# Environmental Assessment Report

# **Zeehan Landfill Wetland**

*Zeehan Waste Depot, Zeehan*

West Coast Council

EPA TASMANIA

ENVIRONMENT PROTECTION AUTHORITY

| Environmental Assessment Report | |
|---|---|
| Proponent | West Coast Council |
| Proposal | Zeehan Landfill Wetland |
| Location | Zeehan Waste Depot, 3990 Henty Road, Zeehan Tasmania 7467 |
| NELMS no. | PCE 10460 |
| Permit Application No. | 2021/13 West Coast Council |
| Electronic Folder No. | EN-EM-EV-DE 261742-001 |
| Document No. | D21-26020 |
| Class of Assessment | 2A |

| Assessment Process Milestones | |
|---|---|
| 25 May 2020 | Notice of Intent lodged |
| 01 July 2020 | Guidelines Issued |
| 02 March 2021 | Permit Application submitted to Council |
| 03 March 2021 | Application received by the Board |
| 13 March 2021 | Start of public consultation period |
| 27 March 2021 | End of public consultation period |
| 6 May 2021 | Date draft conditions issued to proponent |
| 7 May 2021 | Statutory period for assessment ends, extension agreed until 21 May 2021 |
| 21 May 2021 | Proponent submits amended layout to EPA with amended activity area and prepares to submit Permit Application. |
| 12 June 2021 | Start of public consultation period |
| 26 June 2021 | End of public consultation period |
| 6 May 2021 | Conditions forwarded to proponent for comment |

## Acronyms

| | |
|---|---|
| 7Q10 | Lowest 7 day average flow in a 10 year period |
| AMD | Acid and Metalliferous Drainage |
| AMDMP | Acid and Metalliferous Drainage Management Plan |
| AMT | Accepted Modern Technology |
| ANZECC Guidelines | Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (co published by the Australian and New Zealand Environment and Conservation Council). |
| ANZG 2018 | Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018. |
| ASL | Above Sea Level |
| ASS | Acid Sulfate Soils |
| AUSRIVAS | Australian Rivers Assessment System |
| Board | Board of the Environment Protection Authority |
| COD | Chemical Oxygen Demand |
| DPIPWE | Department of Primary Industries, Parks, Water and Environment |
| EER | Environmental Effects Report |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EMPC Act | *Environmental Management and Pollution Control Act 1994* |
| EMPCS | Environmental Management and Pollution Control System |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* |
| LUPA Act | *Land Use Planning and Approvals Act 1993* |
| LWTS | Leachate Wetland Treatment System |
| ML | Megalitres |
| ML/y | Megalitres per year |
| NAF | Non-Acid Forming |
| NAPP | Net Acid Production Potential |

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|---|---|
| $NH_3$ | Ammonia |
| $NO_3$ | Total Nitrate |
| NTU | Nephelometric Turbidity Units |
| PAF | Potentially Acid Forming |
| RMPS | Resource Management and Planning System |
| SD | Sustainable Development |
| SPWQM | State Policy on Water Quality Management 1997 |
| SSGVs | Site Specific Guideline Values |
| STP | Sewage Treatment Plant |
| TN | Total Nitrogen |
| TP | Total Phosphorus |
| TPH | Total Petroleum Hydrocarbons |
| WQO | Water Quality Objective |

## Report Summary

This report provides an environmental assessment of a proposal by West Coast Council for a landfill leachate wetland treatment system at the Zeehan Waste Depot on Henty Road approximately 1.5km south of Zeehan in Western Tasmania. The waste depot is owned and operated by West Coast Council.

The proposal involves construction and operation of a system to treat leachate from the landfill cells using a wetland system and sediment pond to remove suspended solids from site runoff.

This report has been prepared based on information provided in the Environmental Effects Report (EER). Relevant government agencies and the public were consulted, and their submissions, representations and comments considered as part of the assessment.

Further details of the assessment process are presented in section 1 of this report. Section 2 describes the statutory objectives and principles underpinning the assessment. Details of the proposal are provided in section 3. Section 4 reviews the need for the proposal and considers the alternatives. The detailed evaluation of environmental issues is contained in section 6. The report conclusions are contained in section 7.

Appendix 1 contains a list of commitments made by the proponent. Appendix 2 contains the environmental permit conditions for the proposal.

# Contents

# 1 Approval Process

A Notice of Intent for the proposal was received by the Board of the Environment Protection Authority (the Board) on 25 May 2020, and an application for a permit under the *Land Use Planning and Approvals Act 1993* (LUPA Act) was submitted to West Coast Council on 2 March 2021.

The proposal is defined as a level 2 activity under clause 3(a), schedule 2 of the *Environmental Management and Pollution Control Act 1994* (EMPC Act), being a new wetland system to treat leachate from the existing landfill at Zeehan.

Under section 25(1) of the EMPC Act the Council was required to refer the application to the Board for assessment under the Act. The application was received by the Board on 3 March 2021.

The assessment has been undertaken by the Deputy Director, EPA Tasmania under delegation from the Board.

The Board required that information to support the proposal be provided in the form of an Environmental Effects Report (EER) prepared in accordance with guidelines issued on 1 July 2020.

Several drafts of the EER were submitted to EPA Tasmania for review against the guidelines before it was finalised and submitted to Council with the permit application. The EER was released for public inspection for 14 days on 13 March 2021. Following an amendment to the project layout the project was re-advertised for public inspection for 14 days on 12 June 2021.

In both cases an advertisement was placed in *The Advocate* and on the EPA website. The EER was also referred to relevant government agencies for comment. No representations were received.

# 2 SD Objectives and EIA Principles

The assessment has been undertaken by the Deputy Director, EPA Tasmania under delegation from the Board.

The proposal must be considered by the Board in the context of the objectives of the Resource Management and Planning System of Tasmania (RMPS), and in the context of the objectives of the Environmental Management and Pollution Control System (EMPCS) (both sets of objectives are specified in Schedule 1 the EMPC Act). The functions of the Board are to administer and enforce the provisions of the Act, and in particular to use its best endeavours to further the RMPS and EMPCS objectives.

The Board must assess the proposal in accordance with the Environmental Impact Assessment Principles defined in section 74 of the EMPC Act.

# 3 The Proposal

The activity is an upgrade to facilities for removing sediment from runoff and treating landfill leachate at Zeehan Waste Depot (the landfill), Henty Main Road, Zeehan, before discharge to the Little Henty River. The activity area is a portion of the area of the waste depot surrounded by the yellow dotted line in Figure 1.

The need for sediment runoff and leachate treatment facilities was identified in an EMP prepared in 2017 in support of an expansion of the existing landfill. This expansion is outside the scope of this assessment. It includes construction of three new cells and decommissioning and rehabilitation of two existing cells which are nearing capacity.

The main components of this activity are:

- A new leachate wetland treatment system (LWTS).
- Stormwater drainage and construction of a 0.5 Megalitre (ML) sediment pond.

The LWTS is proposed to be gravity fed, with discharge to the Little Henty River. It is expected to treat an average of approximately 23 Megalitres per year (ML/yr) of leachate. The main characteristics of the proposal are summarised in Table 1. A detailed description is provided in Section 3 of the EER.

Construction of the LWTS will involve sediment control earthworks, installation of liners and piping, placement of wetland media, planting, and cultivation of wetland vegetation. It will also involve decommissioning and rehabilitation of the existing leachate pond.

**Table 1: Summary of the proposal's main characteristics**

| **Activity** | |
|---|---|
| Construction and operation of a system to treat leachate and suspended sediments from Zeehan Waste Depot. | |
| **Location and planning context** | |
| **Location** | Zeehan Waste Depot, 3990 Henty Road, Zeehan Tasmania 7467 |
| **Land zoning** | Rural Resource Zone, West Coast Planning Scheme. Recycling and Waste Disposal Use Class. |
| **Land tenure** | Certificate of Title 130728/1<br>Property ID Number 1905549<br>Current Property Owners West Coast Council (WCC) |
| **Existing site** | |
| **Land Use** | Waste management. |
| **Topography** | The Zeehan Waste Depot lies on the northeast slope of the Crotty Ridge on the eastern flank of Mount Zeehan. The waste depot extends from the top of the ridge (approximately 215 m above sea level (ASL)) towards the Little Henty River. The existing landfill cells are at approximately180-190 m ASL. The activity area is at the lowest point on the waste depot, closest to the river at c. 160-170 m ASL (see Figure 1). |
| **Geology** | Devonian – Silurian sedimentary rocks mapped as siltstone, shale and fine-grained sandstone. |
| **Soils** | Sandy Silty Peat black/brown (0.3 -0.7 m), sandy gravel with silt white/grey (0.6-1.2 m) overlying interbedded Sandstone and Siltstone. |

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| **Hydrology** | Three natural drainage lines cross the activity area as shown in Figure 1. The southmost drainage (ZTDL2) line flows northwards along the eastern side of the proposed wetland footprint. This is partly fed by a naturally occurring spring at the base of the Crotty Ridge which is diverted around the landfill cells and flows north-eastwards across the site. These drainage lines flow towards the Little Henty River, which ultimately discharges to the Southern Ocean, south of Trial Harbour, approximately 25 km downstream. |
| **Groundwater** | The EER states groundwater is believed to flow under the activity area in a general north-easterly direction, towards the Little Henty River. |
| **Existing Water Quality** | **Surface water**<br>Section 4.9 of the EER Appendix A (the landfill EMP) states discharge from the Zeehan STP results in increased nutrient loads in the Little Henty River upstream of the activity area. The EER state that elevated metals including Cd, Cu, Pb, Ni and Zn occur in the Little Henty River.<br><br>Comparison of drainage from the waste depot (undertaken as part of more recent routine and project specific ambient monitoring) indicate high nutrient levels in the leachate seeps and leachate pond, as well as exceedances in surface drainage across the waste depot. However, available water quality data for the Little Henty River did not provide evidence that river water quality had been affected by any drainage from the leachate pond.<br><br>**Groundwater**<br>Groundwater quality has been monitored at three boreholes (ZT1, ZT2 and ZT3) at the waste depot since 2002. Monitoring indicated:<br>• Generally low levels of salinity, nutrients and dissolved manganese, although increasing slowly over the monitoring period.<br>• Dissolved Fe in groundwater increased dramatically in 2008 and remained relatively stable at the new elevated levels, exceeding ADWG aesthetic values for drinking water and irrigation LTVs.<br>• Some elevated levels of dissolved Zinc particularly in ZT3 consistent with that expected from local mineralisation.<br>• Monitoring location ZT2 (close to the existing leachate pond) showed differences from the other two, with markedly higher levels of TDS, dissolved Fe and Mn as well as hydrogeochemical characteristics that were much closer to those of the surface water samples for the leachate pond and site drains. |
| **Existing water uses** | There is limited public access to the Little Henty River in the immediate area downstream of the landfill. The nearest location for public access is approximately 5 km downstream. |
| **Natural Values** | No threatened flora listed under the *Threatened Species Protection Act 1995* were recorded within the activity area.<br>The EER states that no threatened fauna was observed during the site survey and the site does not provide significant habitat for fauna species.<br>The activity area lies within two geo-conservation sites, the Western Tasmanian Blanket Bogs and the Zeehan Regional Strike Ridges and Valleys, both of which are large scale geoconservation sites in the region. |
| **Local region** | |
| **Climate** | The climate is cool, with average daily temperatures of around 7°C in July and 15°C in February.<br>The EER states the average wind speed of the area is 17.8 km/h with primarily north and north-north-easterly winds. The site experiences high rainfall with an annual average of 2462 mm, and highest rainfall (280mm monthly average) in July. |
| **Surrounding land zoning, tenure and uses** | The surrounding land is zoned Environmental Management and comprises vegetated natural reserves and unused land. Part of the Crotty Ridge Regional Reserve, which is managed by Tasmania Parks and Wildlife Service, is adjacent to the eastern boundary of the waste depot. The nearest residential dwelling is located approximately 800 m to the north. The Zeehan WWTP is located 1 km to the north and approximately 1.8 km upstream. |
| **Proposed infrastructure** | |

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| **Major elements** | The proposal comprises the following components as indicated in Figure 1:<br>• 0.5ML HDPE lined leachate holding pond which will overflow to Wetland A.<br>• Wetland A – a vegetated wetland with growth / filter medium through which leachate is proposed to flow horizontally, discharging to ZTDL2 (and on to the Little Henty River) or overflowing to Wetland B.<br>• Wetland B – a vegetated wetland with growth / filter medium through which leachate is proposed to flow vertically to a series of perforated pipes in the base of the wetland discharging to ZTDL2 (and on to the Little Henty River) or overflowing to ZDTL via a spillway.<br>• A sediment pond is proposed to receive clean site runoff from surface water drains, allowing suspended sediments to settle out before being discharged to the Little Henty River. |
| **Other infrastructure** | Associated access tracks. |
| **Operational Inputs** | |
| **Water** | Leachate collected from the landfill cells. |
| **Energy** | None, the LWTS is gravity fed. |
| **Other raw materials** | Replacement filter / growing medium - needed if wetland beds becomes clogged. Plants for planting within the wetlands. |
| **Wastes and emissions** | |
| **Liquid** | Liquid effluent from the existing approved landfill discharged to the Little Henty River from the proposed wetland treatment system.<br>Stormwater runoff from the proposed sediment pond discharged to the Little Henty River. |
| **Atmospheric** | Odour from the leachate holding pond and wetlands.<br>Dust from haulage within the waste depot and stockpiling of materials during construction. |
| **Solid** | Construction wastes including spoil and vegetation waste from wetland excavation and miscellaneous waste including excess construction materials.<br>Operational waste including sludge from LWTS leachate holding pond, replaced filter/ growing medium and harvested plant matter from wetlands, sediment collected by the sediment pond. |
| **Controlled wastes** | No controlled waste is anticipated. |
| **Noise** | Construction noise from excavation, haulage and handling of materials on site.<br>No significant operational noise is expected. |
| **Greenhouse gases** | Emissions from construction vehicles and plant. |
| **Construction, commissioning and operations** | |
| **Proposal timetable** | Construction is expected to take approximately 6 months. A commissioning period of 12 months is proposed.<br>The EER states normal operation will commence either 12 months after the start of commissioning or after water quality monitoring has demonstrated the acceptable performance of the facility. |
| **Operating hours (ongoing)** | 24 hours, 7 days a week. |

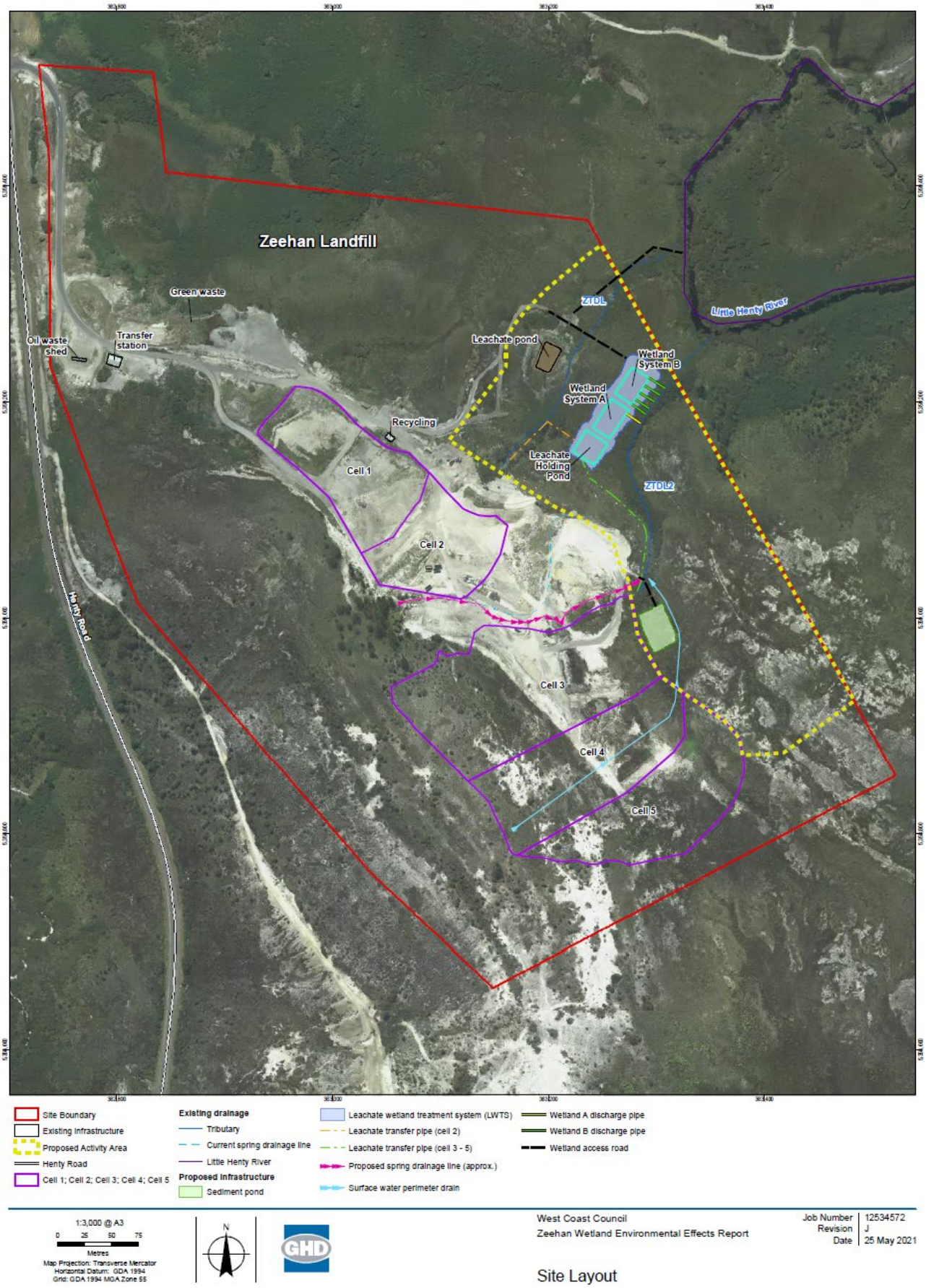



**Figure 1 Site Layout (Figure 3 in the EER)**

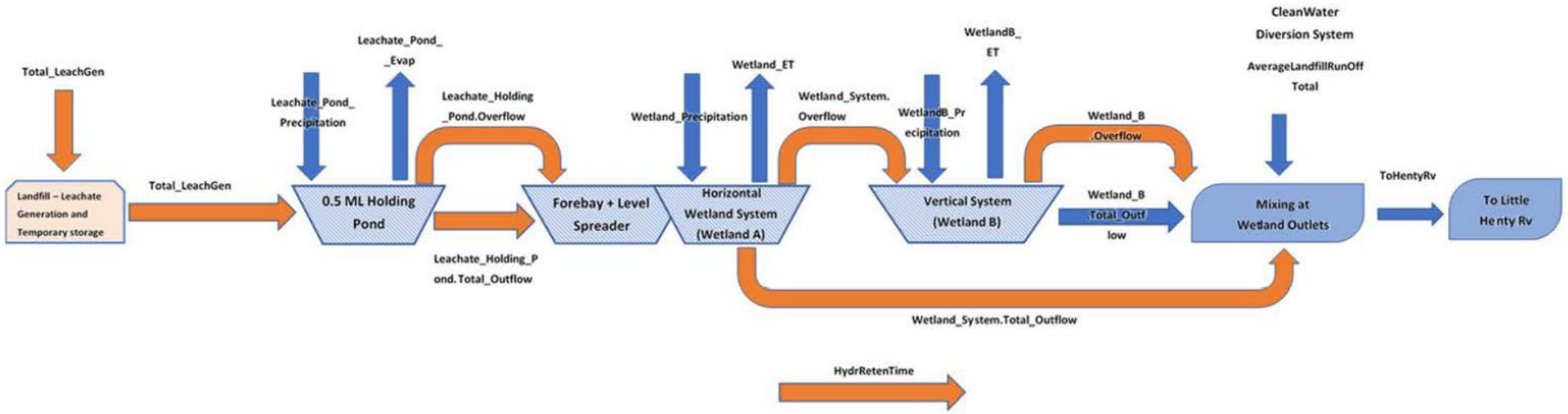



**Figure 2 Schematic diagram of LWTS (Figure 15 in the EER)**

# 4 Need for the Proposal and Alternatives

The Zeehan Waste Depot has been operating for more than 40 years. The two landfill cells (Cells 1 and 2) are reaching capacity. Zeehan is the only operating landfill in the West Coast Council area and landfill remains the only feasible option for disposal of non-recyclable waste streams.

Current leachate management comprises collection of leachate seepage from the cells and transfer to a leachate collection pond for settlement before discharge via a natural drainage line to the Little Henty River. The existing cells are unlined or poorly lined, and the EER states much of the leachate generated is likely to be seeping to groundwater.

A single leachate pond and infiltration from the landfill cells to groundwater, does not reflect best practice for leachate management. The previously approved new cells will capture leachate more effectively, resulting in a greater volume of more concentrated leachate. The EER states this will exceed the capacity of the existing treatment systems. The LWTS is proposed to treat the estimated average 23 ML/y of leachate generated before discharge to the Little Henty River.

An alternative treatment considered would involve pumping leachate approximately 1.8 km to the Zeehan Sewage Treatment Plant (STP). The EER states the LWTS is expected to have the same, if not better environmental outcome. The EER states discharging to the STP will be a contingency option should the LWTS fail to perform as expected.

# 5 Public and Agency Consultation

No public representations were received.

The EER was referred to a number of government agencies/bodies with an interest in the proposal. No submissions were received.

The following areas of EPA Tasmania also provided advice on the EER:

- Regulatory Officer, EPA Tasmania
- Water Specialist, EPA Tasmania

# 6 Evaluation of Environmental Issues

EPA Tasmania has evaluated environmental issues considered relevant to the proposal. Details of this evaluation, along with the permit conditions required by the Deputy Director, are discussed below:

The following issues are discussed:

- Water quality - leachate capture and treatment
- Water quality – stormwater and sediment control
- Acid Metalliferous Drainage, Acid Sulphate Soils and Contamination
- Air quality and odour
- Solid wastes
- Natural values
- Noise
- Decommissioning and rehabilitation

## General conditions

The following general conditions will be imposed on the activity:

- G1 Access to and awareness of conditions and associated documents
- G2 Incident response
- G3 No changes without approval
- G4 Change of responsibility
- G5 Change of ownership
- G6 Notification prior to commissioning
- G7 Complaints register

## Issue 1: Water quality - Leachate capture and treatment

### Description of potential impacts

**Surface Water**

The EER sets out the LWTS concept based on technical literature, and presents a preliminary design in Appendix B.

While the EER states there is little observable impact on the water quality of the Little Henty River from the current landfill, suggesting dilution from river flows, changes to landfill practices (see section 4) will result in a greater volume of more concentrated leachate discharged to the Little Henty. Leachate discharging from the LWTS has potential to cause pollution to the Little Henty River if not appropriately managed.

*Assessment Method*

Section 4.1 of the EER presents an assessment of the potential change to water quality in the Little Henty River that would result from the introduction of the combined discharge of the discharge channel (ZTDL2) with LWTS effluent (referred to as the 'combined discharge') to the Little Henty River.

The following guidelines were used to derive Site Specific Guidelines Values (SSGVs) for the Little Henty River at the point of discharge:

- For nutrient values - A combination of 80th percentile parameter concentrations in combined data from upstream and downstream river sites.
- For metals and other toxicants - ANZG 2018 freshwater aquatic environment 95% species protection guideline values.
- For nitrate toxicity effect on freshwater aquatic species - New Zealand National Institute of Water & Atmospheric Research (NIWA, 2013)
- For Total Petroleum Hydrocarbons - ANZECC 2000 guideline values.

Leachate composition was based on data from recent sampling of a leachate seep from Cell 1 and 2 and collection rate based on a leachate generation model on which the landfill concept design was based.

Predicted LWTS effectiveness was based on literature studies including a review of 85 separate papers on wetland landfill leachate treatment. Where no data were available, the removal rate was assumed to be zero.

Four leachate parameters: total ammonia ($NH_3$), total nitrate ($NO_3$), total nitrogen (TN), and total petroleum hydrocarbons (TPH) exceeded their SSGV in a 'Maximum Dilution' scenario (i.e. the extent that the Little Henty River would dilute inputs from the combined discharge for 7 day average flows). These four parameters, as well as total phosphorus (TP) and chemical oxygen demand (COD) which were both close to the SSTV), were selected for mixing zone modelling.

Modelling of a 'mixing zone' based on a range of river flow scenarios was then undertaken including the lowest 7 day average flow in a 10 year period (7Q10) as a worst case of very low river flow of 3.6ML per day; a low flow case (36 ML per day), and a moderate flow case (360 ML per day) each with corresponding volumes for drainage discharge.

The EER acknowledges a number of limitations, including a lack of sufficient ambient water quality data and assumptions about the shape and size of the receiving water channel. The EER states that modelling will be reviewed and re-assessed once 12 months of site-specific data becomes available.

*Results*

The EER states there is little observable impact on the water quality of the Little Henty River from the current landfill and suggests this is due to dilution from river flow.

The EER modelling predicts the discharge from the LWTS wetlands will result in:

- Localised exceedances for the parameters $NH_3$, total $NO_3$, TN, TPH, COD and TP.
- A mixing zone maximum spatial extent of up to 150 m downstream and up to 3 m across the river for moderate river flows (360ML per day).
- A much smaller (<5m) mixing zone for the 7Q10 very low flow scenario.
- A moderate eutrophication risk from $NO_3$ and a low eutrophication risk from $NH_3$ within the spatial extent of the mixing zone for moderate flow.
- A low toxicity risk from TPH within the spatial extent of the mixing zone for moderate flow.

Additionally, untreated/partially treated overflow of the LWTS wetlands may occur an average 1.1 times per year during high rainfall events when the capacity of the LWTS is exceeded. With climate change predictions showing increased rainfall, these uncontrolled releases may increase over the next 20 to 50 years.

**Groundwater**

The EER states that the leachate pond and wetland A of the proposed LWTS will be constructed with liners to prevent infiltration to groundwater. Wetland B will not be lined but is drained by a series of perforated pipes which will form a preferential path to the drain ZTDL2.

**Management measures proposed in EER**

EER Part 5 'Summary of proposed management measures', lists the following relevant controls:

- **Number 6.** (Prior to construction) Council will engage a qualified horticulturalist to plant and establish the LWTS vegetation, with the horticulturist to develop a wetlands management plan for the plant species selected, to include but not be limited to: species selection, species spacing, harvest frequency, removal frequency, plant requirements, and management and mitigation strategies for poor performance of plant species, prior to construction.
- **Number 7.** (Ongoing) LWTS Maintenance will be undertaken in accordance with EER Section 3.7 and updated as necessary, to include at a minimum 6-monthly inspections of: filter media, plant growth and harvesting requirements, sub-soil drainage, pipe inlets/outlet for blockage, removal of any wind-blown litter, visual observations for any signs of anaerobic conditions such as algae growth, vacuum removal of blockages at the leachate pond inlet. Maintenance actives for the LWTS and sediment pond will be documented in a Site Operations Manual to be kept on site at all times and include person responsible.
- **Number 8.** (Ongoing) A nominated person will be responsible for ensuring environmental practices and controls are followed and implemented.
- **Number 17.** (First 12 months after commissioning of the LWTS) Implement Water Quality Monitoring Plan as described in Section 4.12 of the EER.

- **Number 18.** (Prior to LWTS commissioning and within 12 months after LWTS commissioning) Implement aquatic surveys to establish baseline conditions and update within 12 months of LWTS commissioning.
- **Number 19.** (6 months after LWTS Commissioning) Update mixing zone assessment after 6 months of monitoring available and review the effectiveness of the LWTS and impacts to the Little Henty River.
- **Number 20.** (12 months after commissioning of the LWTS) After a period of one year of monitoring, site specific monitoring data will be reviewed and assessed to determine environmental impacts from the operation and set site specific trigger values.

Note that references to 'commissioning' in the EER relate to the period before the start of LWTS operation, not the 18-month period following first receipt of leachate included in the EAR and defined in the draft permit conditions.

Additional measures described in the EER are as follows:

- Maintenance activities - as discussed in Table 1 (from Section 3.7 of the EER) a program of maintenance activities is proposed to ensure that the LWTS continues to function at its initial operating capacity.
- Section 4.1.4 describes the series of contingency steps that would be taken should the monitoring described above indicate that the LWTS is not performing. These are:
  - Reactive maintenance based on monitoring including removal of sludge, filter blockage, review and adjustment of wetland vegetation.
  - Installation of pumps to recirculate leachate to the landfill cells and reduce overflows in the LWTS.
  - If monitoring demonstrates that environmental harm to the Little Henty River is resulting from leachate discharges via the LWTS, retaining the LWTS as a "polishing treatment" before pumping leachate to the Zeehan STP.

**Public and agency comment**

None

**Evaluation**

**Impacts on receiving environment**

*Accepted Modern Technology*

The EER provides sufficient information to indicate the proposed wetland is suitably sized and configured to adequately treat the anticipated volumes and composition of leachate generated from the proposed new landfill cells. It is considered accepted modern technology (AMT) for the purposes of municipal landfill leachate management, consistent with clause 17 of the *State Policy on Water Quality Management 1997* (SPWQM). The EPA water specialist considers that in general wetland treatment systems like that proposed will primarily remove suspended matter, potentially associated metals, and adsorbed organics (e.g. TRH, PAH) and oxidise ammonia reducing potential toxicity impacts.

Although the EER water balance includes estimates of maximum flows under various scenarios, it was not considered meaningful to include a Q1 regulatory limit on the LWTS as this is primarily driven by climatic conditions and not as a direct consequence of operations of the

landfill. Q1 limits are imposed by the permit for the main landfill operations on the basis of the maximum allowable amount of waste which can be received.

*Modelling and assessment of impacts*

The modelling provided of the impacts of LWTS discharge on the receiving environment supports the general determination that the proposed wetland should reduce overall ammonia concentrations. It is agreed ecotoxicity risks to the local environment from ammonia and other identified toxicants at the edge of the mixing zone are low. The modelled mixing zone does not extend across the entire width of the river which is in compliance with clause 23(e) of the SPWQM.

The residual eutrophication risk is assessed as moderate. To remove significant nutrient load would require substantial ongoing removal of plant growth from the wetland.

While the EER has made a satisfactory effort to characterise the risks to surface water based on available data, various assumptions were required on the composition of future leachate, performance of the LWTS and flow regime in the Little Henty River leading to some uncertainty over the modelling results. It is also limited by a lack of sufficient ambient water quality data.

However, the limited scale of the activity still allows the conclusion that the proposed wetland will reduce potential ecotoxic impacts of leachate to an acceptable level,

The permit defines the first 18-months after receipt of leachate as a **commissioning** phase, where the LWTS and receiving environment will be closely monitored and data gathered used to refine the assessment of impacts and, if necessary operational procedures for the LWTS.

At the end of the commissioning phase a performance review will be undertaken. At this point a decision to set limits on effluent discharges or implement other management or contingency measures to mitigate potential impacts can be reconsidered based on comprehensive data on wetland performance and ambient water quality impacts, without allowing unacceptable environmental risk.

***Monitoring***

The EER sets out a detailed program of monitoring effluent quality and flow, LWTS performance and ambient water quality, for the commissioning phase of the project and longer term. **Condition M1** sets out the water monitoring requirements based on this plan, but with the initial monitoring phase extended to 18 months to ensure that the evaluation monitoring program extends well beyond the performance 'settling' period.

**Condition M2** requires a flow meter to be installed at the leachate holding pond inlet to record the flow of leachate into the LWTS. **Condition M3** sets requirements for maintaining the flow meter.

Monitoring must be implemented according to accepted protocols and to acceptable quality assurance standards (**Condition M4)** and all locations of monitoring sites must be adequately signed to ensure samples are collected at a consistent location (**Condition M5**)**.** The findings of monitoring programs must be submitted in a monitoring report (**Condition M6**) to be issued for 6-monthly reporting periods during the commissioning phase and annual thereafter. Monitoring locations are shown in Figure 3. The outcome of the performance review required by **Condition EF1** (see below) may contain recommendations for changes to the Attachment 2: Water Quality Monitoring Program.

***Review of Wetland Performance***

After the first 18 months of monitoring, a performance review is required by **Condition EF1** based on comprehensive data on wetland performance and ambient water quality impacts gathered during the first 18 months, that will provide updated information on leachate

generation, present findings of monitoring, update SSGVs, validate modelling and assessment undertaken in the EER assessment, and evaluate the performance of the LWTS.

***Overflows***

The EER assessment of water pollution risk includes overflow events occurring approximately once per year during which leachate would bypass filtration by the wetland. This will take place at periods when the leachate is most dilute and the receiving environment, both ZTDL2 and the Little Henty River, are likely to be at high flow, thereby maximising dilution. **Condition M7** requires the sampling of overflow events and notification of the Director.

***Maintenance***

The effectiveness of the LWTS in managing pollution from landfill leachate emissions is dependent on how it is operated and maintained. The EER commits to a program of maintenance on the LWTS including inspections of filter media, vegetation, sub-soil drainage pipe inlets/outlets, and pond conditions for litter, anaerobic conditions, algae growth.

The maintenance program must be defined in the Wetland Management Plan submitted for approval prior to commencement of commissioning of the LWTS under **Condition EF2.** The Plan will need to detail all maintenance measures necessary to ensure that the wetlands will meet the conditions of approval, including procedures to sustain effluent discharge quality during and after periods of maintenance.

***Contingency actions***

**Condition EF2** requires the Wetland Management Plan to include contingency actions should there be ongoing failure of the LWTS to meet anticipated performance requirements.

***Design and construction of LWTS***

The final design of the wetland must be consistent with what is proposed in the EER and be approved by the Director prior to construction as required by **Condition CN1**.

**Condition LM1** requires the liners in the leachate holding pond and Wetland A to be designed, installed, and maintained in accordance with the relevant standards in the Environmental Standards Applying to Liner Construction (EPA 2006). **Condition CN2** states the Quality Assurance requirements for construction of the LWTS.

**Conclusion**

The proponent will be required to comply with the following conditions:

- Condition CN1 Commencement of works
- Condition CN2 Quality Assurance
- Condition EF1 LWTS Performance review
- Condition EF2 Wetland Management Plan
- Condition LM1 Leachate holding pond and wetland liner
- Condition M1 Water monitoring requirements
- Condition M2 Flow meter
- Condition M3 Flow monitoring equipment
- Condition M4 Samples and measurements for monitoring purposes
- Condition M5 Signage of monitoring points
- Condition M6 Water Monitoring Report
- Condition M7 Monitoring and reporting of LWTS overflows

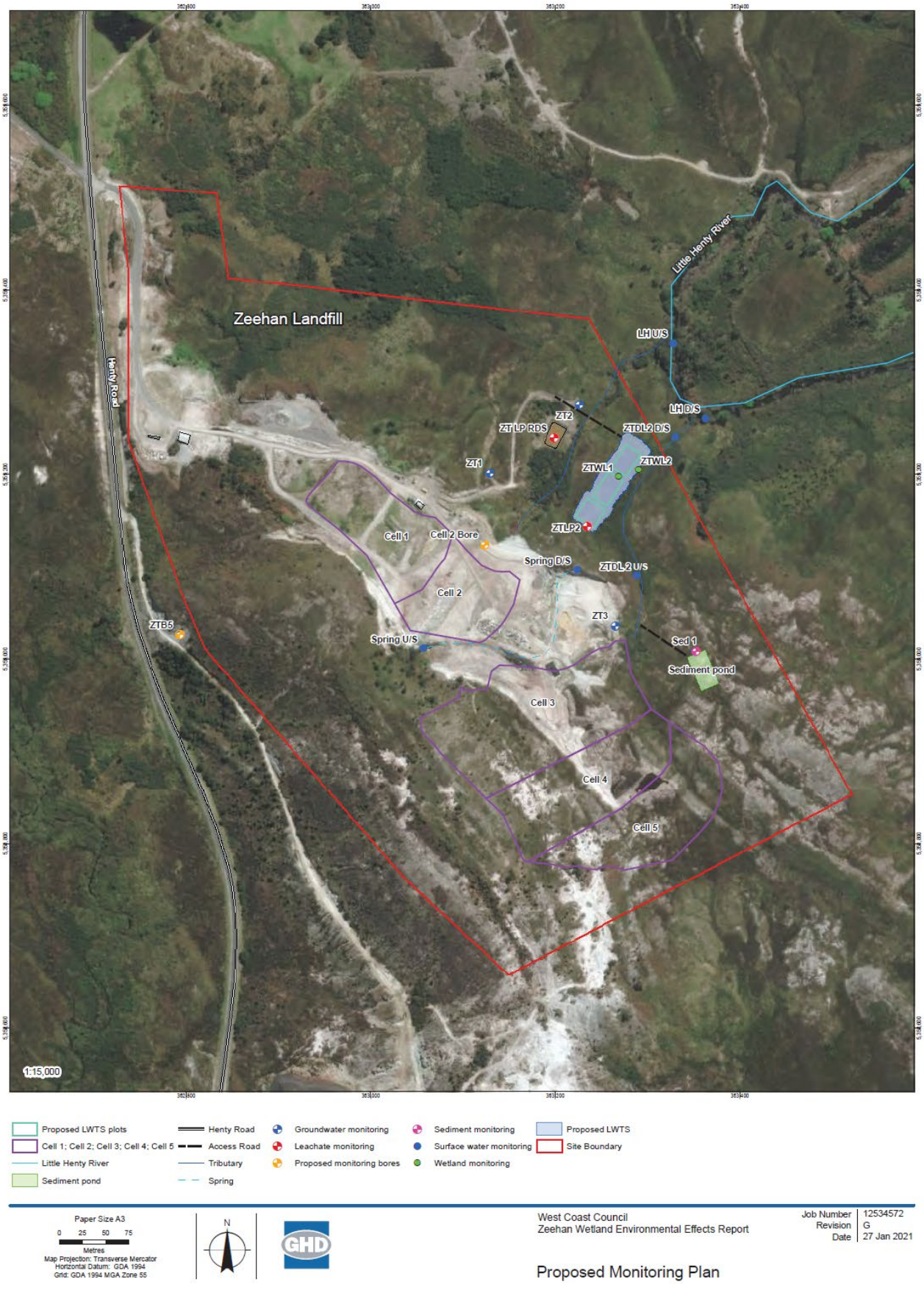



**Figure 3 Existing and proposed monitoring locations for the waste depot (Figure 21 in the EER).**

## Issue 2: Water quality – stormwater and sediment control

### Description of potential impacts

**Sediment pond operation**

The construction of the LWTS, as well as the ongoing operation of the landfill site, may generate sediment laden runoff which could result in impacts to the Little Henty River.

Landfill operational documents previously identified the need for a sediment pond and the pond is proposed as part of the LWTS construction. The construction of the sediment pond also has the potential to result in sediment laden runoff to the Little Henty River.

The EER states that the pond will limit turbidity in the discharged stormwater to between <25 and 50 to Nephelometric Turbidity Units (NTU) for dry weather discharges <50 and 100 NTU for wet weather discharges. The EER states that the principles in *Australian Runoff Quality, and Water Sensitive Urban Design - Engineering procedures for stormwater management in Tasmania* have been used to provide concept sizing of the sediment pond.

### Management measures proposed in EER

EER Part 5 'Summary of proposed management measures', lists the following relevant controls:

- **Number 17.** Implement Water Quality Monitoring Plan as described in Section 4.12 of the EER.
- **Number 10.** The CEMP will include a sediment and erosion control plan with a range of measures to minimise sediment release from disturbed areas as described in Appendix F of the EER. This will include:
  - Use of bunds or silt screens to prevent turbid stormwater discharges.
  - Stabilisation and revegetation of exposed areas as soon as possible.
  - Management of work in wet high rainfall conditions.

The sediment pond is itself a management measure for water quality impacts from the landfill. The EER also proposes maintenance and monitoring measures to ensure its effectiveness. These are summarised in Table 8, Section 3.7 of the EER and comprise:

- Visual Inspection (Annually and following significant rainfall event
- Sediment pond water quality discharge monitoring
- Sediment Removal Annual or when sediment build up reaches 70% capacity of the pond
- Visual litter Inspection and removal

### Public and agency comment

None

### Evaluation

The construction of a sediment pond at the site is supported and the turbidity units referenced for design purposes in the EER are in accordance with turbidity limits in the *Landfill Sustainability Guide, Department of Primary Industries Parks Water and Environment 2004*.

The effectiveness of the sediment pond in managing sediment in runoff will depend on how it is operated and maintained. **Condition SW1** requires appropriately sized and maintained settling ponds to ensure sediment is retained on the Land.

**Condition SW2** requires all reasonable measures are taken to avoid impacts from suspended sediment from construction activities associated with the proposal, which are expected to be minor.

**Condition M1** describes water quality monitoring requirements with respect to the sediment pond.

**Conclusion**

The proponent will be required to comply with the following conditions:

- SW1 Stormwater Infrastructure
- SW2 Stormwater discharge
- M1 Water monitoring requirements

## Issue 3: Acid Metalliferous Drainage, Acid Sulphate Soils and Contamination

### Description of potential impacts

**Acid Metalliferous Drainage and Acid Sulphate Soils**

The EER states the construction footprints have not been used for landfill operations and the potential for uncovering historical contaminated material is very low.

Samples taken during previous geotechnical investigations of the waste depot were tested for acid and metalliferous drainage (AMD) and acid sulfate soils (ASS). Because of a lack of Acid Neutralising Capacity, the soils are classed as Potential Acid Sulfate Soils (ASS). Disturbance of AMD or ASS has the potential for acidification of site runoff, and the potent for impact to the Little Henty River.

While the majority of samples tested were Non-Acid Forming (NAF), two samples showed Net Acid Production Potential (NAPP) and were classed as Potentially Acid Forming (PAF). The surveys indicated the presence of AMD material greater than 5m below ground level.

Although the surveys did not sample the footprint of the LWTS or sediment pond, they indicate some risk of PAF materials being present at this location, although because of the shallow LWTS excavations (>2m BGL) the EER reports a low risk of disturbing PAF material.

Because of a lack of Acid Neutralising Capacity in the soils, all are considered to be Potential Acid Sulfate Soils, although the majority only very mildly. Disturbance of AMD or ASS could result in acidification of site runoff and potential contamination of ambient surface water with dissolved contaminants.

### Management measures proposed in EER

EER Part 5 'Summary of proposed management measures', lists the following relevant controls:

- **Number 3**. Construction activities will be carried out in accordance with an Acid and Metalliferous Drainage Management Plan (AMDMP).

Additional measures described in the EER are as follows:

- LWTS will avoid excavations greater than 2m depth, relying on shaping shallow material to create embankments to minimise risk of uncovering PAF material and ASS.

### Public and agency comment

None

### Evaluation

It is agreed that, while there is a risk of the presence of PAF material and/or ASS material, the limited nature and depth of earthworks required for the construction of the LWTS and sediment pond, mean that there is limited risk of acidification of runoff due to exposure and oxidation. **Condition CN1** requires that specifications and designs are submitted prior to construction. **Condition CN3** requires the preparation of an Acid and Metalliferous Drainage Management Plan, based on that already prepared for the landfill cell footprint.

### Conclusion

The proponent will be required to comply with the following conditions:

- CN1 Commencement of works
- CN3 Acid Metalliferous Drainage Management Plan

| Issue 4: Air quality and odour |
|---|
| **Description of potential impacts** |
| The oxidising conditions of the LWTS should minimise risk of odour impacts, though preventing odour generation depends on regular maintenance to prevent clogging and stagnation. Odour emissions have the potential to impact on sensitive receptors if not appropriately mitigated or managed.<br>The EER states the LWTS has been designed to maintain oxidising conditions of the LWTS which will minimise the risk of odour. The leachate has low levels of volatile compounds and there is minimal open water to allow odour emissions.<br>Dust may be generated during construction activities such as excavation, handling or stockpiling of friable materials. The EER states operation of the LWTS is not expected to give rise to significant dust emissions.<br>The site is located within the existing landfill site. The nearest sensitive receptor is 800 m to the northwest, shielded by from the LWTS by topography. The prevailing winds are generally north-easterly and away from sensitive receptors. |
| **Management measures proposed in EER** |
| EER Part 5 'Summary of proposed management measures', lists the following relevant controls:<br>• **Number 1**. A Construction Environmental Management Plan (CEMP) will be developed and submitted for approval by the Director, EPA.<br>• **Number 9**. As per Section 4.2.3 of this EER, dust will be managed through:<br>  ○ Daily visual monitoring<br>  ○ Dust suppression<br>  ○ Speed restrictions<br>  ○ Rehabilitation of disturbed areas as soon as possible during construction<br>• **Number 16** A complaints register will be maintained during the Project, with all complaints and resolutions recorded throughout the construction phase and during operations<br>Additionally, the measures to manage and mitigate odours from the LWTS through ongoing maintenance are outlined in Section 3.7. |
| **Public and agency comment** |
| None |

**Evaluation**

The measures to control construction dust proposed in the EER are supported. **Condition A1** requires dust emissions to be controlled to prevent environmental nuisance beyond the boundary of the Land.

The LWTS has been designed to minimise the potential for odour generation. Given the distance to sensitive receptors, it is agreed that there is a low potential for nuisance odour provided ongoing maintenance is undertaken. **Condition A2** requires the proponent to put in place such odour management measures as are necessary to prevent odours causing environmental nuisance.

**Condition G7** requires the proponent to maintain a complaints register, which would record any complaints made regarding dust or odour nuisance.

**Conclusion**

The proponent will be required to comply with the following conditions:

- Condition A1 Control of dust emissions during construction
- Condition A2 Odour management
- Condition G7 Complaints register

| Issue 5: Solid wastes |
|---|
| **Description of potential impacts** |
| Precipitation and settling of solids will cause sludge to accumulate in the leachate holding pond and potentially, to a lesser extent, in Wetland A. The EER estimates that sludge in the leachate holding pond would typically be removed every 2 years. Wetland filter media may need to be replaced over time because of clogging. The EER indicates that the sludges and spent wetland media will be disposed of to the landfill on site.<br>The EER proposes annual inspection of the sediment pond and removal of sediment when it reaches 70% capacity of the pond, anticipated to take place annually.<br>The EER states the generation of controlled waste is not anticipated, however the composition of the leachate holding pond sludges will require testing once removed to determine classification under the regulations for disposal.<br>The EER states that the volume of general waste generated by the construction of the LWTS and sediment pond is expected to be small. |
| **Management measures proposed in EER** |
| The EER states that the leachate pond sludge and wetland filter media will be removed to the landfill for disposal.<br>Excavation spoil will be reused onsite for works and landfill operations. Any solid waste will be collected onsite in covered bins and regularly moved to the landfill area, with recyclable material segregated if possible. |
| **Public and agency comment** |
| None |
| **Evaluation** |
| **OI1** reminds the responsible person of the waste management hierarchy and **OI2** reminds the responsible person that Information Bulletin 105 provides information on classification to allow compliance with the Waste Regulations. |
| **Conclusion** |
| The proponent will be required to comply with the following conditions:<br>• OI1 Waste management hierarchy<br>• OI2 Solid waste disposal |

## Issue 6: Natural Values

### Description of potential impacts

The project will require disturbance of a small area of land (<0.5 hectares) comprising habitat mapped as *Restionaceae* rushland (MRR) and Buttongrass moorland (undifferentiated) (MBU), neither of which are listed as threatened in Tasmania.
One threatened flora species *Orthoceras strictum* (horned orchid) was determined to be present during the field survey, approximately 340 m from the sediment pond footprint and 512 m from the LWTS. No threatened flora species were identified in the footprint of the LWTS or sediment pond.

No threatened fauna was recorded in the field survey and the EER states the loss of foraging habitat is unlikely to be noticeable.

Various declared weed species were identified during the field or previously recorded nearby.

### Management measures proposed in EER

EER Part 5 'Summary of proposed management measures', lists the following relevant controls:

- **Number 14** As per Section 4.7 in this EER, weed management will include:
  - Wash-down and inspection of vehicles, machinery, and boots prior to entry/exit from the site to be conducted in accordance with the Weed and Disease Planning and Hygiene Guidelines (DPIPWE 2015) and inspected post washdown by a suitably accredited supervisor.
  - Control of weeds prior to construction where appropriate.
  - Control of material brought onto the site, to ensure it is free from weed seeds or diseases. All material must be certified weed free. All crushed rock and gravels must be certified as Phytophthora free.
  - Records of these activities will be retained.

Additional measures described in the EER are as follows:

- Existing cleared areas should be utilised for storage of fill and capping materials to minimise the overall clearance required.
- Vegetation clearance and excavation will be limited to within 4 m of the footprint of the design, along with access tracks, and will be undertaken only when required by the design documents.
- Traffic movements and works involving the operation of mobile plant and haulage trucks will be restricted to daytime hours to avoid increased fauna collision rates as a result of the Project.
- No works are to be conducted outside of the approved works area. No-go zones are to be clearly marked onsite where works are proposed at the boundary of the site and in proximity to protected vegetation areas.
- Installation of fencing to prevent fauna from falling into the wetlands.

### Public and agency comment

None

| **Evaluation** |
| --- |
| It is agreed that impacts from loss of habitat, or disturbance to threatened fauna and flora is unlikely.<br><br>Management of weeds and pathogens must be controlled, particularly during construction. **Condition FF1** requires machinery washdown and **Condition FF2** requires the site to be kept substantially free of weeds. **Condition OP1** sets the requirement for fencing of the LWTS and sediment ponds and **Condition OP2** requires the control of pests, birds and other scavengers on site. |
| **Conclusion** |
| The proponent will be required to comply with the following conditions:<br><br>• FF1 Machinery washdown<br>• FF2 Weed management<br>• OP1 Site Security<br>• OP2 Potential Disease Vectors |

| **Issue 7: Noise** |
|---|
| **Description of potential impacts** |
| Construction will require minor excavations with earth moving equipment and increase traffic movements. However, the nearest sensitive receptor is 800 m to the northwest from the LWTS and shielded by topography. Noise impacts are expected to be minimal.<br>Operation of the LWTS will generate minimal noise. |
| **Management measures proposed in EER** |
| EER Part 5 'Summary of proposed management measures', lists the following relevant controls for construction noise:<br>• **Number 11** As outlined in Section 4.3 of this EER, noise management through the CEMP will include:<br>  ○ Hours of operation restricted from 0700 - 1700 Monday to Saturday and 1000 – 1600 Sunday.<br>  ○ Machinery and equipment selected, operated, and maintained to minimise noise emissions during construction.<br>Additional measures described in the EER are as follows:<br>• Developing and maintaining a complaints register to monitor and address any noise complaints. |
| **Public and agency comment** |
| None |
| **Evaluation** |
| The activity is not expected to result in significant noise impacts. Therefore, rather than create two sets of working hours restrictions for the same site, **Condition CN4** restricts construction hours for the LWTS to 0700 to 1700 hours Monday to Saturday; and 1000 to 1600 hours on Sunday.<br>**Condition G7** requires the proponent to maintain a complaints register, to record any complaints made regarding dust or odour nuisance. |
| **Conclusion** |
| The proponent will be required to comply with the following conditions:<br>• Condition CN4 Operating hours – Construction<br>• Condition G7 Complaints register |

## Issue 8: Decommissioning

### Description of potential impacts

The EER states that, following the construction of the LWTS, the existing Cell 1 and 2 leachate pond will be decommissioned.

The landfill is expected to have a minimum life span of 70 years during which time the LWTS will operate to treat leachate.

At the end of this period the landfill will be decommissioned, based on an approved decommissioning and rehabilitation plan. Following closure and capping of the landfill cells, the landfill will be subject to a post-closure care, maintenance, and monitoring phase, during which the wetland will continue to receive any residual leachate and be monitored regularly.

At the end of the post-closure phase it is expected that the leachate inlet pipes would be capped, any residual sludge within the LWTS lagoons be removed, and that the wetland will form part of the natural surface water drainage features of the site. Provided a satisfactory landfill closure is undertaken the LWTS will not discharge effluent post closure.

### Management measures proposed in EER

Management measures described in the EER are as follows:

- Regular review and revision of the environmental monitoring program.
- Implementation of contingency plans, if required.
- Continuation of the recording and reporting system.
- Provision of security to minimise risk of damage by vandalism.
- Cessation of leachate management measures once monitoring results indicate landfilled waste has stabilised.
- Capping of leachate inlet pipes and allowing the wetland to form part of the natural surface water drainage features for the site.

### Public and agency comment

None

### Evaluation

It is anticipated that future decommissioning of the LWTS and sediment pond will form part of a wider process covering the whole of the waste depot. Nonetheless, several conditions have been included to manage temporary or permanent closure of the LWTS should this need to be outside a framework covering the whole site.

**Condition DC1** requires that the Director be notified within 30 days of becoming aware of any event or decision which is likely to give rise to the permanent cessation of the use of the LWTS. **Condition DC2** requires the preparation of a Decommissioning and Rehabilitation Plan under these circumstances.

**Condition DC3** requires that all flows from the existing landfill leachate collection systems are redirected to the LWTS at the start of commissioning and that the existing leachate treatment pond and associated channels are decommissioned and rehabilitated to the satisfaction of the Director.

**Condition DC4** sets requirements for temporary cessations of activities. **Condition DC5** sets the requirements for a decommissioning and rehabilitation plan.

### Conclusion

The proponent will be required to comply with the following conditions:

- Condition DC1 Notification of cessation
- Condition DC2 DRP requirements
- Condition DC3 Decommissioning and rehabilitation of redundant existing leachate treatment system
- Condition DC4 Temporary suspension of activity
- Condition DC5 Rehabilitation upon cessation

# 7 Report Conclusions

This assessment has been based on the information provided by the proponent, West Coast Council, in the case for assessment (the EER).

This report incorporates specialist advice provided by EPA Tasmania scientific specialists and regulatory staff.

It is concluded that:

1. the RMPS and EMPCS objectives have been duly and properly pursued in the assessment of the proposal;
2. the assessment of the proposed activity has been undertaken in accordance with the Environmental Impact Assessment Principles; and
3. the proposed activity is capable of being managed in an environmentally acceptable manner such that it is unlikely that the objectives of the *Environmental Management and Pollution Control Act* 1994 (the RMPS and EMPCS objectives) would be compromised, provided that the Permit Conditions - Environmental No. 10460 appended to this report are imposed and duly complied with.

# 8 Report Approval

**Environmental Assessment Report and conclusions, including environmental conditions, adopted:**

Cindy Ong

**ACTING DEPUTY DIRECTOR, EPA TASMANIA**

**Acting under delegation from the Board of the Environment Protection Authority**

Date: 3 August 2021

# 9 References

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

GHD 2021; *Zeehan Landfill Wetland Environmental Effects Report* (February 2021), West Coast Council, Tasmania.

NIWA 2013. Updating nitrate toxicity effects on freshwater aquatic species. Prepared for Ministry of Building, Innovation and Employment: Funded by Envirolink. January 2013.

# 10 Appendices

Appendix 1 Table of proponent commitments

Appendix 2 Permit conditions

# Appendix I – Table of proponent commitments

## Management measures summary

| No. | Proposed measure | Timeframe |
|---|---|---|
| 1 | A Construction Environmental Management Plan (CEMP) will be developed and submitted for approval by the Director, EPA. | 2 months prior to construction |
| 2 | Construction activities will be carried out according to the CEMP as approved by the Director. | Throughout construction |
| 3 | Construction activities will be carried out in accordance with Acid and Metalliferous Drainage Management Plan (AMDMP). | Throughout construction |
| 4 | Any incident that represents a threat to the environment and which may lead to a breach of licence conditions will be communicated by Council to the EPA as soon as reasonably practicable but no later than 24 hours. | Ongoing |
| 5 | Landfill operations will be in accordance with the site EPN and EMP. | Ongoing |
| 6 | Council will engage a qualified horticulturalist to plant and establish the LWTS vegetation, with the horticulturist to develop a wetlands management plan for the plant species selected. To include but not limited to:<br>• Species selection<br>• Species spacing<br>• Harvest frequency<br>• Removal frequency<br>• Plant requirements<br>• Management and mitigation strategies for poor performance of plant species | Prior to construction |

| No. | Proposed measure | Timeframe |
|---|---|---|
| 7 | LWTS Maintenance will be undertaken in accordance with Section 3.7 and updated as necessary, to include at a minimum 6-monthly inspections of:<br>• Filter media<br>• Plant growth and harvesting requirements<br>• Sub soil drainage<br>• Pipe inlets/outlet for blockage<br>• Removal of any wind blown litter<br>• Visual observations for any signs of anaerobic conditions such as algae growth<br>• Vacuum removal of blockages at the leachate pond inlet.<br>Maintenance actives for the LWTS and sediment pond will be documented in a Site Operations Manual to be kept on site at all times and include person responsible. | On going |
| 8 | A nominated person will be responsible for ensuring environmental practices and controls are followed and implemented. | On going |
| 9 | As per Section 4.2.3 of this EER, dust will be managed through:<br>• Daily visual monitoring<br>• Dust suppression<br>• Speed restrictions<br>• Rehabilitation of disturbed areas as soon as possible | During construction |
| 10 | The CEMP will include a sediment and erosion control plan with a range of measures to minimise sediment release from disturbed areas as described in Appendix F of the EER. This will include:<br>• Use of bunds or silt screens to prevent turbid stormwater discharges<br>• Stabilisation and revegetation of exposed areas as soon as possible<br>• Management of work in wet high rainfall conditions | During construction |
| 11 | As outlined in Section 4.3 of this EER, noise management through the CEMP will include:<br>• Hours of operation restricted from 0700 - 1700 Monday to Saturday and 1000 – 1600 and Sunday<br>• Machinery and equipment selected, operated and maintained to minimise noise emissions | During construction |
| 12 | As outlined in Section 4.4 of this EER, waste will be collected on-site in covered bins and regularly removed from the site. Waste segregation to be implemented where practical.<br>Clean fill from works to be backfilled, compacted and reinstated, with any excess removed from the site. | During construction |

| No. | Proposed measure | Timeframe |
|---|---|---|
| 13 | As outlined in Section 4.5 of this EER, re-fuelling and maintenance to be undertaken off-site. If on-site refuelling is required, portable spillage or drip trays will be employed.<br>Spill kits and procedures will be in place to manage fuel, oil or chemical spill in accordance with regulatory requirements. | During construction |
| 14 | As per Section 4.7 in this EER, weed management will include:<br>• Wash-down and inspection of vehicles, machinery, and boots prior to entry/exit from the site to be conducted in accordance with the Weed and Disease Planning and Hygiene Guidelines (DPIPWE 2015), and inspected post washdown by an suitably accredited supervisor<br>• Control of weeds prior to construction where appropriate<br>• Control of material brought onto the site, to ensure it is free from weed seeds or diseases.<br>– All material must be certified weed free.<br>– All crushed rock and gravels must be certified as Phytophthora -free<br>Records of these activities will be retained. | Prior to construction and prior to the operation of mobile plant and vehicles on site. |
| 15 | Council will install a fence around the LWTS and sediment pond to reduce access to native wildlife and protect the LWTS and sediment pond | On going operations |
| 16 | A complaints register will be maintained during the Project, with all complaints and resolutions recorded. | Throughout the construction phase and during operations |
| 17 | Implement Water Quality Monitoring Plan as described in Section 4.12 of the EER. | First 12 months after commissioning of the LWTS |
| 18 | Implement aquatic surveys to establish baseline conditions and update within 12 months of LWTS commissioning (Refer to 4.12). | Prior to LWTS commissioning and within 12 months after LWTS commissioning |
| 19 | Update mixing zone assessment after 6 months of monitoring available and review the effectiveness of the LWTS and impacts to the Little Henty. | 6 months after LWTS commissioning |
| 20 | After a period of one year of monitoring, site specific monitoring data will be reviewed and assessed to determine environmental impacts from the operation and set site specific trigger values. | 12 months after commissioning of the LWTS |

# Appendix 3 – Permit conditions – Environmental

# PERMIT PART B
# PERMIT CONDITIONS - ENVIRONMENTAL No. 10460

Issued under the *Environmental Management and Pollution Control Act 1994*

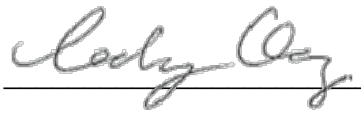
Activity: **The operation of a wastewater treatment works (ACTIVITY TYPE: Wastewater Treatment Works)**
**ZEEHAN WASTE DEPOT, HENTY MAIN ROAD**
**ZEEHAN TAS 7467**

The above activity has been assessed as a level 2 activity under the *Environmental Management and Pollution Control Act 1994* under delegation from the Board of the Environment Protection Authority.

Acting under Section 25(5)(a)(i) of the EMPCA, the Board of the Environment Protection Authority has required that this Permit Part B be included in any Permit granted under the *Land Use Planning and Approvals Act 1993* with respect to the above activity.

Municipality: **WEST COAST**
Permit Application Reference: **DA 2021/13**
EPA file reference: **261742**

Date conditions approved: 3 August 2021

Signed: 

DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

## DEFINITIONS

Unless the contrary appears, words and expressions used in this Permit Part B have the meaning given to them in **Schedule 1** of this Permit and in the EMPCA. If there is any inconsistency between a definition in the EMPCA and a definition in this Permit Part B, the EMPCA prevails to the extent of the inconsistency.

## ENVIRONMENTAL CONDITIONS

The person responsible for the activity must comply with the conditions contained in **Schedule 2** of this Permit Part B.

## INFORMATION

Attention is drawn to **Schedule 3**, which contains important additional information.

## Table Of Contents

***Attachments***



3-8-2021

DELEGATE FOR THE DIRECTOR, ENVIRONMENT PROTECTION AUTHORITY

## Schedule 1: Definitions

In this Permit Part B:-

**Aboriginal Relic** has the meaning described in section 2(3) of the *Aboriginal Heritage Act 1975*.

**Activity** means any environmentally relevant activity (as defined in Section 3 of EMPCA) to which this document relates, and includes more than one such activity.

**Commissioning** means the period comprising at least eighteen (18) months after first receipt of leachate by the LWTS which is taken to be completed when water quality monitoring has demonstrated the acceptable performance of the facility and the relevant operational plans are approved by the Director.

**Construction** means activities associated with the construction phase of the activity, including but not limited to, activities associated with the clearance of vegetation, site works to create a level site, rock breaking, installation of fences and other infrastructure whether on land or in water. Construction is taken to be complete following the sucessful establishment of the wetland vegetation.

**Director** means the Director, Environment Protection Authority holding office under Section 18 of EMPCA and includes a delegate or person authorised in writing by the Director to exercise a power or function on the Director's behalf.

**DRP** means Decommissioning and Rehabilitation Plan.

**EER** Zeehan Landfill Wetland Environmental Effects Report , GHD February 2021.

**EMPCA** means the *Environmental Management and Pollution Control Act 1994*.

**Environmental Harm** and **Material Environmental Harm** and **Serious Environmental Harm** each have the meanings ascribed to them in Section 5 of EMPCA.

**Environmental Nuisance** and **Pollutant** each have the meanings ascribed to them in Section 3 of EMPCA.

**Landfill Sustainability Guide** means the document of this title published by the Department of Primary Industries, Water and Environment in September 2004, and includes any subsequent versions of this document.

**Leachate** means any liquid that is either released by or has percolated through waste.

**LWTS** means Landfill Wetland Treatment System, comprising a leachate holding pond, horizontally drainage leachate wetland system A, vertically draining leachate wetland system B and associated connections and outfall pipes.

**Median** means the value at which the median of all results for the relevant parameter from the previous 12 month period is below the stated value.

**Person Responsible** is any person who is or was responsible for the environmentally relevant activity to which this document relates and includes the officers, employees, contractors, joint venture partners and agents of that person, and includes a body corporate.

**Pollutant** has the meaning ascribed to it in Section 3 of EMPCA.

**Reporting Period** means the period of monitoring reported on in the water monitoring report which is six (6) months for the commissioning phase and twelve(12) months (ending on the 30th September of each year) after commissioning has been completed.

**Stormwater** means water traversing the surface of The Land as a result of rainfall.

**The Land** means the land on which the activity to which this document relates may be carried out, and includes: buildings and other structures permanently fixed to the land, any part of the land covered with water, and any water covering the land. The Land falls within the area defined by:

**1** Title Ref: 130728 folio 1, Property ID: 1905549; and

**2** as further delineated at Attachment 1

**Threatened Species** means species listed under the *Nature Conservation Act 2002*, the *Threatened Species Act 1995* or the *Wildlife Regulations 1999*.

**Wastewater** means spent or used water (whether from industrial or domestic sources) containing a pollutant and includes stormwater which becomes mixed with wastewater.

**Water Sensitive Urban Design** means the design of water infrastructure to minimise impacts on ecosystems while maximising efficient water use.

**Weed** means a declared weed as defined in the *Weed Management Act 1999*.

**Weed And Disease Guidelines** means the document titled *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania*, by the Department of Primary Industries, Parks, Water and Environment, dated March 2015, and any amendment to or substitution of this document.

**ZTDL2** Means the drainage line crossing Zeehan Landfill site into which the LWTS and sediment pond discharge, which flows into the Little Henty River.

## Schedule 2: Conditions

### Maximum Quantities

**Q1 Regulatory limits**

**1** The activity must not exceed the following limits:

**1.1** No limit has been set for the purposes of the Environmental Management and Pollution Control (General) Regulations 2017.

### General

**G1 Access to and awareness of conditions and associated documents**

A copy of these conditions and any associated documents referred to in these conditions must be held in a location that is known to and accessible to the person responsible for the activity. The person responsible for the activity must ensure that all persons who are responsible for undertaking work on The Land, including contractors and sub-contractors, are familiar with these conditions to the extent relevant to their work.

**G2 Incident response**

If an incident causing or threatening environmental nuisance, serious environmental harm or material environmental harm from pollution occurs in the course of the activity, then the person responsible for the activity must immediately take all reasonable and practicable action to minimise any adverse environmental effects from the incident.

**G3 No changes without approval**

**1** The following changes, if they may cause or increase the emission of a pollutant which may cause material or serious environmental harm or environmental nuisance, must only take place in relation to the activity if such changes have been approved in writing by the EPA Board following its assessment of an application for a permit under the *Land Use Planning and Approvals Act 1993*, or approved in writing by the Director:

**1.1** a change to a process used in the course of carrying out the activity; or

**1.2** the construction, installation, alteration or removal of any structure or equipment used in the course of carrying out the activity; or

**1.3** a change in the quantity or characteristics of materials used in the course of carrying out the activity.

**G4 Change of responsibility**

If the person responsible for the activity intends to cease to be responsible for the activity, that person must notify the Director in writing of the full particulars of any person succeeding him or her as the person responsible for the activity, before such cessation.

**G5 Change of ownership**

If the owner of The Land upon which the activity is carried out changes or is to change, then, as soon as reasonably practicable but no later than 30 days after becoming aware of the change or intended change in the ownership of The Land, the person responsible must notify the Director in writing of the change or intended change of ownership.

**G6 Notification prior to commissioning**

At least 14 days prior to the commencement of commissioning of both the leachate wetland treatment system and the sediment pond, the person responsible for the activity must notify the Director of the date on which commissioning is expected to commence.

**G7 Complaints register**

**1** A public complaints register must be maintained. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the activity:

**1.1** the date and time at which the complaint was received;

**1.2** contact details for the complainant (where provided);

**1.3** the subject matter of the complaint;

**1.4** any investigations undertaken with regard to the complaint; and

**1.5** the manner in which the complaint was resolved, including any mitigation measures implemented.

**2** Complaint records must be maintained for a period of at least 3 years.

**Atmospheric**

**A1 Control of dust emissions during construction**

**1** Construction activities must be managed using such measures as are necessary to prevent dust emissions causing environmental nuisance. Such measures may include but are not limited to:

**1.1** using a dust suppression method such as watering dust generating surfaces; and

**1.2** ceasing construction activities in windy weather when dust may be blown in the direction of residences.

**A2 Odour management**

The person responsible must institute such odour management measures as are necessary to prevent odours causing environmental nuisance beyond the boundary of The Land.

**Construction**

**CN1 Commencement of works**

**1** Specifications and design drawings for the LWTS, sediment pond and any other permitted infrastructure must be submitted to the Director for approval, 30 days prior to the start of construction.

**2** Construction must not commence until the Director indicates in writing that any modifications to the specifications and design drawings required have been implemented to his or her satisfaction.

**CN2 Quality Assurance**

**1** Prior to the construction of the LWTS sediment pond and any other permitted infrastructure, a Construction Quality Plan (CQP) must be submitted to the Director for approval.

**2** The CQP must contain:

**2.1** a description of the proposed construction method and specifications of materials proposed;

**2.2** quality assurance and quality control details to be used in relation to methods and materials; and

**2.3** the level of independent supervision and verification.

**3** Unless otherwise specified in writing by the Director, construction and quality control activities must be carried out according to the approved CQP.

**CN3 Acid and Metalliferous Drainage Management Plan**

**1** At least 1 month prior to the commencement of construction activities, or by a date otherwise specified in writing by the Director, an Acid and Metalliferous Drainage Management Plan must be submitted to the Director for approval. This requirement will be deemed to be satisfied only when the Director indicates in writing that the submitted document adequately addresses the requirements of this condition to his or her satisfaction.

**2** The Acid and Metalliferous Drainage Management Plan must be consistent with Appendix C of the EER.

**3** The person responsible must implement and act in accordance with the approved Plan.

**4** In the event that the Director, by notice in writing to the person responsible, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, the person responsible must implement and act in accordance with the varied plan or the new plan, as the case may be.

**CN4 Operating hours - Construction**

**1** Unless otherwise approved in writing by the Director:

**1.1** Construction activities must not be undertaken outside 0700 hours to 1700 hours Monday to Saturday; and 1000 hours to 1600 hours Sunday.

**1.2** Notwithstanding the above paragraph, the construction activities must not be carried out on Public Holidays that are observed State-wide (Easter Tuesday excepted).

**Decommissioning And Rehabilitation**

**DC1 Notification of cessation**

Within 30 days of becoming aware of any event or decision which is likely to give rise to the permanent cessation of the activity, the person responsible for the activity must notify the Director in writing of that event or decision. The notice must specify the date upon which the activity is expected to cease or has ceased.

**DC2 DRP requirements**

Unless otherwise approved in writing by the Director, a Decommissioning and Rehabilitation Plan (DRP) for the activity must be submitted for approval to the Director within 30 days of the Director being notified of the planned cessation of the activity or by a date specified in writing by the Director. The DRP must be prepared in accordance with any guidelines provided by the Director.

**DC3 Decommissioning and rehabilitation of redundant existing leachate treatment system**

**1** Unless otherwise approved in writing by the Director, flows from all existing landfill leachate collection systems must be redirected to the LWTS holding pond at the start of commissioning of the LWTS.

**2** Following commissioning of the LWTS the existing leachate pond and any lines, drains, collection systems not requiring ongoing use must be decommissioned and rehabilitated to the satisfaction of the Director, as indicated in writing.

**DC4 Temporary suspension of activity**

**1** Within 30 days of becoming aware of any event or decision which is likely to give rise to the temporary suspension of the activity, the person responsible for the activity must notify the Director in writing of that event or decision. The notice must specify the date upon which the activity is expected to suspend or has suspended.

**2** During temporary suspension of the activity:

**2.1** The Land must be managed and monitored by the person responsible for the activity to ensure that emissions from The Land do not cause serious environmental harm, material environmental harm or environmental nuisance; and

**2.2** If required by the Director a Care and Maintenance Plan for the activity must be submitted, by a date specified in writing by the Director, for approval. The person responsible must implement the approved Care and Maintenance Plan, as may be amended from time to time with written approval of the Director.

**3** Unless otherwise approved in writing by the Director, if the activity on The Land has substantially ceased for 2 years or more, rehabilitation of The Land must be carried out in accordance with the requirements of these conditions as if the activity has permanently ceased.

**DC5 Rehabilitation upon cessation**

**1** Unless otherwise approved in writing by the Director, following permanent cessation of the activity land disturbed or used in the carrying out of the activity must be rehabilitated in accordance with:

**1.1** the measures set out in the Decommissioning and Rehabilitation Plan for The Land approved in writing by the Director; or

**1.2** where an approved Decommissioning and Rehabilitation Plan is not available, the Acceptable Standards provisions of Section 5 of the *Landfill Sustainability Guide*.

**Effluent**

**EF1 LWTS Performance review**

**1** Within three (3) months of the completion of the commissioning of the LWTS, or by a date otherwise specified in writing by the Director, a review of LWTS performance must be completed using data collected in accordance with condition M1 and Attachement 2, and a report submitted to the Director for approval. This requirement will be deemed to be satisfied only when the Director indicates in writing that the submitted document adequately addresses the requirements of this condition to his or her satisfaction. The report must describe:

**1.1** An updated leachate generation model and leachate composition estimates for the landfill extension;

**1.2** Analysis of inlet and outlet data;

**1.3** Site specific guideline values used to assess impacts to the Little Henty and all data on which they are based;

**1.4** Updated ambient modelling of the impact to Little Henty Water Quality; and

**1.5** A full, clearly presented description of the conclusions of the model and recommendations for further action in relation to the LWTS.

**EF2 Wetland Management Plan**

**1** At least 3 months prior to the completion of commissioning, or by a date otherwise specified in writing by the Director, a Wetland Management Plan must be submitted to the Director for approval. This requirement will be deemed to be satisfied only when the Director indicates in writing that the submitted document adequately addresses the requirements of this condition to his or her satisfaction.

**2** The Wetland Management Plan must be consistent with the wetland management regime in Section 3.7 of the EER unless agreed by the Director.

**3** The plan must be prepared in accordance with any guidelines provided by the Director.

**4** Without limitation, the plan must include details of the following:

**4.1** All activities required to maintain optimum performance of the LWTS;

**4.2** Responsibilities for activities in the plan;

**4.3** Requirements for qualified persons to undertake activities in the plan;

**4.4** A table containing all of the major commitments made in the plan;

**4.5** A timetable for regular maintenance activities;

**4.6** Procedures for sustaining effluent discharge quality during and after periods of maintenance.

**4.7** Maintenance activities in response to deteriorating LWTS performance including triggers for their implementation; and

**4.8** A reporting program to regularly advise the Director of the results of the plan.

**5** The Wetland Management Plan must describe available measures, including the treatment of discharge from the LWTS at the Zeehan Waste Water Treatment Plant, if monitoring or model validation indicate that discharges from the LWTS are resulting in ongoing environmental harm.

**6** The Wetland Management Plan must be approved by the Director before commissioning is deemed to be complete.

**7** The person responsible must implement and act in accordance with the approved plan.

**8** In the event that the Director, by notice in writing to the person responsible, either approves a minor variation to the approved plan or approves a new plan in substitution for the plan originally approved, the person responsible must implement and act in accordance with the varied plan or the new plan, as the case may be.

## Flora And Fauna

**FF1 Machinery washdown**

Prior to entering The Land, machinery must be washed in accordance with the Weed and Disease Guidelines, or any subsequent revisions of that document.

**FF2 Weed management**

The Land must be kept substantially free of weeds to minimise the risk of weeds being spread through the transport of products from The Land.

## Leachate Management

**LM1 Leachate holding pond and wetland liner**

The liners for the leachate holding pond and wetland system A must be designed, installed and maintained in compliance with the relevant standards detailed in the document *Environmental Standards Applying to Liner Construction* (EPA, 2006).

## Monitoring

**M1 Water monitoring requirements**

**1** For the commissioning period, unless otherwise specified in writing by the Director, monitoring must be undertaken in accordance with the Table of Monitoring at Attachment 2.

**2** Unless otherwise approved in writing by the Director, a revised monitoring program must be submitted to the Director for approval, within three (3) months of the completion of the commissioning period.

**M2 Flow meter**

Unless otherwise approved in writing by the Director, a flow meter is to be installed to record flow into the leachate pond before the start of operation of the LWTS.

**M3 Flow monitoring equipment**

**1** Flow monitoring equipment must be maintained in accurate working order in accordance with the manufacturer's specifications and, unless otherwise approved in writing by the Director, must be validated at least once every 12 months.

**2** The dates on which flow monitoring equipment has been validated must be recorded and validation records kept for a minimum of 3 years.

**3** For the purposes of this condition:

**3.1** 'validate' means to undertake a set of actions including inspecting the flow monitoring equipment to check that it is installed in compliance with any relevant standards and is maintained to an acceptable state of repair, which provides an acceptable level of confidence that the flow monitoring equipment operates within an acceptable range of error under normal operating conditions.

**3.2** 'Flow monitoring equipment' means an instrument, including a flow meter, that measures and may record a flow or level of liquid and includes any ancillary device attached to or incorporated into the instrument.

**M4 Samples and measurements for monitoring purposes**

**1** Any sample or measurement required under these conditions must be taken and processed in accordance with the following:

**1.1** sampling and measuring must be undertaken by a person with training, experience, and knowledge of the appropriate procedure;

**1.2** the integrity of samples must be maintained prior to delivery to a testing facility;

**1.3** sample analysis must be conducted by a testing facility accredited by the National Association of Testing Authorities (NATA), or a testing facility approved in writing by the Director, for the specified test;

**1.4** details of methods employed in taking samples and measurements and results of sample analysis, and measurements must be retained for at least three (3) years after the date of collection; and

**1.5** sampling and measurement equipment must be maintained and operated in accordance with manufacturer's specifications and records of maintenance must be retained for at least three (3) years.

**M5 Signage of monitoring points**

With the exception of open water sampling, all monitoring points must be clearly marked to indicate the location and name of the monitoring point.

**M6 Water Monitoring Report**

**1** Unless otherwise approved in writing by the Director, a Water Monitoring Report (WMR) for the activity must be submitted to the Director each year within three (3) months of the end of the Reporting Period.

**2** Unless otherwise specified in writing by the Director, the WMR must be prepared in a form approved by the Director and in accordance with any EPA guidelines relating to the preparation or provision of information within the WMR and must, without limitation include:

**2.1** the date(s) and time(s) of measurements;

**2.2** method(s) used to produce the measurements;

**2.3** results and interpretation of results, including assessment of temporal trends;

**2.4** an assessment of quality assurance and quality control measures;

**2.5** actions taken in response to trigger conditions being met;

**2.6** if applicable, an updated conceptual site model that reflects contemporary understanding of the activity and its impacts;

**2.7** where source-pathway-receptor linkages are identified, an assessment of the risk to human health and the environment;

**2.8** a record of all planned and unplanned maintenance undertaken during the reporting period;

**2.9** an assessment of the adequacy of the management measures in place and recommendations on what, if any, additional management measures are required, to address the identified risks to human health and the environment; and

**2.10** an assessment of the adequacy of the Water Monitoring Report to detect environmental harm arising from the activity and, if applicable, recommendations for changes to the Water Monitoring Report and recommendations for any required changes to the Attachment 2: Water Quality Monitoring Program.

**M7 Monitoring and reporting of LWTS overflows**

**1** In the event of an overflow from the LWTS via the Wetland B spillway to ZTDL2, the person responsible for the activity must:

**1.1** Take a water sample from the ZTDL2 downstream monitoring point within six (6) hours of becoming aware of the overflow; and

**1.2** Notify the Director in writing as soon as is reasonable and practicable.

## Operations

**OP1 Site Security**

Unless otherwise approved in writing by the Director a suitably high security fence must be constructed and maintained around the perimeter of the sediment control and leachate ponds.

**OP2 Potential Disease Vectors**

Measures must be implemented and maintained throughout the operational life of the site to monitor and control the presence of pests, birds and other scavengers on site.

## Stormwater Management

**SW1 Stormwater Infrastructure**

**1** Uncontaminated stormwater must be prevented from becoming contaminated with pollutants and/or carrying sediment or contaminants off The Land. Stormwater infrastructure must be constructed and:

**1.1** must have sufficient capacity to direct and contain run-off that could be expected to arise during the following relevant storm event: Landfill Category B: Putrescible - a 5% AEP storm event;

**1.2** may include provision of strategically located sediment fences, appropriately sized sediment settling ponds, vegetated swales, detention basins and other measures designed and operated in accordance with the principles of Water Sensitive Urban Design; and

**1.3** must be periodically cleaned out to ensure that the design capacity is maintained. Sediment removed during this cleaning must be securely deposited such that sediment will not be transported off The Land by surface run-off.

## SW2 Stormwater discharge

**1** Stormwater must be prevented as far as practicable from mixing with deposited waste.

**2** Polluted stormwater, not leachate, that will be discharged from The Land must be collected and treated prior to discharge to the extent necessary to prevent serious or material environmental harm, or environmental nuisance.

**3** All stormwater that is discharged from The Land must not carry sediment or pollutants such as litter, oil and grease in quantities or concentrations that are likely to degrade the visual quality of any receiving waters outside The Land.

## Schedule 3: Information

### Legal Obligations

**LO1 EMPCA**

The activity must be conducted in accordance with the requirements of the *Environmental Management and Pollution Control Act 1994* and Regulations thereunder. The conditions of this document must not be construed as an exemption from any of those requirements.

**LO2 Storage and handling of dangerous goods, explosives and dangerous substances**

**1** The storage, handling and transport of dangerous goods, explosives and dangerous substances must comply with the requirements of relevant State Acts and any regulations thereunder, including:

**1.1** *Work Health and Safety Act 2012* and subordinate regulations;

**1.2** *Explosives Act 2012* and subordinate regulations; and

**1.3** *Dangerous Goods (Road and Rail Transport) Act 2010* and subordinate regulations.

**LO3 Aboriginal relics requirements**

**1** Aboriginal relics, objects, sites, places and human remains regardless of whether they are located on public or private land, are protected under the *Aboriginal Heritage Act 1975*.

**2** Unanticipated discoveries of Aboriginal heritage must be reported to Aboriginal Heritage Tasmania on **1300 487 045** as soon as possible.

### Other Information

**OI1 Waste management hierarchy**

**1** Wastes should be managed in accordance with the following hierarchy of waste management:

**1.1** waste should be minimised, that is, the generation of waste must be reduced to the maximum extent that is reasonable and practicable, having regard to best practice environmental management;

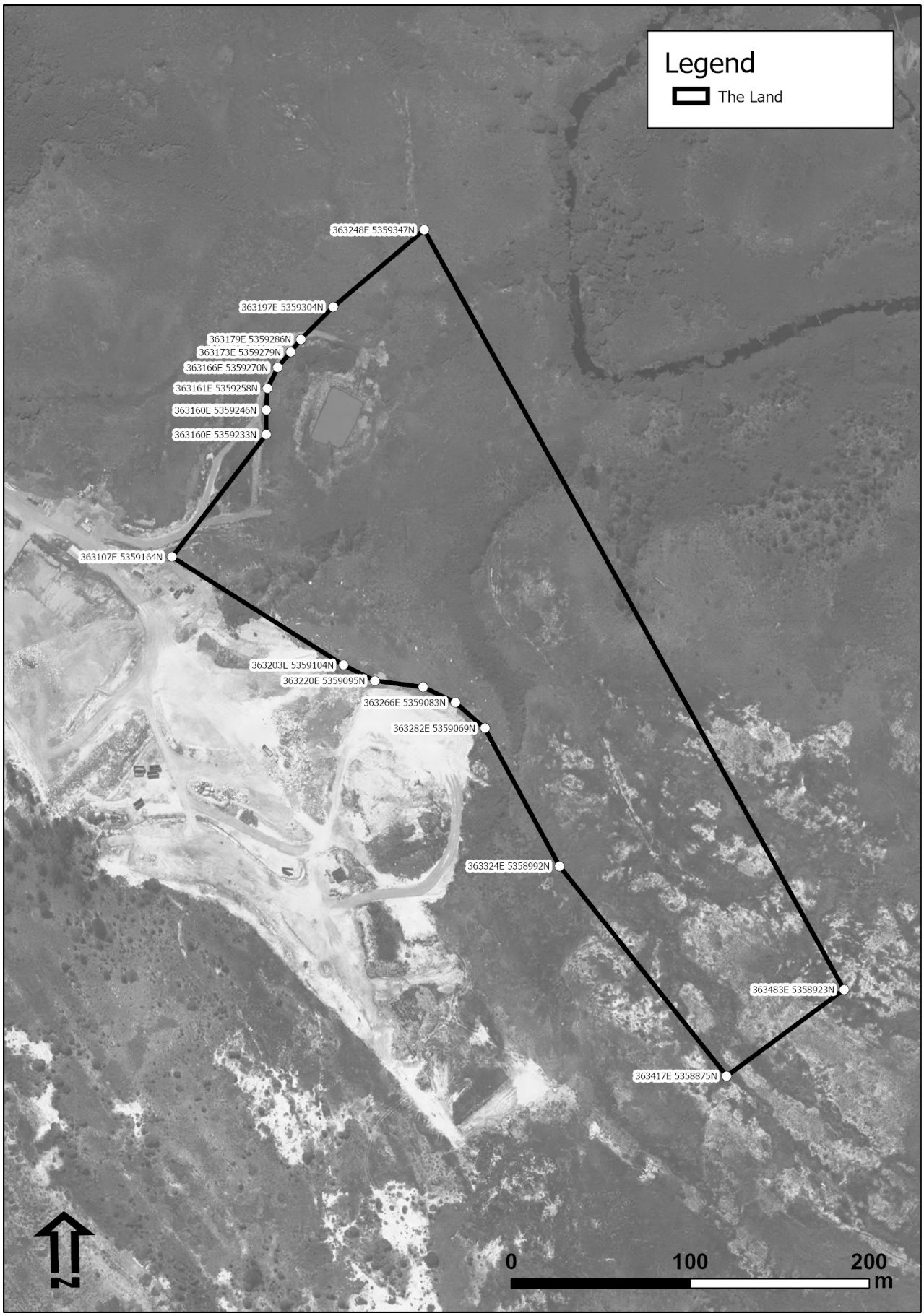
**1.2** waste should be re-used or recycled to the maximum extent that is practicable; and

**1.3** waste that cannot be re-used or recycled must be disposed of at a waste depot site or treatment facility that has been approved in writing by the relevant planning authority or the Director to receive such waste, or otherwise in a manner approved in writing by the Director.

**OI2 Notification of incidents under section 32 of EMPCA**

Where a person is required by section 32 of EMPCA to notify the Director of the release of a pollutant, the Director can be notified by telephoning **1800 005 171** (a 24-hour emergency telephone number).

## Attachment 1: PCE 10460 Map



**Commissioning Phase Water Quality Monitoring Program**

The proposed monitoring locations and sampling requirements for the commissioning phase are provided in Table 1. below and in Zeehan Landfill Wetland EER Figure 21 (attached).

**Table 1. Commissioning Phase Water Quality Sampling Requirements**

| Location code | Location description | Eastings | Northings | Duration | Parameters to be sampled monthly | Parameters to be sampled 6 monthly |
|---|---|---|---|---|---|---|
| ZTLP2 | Leachate pond (new) incoming | 363234.9 | 5359143 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters*<br>FLOW – daily (L/s) | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| ZTWL1 | Wetland discharge outlet wetland A to drainage line (ZTDL1) | 363269 | 5359198 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters* | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| ZTWL2 | Wetland discharge outlet wetland B to drainage line (ZTDL2) | 363269 | 5359198 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters* | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| LHU/S | Little Henty upgradient of the site | 363318 | 5359343 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters*.<br>Chlorophyll-a, blue green algae – monthly November to April. | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| LHD/S | Little Henty downstream of ZTDL2 discharge – approx. 205m | 363363.5 | 5359261 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters*<br>Chlorophyll-a, blue green algae – monthly November to April. | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |

| | | | | | | |
|---|---|---|---|---|---|---|
| ZTDL2 U/S | ZTDL2 upstream of operations | 363288.9 | 5359090 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters*<br>Chlorophyll-a, blue green algae – monthly November to April. | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| ZTDL2 D/S | ZTDL2 downstream of wetland discharge | 363331 | 5359240 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters*<br>Chlorophyll-a, blue green algae – monthly November to April.<br>Flow | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| Spring U/S | Spring upstream of operations | 363057.7 | 5359012 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters* | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| Spring D/S | Spring downstream of operations | 363223.7 | 5359096 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters* | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |
| Sed 1 | Sediment pond outlet | 363355 | 5359009 | 18 months | Metals (T & F)*, nutrients*, major ions*, TSS, BOD/COD, TRH (silica gel), EC, pH, and field parameters* | PAH, OC/OP pesticides, PCB, BTEXN, PFAS |

362|800 363|000 363|200 363|400

5,359,600 5,359,400 5,359,200 5,359,000 5,358,800 5,358,600

Zeehan Landfill

Henty Road

Little Henty River

LH U/S

LH D/S

ZT2

ZT LP RDS

ZTDL2 D/S

ZT1

ZTWL1

ZTWL2

ZTLP2

Cell 1

Cell 2 Bore

Spring D/S

ZTDL 2

Cell 2

ZT3

ZTB5

Spring U/S

Sed 1

Sediment pond

Cell 3

Cell 4

Cell 5

1:15,000

362|800 363|000 363|200 363|400

Proposed LWTS plots
Cell 1; Cell 2; Cell 3; Cell 4; Cell 5
Little Henty River
Sediment pond
Henty Road
Access Road
Tributary
Spring
Groundwater monitoring
Leachate monitoring
Proposed monitoring bores
Sediment monitoring
Surface water monitoring
Wetland monitoring
Proposed LWTS
Site Boundary

Paper Size A3

0 25 50 75

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

West Coast Council
Zeehan Wetland Environmental Effects Report

Job Number 12534572
Revision G
Date 27 Jan 2021

# Proposed Monitoring Plan

Figure 21

G:\32\12534572\GIS\Maps\Deliverables\12534572_007_ProposedMonitoringLocations_RevG.mxd

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3-8-2021


ENVIRONMENT PROTECTION AUTHORITY