Amendment Report

Application for Licence Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L6963/1997/15
Licence Holder	Mindarie Regional Council
ABN	77 069 468 271
File Number	DER2016/001330-1
Premises	Tamala Park Waste Management Facility 1700 Marmion Avenue CLARKSON WA 6030 Legal description – Being part of Lot 9020 on Plan 408820 as depicted in Schedule 1.
Date of Report	12 May 2022
Decision	Revised licence granted

Marko Pasalich
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Date: 2022.05.12 09:03:18 +08'00'

SENIOR ENVIRONMENTAL OFFICER
REGULATORY SERVICES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1 Decision summary

Licence L6963/1997/14 is held by Mindarie Regional Council (Licence Holder) for the Tamala Park Waste Management Facility (TPWMF), located at 1700 Marmion Avenue, Clarkson. The TPWF is primarily a Category 64 Class II/III putrescible landfill site, but the Premises also holds authorisations for categories 12 (Screening, etc. of material), 57 (Used tyre storage), 61 (Liquid waste facility), 61A (Solid waste facility), 62 (Soild waste depot) and 77 (Concrete batching or cement products manufacturing).

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L6964/1997/1 has been granted.

2 Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Premises summary

The TPWMF is located 30 kilometres north of the Perth central business district, 10 km from the Wanneroo town site, 3 km from Burns Beach to the south-west, and 3 km from Quinns Rocks and Mindarie Keys to the north-west. The Premises has been in operation since February 1991.

Municipal waste is accepted for burial in a series of landfill phases covering an approximate area of 37 hectares, of which 11 hectares are now closed. Stage 2 of the landfill (active) is provided with an engineered basal lining system. However, the Stage 1 cells (closed) were not lined. Landfilling occurs progressively to achieve the final design levels required for the capping of the waste profile. Once the final profile is reached, that phase of the cell is capped and rehabilitated.

Excluding the western margin directly adjacent to Stage 2, Stage 1 of the landfill was capped in 2004 and 2005 for the southern and northern phases respectively. The western margin of Stage 1 was not capped as this area is required to 'tie-in' with the Stage 2 landfill and will be last area of filling on the Premises prior to closure. The Stage 2 landfill is divided into three phases, with Phase 1 (northern portion) having already been capped in 2011. Phase 2 (central portion) and Phase 3 (southern portion) are currently active and have not been capped. The landfill cell staging and phases are shown in Figure 1.

Material excavated during construction of the landfill cells that is considered suitable for use as capping is retained on the Premises. This reduces the need for transporting materials on and off-site or for the procurement of cover materials during closure/capping. However, the Licence Holder considers the need to source additional cover material from offsite is likely.

2.3 Application summary

On 29 September 2021, the Licence Holder submitted an application to the department to amend Licence L9089/2017/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act).

The application was submitted to comply with Condition 1.2.7: Table 1.2.4 (Capping Requirements) of existing Licence L6963/1997/14. The specified actions outlined in Condition 1.2.7 requires the Licence Holder to provide final capping plans for Stage 2 Phase 2 West, Stage 2 Phase 2 East and Stage 2 Phase 3 (refer to Figure 1).

The submitted capping plan and capping works forming the scope of this application are for the west area of the Stage 2 cell only (herein referred to as Stage 2 West). Stage 2 West differs from the area specified in the licence as Stage 2 Phase 2 West, as it also comprises approximately the western third of the area referred to as Stage 2 Phase 3.

Supporting documentation provided with this application includes:

- Talis - Closure and Post-Closure Management Plan – 23 June 2021;
- Talis - Quality Assurance Plan‑Stage 2 West Capping Works – 24 June 2021;
- Talis - Capping Stability Risk Assessment for Stage 2 and Immediate Surrounding Area – 29 June 2021;
- Talis - Tamala Park Waste Management Facility – Stage 2 West Capping Works – 30 June 2021; and
- Talis – Tamala Park Waste Management Facility – Technical Drawings (Appendix 2).

To demonstrate best practice, the Licence Holder has also developed and provided a Closure and Post-Closure Management Plan (CPCMP) based on the general requirements set out in *Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills* (EPAV 2015), herein referred to as the BPEM Guidelines.

The submitted CPCMP covers the following key areas:

- Final restoration profile in accordance with the BPEM Guidelines;
- Remaining void space calculations;
- Material volumes available/required for restoration;
- Environmental engineering and management measures at the Premises;
- A phased closure plan, which will form the basis of the subsequent detailed design for the whole Premises and subsequent construction drawings for contract documentation required for the future capping phases;
- Consideration of future land use;
- A post-closure monitoring plan for the rehabilitated landfill to ensure the Premises does not pose an ongoing risk to the environment; and
- Risk assessment for the effective management of potential environmental impacts prior to and following closure.

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

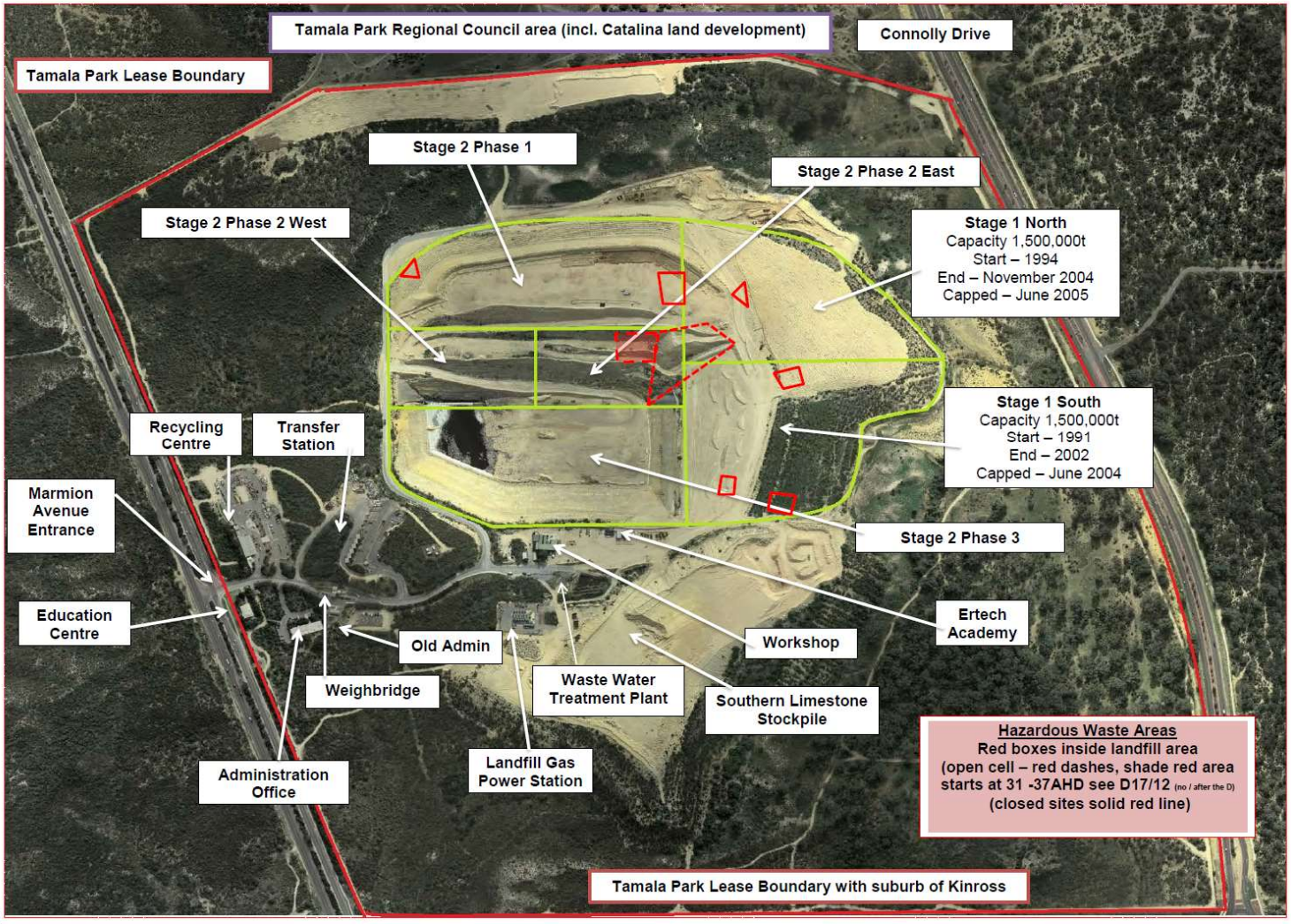


Figure 1: Landfill cell development staging and phases

2.3.1 Landfill profile

A number of cell stages and landfilling phases are required to establish the final profile of the landfill. Capping and filling occur progressively to reduce infiltration and the generation of leachate over the course of operations.

2.3.1.1 Current landfill profile

Stage 1 of the landfill was capped in 2004 and 2005 for the southern and northern phases respectively. Based on historical reporting, the waste mass height ranged from 39 mAHD to approximately 50 mAHD.

A topographic survey undertaken on the active landfill areas on 17 February 2021 showed the western flank of Stage 2 has been partially filled to levels ranging from 33 mAHD at the western edge, to approximately 45 mAHD in the active area. The gradient of the western side slope ranges from 1V:6H to 1V:4H, indicating that some areas exceed the maximum side slope gradient of 1V:5H (20%), recommended in the BPEM Guidelines. Filling of the upper slopes is ongoing and the western flank was anticipated to be filled to 49 mAHD by mid-2021.

Stage 2 ranges from 45 mAHD in the central area to 30 mAHD in the eastern area . Most of the eastern area of Stage 2 lies at 30 mAHD and then rises to approximately 50 mAHD at the Stage 1 interface. The active areas of the Stage 2 landfill are accessed via roads from the southern edge of Stage 2 Phase 3, at approximately 46 mAHD and from the eastern edge of Stage 2 at approximately 30 mAHD, via Stage 1 West. The southern margin of Stage 2 Phase 1 is uncapped at the interface with Stage 2 Phase 2 and ranges from 45 mAHD at the interface to approximately 50 mAHD at the southern edge of the cap.

2.3.1.2 Final capping profile

The Premises is proposed to be capped in a phased approach that will comply with the objectives set out in the BPEM Guidelines and requirements of the Licence. The key objectives adopted for the closure designs include the following:

- Design and construction of the best cap practicable to prevent pollution of groundwater and degradation of air quality;
- Ensuring the seepage through the landfill cap is no more than 75% of the anticipated seepage rate through a basal liner that meets best-practice requirements;
- Progressive rehabilitation of the landfill; and
- Final fill profile and slopes that are generally between 5% and 20% to:
    - Ensure the long-term stability and integrity of the capping material and containment layer;
    - Promote natural surface water run-off;
    - Provide an aesthetically acceptable landform; and
    - Minimise long-term maintenance requirements.

The final height of the fill profile is expected to be 59 m. The Licence Holder engaged a consultant to refine the profile slightly around the lower slopes of Stage 2 to minimise the length of slopes exceed 1V:5H wherever possible. The final waste fill profile for the Stage 2 landfill generally complies with the BPEM Guidelines with the exception of the previously mentioned western flank, which has already been filled to a maximum slope of 1V:4H.

A stability analysis was completed for the proposed capping system design with side slope parameters set at 1V:4H. The assessment determined that the design meets the required Factor of Safety of 1.0 under worst case seismic conditions (Talis 2021). This indicates stability issues are unlikely to occur as a result of the western flank area having a greater than 20% slope.

2.3.1.3 Void space modelling

The results of void space modelling performed by the Licence Holder are presented in Table 1.

Table 1: Estimated Landfill Lifespan for Stage 1 Cells

Landfill Cell	Remaining Void Space (m^3)	Net Void Space (m^3)*	Landfill Capacity (yrs)**
Stage 2 West	50,201	45,181	0.2
Stage 2 East	1,282,473	1,154,226	5.7
Stage 1 West	739,348	665,413	3.3
Sub-total	2,072,022***	1,864,820	9.2

* Less 10% void consumption by cover soils
** Assumed at 0.75 t/m compaction rate
*** Indicative void based on current ground levels prior to construction of piggy back liner system

2.3.2 Landfill capping design

The proposed capping system is comprised of the following structural units (top to bottom):

- Vegetation Layer incorporating hydromulch / seeding;
- 1200 mm of Restoration Layer, comprising:
    - 1000 mm thick layer of subsoils; and
    - 200 mm thick layer of topsoil/growing medium;
- Sub-surface Drainage Layer (geocomposite);
- 1.5 mm thick double textured Linear Low-Density Polyethylene (LLDPE) Geomembrane Layer;
- Sub-cap Gas Collection Layer (geocomposite); and
- 200 mm Regulating layer.

2.3.2.1 Sub Cap Gas Collection layer

A sub-cap Gas Collection Layer will be included within the capping design to prevent the build-up of gas beneath the LLDPE cap. The Gas Collection Layer will comprise of a geocomposite / geonet, which will be connected to the landfill gas extraction system.

A geonet is a 3D plastic core positioned between two layers of geotextile to form a geocomposite. The geocomposite permits a planar transmission of gas between the two layers of geotextile while the filter geotextiles prevent ingress of fines from below and protect the overlying LLDPE geomembrane layer. The geonet will be installed in accordance with manufacturer's guidelines, CPCMP and associated QA/QC requirements.

2.3.2.2 LLDPE geomembrane liner

The artificial sealing layer will comprise a 1.5 mm double textured LLDPE geomembrane liner to meet the maximum permissible seepage requirements stated in the BPEM Guidelines. The material specification for the proposed LLDPE geomembrane are provided in Table 2.

Table 2: Specifications for black textured 1.5 mm thick LLDPE

Property	Test Method	Unit	Requirement
Thickness (min. avg.)	ASTM D5994	mm	1.425
Thickness (lowest individual for 8 out of 10 values)			1.35
Thickness (lowest individual for any of the 10 values)			1.275
Asperity Height (min. avg)	ASTM D7466	mm	0.40
Tensile Properties (min. avg) strength at break	ASTM D6693 Type IV	kN/m	16
Tensile Properties (min. avg) elongation at break		%	300
2% Modulus (max.)	ASTM D5323	kN/m	630
Tear Resistance (min. avg.)	ASTM D1004	N	150
Puncture Resistance (min. avg.)	ASTM D4833	N	340
Carbon Black Content	ASTM D4218	%	2.0 – 3.0
Carbon Black Dispersion	ASTM D5596	Category	9 in Cat. 1/ Cat. 2, 1 in Cat.3
Density	ASTM D792	g/cc	≤ 0.939
Oven Aging at 85°C STD OIT (min. avg.) - % retained after 90 days	ASTM D3895	%	35
Oven Aging at 85°C HP OIT (min. avg.) - % retained after 90 days	ASTM D5885	%	60
UV Resistance HP-OIT (min. avg.) - % retained after 1600hrs	ASTM D7238 ASTM D5885	%	35

2.3.2.3 Subsoil Layer

The subsoil layer is required to protect the underlying geosynthetic layers and has a thickness of 1000 mm. This thickness, in combination with the material specifications, will enable the landform to be trafficked by light vehicles and low ground pressure tracked plant to enable site maintenance to be implemented. The subsoil layer must not contain material that could penetrate the underlying geosynthetic layer. This will be addressed in the QA/QC requirements for the installation of the subsoil layer.

2.3.2.4 Vegetation layer

The upper surface of the restoration soil will comprise a 200 mm depth of topsoil growing medium. This helps to retain the integrity of the subsoil beneath and provides a protection layer for the planting of suitable vegetation, which will eventually bind the surface materials together.

As well as enhancing the environmental performance of the built structure, the intention of the revegetation works is to replicate the appearance of the surrounding landscape.

Following placement of the restoration soils the revegetation layer will incorporate direct seeding of a native grass seed mix or other shallow rooted species, including the application of a hydromulch containing a locally native seed mix. Following ripping of the top surface layer, the hydromulch dressing will be applied on top of the restoration soils to stabilise the soil surface, retain soil, prevent dust, suppress weed growth, accelerate the establishment of vegetation and protect vegetation and soils from displacement by surface water run-off until vegetation is established.

In accordance with the BPEM Guidelines, the restoration soils will be revegetated as quickly as possible to reduce the risk of erosion impacts from rainfall and wind. Since the landfill capping will be phased, the revegetation works will also take place in phases in conjunction with the capping works and with consideration to optimal planting conditions to support high germination and growth.

2.3.2.5 Performance modelling

The BPEM Guidelines require that the best available technology is used to control seepage to an amount not exceeding 10 L/ha/day through the basal liner (design seepage rate) and 7.5 L/ha/day (75% of design seepage rate) through the rehabilitated landfill cap

To verify that the capping design complies with the BPEM Guidelines, modelling was undertaken using the Hydrologic Evaluation of Landfill Performance (HELP 3.95D) model. The model found that seepage through the cap was 0.53 L/ha/day, which is well below the limit of 7.5 L/ha/day.

2.3.3 Landfill gas management

The Premises has a landfill gas management system in place to address gas generation over the life of the landfill. The system is owned and operated by Energy Development Limited (EDL). Approximately 2,000 m/hr of gas is currently collected by the system for destruction through a 6 MW power plant located to the south of the Stage 2 landfill. It is anticipated that the peak gas generation rate will coincide with the final capping stage of the landfill in December 2028.

The landfill has an extensive network of landfill gas collection wells, gas mains and condensate knock-out pots installed in both the closed and capped areas and the active landfill areas. The system features in-waste vertical and horizontal landfill gas extraction wells, and perimeter gas wells designed to monitor and collect any gas migration which may occur outside the edges of the waste mass.

2.3.3.1 Landfill Gas Extraction Wells

Currently the site has a total of 308 vertical gas extraction wells installed:

- 165 wells in Stage 1; and
- 143 wells in Stage 2.

The gas wells are installed in a regular grid-like pattern, typically at a spacing of 25 – 50 m varying on well design. Gas extraction wells are not installed within 5 m of the edge of the landfill to reduce the risk of oxygen infiltration into the waste mass. Generally, wells are targeted to approximately 75% of the waste depth and to a minimum depth of 10 m to ensure optimal gas extraction without encouraging leachate ingress into the system. The anulus around the wells is backfilled with aggregate to protect the pipe from the surrounding waste and allow gas to flow freely through the well.

The connection point to the gas main features a valve to control the flow of landfill gas, an orifice plate setup for measuring gas flows, and sampling point(s) to enable the required operational and post-closure monitoring. The wells are currently monitored and adjusted monthly to optimise operations at the power station.

Wells are progressively installed during the development of the Premises, with installation generally occurring annually. LFG extraction wells are not installed in areas where Asbestos Containing Materials (ACM) has been disposed, due to potential exposure risks.

2.3.3.2 Landfill Gas Extraction Network

Each landfill gas well is connected to a series of lateral pipes that connect to a 250 mm pipeline main that rings each Stage of the Premises. The circular design enables gas to continually flow to the gas destruction system in the event of a blockage along the header or any of the pipes. The main header and lateral pipes are sloped against the flow of gas to facilitate the drainage of leachate and condensate, either back into the landfill or to low elevation 'drop out' points where leachate is then pumped back into the landfill. The system is designed to allow continual expansion of the wellfield with new wells and lateral pipes connected into the ring main as required.

2.3.4 Surface water management

Surface water is proposed to be managed at the Premises through the development of a Surface Water Management System (SWMS). A concept design for the SWMS has been developed and provided by the Licence Holder.

2.3.4.1 Surface water collection

Surface water collection has been incorporated into the design of the final capping system. The final cap includes a geonet drainage layer, laid between the LLDPE layer and the 1200 mm thick restoration soil layer. The drainage layer captures and diverts subsurface water infiltrating through the cap away from the LLDPE layer and to the base of the slopes. This prevents infiltration into the waste mass and acts to reduce the production of leachate over time.

The conceptual design of the SWMS also includes perimeter interceptor drains to collect both surface and subsurface water. The drains will discharge into two soak-aways.

2.3.5 Leachate management

The Stage 2 landfill incorporates a basal leachate collection and extraction system, due to the cell being constructed with an engineered liner. As the Stage 1 landfill is unlined, there is no leachate management system present.

2.3.5.1 Leachate extraction

The leachate collection system consists of a 300 mm thick noncalcareous drainage aggregate and a network of primary and secondary perforated HDPE collector pipes. Leachate is collected in the drainage aggregate, conveyed through the collector pipes and transmitted to sumps at the low points of the cell.

Leachate is extracted via submersible pumps installed in angled sidewall risers connected to the sumps at the base of the cell. Stage 2 Phase 1 is served by three risers located on the northern edge, Stage 2 Phase 2 incorporates one riser located on the western edge and Stage 2 Phase 3 includes three risers located on the southern edge.

2.3.5.2 Leachate containment

Leachate extracted from the landfill is transferred to two lined evaporation ponds located atop the southern portion of Stage 2 Phase 1. The extracted leachate is pumped and conveyed to the ponds via a solid, butt-fusion or equivalent welded HDPE pipeline.

The eastern rectangular pond measures approximately 80 m x 20 m and the western orthogonal shaped pond is 88 m x 20 m at the right angle, with a gradual narrowing to 5 m at the opposite end. The ponds are designed with a shallow operational depth of 500 mm and a top of embankment freeboard height of 500 mm. The 500 mm freeboard provides contingency storage and splash protection for wave motion. The ponds are lined with a black geomembrane.

2.3.5.3 Leachate volume management

Leachate volume is managed primarily via surface evaporation from the two ponds. Leachate levels within the ponds are maintained at a 500 mm depth or less to exploit the radiant heating of the black geomembrane to maximise the amount of leachate evaporation.

Leachate is also recirculated over the surface of the uncapped portion of the landfill. This increases losses through evaporation and encourages storage of leachate within the upper layers of the waste mass. Recirculating leachate increases the rate of waste degradation, stabilisation and settlement of the landfill, leading to more efficient use of landfill void space.

2.4 Consolidation of Licence

As part of this amendment package the department has consolidated the licence by incorporating changes made under the Amendment Notices as summarised in Table 3.

Table 3: Licences consolidated in this amendment

Instrument	Issued	Summary of approval
L6963/1997/14	01/07/2016	DER initiated amendment to update premises address details and implement administrative changes.
L6963/1997/14	20/07/2017	Amendment Notice 1 – Increasing the maximum vertical height of the active tipping face.
L6963/1997/14	22/03/2018	Amendment Notice 2 – Acceptance and storage of paint and processing of green waste.
L6963/1997/14	03/09/2018	Amendment Notice 3 – Acceptance, storage of CCA timber products and removal to an off-site higher class of landfill.

The obligations of the Licence Holder have not changed in consolidating the licence. The department has not undertaken any additional risk assessment of the Premises related to previous Amendment Notices. Previously issued Amendment Notices will remain on the department's website for future reference and will act as a record of the department's decision making.

In consolidating the licence, the CEO has:

- deleted the redundant AACR form set out in the previous licence and advise the Licence Holder to obtain the form from the department's website;
- replaced the term *Licensee* with the term *Licence Holder*;
- revised licence condition's numbers, and removed any redundant conditions and realigned condition numbers for numerical consistency; and
- corrected clerical mistakes and unintentional errors.

3 Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in Table 4. Table 4 also details the control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 4: Licence Holder proposed controls

Emission	Sources	Potential pathways	Proposed controls
Dust	Capping infrastructure works, including earth works and vehicle movements	Air/windborne pathway	No additional controls proposed
Noise	Capping infrastructure works, including earth works and vehicle movements	Air/windborne pathway	No additional controls proposed
Landfill Gas	Degradation of putrescible waste	Air/windborne pathway	Detailed closure and capping design including capping with an LLDPE capping system and Gas Extraction Layer. Landfill gas extraction system owned and operated by Energy Development Limited (EDL). Comprised of existing landfill gas extraction network and wells. Capping system design will significantly reduce landfill gas migration from the cell, increasing the capture efficiency of the extraction system. By containing gas within the extraction system, the controlled discharge locations will be predictable and manageable, and this will reduce the likelihood of fugitive gas emission.
Leachate Management	Seepage through landfill capping system	Seepage to soils and groundwater	Implementation of the CPCMP, capping design and specification to limit the amount of leachate generation and infiltration. The proposed landfill capping system includes (top to bottom):

Emission	Sources	Potential pathways	Proposed controls
			• Vegetation Layer incorporating hydro-mulch / seeding to reduce erosion and advance revegetation; • 1200 mm of Restoration Layer, comprising: – 1000 mm thick layer of site derived subsoils; and • 200 mm thick layer of topsoil/growing medium; • Sub-surface Drainage Layer (geocomposite); • 1.5 mm thick double textured Linear Low-Density Polyethylene (LLDPE) Geomembrane Layer; • Sub-cap Gas Collection Layer (geocomposite); and • 200 mm Regulating layer. Annual monitoring and characterisation of leachate from the sampling riser and evaporation ponds to inform risk management decisions.
Surface Water Management	Uncontrolled surface runoff	Seepage to soils and groundwater	Installation of a geonet drainage layer between the LLDPE layer and the 1200 mm thick restoration soils will capture and divert subsurface waters. Surface and subsurface water will be intercepted by the perimeter surface water ditches which will outfall into two soak-aways. Seepage through the landfill cap is designed to be no more than 75% of the anticipated seepage rate through the basal liner (meeting best-practice requirements). Proponent will develop a site-specific Surface Water Management System (SWMS) for the Premises. Progressive rehabilitation of the landfill and final fill profile to have side slopes that are between 5% and 20% to: • Ensure the long-term stability and integrity of the capping material and containment layer; • Promote natural surface water run-off; • Provide an aesthetically acceptable landform; and • Minimise long-term maintenance requirements.

3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 5 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guidance Statement: Environmental Siting* (DER 2016)). Potential receptors surrounding the Premises are also shown in Figure 2.

Table 5: Sensitive human and environmental receptors and distance from prescribed activity

Receptor	Distance from prescribed activity
Human receptors	
Nearest sensitive receptor – Residential area	The Catalina House Estate and development area is located approximately 150 m north of the premises boundary and 500 m north of the active landfill site (Stage 2 Phase 3) (refer to Figure 2). In addition, the Kinross residential area is located approximately 20 m south of the Premises boundary and 650 m south of the active landfill (Stage 2 Phase 3) (refer to Figure 2).
Environmental receptors	
Underlying groundwater – Perth - Superficial Swan	Depth to groundwater at the Premises ranges between approximately 10 to 40 mbgl depending on the extent of cut and filling. Extensive groundwater monitoring in the area during 2016 indicated levels ranging from 0.4 to 0.9 mAHD. The natural elevation of the Premises varies between 10 to 50 mAHD. The nearest major user of groundwater is the Water Corporation, which abstracts groundwater from the superficial aquifer via the Neerabup bore field. These abstraction bores are located hydraulicly upgradient or cross-gradient from the Premises to the north, north-east and south-east. Groundwater is also abstracted by the nearby Catalina Housing Development. The water is utilised for dust suppression and watering of public open space. There are no known users of groundwater down-hydraulic gradient from the landfill, due to its coastal location.
Public Drinking Water Source Area – Perth Coastal and Gwelup Underground Water Pollution Control Area Priority 3 (P3)	The Premises is located partially within and immediately to the west of a P3 Public Drinking Water Source Area (PDWSA). Given the general direction of groundwater flow within the superficial aquifer is inferred to be in a west-south-westerly direction towards the ocean, the PDWSA is considered to be up hydraulic gradient of the Premises and is unlikely to be a receptor.
Marine receptor – Indian Ocean	The nearest permanent surface water body is the Indian Ocean, approximately 1.5 km to the west of the Premises boundary

Receptor	Distance from prescribed activity
Bush Forever Site – 323: Link from Burns Beach Bushland to Neerabup National Park	The Premises is located partially within the Bush Forever site. Site 323 occurs across the entirety of the Premises area, excluding the landfill and developed areas. Site 323 provides a link between two other Bush Forever sites located to the east and west. Site 322 (west) extends from the Indian Ocean to the west boundary of the Premises and the Kinross residential development to the south. Site 383 lies to the east of Connolly Drive and comprises part of the Neerabup National Park and Lake Gnowergup Nature Reserve.
Threatened Ecological Community (TEC) – Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain	An occurrence of the TEC is located within the Premises boundary, hydraulically upgradient of landfilling activities. The patch is located more than 60 m away from operational areas of the Premises. A buffer of at least 30 m from the outer edge of a TEC occurrence is recommended to ensure adequate protection (DotEE 2019). The TEC is listed as Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (C'Wth).

3.1.3 Pathways and environmental siting

Table 6 below provides a summary of the potential pathways that are considered relevant to emissions and discharges from the prescribed premises *(Guidance Statement: Risk Assessment* (DER 2017)).

Table 6: Pathways and site characteristics relevant to the Premises

Aspect	Details
Meteorology	The nearest Bureau of Meteorology weather station is the Perth Airport (No. 009225) however, the Swanbourne weather station (No. 009215) is considered a more representative site due to its similar coastal location to the Premises. The station provides the following information, based on records from 1993 to 2021: • The prevailing wind direction is easterly in the morning (9am), changing direction to south-westerly in the afternoon (3pm). Wind speeds during both periods are typically light to moderate according to the Beaufort Wind Scale. • The majority of rainfall occurs between May and October, with larger volumes falling during the winter months and peaking in July. • The average annual rainfall is 737.1 mm and the highest recorded annual rainfall is 951.8 mm, occurring in 2021. The SILO database offered by the Queensland Department of Environment and Science provides the following evaporation information for the area, based on records from 2000 to 2020: • Daily average pan evaporation rates range from 1.9 to 9.8 mm and the monthly averages range from 58 to 303 mm. • Annual average evaporation is 1,917 mm.

Aspect	Details
Geology	The Premises consists predominantly of sand of the Quindalup Dune system overlying low grade sand and limestone of the Tamala Limestone formation. The sand and limestone of the underlying formation would be highly permeable. An unconfined aquifer system is present within the underlying formation.
Topography	The natural elevation of the site varies between 10 and 50 mAHD, with elevations in disturbed areas varying depending on the extent of cut and fill activities.

Figure 2: Proximity of receptors surrounding the premises

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

In identifying potential receptors, the department has excluded employees, visitors and contractors of the Licence Holder, as protection of these parties often involves different exposure risks and prevention strategies are provided for under other State Legislation i.e., *Occupational Safety and Health Act 1984*.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 7.

The Revised Licence L6963/1997/14 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 7: Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
Construction								
Earthworks associated with capping and landfill gas works.	Dust	Air/windborne pathway causing impacts to health and amenity	Residential receptor (approximately 500 m north of the premises boundary) Residential receptor (approximately 20 m south of the premises boundary and 650 m south of the active landfill)	Refer to Section 3.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Conditions 3.1.1 – 3.1.3	No additional regulatory controls required. The works will be short term, therefore noise and dust emissions are considered to be manageable and present a low-medium risk. Noise emissions are subject to the *Environmental Protection (Noise) Regulations 1997*.
	Noise			Refer to Section 3.1.1	C = Minor L = Unlikely **Medium Risk**	Y	Conditions 3.1.1 – 3.1.3	
Operation/Post Operation								
Infiltration of water through capping system	Leachate	Seepage (through landfill liner) or overland flow (from over topping of ponds) causing degradation of surface and groundwater quality	Underlying groundwater Indian Ocean (approximately 1.5 km west)	Refer to Section 3.1.1	C = Moderate L = Unlikely **Medium Risk**	N	Conditions 1.2.5, 1.2.6, 1.2.17 Conditions 3.1.1 – 3.1.3 Condition 4.3.1 Schedule 3 Rows 1 – 4 **Condition 2.1.1 is added for the provision of an updated Surface Water and Leachate Management Plan that includes a water balance**	Based on the Licence Holder's proposed controls and siting of the Premises, the risk event would have low level offsite impacts at a local scale and will probably not occur in most circumstances. The Delegated Officer is not aware of any up-to-date leachate management plan or water balance having been undertaken since the previous study in 2003. Since then, measures have been implemented to improve leachate control and reduce volumes, including leachate pond redesigns to increase evaporation rate and aeration. These specific measures have not been captured in the existing licence. The requirement to develop and submit a revised leachate management plan covering the current and future staged development of the landfill will be specified as an additional regulatory control. The plan will need to incorporate a comprehensive water balance.
Decomposition of buried waste	Landfill gas	Lateral gas migration and air/windborne pathway causing impacts to health and amenity	Residential receptor (approximately 500 m north of the premises boundary) Residential receptor (approximately 20 m south of the premises boundary and 650 m south of the active landfill)	Refer to Section 3.1.1	C = Minor L = Unlikely **Medium Risk**	N	Condition 1.2.9 Conditions 3.1.1 – 3.1.3 Schedule 3 Row 5 Schedule 4 **Condition 2.1.1 is added for the provision of an updated Landfill Gas Management Plan** **Condition 4.4.1 and Table 4.4.1 are added for the monthly monitoring of landfill gas** **Condition 5.1.3 is added for the recording of fires at the Premises**	Based on the Licence Holder's proposed controls and siting of the Premises, the risk event would have minimal offsite impacts and low level impacts to amenity at a local scale and will probably not occur in most circumstances. The Delegated Officer has identified deficiencies in existing documentation and licence conditions relating to potential landfill gas emissions. Existing regulatory controls in the licence are not contemporary and do not require the landfill gas system to be maintained or monitored. The Delegated Officer is also not aware of any landfill gas management plan that consolidates up-to-date information for the current management actions and infrastructure used to control landfill gas at the Premises. To contemporise this condition similar to other landfill operations, the licence will be amended to include the monitoring of landfill gas, a requirement to develop and submit a consolidated landfill gas management plan and additional wording requiring the maintenance of the landfill gas system.
		Lateral gas migration and direct fire impacts on terrestrial ecosystems	Bush Forever Site 323 (within the Premises) Tuart (*Eucalyptus gomphocephala*) woodlands and forest of the Swan Coastal Plain (within the Premises)					

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

Note 2: Proposed Licence Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4 Consultation

Table 8 provides a summary of the consultation undertaken by the department.

Table 8: Consultation summary

Consultation method	Comments received	Department response
Local Government Authority advised of proposal on11 November 2021.	Comments received 2 December 2022 – No objection to the proposal	n/a
Public Stakeholders advised of proposal on 11 November 2021	No comments received	n/a
Licence Holder was provided with draft amendment on 25 March 2022	The Licence Holder provided comments on 15 April 2022. Refer to Schedule 1.	Refer to Schedule 1
Licence Holder was provided with a 2nd draft amendment on 28 April 2022	The Licence Holder provided comments on 6 May 2022. Refer to Schedule 1.	Refer to Schedule 1

5 Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

In completing the assessment of potential risks to the environment and public health from emissions and discharges at the Premises, the Delegated Officer has also determined that further regulatory controls are required for potential leachate and landfill gas emissions.

The Licence Holder will be required to develop and submit a consolidated Surface Water and Leachate Management Plan (SWLMP) covering the current and future staged development of the landfill. The SWLMP is to be used to document the site-specific processes and techniques used to ensure all leachate generated at the Premises is managed in a planned and sustainable manner. The plan will need to incorporate a comprehensive water balance to validate assumptions made in the risk assessment and to ensure that leachate containment ponds are sufficiently sized for future requirements. The plan will also consolidate measures undertaken at the Premises over a number of years that have not been incorporated into a single source of information. The SWLMP should contain the following:

- a Landfill Leachate Management Strategy for the prevention of ground and surface water contamination by leachate escape;
- The site's existing and proposed future management techniques for leachate collection and management;
- A summary of the key infrastructure required for leachate management;
- A water balance modelled over at least two consecutive wet years (90th percentile) for the Premises, including the estimated volume of leachate to be generated, disposed of and/or retained in each year;

- Relevant contingency management processes to maintain leachate levels and prevent overtopping; and
- An ongoing Operational Monitoring Strategy for potential leachate emissions and leachate pond storage levels.

Some minor deficiencies in existing documentation and licence conditions were also identified in relation to potential landfill gas emissions. The current licence requires the installation and operation of the landfill gas collection system through licence condition 1.2.8. To contemporise this condition similar to other landfill operations, the licence will be amended to include the following specified actions:

- Condition wording changes to reference maintaining the landfill gas collection network;
- Monthly landfill gas monitoring and associated reporting requirements; and
- Development of landfill gas management plan.

5.1 Summary of amendments

Table 9 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 9: Summary of licence amendments

Condition no.	Proposed amendments
1.2.5	The condition was amended to include the word *'recover'* and the location reference was removed so it reads as follows: *The Licence Holder shall recover and recycle leachate from the Stage 2 landfill by irrigation over, or injecting into, the Stage 2 landfilling area.*
1.2.6	The following new condition was added: *The Licence Holder shall inspect and monitor the leachate management system at a minimum of weekly to monitor leachate levels in all ponds and sumps, and manage movement of leachate between sumps and ponds and the recirculation system.*
1.2.9 (was 1.2.8)	The condition was amended to include the word *'maintain'* so it reads as follows: *The Licence Holder shall install, operate and maintain a system for controlling landfill gas generated on the Premises to prevent lateral migration of landfill gas outside the boundary of the Premises.*
1.2.13 (was 1.2.12)	The condition was amended to remove the words *'take all reasonable and practicable measures'* so it reads as follows: *The Licence Holder shall ensure that no windblown waste escapes from the Premises and that windblown waste is collected on at least a weekly basis and returned to the tipping area or appropriately contained.*
1.2.17 (was 1.2.16)	The condition was amended to refer to *'landfill'* rather than *'filling'* so it reads as follows: *The Licence Holder shall:* *(a) divert stormwater from the landfilled areas of the site to dedicated stormwater drains; and* *(b) remove waste from stormwater drains to allow effective draining.*

Condition no.	Proposed amendments
2.1.1	The following condition requiring specified actions to be undertaken was added as an additional regulatory control: *The Licence Holder shall submit to the CEO the Information in Table 2.1.1 in accordance with the Requirements and Timescale outlined in Table 2.1.*
Table 2.1.1: Row 1 Surface Water and Leachate Management Plan	The following requirements for a Surface Water and Leachate Management Plan were included as the specified actions required by Condition 2.1.1: *A consolidated stormwater and leachate management plan in relation to the current and future developments of the landfill. The plan should clearly distinguish between infrastructure and processes currently existing at the Premises and those that are proposed for the future. As a minimum the management plan must contain:* *(a) engineering information and detailed drawings of the stormwater and leachate management infrastructure.* *(b) water balance modelled over at least two consecutive wet years (90th percentile) for the Premises, including the estimated volume of leachate to be generated, disposed of and/or retained in each year.* *(c) sizing of the current and future leachate ponds demonstrating they are sufficient to contain leachate from the landfill cells.* *(d) sizing of the stormwater ponds or retention infrastructure for impacted runoff from the landfill site.* *(e) relevant contingency management processes to maintain leachate levels and prevent overtopping; and* *(f) An ongoing Operational Monitoring Strategy for potential leachate emissions and leachate pond storage levels.*
Table 2.1.1: Row 2 Landfill Gas Management Plan	The following requirements for a Landfill Gas Management Plan were included as the specified actions required by Condition 2.1.1: *A consolidated and detailed management plan including but not limited to:* *(a) engineering information and detailed drawings of the landfill gas system design for the existing development stage at the landfill site;* *(b) engineering information and detailed drawings of the landfill gas system design for Stage 2 West at the completion of the capping works; and* *(c) engineering information and detailed drawings of the proposed completed state of the landfill gas system design.*
3.1.1	The following condition specifying that construction works must be undertaken to the corresponding requirements was added as a regulatory control: *The Licence Holder must ensure that the construction works specified in Table 3.1.1 meet or exceed the specifications in the corresponding schedule as noted in Table 3.1.1.*
Table 3.1.1: Row 1 Landfill capping works	The following timing and specification reference for the landfill capping works was included in Table 3.1.1:

<table>
<tr><th>Condition no.</th><th>Proposed amendments</th></tr>
<tr><td></td><td>
<table>
<tr><th>Works Type</th><th>Works description</th><th>Timing</th><th>Specifications reference</th></tr>
<tr><td>Landfill capping works</td><td>Construction of the Stage 2 West landfill cap</td><td>The works must commence no later than 6 months after disposal of waste into the Stage 2 West Phase has been completed.</td><td>Schedule 3</td></tr>
</table>
</td></tr>
<tr><td>3.1.2</td><td>The following condition is added to ensure that the capping system is constructed as proposed:

The Licence Holder must within 45 calendar days of an item of infrastructure required by condition 3.1.1 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 3.1.1; and

(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.</td></tr>
<tr><td>3.1.3</td><td>The following condition is added to ensure that compliance with the specifications for the capping system can be determined:

The Environmental Compliance Report required by condition 3.1.2, must include as a minimum the following:

(a) certification by a Suitably Qualified Engineer that the items of infrastructure or component(s) thereof, as specified in condition 3.1.1, have been constructed in accordance with the relevant requirements specified in condition 3.1.1;

(b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 3.1.1; and

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

A corresponding definition was added for ‘Suitably Qualified Engineer’ (Definitions section of the licence).

Means a person who:

(a) holds a Bachelor of Engineering recognised by the Institute of Engineers; and

(b) has a minimum of five years of experience working in a supervisory area of geotechnical and/or civil engineering; and

(c) is employed by an independent third party external to the Licence Holder’s business.</td></tr>
<tr><td>4.4.1</td><td>The following condition is added to require the Licence Holder to monitor landfill gas at the Premises:

The Licence Holder shall undertake the monitoring of parameters specified in Table 4.4.1 according to the specifications in that table.</td></tr>
<tr><td>Table 4.4.1

Landfill gas monitoring</td><td>The following monitoring requirements table was added:</td></tr>
</table>

<table>
<tr><th>Condition no.</th><th>Proposed amendments</th></tr>
<tr><td></td><td>
<table>
<tr><th>Monitoring point reference and location</th><th>Parameter</th><th>Units</th><th>Frequency</th></tr>
<tr><td rowspan="8">Each well, as depicted in Schedule 4</td><td>Volumetric flow rate</td><td>m^3/hr</td><td rowspan="8">Within four weeks of completion of construction of each well and flare and Monthly thereafter</td></tr>
<tr><td>Methane</td><td>Volume %</td></tr>
<tr><td>Carbon dioxide</td><td>Volume %</td></tr>
<tr><td>Oxygen</td><td>Volume %</td></tr>
<tr><td>Nitrogen</td><td>Volume %</td></tr>
<tr><td>Carbon monoxide</td><td>ppm</td></tr>
<tr><td>Gas temperature</td><td>^oC</td></tr>
<tr><td>Pressure</td><td>Pa</td></tr>
</table>
</td></tr>
<tr><td>5.1.3</td><td>The following condition requiring the reporting of fires on the Premises was added:

The Licence Holder must record the following information for all unauthorised fires at the premises:

(a) Details of the date, time and location of the fire;

(b) Measures used to control the fire;

(c) The cause, or suspected cause, of the fire; and

(d) Any residual issues related to the fire.</td></tr>
<tr><td>5.2.1 (Was 3.1.2)</td><td>The condition requiring the completion of an Annual Audit Compliance Report was removed and replaced with the following updated format of the condition:

The Licence Holder must:

(a) undertake an audit of their compliance with the conditions of this licence during the preceding annual period; and

(b) prepare and submit to the CEO by no later than 90 days after the end of that annual period an Annual Audit Compliance Report in the approved form.</td></tr>
<tr><td>5.2.2 (was 3.2.1) Table 5.2.1 (was Table 3.2.1)</td><td>A requirement to report on landfill gas monitoring and fire events was added along with other minor changes to the Annual Environmental Report requirements. The following amendments were made to Table 5.2.1:
<table>
<tr><th colspan="3">Table 5.2.1: Annual Environmental Report</th></tr>
<tr><th>Condition or table
(if relevant)</th><th>Parameter</th><th>Format or form[1]</th></tr>
<tr><td>-</td><td>Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken</td><td rowspan="2">None specified</td></tr>
<tr><td>Table 4.2.1</td><td>Summary of Inputs and Outputs</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Condition no.</th><th>Proposed amendments</th></tr>
<tr><td></td><td>
<table>
<tr><td>-</td><td>Summary of materials processed under Category 12</td><td></td></tr>
<tr><td>Table 4.3.1</td><td>Monitoring of ambient groundwater quality.
Summary of the ambient groundwater quality monitoring results ~~should~~ must be presented ~~in tabulated form within the body of the report as well as onto site drawings, where appropriate~~.</td><td rowspan="3">Tabulated form within the body of the report as well as all raw data provided in an accompanying Microsoft Excel spreadsheet digital document/file (or a compatible equivalent digital document/file)</td></tr>
<tr><td></td><td>~~Assessment of ambient groundwater quality monitoring results against previous monitoring results and relevant assessment levels for water as published in the *Assessment and management of contaminated sites guidelines*.~~</td></tr>
<tr><td>Table 4.3.2</td><td>Landfill gas monitoring.
Summary of the landfill gas monitoring results must be presented.</td></tr>
<tr><td>~~5.2.1~~</td><td>~~Compliance~~</td><td>~~Annual Audit Compliance Report (AACR)~~[2]</td></tr>
<tr><td>5.1.2</td><td>Complaints summary</td><td rowspan="2">None specified</td></tr>
<tr><td>5.1.3</td><td>A summary of all fire incidents that have occurred during the annual period, including the records required by condition 5.1.3</td></tr>
</table>
</td></tr>
<tr><td>5.2.3</td><td>The following new condition specifying timeframes to submit detailed reports for groundwater and landfill gas monitoring was added:

The Licence Holder must submit to the CEO by no later than six months after the end of each annual period, a detailed groundwater monitoring report in relation to condition 4.3.1 and a landfill gas monitoring report in relation to condition 4.4.1. The reports must include an assessment of monitoring results against previous results and relevant assessment levels for water and landfill gas, as published in the Assessment and management of contaminated sites guidelines.</td></tr>
<tr><td>5.2.4</td><td>The following new condition specifying timeframes to comply with an inspector or CEO request was added:

The Licence Holder must comply with a Department Request, within 14 days from the date of the Department Request or such other period as agreed to by the Inspector or the CEO.</td></tr>
<tr><td>5.3.1
Table 5.3.1</td><td>The following notification requirements for failures of the leachate system was added to the notification table:</td></tr>
</table>

<table>
<tr><th>Condition no.</th><th>Proposed amendments</th></tr>
<tr><td></td><td>
<table>
<tr><th colspan="4">Table 5.3.1: Notification requirements</th></tr>
<tr><th>Condition or table
(if relevant)</th><th>Parameter</th><th>Notification requirement[1]</th><th>Format or form[2]</th></tr>
<tr><td>1.2.5 and 1.2.6</td><td>Failure or malfunction of the leachate collection and management system</td><td>As soon as practicable, but no later than 1700 hrs of the next working day.</td><td>None specified</td></tr>
<tr><td rowspan="2">5.1.3</td><td>Any unauthorised fire that:
(a) In accordance with AS 3543, contains smoke with a smoke shade of less than or equal to shade 1; and
(b) Is extinguished in less than 4 minutes.</td><td>As part of the Annual Environmental Report required by condition 5.2.3</td><td rowspan="2">None specified</td></tr>
<tr><td>Any unauthorised fire that:
(a) In accordance with AS 3543, contains smoke with a smoke shade greater than shade 1; and
(b) Is not extinguished in less than 4 minutes.</td><td>As soon as practicable, but no later than 14 days after the fire event</td></tr>
</table>
</td></tr>
<tr><td>Schedule 1</td><td>Map 4 was added to make reference to the capping works location for Phase 2 West and Map 3 was replaced with a newer version.</td></tr>
<tr><td>Schedule 2</td><td>The Annual Audit Compliance Report (AACR) form was removed as it is no longer current. A current version of the AACR form can be obtained from the department's website at https://www.der.wa.gov.au/our-work/licences-and-works-approvals/publications</td></tr>
<tr><td>Schedule 3</td><td>Schedule 3 was added to the licence and includes the specifications for the Phase 2 West capping works in Table S3.1. The following specifications are included:
<table>
<tr><th colspan="3">Table S3.1: Works specifications</th></tr>
<tr><th colspan="2">Infrastructure / Equipment</th><th>Requirements (design and construction)</th><th>Site plan and reference</th></tr>
<tr><td>1</td><td>Final profile</td><td>(a) Final fill profile and slopes are to be between 5% and 20%</td><td>n/a</td></tr>
</table>
</td></tr>
</table>

Condition no.	Proposed amendments			
	2	Capping system Stage	(a) Capping system design to be undertaken in accordance with the specifications set out in the capping technical specifications and quality assurance plans. (b) Capping system to comprise of: (i) 200mm Regulating layer; (ii) Sub-cap Gas Collection Layer (geocomposite); (iii) 1.5mm thick double textured Linear Low-Density Polyethylene (LLDPE) Geomembrane Layer; (iv) Sub-surface Drainage Layer (geocomposite); (v) 1200mm of Restoration Layer, comprising: (vi) 1000mm thick layer of Site won subsoils; and (vii) 200mm thick layer of topsoil/growing medium; (viii) Vegetation Layer incorporating hydromulch / seeding to reduce erosion and advance revegetation.	• Schedule 1 - Map 3 – Capping Location Phase 2 West • Talis Consultants – Techncial Specfications – Tamla Park Waste Mangement Faclity – Stage 2 West Capping Works – 30 June 2021 • Talis - Quality Assurance Plan‑Stage 2 West Capping Works – 24 June 2021
	3	Surface water management	(a) The landfill cap will comply with BPEM guidelines, with side slopes not exceeding a 1:5 (V:H) gradient. (b) A stability risk assessment will also be undertaken to ensure the stability of the final landfill profile to ensure no slope failure occurs	n/a
	4	Leachate management	(a) Seepage through landfill cap is to be no more than 75% of the anticipated seepage rate through the basal liner.	n/a

Condition no.	Proposed amendments			
		Landfill Gas Management	(a) All horizontal gas collection infrastructure and gas collection system and termtaing pipework to completed in accordance with he with the approved plans. (b) Excavation of landfill gas collection trenches at the locations and to the depths shown on the Specification Drawings; (i) Installation of solid and perforated HDPE horizontal pipework; (ii) Backfill of trenches with 20-40mm nominal gravel with separation geotextile surround; (iii) Construction of gravel filled condensate sumps at the toe of the slopes to return condensate into the landfill; (iv) Sealing of pipe penetrations through the capping system with neoprene wraps with stainless (v) steel banding to seal the future geomembrane pipe boot to the side of the gas well/pipework; and (vi) Terminating pipes with an airtight welded end cap / blanking plate for future connection to the landfill gas main.	• Talis Consultants – Techncial Specfications – Tamala Park Waste Mangement Faclity – Stage 2 West Capping Works – 30 June 2021 • Talis - Quality Assurance Plan‑Stage 2 West Capping Works – 24 June 2021
Schedule 4	Two new maps were included depicting the landfill gas extraction system.			

As part of the consolidation of Amendment Notices 1 - 3 (refer to Section 2.4), the Delegated Officer has identified and corrected errors within the licence relating to the limits for waste accepted and processed across multiple prescribed premises categories. These errors inadvertently allowed waste acceptance above the approved capacity for some categories and the landfilling of unsuitable waste material.

The errors corrected through the amendment give effect to the original intent of the related conditions. While the obligations of the Licence Holder have changed in making these corrections, it is understood that the Licence Holder's waste acceptance and processing activities already aligned with the revised obligations.

Table 10 provides a summary of the amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 10: Summary of licence amendments to correct errors with conditions

<table>
<tr><th>Condition no.</th><th>Proposed amendments</th></tr>
<tr><td>1.2.1 and Table 1.2.1</td><td>To correctly align the quantity limits with the approved capacities listed on the front page of the licence, the following amendments were made:
The Licence Holder shall only accept waste on to the Premises if:
(a) it is of a type listed in Table 1.2.1; and
(b) the quantity accepted is below any quantity limit listed in Table 1.2.1 for the corresponding category; and
(c) it meets any specification listed in Table 1.2.1; and
(d) in the case of contaminated solid waste is supported by documentation that demonstrates compliance with the acceptance criteria for Class II/III landfills.
<table>
<tr><th colspan="4">Table 1.2.1: Waste acceptance</th></tr>
<tr><th>Waste type</th><th>Category</th><th>Quantity limit</th><th>Specification[1]</th></tr>
<tr><td>Clean Fill</td><td rowspan="9">64</td><td rowspan="8">350,000 tonnes per annual period (cumulative)</td><td rowspan="2">None Specified</td></tr>
<tr><td>Inert Waste Type 1</td></tr>
<tr><td>Inert Waste Type 2</td><td>Tyres and plastic only</td></tr>
<tr><td>Putrescible waste</td><td>None Specified</td></tr>
<tr><td>Special Waste Type 1</td><td>Asbestos and asbestos containing materials (ACM)</td></tr>
<tr><td>Special Waste Type 2</td><td>Biomedical / clinical (excluding radioactive waste[2])</td></tr>
<tr><td>Contaminated Solid Waste – Class II</td><td>Must meet the acceptance criteria for Class II landfills</td></tr>
<tr><td>Contaminated Solid Waste – Class III</td><td>6,500 tonnes per annual period</td><td>Limited to coarse heavy residue waste only which must meet the acceptance criteria for Class III landfills.</td></tr>
<tr><td>Hazardous Liquid Waste</td><td>61</td><td>252 tonnes per annual period</td><td>Limited to Paints and Resins</td></tr>
<tr><td>Clean Fill</td><td rowspan="4">62</td><td rowspan="4">15,000 tonnes per annual period (cumulative)</td><td rowspan="2">None Specified</td></tr>
<tr><td>Inert Waste Type 1</td></tr>
<tr><td>Inert Waste Type 2</td><td>Tyres and plastic only</td></tr>
<tr><td>Putrescible</td><td>None Specified</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Condition no.</th><th>Proposed amendments</th></tr>
<tr><td></td><td>
<table>
<tr><td>waste</td><td></td><td></td><td></td></tr>
<tr><td>Hazardous Waste</td><td></td><td></td><td>Limited to chromated copper arsenate (CCA) treated timber</td></tr>
</table>
</td></tr>
<tr><td>Table 1.2.2
Waste processing</td><td>
To correctly align waste types, processes and processing limits with the prescribed categories listed on the front page of the licence, the following amendments were made:
<table>
<tr><th colspan="3">Table 1.2.2: Waste processing</th></tr>
<tr><th>Waste type</th><th>Process(es)</th><th>Process limits[1]</th></tr>
<tr><td>All waste types corresponding to Category 64 as specified in Table 1.2.1</td><td>Disposal of waste by landfilling</td><td>(a) Disposal of waste by landfilling shall only take place within the following areas of the landfill:
(i) Stage 2 Phase 2 West;
(ii) Stage 2 Phase 2 East; and
(iii) Stage 2 Phase 3;
as depicted on the Landfill Area and Site Layout Map in Schedule 1;
(b) Shall ensure that the tipping face is no greater than 5 m in vertical height;
(c) Shall restrict the tipping area to a maximum linear length of 50 m;
(d) The separation distance between the base of the landfill and the highest level of the phreatic surface of groundwater shall not be less than 2 m;
(e) Shall maintain an internal buffer distance of 50 m from the boundary of the premises; and
(f) Shall not landfill tyres at the premises.</td></tr>
<tr><td>Clean Fill</td><td rowspan="3">Receipt, handling and associated storage prior to reuse or disposal by landfilling</td><td rowspan="2">None specified.</td></tr>
<tr><td>Inert Waste Type 1</td></tr>
<tr><td>Inert Waste Type 2</td><td>(a) No more than 500 tyres shall be stored at the premises at any one time;
(b) A 2 m separation distance shall be maintained between the tyre stack/pile and adjacent bushland;
(c) Vehicle access to the tyre stack/pile shall be maintained on three sides;
(d) Tyres must be collected and removed to an appropriate authorised facility as soon as practicable; and
(e) Individual tyre stacks shall not exceed
(i) 2 m in height; and
(ii) 75 m^2 in area.</td></tr>
</table>
</td></tr>
</table>

Condition no.	Proposed amendments		
	Putrescible waste		(a) Putrescible waste received at the transfer station shall: (i) Only be stored in sealed containers or on a hardstand area bunded to prevent run-off; and (ii) Shall not be stored on the site for longer than 48 hours. (b) Green waste received for processing shall: (i) Only be stored on a 1 m thick compacted and bunded limestone hardstand; (ii) The stockpile size will be limited to the following dimensions: 50 m (length) x 15 m (width) x 5 m (height); (iii) Unprocessed green waste is to be directly removed after chipping or only stored in the designated processing area (within the landfill area) for less than 2 weeks prior to removal; and (iv) The compacted and bunded limestone hardstand shall be located >60 m from an active tipping face of a cell.
	Special Waste Type 1	Receipt, handling and disposal by landfilling	(a) Waste shall only be disposed of into a designated asbestos disposal area within the landfill. The disposal area(s) for any more than one cubic metre of asbestos material must be defined by grid references on a premises plan; (b) A copy of the premises plan marked with the locations used for waste disposal, as described above, shall be kept as a permanent record; (c) Not to be deposited within 2 m of the final tipping surface of the landfill; and (d) No works shall be carried out on the landfill that could lead to a release of asbestos fibres.
	Special Waste Type 2		(a) Only to be disposed of into a designated biomedical or clinical waste disposal area within the landfill. The disposal area(s) must be defined by grid references on a premises plan; (b) A copy of the premises plan marked with the locations used for waste disposal, as described above, shall be kept as a permanent record; (c) Not to be deposited within 2 m of the final tipping surface of the landfill; and (d) No works shall be carried out on the landfill that could lead to biomedical or clinical wastes being excavated or uncovered.
	Contaminated Solid Waste		(a) Course heavy residue waste meeting acceptance criteria for Class III landfills shall only be disposed of to Stage 2 Phase 2 West, Stage 2 Phase 2 East and Stage 2 Phase 3 as depicted on the Landfill Area and Site Layout Map in Schedule 1.

Condition no.	Proposed amendments		
	Hazardous Liquid Waste	Receipt, handling and associated storage prior to offsite disposal	(a) Paint shall be stored in dedicated paint stillages; and (b) Paint shall not be decanted or fixated on the Premise.
	Hazardous Waste		(a) CCA treated timber shall only be stored in the designated storage bin under cover at the Transfer Station; (b) No CCA treated timber shall be buried on site; and (c) CCA treated timber must be removed off-site prior to the designated bin being full.

References

1. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
2. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
3. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of the Environment and Energy (DotEE) 2019, *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community*, Canberra, Australian Capital Territory
5. Department of Water and Environmental Regulation 2019, *Guideline: Industry Regulation Guide to Licensing*, Perth, Western Australia.
6. Environmental Protection Authority Victoria (EPAV) 2015, *Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills*, Melbourne, Victoria.
7. Talis Consultants Pty Ltd (Talis) 2021, *Closure and Post-Closure Management Plan, Tamala Park Waste Management Facility*, unpublished report.

Appendix 1: Summary of Licence Holder's comments on draft conditions

Condition	Summary of Licence Holder's comment	Department's response
Revised licence – 1st draft		
N/A	The Licence Holder requested that Amendment Notices 1 - 3 be consolidated into the Revised Licence.	Amendment Notices 1 - 3 have been consolidated into the Revised Licence. In consolidating the amendment notices, the Delegated Officer has identified and addressed errors within the licence (Section 2.4 and Section 5.1).
4.3.1	The Licence Holder requested that the condition be amended to include the words *At a minimum* due to additional monitoring be undertaken above what is required in the licence.	The additional wording to the condition is not required as the existing condition does not limit the ability to undertake further monitoring above the requirements of Table 4.3.1.
Condition 4.3.1 - Table 4.3.1: Monitoring of ambient groundwater quality	The Licence Holder requested that the reference to the monitoring bore location be extended to refer to Map 3, rather than just Schedule 1.	The requested change has been made.
4.4.1 - Table 4.4.1: Landfill gas monitoring	The Licence Holder identified an error in the monitoring point location reference.	The reference was changed from Schedule 3 to Schedule 4.

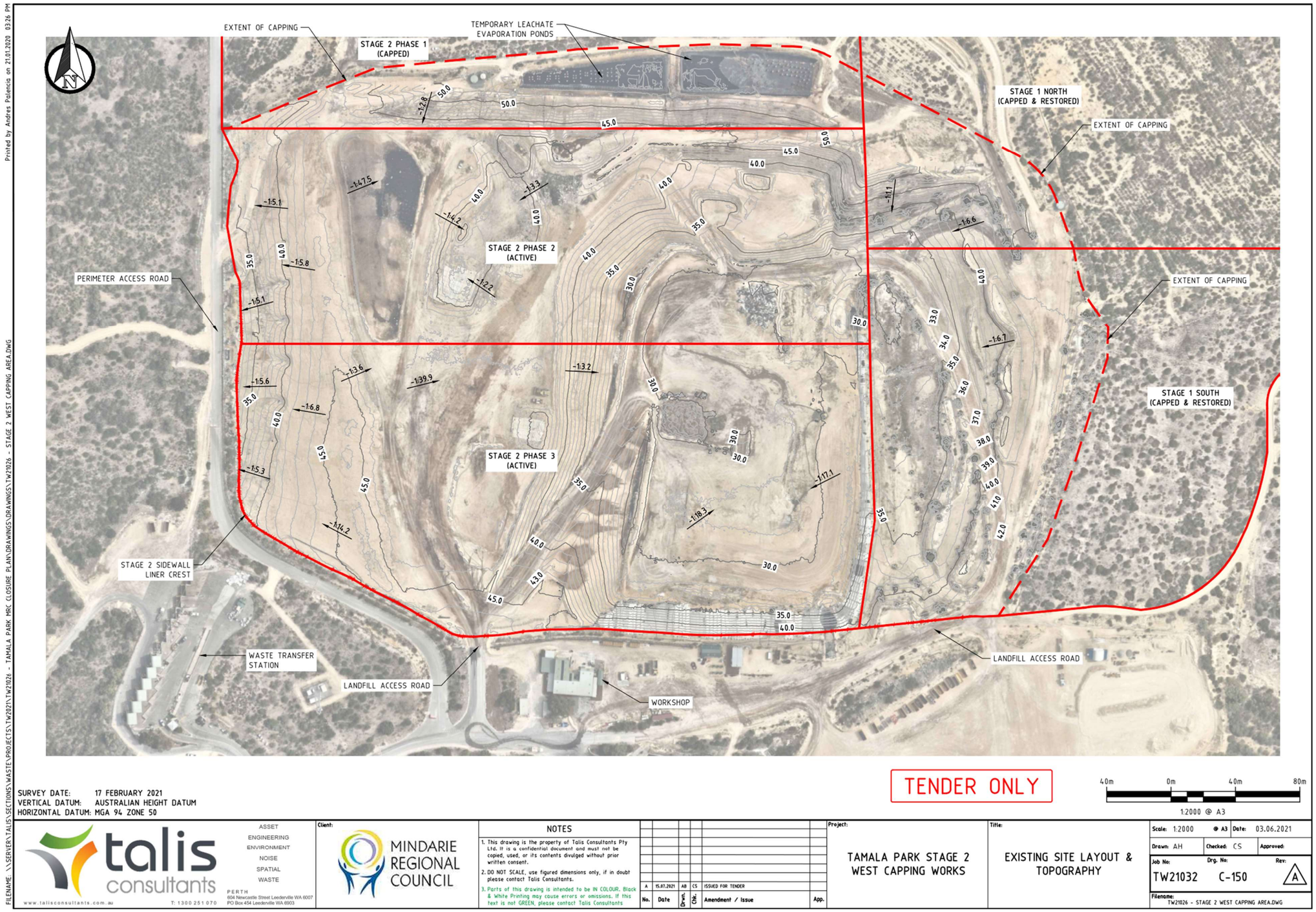
5.1.3	The Licence Holder requested that the unauthorised fire reporting requirements be further revised to reduce the potentially high reporting burden likely to result from having to report minor fires. The Licence Holder provided the following specific comments in relation to reporting of fires: With respect to the MRC's clarification to fire reporting conditions in the Licence, we offer the following information in support of our proposed amendment. Fires on site are becoming increasing frequent, primarily due to domestic flares or batteries that ignite when subjected to pressure from mobile plant in the course of disposal. The MRC recognises this risk and has implemented a number of controls to ensure that this risk is adequately mitigated to address the unknown element of domestic waste disposal. These controls include proactive customer engagement and community education elements, as well as responsive manning, supervision, training and equipment to ensure the timely response to fire. The nature of waste management at Tamala Park means that the MRC is adequately positioned to respond to these events without the need for external resources or emergency service support. Staff on site are trained in fire response in a timely manner, and the high manning compliment ensues that all at risk areas of site a permanently manned throughout the working day. A summary of existing response to fire controls are in outlined below. 1. All customers accessing the waste transfer station are greeted by MRC staff and asked to declare that their load is free from paints, batteries and chemicals. 2. Provision for the segregation of batteries are made available at the transfer station. 3. Signage and a visual display of burnt batteries is positioned at the entrance to the transfer station for community education purposes, as is a running tally of fires experienced year to date. 4. Fixed fire fighting systems (hoses) have been fitted with inline foam distribution systems, to enable the delivery of fire fighting foam to every fire, regardless of size, without the need for specialist equipment or external agency support.	The Delegated Officer considers the proposed two-tiered reporting system for fire events to be suitable and not increase the potential risk of smoke emissions from the premises impacting potential receptors. The proposed metric involving use of a Ringelmann Chart aligns with the *Environmental Protection (Unauthorised Discharges) Regulations 2004* and is adequately described in *Australian Standard AS 3543 Use of standard Ringelmann and Australia Standard miniature smoke charts*. The condition has been modified to specify record keeping requirements for fires only and the proposed two-tiered reporting system has been specified in condition 5.3.1: Table 5.3.1.

Condition	Summary of Licence Holder's comment	Department's response
	5. All fires are internally reported and recorded in our event management system, regardless of size or duration. 6. 2 x large 10,000 L watercarts and 2 x smaller 600 L utes fitted with firefighting systems, all with the capability to deliver firefighting foam, are permanently based on site. 7. Mobile plant only makes contact with waste during manned hours, ensuring that the activities known to increase the risk of ignition are correspondingly supported by trained staff with the ability to extinguish the fire in a timely manner. In the vast majority of cases, fires are extinguished in less than 2 minutes, with no disruption to services or notable emissions. With due consideration to the aforementioned controls, the MRC proposes the following definitions in relation to fire reporting, that incorporates elements of the Environmental Protection (Unauthorised Discharges) Regulations 2004 and AS 3543:2014 - Use of Standard Ringelmann and Australian Standard Miniature Smoke Charts: 1. A small fire that doesn't require immediate reporting to DWER is defined as displaying the following characteristics: a) Does not contain Dark Smoke, with a smoke shade of less than or equivalent to 1 when using the Ringelmann smoke chart (AS 3543:2014), and; b) Is extinguished within a period of less than 4 minutes. 2. A fire that requires an immediate report to DWER is defined as: a) Containing Dark Smoke, with a smoke shade of greater than 1 when using the Ringelmann smoke chart (AS 3543:2014), and; b) Is not extinguished within a period of less than 4 minutes.	

Condition	Summary of Licence Holder's comment	Department's response
5.2.2	The Licence Holder requested that the submission of a detailed report on groundwater monitoring conducted at the premises be changed to submission within 6 months of the end of the annual period. This is to allow for potential delays with external consultants conducting the monitoring and so that it may align with their other regulatory requirements to monitor and report on groundwater. The raw data is proposed to be submitted in accordance with the existing condition as this is generally available at this time.	The Delegated Officer considers the proposed change to the detailed reporting timeframe to be suitable, as the monitoring results will still be made available with the Annual Environmental Report. Requirements related to assessing the monitoring results have been removed from Condition 5.2.2 and the requirement to submit detailed reports for groundwater and landfill gas monitoring within 6 months of the annual period has been included as a new condition (5.2.3).
Table 5.2.1	The Licence Holder requested that wording within the table be changed to refer to a critical loss of capability in relation to reporting of pollution control equipment failures.	The Delegated Officer considers that a *critical loss of capability* is problematic to define for a general reporting condition relating to failures of pollution control equipment. As the requirement uses the standard wording for the licence format, the existing wording will be retained.
Table 5.3.1 (was 5.1.1)	The Licence Holder requested that wording within the table for notification requirements related to failure of the leachate system be changed to refer to critical failure and events that lead to environmental pollution.	The Delegated Officer considers that the term *critical failure* is problematic to define for a general reporting condition relating to failures and malfunction of the leachate system. The requirement to notify only when environmental pollution has occurred is not the intent of the condition. The condition is intended to provide notification before this has occurred or has been determined to have occurred. Additionally, the Licence Holder is already required to report an event that leads to environmental pollution through s72 of the EP Act. The existing wording will be retained.
Schedule 4	The Licence Holder provided an additional figure with an improved resolution showing the location of landfill gas monitoring wells at the premises.	The figure has been included in Schedule 4.

Condition	Summary of Licence Holder's comment	Department's response
Revised licence - 2nd draft		
Table 1.2.1	The Licence Holder requested clarity if stockpiles Clean Fill material to be used as landfill cover would be impated by the inclusion of Clean Fill within the combined limit of 15,000 tonnes per annual period corresponding to category 62.	Clean Fill material being stockpiled as landfill cover would not be included in the 15,000 tonnes per annual period limit. This limit corresponds to category 62 and only applies to Clean Fill material that is accepted for storage pending final disposal offsite. Clean Fill that is accepted for use as cover material is included in the corresponding category 64 limit of 350,000 tonnes per annual period.
Schedule 1 Map 3	The Licence Holder requested that an updated version of the groundwater monitoring bore map be included in the licence.	The updated monitoring bore map has been included as a replacement for Map 3. The Delegated Officer notes that not all monitoring bores displayed on the figure are required to be sampled under the licence. The bores which require monitoring are stated in Table 4.3.1 prior to referencing Map 3.
Schedule 4 Map 5	The Licence Holder queried why Map 5 was not referenced within any conditions of the licence, but stated that the inclusion was not material to them.	Map 5 has been included for information purposes, as it shows the layout of the landfill gas pipework.

Appendix 2: Tamala Park Waste Management Facility technical drawings



Appendix 2: Tamala Park Waste Management Facility technical drawings

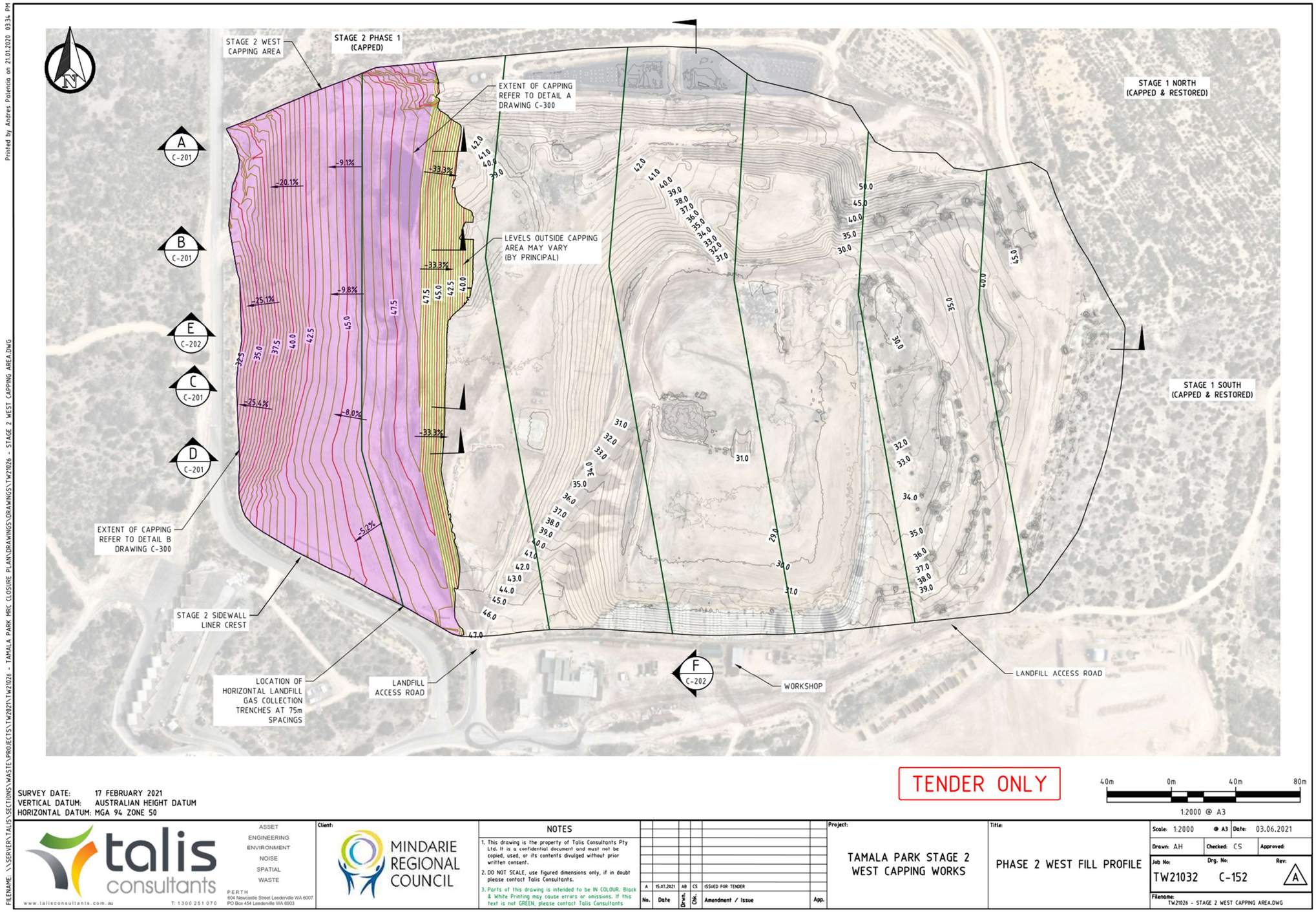


Figure 4: Stage 2 West capping works extent and fill profile

L6963/1997/14

Appendix 2: Tamala Park Waste Management Facility technical drawings

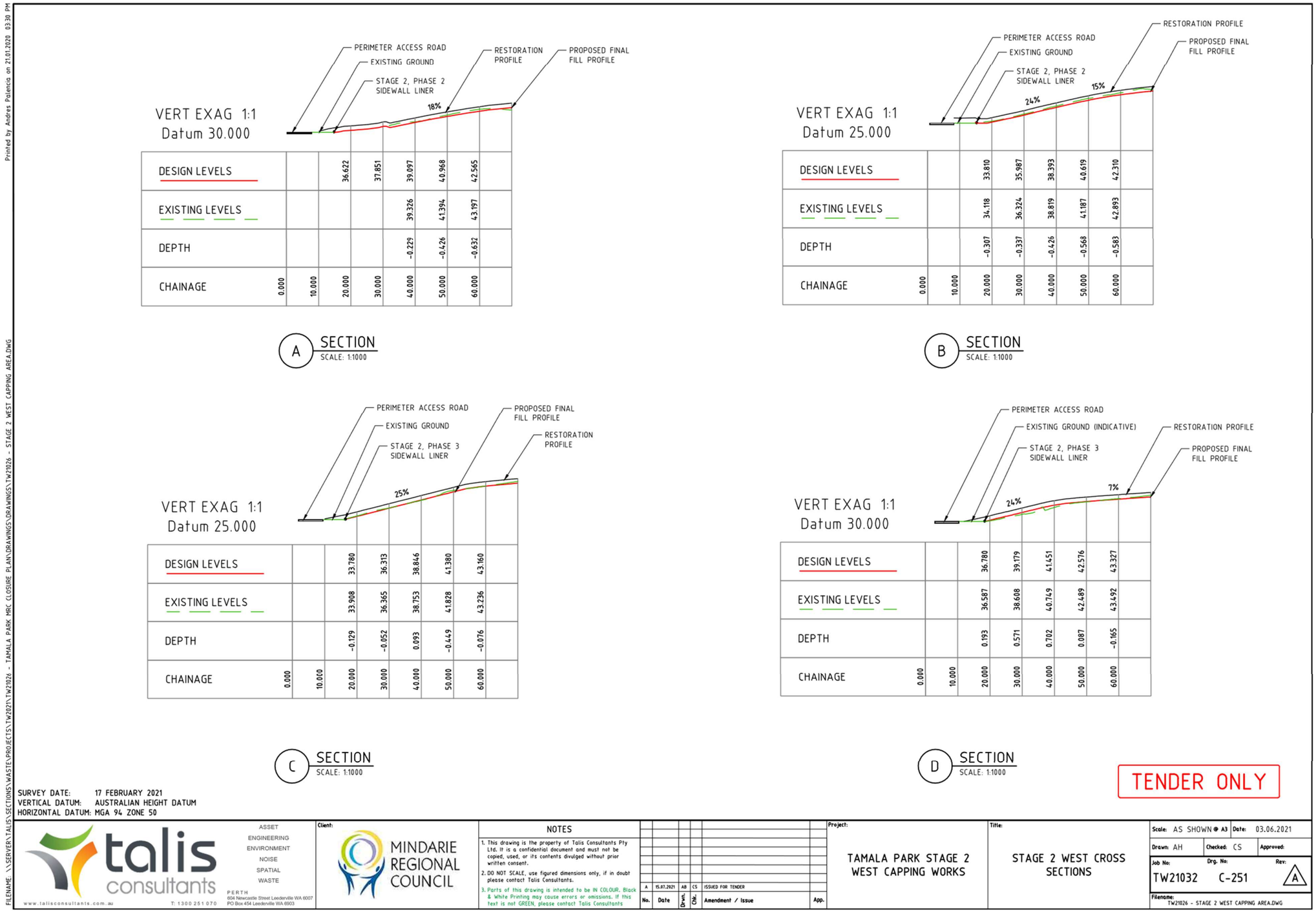


Figure 5: Stage 2 West cross section

L6963/1997/14

Appendix 2: Tamala Park Waste Management Facility technical drawings

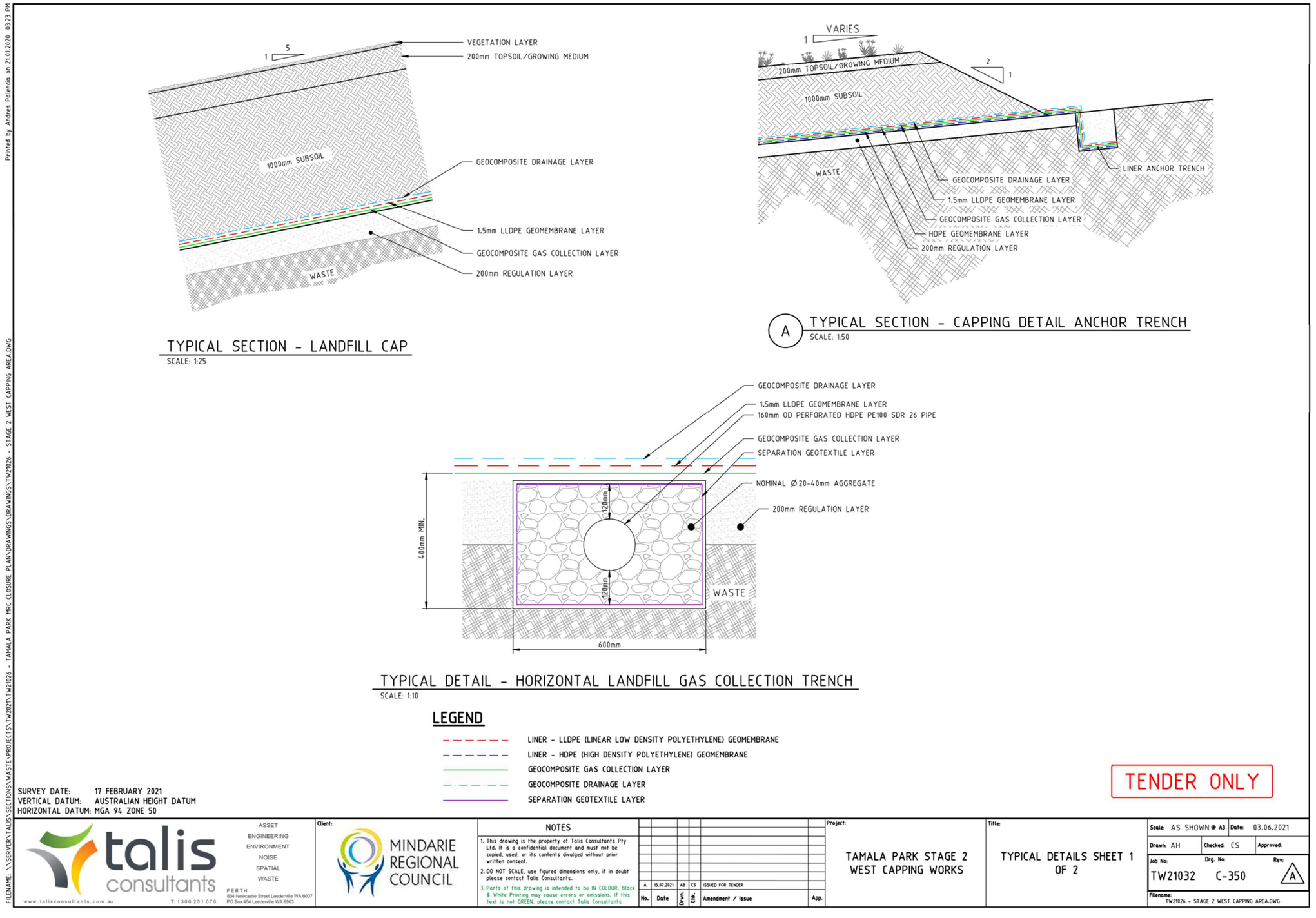


Figure 6: Stage 2 West typical details 1

L6963/1997/14

Appendix 2: Tamala Park Waste Management Facility technical drawings

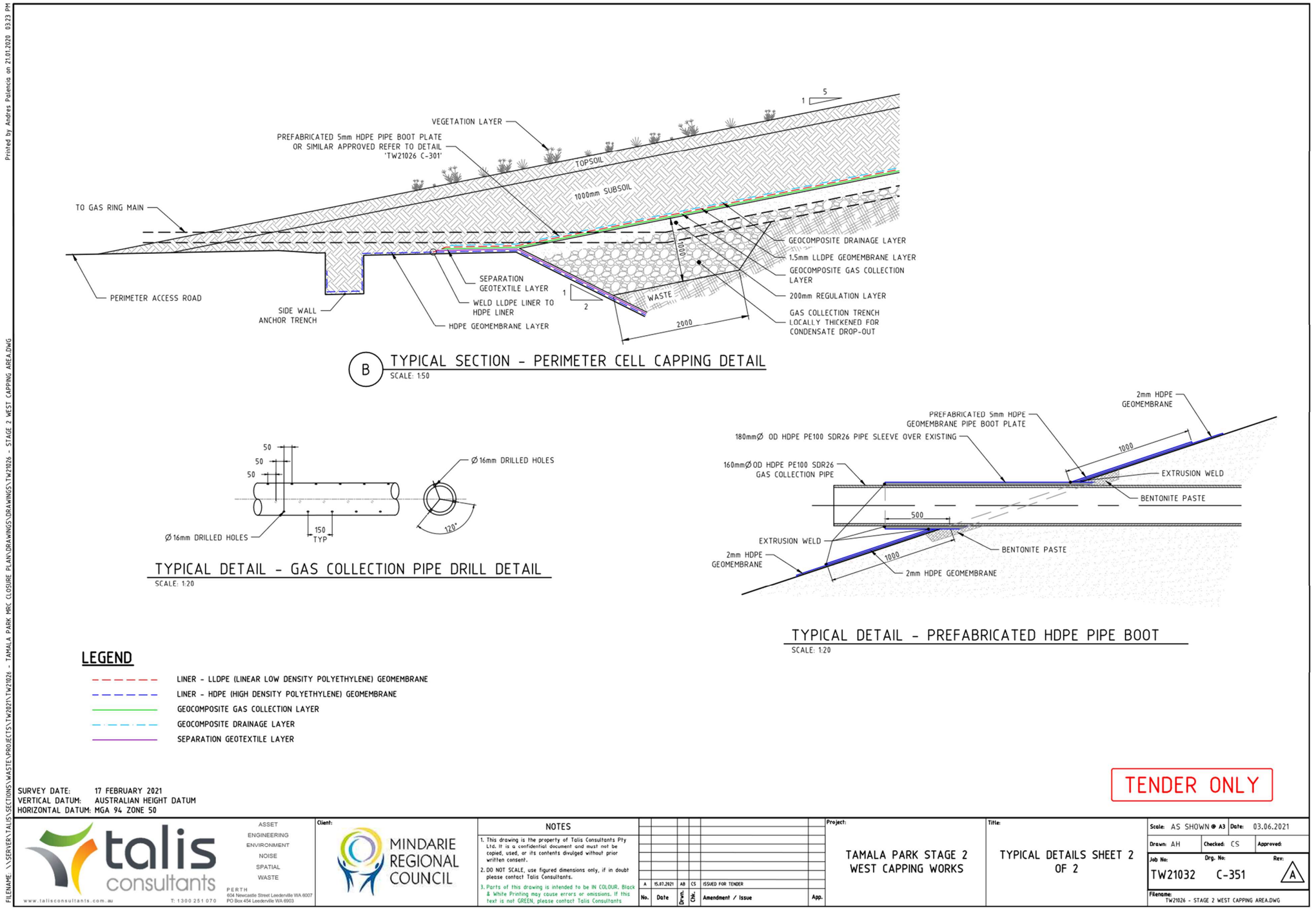


Figure 7: Stage 2 West typical details 2

L6963/1997/14

Appendix 2: Tamala Park Waste Management Facility technical drawings

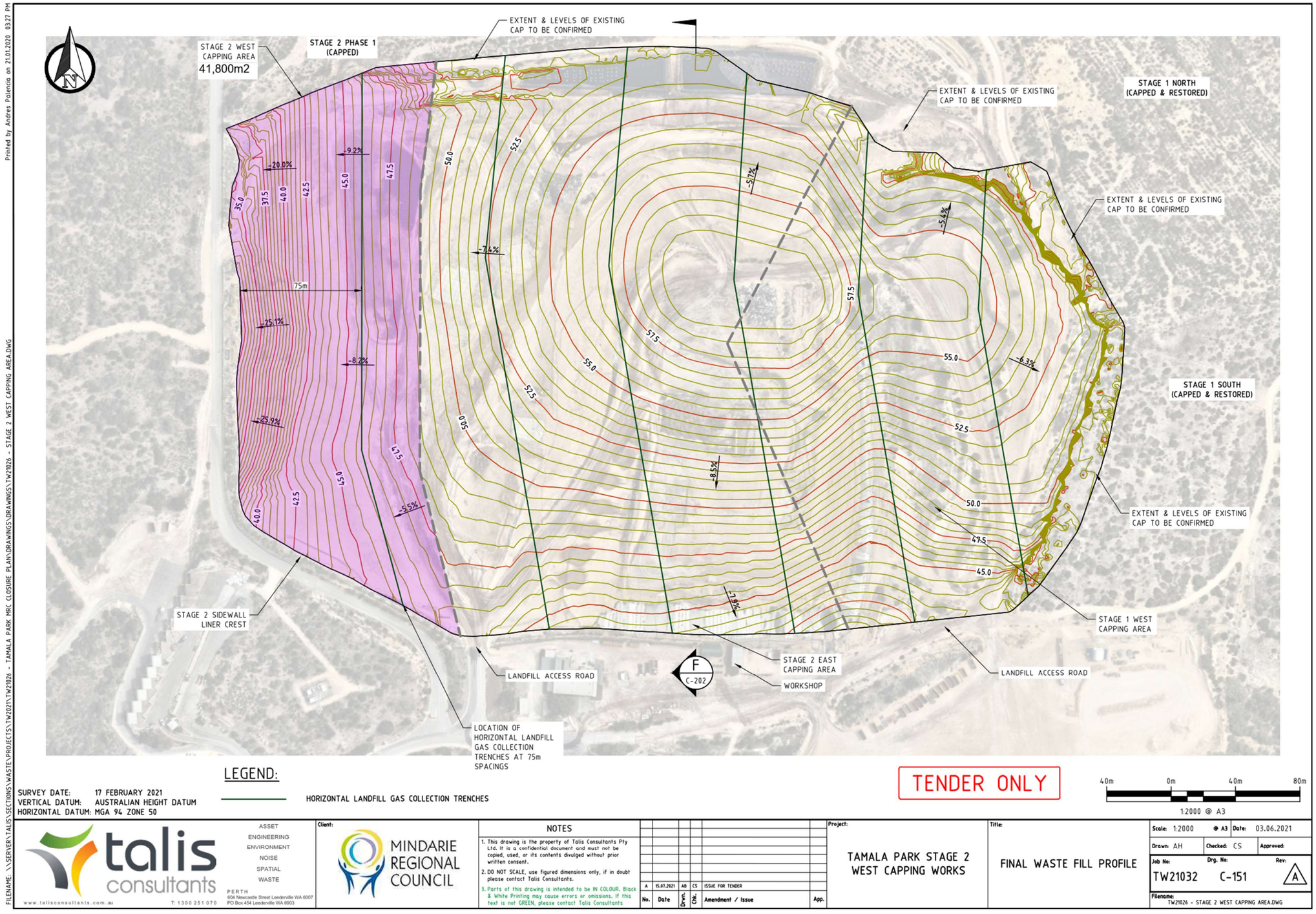


Figure 8: Tamala Park final landfill profile

L6963/1997/14

Appendix 2: Tamala Park Waste Management Facility technical drawings

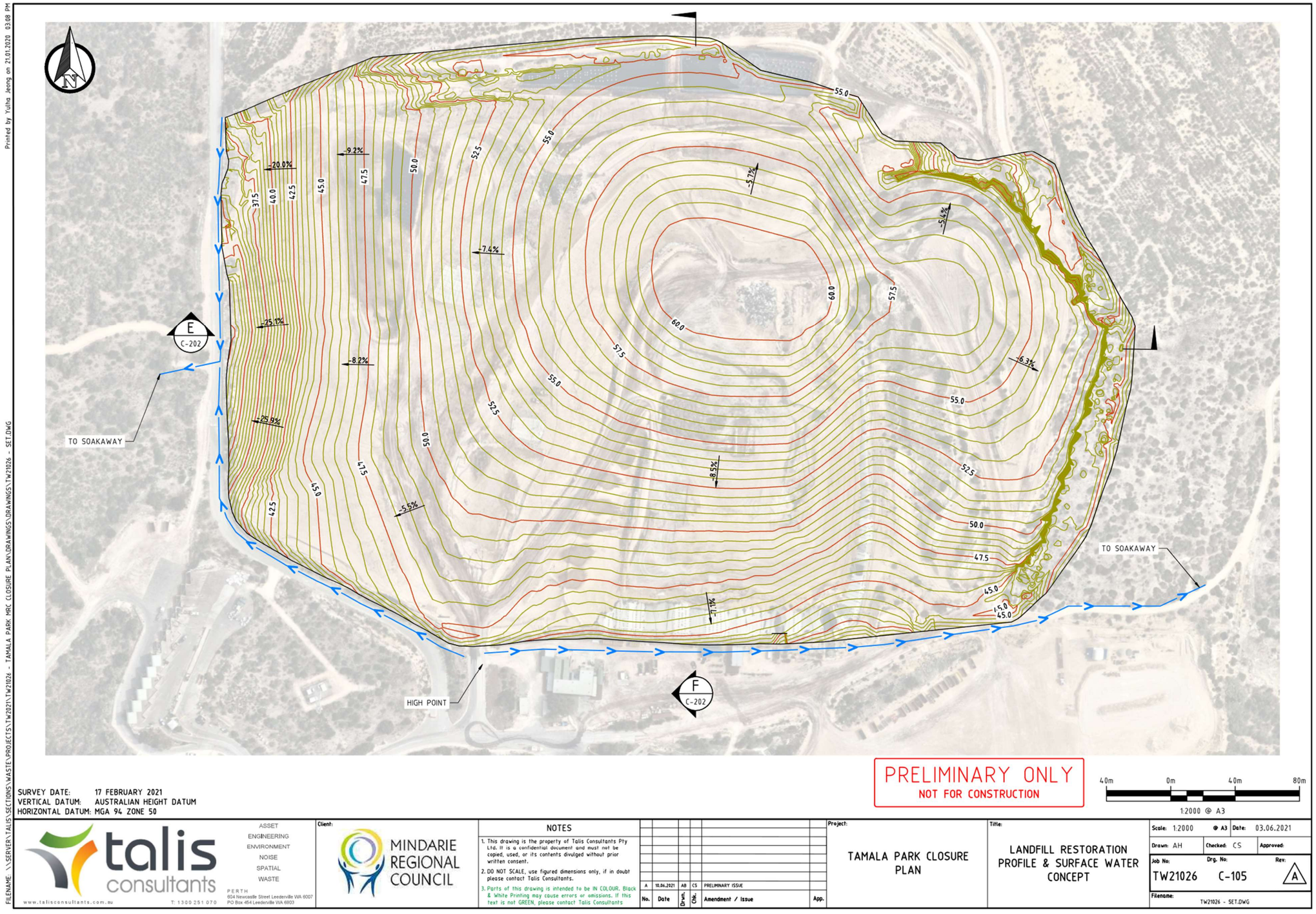


Figure 9: Tamala Park final landfill profile and stormwater management

L6963/1997/14

Appendix 3: Application validation summary

SECTION 1: APPLICATION SUMMARY **Application type**					
Works approval	☐				
Licence	☐	Relevant works approval number:		None	☐
		Has the works approval been complied with?		Yes ☐ No ☐	
		Has time limited operations under the works approval demonstrated acceptable operations?		Yes ☐ No ☐ N/A ☐	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?		Yes ☐ No ☐	
		Date Report received:			
Renewal	☐	Current licence number:			
Amendment to works approval	☐	Current works approval number:			
Amendment to licence	☒	Current licence number:	L6963/1997/14		
		Relevant works approval number:		N/A	☐
Registration	☐	Current works approval number:		None	☐
Date application received		29/9/2021			
Applicant and Premises details					
Applicant name/s (full legal name/s)		Mindarie Regional Council			
Premises name		Tamala Park Waste Management Facility			
Premises location		1700 Marmion Avenue Clarkson WA 6030 Being part Lot 9020 on Plan 408820 as depicted in Schedule 1			
Local Government Authority		City of Joondalup			
Application documents					
HPCM file reference number:		DWERDT509105			
Key application documents (additional to		• *Closure and Post-Closure Management Plan (CPCMP)*			

application form):	*Talis Consultants, June 2021;* • *Technical Specification for the Stage 2 West Capping Works (Specification) Talis Consultants, June 2021; and* • *Capping Stability Risk Assessment for Stage 2 and Immediate Surrounding Area (SRA) Talis Consultants, June 2021*
Scope of application/assessment	
Summary of proposed activities or changes to existing operations.	• Installation of capping works are required to close the Stage 2 West portion of the active landfill in accordance with the progressive closure plan for the site. (6963/1997/14). • Amendments to licence condition 1.2.7 (Table1.2.4) to reflect proposed capping installation of Stage 2 Phase 2 West.

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	**Assessed production or design capacity**	Proposed changes to the production or design capacity (amendments only)
Category 12	1,500,000 tonnes per annual period	*No change to production or design capacity.*
Category 57	500 tyres at any one time	*No change to production or design capacity.*
Category 62	15,000 tonnes per annual period	*No change to production or design capacity.*
Category 64	350,000 tonnes per annual period	*No change to production or design capacity.*
Category 7 •	30,000 tonnes per annual period	*No change to production or design capacity.*

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes ☐ No ☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ☐ No ☒	Ministerial Statement No: 000629 EPA Report No: 1139 Note: The site does not have a Ministerial Statement (MS) specific for the site. The MS Relates to Metropolitan Regional Scheme to accommodate modifications to zones and reserves for Clarkson-

		Butler district. Condition 2 of the MS requirements the scheme to maintain a 500 meter buffer from the active landfill face areas.
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ☐ No ☒	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes ☒ No ☐	Certificate of title ☐ General lease ☐ Expiry: Mining lease / tenement ☐ Expiry: Other evidence ☐ Expiry:
Has the applicant obtained all relevant planning approvals?	Yes ☐ No ☐ N/A ☒	Approval: Expiry date: If N/A explain why?
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes ☐ No ☒	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes ☐ No ☒	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes ☒ No ☐	Application reference No: N/A Licence/permit No:68672, 173726, 200058 and 17591. Licence / permit not required: N/A
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes ☐ No ☒	Name: N/A Type: N/A Has Regulatory Services (Water) been consulted? Yes ☐ No ☐ N/A ☒ Regional office: N/A
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes ☒ No ☐	Name: Part of Perth Ground Water Area Priority: P3 Note: The Site is located immediately to the west of Priority 3 (P3) Public Drinking Water Source Protection Area, which is located within the Premises boundary and to the east.

		Yes ☒ No ☐ N/A ☐
Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*)	Yes ☐ No ☒	N/A
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes ☐ No ☒	N/A
Is the Premises subject to any EPP requirements?	Yes ☐ No ☒	N/A
Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*?	Yes ☒ No ☐	Classification: - Contaminated - remediation required Date of classification: 29/07/2020