Surface Water and Leachate Management Plan

Wangara Waste Transfer Station

Prepared for City of Wanneroo

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Project Number: TW25021

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Signature		

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1 Introduction

Talis Consultants Pty Ltd (Talis) was commissioned by the City of Wanneroo (the City) to prepare a Surface Water and Leachate Management Plan (SWLMP) for the proposed Waste Transfer Station (WTS) development at Lot 522, 86 Motivation Drive, Wangara, Western Australia (the Site). The Site was previously used as a Materials Recovery Facility (MRF) and is proposed to be repurposed as an interim WTS. This SWLMP summarises the assessments and strategy for managing surface water and leachate at the proposed facility.

No surface water modelling has been undertaken for the Site, as the existing surface water management system (SWMS) is considered sufficient to manage stormwater from the proposed infrastructure with minor adjustments. The facility does not require new a drainage system, and the proposed modifications will not significantly alter existing surface water flows and designated discharge points.

1.1 Background

The proposed WTS will accept waste from the City's kerbside collection services and transfer it to processing facilities in the southern region of the Perth Metropolitan Area. In doing so, it will ensure continuity of essential waste consolidation services in the short to medium term and support the City's broader transition toward regionalised waste infrastructure at the Neerabup Resource Recovery Precinct (NRRP). The City intends to have the WTS operational by early 2026 and enable a smooth transition of waste management services ahead of the planned closure of the Tamala Park landfill. The facility will have a lifespan of approximately 5 years, to serve as a contingency should delays occur in the delivery of the NRRP.

The WTS elements that the City is seeking approval for include:

- Repurposed WTS building;
- Supporting infrastructure:
  - Truck refuelling station;
  - Truck washdown station;
  - Existing SWMS; and
  - Fire management system.

The layout of the Site is shown in Drawing C-101, available in Appendix A.

1.2 Objectives

This SWLMP summarises the design and operationally flexible leachate and surface water management systems at the Site. The SWLMP has been developed in general accordance with the following guidelines:

- Sustainability Victoria's Guide to Best Practice at Resource Recovery Centres; revised 2019 (Guidelines for Resource Recovery Centres)
  - Outlines a better practice approach to developing, managing and operating resource recovery centres (including WTSs) and provides guidance on better practice environmental risk design

The SWLMP shall address the following benchmark controls for surface water and leachate management at the Site as under Section 3.4.3 of the Guidelines for Resource Recovery Centres:

- Fully sealed surfaces in areas where waste is handled or stored, to prevent leachate infiltration into soil;
- Covered areas or enclosed buildings for waste receival and storage to minimise rainwater ingress;
- Separation of clean stormwater from contaminated runoff, including the use of bunds or gradient fall to direct leachate to collection points;
- Leachate containment and treatment systems, such as sumps or tanks, to manage runoff from washing or spills;
- Use of first flush diversion systems, where possible, for uncontaminated areas to reduce treatment volumes;
- Regular inspections and maintenance of drainage infrastructure to ensure ongoing function; and
- Monitoring of runoff and leachate systems to identify potential pollution events.

Additional design requirements may be considered based on the finalised surface water and leachate management strategy as discussed further in Sections 3 and 4.

1.3 Scope of Report

In order to meet the objectives discussed in Section 1.2, the SWLMP contains the following elements:

- Site Information;
- Surface Water Management Strategy:
  - Key infrastructure; and
  - Operational management and monitoring strategy.
- Leachate Management Strategy:
  - Key infrastructure; and
  - Operational management and monitoring strategy.
- Appendices, including Figures and Drawings.

2 Site Information

This section provides background information in relation the location, current and proposed site infrastructure, licencing, and key environmental attributes relevant to this SWLMP.

2.1 Site Location and Access

The Site is located at 86 Motivation Drive, Wangara, within the City of Wanneroo. It occupies Lot 552 on Deposited Plan 406640, which is zoned General Industry under the City's Local Planning Scheme and situated within the Wangara Industrial Area. The Site covers an area of approximately 1.79 hectares. The surrounding area is primarily used for industrial purposes, with no sensitive land uses in close proximity.

Access to the Site is via Motivation Drive, which connects to major transport routes including Ocean Reef Road and Wanneroo Road. Vehicle entry and exit are managed via a sealed access road located on Lot 9005, which is directly south of the Site and an additional separate site exit for kerbside collection vehicles onto Opportunity Drive in the north of the Site. These access points will remain unchanged and continue to support site operations as part of the proposed development as detailed in Section 2.2.

The location of the Site is shown in Figure 1 in Appendix A.

2.2 Current and Proposed Site Infrastructure

The Site and Lot 9005 contain existing infrastructure that supports the Site's ongoing use for waste operations. The existing infrastructure within Lot 9005 includes the following elements:

- Weighbridge and gatehouse;
- Site access; and
- Site exit for Transfer Trailers.

However, this SWLMP focuses solely on proposed infrastructure within the Site, which includes the following elements:

- Large, enclosed shed previously used as a MRF for the sorting and storage of recyclable materials.
  - The eastern half (existing receival hall) is proposed to be repurposed as a WTS building while the western half will be demolished and will provide Truck parking space;
- Sunken and roofed load-out lane (2m below ground level) adjoining the WTS for Transfer Trailer loading;
- Trucks reversing apron including twin side PC panel and post retaining wall south of the WTS building;
- Truck refuelling station;
- Truck washdown bay;
- Fire management system;
- Hardstand extensions to allow space for the washdown bay and the reversing apron;
- Site exit for kerbside collection vehicles exiting from the northeast of the Site onto Opportunity Street;

- A maximum 1.5m high retaining wall along the southern hardstand extension;
- Two concrete pads (to be demolished and replaced with new sealed hardstand areas); and
- Perimeter fencing will be extended to enclose the expanded operational area, with existing mesh fencing replaced by new Colorbond fencing along most of the boundary to support compliance with noise regulation limits.

The current Site layout is shown in Figure 3 in Appendix A.

2.3 Licencing

The Site is owned and managed by the City and has been in operation since 2013.

The City currently holds Licence L9230/2019/1 for the Site as a Category 62 – Solid waste depot Prescribed Premises under Part V of the *Environmental Protection Regulations 1987* as outlined in Table 2-1.

Table 2-1: Proposed Prescribed Premises Categories

Category	Category Description	Production or Design Capacity
62	Solid waste depot: premises on which waste is stored, or sorted, pending final disposal or re-use.	500 tonnes or more per year

In the current Licence, the Site boundary is defined as the cadastre boundary of Lot 522. The hardstand extensions described in Section 2.2 are located entirely within the current boundary.

2.4 Environmental Attributes

The following sections outline the environmental attributes of the Site with relevance to the surface water and leachate management system strategies for the Site's redevelopment works.

2.4.1 Climate

The local climate is characterised by hot, dry summers and mild, wet winters, with low to moderate and highly variable annual rainfall, predominantly occurring during the winter months. The average monthly rainfall, the mean maximum and mean minimum temperatures and Pan evaporation from 1970 to 2024 are provided in Table 2-2. This data has been sourced from SILO, which is a database of Australian climate data from 1889 to the present that is hosted by the Queensland Department of Environment and Science (DES). SILO constructs datasets from observational data obtained from BOM, using mathematical interpolation techniques to infill gaps in time series and construct spatial grids.

Table 2-2: Monthly Climate Statistics Summary from 1970 – 2024

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	14	16	17	36	92	139	152	122	76	40	25	8	736
Mean Evaporation (mm)	299	253	217	135	88	63	64	78	105	160	215	276	1,952

Mean Max Temp (°C)	31	32	29	26	22	19	18	19	20	23	26	29	24
Mean Min Temp (°C)	18	18	17	14	11	10	9	9	10	11	14	16	13

The average annual rainfall recorded at Wangara since records began is 736mm, with the minimum and maximum values ranging from 8mm and 152mm per month, respectively. The average annual potential evaporation rate is approximately 1,952 mm, which is nearly three times the average annual rainfall and occurs at higher rates during the warmer, drier months of the year.

The wind direction generally ranges from easterly to northeasterly in the morning (9am), changing direction to south-westerly to westerly in the afternoon (3pm). Winds at the Site are typically moderate in the morning and the afternoon. The wind rose for morning and afternoon winds can be seen in Diagram 2-1. The provided Wind data was recorded at Perth Metro weather station (BOM Station Number: 009225).

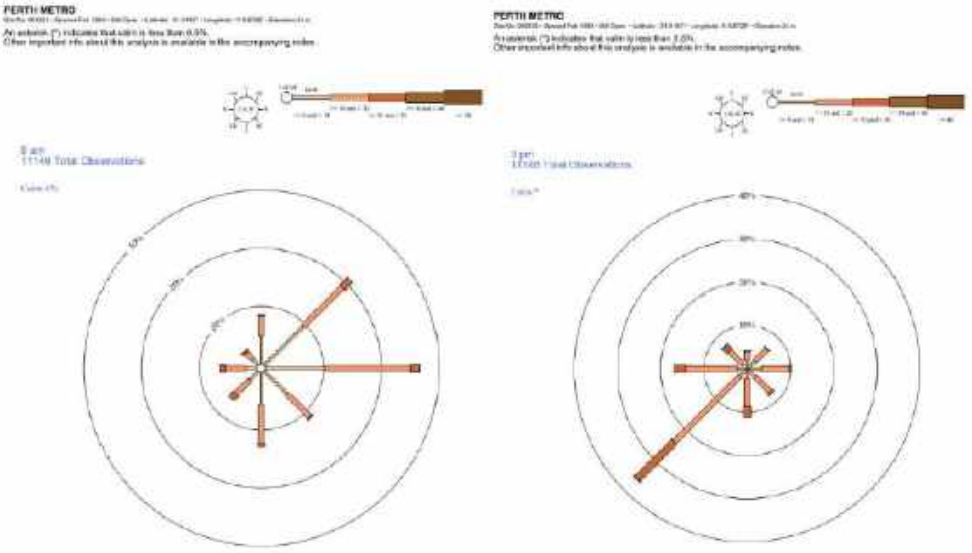

Diagram 2-1: 9am (left) and 3pm (right) Wind Rose for Perth Metro Station

2.4.2 Topography

The topography at the Site ranges from approximately 68m Australian Height Datum (AHD) in the northwest to 61mAHD in the southeast. Across the majority of the existing hardstand area, ground levels remain relatively consistent between 67mAHD and 68mAHD. However, the southeastern corner of the Site features a notable slope, with a drop from 67mAHD to 61mAHD over a short distance. A hardstand extension is proposed in this area and therefore, earthworks will be required to regrade the southeastern portion of the Site to approximately 67.5mAHD.

The topography for the Site is shown in Figure 6 in Appendix A.

2.4.3 Geology

According to Landgate, the surface geology of the WTS comprises of the soil profile Qdc: Coastal sand dunes, beach sand, barrier beaches, foredune, beach ridges; calcareous and siliceous, locally shelly and/or cemented (beach rock); locally reworked. The surface geology at the Site is shown in Figure 7 in Appendix A.

A geotechnical investigation was conducted in February 2025 by WSP. The investigation included cone penetration testing, hand augering, permeability testing and laboratory analysis. The investigation concluded that the Site is underlain by sand derived from the Tamala Limestone formation, which is characterised as fine to coarse-grained, sub-angular to sub-rounded quartz sand with minor feldspar content (WSP, 2025). Based on site conditions, the area has been classified as Class A in accordance with AS 2870-2011, indicating low ground reactivity (WSP, 2025). Infiltration testing supports a design infiltration rate of 5 metres per day for stormwater management systems installed at approximately 1 metre depth, subject to appropriate separation distances from foundations and subsurface structures (WSP, 2025). The geotechnical investigation report is provided in Appendix B.

2.4.4 Groundwater

Desktop investigations on groundwater levels were carried out using geospatial data from the *Gnangara–Jandakot Depth to Groundwater Contours – 2019 (Maximum)* dataset, published by the Department of Water and Environmental Regulation and accessed via the Data WA catalogue. This dataset provides modelled estimates of the maximum depth to groundwater, expressed in metres below ground level (mbgl), across the superficial aquifer system in the Perth region.

The groundwater contours show that the groundwater level on the Site ranges from 21mbgl to 28mbgl. Across the majority of the existing hardstand the groundwater level is at 28mAHD which decreases to 25mAHD towards the northeastern site boundary. In the southeastern corner of the Site, south of the existing hardstand, the groundwater level increases to 21mbgl in the area close to the existing drainage sump.

The groundwater contours are shown in Figure 9 in Appendix A.

2.4.5 Surface Water

There are no permanent natural surface water bodies on the Site. The nearest surface water body is Lake Badgerup, approximately 1,300m west of the Site as shown in Figure 10 in Appendix A.

3 Surface Water Management Strategy

Environmental risks associated with leachate and surface water within the overall Site boundary will be managed through the continued implementation of the Site's existing SWMS with some modifications. To appropriately manage these risks, the SWMS must continue to achieve two key objectives including minimising leachate generation and proactively managing surface water. These objectives, and the design features incorporated to achieve these, are shown in Table 3-1.

Table 3-1: Objectives and Associated Design Features of the Surface Water Management System

Objective	Design Feature
Minimise Leachate Generation	Leachate generation is limited to the WTS building, which will be fully contained through roofing, sealed and bunded surfaces, and dedicated drainage infrastructure.
	The existing SWMS is designed to manage uncontaminated stormwater separately from leachate-generating areas. This is achieved through the elevated design of the WTS building and strategic grading of surrounding hardstands to maintain clear separation between uncontaminated and potentially contaminated water.
Proactively Manage Surface Water	Retain and maintain existing hardstands graded to direct runoff into the Site's established drainage infrastructure.
	Incorporate hardstand extensions into the existing drainage layout to ensure continued effective surface water management.
	Utilise controlled discharge points on Site, including an additional discharge point introduced as part of a hardstand extension, designed to convey stormwater via the existing surface gradient to an unlined drainage sump in the south-east corner of the Site.

The proposed SWMS to meet the objectives outlined in Table 3-1 is discussed in the following sub-sections.

3.1 Key Infrastructure

The surface water runoff from all Site infrastructure, excluding washdown bay, will be directed into the Site's existing SWMS to mitigate onsite flooding of the Site.

The adjustments to the existing SWMS consist of:

- Gutters and downpipes on the WTS building and loadout lane to collect roof runoff;
- An existing pit and pipe drainage network throughout the southern section of the Site, conveying uncontaminated runoff to a new discharge point on the southern boundary and ultimately to an unlined sump outside the south-western corner of the Site; and
- An existing soak well system in the northern section of the Site to manage uncontaminated stormwater runoff from hardstand areas via infiltration.

The proposed works, as detailed in Section 2.2, will increase the Site's hardstand area by approximately 40%, split evenly between newly constructed graded extensions and the existing flat concrete slab left in place following partial demolition of the western side of the existing building on

site. Runoff from the graded extensions will be directed into the existing SWMS. The existing system is considered adequate to manage the additional runoff, and no further modifications are proposed.

The layout of the updated SWMS is shown in Drawing C-101 in Appendix A, and further discussion on the key infrastructure for surface water management is provided in the following sub-sections.

3.1.1 WTS Building

The WTS building and loadout lane will include a gutter and downpipe system to collect roof runoff. As the building is currently in the concept design phase, the final roof fall direction has not been confirmed. Runoff from the roof will be directed into the Site's existing pit and pipe drainage network, either via a pit located on the eastern or western side of the building, depending on the detailed design.

3.1.2 Pit and Pipe Drainage System

The pit and pipe network services the southern section of the Site, collecting runoff from roofed areas, including the WTS building and loadout lane, and surrounding graded hardstands. Runoff is conveyed to a controlled discharge point on the southern boundary, which was relocated to accommodate the hardstand extension. Despite the change in location, surface water continues to flow to the existing unlined drainage sump located just outside the Site's south-western boundary. This is facilitated by a culvert beneath the retaining wall adjacent to the reversing bay.

3.1.3 Soak Well System

In the northern section of the Site stormwater from hardstands is managed via a soak well system that facilitates infiltration. No new stormwater infrastructure is proposed, as the existing system is sufficient to accommodate runoff from the extended operational area.

3.1.4 Truck Refuel Station

To prevent the offsite transfer of hydrocarbons or other pollutants, surface water runoff from the refuelling station will be treated by an oil-water-separator before being directed to the existing pit and pipe drainage system as detailed in Section 3.1.2.

3.1.5 Truck Washdown Bay

The washdown bay will be sealed and bunded to contain any contaminated wash water or surface water runoff which be collected via a sump and underground containment tank and removed from Site by a licensed external contractor for appropriate disposal.

3.1.6 Hardstands, Surfacing & Bunding

The proposed hardstand extensions will be constructed using low-permeability surfaces such as asphalt or concrete to minimise rainfall infiltration into underlying soils. These new surfaces will be graded to direct stormwater runoff away from the WTS building and loadout lane and toward the Site boundary, facilitating collection by the Site's existing SWMS. The specification description regarding the hardstand extensions is detailed in Table 3-2.

Table 3-2: Specification Description of Hardstand Extensions

Layer	Material	Thickness	CBR
Surfacing	14mm Dense Graded Asphalt with A10E PMB	40mm	NA
Waterproofing	Primerseal	10mm	NA
Basecourse	Crushed Rock	170mm	80
Subbase	Gravel	170mm	30
Fill	Gravel	Varies	15

The concrete slab from the demolished western portion of the existing building will remain in place and is generally flat. Runoff will ultimately flow towards adjacent sloped hardstands and into the Site's existing SWMS.

3.2 Management and Monitoring Strategy

Regular monitoring and maintenance of the SWMS will continue to be undertaken on a regular basis to ensure the system is operating effectively. Table 3-3 shows the recommended monitoring and maintenance schedule to preserve the integrity of the SWMS following the Site's redevelopment.

Table 3-3: Monitoring and Maintenance Schedule for the SWMS

Activity	Frequency
Integrity of all surface water drains and bunding	Weekly or following heavy rainfall events
Integrity of all overflow points and outlets	Monthly or daily during heavy rainfall events
Integrity of the washdown bay containment infrastructure and refuel station oil separator	Periodic

Surface water sampling and monitoring is not currently undertaken at the Site and is not considered necessary following the Site development works given the low-risk nature of the run-off, significant separation to groundwater (Section 2.4.4) and minimal potential environmental and social impacts.

4 Leachate Management Strategy

Leachate generation on Site is limited to the enclosed areas where waste materials or residues may come into contact with water. These include the WTS building, the loadout lane, and the washdown bay. Leachate may arise during routine floor cleaning, from washdown activities, or in emergency situations such as fire suppression. As no waste handling or storage will occur outside the WTS building, the remaining external hardstand areas will remain free of leachate-generating activities.

The design of these areas has been developed to minimise or eliminate leachate generation wherever possible. The following sections discuss the key infrastructure that will manage the anticipated small volumes of leachate generated at the Site.

4.1 Key Infrastructure

4.1.1 WTS Building

The internal floors of the WTS building will be flat, except within the waste bunker, which will be constructed with a slight grade to facilitate drainage. Runoff within the bunker will be directed to two leachate collection points located in opposing corners. These collection points will be connected to an underground pipe network that conveys leachate to a dedicated containment tank located outside the building. The leachate tank will be periodically emptied by a licensed contractor for off-site treatment and disposal.

The leachate management system within the WTS building is shown in Drawing S-102 in Appendix A.

Table 4-1 provides a summary of any new proposed hardstand areas as part of the redevelopment works. Roads / high-traffic areas will comprise of sealed asphalt installed in accordance with Institute of Public Works Australia (WA Branch) and Australian Asphalt Pavement Association (WA Branch) Technical Specification, Tender Form and Schedule for Supply and Laying of Asphalt Road Surfacing.

Table 4-1: Summary of Hardstand Elements at the WTS

Concrete Element	F'c (MPA)	Concrete Class & Grade	Max Aggregate Size (mm)	Target Slump (mm)
Footings	25	N25	20	80
Slab-on-ground all other	32	N32	20	80
Columns	40	N40	20	80
Walls	40	N40	20	80

4.1.2 Loadout Lane

The loadout lane will be the lowest point on Site and is designed to capture fire water runoff in emergency scenarios. Accumulated water will be removed from Site by a licensed liquid waste contractor. The loadout lane has a capacity of approximately 340 cubic meters (m^3).

4.1.3 Leachate Tank System

All leachate from the WTS building and washdown bay will be conveyed to a dedicated, self-bunded underground tank. The tank includes a float sensor linked to an alarm system to trigger pump-outs when the tank reaches capacity. The tank will have the following specifications:

- 1,850mm internal diameter;
- 8,700mm length;
- 600mm diameter access manhole;
- Class D load-rated lid (trafficable); and
- Fitted with submersible pump and monitoring system.

The location of the leachate tank system is shown in Drawing C-101 in Appendix A.

4.2 Management and Monitoring Strategy

The leachate management system (LMS) will be regularly inspected, maintained, and repaired when necessary. Leachate monitoring will be undertaken on a regular basis to ensure the LMS (i.e. drain, pipes, etc.) is operating effectively. Table 4-2 shows the recommended monitoring and maintenance schedule to preserve the integrity of the LMS.

Table 4-2: Monitoring and Maintenance Schedule for the LMS

Activity	Frequency
Integrity of all drains, sumps and pipes	Monthly or following hardstand cleaning
Leachate tank leachate level	Continuously
Leachate tank integrity	Annually

APPENDIX A
Figures and Drawings

Figures

Figure 1: Locality

Figure 3: Site layout

Figure 6: Topography

Figure 7: Geology

Figure 9: Groundwater Contours

Figure 10: Hydrology

Drawings

Drawing C-101: General Arrangement

Drawing S-102: Ground Floor Layout

APPENDIX B
Geotechnical Investigation

Assets | Engineering | Environment | Noise | Spatial | Waste

Talis Consultants
ABN 85 967 691 321

HEAD OFFICE
604 Newcastle Street,
Leederville
Western Australia 6007

PO Box 454,
Leederville
Western Australia 6903

NSW OFFICES
Nowra
76 Bridge Road, Nowra
New South Wales, 2541

PO Box 1189, Nowra
New South Wales, 2541

Newcastle
58 Cleary Street, Hamilton
New South Wales, 2303

P: 1300 251 070
E: enquiries@talisconsultants.com.au