-	-
Nickel	mg/L	0.001	0.013	0.2	1	1	-	-
Zinc	mg/L	0.001	0.015	2	20	-	-	-

1. Maintenance of ecosystems – Australian and New Zealand Environment and Conservation Council (ANZECC), National Water Quality Management Strategy, Australian and New Zealand Guidelines for Freshwater and Marine Water Quality, 2000
2. Agriculture, parks and gardens – Australian and New Zealand Environment and Conservation Council (ANZECC), National Water Quality Management Strategy, Australian and New Zealand Guidelines for Long-Term Irrigation, 2000
3. Stock Watering – Australian and New Zealand Environment and Conservation Council (ANZECC), National Water Quality Management Strategy, Australian and New Zealand Guidelines for Stock Watering, 2000
4. Industrial water use – ANZECC, National Water Quality Management Strategy. Australian and New Zealand Guidelines for Industrial Water Use, 1992 - Based on once through cooling system (Fresh water)
5. Primary contact recreation – NHMRC, Guidelines for Managing Risk in Recreation Water, 2008
6. Buildings and structures - Australian Standard 2159-2009, Piling-Design and Installation (AS2159-2009), 2009 – Based on low permeability soils

### 13.3.3 Leachate monitoring

The CPBJH JV will be responsible for sampling and analysis of dewatered leachate from spoil at Hi Quality’s containment bays and information on this is provided in the Agon Environmental SAQP (2020)..

### 13.3.4 Surface water and leachate sump monitoring

#### Monitoring objectives

- To assess whether surface water is contaminated with leachate or treated water
- To assess for any impact on Emu Creek due to discharge of treated water

#### Proposed monitoring network

Given the existing surface water sampling locations for the Landfill Licence monitoring program, it is considered that no additional sampling locations are required. The quarry sump (QS1) is currently being monitored biannually under the Landfill Licence monitoring program, and is proposed to be part of the SWMF’s monitoring program. The monitoring frequency for the quarry sump is proposed to be increased to bimonthly (refer Table 12). The locations of the (existing) surface water monitoring network is provided in Figure 3 of Appendix A.

#### Proposed monitoring program

The proposed surface water monitoring program is similar to that of the landfill’s monitoring program, and PFAS compounds are proposed to be included in the existing analytical suite. The proposed surface water monitoring program is summarised in Table 12.

**Table 12 Surface water and leachate monitoring program**

Surface water monitoring	
Item	Details
Monitoring locations	<p>The following surface water locations will be sampled for water level, and field and laboratory analysis:</p> <ul style="list-style-type: none"> <li>• Creek locations: EC01 to EC04</li> <li>• Quarry (QS1)</li> <li>• Leachate sumps within the containment cell</li> <li>• These locations are currently monitored as part of the Landfill Licence monitoring program.</li> </ul>
Monitoring and sampling frequency	<ul style="list-style-type: none"> <li>• For creek locations: biannual for water quality and water level</li> <li>• Leachate sumps in the containment cell: monthly monitoring for the first four months. After the first four months the variability of the results can be assessed and if there is insignificant variability the frequency may be reduced.</li> <li>• [REDACTED]</li> </ul> <p>If concentrations of PFAS increase over time (onsite or offsite), then the source of the increase in concentrations should be investigated and the need for aquatic biota sampling will be informed on the findings of the baseline low flow macro-invertebrate survey and further monitoring during the operation of the SWMF.</p>
Baseline monitoring	<p>It is recommended that baseline monitoring is undertaken in Emu Creek for:</p> <ul style="list-style-type: none"> <li>• PFOS, PFHxS, PFOA</li> </ul>
Water levels	All water levels should be converted to reduced levels (m AHD).

Surface water monitoring	
Item	Details
Leachate level monitoring	Leachate levels in the containment cell sump/s will be monitored by a permanent depth monitoring device including an automated alarm system and also gauged on a monthly basis. Leachate levels will be maintained 300mm above the cell drainage layer.
Volume	The volume of water [REDACTED] will be recorded via a flow meter with daily readings taken.
Field parameters	All sampling locations are to be tested for the following parameters during monitoring: <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Electrical Conductivity</li> <li>• Dissolved Oxygen</li> <li>• Oxidation – Reduction Potential</li> <li>• pH</li> <li>• Physical appearance (turbidity, sheen, odour, sediment load, etc)</li> </ul>
Surface water laboratory parameters	Additional parameters to be monitored that are not included in the Landfill Licence monitoring program include: <ul style="list-style-type: none"> <li>• PFOS, PFHxS, PFOA</li> <li>• Total suspended solids</li> </ul>
Leachate laboratory parameters	Leachate in the sump/s will be tested for the following parameters: <ul style="list-style-type: none"> <li>• pH, redox, dissolved oxygen</li> <li>• Total dissolved solids</li> <li>• Total suspended solids</li> <li>• Major ions: calcium, potassium, magnesium, sodium, chloride, bicarbonate (as bicarbonate), sulphate, fluoride</li> <li>• PFOS, PFHxS, PFOA</li> <li>• IWRG 621 analytes (water equivalent)</li> <li>• Nutrients (Nitrate as N, Ammonia as N)</li> <li>• COD and BOD</li> </ul>
Laboratory limits of reporting for PFAS	<ul style="list-style-type: none"> <li>• PFOS – 0.0002 µg/L</li> <li>• PFHxS – 0.0005 µg/L</li> <li>• PFOA – 0.0005 µg/L</li> <li>• Sum of PFOS+ PFHxS – 0.0005 µg/L</li> </ul>
Procedures	<ul style="list-style-type: none"> <li>• Monitoring is to be generally undertaken in compliance EPA Publication IWRG701 – <i>Sampling and analysis of waters, wastewaters, soils and wastes</i></li> <li>• Example field record sheets can be found in EPA Publication 699.</li> </ul>
Field records	Field records for each sampling location should be recorded. Records should show at a minimum: <ul style="list-style-type: none"> <li>• Monitoring date and time</li> <li>• Standing water level (based on a survey datum at monitoring point)</li> <li>• Field parameters</li> </ul>

Surface water monitoring	
Item	Details
QA/QC	<p>The QA/QC program should contain the following components as a minimum:</p> <ul style="list-style-type: none"> <li>• Water sampling should be undertaken by qualified, experienced personnel, in accordance with appropriate EPA guidelines and standard industry practice</li> <li>• Filtration and preservation of water samples</li> <li>• Sample preservation, containers and holding periods for surface water samples should be in accordance with Appendix A of EPA Publication IWRG701</li> <li>• Use of chain of custody documentation</li> <li>• Use field recording sheets</li> <li>• Field equipment calibration records</li> <li>• Annual review of sampling methodology, sampler experience and training</li> <li>• Use of consistent sampling techniques</li> <li>• NATA endorsement of laboratory reports</li> <li>• Collection of QA/QC samples in accordance with the guidance outlined in EPA Publication 699: <ul style="list-style-type: none"> <li>– x 1 blind duplicates (for intra-laboratory analysis) for every 20 primary water (includes groundwater, leachate and surface water) samples collected</li> <li>– x 1 field split (for inter-laboratory analysis) for every 20 primary water (includes groundwater, leachate and surface water) samples collected</li> <li>– x 1 rinsate blank per day that reusable equipment (e.g. micro purge pump) is used to collect a water sample</li> <li>– x 1 trip blank when sampling for BTEX and VOCs</li> </ul> </li> <li>• Calculation of Relative Percent Differences (RPDs) as per the guidance in AS 4482.1-2005 <ul style="list-style-type: none"> <li>– Undertaking data validation checks (laboratory receipted data, digital data entry)</li> </ul> </li> </ul>
PFAS sampling procedures	<ul style="list-style-type: none"> <li>• Refer to EPA publication 699 Groundwater Sampling Guidelines</li> <li>• Groundwater sampling will be undertaken using low-flow micro-purge sampling techniques</li> <li>• Use dedicated surface water sampling equipment that is not Teflon coated</li> <li>• Avoid wearing new clothing / wearing waterproof clothing, as these can be sources of PFAS cross-contamination)</li> <li>• Follow water only decontamination approach</li> </ul>

### Surface water assessment criteria

Assessment criteria for monitoring of Emu Creek and QS1 is as per the criteria provided in Table 11.

### 13.3.5 Treated water monitoring

#### Monitoring objectives

To monitor the quality of treated water prior to deposit at a site licensed to accept industrial waste of that kind or reuse if the analysis of the treated water determines that it meets the specifications for reuse set out in Table 13.

#### Monitoring program

The treated water monitoring program is summarised in Table 13.

**Table 13 Treated water monitoring program**

Treated water monitoring	
Item	Details
Monitoring location	<ul style="list-style-type: none"> <li>• Holding tank or dam for treated water</li> </ul>
Monitoring frequency	<p>The monitoring frequency of the treated water will be dependent on the storage capacity. The treated water will need to be tested prior to being reused for on-site operations or deposited to a licenced site. The storage will be designed to hold at a minimum 24 hours of treated water based on the peak daily treatment capacity [REDACTED] and therefore, a daily testing frequency will be adopted initially. During periods where the storage capacity is found to be greater than 24 hours than the testing frequency can be increased on a pro-rate basis.</p>
Field parameters	<p>All samples will be tested for the following parameters during sampling:</p> <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Electrical Conductivity</li> <li>• Dissolved Oxygen</li> <li>• Oxidation – Reduction Potential</li> <li>• pH</li> <li>• Physical appearance (turbidity, sheen, odour, sediment load, etc.)</li> </ul>
Laboratory parameters	<p>All treated water samples are to be analysed for the following parameters:</p> <ul style="list-style-type: none"> <li>• pH, redox, dissolved oxygen</li> <li>• Total dissolved solids</li> <li>• Total suspended solids</li> <li>• Major ions: calcium, potassium, magnesium, sodium, chloride, bicarbonate (as bicarbonate), sulphate, fluoride</li> <li>• PFOS, PFHxS, PFOA</li> <li>• IWRG 621 (water equivalent)</li> <li>• Nutrients (Nitrate as N, Ammonia as N)</li> <li>• BOD, COD</li> </ul> <p>The sampling suite is based on the requirement in the SAQP to sample leachate for these parameters.</p>
Laboratory limits of reporting for PFAS	<p>PFOS – 0.0002 µg/L  PFHxS – 0.0005 µg/L  PFOA – 0.0005 µg/L  Sum of PFOS+ PFHxS – 0.0005 µg/L</p>
Procedures	<ul style="list-style-type: none"> <li>• Monitoring is to be generally undertaken in compliance EPA Publication IWRG701 – <i>Sampling and analysis of waters, wastewaters, soils and wastes</i></li> <li>• Example field record sheets can be found in EPA Publication 699.</li> </ul>
Field records	<p>Field records for each sampling location should be recorded. Records should show at a minimum:</p> <ul style="list-style-type: none"> <li>• Monitoring date and time</li> <li>• Field parameters</li> </ul>

Treated water monitoring	
Item	Details
QA/QC	<p>The QA/QC program should contain the following components as a minimum:</p> <ul style="list-style-type: none"> <li>• Water sampling should be undertaken by qualified, experienced personnel, in accordance with appropriate EPA guidelines and standard industry practice</li> <li>• Filtration and preservation of water samples</li> <li>• Sample preservation, containers and holding periods for water samples should be in accordance with Appendix A of EPA Publication IWRG701</li> <li>• Use of chain of custody documentation</li> <li>• Use field recording sheets</li> <li>• Field equipment calibration records</li> <li>• Annual review of sampling methodology, sampler experience and training</li> <li>• Use of consistent sampling techniques</li> <li>• NATA endorsement of laboratory reports</li> <li>• Collection of QA/QC samples in accordance with the guidance outlined in EPA Publication 699: <ul style="list-style-type: none"> <li>– x 1 blind duplicates (for intra-laboratory analysis) per day</li> <li>– x 1 field split (for inter-laboratory analysis) per day</li> <li>– x 1 rinsate blank per day</li> </ul> </li> <li>• Calculation of Relative Percent Differences (RPDs) as per the guidance in AS 4482.1-2005 <ul style="list-style-type: none"> <li>– Undertaking data validation checks (laboratory receipted data, digital data entry)</li> </ul> </li> </ul>
PFAS sampling procedures	<ul style="list-style-type: none"> <li>• Use dedicated surface water sampling equipment that is not Teflon coated</li> <li>• Avoid wearing new clothing / wearing waterproof clothing, as these can be sources of for PFAS cross-contamination)</li> </ul> <p>Follow water only decontamination approach</p>



**Table 14 Treated water specifications for potential COCs**

Indicator	Unit	Adopted groundwater criteria (Table 11)	ADWG (2011)	In-situ GW (historical range)	In-situ GW (historical average)	Adopted specifications
PFOS	µg/L	0.13	0.07	-	-	0.07 (ADWG 2011)
Total sum of PFOS and PFHxS (µg/L)	µg/L	2	0.07	-	-	0.07 (ADWG 2011)
PFOA (µg/L)	µg/L	10	0.56	-	-	0.56 (ADWG 2011)
pH	-	6.5-8.5	6.5-8.5	-	-	6.5-8.5 (ADWG 2011)
Nitrate (as N)	mg/L	8.7	50	<0.01 – 15	1.14	8.7 (90% SPL)
Fluoride	mg/L	-	1.5	0.1 – 1.2	0.36	1.5 (ADWG 2011)

Indicator	Unit	Adopted groundwater criteria (Table 11)	ADWG (2011)	In-situ GW (historical range)	In-situ GW (historical average)	Adopted specifications
Arsenic	mg/L	0.0042	0.01	<0.001 – 0.03	0.007	0.01 (ADWG 2011)
Chromium (VI)	mg/L	0.006	0.05	<0.001 – 0.08	-	0.05 (ADWG 2011)
Copper	mg/L	0.0018	2	<0.001 – 0.031	0.004	0.0018 (90% SPL)
Mercury	mg/L	0.0019	0.001	<0.0001 – 0.0023	0.002	0.001 (ADWG 2011)
Nickel	mg/L	0.013	0.02	<0.001 – 0.184	0.022	0.02 (ADWG 2011)
Zinc	mg/L	0.015	3 (aesthetic)	<0.001 – 0.41	0.036	0.015 (90% SPL)

**Note:**

(1) The treated water reuse specifications are for on-site reuse. The treated water quality for deposit to a licensed facility will be dependent on the applicable criteria at the facility.

(2) SPL – Species Protection Level

### 13.3.6 Dust monitoring

#### Monitoring objectives

To assess whether dust is deposited at levels impacting the environment and public health beyond the site boundary.

#### Monitoring locations

Currently dust deposition gauges are installed in six locations surrounding the Hi Quality property for monitoring impacts on existing operations at the premise (refer Figure 3, Appendix A). Hi Quality will install additional dust gauges for the SWMF operations. The additional locations are to be determined.

#### Dust monitoring program

The proposed dust monitoring program is outlined in Table 15.

**Table 15 Dust monitoring program**

Dust monitoring	
Monitoring Locations	Existing dust deposition gauges (refer Figure 3, Appendix A): DDG01, DDG02, DDG03, DDG04, DDG05, DDG06 Hi Quality will install additional dust gauges for the SWMF operations. The additional locations are to be determined.
Monitoring frequency	Samples to be analysed by a laboratory monthly. Daily visual inspections for excessive dust at the property boundary adjacent the SWMF will also be undertaken as described in section 13.3.1. This will include a daily check of rainfall and predicted wind speeds will be used to assess if additional dust controls are required. If no rain has occurred over the previous three days and winds are forecast to be greater than 40 km/hr, then an assessment will be made to determine if additional dust controls (e.g. watering of unsealed roads) is necessary to reduce the likelihood of dust impacts outside the site boundary.

Dust monitoring	
Parameters	<p>The following parameters are to be analysed:</p> <ul style="list-style-type: none"> <li>• Total Solids</li> <li>• Total Soluble Matter</li> <li>• Total Insoluble Matter</li> </ul>
Procedures	<p>In assessing the air quality at the Hi-Quality property, the following standards are of relevance.</p> <p>Siting of Sampling Equipment AS/NZS 3580.1.1:2007, Methods for sampling and analysis of ambient air – Part 1.1: Guide to siting air monitoring equipment.</p> <p>Dust Deposition Gauges AS/NZS 3580.10.1:2003, Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method.</p> <p>Meteorology AS/NZS 3580.14:2011: Methods for sampling and analysis of ambient air – Part 14: Metrological monitoring for ambient air quality monitoring applications.</p>

### Assessment criteria

The threshold criteria for dust deposition surrounding operational landfills is not well developed. As such, guidance is drawn from the Mining Protocol of Environmental Management (PEM), it notes that results from deposited dust monitoring should not exceed 4 g/m<sup>2</sup>/month (no more than 2 g/m<sup>2</sup>/month above background).

Deposited dust can be in the form of Total Solids (TS), Total Soluble Matter (TSM) and Total Insoluble Matter (TIM).

#### 13.3.7 Noise monitoring

A quantitative noise assessment was prepared to assess the potential noise impact from the operation of the SWMF to the surrounding sensitive receivers. The quantitative noise assessment report is provided in Appendix B of the OMP.

As part of the assessment, measurements of the background ambient noise levels were undertaken and operational noise levels were predicted based upon the indicative equipment, site layout and expected activities.

Operational noise compliance monitoring will be undertaken to verify compliance with SEPP N-1 noise criteria and confirm the effective implementation of noise mitigation measures. If exceedances are identified, the cause will be investigated and mitigated. Noise levels will also be checked as part of the daily inspection program (refer section 13.3.1).

Noise mitigation and management measures for the construction and operation of the SWMF are detailed in section 13.5.6.

### 13.4 Reporting

Sections 7, 8, 9 and 11.7 of the OMP, detail requirements to measure and record the information required to be recorded and retained.

The following information will be recorded and retained at the premises for at least 2 years:

- The quantity of tunnel boring machine spoil received at the processing area and the date on which it was received

- 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
- The quantity of leachate removed from the processing area for the purposes of reuse and the date on which it was removed
- The quantity of leachate removed from the processing area for discharge or deposit into the sewerage system of a water corporation (if any)
- 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

Sections 7, 8, 9 and 11.7 of the OMP (Appendix H), detail requirements to measure and record the information required to be recorded and retained.

*(Subregulation 6(2)(o) Details of the method to be used to measure and record the information required to be recorded and retained under regulation 5(p).)*

### 13.5 Pollution incident plan

Sections 13.5.1 to 13.5.5 detail the contingency actions to be undertaken if there are exceedances of the adopted trigger levels. Actions to be taken following a leak or spill are outlined within Table 9. The EPA will be notified of any pollution incidents or escape, spill or leak of waste outside the containment areas in writing as soon as is practicable with following information provided:

- Time, date and location of the incident
- Nature of the incident
- Circumstances in which the incident occurred (including the cause of the incident, if known)
- Name of the person reporting the incident
- Corrective actions proposed/implemented

Sections 13.6.1 to 13.6.4 detail the contingency actions to be undertaken if there are exceedances of the adopted trigger levels.

*(Subregulation 6(2)(r) A pollution incident plan setting out how any pollution incident will be responded to.)*

#### 13.5.1 Groundwater (including ecosystems protection)

If a pollution event occurs that is due to leachate or should the monitoring data for groundwater and Emu Creek show exceedances of the trigger levels shown in Table 11, Hi Quality will undertake monthly groundwater and surface water monitoring for a period of three months. In addition, leachate level management and leachate chemistry will be investigated to assess potential impacts from leachate. Should the monitoring data show consistent exceedances during this three month period, deposit of the treated water to a licensed site and reuse of water for on-site operations (i.e. dust suppression) will cease and Hi-Quality will further investigate the matter through additional monitoring of the groundwater wells and leachate sumps. [REDACTED]

A Section 53V audit will be completed to audit the risk of harm actually or potentially arising from the SWMF activities (refer to section 14.3 for further details). Should unacceptable risk to groundwater be realised the audit will make recommendations for groundwater clean-up to the extent practicable.

### **13.5.2 Leachate**

A pollution event that is caused by leachate may include an overflow of the pre-treatment holding pond or a pipe rupture. The matter will be immediately investigated by Hi Quality. This will involve investigating how the SWMF leachate management system failed to contain the leachate and undertaking remedial works to rectify the leachate management system (if required) and any impacts from leachate spillage.

Hi Quality will also undertake monitoring of the leachate spill in accordance with Section 13.3.4, and results will be compared against the trigger values outlined in Table 11 to assess the risk and remediate (if necessary).

### **13.5.3 Treated water**

Should the WTP fail or treated water specifications shown in Table 14 for reuse not be achieved (based on effluent quality), reuse of water for on-site operations (i.e. dust suppression) will cease and the plant operator for the WTP will investigate the cause of the WTP failure and/or why the treatment levels are not being achieved.

[REDACTED]

### **13.5.4 Surface water**

Where there is significant off-site surface water runoff from the SWMF including sediment and erosion that is or is reasonably expected to be detrimental to beneficial uses, the matter will be immediately investigated by Hi Quality. This will involve investigating how the SWMF stormwater management system failed to allow off-site discharge of surface water runoff and undertaking remedial works to rectify the stormwater management system (if required) and any off-site erosion impacts.

Hi Quality will also undertake monitoring of the surface water that has discharged off-site in accordance with Section 13.3.4, and results will be compared against the trigger values outlined in Table 11 to assess the risk and remediate (if necessary).

### **13.5.5 Dust**

Where there is significant off-site migration of dust from the SWMF including the temporary storage of spoil in the containment bays or from the unloading of spoil into the containment cell that is or is reasonably expected to be detrimental to beneficial uses, Hi Quality will immediately investigate the matter to establish the source of the dust. Once the source of the dust is known, Hi Quality will put in place the relevant dust control measures described in Table 9 to control the dust source.

Hi Quality will also investigate the potential impacts of dust disposition that has potentially occurred off-site and dust generating activities may be required to cease operating until the issue is rectified.

As described in section 13.3.6 dust monitoring gauges will be analysed on a monthly basis. Should the dust trigger levels be exceeded, Hi Quality will conduct an investigation to assess if dust control measures are being implemented appropriately and if not, they will be rectified.

### **13.5.6 Noise**

Noise mitigation and management measures to be considered during the construction and operation of the SWMF are outlined in the Noise Assessment report provided in Appendix B of the OMP. The construction and operation noise mitigation and management measures will be adopted where reasonable and feasible to reduce the impact on the surrounding receivers and sensitive land uses.

## **13.6 EMP review**

This EMP generally provides an overall framework for environmental management of the SWMF, whereas the OMP incorporates the details of environmental monitoring. Therefore, the review of the EMP will be primarily focused on regularly reviewing the OMP.

The EMP will initially be reviewed and updated one month after commencement of the operations to take into account any changes at the SWMF or changes in legislation. Following the initial review, the EMP will be reviewed as part of the operational audit, and updated (if necessary) according to the recommendations of the audit. Reviews will also be triggered whenever environmental objectives provided in Table 4 of the OMP are not met. The EMP will be reviewed to allow its continuing suitability, adequacy and effectiveness. Reviews will include assessing opportunities for improvement and the need for changes to the EMP.

The EMP will initially be reviewed and updated one month after commencement of the operations to take into account any changes at the SWMF or changes in legislation. Following the initial review the EMP will be reviewed as part of the operational audit, and updated (if necessary) according to the recommendations of the audit. Reviews will also be triggered whenever environmental objectives of the OMP are not met.

*(Subregulation 6(2)(t) How the EMP is to be reviewed.)*

## 14. Auditor review

GHD understands that EPA appointed auditor participation in the SWMF project will be divided into the following three phases:

1. Preparation of EMP
2. Construction of SWMF infrastructure
3. Operation over a period of up to two years

### 14.1 EMP review

The Regulations (2020) require an environmental auditor to assess 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 the Regulations (2020).

An EPA appointed auditor has prepared a review letter that assesses the suitability of the detailed designs, technical specifications and construction quality assurance plan of the containment cell and also for the containment layers of containment bays and pre-treatment holding ponds (Appendix L). An EPA appointed auditor has also prepared a review that assesses the suitability of the monitoring program and pollution incident plan (Appendix L).

An EPA appointed auditor has prepared a review letter that assesses the suitability of the detailed designs, technical specifications and construction quality assurance plan of the containment cell and also for the containment layers of containment bays and pre-treatment holding ponds. An EPA appointed auditor has also prepared a review letter that assesses the suitability of the monitoring program and pollution incident plan.

*(Subregulation 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.)*

### 14.2 Construction of SWMF infrastructure

Prior to depositing spoil in the containment cell, verification of the containment cell construction by an EPA appointed auditor and independent third party geotechnical verification consistent with EPA Publication 1323.3 will be provided to EPA. In this respect an EPA appointed auditor will prepare a letter confirming works have been undertaken in accordance with the EMP and detailed design documents for the containment cell, containment bays and leachate holding ponds, or justifying why deviations or non-conformances were appropriate. This is expected following completion of works.

In preparing this letter, the auditor will undertake a high level review of construction verification report(s) prepared by a suitably qualified consultant to demonstrate that works have been completed in general accordance with the detailed design documents for the containment cell, containment bays and leachate holding ponds.

### 14.3 Risk of harm audits

The Regulations (2020) require an environmental auditor to audit the risk of harm actually or potentially arising from the activities at a frequency specified in the EMP. It is proposed that auditing of the activities of the SWMF will be incorporated in the scope of the s53V operational audits currently undertaken for the landfilling activities at the premises. As such, the frequency of the audits will be annual, unless otherwise specified as an outcome of an operational audit.

Given the scale and duration of the works, EPA have indicated that updates on progress may be appropriate. Results from the groundwater, surface water and treated water monitoring program will be provided to Auditor for reference as part of the auditor's progress reporting to EPA.

Auditing of the activities of the SWMF will be incorporated in the scope of the s53V operational audits currently undertaken for the landfilling activities at the premises. As such, the frequency of the audits will be annual, unless otherwise specified as an outcome of an operational audit.

*(Subregulation 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.)*

### 14.4 Independent verification

In accordance with the SAQP, Hi-Quality is required to engage an independent verifier to produce a verification report on a six monthly basis. The verification report is to provide the independent verifier's checks with regard to SWMF's compliance with the relevant requirements in the EPA Classification concerning SWMF's disposal of the spoil.

## 15. References

Agon 2020, West Gate Tunnel Project - Zone 302 Sampling Analysis Quality Plan for Tunnel Spoil for Transport to Site X for Reuse or for Disposal, Agon Environmental, 25 March 2020.

Agon 2019, West Gate Tunnel Project Zone 302 Information on Foaming Agents for Tunnel Spoil, 16 September 2019.

AJJV 2018, Aurecon Jacobs Joint Venture - Soil Contamination Impact Assessment, Technical Information Report WGT-100-038-REP-AJV-240-000-0001, Revision number D, August 2018.

DiBattista, V., Rowe, R.K., Patch, D. and Weber, K. (2020) PFOA and PFOS Diffusion through Geomembranes at Multiple Temperatures, *Waste Management* (in press).

EPA 2020, PFAS in Victoria, last updated 20 May 2020, <https://ref.epa.vic.gov.au/your-environment/land-and-groundwater/pfas-in-victoria>

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GHD 2021a, Hi Quality Sunbury Waste Management Facility – Operational Management Procedures, March 2021.

Hi Quality and Edelman 2020, Communications and Stakeholder Engagement Plan, Sunbury Waste Management Facility, July 2020.

Nolan 2019, Section 53V Audit - Landfill Operation Audit, Hi Quality Landfill, Service Order No. 8005772, Nolan Consulting Pty Ltd, February 2019.

PFAS National Environmental Management Plan (NEMP), Version 2.0 – January 2020, National Chemicals Working Group of the Heads of EPAs Australia and New Zealand (HEPA)

# Appendices of the EMP Report

# **Appendix A** of the EMP Report – Figures

# **Appendix B** of the EMP Report – Human health and ecological risk assessment

# **Appendix C** of the EMP Report – Containment bay and pre-treatment pond detailed design

**Appendix D** of the EMP Report – Containment bay and pre-treatment pond modelling and holistic water balance modelling

# **Appendix E** of the EMP Report – Containment cell detailed design

# **Appendix F** of the EMP Report – Containment cell modelling

# **Appendix G** of the EMP Report – Water treatment plant solution

# **Appendix H** of the EMP Report – Operational Management Procedures

# **Appendix I** of the EMP Report – Baseline PFAS monitoring memorandum

# **Appendix J** of the EMP Report – Proposed transport routes

# **Appendix K** of the EMP Report – Monthly spoil volumes

# **Appendix L** of the EMP Report – Auditor verifications



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