Site Drainage Assessment

1 Introduction

This Site Drainage Assessment seeks to provide an overview of the stormwater management techniques at TLK LHP1 on Lot 12 Mason Road Kwinana Beach.

2 Desing Criteria & Assumptions

Currently, there are no District or Local Water Management Strategy for this area. Therefore, the stormwater drainage management was designed in accordance with:

- The City of Kwinana's Planning Policy for Development within the Industrial Zones (Town Planning Scheme No.2)
- Australian Rainfall and Runoff 1987 Guidelines and

- The Environmental Protection Authority (EPA) First Flush Guidelines and Principals.

The general criteria for stormwater Runoff Management include:

- In accordance with City of Kwinana's requirement for events up to the 100 years 24 hour ARI, no flows will be allowed to exit the site – surface runoff will be retained and infiltrated on site.
- A minimum freeboard of 300mm will be maintained between the maximum flood level and the finish floor level of buildings within the Site.
- Manning's Runoff Coefficient for impervious areas such as Roof, Roads, Carparks, and other Hard Stand is 0.9. As for pervious landscaped areas, the coefficient of runoff is 0.1.
- Within the Pyrometallurgical and Hydrometallurgical operation areas, there are large concrete bunds designed to capture major chemical spillage. Therefore, stormwater runoff is not expected from these bunded areas. Location and size of these bunded areas attached in Appendix 1
- In accordance with the First Flush Guidelines and Principals, stormwater runoff from the Delivery Area, Stage 1 Pyro Operations Areas, and the TAS Loading Area will be directed to two Water Quality Management Systems, which includes Wedge Pits, Storage Tanks, and overflow pipes. The Wedge pits are designed to capture and store up to the 1 Year 1 Hour ARI storm events and allowed suspended solids to settle. For storm events greater than the 1 Year 1 Hour ARI event, the excess stormwater will be conveyed via an overflow pit and pipe system towards the onsite infiltration swales. The Storage Tanks are to contain treated stormwater for use as process water.
- MSP's Engineering Design Criteria, Document No. 11304-T-DC-001 Rev0, stipulated that Drainage structures design shall be based on the following rainfall events:
    - Internal Plant Open Drains and Roadside Drains – 1 in 2 Year ARI
    - Minor underground pipes and culverts - 1 in 5 Year ARI
    - Major plant and road pipes and culverts – 1 in 10 Year ARI

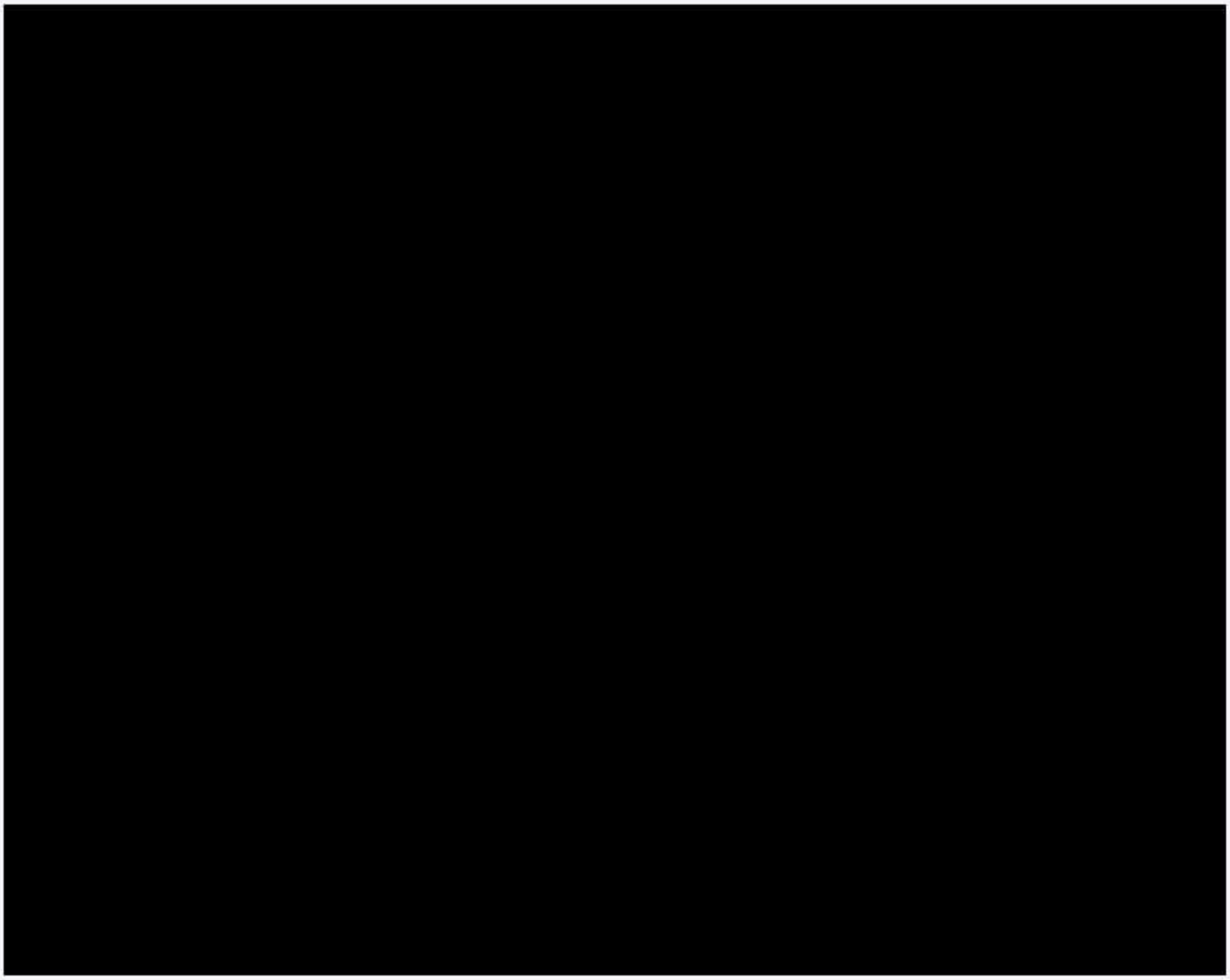
3 Stormwater Catchment

The site area of 20.37ha is divided not 4 main stormwater conveyance and infiltration systems. Each system consists of several catchments as described below:

System	Sub-Catchments	Total Catchment (m²)	Previous Area (m²)	Impervious Area (m²)	Bunded Areas (m²)
1	A B D F & G	84,136	13,100	68,642	2,394
2	C	99,975	21,490	72,711	5,774
3	E	11,876	6,556	5,320	0
4	G	7,713	2,960	4,753	0
	Total	203,700	44,106	151,426	8,168

The bunded areas are excluded from stormwater runoff calculations.

The drainage strategies for each drainage system are as follows:



3.2 System 2 – Southeast Catchment

3.3 System 3 – Central Catchment

3.4 System 4 – Eastern Cathcment

4 Storage Requirements

TABEC Civil Engineering Consultants were consulted to design and check the drainage swales infiltration and storage requirements.

Rational method and the effective impervious area were used to estimate the total runoff volume within each system, while the infiltration volume was estimated using Green Ampt and Shallow Water Table Log Model. The design method is based on the basic concept that retention basins function by providing temporary storage while inflow (stormwater runoff) arrives at a high rate and outflow (soakage) occurs at a slower rate.

As the drainage swales within each system are connected, these swales were represented in the PCSump Model by a single large basin, with effectively the same base area, a 1 in 2 side slope, and an average spacing to the maximum groundwater level.

TABEC Civil Engineering Consultants have adopted a soil permeability of 5m/day as per the Geotechnical recommendation, with a 2m/day clogged base layer, and have applied a permeability reduction factor of 0.8 and 0.6 for Shallow Water Log Model and Green Ampt Model, respectively.

The summary sheet of PC-Sump Calculation are presented in Appendix 2, and the table below provides a summary comparison of the PC-Sump estimated storage requirement and the detailed designed storage capacity.

	System 1 (NW)	System 2 (SE)	System 3 (C)	System 4 (E)
Catchment Area	8.41ha	10ha	1.19ha	0.77ha
Bunded Area	0.24ha	0.58ha	Nil	Nil
Effective Impervious Area	6.31ha	6.75ha	0.54ha	.045ha
100Y24H ARI Storage Requirement	**5,660m³**	**5,340m³**	**250m³**	**160m³**
Total Storage Capacity with Drainage Swales	5,290m³	5,597m³	314m³	594m³
Storage Capacity within Pits and Pipes	295m³	177m³	0	8m³
Wedge Pits Capacity	450m³	NA	NA	NA
Total Designed Storage Capacity	**6,035m³**	**5,774m³**	**314m³**	**602m³**

5 Summary

The internal stormwater drainage system for the LHPP1 has been designed to conform to the City of Kwinana's engineering requirements for Industrial Areas. Stormwater runoff from the site will be retained onsite for up to the 100 Year 24-hour ARI event, and for greater storm events the water will be conveyed by overland flow towards the western boundary and overflow at an RL of 4.4m AHD, with the maximum flood depth of 1.2m and a freeboard greater than 300mm. Furthermore, the site aims to use all treated stormwater as process water to improve sustainability and cost effectiveness.

Appendix 1Site Drainage Plan