

# Neerabup Resource Recovery Precinct - Master Plan

**Final Report** 



**Prepared for City of Wanneroo** 

**27 November 2024** 

**Project Number: TW24028** 



#### **DOCUMENT CONTROL**

Version	Description	Date	Author	Reviewer	Approver
0.1 Internal Review		30/04/2024	QK	BC & RC	RC
1.0	Draft Release for Client Review	1/10/2024	QK	RC	RC
2.0	Draft 2 Report issued to Client	14/11/2024	QK/EB	RC	RC
2.1 Draft 3 issued to Client		27/11/2024	RC	RC	RC
2.2	Draft 4 issued to the Client	27/11/2024	EB/SM	RC	RC
2.3	Final Report	6/12/2024	RC	RC	RC

## Approval for Release/

Name	Position	File Reference
Ronan Cullen	Director & National Waste Leader	TW24028 - Wanneroo Neerabup RRP Master Plan_2.3
Signature	Low Uhn	

Copyright of this document or any part of this document remains with Talis Consultants Pty Ltd and cannot be used, transferred or reproduced in any manner or form without prior written consent from Talis Consultants Pty Ltd.



#### **EXECUTIVE SUMMARY**

The City of Wanneroo (the City) commissioned Talis Consultants to develop a Site Master Plan for the proposed Neerabup Resource Recovery Precinct (NRRP) to address long-term waste management needs. The NRRP is designed to provide infrastructure for recyclables, organics, and residual waste, including a Waste to Energy (WtE) facility, Material Recovery Facilities (MRF), Food Organics/Garden Organics (FOGO) processing and a Waste Transfer Station (WTS). The NRRP will help address the lack of waste infrastructure in northern Perth while increasing material recovery, generating local employment opportunities and reducing transportation costs and emissions. After finalisation of the Draft Master Plan a Market Sounding process was launched to engage with key players across the waste industry and incorporate their input prior to finalising the Master Plan.

The objective of the Project was to assess the waste infrastructure needs for the City and surrounding northern suburb regions and prepare a blueprint for the development of the NRRP to ensure that the current and future resource recovery and waste management requirements can be catered for. The Master Plan aims to assist the City in determining its short- and long-term recycling and waste infrastructure requirements and direct future land use planning decisions for the NRRP.

## **Due Diligence**

The City nominated four locations within the proposed NRRP for consideration within the Master Plan. Based on an initial assessment of services and utilities access, the City and Talis determined that Lot 600 (the Site) was best suited. A Due Diligence Assessment followed, evaluating the Site's suitability for waste infrastructure based on environmental and social factors. No significant concern were identified during this due diligence assessment suggesting that the Site warranted further consideration for the development of the NRRP.

## **Infrastructure Needs Analysis**

A Waste Infrastructure Needs Analysis determined the most critical waste infrastructure for the City on its short and long term waste services provisions. The following priority facilities were identified for inclusion with the NRRP - Community Recycling Centre (CRC), WTS, MRF and WtE.

Based on a 30-year Waste Projections, considering all municipal solid waste (MSW) streams from the City and its neighbouring Cities of Joondalup and Stirling, a comprehensive Capacity Modelling and Infrastructure Sizing exercise was conducted. This process ensured that the proposed facilities would be appropriately scaled to meet both current and future waste management needs.

As the project progressed and particularly based on feedback from the Market Sounding process, it was identified that there would be significant time (15-20 years) to make a WtE at the NRRP financially viable and also allow sufficient time for this delivery. At this stage, it is anticipated that this could be approximately 15+ years. It is recognised that Tamala Park landfill will only have sufficient void space capacity to cater for the City's short term disposal requirements. Therefore a WTS was recognised as a priority facility to consolidation the City residual waste streams prior to transportation to the WtE facilities south of Perth to ensure that the City can provide cost effective waste management services.

The City and Talis investigated the option of converting the existing Wangara MRF building into a WTS in terms of design, costs and time frames. This was then compared to the establishment a new WTS facility at the NRRP. These works are included in this report. In summary, the recommendation is that the existing Wangara MRF facility be converted into an interim WTS facility that the City can use until the Neerabup WTS is fully operational.



## **Master Plan Design**

Talis integrated a series of Best Practice Design Principles into the NRRP layout, focusing on supporting operational linkages and separating front and back-of-house activities. Examples for the implementation of those principles are a communal weighbridge shared by the WTS and MRF and distinct areas for operational activities and community interactions within the CRC. The final Master Plan determined a split in the NRRP, divided by the proposed future rail corridor and zone of influence into.

- Southern Area: that can satisfy all the high priority infrastructure with access provided from the existing Trandos Road and collocating the WtE facility close to the existing grid connection associated with Neerabup Power Station. The waste infrastructure to be included in the Southern Area include WtE, MRF, WTS, CRC and supporting site infrastructure (weighbridge, roads, etc);
- Northern Area: which will provide lots for medium and low priority waste infrastructure which can be delivered as required.

#### **Cost Estimate**

Capital cost estimates for the NRRP has been prepared based on the Master Plan designs for the proposed facility. The capital costs represent all expenses relating to the establishment of physical infrastructure such as road works, hardstands earthworks and structures. The estimated overall cost of the NRRP is \$1.27 B (excl. GST). The WtE is the most expensive item in the cost estimates at \$750,000,000, which is equal to more than half of the overall cost. The MRF is the second most expensive item at approximately \$40,000,000. However, both these facilities are proposed to be delivered by private industry.

A full breakdown of the costs is included in the report, however, the following table summarises the split of costs between the City and private sector for the delivery of the NRRP.

Description	Total	City	Private Sector
Community Recycling Centre	\$4,520,000	\$4,520,000	-
Weighbridge	\$825,000	\$825,000	-
Material Recovery Facility	\$40,000,000	-	\$40,000,000
Waster Transfer Station	\$5,278,000	\$5,278,000	-
Waste to Energy	\$750,000,000	-	\$750,000,000
Battery Station	\$155,000,000	-	\$155,000,000
Future Expansion	\$2,484,000	\$2,484,000	-
Enabling Works Package (excluding WtE)	\$4,000,000	\$4,000,000	-
Road Upgrades	\$2,000,000	\$2,000,000	-
Wangara Conversion (Interim)	\$2,000,000	\$2,000,000	-
Sub Total	\$966,107,000	\$21,107,000	\$945,000,000
Contingency (20%)	\$192,475,200	\$4,221,400	\$188,253,800
Professional Fees (6%)	\$57,742,560	\$1,266,420	\$56,476,140
Cost Escalation (7%)	\$67,366,320	\$1,477,490	\$65,888,830
Grand Total	\$1,283,691,080	\$28,072,310	\$1,255,618,770



## **Approval Pathway Mapping**

Talis has outlined the individual approvals pathway for all facilities covering the Environmental and Planning Approvals. Due to the variety of facilities with their own characteristics the approvals process will differ between facilities. As the CRC and WTS will both be owned and operated by the City therefore, public works exemptions approach can be utilised for the planning approval.

## **Project Delivery Model**

Talis assessed a Project Delivery Model for the NRRP to determine which components the City should manage in-house and which are better suited for private firms. There is a trend towards Merchant Plant facilities in WA and Australia, where private industry handles waste processing through approvals, financing, and operation, often funded by long-term waste supply agreements with local governments. The City's main risk is ensuring a consistent waste supply, mitigated through contracts for residual waste streams. While local governments are moving away from owning waste facilities in metropolitan areas, they still manage infrastructure for waste consolidation and transport.

Project Phase	WtE	MRF	CRC	WTS
Land Ownership	City	City	City	City
Waste Supply	City	City	City	City
Approvals	Private	Private/City	City	City
Capital Funding	Private	Private	City	City
Facility Design	Private	Private	City	City
Facility Construction	Private	Private	City	City
Facility Operation	Private	Private	City	City

#### **Market Sounding**

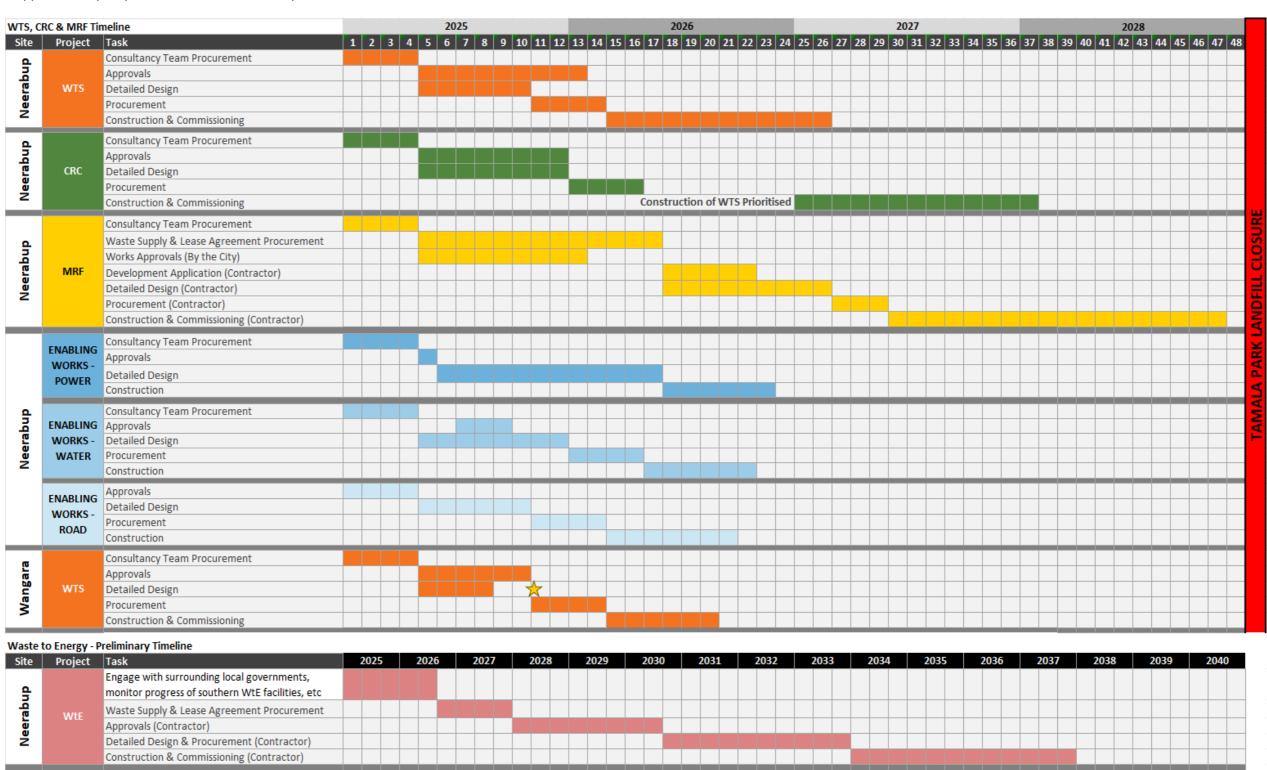
The Market Sounding exercise was advertised on the City's tender portal on 2 September 2024, with invitations sent to leading companies in the waste industry. Interested participants registered via the portal and were contacted by Talis, receiving a project outline, market sounding details and a consultation agreement. After signing, participants were sent a questionnaire and invited to an interview with the City and Talis to discuss their responses. A total of seven companies completing the questionnaire and interview stages. The key findings arising from the Market Sounding process include:

- Overall support for the NRRP with wide recognition of the lack of waste processing capacities within the northern Perth metropolitan area;
- Strong Industry support for the development of the MRF at the NRRP to service the northern suburbs, particularly delivered through a long term waste supply agreement; and
- There were concerns raised over the lack of available feedstock to ensure the financial viability for the WtE. Responses recommended waiting 2-3 years before reassessing available feedstock due to the existing WtE facilities in Kwinana and Rockingham soon commencing operation. Concerns also raised about the low waste levy rate in WA currently negatively impacts the financial viability of developing the proposed WtE facility.



# **Preliminary Timelines**

Preliminary timelines for the delivery of the WTS, CRC, MRF, WtE Facility as part of the NRRP project were also assessed including findings from the market sounding process. To minimise timeframes, a variety of the tasks will be completed concurrently including the detailed design during the approvals process. This will expedite the delivery of the various infrastructure elements. It is important to note that it is anticipated that the preferred contractor will secure the relevant approvals for the MRF, however this could be taken on by the City further reducing the timeframe for the delivery of that project. It is proposed that the construction of the WTS and CRC would be delivered through a single construction contractor, however the delivery of the WTS would be prioritised over the CRC due to the urgency. Enabling works will be required to deliver the NRRP, including facilitating its construction. These works should commence as soon as possible to minimise potential delays with the delivery of the various NRRP facilities. The timeline for development of the WTS at the Wangara site is also included as a contingency if needed by the City prior the timeframe for the delivery of the WTS at NRRP. The City may wish to get the Wangara WTS project construction ready by obtaining the approvals and detailed design works. WtE projects have long lead times, and it is anticipated that it could take approximately 13 years to deliver a WtE facility at NRRP.





#### Recommendations

Based on the works completed on this Master Plan Report including the Market Sounding process, Talis puts forward the following recommendations for the City's consideration:

- 1. Progress the development of the Neerabup Resource Recovery Precinct on Lot 600 Old Yanchep Road by proceeding with enabling works packages.
- 2. Focus on the development of the Southern Area of Lot 600 for the delivery of the high priority waste infrastructure and leave the North Expansion Area for future development. The high priority waste infrastructure includes the Waste Transfer Station, Material Recovery Facility, Community Recycling Centre and Waste to Energy Facility.
- 3. Advocate for a regional approach by working with surrounding local governments to consolidate tonnages to provide suitable feedstocks for future facilities at the Neerabup Resource Recovery Precinct.
- 4. Prioritise the delivery of the following high priority waste infrastructure:
  - a. Waste Transfer Station and Community Recycling Centre: commencing with Approvals and Detailed Design works. These works should be delivered through one construction package;
  - Material Recovery Facility: commencing Recycling Processing Contract coupled with a Lease Agreement for the development of the Material Recovery Facility by private industry. The City may take on the Approvals for the Material Recovery Facility to further expedite its delivery; and
  - c. Wangara Waste Transfer Station: Progress with the necessary approvals and detailed design works so that this project is construction ready. This will provide a contingency arrangement to the City should Tamala Park landfill cease operations and the Neerabup Waste Transfer Station not ready to commence operations.
- 5. Support the development of a Waste to Energy facility at the Neerabup Resource Recovery Precinct by;
  - a. Protect its proposed location within the Master Plan including through relevant planning controls;
  - b. Closely monitor the progress of the two Waste to Energy facilities over the coming years;
  - c. Advocate to state government for an increase on the landfill levy to make Waste to Energy projects more financially viable; and
  - d. Commence with the preparation of a Waste Supply Agreement for Waste to Energy services coupled with a lease agreement for the Waste to Energy site at the Neerabup Resource Recovery Precinct. To maximise the necessary foundation feedstocks the Waste Supply Agreement should be delivered through a regional procurement process with surrounding local governments. This Waste Supply Agreement should be released in approximately 2 years.
- 6. Seeking funding opportunities for the development of the Neerabup Resource Recovery Precinct.



- 7. Prepare a detailed Project Management Plan for the delivery of the Neerabup Resource Recovery Precinct outlining all the key stages and tasks associated the various facilities. As part of these works, continue to assess opportunities to streamline the delivery of the works including running tasks concurrently as well as combining approval applications and procurement processes across various facilities.
- 8. Prepare a Community and Stakeholder Engagement Plan for the Neerabup Resource Recovery Precinct to its development and support future approval applications. The Waste to Energy facility should be included in all such activities from the offset to assist with its social licence to operate and future approval processes.
- 9. Engage with the City's Town Planning department in relation to:
  - a. Further progressing the zoning of Lot 600 to enable the delivery of the Neerabup Resource Recovery Precinct; and
  - b. Confirm the appropriate planning approach for the Project including the City utilising Public Works Exemptions for the facilities it will own and operate.
- 10. Engage with the Department of Water and Environmental Regulations in relation to the approvals for the Neerabup Resource Recovery Precinct and particularly if the City can obtain a Clearing Permit for the full area and submit Works Approval for the Material Recovery Facility.
- 11. Further investigate the development of a Solar Farm on the old Pinjar Landfill Lot 503 Old Yanchep Road.



# **Table of Contents**

1	Intro	Introduction				
	1.1	Object	ive	1		
	1.2	Projec	t Scope	2		
2	Nom	inated S	Sites	3		
	2.1		on			
		2.1.1	Lot 502	3		
		2.1.2	Lot 503	3		
		2.1.3	Lot 600	3		
		2.1.4	Lot 801	4		
3	Servi	ices and	Utilities Assessment	5		
	3.1	Lot 60	0 Services	5		
		3.1.1	Gas 5			
		3.1.2	Telecommunications	5		
		3.1.3	Water	6		
		3.1.4	Power	6		
		3.1.5	Transport	7		
		3.1.6	Developable Area	7		
		3.1.7	Summary of Services and Utilities	8		
4	Due	Diligenc	e Assessment	9		
	4.1	.1 Climate				
		4.1.1	Rainfall	9		
		4.1.2	Pan Evaporation	10		
		4.1.3	Prevailing Winds	10		
		4.1.4	Temperature	10		
	4.2	Topog	raphy	11		
	4.3	Geolog	gy	11		
	4.4	Surfac	e Water	11		
	4.5	Hydro	geology	11		
	4.6	Flora a	and Vegetation	12		
		4.6.1	Threatened and Priority Ecological Communities	12		
		4.6.2	Threatened and Priority Flora	13		
	4.7	Fauna.		13		
	4.8	Separa	ation Distances	14		
	4.9	Cultura	al Heritage	14		



	4.10	Summary		15		
5	Legis	ative & Policy Fra	ımework	16		
	5.1	National		16		
		5.1.1 National	Waste Policy	16		
		5.1.2 Emissions	s Reduction Fund	16		
	5.2	State		17		
		5.2.1 Waste Av	voidance and Resource Recovery Act 2007	17		
		5.2.2 Waste Av	oidance and Resource Recovery Strategy 2030	17		
		5.2.3 WA Comp	posting Guidelines	20		
		5.2.4 WtE Strat	tegic Advice	20		
		5.2.5 State Wa	ste Infrastructure Plan	21		
	5.3	Local		22		
		5.3.1 City Fram	nework	22		
6	Wast	e Infrastructure N	leeds Analysis	23		
	6.1	Waste to Energy.		24		
		6.1.1 Existing fa	acilities	25		
	6.2	Materials Recove	ry Facility	26		
	6.3	3 Organics				
	6.4	Food Organics		28		
	6.5	Garden Organics.		29		
	6.6	Food and Garden	Organics	29		
		6.6.1 Existing F	acility on Lot 801	29		
	6.7	Waste Transfer S	tation	29		
		6.7.1 Wangara	WTS Assessment	30		
	6.8	Solar Farm		30		
	6.9	Community Recy	cling Centre	31		
	6.10	Battery Storage a	and Substation	32		
7	Wast	e Projections		33		
	7.1	Population Project	ctions	33		
	7.2	Current Waste Ad	cceptance	34		
	7.3	Potential Future	Facility Feedstock	34		
8	Capa	city Modelling and	d Infrastructure Sizing	37		
9	Mark	et Sounding		39		
	9.1	Stages of the Ma	rket Sounding	39		
	9.2	Participants		39		



		9.2.1 Questionnaire	40
	9.3	Summary of Responses on the NRRP Master Plan	41
	9.4	Summary of Responses for the WtE Facility	42
	9.5	Summary of Responses for the MRF	44
10	Site N	Master Plan	46
		Best Practice Design Principles	
		Development	
		·	
		Waste to Energy facility	
		10.4.1 Entry and Exit	
		10.4.2 Tipping Hall & Bunker	48
		10.4.3 Combustion Line & Electricity Generation	49
		10.4.4 Incinerator Bottom Ash Treatment Plant	
		10.4.5 Flue Gas Treatment	49
	10.5	Community Recycling Centre	50
		10.5.1 Entry and Exit	50
		10.5.2 Kiosk	50
		10.5.3 Reuse Shop, Administration & Education Centre	50
		10.5.4 Household Hazardous Waste Shed	51
		10.5.5 Hardstand Area	51
		10.5.6 Multi-Tier Drop-off Facility	52
	10.6	Materials Recovery Facility	52
		10.6.1 Entrance and Exit	52
		10.6.2 MRF Building	52
	10.7	Waste Transfer Station	54
		10.7.1 Entrance and Exit	54
		10.7.2 WTS Building	54
	10.8	Battery Storage	55
	10.9	Northern Expansion Area	56
11	Cost	Estimates	57
		Cost Estimate Methodology	
		Summary of Cost	
		Division of Costs	
	11.4	Below the Line Costs	60
		11.4.2 Limitations and Exclusions	60



12	Appr	ovals Pa	ath Mapping	61
	12.1	Enviro	nmental Approvals	61
		12.1.1	EPA Referral	61
		12.1.2	DWER Works Approval and Licence	64
		12.1.3	DWER Appeals	67
		12.1.4	Clearing	67
		12.1.5	EPBC Act Referral for Matters of National Environmental Significance	68
	12.2	Plannir	ng Approvals	68
		12.2.1	Zoning	68
		12.2.2	Land Use Classifications & Permissibility	69
		12.2.3	Development Assessment Panel Application	72
		12.2.4	Planning Appeals	72
		12.2.5	Public Works Exemptions	72
	12.3	Timefr	ames	73
	12.4	NRRP A	Approvals Pathway	74
13	Proje	ct Deliv	ery Model	75
	13.1	Land O	Dwnership	76
			vals	
	13.3	Capital	Funding	77
	13.4	Facility	Design & Construction	77
	13.5	Facility	Operation	77
	13.6	Waste	Supply	78
	13.7	Summa	ary of Preferred Delivery Models	78
14	Prelin	minary 1	Timelines	80
15	Paca	, mmand	ations	92
13			nses to NRRP Master Plan	
	13.1		Vision and Design of the NRRP	
			Opportunities of the NRRP	
			Constraints/Barriers of the NRRP	
			Additional commentary	
	15 2		nses to WtE Facility	
	±↓.∠	•	Technology	
			Timeframes	
			Master Plan Feedback	
			Feedstocks and Sizing	
		±⊅.∠.→	1 CCUSCORD WITH SIZING	/



	15.2.5	Cost Estimate	F-8
	15.2.6	Project Delivery Model	F-8
	15.2.7	Energy Outputs	F-9
	15.2.8	Residues	F-9
	15.2.9	Opportunities and Constraints	F-10
15.3	Respon	ses to MRF	F-11
	15.3.1	Technology	F-11
	15.3.2	Timeframes	F-12
	15.3.3	Master Plan Feedback	F-12
	15.3.4	Feedstocks and Sizing	F-12
	15.3.5	Cost Estimate	F-13
	15.3.6	Project Delivery Model	F-13
	15.3.7	Outputs and Residues	F-14
	15.3.8	Opportunities and Constraints	F-15
Tables			
		nmunications Infrastructure on Lot 600	
		pable Areas on Lot 600	
		Overview in RAAF Pearce, WA (1941-2021)	
Table 4-2:	Average	Pan Evaporation Data for the Preferred Site in Millimetres (mm)	10
	_	e Temperature for the Preferred Site in Degrees Celsius (°C)	
Table 6-1:	Waste I	nfrastructure Prioritisation	24
Table 6-2:	Treatme	ent methods for organics recovery depending on waste composition	28
Table 7-1:	Historio	cal Population Data	33
Table 7-2:	Historic	al and Future Growth Data	34
Table 7-3:	Summa	ry of Current Waste Acceptance in Tonnes	34
Table 7-4:	Waste P	Projection by facility type in tonnes	36
Table 8-1:	Capacity	y Modelling and Infrastructure Sizing	38
Table 9-1:	Extent o	of participant involvement	40
Table 9-2:	Experie	nce and Questionnaire responses by participants	41
Table 10-1	: List of	Drawings	48
Table 10-2	: WTS D	esign Specifications	55
Table 11-1	: Summ	ary of Cost Estimate	58
Table 11-2	: Divisio	n of costs between City and Private Sector	59
Table 12-1	: Necess	sary Environmental Approvals	61



Table 12-2: R	elevant EPA Factors and Objectives	62
Table 12-3: Pi	rescribed Premises Category	65
Table 12-4: Po	otential land use classes and permissibility	70
Table 12-5: A	nticipated Timeframes	73
Table 12-6: A	nticipated Approval Pathway for each facility	74
Table 13-1: D	elivery Model Framework	79
Table 15-1: W	tE generated residue, tonnages and preferred treatment methods	F-9
Table 15-2: N	IRF output materials and potential markets	F-14
Diagrams		
Diagram 5-1:	Waste Hierarchy	18
Diagram 5-2:	Circular Economy	18
Diagram 5-3:	Waste Strategy 2030 Objectives and Targets	19
Diagram 13-1	: Project Delivery stages	76
Figures		
Figure 1: Win	d Rose for RAAF Pearce. (BOM) am (left) and 3pm (right)	10
Figure 2: Nee	rabup Structure Plan Map	71
Figure 3: NRR	P and Wangara Project Timeline	81
Appendic	ces	
APPENDIX A	Figures	
APPENDIX B	Drawings	
APPENDIX C	Drawings	
APPENDIX D	Services and Utilities Report	
APPENDIX E	Waste to Energy Strategic Advice	
APPENDIX F	Market Sounding Detailed Response Overview	
APPENDIX G	Market Sounding Questionnaire	
APPENDIX H	Further discussions with Solo	
APPENDIX I	Wangara WTS Assessment	
Drawings	;	
W-101 NRRP	Masterplan Layout	
W-102 Wast	e to Energy facility Plan	
W-103 WTS,	CRC and MRF Plan Playout	
W-104 NRRP	Masterplan Swept Paths	
S-101 HHW	Shed – Proposed Floor Plan and Typical Sections	

S-201 Multi-Tier Drop-Off floor plan and Section



- S-301 Reuse Shop Floor Plan and Section
- S-401 Typical Section Waste Transfer Shed



#### 1 Introduction

The City of Wanneroo (the City) commissioned Talis Consultants Pty Ltd (Talis) to prepare a Site Master Plan for the proposed Neerabup Resource Recovery Precinct (the NRRP) to ensure that the City's future objectives and requirements for the NRRP can be catered for (the Project). The NRRP is intended to provide much needed waste processing infrastructure within the northern suburbs and cater the City's waste streams, including recyclables, organics and residual waste including both short and longer term. Therefore, multiple waste processing facilities may be required at the NRRP including Waste to Energy (WtE), Material Recovery (MRF) and Food Organics/Garden Organics processing (FOGO). To facilitate the phasing of any development, the NRRP may also require a Waste Transfer Station (WTS) to the efficient transportation of waste longer distances to treatment facilities.

The City and Talis recognise that there is insufficient waste processing infrastructure in the north of Perth. A clear example of this is the two WTE facilities set to open in late 2024 being located within close proximity of each other in East Rockingham and Kwinana, approximately 70 kilometres south of Wanneroo. By creating a Precinct specifically for waste processing infrastructure, the City will ensure that their future waste management needs can be met locally, without having to transport waste vast distances. This will reduce the cost of transporting waste for the City as well as reducing greenhouse gas emissions and creating local employment.

The City nominated four locations within the zoned NRRP for consideration within this Master Plan including:

- Lot 502, 100 Pederick Street, Neerabup (Lot 502);
- Lot 503, 1851 Old Yanchep Road Pinjar (Lot 503);
- Lot 600, 570 Wattle Avenue, Neerabup (Lot 600); and
- Lot 801, 109 Pederick Road, Neerabup (Lot 801).

The City has recognised the importance of private industry involvement to assist with the delivery of the NRRP Master Plan vision and the delivery of key recovery and waste processing facilities. A market sounding exercise was undertaken to acquire early input from relevant industry players on the project.

As part of the works, the City also commissioned Talis to assess a variety of design options of transforming the City's old Wangara site including building into a WTS. As part of these works, Talis has prepared a variety of designs options, cost estimates and undertook a technical comparison analysis compared to delivering the WTS at the NRRP. The objective of these works is to assist the City in determining if the Wangara site is a better location for the WTS as opposed to NRRP.

# 1.1 Objective

The objective of the Project is to assess the waste infrastructure needs analysis for the City and surrounding northern suburb regions and prepare a blueprint for the development of the NRRP to ensure that the current and future resource recovery and waste management requirements can be catered for. This Master Plan aims to assist the City in determining its short- and long-term recycling and waste infrastructure requirements and direct future land use planning decisions for the NRRP.



## 1.2 Project Scope

This Site Master Plan charts out the future development of the NRRP to cater for the future Site uses and provides an implementation plan to achieve this vision. Therefore, the following details were investigated as a part of the Project Scope:

- Site Description;
- Service and Utilities Access;
- Due Diligence Assessment;
- Waste Infrastructure Needs Analysis;
- Legislative & Policy Framework;
- Waste Projections;
- Capacity Modelling and Infrastructure Sizing;
- Market Sounding;
- Site Master Plan;
- Cost Estimates;
- Approvals Path Mapping;
- Project Delivery Model;
- Implementation Plan; and
- Recommendations.

The above tasks have been complete by Talis as a part of the Project and are included in this Report.



## 2 Nominated Sites

The following sections provide an overview of the key aspects of the City's Nominated Sites, including their relative location and summarised findings of the Services and Utilities Report.

#### 2.1 Location

The four Nominated Sites are located approximately 33 kilometres (km) north of Perth within the Neerabup Industrial area and a radius of approximately 2km from the Old Yanchep Road and Pederick Street Intersection.

The locality of the City's Nominated Sites is detailed in Figure 1 (Appendix A).

#### 2.1.1 Lot 502

Lot 502 is situated at 100 Pederick Street, Neerabup 6031, as shown in Figure 2 (Appendix A) and spans 35 hectares (ha). The Nominated Site is zoned Regional Parks and Recreation under the Metropolitan Region Scheme (MRS) and not zoned under the City's District Planning Scheme No. 2 (DPS). Approximately half of the Nominated Site is currently occupied by the Pinjar Motorcycle Park which includes the Pinjar Park Speedway and the Wanneroo Motocross Club. The remaining half of the Nominated Site which is additionally zoned bush forever under the MRS has remnant vegetation that has limited disturbance to it.

The land is owned and managed by the City and is currently not licenced for waste management activities.

In discussions with the City, it was determined that Lot 502 should not be prioritised for consideration within the Project due to the existing motorsport uses at the Nominated Site and remnant vegetation.

#### 2.1.2 Lot 503

Lot 503 is Pinjar Park, a former landfill site situated at 1851 Old Yanchep Road Pinjar, 6078 as shown in Figure 3 (Appendix A). The detail of the deposited waste, extent of the filling, depth of capping are unknown. Extensive investigations would be required to determine these details which is outside the scope of this project. The Nominated Site is zoned Parks and Recreation and bush forever under the MRS and zoned General Industry under the DPS.

The land is owned and managed by the City and is currently not licenced for the acceptance, recovery and disposal of waste. This site is 25.1 hectares (ha) on a bush forever land and zoned Parks and Recreation.

Developing infrastructure on top of old landfills present a significant number of construction, environmental and health and safety risks which are generally avoid is alternative locations are available. Therefore, the use of Lot 503 has not been prioritised as part of the Project.

#### 2.1.3 Lot 600

Lot 600 encompasses approximately 47ha and situated at 570 Wattle Avenue, Neerabup, WA, 6031 as shown in Figure 4 (Appendix A).



Access to the Nominated Site is via Old Yanchep Road, which is sealed and allows vehicles to enter and exit the from the east. Trandos Road in the south is partly sealed and allows vehicles to enter and exit from the south. There is also a potential access from the west from the Orchid Road easement.

The land is owned and managed by the City and is currently not licenced for the acceptance, recovery and disposal of waste. The Lot is the City Freehold and is zoned Public Purpose – Special Use (Energy Generation). The northwestern end of Lot 600 is currently under lease by the Wanneroo International Kartway and excluded from the developable area of Lot 600. Wattle Park is situated on Lot 500 bordering the northeastern side of Lot 600 and is classed as a Type 3R Reserve.

The Zoning around Lot 600 is detailed in Figure 5 (Appendix A).

The remaining 36.8ha of the Lot 600 has not been developed and consist of sparse vegetation with a number of illegal trail bike tracks. Lot 600 has strong access routes and provides a large undeveloped land within the heart of the industrial area. It is also located adjacent to the Neerabup Power Station which provide access to the electricity grid.

In consultation with the City, Lot 600 was selected as the Preferred Site for the NRRP.

#### 2.1.4 Lot 801

Lot 801 is situated at 109 Pederick Road, Neerabup 6031 as shown in Figure 6 (Appendix A). This site is 10.3 ha and bound by Pederick Road on the north, Lot 800 on the east, Lot 901 on the south and Lot 103 on the west. This site is currently occupied by the Mindarie Regional Council's (MRC's) Resource Recovery Facility which is not operating.

This site is licenced (Licence No. L8336/2009/3) under Part V of the Environmental Protection Act 1986 to undertake a number of waste management activities, including the following Prescribed Premises Category from Schedule 1 of the Environmental Protection Regulations 1987:

• Category 67A: Compost manufacturing and soil blending – 110,000 tonnes (t) per year.

This site is own by MRC and is zoned General Industry. MRC is a regional local government entity responsible for waste processing for several Perth municipalities, serving around 750,000 people and managing 180,000 tonnes of waste annually.

Until August 2021, its Neerabup Resource Recovery Facility (RRF) processed 100,000 tonnes of waste per year, diverting over 60,000 tonnes of organic materials from residual waste through composting. With the introduction of the State's Waste Avoidance and Resource Recovery Strategy 2030 (WARR Strategy), MRC's member councils have been transitioning to kerbside organic collections (including FO, GO and combined FOGO), with collected organics currently processed by external recyclers. The use of Lot 600 is currently under review by the MRC with tenders being assessed to recycle potential FOGO materials in line with the WARR Strategy.

Recognising that MRC is currently evaluating options of repurposing the RRF through a formal tender process, the City concurred that Lot 801 should not be prioritised for consideration as part of the development of this Master Plan.



## 3 Services and Utilities Assessment

Talis was engaged by the City to develop a Services and Utilities Report for the City's proposed NRRP. Talis has undertaken a desktop investigation to determine the existing services and potential future infrastructure within the project area. The findings are presented within this report. The major infrastructure service requirements assessed include:

- Gas Pipeline: NewGen Neerabup Power Station;
- Underground and Overhead Power Lines;
- Telecommunications;
- Railway corridor; and
- Water Corporation proposed Alkimos Seawater Desalination Plant (SDP) Trunk Main.

Talis has used Before You Dig Australia (BYDA) to search for existing infrastructure adjacent the nominated sites. No site investigations, survey or service locating has been undertaken. The following recommendations are based on the information and data available at the time.

#### 3.1 Lot 600 Services

The following sections summarise the Services and Utilities Report focused on Lot 600, the Preferred Site. The full Services and Utilises Report is included in Appendix D.

#### 3.1.1 Gas

NewGen Neerabup is a joint venture partnership between Shell Energy and Energy Infrastructure Trust that owns a 330 Mega Watts (MW) open cycle gas-fired power station in Neerabup, located opposite Lot 600, south of Trandos Road. The power station is connected to the Southwest Interconnected System and operated by Infrastructure Capital Group.

Neerabup Pipeline is located within the eastern side of Lot 600, with an easement in place. This easement is about 5m wide and covers 3,056m<sup>2</sup> of the Preferred Site. Figure 7 (Appendix A) shows the Neerabup pipeline easement and other utilities in relation to Lot 600.

Developments within the proximity of the pipeline require a formal HAZID Workshop. It is recommended that all proposed development for the NRRP is situated outside the easement. However, any activity in the vicinity of the easement that might compromise the integrity of the pipeline might still need to be reviewed and approved by relevant authorities. Such activities include but are not limited to heavy vehicle movements, ground penetration vibrations and excavations.

#### 3.1.2 Telecommunications

Table 3-1 accesses the telecommunications features on and surrounding Lot 600.



Table 3-1: Telecommunications Infrastructure on Lot 600

Services	Description
NBN <sup>TM</sup>	NBN <sup>TM</sup> owns underground services along the western boundary of Lot 600, as well as a 100mm PVC conduit that extends from the Wanneroo International Kartway in a south-east direction for about 334.3m terminating in the middle of Lot 600. This conduit needs to be physically located on site and either avoided or relocated prior to any construction.
Optus	There are underground Optus Fibre Optic Telecommunication assets (Optus cables in other utility conduit) along the eastern boundary of Lot 600, under Orchid Road.
Telstra	There are some Telstra cables and pits on the east, south and west sides of the site. The Telstra cables along the eastern boundary appears to be within Lot 600 boundary.
TPG Telecom (WA)	There are Pipe Networks Pit and Duct at the north-west and south-west corner of Lot 600.

#### 3.1.3 Water

There are no existing Water Corporation assets inside or surrounding the Preferred Site.

A future underground water Trunk Main is proposed to convey drinking water from the proposed Alkimos SDP to Wanneroo. The preferred alignment for the proposed underground pipeline passes along Old Yanchep Road on the east side of Lot 600.

#### **Water Supply**

The closest existing point for water supply connection is 2.2 km to the southwest at the corner of Mather Driver and Peak Road.

The future Alkimos Seawater Desalination Plant (SDP) Trunk Main could potentially provide the nearest water supply connection to Lot 600, with production expected to begin in 2028.

#### **Wastewater Disposal**

An on-site wastewater disposal system will be required for Lot 600. The closest wastewater connection point is located approximately 3km south of Lot 600 within the residential development in the northern part of Banksia Grove.

#### 3.1.4 **Power**

Western Power owns the following infrastructure within the vicinity of Lot 600:

- Overhead transmission cables on the western and southern boundaries; and
- Underground high voltage distribution cables next to the eastern boundary.

In addition to the services noted above, Western Power has restriction zones either side of the overhead power lines as following:



- 35m either side of the transmission power lines along Trandos Road; and
- 10m either side of the transmission power lines along Orchid Road.

Restriction zones shall be avoided during all construction activities. This means that besides roads no structures can be built within the restriction zones.

#### 3.1.5 Transport

As a part of the proposed Neerabup Industrial Area Structure Plan No. 17 (Neerabup Structure Plan) (Taylor Burrell Barnett, 2020) for the area, a 55m easement has been allocated to future rail corridor. The proposed alignment for the railway passes through Lot 600 in an east-west direction, from Old Yanchep Road to Orchid Road. The Public Transport Authority (PTA) has advised that 100m zone of influence either side of the proposed alignment must be considered. The easement and zone of influence basically split Lot 600 in two, leaving northern and southern areas.

#### **Access**

Lot 600 is currently accessible for B-Double trucks through Old Yanchep Road with no conditions. Neither Trandos Road nor Orchid Road are currently accessible for B-Double trucks.

However, Orchid Road and Trandos Road are proposed to undergo future upgrades as parts of the City's Long Term Financial Plan (LTFP) to accommodate for RAV 7 heavy vehicles, which would permit B-Doubles. In this case, access to Lot 600 from Old Yanchep Road, Trandos Road and Orchid Road will be possible.

#### **Existing Services on Plan**

Figure 7 (Appendix A) shows all the existing known services and proposed rail corridor on and around Lot 600.

#### 3.1.6 Developable Area

Given the services, easement and clear zone in place across and near Lot 600 an indicative area of about 13.3 ha on the north side of the rail corridor and an approximate area of 16.4 ha on the south side of the railway corridor are considered buildable for the future NRRP at this site. Figure 7 outlines the restricted and available areas on Lot 600.

Table 3-2: Developable Areas on Lot 600

Description	Area (ha)
Developable land – North of the rail corridor	11.44
Developable land – South of the rail corridor	14.46
Developable zone of influence — North of the rail corridor	1.84
Developable zone of influence – South of the rail corridor	1.95
Total Developable Area (ha)	29.69



#### 3.1.7 Summary of Services and Utilities

Four (4) nominated sites were assessed based on their existing services infrastructure, heavy vehicle networks and proposed road upgrades to the best of Talis' knowledge at the time of preparing this report. A summary of the assessment results is presented below while a more detailed information about Lot 600 is provided in Section 4:

- Lot 600 is the City's Preferred Site which includes considerable number of services and easements across the Lot. 18 ha of this Lot, separated in two sections, is considered suitable for the NRRP.
- Lot 801 is the smallest among nominated sites with minimum clashed with existing services.
   This site includes existing facilities belong to the MRC. The whole 10 ha of this Lot is considered suitable for the NRRP.
- Lot 502 is partially occupied by the Pinjar Motorcycle Park and partially covered with a bush forever land. Existing underground Telstra services pass through the middle of the Lot. Approximately 19 ha of this Lot is considered suitable for the NRRP.
- Lot 503 is a bush forever land and a former landfill site. Overhead powerlines and underground telecommunication services exist on the southern boundary of the Lot. This Lot does not seem suitable for either a WtE Facility or a GMSF, unless restrictions with bush forever land is raised.
- Based on the findings in the Services and Utilities Report it was decided that all of the facilities except the solar farm will be located on Lot 600. The other 3 sites will not be considered for further review.

The Preferred Site for the NRRP is located inside Lot 600 (Preferred Site). This is due to its size, proximity to power transmission infrastructure, and suitability for various waste management facilities make it the most appropriate choice, despite the challenges posed by existing services.

Based on the findings in the Services and Utilities Report, it was decided that all facilities, except the solar farm, will be located on Lot 600. Due to existing developments and clashes with bush forever land the other three sites will not be considered for further review.

The complete Services and Utilities Report is provided in Appendix D.



# 4 Due Diligence Assessment

To assess Lot 600 potential for the development of the NRRP, Talis undertook a Due Diligence Assessment collating information on the environmental and social values on and surrounding the Preferred Site. This assessment considered the following factors:

- Environmental Attributes:
  - o Climate;
  - Topography;
  - Geology;
  - Surface Water;
  - Hydrogeology;
  - Flora and Vegetation;
  - o Fauna; and
  - Separation Distances.
- Social Attributes:
  - o Cultural Heritage.

#### 4.1 Climate

Lot 600 is located within a region that experiences a sub-tropical climate with hot dry summers and mild wet winters. Historic weather data is typically sourced from the Bureau of Meteorology (BOM) website. The BOM's closest weather station to Lot 600 that has been recording long-term data is Pearce RAAF (Station Number: 009053), approximately 23km to the northeast. The prevailing wind direction, rain and temperature has been sourced from this data.

The local and regional climate data sources have been utilised for this evaluation, including rainfall and pan evaporation.

#### 4.1.1 Rainfall

Rainfall in the area falls during the winter months of April to October. The driest months are November to March. The mean annual rainfall for Lot 600 is calculated as 672 millimetres (mm) with the highest recorded annual rainfall of 985mm occurring in 1945. The 90<sup>th</sup> percentile rainfall year occurred in 1995 and resulted in a rainfall of 204mm. The average rainfall data from 1941 to 2021 has been provided in Table 4-1.

Table 4-1: Rainfall Overview in RAAF Pearce, WA (1941-2021)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	10	13	16	34	82	130	134	106	68	37	22	10	672
90 <sup>th</sup> Percentile	24	33	38	67	134	204	199	142	102	63	54	33	786
Highest	109	99	102	114	195	389	247	226	155	133	94	64	985

Source: BOM



#### 4.1.2 Pan Evaporation

The average daily pan evaporation rates for the Preferred Site are based on the daily rates from BOM for Perth Airport, 32km to the south. The average pan evaporation data from 1981 to 2024 has been provided in Table 4-2.

Table 4-2: Average Pan Evaporation Data for the Preferred Site in Millimetres (mm)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Daily	10.2	9.6	7.7	5.0	3.0	2.2	2.1	2.6	3.7	5.4	7.6	9.1	5.7

Source: BOM

The daily average pan evaporation ranges from 2.1mm to 10.2mm. The average annual pan evaporation for Lot 600 is calculated as 5.7mm. The mean annual pan evaporation rate is approximately 1,594mm, which exceeds annual rainfall by about 866mm.

#### 4.1.3 Prevailing Winds

Figure 1 indicates that winds are predominantly easterly in the morning (9am), changing westerly to south-westerly in the afternoons (3pm).

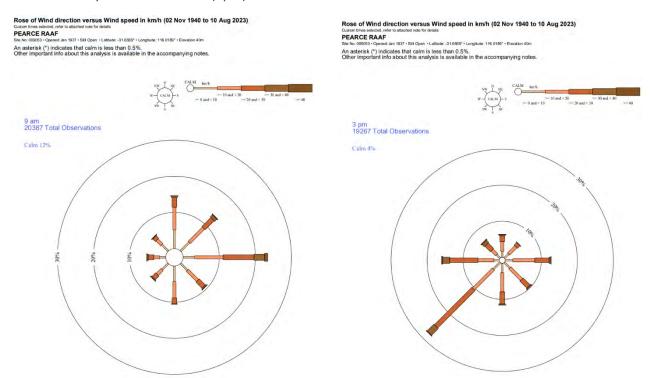


Figure 1: Wind Rose for RAAF Pearce. (BOM) am (left) and 3pm (right)

#### 4.1.4 Temperature

The average maximum and minimum temperatures for the Sit Lot 600 are sourced from the BOM weather station located at RAAF Pearce. Table 4-3 presents a summary of temperature records from 1940 to 2024.



Table 4-3: Average Temperature for the Preferred Site in Degrees Celsius (°C)

Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ave. Max.	33.6	33.4	30.6	26.4	22.1	19.0	17.9	18.5	20.2	23.6	27.4	30.7	25.3
Ave. Min.	17.0	17.6	16.1	13.3	10.7	9.3	8.4	8.2	8.8	10.2	12.6	14.7	12.2

Source: BOM

The highest average temperatures occur in January, with an average maximum of 33.6°C, and in February with an average minimum of 17.6°C. The lowest average maximum temperature occurs in July at 17.9°C with August having the lowest average minimum at 8.2°C.

## 4.2 Topography

The topography across Lot 600 does not vary significantly, with elevations ranging from 56 metres Australian Height Datum (mAHD) in the south-western corner, to 44mAHD on the eastern border of Lot 600. On average there is a 1.6% change in grade across Lot 600.

The general topography of Lot 600 is shown in Figure 8 (Appendix A).

## 4.3 Geology

Based on the published regional geology (1:50,000 Department of Mines and Industry Regulation and Safety Map of Muchea 2020), Lot 600 is located within an area of sand with a majority of Karrakatta Sand Grey phase and small parts of Karrakatta Sand Yellow phase in the south-west part of the Preferred Site.

The surface geology is shown in Figure 9 (Appendix A).

#### 4.4 Surface Water

Lot 600 is in the Swan Avon Lower Swan catchment and partially intersects the Lake Pinjar geomorphic wetland in the east. No drainage lines or other hydrological features intersect the survey area of Lot 600.

The Public Drinking Water Source Area Gnangara Underground Water Pollution Control is located 250m north of the site boundaries. A significant stream connected to Lake Pinjar, located approximately 250 meters from Lot 600, extends alongside the eastern boundary.

The Surface Water of Lot 600 and surrounding area is shown in Figure 10 while Wetlands are shown in Figure 11 (Appendix A).

## 4.5 Hydrogeology

Lot 600 is part of the Neerabup Industrial Area (NIA) which is situated within the Gnangara Groundwater System, specifically in the Wanneroo Proclaimed Groundwater Area and borders to the Gnangara Proclaimed Groundwater Area in the north, as pictured in Figure 12 (Appendix A). Groundwater in this region is managed according to the Gnangara groundwater areas allocation plan, which is currently under revision to establish new aquifer allocation limits to ensure sustainable groundwater supply and environmental management. However, current allocation limits for all groundwater sources in the Neerabup area have already been reached (GHD, 2020). Industries



planning to use groundwater in their activities need to consider water availability, with groundwater licenses and water trading managed by the Department of Water. The primary regional groundwater flow beneath the NIA is generally westward (GHD, 2020).

The anticipated maximum depth to Groundwater varies from 18 meters below ground level (mbgl) in the southwestern corner to 4 mbgl on the eastern border of Lot 600. The groundwater contour lines, detailed in Figure 12 (Appendix A), are based on publicly available data by the Department of Water and Environmental Regulation (DWER) from 2021.

Local groundwater investigations have detected elevated contaminant concentrations near the NIA, including a leachate plume from a former Pinjar landfill site. Coffey Environments Australia's 2016 investigation of the former Pinjar Landfill site revealed elevated nutrient and metal levels beneath the landfill with a notable decline in contaminant levels in down-gradient bores towards the NIA boundary. It is believed that transitioning land use in parts of the NIA from horticulture to industrial, business, and service use could reduce the leaching of nutrients and agricultural chemicals (e.g., herbicides and pesticides) into groundwater and water-dependent ecosystems (GHD, 2020).

## 4.6 Flora and Vegetation

As detailed in Figure 13 (Appendix A) the flora species on Lot 600 are:

- Outside the boundaries of the preferred Site on the premises of the neighbouring Kartway:
  - o BaMW: Banksia attenuata and B. menziesii mid woodland;
  - o BiMW: Banksia ilicifolia mid woodland.
- Inside the boundaries of the preferred Site:
  - EtLMW: Eucalyptus todtiana and Nuytsia floribunda mid mallee woodland;
  - o MpMW: Melaleuca preissiana and Eucalyptus rudis subsp. rudis mid woodland.

In total there were two surveys undertaken on Lot 600:

- A targeted flora survey conducted by Eco Logical Australia (ELA) in 2013; and
- A flora and vegetation survey was conducted by James Tsakalos, Senior Environmental Scientist, during October 2020.

The vegetation condition varies from very good to degraded, with over 70% of Lot 600 and 100% of its developable area, defined in Section 3.1.6, classified as degraded. The primary factors contributing to this degradation were disturbances from weeds and vehicles, evidenced by the number of vehicle tracks observed within the survey area (Ecoscape, 2021). The vegetation condition is detailed in Figure 14 (Appendix A).

#### 4.6.1 Threatened and Priority Ecological Communities

In Western Australia (WA) 'Threatened Ecological Communities' (TECs) are defined by the WA Threatened Ecological Communities Scientific Advisory Committee and are assigned to one of four categories (Presumed Totally Destroyed, Critically Endangered, Endangered, Vulnerable). While they are not afforded direct statutory protection at a state level (unlike Declared Rare Flora under the WC Act) their significance is acknowledged through other State environmental approval processes (i.e., Environmental Impact Assessment process pursuant to Part IV of the *Environmental Protection Act 1986*). Priority Ecological Communities (PECs) are ecological communities that are under consideration for listing as a TEC, but do not yet meet the criteria. The PEC is placed into a Priority Rating between 1-5 that ranks the PEC based on known occurrences, threats and management of the community.



The DBCA database search within Lot 600 revealed:

- TECs within the majority of the area;
- Environmentally Sensitive and Bush Forever Areas partially intersects the eastern boundary and covers areas of the neighbouring Kartway and surrounding land on the east and northwest.

Due to the degraded condition of the entire vegetation on the Preferred Site and the good to very good condition of vegetation in the neighbouring areas it can be said concluded that the vegetation within the Preferred Site is of low significance. The location of TECs, Environmentally Sensitive & Bush Forever Areas is provided in Figure 15 (Appendix A).

#### 4.6.2 Threatened and Priority Flora

The survey by Eco Logical Australia did not record any Threatened or Priority Flora within the survey area (Ecoscape, 2021). Prior to the flora and vegetation survey a desktop assessment undertaken by Ecoscape (Australia) Pty Ltd (Ecoscape) identified the likelihood of four conservation-listed flora to occur within the survey as 'Possible'. The flora and vegetation survey, conducted by James Tsakalos, Senior Environmental Scientist, during October 2020, identified no threatened Flora under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) or the Western Australian Biodiversity Conservation Act (BC Act). Additionally, no Priority-listed flora was found. Post-survey, the likelihood of four initially possible conservation-listed flora occurring in the area was revised to unlikely due to vegetation condition, grazing, weeds, and other disturbances. The nearest threatened species is located 2.59 km away, and the nearest priority species, classified as priority 2, is 2.34 km from Lot 600. Figure 16 (Appendix A) details the threatened and priority flora near Lot 600.

#### 4.7 Fauna

The desktop assessment undertaken by Ecoscape indicated that, based on habitat requirements, the following species were considered to have a high likelihood of occurring in the survey area:

- Carnaby's Cockatoo;
- Forest Red-tailed Black Cockatoo;
- Quenda; and
- Western Brush Wallaby (Ecoscape, 2021).

The habitat suitable to support these species was targeted during the field survey. The fauna survey conducted in October 2020 recorded a total of 18 vertebrate fauna species within the survey area (Ecoscape, 2021). No conservation-listed fauna was recorded, other than the Rainbow Bee-eater, which is EPBC-listed as Marine. However, the Banksia Woodland within the survey area has suitable habitat for conservation-listed species such as Black Cockatoos and Quenda. The habitat quality was scored based on the Commonwealth Black Cockatoo foraging quality scoring tool (Commonwealth of Australia 2017). Two fauna habitat types were identified: Banksia Woodland and Degraded Woodland, which includes Eucalyptus todtiana, Melaleuca preissiana, and Eucalyptus rudis. Additionally, 19 Black Cockatoo breeding habitat trees were recorded, comprising three Eucalyptus marginata and sixteen Eucalyptus rudis. The area also contains foraging habitat for Black Cockatoos, assessed as 'High' and 'Very High' quality for Carnaby's and Forest Red-tailed Cockatoos, respectively. The scoring tool does not consider vegetation condition. Since the majority (70%) of the surveyed area is degraded it can be said that the overall significance is substantially lower than the scoring tool might imply.



Based on Landgate data, the nearest threatened species was recorded 167 meters north, and a Priority 4 species was found 639 meters southeast of the Preferred Site. The threatened and priority Fauna in and around the Preferred Site is detailed in Figure 17 (Appendix A).

## **4.8** Separation Distances

Lot 600 is located approximately 9 km north of the Wanneroo townsite in a public purposes zone surrounded by parks and recreation zones in the northeast to west and industrial zones to the south and southwest. Bordering north of the neighbouring Kartway and 2km east of the Preferred Site there are zones of State forests as pictured in Figure 18 (Appendix A).

The WA Environmental Protection Authorities (EPA's) Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses (2005) (Guidance Statement 3) contains the recommended minimum separation distances between industrial activities, including waste management facilities and sensitive land uses. Sensitive land uses are defined as those that are sensitive to industrial emissions and include residential developments, schools, hospitals, shopping centres and other public areas and buildings.

However, for WtE facilities those distances do not apply. The 'Report and recommendations of the Environmental Protection Authority and the Waste Authority - Environmental and health performance of WtE technologies' (2013) recommends WtE plants should be located in current or future industrial zones with sufficient buffer distances from sensitive receptors. It is essential to maintain buffer integrity throughout the plant's operational lifespan. For further information on WtE Strategic Advice please refer to Section 0. The recommended minimum separation distances between single residences and the potential industry activities for the Preferred Site is 1km.

The closest rural residential housing is located approximately 960m to the north of the Preferred Site. The next nearest sensitive receptor is 1.17km to the southeast. The Separation Distances and Sensitive Receptors are shown in Figure 18 (Appendix A), while zoning surrounding Lot 600 is shown in Figure 5 (Appendix A).

Lot 600 has significant separation distances to sensitive receptors and will be able to satisfy the relevant requirements from the EPA. This is discussed further in Section 9.

## 4.9 Cultural Heritage

A search for relevant Aboriginal Heritage sites was conducted using the Department of Aboriginal Affairs (DAA) online Aboriginal Heritage Inquiry System (AHIS). This search identified two Aboriginal Cultural Heritage (ACH) Places close to Lot 600:

- The lodged place Lake Neerabup, ID number 3693, classed as culturally sensitive and located approximately 2km west of the current prescribed premises boundary;
- The registered heritage place Honey Possum Site, ID number 3503, classed as not culturally sensitive and located approximately 2.3km west of the current prescribed premises boundary.

A search within the Local Heritage Survey found the heritage site Albert Thomas House approximately 2km east of Lot 600.

The Heritage sites are shown in Figure 19 (Appendix A).



## 4.10 Summary

This section evaluated the suitability of Lot 600 for developing waste infrastructure based on environmental and social attributes. The Preferred Site is deemed suitable for the NRRP due to the following reasons:

- Environmental Attributes and Regulatory Compliance: The Preferred Site's characteristics and regulatory adherence support its suitability for the proposed land use changes, promoting sustainable groundwater management and minimising ecological impacts;
- Lack of Significant Ecological Constraints: The presence of degraded vegetation and fauna habitats reduces ecological limitations; and
- Compliance with Separation Distance Guidelines: Adherence to these guidelines ensures minimal impact on sensitive land uses.



# **5** Legislative & Policy Framework

It is critical that the Site Master Plan conforms to any relevant National, State and local legislation, policies and standards with regards to the relevant waste infrastructure that are proposed for the NRRP.

#### 5.1 National

#### 5.1.1 National Waste Policy

The National Waste Policy – Less Waste, More Resources was released by the Department of the Environment and Energy in 2018 and provides a framework for collective action by businesses, governments and communities and individuals until 2030.

The policy identifies five overarching principles underpinning waste management in a circular economy, including:

- Avoid waste;
- Improve resource recovery;
- Increase use of recycled material and build demand and markets for recycled products;
- Better manage material flows to benefit human health, the environment and the economy;
   and
- Improve information to support innovation, guide investment and enable informed consumer decisions.

The policy guides continuing collaboration between all Australian governments, businesses and industry. It does not remove the need for governments, businesses and industries to implement tailored solutions in response to local and regional circumstances.

#### 5.1.2 Emissions Reduction Fund

The Emissions Reduction Fund aims to reduce emissions by providing incentives for businesses, landowners, state and local governments, community organisations and individuals to adopt new practices and technologies. Legislation to implement the Emissions Reduction Fund came into effect on 13 December 2014.

There are many activities which are eligible to earn Australian Carbon Credit Units (ACCUs) under the scheme. One ACCU is earned for each tonne of carbon dioxide equivalent (tCO2-e) stored or avoided by a project. ACCUs can be sold to generate income, either to the Government through a carbon abatement contract, or on the secondary market.

The potential waste management activities that may earn ACCUs as part of the Emissions Reduction Fund are alternative treatment of organic waste (i.e. composting as opposed to landfilling), the diversion of residual waste from landfill through WtE as well as capture and combustion of landfill gas. Councils and/or private industry that undertake these types of projects in accordance with the approved emissions reduction methods can then sell the resulting ACCUs to the Clean Energy Regulator or an alternate buyer on the secondary market.



#### 5.2 State

The WA State framework consists of legislation, development plans, strategies and guidelines which steer the management of waste. The main legislative documents describe the requirements for transporting, storing, processing, managing, recovering and disposing of recyclable and waste material.

#### 5.2.1 Waste Avoidance and Resource Recovery Act 2007

The Waste Avoidance and Resource Recovery (WARR) Act 2007 is Western Australian State Legislation that came into effect in June 2008. The objectives of the WARR Act are "to contribute to the sustainability, and the protection of human health and the environment, in WA and the move towards a waste-free society by:

- Promoting the most efficient use of resources, including resource recovery and waste avoidance;
- Reducing environmental harm, including pollution through waste;
- The consideration of resource management options against the following hierarchy:
  - Avoidance of unnecessary resource consumption;
  - o Resource recovery (including reuse, reprocessing, recycling and energy recovery); and
  - o Disposal."

The WARR Act 2007 establishes the Waste Authority and its duty to "advise and make recommendations on the regulation of waste services," which includes the avoidance of waste generation and increased resource recovery. To carry out this duty, the Waste Authority is required to prepare a waste strategy.

#### **5.2.2** Waste Avoidance and Resource Recovery Strategy 2030

The Waste Avoidance and Resource Recovery Strategy 2030 (Waste Strategy 2030) was published in February 2019 and outlines a vision for WA to "become a sustainable, low-waste, circular economy in which human health and the environment are protected from the impacts of waste."

The Waste Strategy 2030 has three guiding concepts:

- Waste hierarchy;
- Circular economy; and
- Behaviour change.

The Waste Hierarchy (Diagram 5-1) is an internationally accepted principle used to guide decision making surrounding waste management. It identifies waste management options in order of preference, with the most preferred options located at the top of the hierarchy. Avoiding the generation of waste is the highest priority, followed by various methods of recovery or reprocessing before waste is disposed.





Diagram 5-1: Waste Hierarchy

A circular economy (Diagram 5-2) is an alternative to a traditional "take, make, use, dispose" economy that aims to retain materials in the economy for as long as possible. This is achieved by reusing and recovering materials as well as extracting energy from waste as set out in the waste hierarchy.



Diagram 5-2: Circular Economy

The Waste Strategy 2030 aims to change waste management behaviours through a combination of knowledge, infrastructure, and incentives. It states that knowledge is important for starting behaviour changes but must be complemented with incentives to ensure that the decision to change behaviours can be acted upon.

It also asserts that it is critical to have the appropriate infrastructure to facilitate behaviour changes. This includes having the facilities necessary to manage and process the different categories of waste that result from behaviour changes.

The Waste Strategy 2030 has used these three guiding concepts to develop overarching targets for WA under three objectives, "Avoid", "Recover" and "Protect" (Diagram 5-3). It states that local solutions are particularly important to achieve a circular economy and that WA has an opportunity to benefit from greater local recycling activity.



Avoid	Recover	Protect				
Western Australians generate less waste.	Western Australians recover more value and resources from waste.	Western Australians protect the environment by managing waste responsibly.				
<ul> <li>2025 – 10% reduction in waste generation per capita</li> <li>2030 – 20% reduction in waste generation per capita</li> </ul>	2025 – Increase material recovery to 70%     2030 – Increase material recovery to 75%     From 2020 – Recover energy only from residual waste	2030 – No more than 15% of waste generated in Perth and Peel regions is landfilled     2030 – All waste is managed and/or disposed to better practice facilities				

Diagram 5-3: Waste Strategy 2030 Objectives and Targets

The proposed site development will assist the City in achieving these overarching targets and provide a key local waste management point for residents within the City.

#### 5.2.2.1 Consultation Draft May 2024

The Consultation Draft Waste Strategy (Draft Strategy) was released in May 2024 as part of the State Waste Strategy review process. The Draft Strategy outlines a comprehensive approach to waste management that aligns with the principles of the circular economy and addresses climate change. It aims to:

- reduce the generation of waste per capita by 10% by 2030, emphasising the importance of minimising waste at the source;
- achieve a 75% recycling rate for all waste by 2030:
  - o Increasing recycling rates for organic waste, plastics, and e-waste; and
  - o Implementation of bottom ash recycling from WtE.
  - o Reducing the disposal of organic waste to landfill by 50% from 2019-20 levels by 2030;
- enhance recycling infrastructure and industry development to support the entire lifecycle of
  waste management, from collection and processing to creating markets for recycled
  products. This includes investing in advanced recycling technologies, supporting research
  and development projects, and fostering partnerships between government, industry, and
  community organisations;
- emphasise the role of waste management in reducing greenhouse gas emissions and supporting broader climate goals; and
- enhance data collection and monitoring of waste streams to enable better planning and implementation of waste management practices.

The Waste Strategy 2030 emphasises WtE as a method for recovering energy from residual waste and integrates it into a broader waste management framework. The Draft Strategy acknowledges WtE but shifts the focus towards reducing waste generation, improving recycling rates, and considering the environmental impact of waste management practices, including the contribution of WtE to greenhouse gas emissions. The Draft Strategy mentions 164,500 tonnes of WtE capacity is required in addition to the 760,000 tonnes already anticipated from the two upcoming facilities (see Section 6.1.1).

Regarding organics recovery, the 2019 Strategy set initial targets for reducing organic waste to landfill and increasing material recovery, focusing on the rollout of FOGO systems. The Draft Strategy introduces new targets based on the successful implementation in several LGAs.



For MRFs, the 2019 Strategy focused on establishing a recycling infrastructure support program to enhance material recovery. The Draft Strategy, however, provides more detailed plans for infrastructure support and market development. It includes funding programs and initiatives to develop the recycling industry, aiming to enhance the capacity and efficiency of recycling processes.

In terms of targets and goals, the 2019 Strategy set broad objectives for waste reduction, resource recovery, and landfill diversion. The Draft Strategy, however, introduces more specific and ambitious targets, particularly for organics recovery and recycling rates, and includes a stronger emphasis on achieving environmental outcomes such as reducing greenhouse gas emissions. This shift reflects a broader and more detailed approach to waste management that not only focuses on recovery metrics but also on the overall environmental impact.

## **5.2.3** WA Composting Guidelines

The DWER Guideline: Better practice organics recycling 2022 (WA Composting Guidelines) provides guidance on the appropriate environmental management of organics processing facilities. The guidelines adopt the contamination thresholds outlined the Australian Standard AS4454-2003 Composts, soil conditioners and mulches for assessing the quality of raw mulch, pasteurised product or compost produced at the organics facility. The scope of guidelines is as follows:

- define clearly the environmental issues that affect the management of composting and related organics processing facilities;
- outline the regulatory framework;
- identify objectives, design requirements, performance requirements and performance measurements for dealing with each issue;
- identify the benchmarks used for measuring and monitoring performance;
- outline the types of issues that should be considered when planning composting and related organics processing facilities; and
- identify possible environmental management techniques.

As part of the works for the development of Project, due regard has been given to the WA Composting Guidelines for organic facilities.

#### 5.2.4 WtE Strategic Advice

In 2013, the EPA and Waste Authority published a strategic advice titled "Environmental and health performance of WtE technologies" (WtE Strategic Advice) as requested by the Minister for Environment under Section 16(e) of the Environmental Protection Act 1986. The advice is based on a technical review of WtE plants around the world by WSP Environment and Energy Ltd investigating:

- legislation for the establishment and operation of WtE facilities, focussed on emissions, in jurisdictions where these facilities currently exist;
- current emissions from established and operating best practice facilities; and
- current and historical level of compliance of these facilities.

As a result, the EPA formed two conclusions and 21 recommendations which are summarised in the following principles:

Only proven technology components should be accepted for commercially operating WtE plants;



- The expected waste input should be the main consideration for the technology and processes selected;
- Proposals must demonstrate best practice that, at a minimum, meets the European Union's Waste Incineration Directive standards for emissions at all times;
- The waste sourced as input must target genuine residual waste that cannot feasibly be reused or recycle;
- Continuous emissions monitoring must occur where feasible, and non-continuous emissions monitoring must be required for all other emissions of concern;
- Residual by-products must be properly treated and disposed of to an appropriate landfill, except where it is demonstrated that they can be safely used elsewhere with acceptable impacts to the environment or human health.

The 21 recommendations are provided in Appendix E.

As part of the works for the development of the Project, the WtE facility should be sited and designed with due regard given to the WtE Strategic Advice.

#### **5.2.5** State Waste Infrastructure Plan

The State Waste Infrastructure Plan 2024 (Infrastructure Plan 2024) is a strategic framework designed to address WA's waste management needs. It aligns with the Waste Strategy 2030, aiming to reduce waste, increase recycling, and support a circular economy. The plan identifies future infrastructure requirements, risks, and investment priorities, adapting to technological, market, and societal changes.

The goals for the Perth Area include:

- Increasing Waste Recovery Rates: By 2030, Perth aims to boost its materials recovery rate from 66% to 82%, and its overall resource recovery to 92%, minimising landfill use.
- Development of WtE facilities: An additional 164,500 tonnes per year capacity is required beyond the two facilities already in construction.
- Enhancing Organics Recovery: Upgrading facilities to handle FOGO is essential for reducing greenhouse gas emissions and meeting recovery targets. An additional 100,000 tonnes per year capacity needed.
- Expanding MRF capacity: An additional 100,000 tonnes per year capacity needed.
- Establishing Strategic Waste Precincts: Investigating new waste precincts in northern and southern Perth will facilitate facility development and improve regional accessibility.
- Improving Waste Transport and Consolidation Infrastructure: Enhancing transport to and from waste facilities and developing consolidation infrastructure in northern Perth will enable efficient waste transfer.
- Addressing Cardboard and Paper Recovery: A new cardboard and paper recovery facility will
  meet recovery targets and address the fibre export ban, with contingency plans for
  processing needs.
- Enhancing Contingency Planning: Improved contingency planning will mitigate capacity risks, ensuring effective waste management during unexpected closures or disasters.

The NRRP will significantly advance the targets set in the Infrastructure Plan 2024 by creating a Strategic Waste Precinct that will either greatly increase or fully meet the capacity for WtE, MRF, and organics recovery. Talis was involved in the Waste Infrastructure Needs Analysis Report which provided the data analysis that fed into the State Waste Infrastructure Plan. All modelling works



where based on the achievement of the waste avoidance (20% reduction) and material recovery targets. This significantly impacts the volume of residual waste remaining as well as overestimates that recycling (including the MRF and Organics) infrastructure required.

### 5.3 Local

### **5.3.1** City Framework

The City framework consists of legislation, development plans, and strategies designed to guide development and service provision within the region, including waste management. The DPS, together with the Local Planning Strategy, forms the overarching strategy to provide a coordinated approach for future actions within the region whilst the City's Waste Local Law 2016 sets out the legislative framework and strategies to manage waste services effectively. This framework ensures that the City's development aligns with its long-term goals and community needs.

The DPS aims to control and guide land use and development to enhance community welfare and maintain environmental quality. This scheme is fundamental in planning and zoning, influencing how land can be used and what types of development are permissible.

The City's Community Strategic Plan 2017/18 – 2026/27 outlines several key vision areas, including:

- Civic Leadership;
- Healthy, Safe, Vibrant, and Connected Communities;
- A Strong Local Economy; and
- A Valued Natural and Built Environment.

Within these vision areas, the sustainable management of resources, economic development, and collaboration with the resource sector are key priority themes.



# **6** Waste Infrastructure Needs Analysis

The primary driver for expanding the waste infrastructure in the north is population growth, with Wanneroo being the fastest-growing local government area (LGA) in Perth and providing easier access to waste infrastructure for the suburbs north of Perth. Waste infrastructure must adjust to this change in demographics and careful placement of these facilities is required to ensure that there is adequate access to facilities near the source of the waste generation. Two central factors of improving local waste infrastructure are proximity/accessibility and resource recovery. This section addresses the critical need for enhanced waste management infrastructure in the northern suburbs, specifically focusing on the City and its surroundings.

The northern suburbs are lacking in waste infrastructure on different levels. Currently two thirds of Perth's MRFs and all of its WtE facilities are located south of the river. Having waste infrastructure close by and visible for the local residents is beneficial for the following reasons:

- Reduced Transportation Costs: Lower fuel, maintenance, and labour expenses due to shorter travel distances for waste collection vehicles;
- Environmental Benefits: Decreased greenhouse gas emissions and fuel consumption, contributing to a smaller carbon footprint;
- Increased Efficiency: Quicker turnaround times for waste collection vehicles, allowing for more efficient and improved collection service;
- Higher Recycling Rates: Easier implementation and promotion of local recycling programs, leading to increased diversion of waste from landfills;
- Economic Benefits: Job creation and economic stimulation through local employment and related business growth;
- Community Engagement: Opportunities for public education on recycling processes and environmental responsibility.

As stated in the WA State Waste Infrastructure Plan (2024) there is particular need for the following waste infrastructure in the Perth region:

- MRF: at least 33,000 tonnes of additional procession capacity;
- Organics: high demand for low-risk organics recovery facilities; and
- WtE: with the two emerging plants in the south, there is high demand for a plant in the north.

This is supported by the following goals and targets of the Waste Avoidance and Resource Recovery Strategy 2030 – Consultation draft (Waste Authority, May 2024):

- Recover energy only from residual waste;
- No more than 15% of waste generated in Perth and Peel is landfilled; and
- Increase the recycling rate to 75%.

A more detailed summary of the Waste Avoidance and Resource Recovery Strategy 2030 and WA State waste infrastructure plan (2024) is provided in Section 5.

To identify the most pressing infrastructure requirements, the necessary processing facilities have been categorised by priority levels: high, medium, and low. This prioritisation will guide the allocation of resources to the most critical areas, ensuring maximum environmental and community benefits.



The facilities classed as high priority are all either publicly or privately owned and operated major facilities which are of significant importance to the local waste infrastructure. They form the first step of waste processing in the NRRP treating the City's waste requirements. The medium and low priority facilities are all smaller privately operated facilities which in some instances rely on the high priority facilities for feedstock. They form the second processing step and accept waste that has been presorted by the high priority facilities.

Various modular resource recovery facilities will be needed to enable the local recycling of different materials. This ensures that separated recyclable waste streams from the MRF and WTS can be recycled in immediate proximity. The MRF will produce a variety of recyclable products including plastics, glass, paper and metals which will be recycled into new products.

In collaboration with the City, the following ranking of waste infrastructure as shown in Table 6-1 was determined, which help guide the Master Plan development.

Table 6-1: Waste Infrastructure Prioritisation

High Priority		Medium and Low Priority			
1.	Waste to Energy;	1.	Tyres;	10. Education Centre;	
2.	Materials Recovery	2.	CDS;	11. Training Centre; and	
	Facility;	3.	Plastics;	12. Data Centre.	
3.	Organics (FO, GO and/or	4.	Glass;	13. Textiles;	
	FOGO);	5.	Solar Panel	14. Bicycles;	
4.	Solar Farm*;		recycling;	15. Reuse Shop and Repair	
5.	Battery Storage and	6.	Mattresses;	Café;	
	Substation;	7.	R&D/Microfactory	16. Construction and	
6.	Community Recycling Centre; and	8.	Enabling and support:	Demolition Waste (C&D); and	
7.	Waste Transfer Station;	9.	Weighbridge;	17. Wood waste as a fuel.	

Note: \*The Solar Farm would be placed on Lot 503 if suitable as per Section 3.1.7.

## **6.1** Waste to Energy

WtE is a sustainable waste management process that involves the conversion of non-recyclable waste materials (residual waste) into usable forms of energy, such as electricity, heat, or fuel. This process not only reduces the volume of waste destined for landfill but also provides a renewable source of energy.

There are several methods of WtE conversion, including:

#### • Thermochemical Conversion:

- Incineration: Burning waste materials to produce heat, which is then used to generate steam and produce electricity. This is the most common method for large scale energy recovery from residual waste.
- Gasification: Gasification is a thermochemical process that converts organic material into syngas (a mixture of hydrogen, carbon monoxide, and carbon dioxide) by reacting it at high temperatures with a controlled amount of oxygen or steam. The resulting



syngas can be used for electricity generation, heating, or as a feedstock for producing chemicals and fuels.

- Pyrolysis: Decomposing organic materials at high temperatures in the absence of oxygen to produce liquid or gaseous fuels like biochar, bio-oil, and syngas.
- Carbonisation: Carbonisation is a specific type of pyrolysis that focuses on converting organic material into carbon-rich char. This process involves heating the material in the absence of oxygen, resulting in a high-carbon product used for energy, soil improvement, or as a filtration medium.
- Plasma processing: Utilises extremely high-temperature plasma to generate heat, fuels, and various products, such as metals and construction materials, while also producing some emissions.
- **Biochemical Conversion**: Biomass can be converted into energy by biochemical processes, including fermentation and anaerobic digestion as discussed in Section 6.3.

WtE technologies offer several benefits, including:

- Reduction of Landfill Use: By diverting waste from landfills, WtE helps to minimise the environmental impact associated with waste disposal.
- Energy Generation: WtE provides a renewable source of energy, helping to reduce reliance on fossil fuels and contributing to energy security.
- Greenhouse Gas Reduction: Properly managed WtE processes can significantly reduce greenhouse gas emissions compared to traditional waste disposal methods.

Incineration has been chosen as the most appropriate WtE technology for this project over other methods due to its availability, proven track record, and cost-effectiveness. Based on these factors, incineration is the preferred technology adopted in Australia for all proposed WtE facilities to date for the processing of residual waste. It is the most established method for large-scale energy recovery from residual waste, with many regions having already approved facilities, streamlining regulatory compliance. The well-developed technology and infrastructure lead to lower capital and operational costs compared to newer technologies like gasification or plasma processing.

Additionally, incineration plants can handle large volumes of waste efficiently, making them suitable for high waste generation areas. The existing infrastructure and expertise ensure effective management and maintenance, reducing operational risks. While incineration handles residual waste effectively, it is essential to prioritise waste avoidance and reduction strategies to decrease the overall waste volume, enhancing efficiency and aligning with sustainability goals.

While incineration helps reduce the volume of waste and provides a source of renewable energy, it also produces emissions and residues that need to be carefully managed to minimise environmental and health impacts. Advanced air pollution control technologies, as discussed further in Section 10.4, play a crucial role in ensuring that emissions from incineration plants meet stringent regulatory EU-standards. The EU-standards have been adopted in Australia including in the WtE Strategic Advice commissioned by the EPA and Waste Authority which are discussed in Section 5.2.4.

#### **6.1.1** Existing facilities

The two existing WtE facilities which are currently under the latter stages of construction and commissioning, are located within 7km of each other in the southern suburbs of Perth and



approximately 70km south of Wanneroo. The electricity generated by the two facilities will be fed into the public grid.

The Kwinana WtE facility (Kwinana WtE), located at Lot 9501 Leath Road, Kwinana Beach, is expected to commence operations by the end of 2024. This facility is fully owned by Acciona Pty Ltd and will be operated by Veolia who will also deliver waste tonnages to the facility. Keppel Seghers has been the EPC Contractor on the project. Once operational the Kwinana facility will process up to 460,000 tonnes of residual waste and generate 38 MW per hour (MW/h) of electricity.

The East Rockingham WtE facility (Rockingham WtE), located at 26 Office Road, East Rockingham, WA 6168, is expected to begin operations by the end of 2024. This facility is owned by a partnership between Acciona and the John Laing Group. The facility will be operated by Veolia who will also deliver waste tonnages, Hitachi Zosen Inova (HZI) has been the EPC Contractor on the project. Once operational the East Rockingham facility will process up to 300,000 tonnes of residual waste and generate 29 MW/h.

## **6.2** Materials Recovery Facility

MRFs are critical components of modern waste management systems, enabling the efficient sorting and processing of recyclable waste. They use a number of methods to separate recyclables including:

- Manual sorting;
- Screens;
- Trommels;
- Air classification;
- Magnets and eddy current separators;
- Optical sorting; and
- Al-powered robotic sorting systems.

These processes separate the input material into fractions which can then be further processed into the input for manufacturing of new products at external businesses. The fractions generally include:

- Plastics:
  - o HDPE;
  - o PET;
- Aluminium;

- Steel;
- Glass;
- Clean Paper and Cardboard; and
- Residues and Contaminants.

Currently, there is no operational MRF in the northern suburbs. Recyclable waste from the City is processed at the Bibra Lake Resource Recovery Park, located approximately 50 km from Wanneroo. The closest operational MRF to Wanneroo is, Cleanaway's facility located in Guilford about 30 km away. This facility has sufficient capacity to process up to 200,000 tonnes of recyclable waste annually.

### 6.3 Organics

Organic waste is commonly divided in food organics (FO) and garden organics (GO). The City is currently only recovering GO while FO is collected within residual waste. The two waste streams can either be collected together or separate. The chemical and physical properties of the materials differ significantly, especially in terms of moisture content, porosity and structural stability. The most



suitable treatment option depends on these properties, as shown in Table 6-2. There are three general treatment options for organics:

- Composting is defined as the biological decomposition and stabilisation of organic substrates under aerobic and thermophilic (>45°C) conditions to produce a product that is stable, free of pathogens and plant seeds, and can be beneficially applied to land.
  - Vermicomposting: This method utilises earthworms to decompose organic waste into nutrient rich worm compost. Vermicomposting requires a higher level of management and is less forgiving than other composting methods. In Australia only one large scale application remains operational out of the four that were initially initiated.
  - Static Pile Composting (SP): This method involves creating large piles of organic material, occasionally turned using heavy machinery like tractors and often covered with fabric to minimise heat and moisture loss. It involves low start-up costs, good moisture retention, simplicity, and reduced maintenance. However, composting may be uneven and might not reach temperatures needed to break down certain materials.
  - Static Aerated Process Composting (SAP): This method combines aerobic and anaerobic decomposition to efficiently break down organic waste. It uses air ducts or forced air to support oxygen-loving microbes, maintains a balance of green (nitrogen-rich) and brown (carbon-rich) waste layers, and controls moisture and temperature to optimise microbial activity. Periodic turning introduces oxygen, while leachate is managed to prevent pollution. The result is a stable, nutrient-rich compost safe for agricultural use.
  - Mobile Aerated Floor (MAF): This method uses a static pile principle. Unlike traditional composting systems that require constant turning of the material, the MAF system aerates the compost by moving air through the pile. This design allows for precise control over the composting process, resulting in a high-quality finished product through well-defined maturation stages. Additionally, the MAF system's modular nature makes it highly adaptable to various site requirements and material processes. The method is applied by composting company C-Wise, based in Nambelup, WA.
  - Windrow composting: The waste is set up in long rows and may be covered in case of high rainfall. This method is cost-effective, flexible, and reliable for stabilising organic residues. However, it offers limited process control, leading to potential environmental issues such as odour and leachate emissions, and it is challenging in high rainfall areas without covers. Despite its higher land demand due to low throughput per unit area, its low investment and operating costs make it competitive with other options.
  - In-vessel composting (tunnel, box, vertical silo, drum): Composting in a controlled, enclosed environment speeds up the decomposition process and reduces odours. The Bunbury Harvey Regional Council (BHRC) is currently in the procurement stage for a 35,000 tonne per annum in-vessel (tunnel) composting facility.
- Anaerobic digestion: Microorganisms break down organic matter in the absence of oxygen, producing biogas and digestate. This method produces renewable energy and nutrient-rich fertiliser.
  - The **Batch method** involves adding all the organic waste to the digester at once. The process continues until the entire batch has been digested, after which the digester is emptied, cleaned, and refilled with a new batch. This method is simple and effective for smaller-scale operations or when dealing with feedstocks that do not require continuous processing. However, it may lead to intermittent production of biogas and digestate, which can be less efficient compared to continuous systems.
  - The Sequential Batch method (SBAD) is a type of batch system where organic waste is processed in a series of sequential batches. Each batch undergoes a full digestion cycle before the next is introduced. SBAD offers flexibility in handling varied feedstocks and



- simpler operational management, but it results in intermittent biogas production and requires additional space and labour for batch handling.
- The Continuous Systems method involves organic waste continuously being fed into the digester while digestate is removed simultaneously. This method provides steady biogas production and efficiency but requires careful management and higher setup costs.
- Completely mixed digesters keep the contents thoroughly stirred, ensuring uniform conditions throughout the process. Organic waste is added and digestate is removed regularly, allowing for effective handling of diverse feedstocks. The key benefits are flexibility and consistent digestion rates due to the even distribution of microorganisms. The main drawbacks include higher energy consumption for mixing and potential operational complexity.
- Plug flow digesters process solid organic waste by moving it through the digester in a linear flow pattern. Material progresses from one end to the other, experiencing different stages of digestion along the way. This method is particularly effective for high solid content feedstocks, such as garden and food waste. The advantages include efficient digestion of high solids and enhanced process efficiency. However, the system can be complex to design and maintain.
- Two-stage digesters separate the anaerobic digestion process into two distinct phases: acidogenesis and methanogenesis. This approach improves the efficiency of biogas production by allowing each phase to occur under optimal conditions. The process is particularly useful for complex feedstocks and can yield high-quality biogas. The main disadvantages include increased system complexity and higher operational costs compared to simpler digestion methods.

**Thermochemical conversion:** Biomass can be converted into energy (heat or electricity) or energy carriers (charcoal, oil, or gas) through thermochemical processes (see Section 6.1).

Table 6-2: Treatment methods for organics recovery depending on waste composition

Combustion	Composting	Anaerobic Digestion				
Wood	'					
Tree & Shrub F	runings					
Land C	learing					
	Vegetation Management					
	Park & Garden Residues					
	Mixed Garden &	Food Organics				
	Commercial Organics					
Kitchen Organics						
Food Scraps						
Increasing Moisture Content	Increase Increase	ing Porosity and Structural Stability				

## **6.4** Food Organics

According to MRC Waste Audit Report 2018, 14.5% of kerbside residual waste is food waste which could be recovered by separate collection according to the. This valuable waste stream could be used to produce compost or biogas.



When processing food waste alone, the focus is on managing its high moisture content and rapid decomposition. This requires careful moisture control to prevent odours and ensure aerobic conditions. Contaminants like plastic and packaging must be removed before composting, and temperature control is crucial for pathogen destruction. Thus, In-Vessel Composting and Anaerobic Digestion are the preferred methods when processing FO separately. The company Richgro who are processing commercial FO are understood to be selling digestate from their anaerobic digestion plant located in Jandakot, WA, to local farms.

## **6.5** Garden Organics

Compared to FO, GO has lower moisture content and higher lignin/cellulose levels, needing shredding to accelerate decomposition. Balancing carbon-rich materials (like leaves) with nitrogen-rich ones (like grass clippings) is essential for effective composting. The most cost effective and simple processing of GO is shredding and mulching. Other suitable treatment options for GO material include Windrowsor Vermicomposting, Pyrolysis and Gasification.

## **6.6** Food and Garden Organics

Combined processing of FOGO merges these types, aiming for an optimal moisture balance and improved aeration. Garden waste helps mitigate odours from food waste and provides better structure for decomposition. However, it requires robust equipment to handle diverse waste types and ensure consistent compost quality.

The most suitable treatment methods for combined processing of FOGO are:

- Anaerobic Digestion: Combining food and garden waste can optimise the moisture balance and improve biogas production efficiency. SBAD allows for better control and optimisation of biogas production from mixed waste.
- Composting: Combining the two types of waste can balance the carbon-nitrogen ratio, enhancing compost quality.

### 6.6.1 Existing Facility on Lot 801

The existing Resource Recovery Facility on Lot 801 (see Section 2.1.4) could be retrofitted and used to process FOGO material. The MRC is currently investigating options, along with other treatment methods including at alternative locations, through the recent request for tender titled "Provision of FOGO Processing Services". When operational the Resource Recovery Facility was licenced under Category 67A (Compost manufacturing and soil blending).

### **6.7** Waste Transfer Station

Transfer stations are integral to a community's waste management system, serving as a vital link between waste collection systems and final disposal facilities. They facilitate the recovery of various resources from the local community and the consolidation of waste from multiple sources into larger transfer vehicles, enabling more economical transport to treatment, processing and disposal facilities.

The primary objective of a WTS is to avoid long-term storage of materials, ensuring that waste and recyclables are promptly consolidated and moved off-site. At the NRRP, the WTS will serve as a central hub for coordinating the transfer of waste from the and kerbside collection waste stream including residual waste, recyclables and organics. The WTS could also accept waste materials collected from the Community Recycling Centre (CRC) for greater consolidation. Recognising the significant distance



from Wanneroo to waste processing infrastructure, the importance of WTS facilities is critical to the City's waste management system. However, as new waste processing infrastructure is delivered in accordance with the Master Plan, the WTS requirements may evolve over time. For instance, Once the WtE is operational at Neerabup and receives all residual waste, this material will no longer need to be processed at the WTS. However, the WTS can continue to function as a consolidation facility for other waste streams including recyclables and organic waste (FOGO, FO, or GO).

Generally, there are three forms of WTS operational including:

- Bulk Haulage (Loose Fill): Waste materials are loaded using a front-end loader into bulk haulage vehicles for transportation. Compaction of the material is achieved by the front end loader placing pressure on the material. Generally, this results in an average compaction rate of 0.3 tonnes per m3;
- Bulk Haulage (Excavator Press): This method is an advancement of the Loose Fill option, however a high reach excavator is utilised to press the waste to achieve a compaction of 0.4 tonnes per m3; and
- Inbuilt Compactor: This involves a WTS with an inbuilt hydraulic compaction system. Waste received at the WTS will be loaded into a compactor system via a hopper utilising a frontend loader. The materials will then be compressed utilising a hydraulic ram into designated containers or transfer trailers, resulting in a compaction rate of 0.5 tonnes per m3.

### **6.7.1** Wangara WTS Assessment

As part of the works, the City also commissioned Talis to assess a variety of design options of transforming the City's old Wangara site including building into a WTS. As part of these works, Talis has prepared a variety of designs options, cost estimates and undertook a technical analysis compared to delivering the WTS at the NRRP. The objective of these works is to assist the City in determining if the Wangara site is a better location for the WTS as opposed to NRRP. The Wangara WTS Options Assessment is contained within Appendix I which include details of the works undertaken and key findings.

Arising from there works, Talis recommended that the WTS at NRRP should be prioritised recognising the greater return on investment opportunities that facility brings along with supporting the overall delivery of the NRRP. In further discussions with the City it was determined that the Wangara MRF facility could be converted into an interim WTS facility that the City can use utilise if the Neerabup WTS was not fully operational prior to the closure of Tamla Park landfill. Talis recommends that the City progresses with the necessary approvals and detailed design works so that this project is construction ready. This will provide a contingency arrangement to the City should Tamala Park landfill closes and the Neerabup Waste Transfer Station not be completed.

#### 6.8 Solar Farm

A solar farm, also known as a solar power station or photovoltaic (PV) power station, is a large-scale installation designed to harness energy from the sun using photovoltaic panels or other solar technologies. Unlike smaller residential solar setups, solar farms are typically spread over large areas and can generate significant amounts of electricity, often feeding directly into the grid or supplying nearby power users. Solar farms can be classified into two main types:

• PV Solar Farms: These use PV panels to convert sunlight directly into electricity. The electricity generated is usually fed into the national grid; and



• Concentrated Solar Power (CSP) Farms: These use mirrors or lenses to concentrate a large area of sunlight onto a small area. The concentrated light is then used as heat to produce steam, which drives a turbine connected to a power generator.

Due to the size of the Nominated Sites, only a PV Solar Farm has been considered for the Project. Solar Farms provide a number of benefits including:

Solar Farms provide a number of benefits including:

- Renewable Energy Source: Solar farms provide a renewable and inexhaustible source of energy. Unlike fossil fuels, which are finite and contribute to environmental degradation, solar energy is abundant and can be harnessed continuously;
- Reduction in Greenhouse Gas Emissions: One of the most significant benefits of solar farms
  is the reduction in greenhouse gas emissions. By replacing energy generated from fossil fuels
  with solar power, solar farms help mitigate climate change by reducing carbon dioxide and
  other harmful emissions;
- **Energy Independence**: Solar farms contribute to energy independence by reducing reliance on imported fuels;
- **Economic Benefits**: The development and operation of solar farms create jobs and stimulate economic growth. The solar industry employs a wide range of professionals, from engineers and construction workers to maintenance staff and researchers. Additionally, local economies benefit from increased investment and infrastructure development;
- Low Operating Costs: Once a solar farm is installed, the operating and maintenance costs are relatively low compared to traditional power plants. Solar panels have no moving parts and typically require minimal maintenance, which translates to lower long-term operating expenses;
- Land Use and Multipurpose Benefits: Solar Farms can be constructed on a variety of land types, including brownfields, deserts, and agricultural land. In this case, the uses for a former landfill size are limited and the construction of a Solar Farm provides a higher use than some alternatives; and
- Local Benefits: Local power users can benefit from solar farms through the establishment of micro grids or behind the meter supply, where power users can purchase the solar farm's output. This allows power users who may not have suitable rooftops or financial capacity for individual solar installations to still benefit from solar energy.

The NRRP can benefit immensely from a nearby operating solar farm by enhancing overall energy efficiency. Additionally, co-location with the NRRP aligns with sustainability goals by supporting renewable energy production alongside efficient waste management practices, thereby contributing positively to environmental stewardship within the local community.

## 6.9 Community Recycling Centre

CRCs are comprehensive facilities that provide a full range of recycling and waste acceptance services to the community. Modern integrated facilities typically include features such as a reuse or tip shop, waste education centres, a dedicated recycling area, bulk waste acceptance, hazardous waste acceptance, and residual waste disposal. By offering these services, CRCs facilitate community engagement with the full waste hierarchy, promoting a greater understanding of waste management practices.



They complement vergeside services, providing additional avenues for waste reduction and recycling. Various strategies can be employed to achieve these outcomes, ensuring that CRCs effectively support sustainable waste management practices in the community.

Numerous successful Community Resource Centres (CRCs) are currently operating across Perth and are extensively utilised by the surrounding communities. There is an increasing expectation from the community for local governments to offer these facilities, especially in areas where such services are not yet available.

### **6.10** Battery Storage and Substation

Battery storage allows for the capture and retention of excess energy produced during peak hours of electricity generated by Solar Farm, WtE and Anaerobic Digestion to better align with peak power usage to reduce the amount of power being exported and imported from the grid. During sunlight hours the battery storage ensures that this energy can be utilised during periods of low or no sunlight, such as nighttime or cloudy days. This capability to store energy enhances the stability of the power supply, reducing reliance on the grid and providing a buffer against power outages. Additionally, battery storage can help in balancing supply and demand, allowing for a more consistent and controlled release of energy to the grid, thereby mitigating the issues of energy variability and intermittency inherent in solar power.

Economically, the integration of battery storage can result in cost savings by enabling participation in energy markets through demand response programs. Overall, battery storage significantly boosts the efficiency, reliability, and financial returns of solar farms, promoting a more sustainable and resilient energy future.



# 7 Waste Projections

A key objective for the Site Master Plan is to ensure that the infrastructure is adequately sized to cater for current and future demands. Waste generation is often closely linked to population growth, and population growth rates are frequently used to project future waste generation. Therefore, it was assumed that waste generation will increase proportionally with population growth.

Some proposed facilities are not yet part of the City's waste management infrastructure. Consequently, Talis divided the existing waste streams into fractions which present the feedstocks for the proposed facilities, forming the basis for their sizing as shown in Section 8. In addition, the City also recognises that these facilities will provide a regional solution. Therefore, Talis has assessed and projected potential feedstock from the Cities of Joondalup (Joondalup) and Stirling (Stirling).

The following sections provide details on the current and future waste projections associated with the Master Plan.

## **7.1** Population Projections

To generate estimated tonnages historical waste data and average annual growth based on Australian Bureau of Statistics (ABS) census data was used. Table 7-1 presents the census population data, while Table 7-2 displays the calculated average annual growth rates between census years, both historical and projected, for all three cities.

For each of the three cities different timeframes of data were available. The average historical growth rate for Wanneroo and Joondalup is based on population increase between the years 2006 and 2023, while for Stirling the available data covers only the years 2013 to 2023. For Wanneroo a yearly growth rate of 3.38% was assumed until 2046 whilst from 2046 to 2053 a yearly increase of 10,000 residents was assumed. For Joondalup and Stirling a consistent yearly growth rate of 0.30% and 0.41% was applied respectively.

**Table 7-1: Historical Population Data** 

	Wanneroo		Joondalup		Stirling		
Year	Population	Average Annual Growth Rate	Population	Average Annual Growth Rate	Population	Average Annual Growth Rate	
2013	176,627	+4.6	164,414	+0.5	220,152	+0.4	
2015	188,278	+3.2	162,904	-0.6	221,986	+0.9	
2017	199,194	+2.3	161,057	+0.1	227,540	+1.4	
2019	208,263	+2.3	162,308	+0.5	234,322	+0.8	
2021	216,422	+1.7	165,050	+0.6	243,871	+3.2	
2023	229,438	+3.7	169,657	+2.4	220,152	+0.4	



**Table 7-2: Historical and Future Growth Data** 

Wanneroo		Joondalup		Stirling		
Timeframe	Average Annual Growth Rate	Timeframe Average Annual Growth Rate		Timeframe	Average Annual Growth Rate	
2006-2023	+4.17%	2006-2023	+0.48%	2013-2023	+1.13%	
2021-2046	+3.38%	2021-2046	+0.30%	2016 2020	10.410/	
2046-2053	+10,000	2046-2053	+0.30%	2016-2020	+0.41%	

Note: All data in italics are the population projections

### 7.2 Current Waste Acceptance

Table 7-3 presents the waste volumes accepted by the three Cities for the year 2022. The waste categories follow the City's weighbridge acceptance categories, which are based on the City's Waste Fees and Charges. Data for illegal dumping was not available for Joondalup and Stirling, while public space waste volumes were also unavailable for Stirling.

**Table 7-3: Summary of Current Waste Acceptance in Tonnes** 

Wasta Time	2022					
Waste Type	Wanneroo	Joondalup	Stirling			
Recycling Kerbside	15,296	14,389	18,042			
General Waste	50,711	32,820	58,756			
Garden organics total	18,764	25,014	27,843			
Bulk - Junk	7,071	4,950	5,341			
Public Space	809	540	-			
Illegal dumping/verge pick up	223	-	-			
Total Waste	92,874	77,712	109,981			

## **7.3** Potential Future Facility Feedstock

To understand future waste volumes, the waste streams were projected over a 30-year period based population projections. In addition a number of waste related assumptions were applied to the projections including allocation of waste streams to preferred treatment options including processing residues. Talis also assessed the advancement of current GO kerbside collections to FOGO across the various Cities. The available waste stream for FO was calculated by applying the capture rate of 14.5% for FO currently within kerbside residual waste stream and assuming a recovery rate of this fraction of 75%. The results of the waste projections are summarised in Table 7-4.

The projections show that due to the it's substantially higher growth rate the City makes up the majority of waste volumes across all waste streams in the future years. The key findings associated with the waste projections include:



### WtE volumes:

- o Currently (2024) estimated at 142,651 t; and
- o Growing to 167,015 tonnes by 2032 and 232,333 tonnes by 2052.

### • MRF volumes:

- o Currently estimated at 49,014 t; and
- o Growing to 54,950 tonnes by 2032 and 74,179 tonnes by 2052.

#### FOGO volumes:

- o Currently estimated at 91,737 t; and
- o Growing to 101,570 by 2032 and 133,166 tonnes by 2052.



**Table 7-4: Waste Projection by facility type in tonnes** 

	2032			2042			2052					
	Wanneroo	Joondalup	Stirling	Total	Wanneroo	Joondalup	Stirling	Total	Wanneroo	Joondalup	Stirling	Total
WtE	74,371	36,188	56,457	167,015	103,697	37,288	58,815	199,800	132,640	38,422	61,271	232,333
MRF	21,328	14,827	18,796	54,950	29,738	15,278	19,581	64,596	38,038	15,742	20,398	74,179
FO	7,670	3,432	9,525	20,627	10,694	3,537	9,923	24,153	13,679	3,644	10,337	27,660
GO	26,163	25,774	29,006	80,943	36,480	26,558	30,217	93,255	46,662	27,365	31,479	105,506
FOGO	33,833	29,207	38,530	101,570	47,174	30,095	40,140	117,408	60,341	31,010	41,816	133,166



# 8 Capacity Modelling and Infrastructure Sizing

Based on the Waste Infrastructure Needs and the Analysis Waste Projections discussed in Sections 6 and 7, a comprehensive Capacity Modelling and Infrastructure Sizing for the NRRP has been undertaken to help guide the development of the Master Plan. This approach ensures that the planned facilities are appropriately scaled to meet the City's and surrounding regions current and future waste management requirements. The process involved analysing current and projected waste generation data, assessing future population growth, and considering technological advancements in waste processing. The goal is to determine the optimal capacity and size of the infrastructure needed for the NRRP to operate efficiently and effectively.

By aligning infrastructure capacity with projected needs, Talis aims to support the City in creating a state-of-the-art NRRP that enhances sustainability, improves waste management efficiency, and contributes to the City's environmental goals. To ensure accuracy and feasibility, Talis benchmarked these findings against existing facilities similar to those proposed for the NRRP. This benchmarking process included a desktop review of the footprint and capacity assessments of comparable facilities, allowing Talis to draw on real-world examples to inform their recommendations. By comparing these established facilities, Talis could determine the optimal size and capacity for the new infrastructure, ensuring its effectiveness and efficiency.

For all high priority facilities, a total an area of 21.2 ha is needed. Key considerations regarding sizing of the individual facilities included:

- The reference site for the WtE facility is the Rockingham WtE which is currently under construction, as detailed in Section 6.2.1.1. This site was chosen because, unlike the Kwinana WtE, the Rockingham WtE includes an Incinerator Bottom Ash (IBA) Treatment Plant, which is also planned for the WtE facility at the NRRP;
- The MRF was sized based on the Cleanaway facility which was adjusted based on comparison with the RRG and Veolia facilities;
- The WTS and CRC were sized based on Talis' industry knowledge and multiple reference facilities in the Perth metro area;
- The organics facility's size estimate was based on multiple reference sites with different processing methods; and
- The Battery storage was sized based on a reference plant in Naval Base, WA.

The results of the Capacity and Infrastructure Sizing are detailed in Table 8-1.



Table 8-1: Capacity Modelling and Infrastructure Sizing

Facility Type		Example Facilities	Example Facilities N						
		Location	Capacity (t/a)	Footprint (ha)	Requirements				
					Capacity (t/a)	Footprint (ha)			
WtE		East Rockingham	300,000	7.3	Min. 200,000	7.3			
MRF		Veolia Bibra Lake Resource Recovery Park	90,000	2.4	100,000	2.4			
		Cleanaway Perth MRF, Guildford	200,000	2.6					
		Resource Recovery Group (RRG), Canning Vale	120,000	3.3					
	FO	Richgro (anaerobic digestion), Jandakot	50,000	1.4	40,000	3.5			
Ougonias	ganics GO	Wangara Greens (Mulching)	2,300	1.7					
Organics		RRG, Canning Vale	50,000	1.5					
FOGO		Sacyr (In-vessel composting), Dandenong VIC	120,000	2.4	150,000				
WTS		Eastern Metropolitan Regional Council (EMRC), Hazelmere WTS	140,000	1.82	140,000	3			
		City of Canning, Ranford Road Resource Recovery and WTS	40,000	2.6					
		City of Stirling, Recycling Centre Balcatta	250,000	4					
CRC		Armadale, CRC	50,000	3.11	N/A	2			
		Armadale, Tip Shop	5,000	0.96					
		EMRC, CRC (future)	N/A	1.68					
Battery St	orage	Synergy, Kwinana Battery Energy Storage System 1, Naval Base	N/A	3	N/A	3			
TOTAL						21.2			



# 9 Market Sounding

The City has recognised the importance of private industry involvement to assist with the delivery of the NRRP Master Plan vision as well as some of the key desired recovery and waste processing facilities. As such, the City engaged with the market to obtain input into the preparation of the Master Plan report. This section provides a summary of the market sounding process and feedback received. Reoccurring trends and themes have been consolidated into the broader Master Plan.

Further detailed information regarding the market sounding process is contained within the following Appendices:

- Appendix F Market Sounding Detailed Response Overview
- Appendix G Market Sounding Questionnaire
- Appendix H Further discussions with Solo

## 9.1 Stages of the Market Sounding

The market sounding exercise was publicly advertised on the City's tender portal on 2 September 2024. In addition, invitations to participate were sent out to leading waste management companies across that industry.

Interested participants submitted a registration of interest through the City's portal and were then contacted by Talis, receiving a cover letter outlining the project, market sounding process, and a consultation agreement.

Following receipt of the signed consultation undertaking, participants were sent a questionnaire to complete and return. The questionnaire waste split into 3 sections including the NRRP Master Plan, WtE and MRF. Within each section, participants were asked a number of questions across a number of factors including thoughts on the project/facility, draft designs, tonnages requirements, timelines and project delivery model. The full list of questions can be found in Appendix G. A summary of the responses including common themes and general trends is provide within this section. The detailed summary of all responses is provided in Appendix F.

Participants were then invited to partake in an interview process with the City and Talis to further elaborate and discuss responses to the questionnaire. Following the interview process, some minor clarification was sought from Solo in relation to some of areas that had limited information during previous stages of the market sounding process. These additional information can be found in Appendix H.

### 9.2 Participants

A total of sixteen companies contacted the City and Talis throughout the Market Sounding process. Thirteen submitted a registration of interest and seven proceeded with further participation in the process, submitting replies to the questionnaire and/or participating in the interview process.

A summary list of all participants and stages of the exercise they were involved in can be found below in Table 9-1.



Table 9-1: Extent of participant involvement

Company Name	Invited to apply	Registered Interest via Portal	Undertaking Completed	Questionnaire Completed	Interview Completed	
Cleanaway	✓	No further res	ponses received			
East Rockingham Waste to Energy	<b>√</b>	No further res	ponses received			
Instant Waste	✓	No further res	ponses received			
Fichtner Australia Pty Ltd		<b>√</b>	No further respo	onses received		
GHD Pty Ltd		✓	No further respo	onses received		
Re.Group Pty Ltd	<b>✓</b>	<b>✓</b>	No further responses received			
Community Greenwaste Recycling P/L		<b>√</b>	<b>✓</b>	✓ No further responses received		
Valoriza Greening Australia		✓	✓ No further responses received			
WSP Australia Pty Limited		<b>√</b>	<b>✓</b>	No further respo	onses received	
Kanadevia INOVA*		✓	✓	✓	✓	
Kwinana Energy Recovery (KER)	<b>✓</b>	<b>✓</b>	<b>✓</b>	Never Submitted **	✓	
NALG Envirotech Pty Ltd		✓	✓	✓	✓	
REMONDIS Australia Pty Ltd		<b>√</b>	✓	✓	<b>√</b>	
Solo Resource Recovery		✓	✓	✓	✓	
Tracey Brunstrom & Hammond (TBH)		<b>√</b>	<b>✓</b>	✓	<b>√</b>	
Veolia Recycling & Recovery Pty Ltd		<b>√</b>	<b>✓</b>	✓	✓	

NOTE: \*Previously Hitachi Zosen Inova Australia Pty Limited

### 9.2.1 Questionnaire

The Market Sounding Questionnaire was split into the following three sections:

- NRRP Master Plan;
- WtE Facility; and,
- MRF.

<sup>\*\*</sup> KER did not complete the questionnaire but submitted a presentation with covered some of the questions



Participants were asked to respond to sections and questions that were relevant to their area of operations and expertise. The sections each participant responded to can be found below in Table 9-2.

Table 9-2: Experience and Questionnaire responses by participants

Participant	Experience and Expertise	1. NRRP Master Plan	2. WtE Facility	3. MRF
Kanadevia INOVA	Global, Design & manufacturing of WtE technologies, WtE facility operators, involved in delivery of 600+ facilities.	✓	<b>√</b>	
Kwinana Energy Recovery (KER)			√ via interview process	
NALG Envirotech Pty Ltd	Australia-based, Organics processing facilities and technologies.	<b>√</b>		
REMONDIS Australia Pty Ltd	Global, Waste services including collections, processing and operating landfills, MRFs, organics facilities, transfer stations and WtE facilities.	✓	✓	✓
Solo Resource Recovery	including collections and operating		<b>√</b>	✓
Tracey Brunstrom & Hammond (TBH)	Global, project management and conflict resolution, were involved in Kwinana WtE facility development.	<b>√</b>	✓	
Veolia Recycling & Recovery Pty Ltd	Global, waste services including collections, processing and operating landfills, MRFs, organics facilities, transfer stations and WtE facilities.	✓	✓	✓

## 9.3 Summary of Responses on the NRRP Master Plan

The following provides a summary of key feedback received in relation to the NRRP Master Plan derived from the questionnaire and interview. A more detailed response is provided in Appendix F.

### NRRP Vision and Master Plan Designs;

- Responses demonstrated significant overall support for the NRRP vision showing industry recognition for the lack of waste processing in the northern areas of Perth and the opportunities that project could bring to the wider region;
- Responses support the overall design of the Master Plan drawings without any negative feedback;
- Opportunities: Identified opportunities of the NRRP could deliver included:



- Demonstrating the City's commitment to sustainable and responsible waste management;
- Improving industry confidence and enhancing local employment opportunities;
- o Bridging the gap between northern and southern waste infrastructure; and,
- Promoting circular economy initiatives through re-using materials across facilities within the NRRP.
- **Constraints:** Identified constraints on the delivery of the NRRP included:
  - Lack of available feedstock as a primary constraint for the WtE facility;
  - Low landfill levy rates in WA impacting financial viability;
  - Negative community perceptions and social licence to operate; and
  - o Misalignments in existing LGA waste contracts.

#### • Additional commentary:

- Integration of different waste streams in the layout of the design to clarify synergies between facilities;
- Incorporating glass processing in the MRF design; and,
- Being mindful not to underestimate the complexity of facilities when planning for time required to complete project stages.

## 9.4 Summary of Responses for the WtE Facility

The following provides a summary of key feedback received for the WtE Facility based on Respondent's questionnaire and interview. A more detailed response is provided in Appendix F. Additional discussions were held with Solo for further information surrounding the proposed gasification facility (contained within Appendix H).

- **Technologies:** All respondents bar one agreed that moving grate incineration was the most suitable and internationally proven WtE technology.
  - Responses from Kanadevia INOVA and KER noted gasification would be difficult to utilise due to requiring homogenous feedstock to operate efficiently;
  - o The response from Solo noted a preference for using gasification.
- **Timeframes:** The proposed timeframe of 8-10 years was generally agreed as suitable. Suggested timeframes for different stages:
  - o 1-3 years for the waste supply agreement procurement process;
  - o 1-2 years for approvals; and,
  - o 3-5 years for design, construction and commission.

However, respondents recommended that the City continue to monitor the progress of the two southern WtE facilities over the coming years prior to releasing the waste supply agreement procurement documentation;

- Master Plan Feedback: All responses agreed the site location, allocated area and design were suitable.
  - KER suggested considering additional space for a laydown area, and/or for expediting development stages through space to allow pre-assembly of components;
  - Further discussions with Solo have indicated a 200,000tpa gasification facility would require a footprint of 4 – 5 hectares including pre-treatment facilities.



- Feedstocks and Sizing: All responses raised concerns over the potential lack of available feedstock including how the market may 'balance out' once the two southern WtE facility commence operation in the coming year.
  - Responses indicated a feedstock ratio of 70-80% municipal solid waste (MSW) to commercial and industrial (C&I) would be required for;
  - o Examples of alternative sources for additional feedstock included:
    - MSW from other surrounding LGAs;
    - Third party C&I waste;
    - Medical waste;
    - Sludges; and,
    - Biomass for gasification (eg. wood, plants, food scraps)
  - Proposed minimum viable facility sizes for incineration varied across the respondents including:
    - KER: 150,000-200,000 tonnes per annum (tpa);
    - Kanadevia INOVA, TBH, Veolia: 300,000 tpa; and,
    - Remondis: 500,000 tpa.
  - Solo proposed the absolute minimum viable size for gasification would be 100,000 tpa, while the preferred size for the available tonnes would be 200,000 tpa.
- **Cost Estimate:** All relevant respondents agreed the proposed \$750 million was an accurate current day cost estimate for developing an incineration facility. Solo indicated gasification would cost in the range of \$420 million including pre-treatment facilities.
- **Project Delivery Model:** The City's preference is to deliver the WtE facility through a Merchant Plan approach with a long-term lease agreement coupled with a waste supply agreement with the preferred contractor.
  - The Merchant Plant approach was considered suitable by all Respondents. Responses indicated the following contract terms would be required:
    - A minimum 25-30 year lease term; and
    - A minimum 20 year waste supply agreement.
  - Some participants indicated a preference for a Public Private Partnership (PPP) approach to share the risks with the City.
- **Energy Outputs:** Received responses provided input on the potential energy output and if it could supply a microgrid across the NRRP and wider Neerabup Industrial area.
  - o A 300,000tpa incineration facility would generate 28-30MW annually
    - Additional opportunities to generate more energy presented through providing excess heat and process steam to other nearby facilities;
  - A 100,000tpa gasification facility would generate 10MW annually with options to size energy generation to service peaking power needs based on outputs not directly linked to feedstock tonnages;
  - Both types of WtE facilities were deemed suitable for suppling a microgrid;
- Residues: Incinerator Bottom Ash (IBA) and Air Pollution Control residue (APCr) are expected by-products from WtE facility. Based on a 300,000tpa incineration facility or a 100,000tpa gasification facility, expected volumes and preferred treatments for IBA and APCr include:
  - o **IBA**: Preferred treatment to extract ferrous and non-ferrous metals then grade aggregate for reuse within construction industry.



- Incineration: 60,000 90,000tpa (20 30%)
- Gasification: 20,000 30,000tpa (10-15%)
- APCr: Preferred treatments to stabilise and dispose in Class III/IV landfill. One alternative suggested carbonising APCr with water and sand to create manufactured limestone for use in the construction industry.
  - Incineration: 6,000 15,000tpa (2 5%)
  - Gasification: Solo indicated APCr would be minimal due to syngas being contained in a closed loop process.

#### • Opportunities and Constraints:

- Opportunities: Suggested opportunities for the development of a WtE facility included:
  - Providing environmental benefits via diversion from landfill;
  - Circular opportunities to provide power and team to co-located facilities; and
  - Creating new employment opportunities and encouraging industry development.
- o **Constraints:** The following barriers could impact the delivery of the facility:
  - Lack of available feedstock;
  - Negative community perceptions;
  - Industry inexperience for constructing and delivering the project; and
  - Low cost of WA landfill levy impacting on the financial viability of such projects.

## 9.5 Summary of Responses for the MRF

The following provides a summary of key feedback received for the MRF project obtained from Respondent's questionnaire and interview. A more detailed response is provided in Appendix F.

- **Technologies:** A list of potential MRF processing plant equipment was provided. Responses generally agreed with the proposed equipment list, in addition to the following comments:
  - Additional mobile equipment would be required for incoming and outgoing materials;
  - Equipment for glass recovery should be considered;
  - Waste compactors for residual waste could improve efficiencies; and
  - o A modern fire suppression system should be included.
- **Timeframes:** The proposed timeframe of 3-4 years was generally agreed as suitable. Suggested timeframes for different stages:
  - o 1 1.5 years for the RFT process; and
  - 2 3 years for approval, design, construction and commissioning (following contract award)
- Master Plan Feedback: All responses agreed the site location, allocated area and design were suitable.
  - Veolia also suggested creating a separate building >35m apart for storing recovered commodities to reduce fire risks and therefore the fire management system to be installed.
- **Cost Estimate:** Remondis and Veolia stated the proposed \$23 million cost would be insufficient, indicating actual costs would be in the region of \$30-40 million.
  - Solo indicated \$23 million would be sufficient for a 40,000-50,000tpa facility.



- o Some of these additional costs included fire prevention technologies.
- Project Delivery Model: The City's preference is to deliver the WtE facility through a
  Merchant Plan approach with a long-term lease agreement coupled with a waste supply
  agreement with the preferred contractor.
  - The Merchant Plant approach was considered suitable by all Respondents. Responses indicated the following contract terms would be required:
    - A minimum 10-15 year lease term; and
    - A minimum 10-15 year waste supply agreement.

#### Feedstocks and Sizing:

- o No significant concerns were raised by the respondents in relation to available feedstock.
- Proposed minimum viable facility sized varied between participants:

Solo: 20,000-30,000tpa

Veolia: 60,000tpa

Remondis: 80,000-100,000tpa.

- o Provided examples of alternative sources for additional feedstock included:
  - Collections from other surrounding LGAs, noting the City of Greater Geraldton who have not yet implemented a kerbside recycling services for its rate payers; and
  - Third party C&I waste.
- Outputs and Residues: The list of proposed outputs was generally agreed with.
  - o Examples of markets for outputs included:
    - Recycled Plastics: Manufacturing and construction;
    - Recycled Paper and Cardboard: Paper mills, packaging companies, crafts and recycling;
    - Metals: Metal recycling companies;
    - Recycled Glass: Glass manufacturers, construction (road bases) and landscaping;
    - Tetra Pak: Inherent value from CDS;
  - Energy recovery via WtE was noted as the preferred treatment for most residues.

#### • Opportunities and Constraints:

- Opportunities: Suggested opportunities for the development of a MRF included:
  - Beneficial for meeting recovery targets of the region;
  - Reduced transportation costs and environmental impacts;
  - Addressing a lack of recycling processing infrastructure in the region; and
  - Presenting circular opportunities through synergies between co-located facilities.
- Constraints: The following barriers could impact the delivery of the facility:
  - Securing available feedstocks;
  - Approvals and community support;
  - Fluctuations in recyclables market; and,
  - Coordination between contractors, industry and local governments



### 10 Site Master Plan

It is important that the Site Master Plan provides a framework for the development of the NRRP such that it can satisfy all current and future waste management requirements for the City and surrounding region. A series of options were considered to support these key design inputs. The methodology and overall development of the Site Master Plan is discussed within the following sections.

## **10.1** Best Practice Design Principles

The following is a summary of the key design principles that were used to guide the development of the Master Plan. These design principles have been devised based on Talis' experience on our delivery on a range of similar projects, aligns with the waste management hierarchy and other legislative framework as discussed in Section 5.

- Maximise the source separation of materials to maximise diversion from landfill;
  - Maximise the separation of materials into clean waste streams for reuse, recycling or recovery. Encourage the separation of materials before it arrives at the NRRP where possible.
- Adopt best practice design and operational standards including;
  - Promote sustainable waste management operations (NRRP set out in relation to the waste management hierarchy);
  - Design of waste management infrastructure for efficient and safe disposal;
  - Appropriate signage to provide clear advice to users;
  - Separate NRRP operations from areas intended for community interaction (separate front and back of house as far as reasonably practicable);
  - o Police waste acceptance activities while minimising staff resources;
  - Minimise combining heavy and light traffic;
  - o Promote work health and safety (WH&S) aspects across the NRRP;
  - o Incorporate environmental measures to minimise any potential impacts;
- Support linkages/flows between various NRRP operations to improve operational efficiency and minimise the onsite material handling requirements;
- Minimise development footprints to reduce excessive costs;
- Design access roads to cater for queuing of traffic;
- Promote occupational health and safety (OH&S) aspects of the NRRP;
- Incorporate environmental measures to minimise any potential impacts;
- Visual Amenity to be maximised to present a facility the community should be proud of;
- Incorporate environmentally sustainable design principles across the NRRP;
- Design elements to be modular to accommodate future technological improvements, enable staging of construction and allow flexibility; and
- Optimise data collection.

As the City further advances its waste management systems, the population grows, business and operations expand, waste volumes increase and new technologies for waste handling and processing become available, suitable areas of the NRRP should be earmarked for future developments and



expansion. The NRRP should be designed in a way that the individual facilities can be constructed in a phased approach.

## 10.2 Development

The project was structured to facilitate an effective exchange of ideas between the City and Talis through fortnightly progress meetings and three key design workshops. The Waste Projections, Waste Infrastructure Needs Analysis, and Capacity Modelling and Infrastructure Sizing formed the foundation for the Master Plan design.

The initial key factors considered in the layout of the NRRP included:

- The waste management hierarchy and best practice design principles;
- The future capacity and operations of the NRRP;
- Prioritisation of facilities and grouping of similar activities; and
- The spatial requirements for each activity and not expanding into areas not required.

Using these elements, Talis developed multiple draft designs, which were refined based on feedback from discussions with the City. The final design was achieved through the Design Input Workshop and the Master Plan Workshop. The final Master Plan determined a split in the NRRP, divided by the proposed future rail corridor and zone of influence into:

- Southern Area: that can satisfy all the high priority infrastructure with access provided from the existing Trandos Road and collocating the WtE facility close to the existing grid connection associated with Neerabup Power Station. The waste infrastructure proposed for the Southern Area includes:
  - o WtE:
  - o MRF;
  - o WTS
  - o CRC;
  - Battery storage facility;
  - Supporting site infrastructure (weighbridge, roads, etc);
- Northern Area: which will provide lots for medium and low priority waste infrastructure which can be delivered as required.

The Site Master Plan intends to highlight the general usage of land within the NRRP for the purpose of illustrating the future footprint of each activity. All areas allocated for each activity and presented in the Site Master Plan are flexible and can be modified to better adapt to operational changes or unforeseen future demands for the NRRP.

## **10.3** Master Plan Drawings

The key infrastructure highlighted in the Master Plan are detailed in the following sections. The Site Master Plan and associated designs are listed in Table 10-1 and attached in Appendix B.



Table 10-1: List of Drawings

Drawing Ref	Title	Description
W-101	NRRP Masterplan Layout	The general concept layout for all activities at the NRRP, including locations and spatial requirements.
W-102	Waste to Energy facility Plan	The design for the WtE facility.
W-103	WTS, CRC and MRF Plan Playout	The design layout for the WTS, CRC and MRF.
W-104	NRRP Masterplan Swept Paths	The swept path analysis of the Southern Area of the NRRP including WtE facility, WTS, CRC and MRF.
S-101	HHW Shed – Proposed Floor Plan and Typical Sections	The proposed floor plan and typical cross sections for the HHW Shed.
S-201	Multi-Tier Drop-Off floor plan and Section	The floor plan and cross sections for the Multi-Tier Drop-Off facility.
S-301	Reuse Shop Floor Plan and Section	The floor plan and cross sections for the Reuse Shop.
S-401	Typical Section – Waste Transfer Shed	The floor plan and cross sections for the Waste Transfer building.

## 10.4 Waste to Energy facility

### 10.4.1 Entry and Exit

Vehicles entering the WtE facility use a two-way access road and have designated routes based on their purpose. They first pass through a weighbridge and gatehouse situated in the northern part of the facility.

After passing the weighbridge vehicles depositing waste turn left into the manoeuvring area adjacent to the tipping hall. Conversely, vehicles coming to pick up residues proceed straight onto a two-way road leading to a one-way loop road around the IBA treatment plant, located in the southern part of the WtE facility. If a vehicle is equipped with more than one trailer, it will proceed to the decoupling area, located south of the manoeuvring area.

### 10.4.2 Tipping Hall & Bunker

The tipping hall is the initial receiving area for waste delivered by collection vehicles at the facility. It is a large, enclosed structure designed to contain odours and prevent litter. Negative pressure is achieved using a ventilation system that continuously extracts air from the bunker area into the combustion chamber.

Adjacent to the tipping hall is the bunker, a deep pit where waste is stored prior to incineration. This bunker is designed to hold several days' worth of waste to ensure a steady supply required for the incinerator. Negative air pressure is maintained within the bunker to ensure that any air movement is directed into the facility rather than out into the surrounding environment.



The waste is mixed and homogenised in the bunker using one or multiple overhead cranes to ensure a consistent feedstock for the incinerator. Cranes equipped with grabs then transfer the waste from the bunker to the feeding hopper of the incinerator, maintaining a continuous and controlled flow of waste to the combustion process.

### **10.4.3** Combustion Line & Electricity Generation

The combustion line includes the furnace, boiler, and related equipment, with the furnace specifically designed to achieve complete combustion of the waste. Electricity generation at the facility involves converting the thermal energy produced by the combustion process into electrical energy. Heat from the combustion process generates high-pressure steam in the boiler. This steam drives a turbine connected to an electricity generator. The substation including transformer is located in the southeastern corner of the facility

Continuous monitoring and control of combustion parameters, such as temperature and oxygen levels, optimise efficiency and minimise emissions. Additionally, surplus heat can be utilised for heating or other industrial processes, further enhancing the facility's energy efficiency and minimise emissions.

To further enhance emission control, many WtE facilities incorporate Selective Non-Catalytic Reduction (SNCR) technology. SNCR is used to reduce nitrogen oxide (NOx) emissions formed during combustion. In this process, a reagent, typically ammonia or urea, is injected into the flue gas stream in the furnace or the boiler's post-combustion zone at high temperatures. This chemical reaction reduces NOx to nitrogen and water vapor, helping to meet regulatory emission standards and align with EU-standards as adopted by the EPA WtE Strategic Advice defined in Section 5.2.4.

Ash and non-combustible waste components such as glass, minerals and scrap metals, summarised under the term Incinerator Bottom Ash (IBA), accumulate on the bottom of the combustion chamber and are extracted through the ash extractor.

#### 10.4.4 Incinerator Bottom Ash Treatment Plant

The IBA treatment plant is located on-site and processes the IBA produced by the incinerator to recover valuable materials and reduce waste volume. It includes an initial sorting of particle sizes via classifications screens. Ferrous metals are removed from the ash using magnets, while non-ferrous metals are separated using eddy current separators. The remaining mix of fine mineral fractions, the IBA aggregate (IBAA), can be used safely for construction materials e.g. road base. Quality control measures are implemented to ensure that the treated ash meets regulatory standards for use as a construction material.

#### 10.4.5 Flue Gas Treatment

The flue gas treatment system at a WtE facility typically includes several stages designed to remove pollutants and ensure emissions meet environmental regulations. Key components of this multistage treatment system include electrostatic precipitators, fabric filters, scrubbers, and activated carbon injection systems. Particulate removal is achieved using electrostatic precipitators or fabric filters, which capture fly ash and other particulates. Gas cleaning involves the neutralisation of acidic gases such as hydrogen chloride (HCl) and sulphur dioxide (SO2) using scrubbers or dry sorbent injection, often utilising lime. To control dioxins, furans, and heavy metals, activated carbon is injected into the flue gas stream.



The residue which accumulates in flue gas treatment, the air pollution control residue (APCr), contains fly ash from the boiler and a mix of pollutants e.g. metal oxides and salts. The APCr is treated as hazardous waste and is commonly landfilled which often requires immobilisation of pollutants. The EMRC is currently proposing to construct an APCr immobilisation plant at its Red Hill Waste Management Facility, with the immobilised material landfilled within Class IV landfill on site. However, there are multiple emerging treatment technologies which can turn the residue into a reusable product, such as accelerated carbonation technology, plasma technology or zinc recovery. Such technologies are currently utilised in the United Kingdom (UK), however there is much greater incineration occurring resulting in high volumes of APCr.

### **10.5** Community Recycling Centre

#### 10.5.1 Entry and Exit

The community and service vehicles will access the CRC from the south, off Trandos Road and pass through a roundabout. The customers pass straight through while service vehicles turn right to access the service lane.

After passing straight through the roundabout customers will access a one-way loop road. This loop road is designed to ensure a continuous flow through the CRC, minimising traffic conflicts and promoting ease of use. The sealed road will feature a public access gate at the entrance, which staff will open daily. After entering the loop road customers pass by the kiosk.

A sealed two-way service lane is located at the rear of each area of the CRC to allow staff only access to service the various receptacles and community drop off areas. The service lane will have an electric gate to be operated by a card or code to prevent the public from accessing it. The lane loops around the perimeter of the facilities and ends after the Multi-Tier Drop Off. It includes a turning point located before entering the rear of the Drop Off Area and one after the Multi-Tier Drop Off.

The public parking area, to be used by customers of the Reuse Shop, staff and groups coming to the CRC to use the Education Centre, is accessible via the first left turn after the kiosk. The 1550 m2 parking area will have 20 parking bays and 5 parks for light vehicles with a trailer. The public parking area has an additional access point which allows customers to enter after they went around the full loop. The exit is connected to a crossroad in between Drop Off Area and Multi-Tier Drop Off and leads back to the roundabout at the CRC entrance/exit.

#### **10.5.2** Kiosk

A kiosk will be located at the community entrance to the CRC, where site staff will direct customers to the required drop off area. The kiosk can also facilitate the management of traffic, inspection of materials presented and acceptance of payment from customers who wish to drop off materials at the facility.

The kiosk is a fully enclosed building that will be 27m<sup>2</sup>. The roof of the kiosk will be adjoined to the Reuse Shop by a canopy which goes over the entrance road.

### **10.5.3** Reuse Shop, Administration & Education Centre

At the Reuse Shop, customers have the option to buy or drop-off used goods. The facility also handles the storage, sorting, and display of the goods for sale. The Reuse Shed will consist of a 420 m<sup>2</sup> enclosed building and a 250 m<sup>2</sup> sealed forecourt area. The Reuse Shop will be established at the front of the



CRC to allow drop-off of materials for reuse/resale in accordance with the waste management hierarchy.

There will be numerous entrances to the Reuse Shop to access the different drop-off areas. A large, sealed parking area will be located next to the Reuse Shed for the transfer of bulkier materials or for customers wanting to browse longer at the facility. Alternately customers can pass through the kiosk and divert from traffic to a 25 m stopping lane where items can be dropped-off to the Reuse Shop.

The Education Centre adjoining the reuse shop will provide an area for meetings and groups to visit and learn more about waste management practices, the NRRP, and its initiatives. It will feature a 420 m2 Education Centre which will house the Administration centre, Reception, and staff Crib Room. The entrance to the building will be from the public parking area at the most eastern side.

#### 10.5.4 Household Hazardous Waste Shed

A fully enclosed HHW Shed will be established for the safe acceptance and storage of hazardous materials such as oil, paint, batteries, fluorescent tubes and globes, aerosols, and pesticides etc. The HHW is located at the southeast corner of the CRC with a series of parallel parking bays provided alongside. The service lane runs behind the building allowing service vehicles access for collection. Customers have access to the canopy overhang area to drop off their HHW. The enclosed areas are only accessible for staff.

The shed should be designed in accordance with the DWER's *Guidelines For The Design And Operation Of Facilities For The Acceptance And Storage Of Household Hazardous Waste (DWER, 2013).* 

HHW Shed comprises of a 145 m² undercover hardstand. It will have three modular enclosed areas each designed to suit the requirement of the type of waste to be stored. Two of the areas, divided by chain link fencing, will have in total three 3m wide roller doors. The remaining enclosed area is divided into two sections, and will have two full height fire wall partitions, one between the two sections and the other between the adjacent enclosed area.

Each area will have designated storage receptacles and distinct areas for each waste stream, designed specifically for the type of HHW to be stored. This will include racking and shelving, cages, and storage containers. The customers drop off items at the 42 m<sup>2</sup> canopy overhang area which features a drop-off table which provides space for materials to be sorted into their respective streams.

The HHW Shed will feature an appropriate spill containment system with grading, bunding, drainage and drainage pits. A security fence with locks on all gates and doors will be installed around the facility holding the HHW. As per requirements the HHW Shed should have an emergency shower and eye wash station.

### 10.5.5 Hardstand Area

An open-air concrete hardstand area will be established to allow customers to drop off a range of recyclable materials in designated areas and containers. Two lanes have been provided through this section to allow customers to divert from the flow of traffic into a stopping lane alongside the various receptacles. For materials such as e-waste, car batteries and gas cylinders, cages will be provided. Large bulky items such as white goods and large electrical items will be dropped off on a 150m2 uncovered concrete stand area. Other materials, like inert waste, plastics, glass, and cardboard, can be dropped off into 1 of 7 hook lift bins.



On the completion of drop off, customers can turn left, exit via the roundabout and head back towards the entrance of the CRC. Customers who wish to drop off larger quantities of recyclables or residual waste can follow the loop to the Multi-Tier Drop- off Facility.

### 10.5.6 Multi-Tier Drop-off Facility

A Multi-Tier Drop-off Facility will provide customers to deposit residual waste or even bulkier recyclable items such as scrap metal and green waste. The facility is located on the western side of the CRC and is the last facility on the CRC loop. A weighbridge can be installed both at the entrance and exit of the facility to ensure accurate quantification of the material dropped off. The facility will be a saw tooth arrangement and contain 14 bays which will be in front of the 7 hook-lift bins (two bays per bin). Sufficient room has been provided for queuing /manoeuvring area in front of the bins as well as line markings to guide reversing movements.

The Multi-Tier Drop-off Facility will be a 1520m2 raised hardstand and will have a canopy above the parking bays to protect customers from the weather.

The Multi-Tier Drop Off Facility is elevated so that domestic customers can reverse their vehicles up to the sawtooth wall and unload waste materials into Hook-lift bins on the hardstand below. Heading up the ramp, vehicles will be able to reverse into raised bays aligning with hook-lift bins and drop off materials from behind a safety barrier into the dedicated receptacles below. The facility also features two uncovered laydown areas in each corner which can be used for bulkier / heavy material. In addition, the City may also allow for the acceptance of mattresses and tyres in these areas.

## 10.6 Materials Recovery Facility

Another key piece of infrastructure proposed for the NRRP is the MRF, where commingled kerbside recyclables will be accepted, processed and consolidated via a baling system. The baled materials, including plastics (HDPE/PET), paper, cardboard, glass, and tin/aluminium, will be stored in until there is sufficient material for transport offsite for further recycling by third-party contractors.

### 10.6.1 Entrance and Exit

Vehicles destined for the MRF will enter the NRRP from the south off Trandos Road via the main site entrance shared with the WTS. The vehicles will follow the road to the weighbridge for inspection and data collection prior to proceeding to the MRF. The weighbridge staff will inform the drivers which door to use to enter the MRF.

#### 10.6.2 MRF Building

The MRF will be a fully enclosed warehouse building with a footprint of 3840m² (81m x 48m). The height will vary but the building will have a minimum clearance height of 8m at the eaves. The design height of the facility ensures that sufficient clearance is provided for collection vehicles as they unload onto the tipping floor within the MRF. The preferred model for the MRF is a Flat Floor configuration. The materials will be deposited directly onto the concrete hardstand floor and then feed through the MRF's processing and sorting system.

Internally, the MRF building consists of the following key areas:

- Unloading/tipping area;
- Storage bunker area for unprocessed materials;



- Processing area for the separation of materials; and
- Dispatch for the storage and load out of materials.

The unloading/tipping area is located in the northern section of the building. The unloading area is accessible the entrance roller doors at the north of the MRF building. The entrance consists of a reversing apron of 1,730m² external to the building that leads to four access doors. These are roller doors that will minimise fugitive emissions from the MRF. The slope of the reversing apron falls away from the MRF building to prevent the ingress of stormwater.

Kerbside collection vehicles use the reversing apron to make a comparatively simple reverse turn into the MRF. Once completely inside the building, the roller door closes. The kerbside collection vehicles reverse into the unloading area whereupon it end-tips the recycling materials on the concrete floor. Upon completion, the driver returns the kerbside collection vehicles body to its normal position and drives out the MRF in a straight manner. If required, the drivers can sweep out the kerbside collection vehicles at the bunker. Once outside, the Kerbside collection vehicles turn left and leaves the NRRP via the weighbridge.

The temporary storage bunker area is located in the northern section of the building and is bounded on two sides by 5m high precast reinforced concrete walls to provide sufficient capacity. When necessary, the waste storage bunker area will be washed down. The water will flow towards collection points and divert potential leachate to a containment tank below ground external to the MRF.

After the RCV tips the recyclables onto the floor and leaves the unloading area, the front-end loader within the MRF building will either consolidate the materials within the temporary storage bunker area or transfer the materials directly into the feed hopper to feed into the processing area.

Recoverable materials will be sorted, processed and consolidated within the MRF by a range of plant and equipment. Modern MRFs can include:

- Feed Hopper;
- 900mm Conveyor Belts;
- Trommel Screen;
- Air separator;
- Disc Screen Separator;
- Air-Conditioned Picking Station;
- Magnetic belt Separator;
- Eddy Current Separator;
- Optical Sort
- Al Robotic Sorting Station;
- Bottle Perforators; and
- Balers.

Using a forklift, the baled material will either be transferred to the dispatch area for storage and eventually load out.

The MRF floor will be constructed with reinforced 200mm thick (minimum) concrete which falls to allow water to flow towards collection points and divert potential leachate to a containment tank below ground external to the MRF. Ridge ventilators will be installed along the roof of the MRF to provide natural ventilation within the building.



### 10.7 Waste Transfer Station

The key piece of infrastructure proposed for the NRRP is the WTS, where waste will be accepted, and temporarily stored and/or sorted before being transported to the other facilities for further treatment. The purpose of the WTS is to provide waste generators, waste collectors and waste handlers options to dispose of their materials within relatively close proximity to where these materials are generated. The WTS will reduce the travelling requirements of the waste generators and collection vehicles and also reduce the number of vehicles travelling to and from the downstream processing facilities.

The WTS is positioned next to the CRC, isolated from public access areas; therefore, the community will not be granted access to the WTS due to the risk associated with potential conflicts between heavy and light vehicles within the confines of the WTS.

#### **10.7.1** Entrance and Exit

Vehicles destined for the WTS will enter the WTS via the main Site entrance. This entrance and the weighbridge are shared with the MRF. The vehicles will follow the road to the weighbridge for inspection and data collection prior to proceeding to the WTS. The weighbridge staff will inform the drivers which door to use to enter the WTS building.

#### 10.7.2 WTS Building

The WTS will be a fully enclosed warehouse building with a footprint of 1,850m² (37m x 50m). The height will vary but the building will have a minimum clearance height of 8m at the eaves. The design height of the facility ensures that sufficient clearance is provided for collection vehicles as they unload onto the tipping floor within the WTS. The preferred model for the WTS is a Flat Floor configuration. The materials will be deposited directly onto the concrete hardstand floor of the WTS and then stored in designated bunkers prior to being loaded into specialist haulage vehicles (B-Double or similar road train configurations) and potentially through compaction system.

The WTS has been designed to a capacity of approximately 195,000 tpa of residual waste, with one-day storage capacity based on seven days of operation. If kerbside recyclable waste will be included the capacity will decrease due to its significantly lower density. Based on the current design 1 m2 is needed for 185 tpa of kerbside recyclable waste.

The WTS floor will be constructed with reinforced 200mm thick (minimum) concrete. The floor of the waste storage bunker area has been designed with a fall to allow water to flow towards collection points and divert potential leachate to a containment tank below ground external to the WTS, which will be pumped out as required or gravity feed to a centralised sump.

Ridge ventilators will be installed along the roof of the WTS to provide natural ventilation within the building.

Internally, the WTS building consists of three key areas:

- Unloading/tipping area;
- Waste storage bunker area; and
- Bulk load out area.



The unloading/tipping area is located in the northern section of the building. The unloading area is accessible via the kerbside collection vehicles entrance at the north of the WTS building. The entrance consists of a reversing apron of 1,100m2 external to the building that leads to four access doors. These are roller doors that will minimise fugitive emissions from the WTS. The slope of the reversing apron falls away from the WTS building to prevent the ingress of stormwater.

The kerbside collection vehicles will access the WTS building via one of the four access doors. The kerbside collection vehicles use the reversing apron to make a comparatively simple reverse turn into the WTS. Once completely inside the building, the roller door closes. The kerbside collection vehicles reverse into the unloading area whereupon it end-tips the waste on the concrete floor. Upon completion, the driver returns the kerbside collection vehicles body to its normal position and drives out the WTS in a straight manner. If required, the drivers can sweep out the kerbside collection vehicles. Once outside, the kerbside collection vehicles turn left and leaves the NRRP via the weighbridge.

The waste storage bunker area is located in the southern section of the building and is bounded on three sides by 5m high precast reinforced concrete walls.

When necessary, the waste storage bunker area will be washed down. The water will flow towards collection points and divert potential leachate to a containment tank below ground external to the WTS.

After the kerbside collection vehicles tips the waste onto the floor and leaves the unloading area, the front-end loader within the building will either transport the waste to the appropriate stockpile within the waste storage bunker area or transfer the waste directly into the transfer trailer or compaction system located on the building's western side. If the waste is stockpiled, it will typically not remain in the WTS building for long periods of time to mitigate odour and reduce the attraction of vermin and feral animals.

A summary of the WTS design specifications is shown in Table 10-2.

**Table 10-2: WTS Design Specifications** 

Aspect	Details
Size	1,850m²
Design Capacity	195,000 tpa
Storage	1 day

### 10.8 Battery Storage

The facility will be positioned on a hardstand area north of the WtE facility with ideal access to the electrical grid due to high voltage power transmission lines and the adjacent Neerabup Power Station. It will be located within the zone of influence of the railway corridor. Considering that commonly used battery storage systems have a lifespan of 15-20 years, there should be minimal conflict between the battery storage and the proposed railway. The substation is located in the southern portion of the adjacent WtE facility and is utilised jointly by both facilities.

The primary components are the battery storage units, housed typically in modular containers which are sized like a 40-foot shipping container (12.2m x 2.4m x 2.6m). They are arranged in a grid pattern



to maximise space efficiency and facilitate cooling and electrical connections. Each container houses lithium-ion battery systems with capacities ranging typically from 1 MW hour (MWh) to 5 MWh. The Power Conversion System is centrally located to ensure efficient distribution to the battery units, incorporating inverters, transformers, and switchgear for high efficiency and reliability. Advanced cooling and fire suppression systems maintain optimal operating conditions and ensure safety, while a central control room equipped with real-time monitoring and management software oversees operations.

## 10.9 Northern Expansion Area

The expansion area located north of the railway corridor is designated to accommodate a range of medium- and low-priority facilities, as well as an organics facility in the northwestern corner. This modular space will include a research and development facility featuring a microfactory and will house at least eight facilities dedicated to recovering the following waste streams:

- Tyres;
- E-Waste;
- Mattresses;
- Container Deposit Scheme (CDS);
- Solar Panels;
- Glass;
- Plastics; and
- Textiles.

An additional zone on the eastern side is allocated for future expansion of resource recovery.

Access to the expansion area will be provided from Orchid Road via two entry points. A two-way loop road will circle the entire area, ensuring efficient access to all recovery facilities.



#### 11 Cost Estimates

Capital cost estimates for the NRRP has been prepared based on the Master Plan designs for the proposed facility. The capital costs represent all expenses relating to the establishment of physical infrastructure such as road works, hardstands earthworks and structures.

### 11.1 Cost Estimate Methodology

This preliminary cost estimate has been prepared using a quantity of size (or square meter) breakdown of the components of the proposed facility as measured from the Site Concept Design.

The capital cost estimates have been generated utilising Talis' internal database of unit costs for both civil and structural works based on similar projects completed. These have been supplemented with rates from the City and Rawlinsons Australian Construction Handbook Edition 41 2023 (Rawlinsons). It is important to note that Rawlinsons figures tend to represent high end market rates.

To clearly outline all required works, the project was divided into the key areas within the NRRP and then their various components parts. These include;

- 1. The preliminary works for a project typically involve a contractor's insurances and management systems and has been calculated as 4.5% of the total capital cost (excl. local loading, contingency, and professional services).
- 2. Earthworks incorporate costings for site clearance, as well as cut and fill works.
- 3. The roadworks and surfacing component cover the cost of sub-grade preparation, sub-base, basecourse and sealing of all public roads and other paved hardstand areas.
- 4. The buildings and infrastructure component has been split into the various key construction elements including reinforced concrete works and slabs, roller doors, canopy, etc.
- 5. The surface water management system component includes the cost of a network of gulley's, swales, and pipes to divert surface water from the NRRP activities as well as the storm water pond.
- 6. Miscellaneous works incorporates all further construction works not covered under the preceding categories with a focus on utility services, security and Occupational Health and Safety (OH&S).
- 7. A construction contingency of 20% has been incorporated into the capital cost estimate model as well as a Professional Services loading of 6% to cater for design, approvals, project management and contract administration activities.
- 8. A cost escalation of 7% has been included to account for anticipated increases in costs due to inflation, market conditions, and unforeseen economic factors, ensuring the project budget remains realistic and manageable over time.

### 11.2 Summary of Cost

The estimated overall cost of the NRRP is \$1.25 B (excl. GST). For the WtE and Battery Station a cost estimate was assumed based on reference sites known to Talis. Therefore these numbers are solely a rough estimate. With further input during the market sounding these costs may be further refined. The WtE is the most expensive item in the cost estimates at \$750,000,000, which is equal to more than half of the overall cost. The Buildings & Infrastructure of the MRF is the second most expensive item at approximately \$40,000,000which is attributed to the required equipment.

The full estimated capital expenditure model can be found in Table 11-1. The costs have been provided for each of the separate areas of the facility, shown in Appendix C.



Table 11-1: Summary of Cost Estimate

Item	Description		Amount (\$ excl. GST)	
Commun	ity Recycling Centre			
1	Preliminaries		\$411,000	
2	Site Clearance & Earthworks	Site Clearance & Earthworks		
3	Roadworks & Surfacing		\$663,000	
4	Buildings & Infrastructure		\$2,468,000	
5	Surface Water Management		\$19,000	
6	Services		\$758,000	
		Total	\$4,520,000	
Weighbri	dge			
1	Preliminaries		\$75,000	
2	Site Clearance & Earthworks		\$39,000	
3	Roadworks & Surfacing		\$161,000	
4	Buildings & Infrastructure		\$409,000	
5	Services		\$141,000	
		\$825,000		
Material	Recovery Facility			
1	Preliminaries		\$3,637,000	
2	Site Clearance & Earthworks		\$164,00	
3	Roadworks & Surfacing		\$414,000	
4	Buildings & Infrastructure		\$35,140,000	
5	Surface Water Management		\$29,000	
6	Services		\$616,000	
		Total	\$40,000,000.00	
Waste Tr	ansfer Station			
1	Preliminaries		\$480,000	
2	Site Clearance & Earthworks		\$122,000	
3	Roadworks & Surfacing		\$607,000	
4	Buildings & Infrastructure		\$3,599,000	
5	Surface Water Management		\$13,000	
6	Services		\$457,000	
		Total	\$5,278,000	
Waste to	Energy Facility			
1	WTE facility		\$750,000,000	



Battery Station			
1	Battery Station	\$155,000,000	
Future Expar	nsion Area		
1	Preliminaries	\$226,000	
2	Site Clearance & Earthworks	\$918,000	
3	Roadworks & Surfacing	\$646,000	
4	Services reticulation	\$694,000	
	Total	\$2,484,000	
Subtotal		\$958,107,000	
Contingency	(20%)	\$191,621,400	
Professional	Services (6%)	\$57,486,420	
Cost Escalation	on (7%)	\$67,067,490	
Total		\$1,274,282,310	

## **11.3** Division of Costs

The division of costs between the City and the Private sector have been summarised below in Table 11-2.

Table 11-2: Division of costs between City and Private Sector

Description	Total	City	Private Sector
Community Recycling Centre	\$4,520,000	\$4,520,000	-
Weighbridge	\$825,000	\$825,000	-
Material Recovery Facility	\$40,000,000	-	\$40,000,000
Waster Transfer Station	\$5,278,000	\$5,278,000	-
Waste to Energy	\$750,000,000	-	\$750,000,000
Battery Station	\$155,000,000	-	\$155,000,000
Future Expansion	\$2,484,000	\$2,484,000	-
Enabling Works Package (excluding WtE)	\$4,000,000	\$4,000,000	-
Road Upgrades	\$2,000,000	\$2,000,000	-
Wangara Conversion (Interim)	\$2,000,000	\$2,000,000	-
Sub Total	\$966,107,000	\$21,107,000	\$945,000,000
Contingency (20%)	\$192,475,200	\$4,221,400	\$188,253,800
Professional Fees (6%)	\$57,742,560	\$1,266,420	\$56,476,140
Cost Escalation (7%)	\$67,366,320	\$1,477,490	\$65,888,830
Grand Total	\$1,283,691,080	\$28,072,310	\$1,255,618,770



It is important to note that these costings that have been developed based on the Master Plan designs only and reflect the estimated capital expenditure for the NRRP. The Master Plan designs of the NRRP were developed based on the current information available and will be further refined as the project progresses. This will facilitate the preparation of more detailed and accurate capital cost estimates.

It is recommended that the City undertakes further detailed cost estimates as the project progresses particularly during the detailed design phase.

#### 11.4 Below the Line Costs

#### 11.4.1.1 Construction Contingency

The Construction Contingency is an allowance to cover the risk of variations and unforeseen items encountered during construction. A construction contingency of 20% has been allowed for in the estimate which is considered appropriate for a Master Plan stage designs and for the complexity and risk profile of the project.

#### 11.4.1.2 Design Contingency

A design contingency is an allowance to cover the risk of the design complexity/detail as the project and the design evolves. No allowance has been made in the cost estimate.

#### 11.4.1.3 Environmentally Sustainable Design (ESD) Allowance

No allowance has been made for ESD initiatives in the cost estimate. It is not uncommon on similar projects for a below the line allowance of 3% of Estimated Total Construction Cost to be budgeted for ESD initiatives.

#### 11.4.1.4 Public Art Allowance

No allowance in the cost estimate has been made for Public Art. It is not uncommon on similar projects for a below the line allowance of 1% of Estimated Total Construction Cost to be budgeted for.

#### 11.4.2 Limitations and Exclusions

- This cost estimate is based on the approved site Master Plan design and not on a detailed design for the project;
- This cost estimate will be subject to change as the design is progressed through to conceptual and detailed design phases;
- This cost estimate was undertaken prior to the commencement of various specialist studies (i.e., Geotechnical) and has assumed that such studies will not impose a significant cost burden on the project; and
- Statutory authority charges, legal fees and finance costs have not been included.



## 12 Approvals Path Mapping

A variety of environmental and planning approvals will be required to support the construction and operation of the NRRP. These are discussed within the following sections including the anticipated approval pathway for the various facilities of the NRRP.

## 12.1 Environmental Approvals

Several environmental approvals that will and may be required for the NRRP as summarised in Table 12-1 and discussed within this section of the report.

**Table 12-1: Necessary Environmental Approvals** 

Process	Approval Authority	Relevant Legislation	
Environmental Impact Assessment (May be required)	Minister of Environment (State)	Part IV of Environmental Protection Act 1986 (EP Act)	
Works Approval & Licence (Mandatory)	(DWER) (State)	Part V of Environmental Protection Act 1986 (EP Act)	
Vegetation Clearing Permit (Mandatory)	DWER (State)	Part V Division 2 of the Environmental Protection Act 1986 (EP Act)	
EPBC Act Referral for Matters of National Environmental Significance (May be required)  Department of Agriculture, Water and the Environment (National)		Environmental Protection and Biodiversity Conservation Act	

#### 12.1.1 EPA Referral

Any project that could have a significant impact on the environment may be referred to the EPA to decide whether a proposal should be formally assessed, pursuant to Part IV of the EP Act. A referral to the EPA can be made by any party, including the proponent, stakeholders, government bodies or a member of the public.

It is noted that a S38 Referral to the EPA is an optional approval and is generally only required where potentially significant environmental impacts may occur which is generally the case for the WtE and FOGO facilities. A proposal can only be assessed by the EPA once but may be referred to the EPA by any party at any time before, during or after construction and operation. If a proposal is referred to the EPA during construction and operations and the EPA decides to formally assess, all works must cease until the assessment process has concluded. Construction and operation can continue within the period between the initial referral and a decision to formally assess the proposal, however it is recommended that all activities are temporarily halted until the EPA has provided further information.



There is a precedent for the EPA to assess large processing facilities, such as WtE and FOGO facilities. Based on our experience, Talis recommends that the developer of the WTE and potentially FOGO facility submit a S38 Referral to the EPA to manage the overall timeframes for approval and to avoid a third party referral during construction or operation.

#### 12.1.1.1 Level of Assessment

Once a referral has been made, the EPA will decide on whether the referral is valid (for example, whether the project has the potential to have a significant impact on the environment) and the level of assessment requirement.

In deciding the level of assessment, the EPA may consider any or all of:

- Information and level of detail provided in the referral (and any supplementary reports with the referral), including:
  - The project;
  - Potential impacts;
  - Proposed management measures; and
  - Evidence of effective stakeholder consultation.
- Information obtained from any requests for further information (S38A of the EP Act) and/or EPA's own investigations and inquiries [S39A(2) of the EP Act];
- the number and complexity of preliminary key environmental factors relevant to the project;
- Whether it is a common type of project where there is an established condition-setting framework for that type of project; and
- The level of public interest about the likely effect of the project, if implemented, on the environment.

If the EPA decides to formally assess the proposal, it may request additional information and/or specify a public review period. Based on experience, the EPA is anticipated to choose to assess the proposed NRRP facilities and set a minimum two-week public review period.

#### 12.1.1.2 Relevant Environmental Factors and Objectives

When deciding whether to assess a proposal, and the level of assessment, the EPA may consider up to 14 environmental factors organised under five broad themes. Each factor has an associated objective that the EPA will use to determine whether a proposal may be significant. The factors and objectives that are likely to be relevant are shown in Table 12-2.

Table 12-2: Relevant EPA Factors and Objectives

Theme	Factor	Objective	Comment
Land	Flora and vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Since clearing is unavoidable the impact on the existing flora and fauna within and surrounding the Preferred Site will have to be assessed.



	Terrestrial fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	
	Terrestrial Environment al Quality	To maintain the quality of land and soils so that environmental values are protected.	Leachate may be generated from the decomposition and processing of organic materials. If leachate is released from the NRRP,
Water	Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	it may impact water or soil quality.  While impacts are not expected to occur, a discussion of the proposed management measures and controls should be included in the supporting documentation for the EPA Referral.
	Social Surroundings	To protect social surroundings from significant harm.	Odour emissions will be generated from the acceptance and processing of FOGO materials. While environmental management controls such as a biofilter may be implemented, the developer will be required to demonstrate that they will effectively manage odour emissions.
People	Human health	To protect human health from significant harm.	Emissions of pollutants such as particulate matter and volatile organic compounds (VOCs) may arise from the operation of WtE facilities. Implementing strict air quality controls and continuous monitoring will be essential to ensure that emissions remain within safe limits. The developer must demonstrate that these measures will effectively protect human health by preventing exposure to harmful levels of pollutants.
	Air quality	To maintain air quality and minimise emissions so that environmental values are protected.	Emissions from the WtE and organics facility must be minimised. The developer will implement stringent emission controls and continuous monitoring to ensure air quality remains high and environmental values are safeguarded.
Air	Greenhouse	To reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.	Waste processing activities must aim to lower greenhouse gas emissions. The City will employ advanced technologies and practices to reduce emissions and contribute to climate change mitigation.

To address these factors, a number of supporting studies can be prepared to review potential impacts and propose any required management measures. These may include, but may not be limited to:



- A Surface Water and Leachate Management Plan;
- An Odour Impact Assessment;
- A Human Health Risk Assessment;
- An Air Quality Impact Assessment; and
- A Greenhouse Gas Assessment.

Prior to any submissions to the EPA, it is recommended that a scoping meeting with the EPA is held. The EPA's exact data and supporting study requirements can be confirmed during the meeting to ensure that all relevant information is provided to the EPA upon initial submission of the EPA Referral.

#### **12.1.1.3** *Data Requirements*

The general data requirements for the Referral to the EPA include:

- A completed Content of Referral form;
- Spatial data in GIS format, including a site map;
- A description of the proposal and its processes;
- Identification of relevant environmental factors, potential impacts and proposed management measures;
- Extent of any clearing required;
- Holistic and cumulative impact assessments; and
- Supporting specialist studies

The information provided to the EPA is similar to the information required for the DWER Works Approval, however the EPA does not typically require a detailed infrastructure or process descriptions.

#### 12.1.1.4 Appeal Avenues

- Proponents as well as any other person can appeal decisions made by the EPA within 21 days
  of being notified of the EPA's decision. Appeals should be lodged with the Minister for
  Environment through the Office of the Appeals Convenor. The following can be appealed:
- A decision not to assess a referred proposal cannot be appealed by the proponent;
- Conditions set by the Minister on a proposal; and
- A decision to not grant approval.

#### 12.1.2 DWER Works Approval and Licence

The various facilities across the NRRP will be considered Prescribed Premises under Part V of the EP Act and will each need to undergo DWER's approval processes to obtain both a Works Approval and a Licence. The process for obtaining a Works Approval or Licence from DWER is similar for both approvals, however the supporting information required for each differs slightly.

A Works Approval is required before constructing a Prescribed Premises and requires specific detail regarding environmental impacts associated with construction and the likely environmental engineering controls of a proposal. A Licence is required for the operation of the facility and its Application cannot be considered until the construction has been 'certified' by the DWER under the Works Approval process.



## **12.1.2.1** *Prescribed Premises Category*

The NRRP facilities are expected to be classified under different Prescribe Premises categories as outlined in Table 12-3.

**Table 12-3: Prescribed Premises Category** 

Category No.	Name	Description	Production or Design Capacity			
Waste to Energy						
60 Incineration		Premises (other than premises within category 59) on which waste, excluding clean paper and cardboard, is incinerated.	100 kg or more per hour			
67	Fuel burning	Premises on which gaseous, liquid or solid fuel is burnt in a boiler for the supply of steam or in power generation equipment.	In aggregate 500 kg or more per hour (fuel with a sulphur content of 0.25% or more) or in aggregate 2 000 kg or more per hour (fuel with a sulphur content of less than 0.25%)			
52	Electric power generation	Premises (other than premises within category 53 or an emergency or standby power generating plant) on which electrical power is generated using a fuel.	20 MW or more in aggregate (using natural gas) 10 MW or more in aggregate (using a fuel other than natural gas)			
61A	Solid waste facility	Premises (other than premises within category 67A) on which solid waste produced on other premises is stored, reprocessed, treated, or discharged onto land.	1,000 tonnes or more per year			
		Waste Transfer Stati	on			
62	Solid waste depot	Premises on which waste is stored, or sorted, pending final disposal or re-use.	500 tonnes or more per year			
		Community Recycling C	entre			
62	Solid waste depot	Premises on which waste is stored, or sorted, pending final disposal or re-use.	500 tonnes or more per year			
57	Used tyre storage (general)	Premises (other than premises within category 56) on which used tyres ae stored.	100 tyres or more			
		Materials Recovery Fac	cility			



Solid waste facility		Premises (other than premises within category 67A) on which solid waste produced on other premises is stored, reprocessed, treated, or discharged onto land.	1,000 tonnes or more per year		
	Organics				
Compost manufacturing and soil blending		Premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended soils.	1,000 tonnes or more per year		

#### 12.1.2.2 Works Approval

As the NRRP facilities are expected to be considered Prescribed Premises, the developers will be required to obtain a Works Approvals from the DWER. A Works Approval is required before constructing a Prescribed Premises and requires specific details regarding environmental impacts associated with the construction of the facility and the proposed engineering measures to mitigate or manage emissions during operation.

Application forms include an option to request a time limited operations period which allows applicants to perform operations once the Works Approval compliance report has been approved by the DWER and prior to a Licence being granted. The time limited operations period can be set between 90 and 180 days although for WtE projects the DWER has approved long timeframes.

To complete the Works Approval assessment process, including approval for any time limited operations period, the DWER will seek information on:

- Supporting environmental information, such as an Environmental Assessment and Management Plan (EAMP), including:
- Potential impacts;
- Proposed management measures; and
- Evidence of effective stakeholder communication.
- Specialist studies to review the potential environmental impacts of the project and proposed any required management measures such as odour impact assessment, Surface Water and Leachate Management Plan, etc;
- Maps of premises boundaries and preliminary designs;
- Information on any proposed clearing; and
- The proposed activities of the project.

It is recommended that a request for the maximum allowable time limited operations period of 180 days is included within any Works Approval applications associated with the NRRP. This will allow the City and other proponents to avoid delays in the commencement of operation of the NRRP facilities while waiting for the Licences to be granted.



The Works Approval holder will be responsible for ensuring their NRRP facility complies with all Works Approval conditions and will be liable for any penalties if conditions are breached.

#### 12.1.2.3 Licence

The proponent of the various NRRP facilities will be required to apply for a Licence through the DWER (whilst operations are progressing via the time limited operations approvals under the Works Approval). The DWER must be provided with at least one of the following before a Licence can be applied for:

- Environmental Compliance Report; and/or
- Environmental Commissioning Report.

The timeframe for this assessment is expected to be shorter than that of the Works Approval application, as much of the required information will have been provided in the Works Approval application, unless significant changes have been made.

According to the Guidance Statement: Licence Duration (Department of Environment Regulation, 2016), most new licences for new premises will be granted for a duration of 20 years. This reduces the need for applicants to submit Licence renewal applications.

Much of the information provided to the DWER for the Works Approval will be sufficient for the Licence, particularly if a time limited operations period was applied for as detailed infrastructure and operational information would be required by the DWER during the assessment of the Works Approval application.

The Licence holder will be responsible for ensuring that their NRRP facility complies with all Licence conditions and will be liable for any penalties if conditions are breached.

#### 12.1.3 DWER Appeals

Applicants can appeal decisions made by the DWER within 21 days of being notified of the decision. Appeals should be lodged with the Minister for Environment through the Office of the Appeals Convenor. The following can be appealed:

- The conditions of a Works Approval or Licence;
- An amendment to a Works Approval or Licence;
- Refusal to grant or transfer a Works Approval or Licence; and
- Revocation or suspension of a Works Approval or Licence.

#### **12.1.4** Clearing

Clearing will be required to support the development of the NRRP. This clearing will include native vegetation. Therefore, a Clearing Permit will be required from the DWER. However, approval to clear the land can be obtained through the EPA formal assessment process or the DWER Works Approval process.



## 12.1.5 EPBC Act Referral for Matters of National Environmental Significance

The Department of Agriculture, Water and the Environment (DAWE) Matters of National Environmental Significance (MNES); Significant Impact Guidelines 1.1 (MNES Guidelines, 2013) outline significant impact criteria to assist within determining if a project requires referral under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). A project requires referral if it is likely to have a significant impact on MNES. To determine if an action is likely to have a significant impact a proponent undertakes a 'self-assessment' using the MNES Guidelines. If the proponent determines that the action requires referral, the action is referred to the Minister for the Environment (Minister).

As the NRRP does include the clearing of native vegetation, a self-assessment using the MNES Guidelines should be undertaken.

## **12.2** Planning Approvals

The planning approval for the NRRP facilities is required for all facilities except for the WTS and CRC if the City wishes to utilise a Public Works Exemption. It must be ordinarily obtained from the relevant local government, which in this instance is the City, however planning approval can also be obtained from a development assessment panel, depending on the value of the development. The following section outlines the planning framework and approval options.

#### **12.2.1** Zoning

Planning approval in the City is subject to the policies and controls documented within the District Planning Scheme (DPC). The DPS outlines the zoning types within the City and the various land use classes that developments may be classified as. The DPS also sets out which land use classes are or are not permitted in each zone. Developments are required to comply with the relevant policies and controls outlined in the DPS, as well as any broader planning policies and guidelines.

The NRRP is located on land currently zoned as Special Uses under the Metropolitan Region Scheme (MRS) and also the DPS. Within the DPS, Special Use objectives include:

- To facilitate special categories of land uses which do not sit comfortably within any other zone; and
- To enable the local government to impose specific conditions associated with the special use.

The NRRP is located immediately northeast of the Neerabup General Industrial Area. The objectives of the General Industry zone are:

- To provide for a broad range of industrial, service and storage activities which, by the nature of their operations, should be isolated from residential and other sensitive land uses;
- To accommodate industry that would not otherwise comply with the performance standards of light industry; and
- Seek to manage impacts such as noise, dust and odour within the zone.

The Neerabup Structure Plan (Taylor Burrell Barnett, 2020) is the relevant structure plan outlining the proposed future zoning and development. As per the Neerabup Structure Plan, for the southwestern corner of the NRRP, and roughly the proposed location for the WtE facility within the Master Plan, has been zoned for future General Industrial (Figure 2). It is anticipated that the remaining area of the



NRRP could also be zone as General Industrial, however it is recommended that the City engages with its planning department to determine the likely future zoning for Lot 600 and the NRRP.

#### 12.2.2 Land Use Classifications & Permissibility

Talis has reviewed the DPS in relation to the most applicable Land Use classifications for the various NRRP facilities. As will be evident below, some facilities could fall into multiple definitions and where relevant, Talis has assessed the zoning permissibility for each relevant land use classification.

The permissibility of land use classes is dependent on the zoning of the land and may or may not be subject to local government approval. The symbols used in the zoning table of the City's DPS mean the following:

- **P** (*Permitted*) The use is permitted by the City DPS, provided the use complies with the relevant development standards and the requirements of the DPS;
- I The use is permitted if it is consequent on, or naturally attaching, appertaining or relating to the predominant use of the land and it complies with any relevant development standards and requirements of the DPS;
- **D** (*Discretionary*) The use is not permitted unless the local government has exercised its discretion by granting planning approval;
- A (Advertised) The use is not permitted unless the local government has exercised its
  discretion by granting development approval after giving special notice in accordance with
  clause 64 of the LPS; and
- X (Not Permitted)— The use in not permitted by the DPS.

Based on the Neerabup Structure Plan, it is assumed that the full NRRP site could be zoned as General Industry in the future. Talis has determined potential land use classes and permissibility for each of the various NRRP facilities based on the General Industry zoning (Table 12-4). All facilities have obtained a Discretionary or Advertised rating depending on the preferred land use classification applied to the various facilities. Therefore, there is a path to obtaining planning approval for the various facilities, which is particularly relevant in these facilities are to be delivered by the private industry.

The current and likely future zoning and potential use class for the NRRP should be discussed with the City's planning officers to help determine whether the redesigned WTS can be implemented and assist in the preparation of appropriate supporting studies.



Table 12-4: Potential land use classes and permissibility

NRRP Facilities	Definition	General Industrial Zone Permissibility
	Resource Recovery Centre means premises other than a waste disposal facility used for the recovery of resources from waste;	D - Discretionary
WtE	Renewable Energy Facility means premises used to generate energy from a renewable energy source and includes any building or other structure used in, or in connection with, the generation of energy by renewable resources. It does not include renewable energy electricity generation where the energy produced principally supplies a domestic and/or business premises and any on selling to the grid is secondary.	
	Waste Disposal Facility means premises used —  (a) for the disposal of waste by landfill; or  (b) the incineration of hazardous, clinical or biomedical waste;	A - Advertised
MRF	Resource Recovery Centre means premises other than a waste disposal facility used for the recovery of resources from waste;	D - Discretionary
WTS	Waste Storage Facility means premises used to collect, consolidate, temporarily store or sort waste before transfer to a waste disposal facility or a resource recovery facility on a commercial scale	D - Discretionary
cnc.	Resource Recovery Centre means premises other than a waste disposal facility used for the recovery of resources from waste;	D - Discretionary
CRC	Waste Storage Facility means premises used to collect, consolidate, temporarily store or sort waste before transfer to a waste disposal facility or a resource recovery facility on a commercial scale	D - Discretionary
Organics	Resource Recovery Centre means premises other than a waste disposal facility used for the recovery of resources from waste;	D - Discretionary



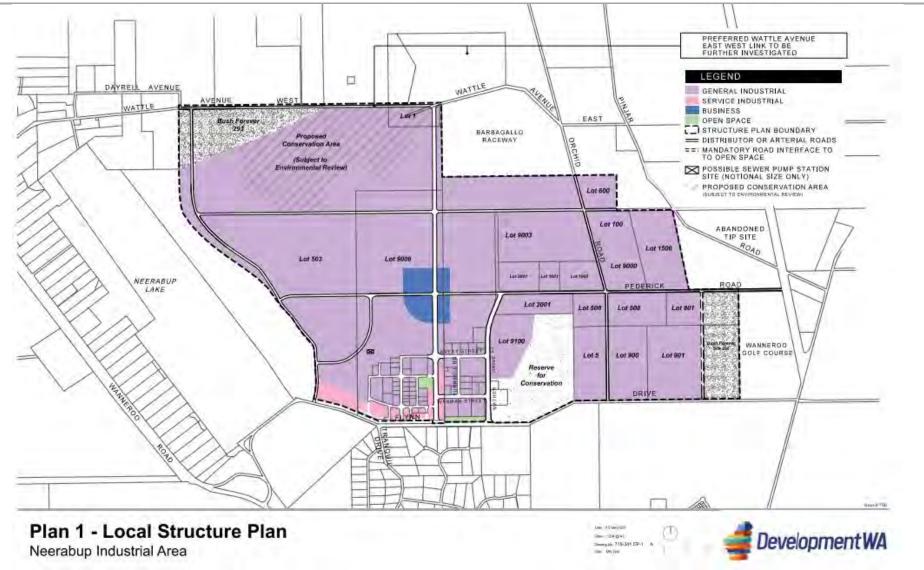


Figure 2: Neerabup Structure Plan Map



#### 12.2.3 Development Assessment Panel Application

Under the Planning and Development (Development Assessment Panels) Regulations 2011, proponents may choose to instead submit a Development Assessment Panel (DAP) application to the City if the estimated value of a project is between \$2-20M. A mandatory DAP application to the City is required if the estimated value a project is estimated to cost over \$20M. Based on Talis' cost estimates (Section 11), the WtE and MRF project will definitely trip the DAP financial threshold.

If additional information is required following submission of the application, the City or the WAPC will discuss this with the applicant prior to providing the application to the DAP for determination. The City will prepare a report to the DAP, known as a 'Responsible Authority Report', which contains an assessment of the project against the applicable planning framework as well as the City recommendation on approval or otherwise. The DAP will then decide whether to approve with conditions, or decline the application.

#### 12.2.4 Planning Appeals

Applicants can appeal decisions relating to planning approvals within 28 of being notified of the decision. Appeals should be lodged with the State Administrative Tribunal. Applicants can appeal:

- Refusal to grant approval; and
- Conditions the approval is subject to.

#### **12.2.5** Public Works Exemptions

In WA, Local Governments are required to provide municipal waste services through enacted legislation. Key elements of the NRRP, particularly the CRC and WTS could be considered public works, which is subject to a Public Works Exemption under Section 6 of the Planning and Development Act 2005 (PD Act) pursuant to Part 6 of the Waste Avoidance and Resource Recovery Act 2007. The PD Act gives exempt bodies the power to undertake a public work, or take land, for the purposes of a public work without obtaining development approval from the responsible authority under the relevant planning scheme subject to certain conditions.

The key pieces of legislation relating to the Public Works Exemption are the PD Act, Public Works Act 1902 and the Waste Avoidance and Resource Recovery Act 2007.

In accordance with the PD Act, a proponent such as a Local Government (and other bodies, as specified in Section 6 of the PD Act) is entitled to the public works exemption for Development Approvals:

"(1) Subject to section 5(2) and (3) and subsections (2) and (3) of this section, nothing in this Act interferes with the right of the Crown, or the Governor, or the Government of the State, or a local government.

to undertake, construct or provide any public work."

Public works is defined in the Public Works Act under Part 1 Section 2 as:

"(a) every work which the Crown, or the Governor, or the Government of WA, or any Minister of the Crown, or any local authority is authorised to undertake under this or any other act."

The Waste Avoidance and Resource Recovery Act 2007 came into force in WA in July 2008 and was developed to, amongst other things, provide a legislative framework for waste avoidance and resource



recovery systems and prescribe local government waste management responsibilities. Part 6 of the Waste Avoidance and Resource Recovery Act 2007 outlines the requirement of local governments to provide waste services. Under Section 3 - Terms Used, 'waste service' means:

- "(a) the collection, transport, storage, treatment, processing, sorting, recycling or disposal of waste; or
- (b) the provision of receptacles for the temporary deposit of waste; or
- (c) the provision and management of waste facilities, machinery for the disposal of waste and processes for dealing with waste."

Therefore, the various piece of waste infrastructure (such as the CRC and WTS) to be provide by the City would be regarded as a critical service for the community that aligns with the service requirements under Part 6 of the Waste Avoidance and Resource Recovery Act 2007.

Given the requirement of Local Government Authorities to provide waste services including infrastructure, the establishment of various elements of the NRRP to be provided by the City would therefore be defined as a public work which is subject to a public works exemption under the PD Act. The PD Act gives exempt bodies the power to undertake a public work or take land for the purposes of a public work without obtaining development approval from the responsible authority under the relevant planning scheme. However, the proponent will still be required to have regard to the purpose and intent of the local planning scheme and have regard to the principles of proper and orderly planning and the amenity of the area:

- "(2) Rights referred to in subsection (1) are to be exercised having due regard to -
- (a) the purpose and intent of any planning scheme that has effect in the locality where, and at the time when, the right is exercised; and
- (b) the orderly and proper planning, and the preservation of the amenity, of that locality at that time."

It is recommended that the City discusses the Public Works Exemption with its Planning Department and may also wish to obtain legal advice on this matter.

#### 12.3 Timeframes

Table 12-5 outlines the typical assessment timeframes for the various environmental and planning approvals following submission of complete applications. These timeframes may differ in practice depending on the complexity of the project and requests for further information from regulators. It is recommended that the City and other NRRP facility proponents consults with the various approval authorities while they are assessing the various applications to ensure that the assessments are progressing according to anticipated timeframes.

The City and other NRRP facility proponents should also consider progressing with the detailed design works and construction contract procurement processes to a stage such that once approvals are received, construction can immediately commence.

**Table 12-5: Anticipated Timeframes** 

Requirement Anticipated Assessment Time	Requirement	Anticipated Assessment Time
---	-------------	-----------------------------



EPA Referral (Formally Assessed)	18 months
EPA Referral (Not Assessed)	6 months
Works Approval	6 months
Planning Approval	4 months
Licence	6 months

## 12.4 NRRP Approvals Pathway

The NRRP includes a variety of recovery and waste management infrastructure each with their own characteristics (including waste accepted and treatment) along with associated environmental and social factors. Therefore, all facilities will have differing approval pathways. It is anticipated that the CRC and WTS will both be owned and operated by the City and therefore, public works exemptions approach as an alternative to planning approval. In addition, there is the opportunity for the City to obtain a combined approvals for both the CRC and WTS if desired.

The proposed approval pathway for each facility is shown in Table 12-6.

Table 12-6: Anticipated Approval Pathway for each facility

NRRP Facilities	EPA Referral	DWER		Blanding Aggressel
NRRP Facilities	EPA Referral	Works Approval	Licence	Planning Approval
WtE	✓	✓	✓	✓
MRF	Х	✓	✓	✓
CRC	Х	✓	✓	Public Works
WTS	Х	✓	✓	Exemption
<b>Battery Storage</b>	Х	✓	✓	✓
Organics	✓	✓	✓	✓



## 13 Project Delivery Model

As part of the Master Plan, Talis has investigated the options for a Project Delivery Model to develop a framework that could be further advanced as the project develops. The key focus at this stage is to determine which aspects of the project would be delivered in-house by the City and which aspects may be best delivered through private firms including private waste service providers.

Talis recognises a significant shift in the delivery of waste infrastructure within WA and Australia consistent with recent international trends. The delivery of Merchant Plant facilities is becoming more prevalent where facilities (particularly waste processing facilities) are delivered by private industry including approvals, financing, construction and operation. These facilities accept waste from multiple waste generators across both local government and the private sectors. To support such facilities, and particularly those with significant capital and operational costs, these Merchant Plant facilities obtain financial backing based on securing large volume and long-term waste supply agreements with large local government and regional council groups. This is how the two WtE facilities south of Perth obtained the necessary financing arrangements to commence construction. Under the Merchant Plant contract model, the City (and other local governments) main risk would be the supply of waste however this would be mitigated through a waste arising contracts that commits these local governments to provide its residual streams generated (as opposed to an actual tonnage value). Merchant Plant proponent preference is to secure contracts regional councils or grouping of local governments that provide significant volumes and for long term periods (20 year terms). This emphasises the importance of the City continuing to work with its surrounding to local governments (such as the Cities of Joondalup and Stirling) to provide as much tonnage to the market under one procurement process.

In turn, Local and Regional Governments are in many instances transitioning away for waste facilities ownership and operations, and particularly in metropolitan areas where the private sector is providing such services. However, Local and Regional Government are continuing to own and operate waste infrastructure to accept, consolidate and transport waste to other processing facilities such as CRC and WTS.

To assist in this process, Talis determined the key stages required throughout the lifetime of the NRRP from development through to closure (Diagram 13-1). There are a variety of risks and associated liabilities across the life cycle of facility delivery and operations, which is a key aspect in determining a preferred Project Delivery Model Framework. As part of this process, the City and Talis held workshops to consider who would be best placed to manage these risks and liabilities across each of the various NRRP projects. The Preferred Delivery Model Framework for each of the various stages of the life cycle for each of the NRRP facilities is discussed in the following sections.

During the Market Sounding process participants were asked to comment on the proposal for delivering the project through a Merchant Plant arrangement. Most agreed this would be suitable, however, Veolia and Remondis noted a preference for a Public Private Partnership (PPP) model instead so investment risks could be shared with the City.

While PPP has been successful for projects in Europe, the Australian industry has seen a move away from this approach instead favouring the Merchant Plant model.



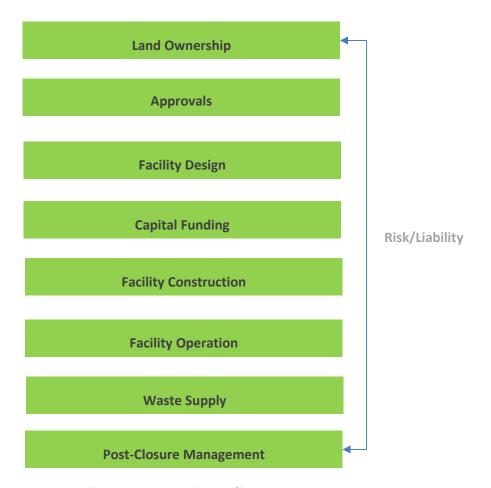


Diagram 13-1: Project Delivery stages

#### 13.1 Land Ownership

As outlined previously, the proposed NRRP site is currently located on freehold land owned by the City.

Talis is of the opinion that the City should retain land ownership over all parcels of land to be able to retain long term planning and decisions making for the NRRP. Once the land is sold, its use will no longer be determined by the City and could be used for a purpose other than a waste related use.

Where a facility is going to be developed and operated by an entity other than City, their tenure on the land can be secured by way of a lease agreement. This lease agreement can include clauses to the effect that they must accept the City's suitable waste material.

The only exception for this is for the WtE facility if the proponent requires ownership of the land to secure approvals and/or financing. Due to the significant investment in the WtE facility, the financial backers of this facility may require that the land be owned by the proponent to reduce their overall risk to the project. In this instance, the City should consider selling the land for a WtE at commercial rates to the proponent with the caveat that the facility needs to accept and process the City's waste and that works need to be progressed within a specified time frame or ownership will revert back to the City at the original purpose price.



## 13.2 Approvals

The approvals required for the facilities can be categorised into key groupings including planning and environmental (as discussed in Section 61).

Talis recommends that the proponent of each facility should seek their own approvals for their respective facilities. City should secure all the approvals for the WTS and CRC along with the access way and weighbridge to the combined weighbridge. In this instance, a public works exemption can be utilised as an approach for planning.

The respective proponents to secure the as all approvals for the WtE, MRF and other potential private facilities.

The only alternative to this approach is whether the City considers securing a clearing permit for the either NRRP or event just the Southern Area to assist with the development of the NRRP. Talis recommends that this approach is discussed with the DWER.

## 13.3 Capital Funding

This stage is specifically concerned with the provision of capital funding for the construction of the various facilities. The Cost Estimates carried out in Section 11 indicates that the initial capital cost of developing the NRRP will be in the region of \$1.25 B (excl. GST).

As outlined previously, the WTS, the CRC and Weighbridge facility are to be delivered by the City and therefore, the capital costs associated with these projects will be the responsibility of the City. However, the WTS and MRF (as well as other lots within the Northern Expansion Area) which should be delivered as Merchant Plants. Therefore, the capital funding for these facilities should be delivered by their respective proponents.

## **13.4** Facility Design & Construction

Talis proposes that the design and construction for the WTS, CRC and Weighbridge facilities is delivered by the City. However, the City will use specialists contractors to assist with the design and construction of these facilities through formal procurement processes.

The proponents for the WtE, MRF and Organics facilities will hold overall responsibility for the design and construction of these facilities. Many of these facilities are technologically advanced requiring in depth knowledge of the process to ensure a successful design. The knowledge and experience required to design these types of facilities is therefore limited to proponents of the technology or specialist engineering companies.

#### 13.5 Facility Operation

The successful operation of WtE, MRF and Organics facilities requires specialist knowledge and experience. The City currently does not have the technical knowledge and experience in-house to operate these facilities and securing and maintaining such staffing resources would prove extremely challenging for the City. In addition, the governance model, administration systems and lack of flexibility associated with Local Governments function are not always conducive to the demands of operating a modern waste infrastructure, especially in the case of WtE, MRFs and Organics facilities.



Talis recognises a variety of advantages that private waste service providers have over Local Governments in the operation of waste management facilities, including but not limited to:

- Waste management services are part of their core business;
- Pool of specialised and experienced staff to draw from;
- Greater access to latest international technology and expertise;
- Advanced operational systems including administration, environmental and health and safety;
- Greater operational flexibility resulting in:
  - simpler decision making processes;
  - o ability to adjust to altering project demands;
  - ability to attract and retain staff;
- Competitively priced services; and
- Greater ability to secure funding for new investments.

For these reasons, Talis recommends that the WTE, MRF and Organics facilities should be operated by a private proponent.

Where the facility operations are less complex or customer focussed, such as WTS and CRCs, the City would be ideally suited to be operated by the City. However, the City may also choose to have these facilities operated by a private contractor on their behalf.

## 13.6 Waste Supply

The delivery of Merchant Plant facilities is becoming more prevalent particularly for waste processing facilities. These facilities accept waste from multiple waste generators across both local government and the private sectors. To support such facilities, and particularly those with significant capital and operational costs, these Merchant Plant facilities obtain financial backing based on securing large volume and long-term waste supply agreements with large local government and regional council groups. This is how the two WtE facilities south of Perth obtained the necessary financing arrangements to commence construction. Under the Merchant Plant contract model, the City (and other local governments) main risk would be the supply of waste however this would be mitigated through a waste arising contract that commits these local governments to provide its residual streams generated (as opposed to an actual tonnage value). Merchant Plant proponent preference is to secure contracts from regional councils or grouping of local governments that provide significant volumes and for long term periods (20 year terms). This emphasises the importance of the City continuing to work with its surrounding to local governments (such as the Cities of Joondalup and Stirling) to provide as much tonnage to the market under one procurement process. Such waste supply arrangements will be necessary for the WtE facility to provide foundation feedstocks. This may also be required for MRF and Organics facilities.

## 13.7 Summary of Preferred Delivery Models

From a technical perspective, Talis' recommended Delivery Model Framework for the various facilities of the NRRP are summarised in Table 13-1 below.



Table 13-1: Delivery Model Framework

Project Phase	WtE	MRF	CRC	WTS	Battery Storage	Organics	Leased Lots
Land Ownership	City	City	City	City	City	City	City
Waste Supply	City	City	City	City	NA	City	Private
Approvals	Private	Private	City	City	Private	Private	Private
Capital Funding	Private	Private	City	City	Private	Private	Private
Facility Design	Private	Private	City	City	Private	Private	Private
Facility Construction	Private	Private	City	City	Private	Private	Private
Facility Operation	Private	Private	City	City	Private	Private	Private

\_



## 14 Preliminary Timelines

Preliminary timelines for the delivery of the key priority facilities including WTS, CRC, MRF, WtE facility were prepared through discussions between the City and Talis including feedback from the Market Sounding process. These are shown in Figure 3.

To minimise timeframes, a variety of the tasks will be completed concurrently including the detailed design during the approvals process. This will expedite the delivery of the various infrastructure elements. It is important to note that it is anticipated that the preferred contractor will secure the relevant approvals for the MRF, however this could be taken on by the City further reducing the timeframe its delivery.

It is proposed that the construction of the WTS and CRC would be delivered through a single construction contractor, however the delivery of the WTS would be prioritised over the CRC due to the urgency and pressing need for that facility.

Enabling works will be required to deliver the NRRP, including facilitating its construction. These works should commence as soon as possible to minimise potential delays with the delivery of the various NRRP facilities.

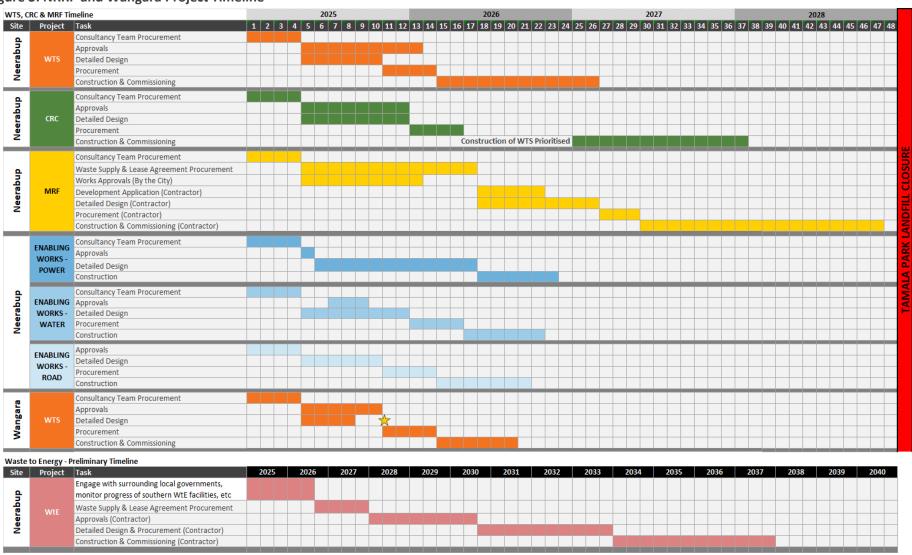
The timeline for development of the WTS at the Wangara site is also included as a contingency if needed by the City prior the timeframe for the delivery of the WTS at NRRP. The City may wish to get the Wangara WTS project construction ready by obtaining the approvals and completing the necessary detailed design works.

WtE projects have long lead times with the two WtE facility now going for over 15 years and not yet fully operational. However, as these where the first to be approved and developed in Australia and were also impacted by COVID-19. Experience suggests that these pioneering projects have now paved the path for the future WtE facilities and therefore, the lead times for the next facilities will be reduced. Globally, WtE generally required 8-10 years to deliver. Based on the feedback from the Market Sounding process, it is recommended that the City closely monitors the progress of the two southern WtE facilities over the coming two years while doing works in the background including engaging with surrounding local government about consolidation of waste volumes and support for the project. In addition, the City should commence with the preparation of the Waste Supply Agreement and Lease Agreement. At this stage, it is recommended that the City does not release the Waste Supply and Lease Agreement to the Market until 2026, when the two southern WtE facilities will have a couple of years of operations. Based on the above, it is anticipated that it will take approximately 13 years to deliver a WtE facility at NRRP.

Talis recommends that the City prepares a Project Management Plan for the delivery of the NRRP advancing greater breakdown on the various tasks and their interactions across multiple facilities. This should be updated on a regular basis as the project progresses.



Figure 3: NRRP and Wangara Project Timeline





## 15 Recommendations

Based on the works completed on this Master Plan Report including the Market Sounding process, Talis puts forward the following recommendations for the City's consideration:

- 1. Progress the development of the Neerabup Resource Recovery Precinct on Lot 600 Old Yanchep Road by proceeding with enabling works packages.
- 2. Focus on the development of the Southern Area of Lot 600 for the delivery of the high priority waste infrastructure and leave the North Expansion Area for future development. The high priority waste infrastructure includes the Waste Transfer Station, Material Recovery Facility, Community Recycling Centre and Waste to Energy Facility.
- 3. Advocate for a regional approach by working with surrounding local governments to consolidate tonnages to provide suitable feedstocks for future facilities at the Neerabup Resource Recovery Precinct.
- 4. Prioritise the delivery of the following high priority waste infrastructure:
  - Waste Transfer Station and Community Recycling Centre: commencing with Approvals and Detailed Design works. These works should be delivered through one construction package;
  - Material Recovery Facility: commencing Recycling Processing Contract coupled with a Lease Agreement for the development of the Material Recovery Facility by private industry. The City may take on the Approvals for the Material Recovery Facility to further expedite its delivery; and
  - c. Wangara Waste Transfer Station: Progress with the necessary approvals and detailed design works so that this project is construction ready. This will provide a contingency arrangement to the City should Tamala Park landfill cease operations and the Neerabup Waste Transfer Station not ready to commence operations.
- 5. Support the development of a Waste to Energy facility at the Neerabup Resource Recovery Precinct by;
  - a. Protect its proposed location within the Master Plan including through relevant planning controls;
  - b. Closely monitor the progress of the two Waste to Energy facilities over the coming years;
  - c. Advocate to state government for an increase on the landfill levy to make Waste to Energy projects more financially viable; and
  - d. Commence with the preparation of a Waste Supply Agreement for Waste to Energy services coupled with a lease agreement for the Waste to Energy site at the Neerabup Resource Recovery Precinct. To maximise the necessary foundation feedstocks the Waste Supply Agreement should be delivered through a regional procurement process with surrounding local governments. This Waste Supply Agreement should be released in approximately 2 years.



- 6. Seeking funding opportunities for the development of the Neerabup Resource Recovery Precinct.
- 7. Prepare a detailed Project Management Plan for the delivery of the Neerabup Resource Recovery Precinct outlining all the key stages and tasks associated the various facilities. As part of these works, continue to assess opportunities to streamline the delivery of the works including running tasks concurrently as well as combining approval applications and procurement processes across various facilities.
- 8. Prepare a Community and Stakeholder Engagement Plan for the Neerabup Resource Recovery Precinct to its development and support future approval applications. The Waste to Energy facility should be included in all such activities from the offset to assist with its social licence to operate and future approval processes.
- 9. Engage with the City's Town Planning department in relation to:
  - a. Further progressing the zoning of Lot 600 to enable the delivery of the Neerabup Resource Recovery Precinct; and
  - b. Confirm the appropriate planning approach for the Project including the City utilising Public Works Exemptions for the facilities it will own and operate.
- 10. Engage with the Department of Water and Environmental Regulations in relation to the approvals for the Neerabup Resource Recovery Precinct and particularly if the City can obtain a Clearing Permit for the full area and submit Works Approval for the Material Recovery Facility.
- 11. Further investigate the development of a Solar Farm on the old Pinjar Landfill Lot 503 Old Yanchep Road.



## **APPENDIX A**

# **Figures**

Figure 1: Site Locality of the City's Nominated Sites

Figure 2: Site Locality of Lot 502

Figure 3: Site Locality of Lot 503

Figure 4: Site location of Lot 600

Figure 5: Zoning

Figure 6: Site location of Lot 801

Figure 7: Easements on Lot 600

Figure 8: Topography

Figure 9: Geology

Figure 10: Surface Water

Figure 11: Wetlands

Figure 12: Groundwater

Figure 13: Vegetation Units

Figure 14: Vegetation Condition

Figure 15: Threatened and Priority Ecological Communities, Environmentally Sensitive Areas &

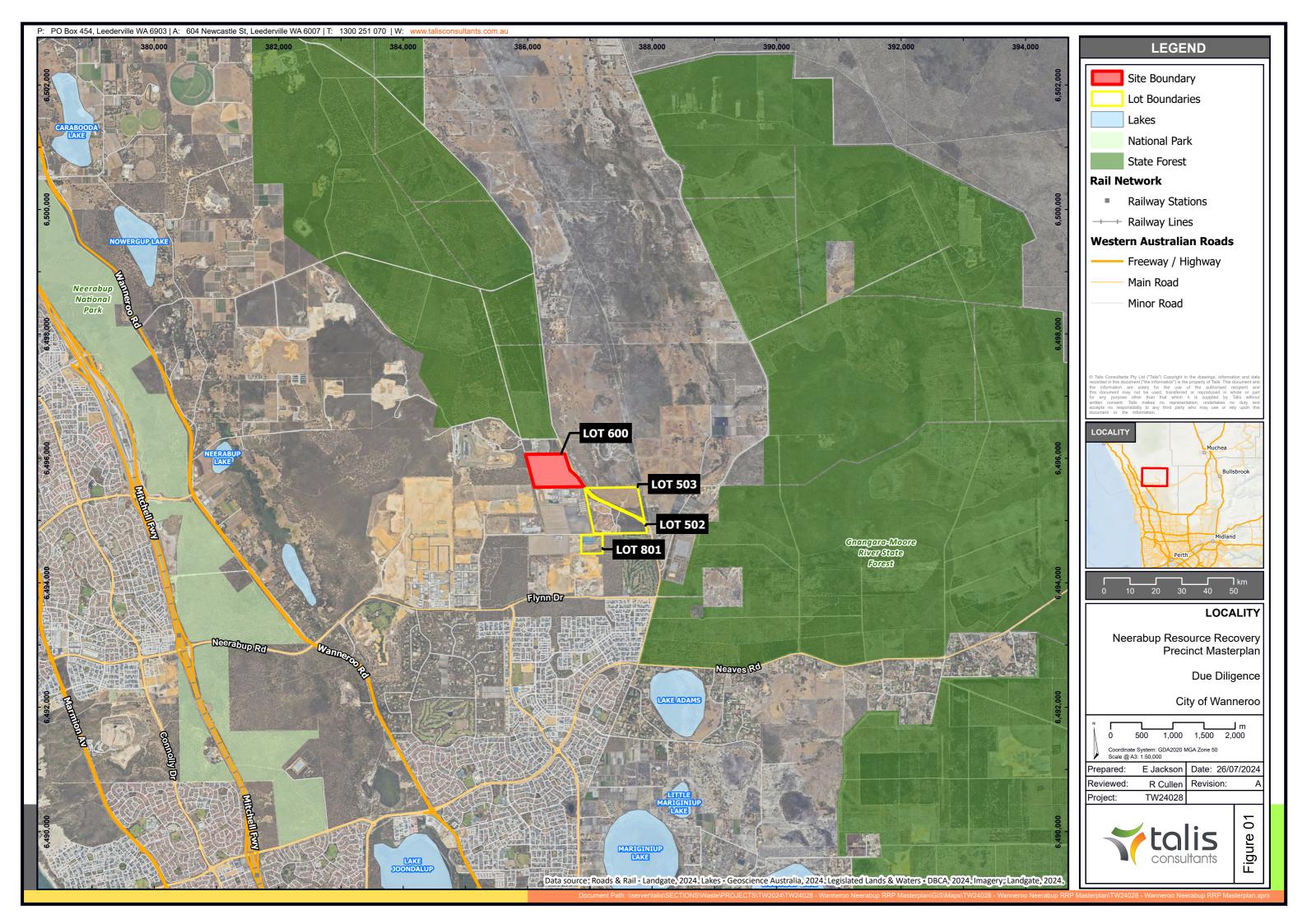
**Conservation Reserves** 

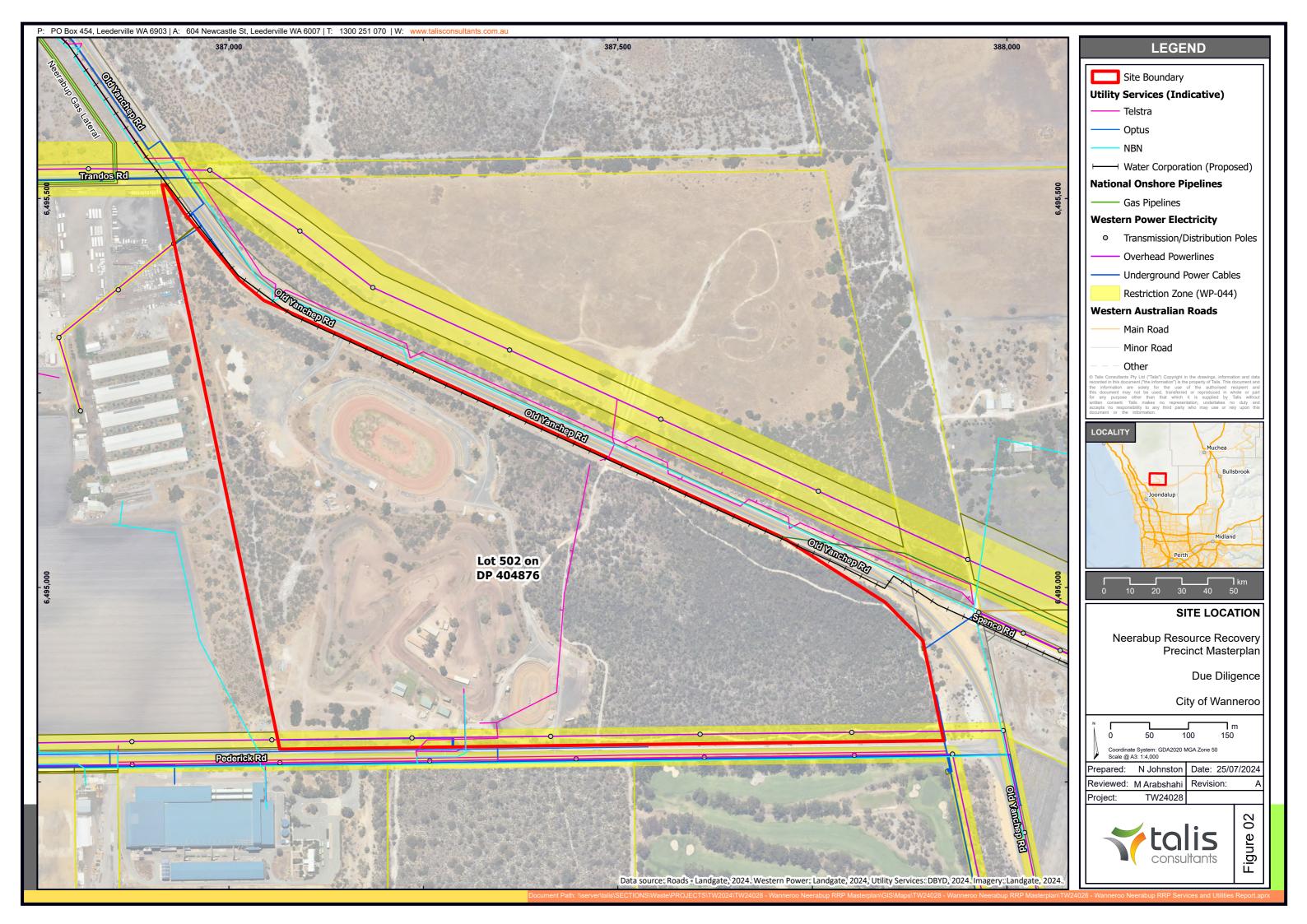
Figure 16: Threatened Priority Flora

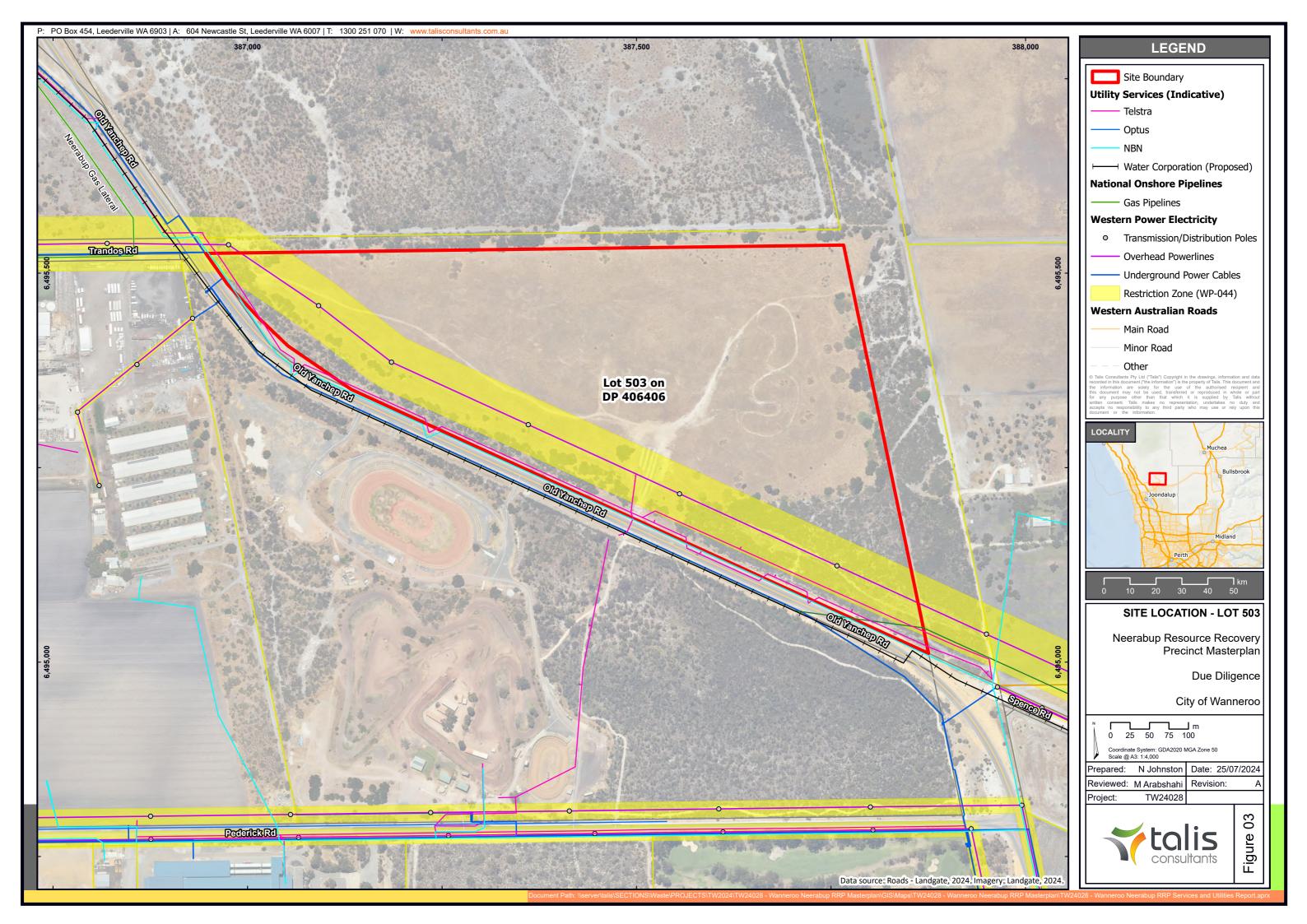
Figure 17: Threatened Priority Fauna

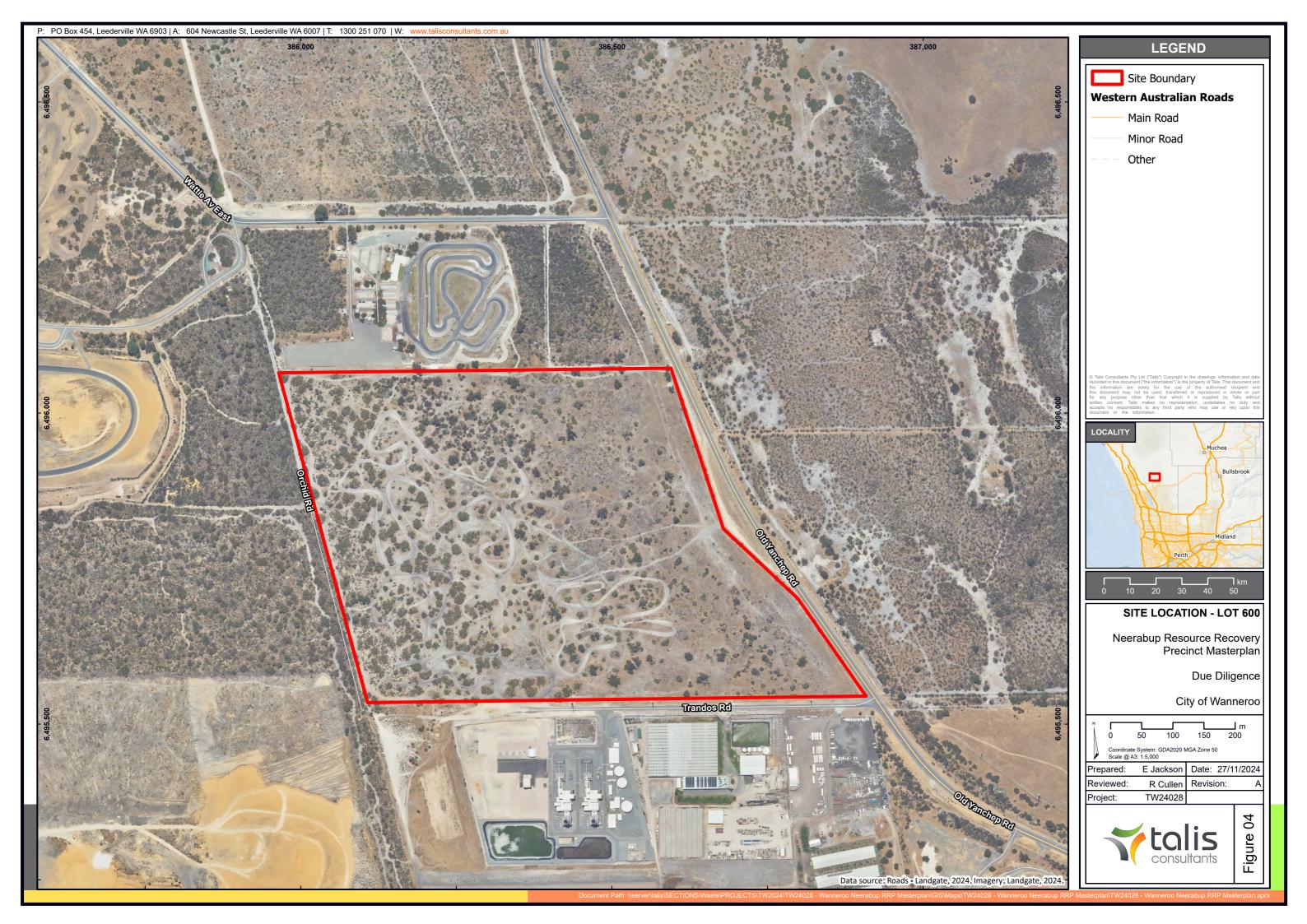
Figure 18: Separation Distances

Figure 19: Heritage

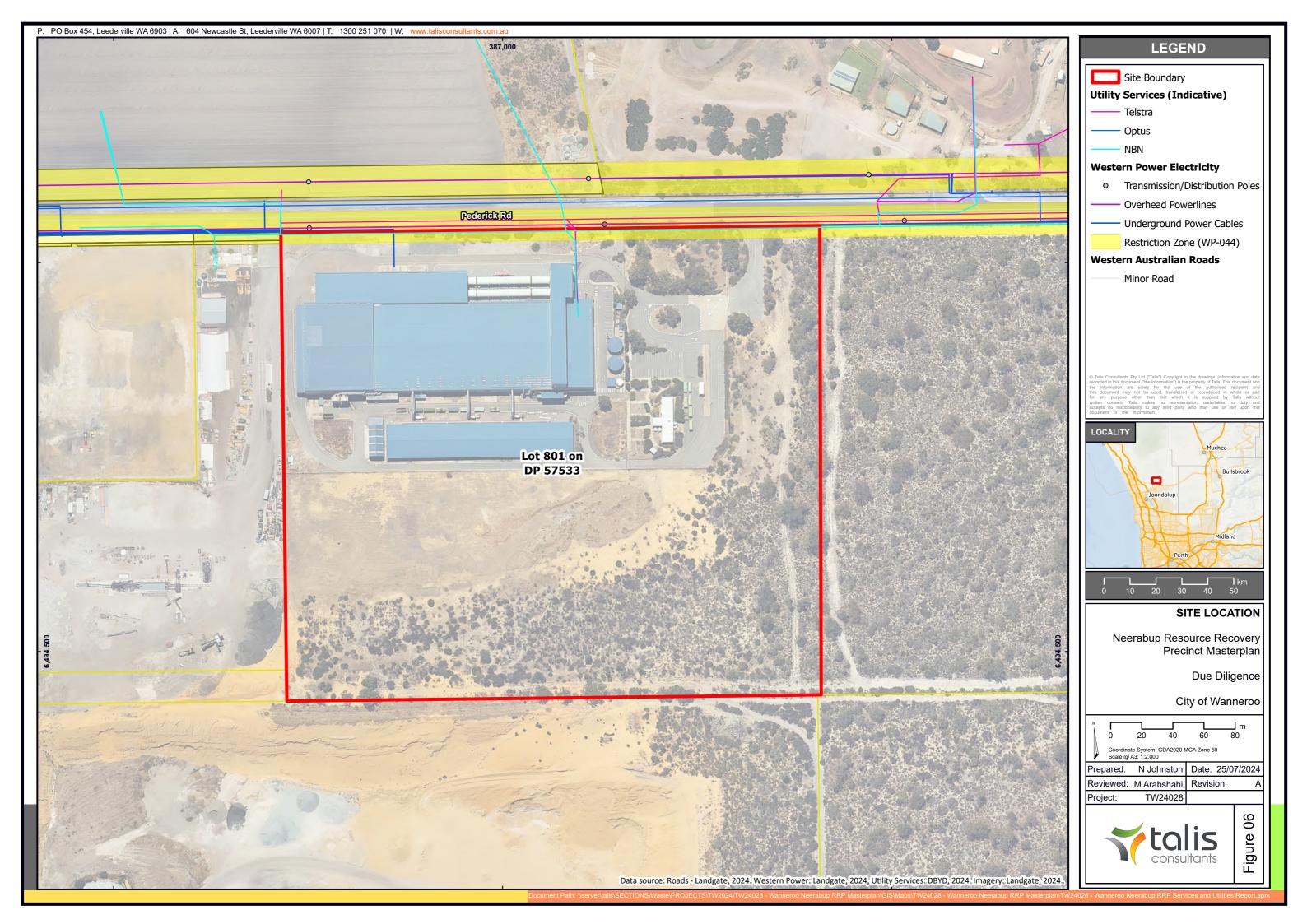


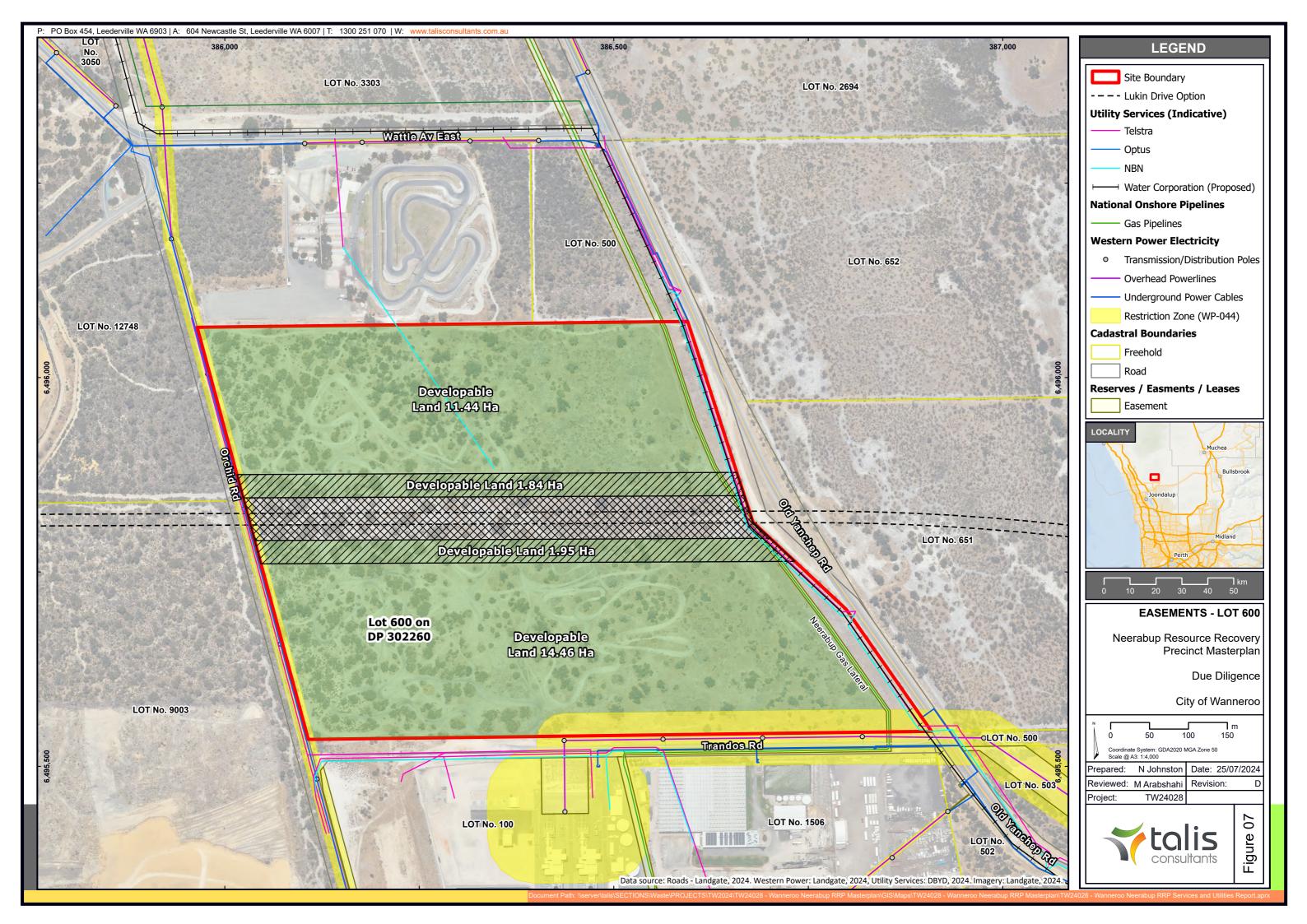


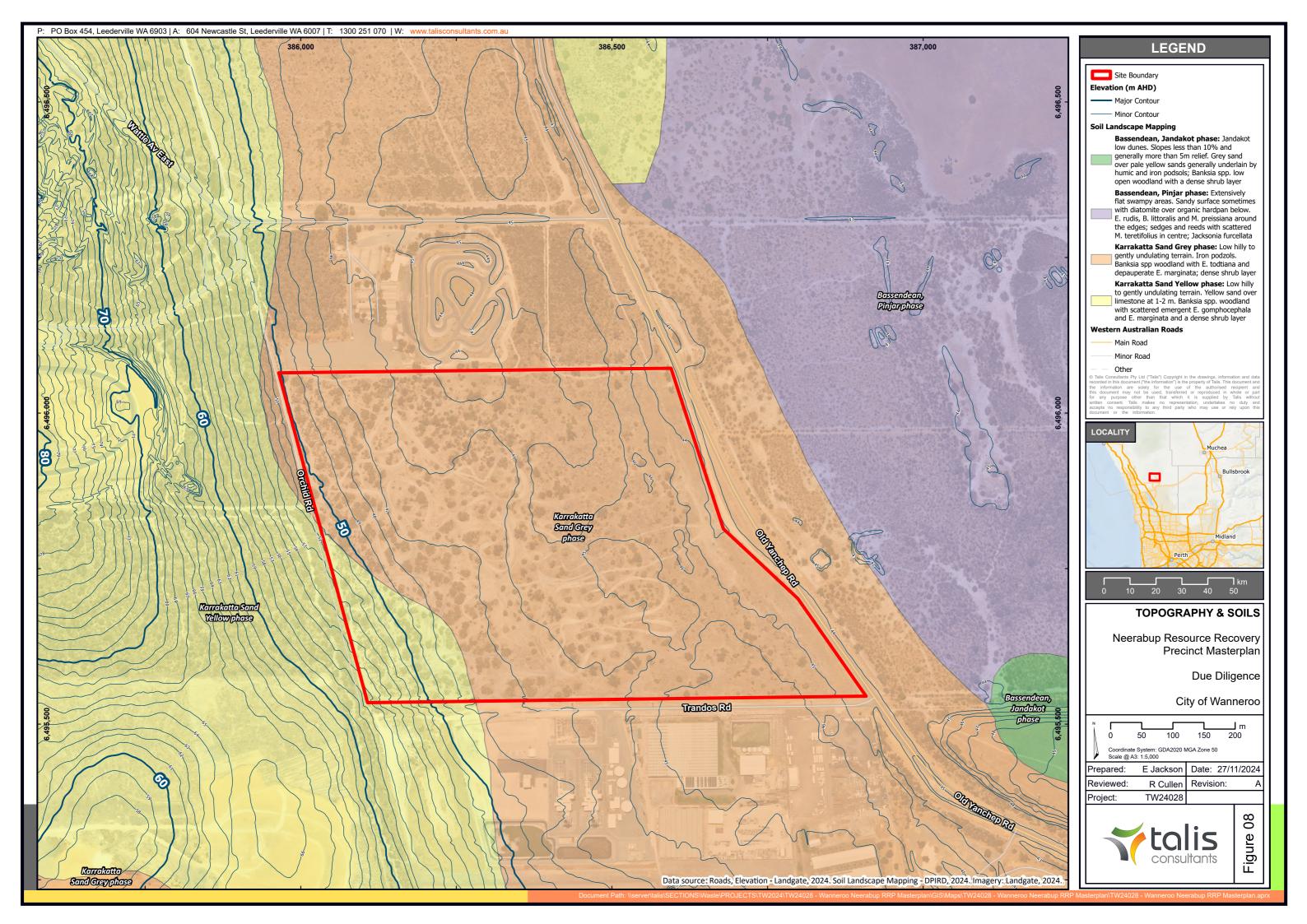


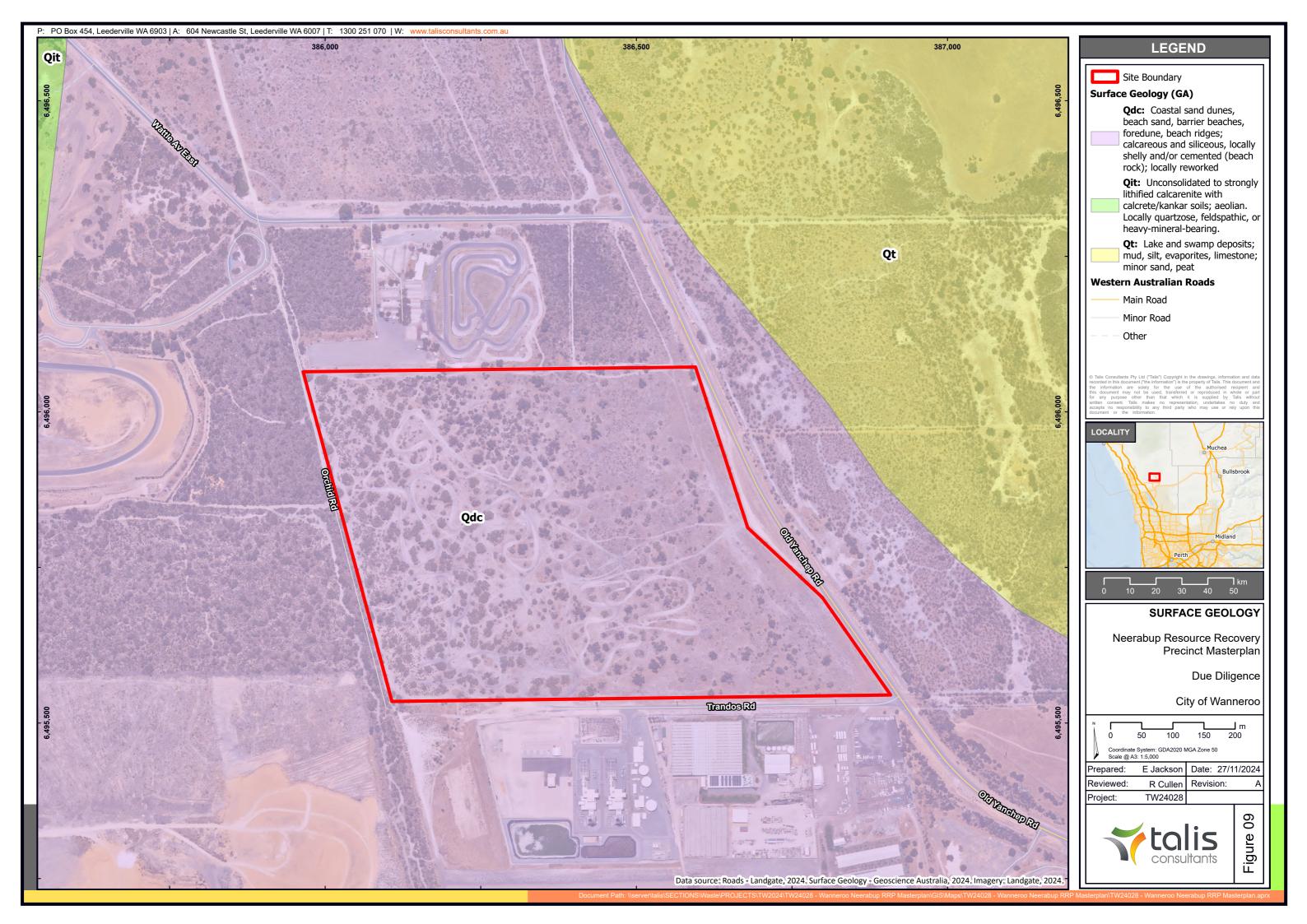


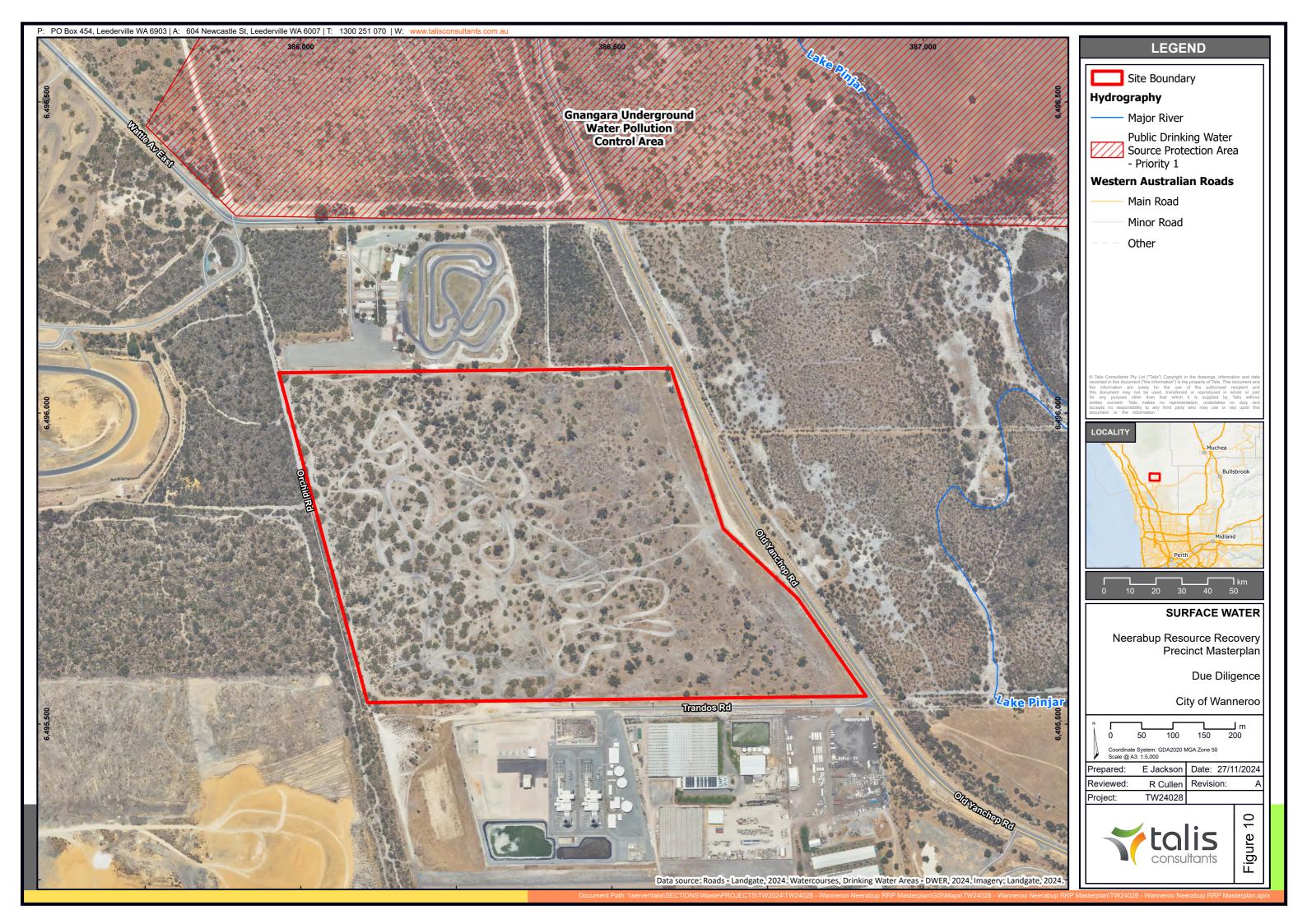


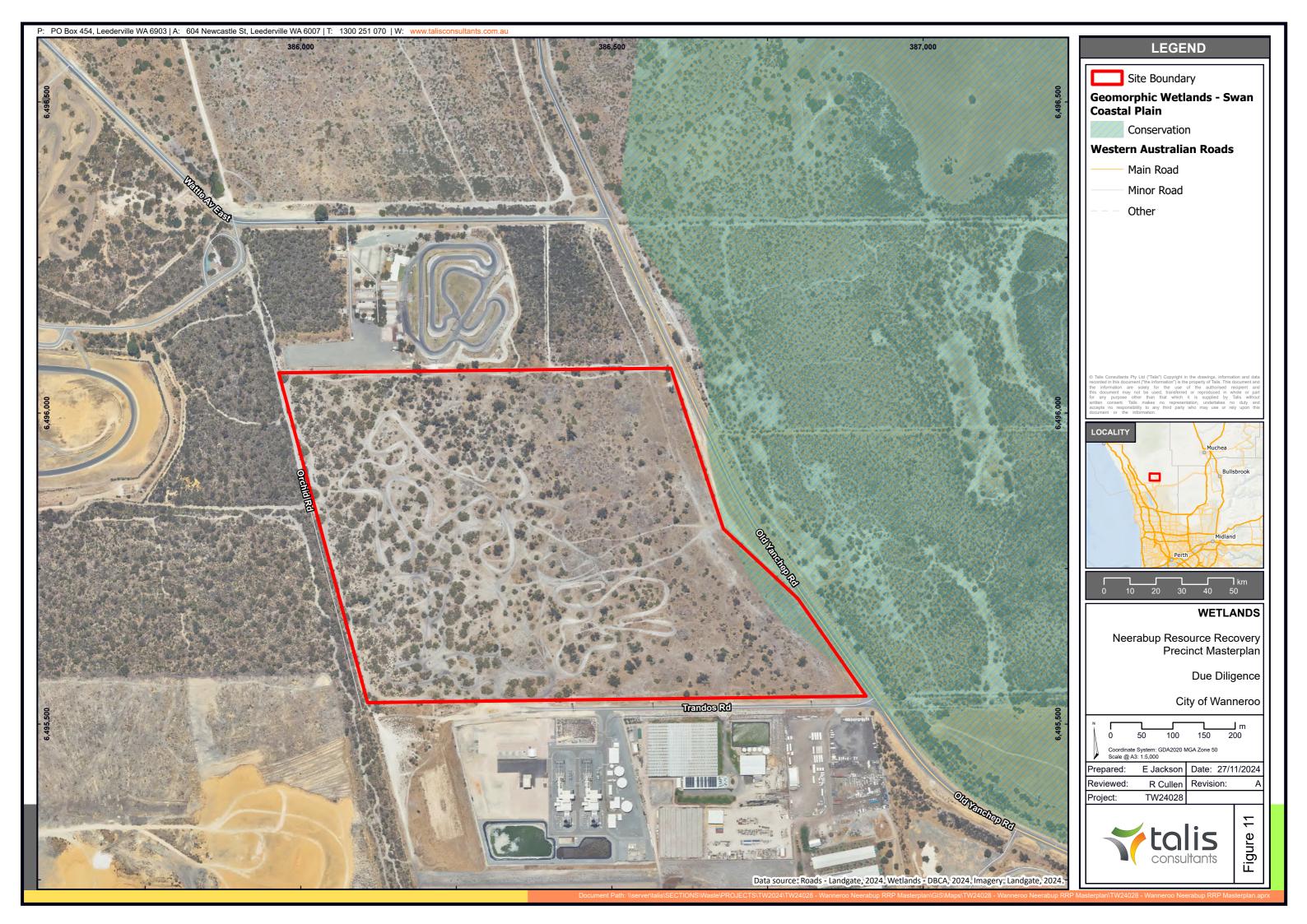


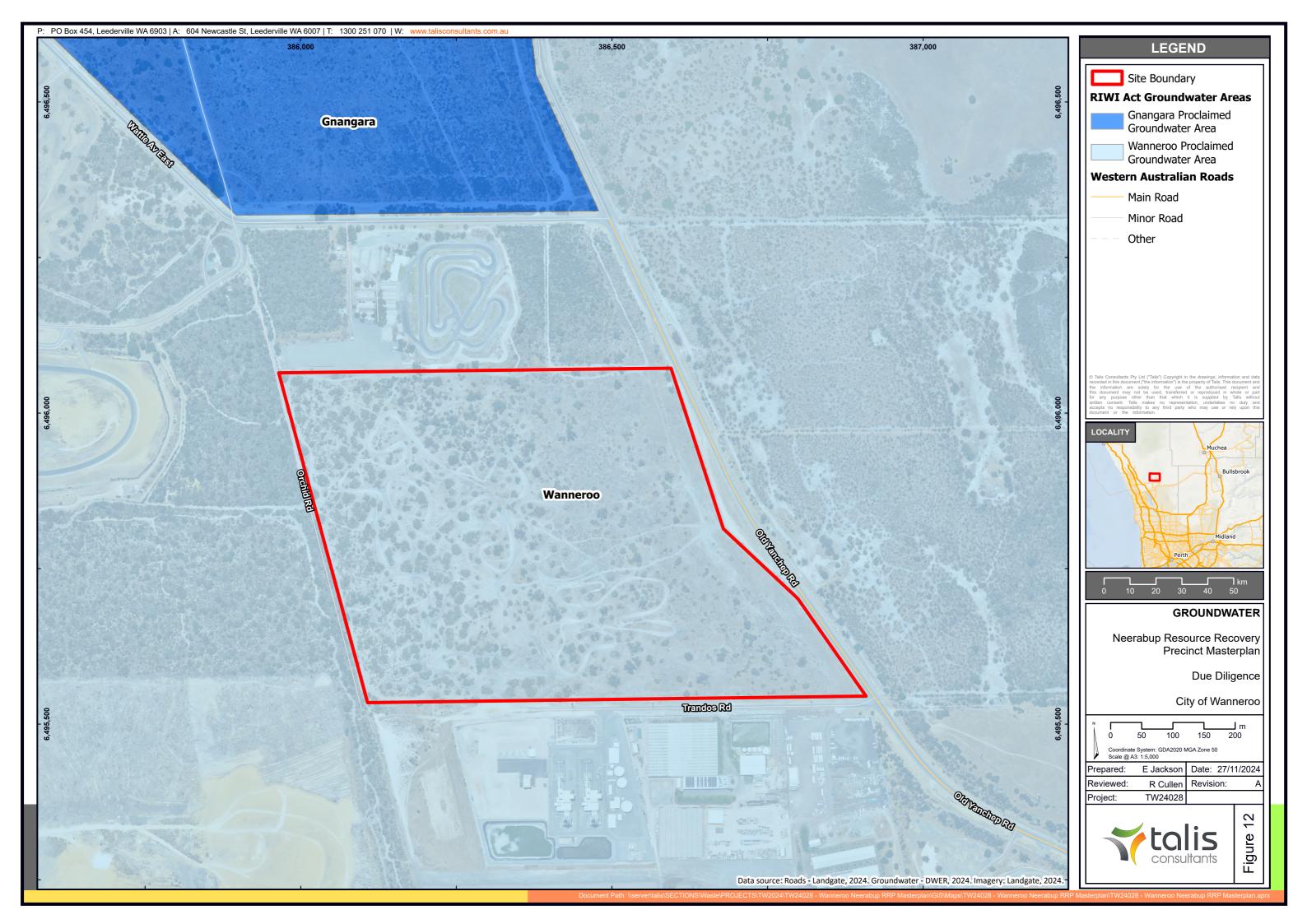


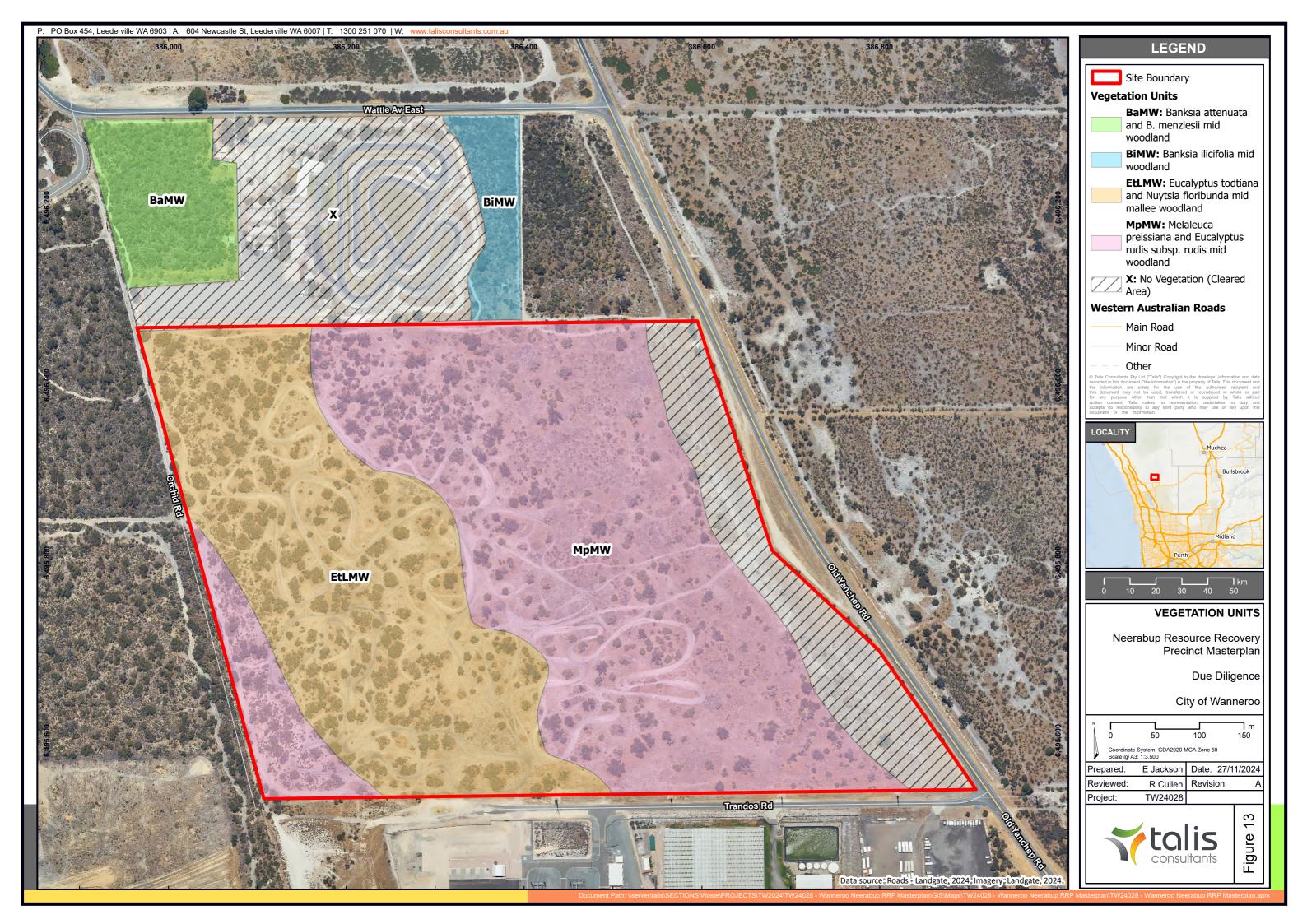


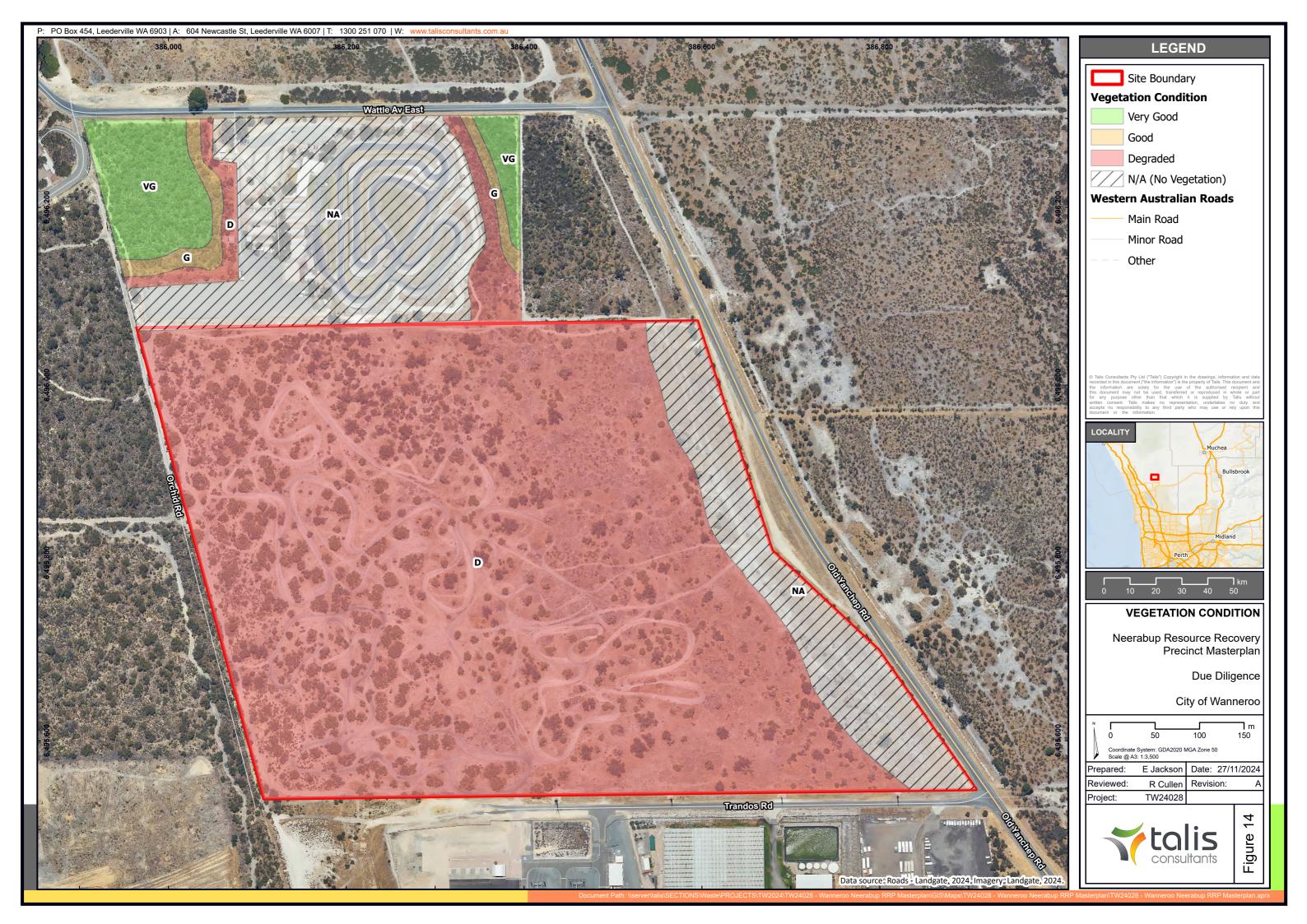


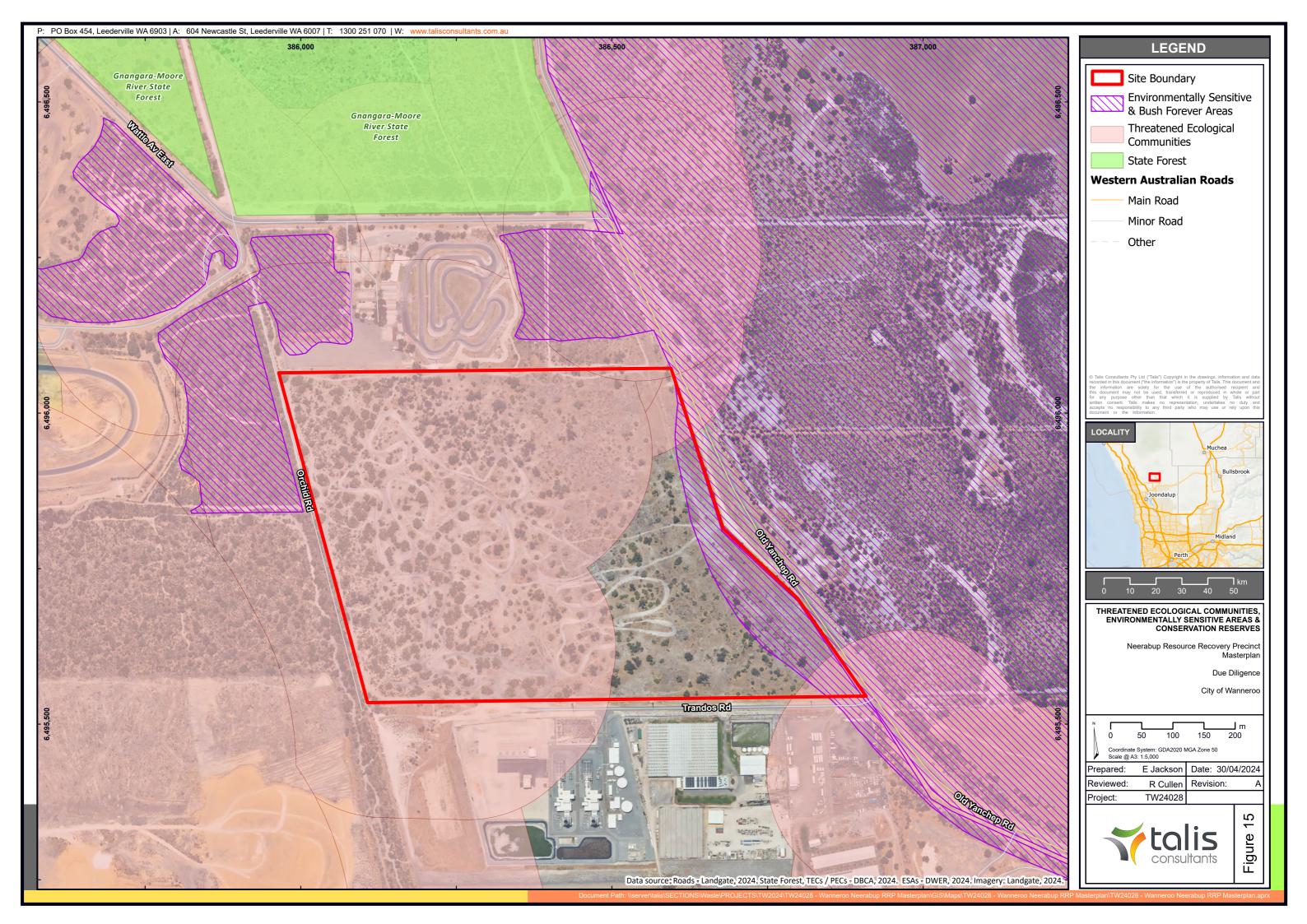


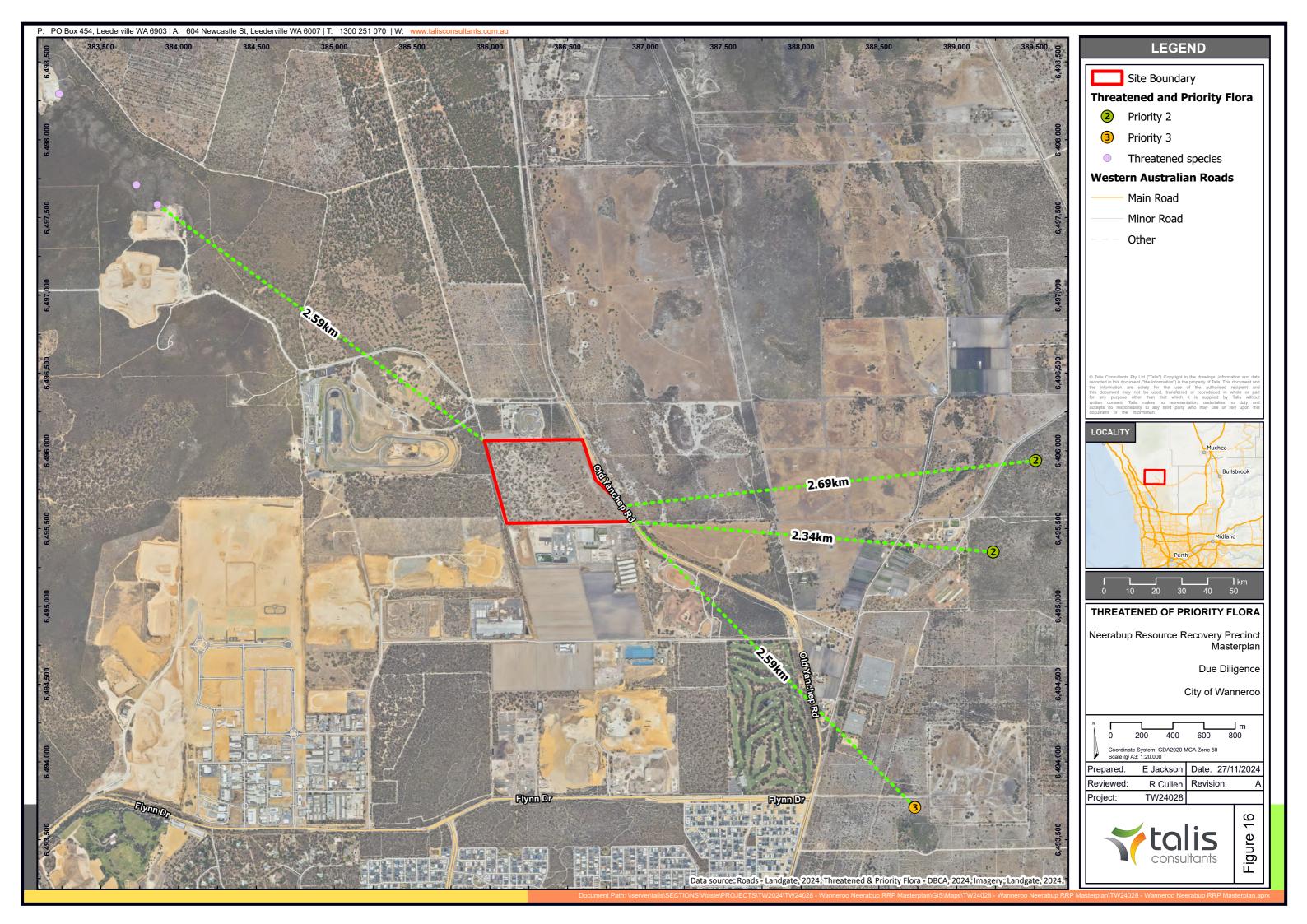


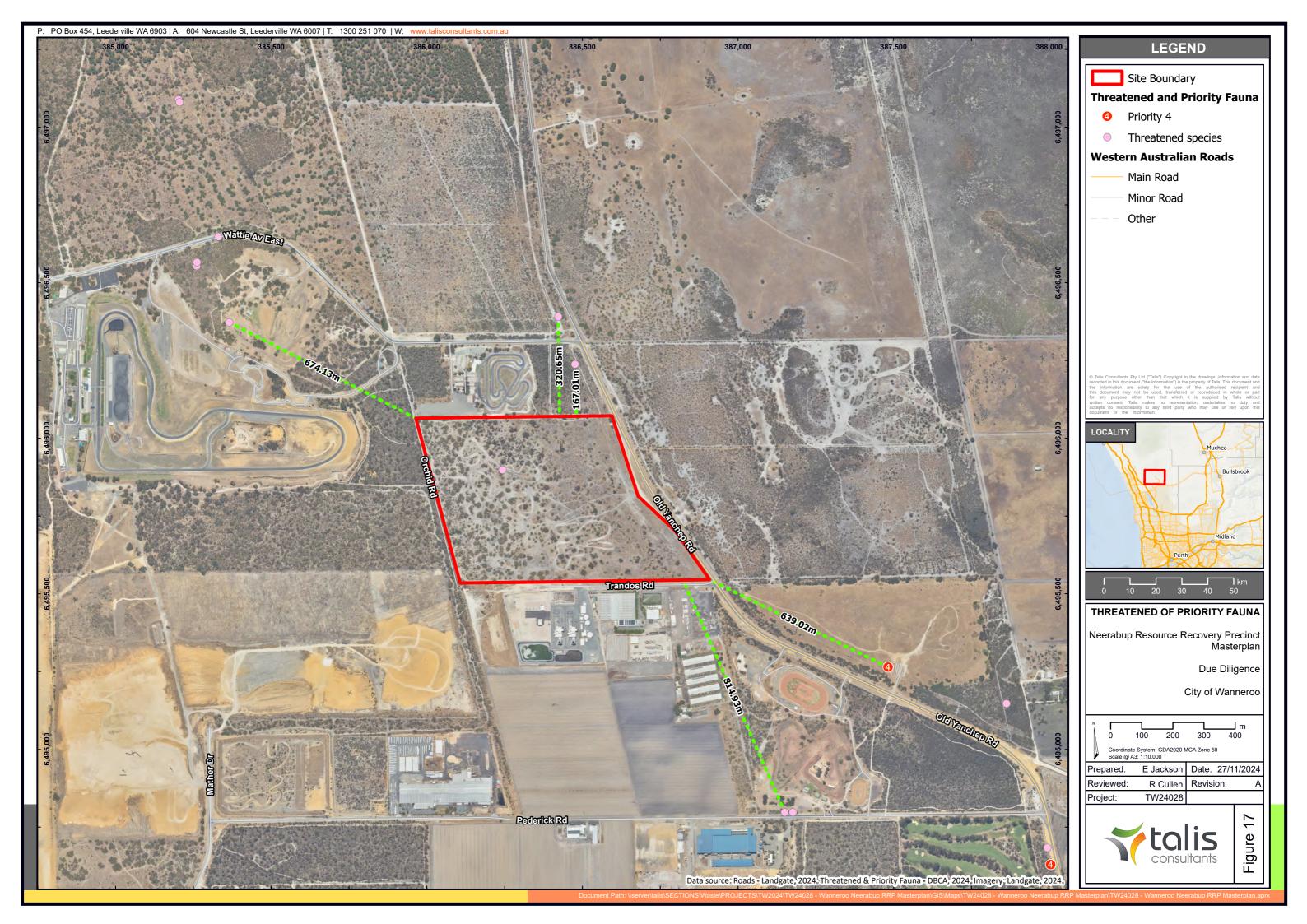


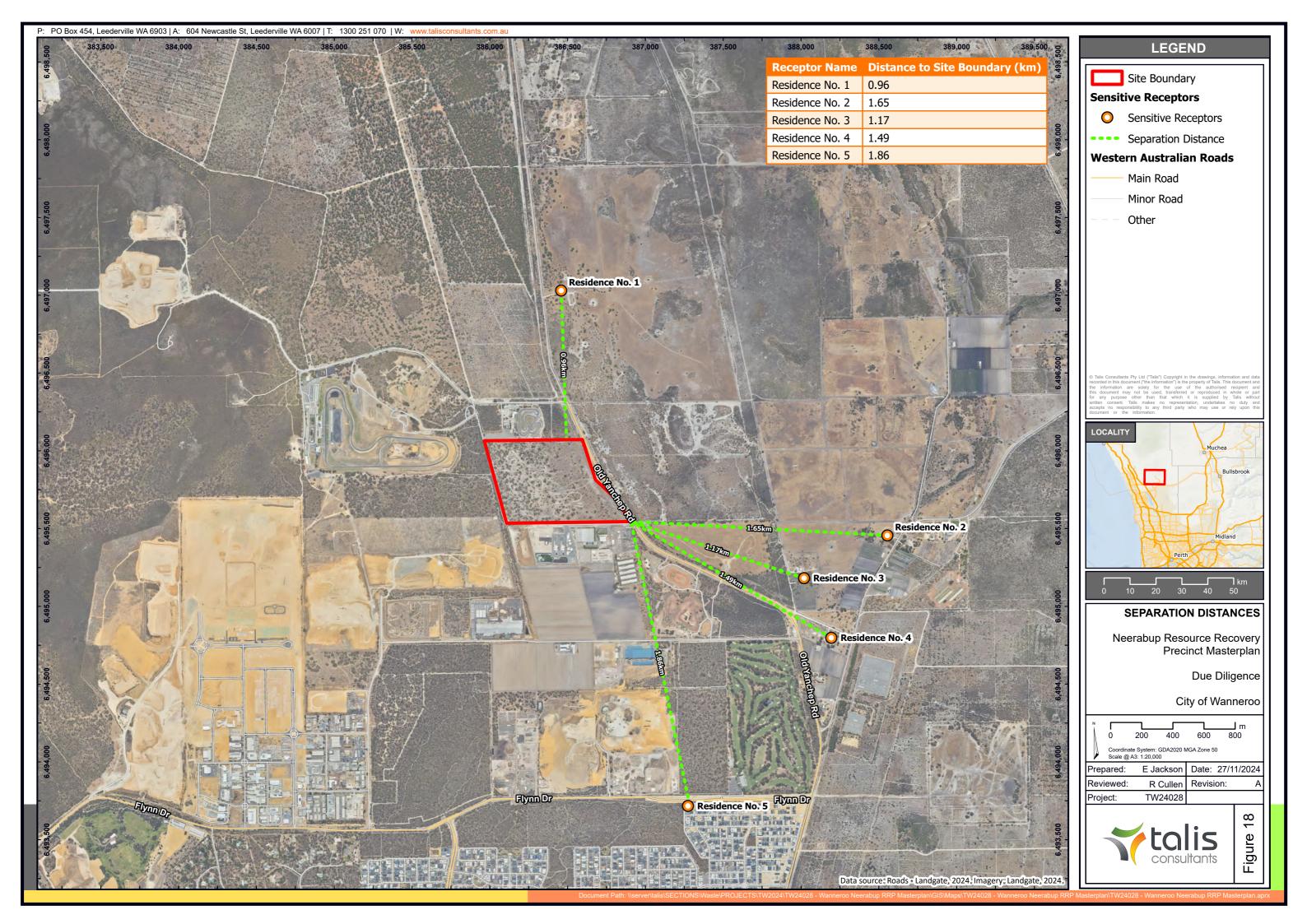


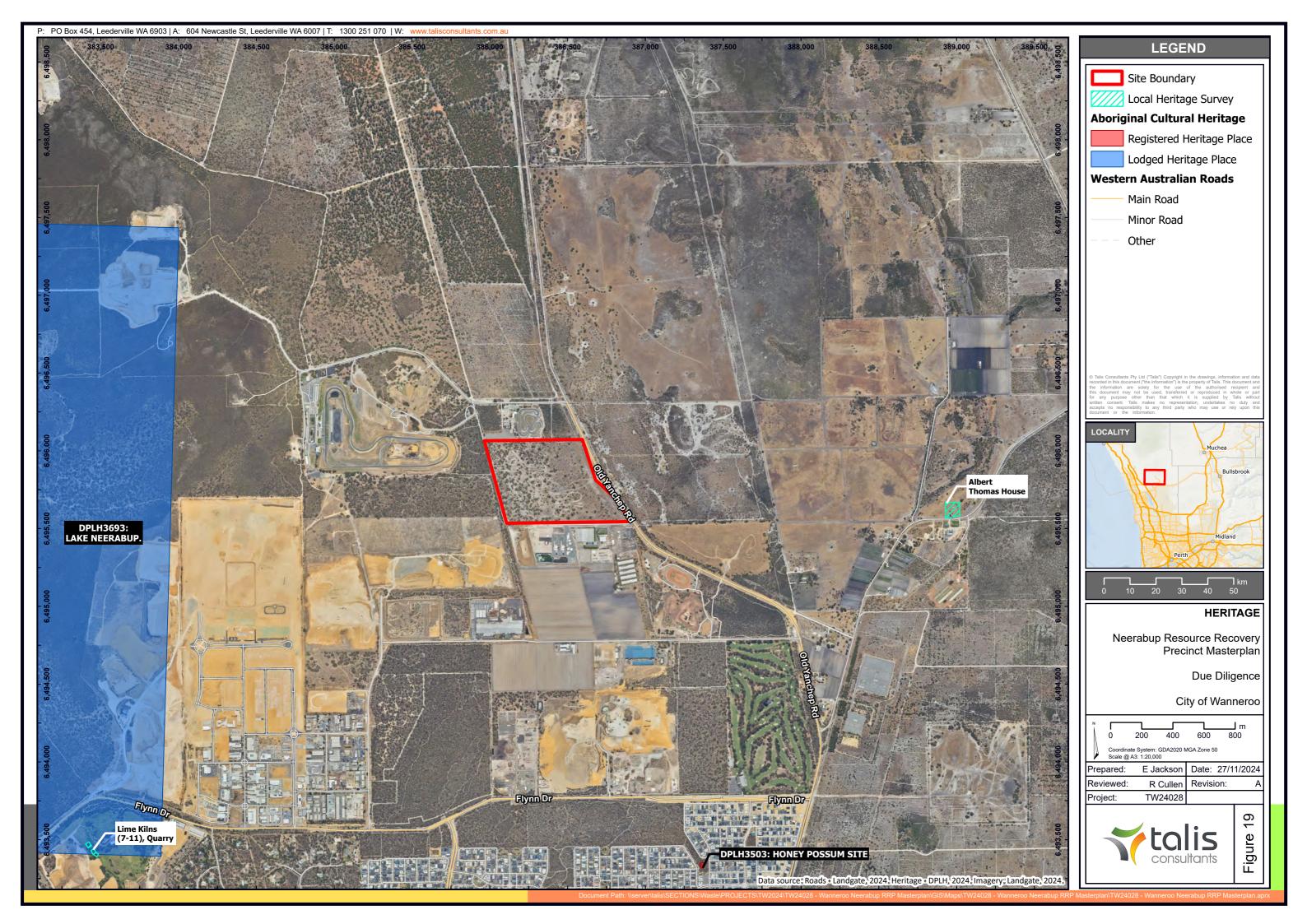












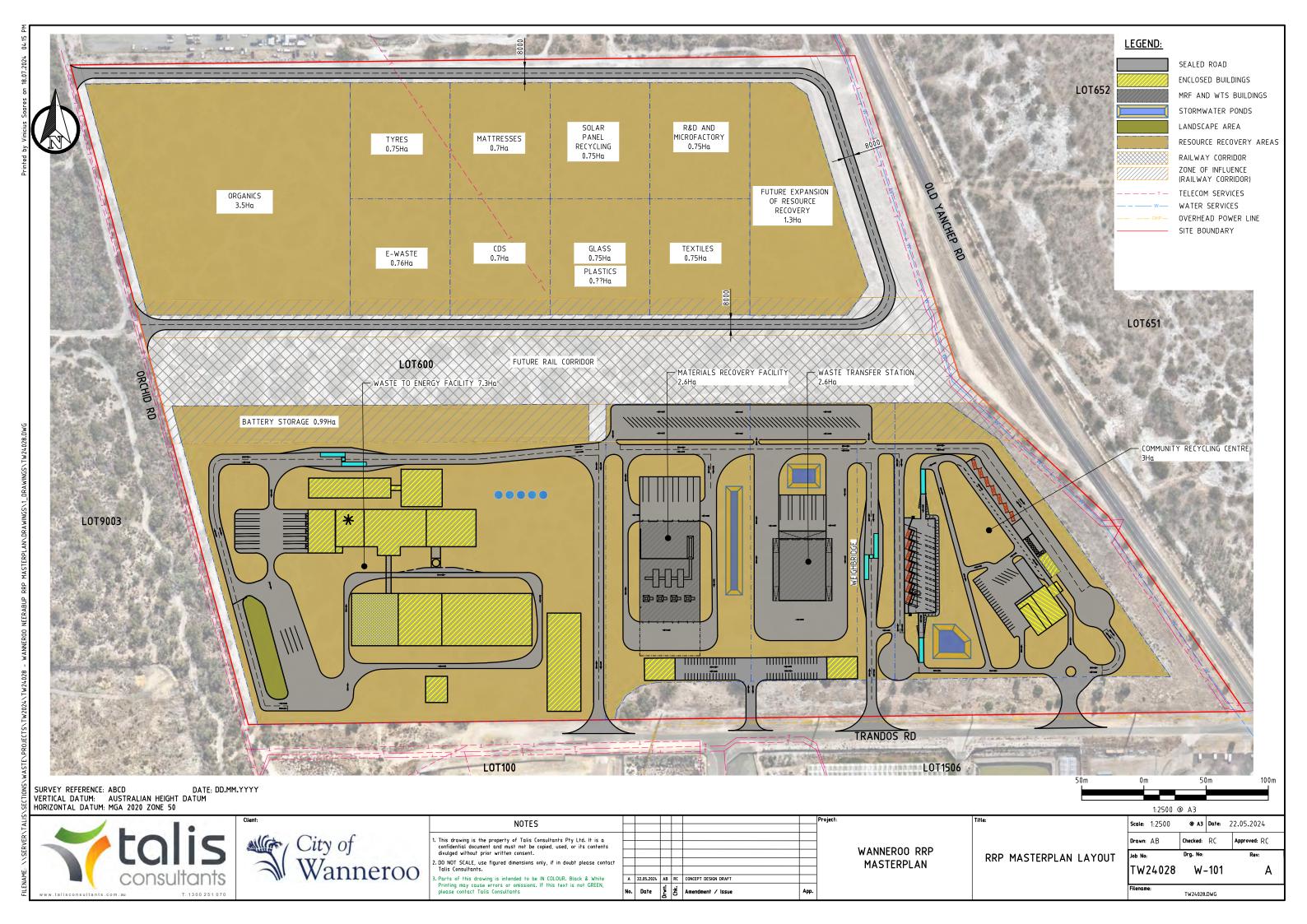


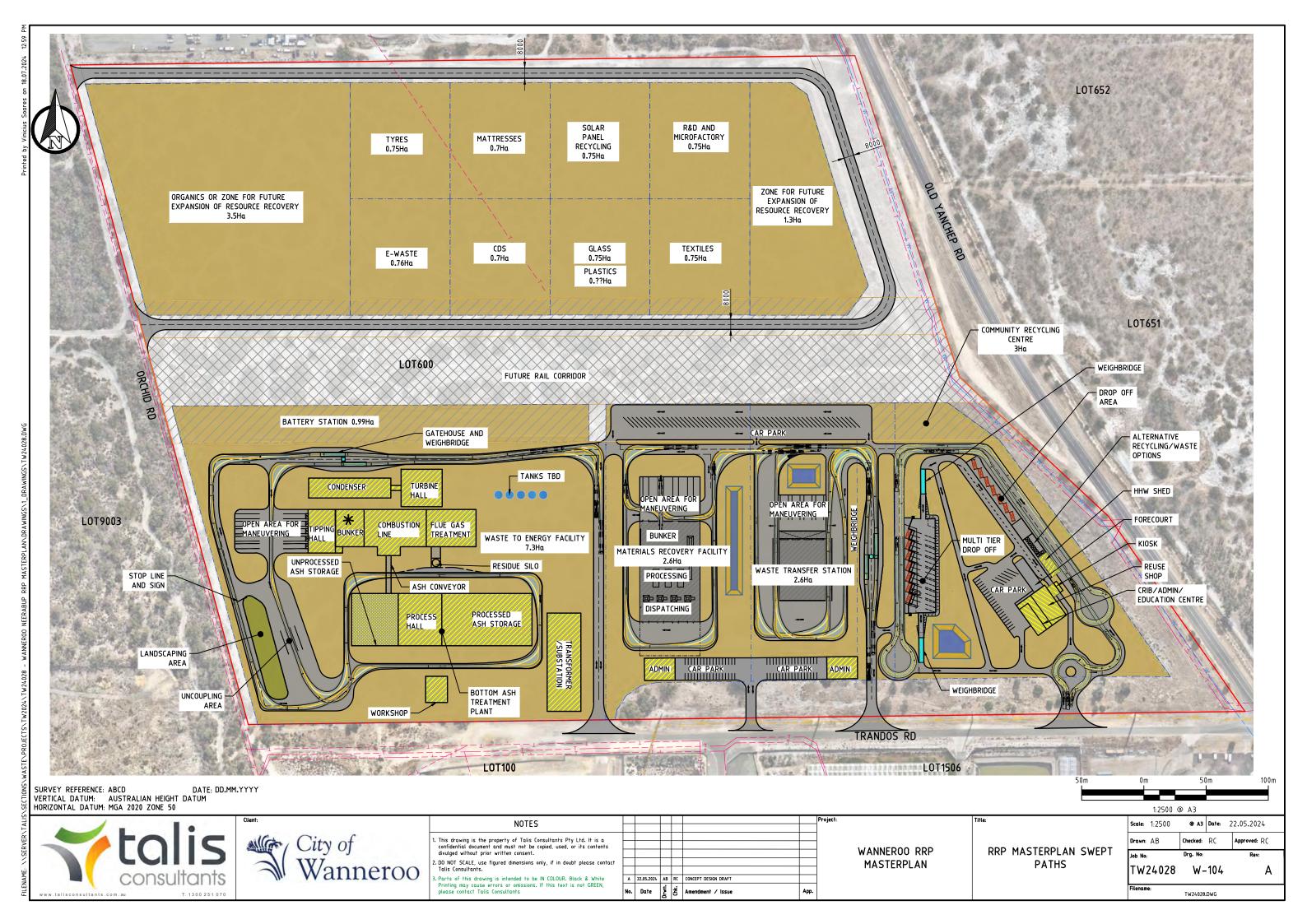
# **APPENDIX B**

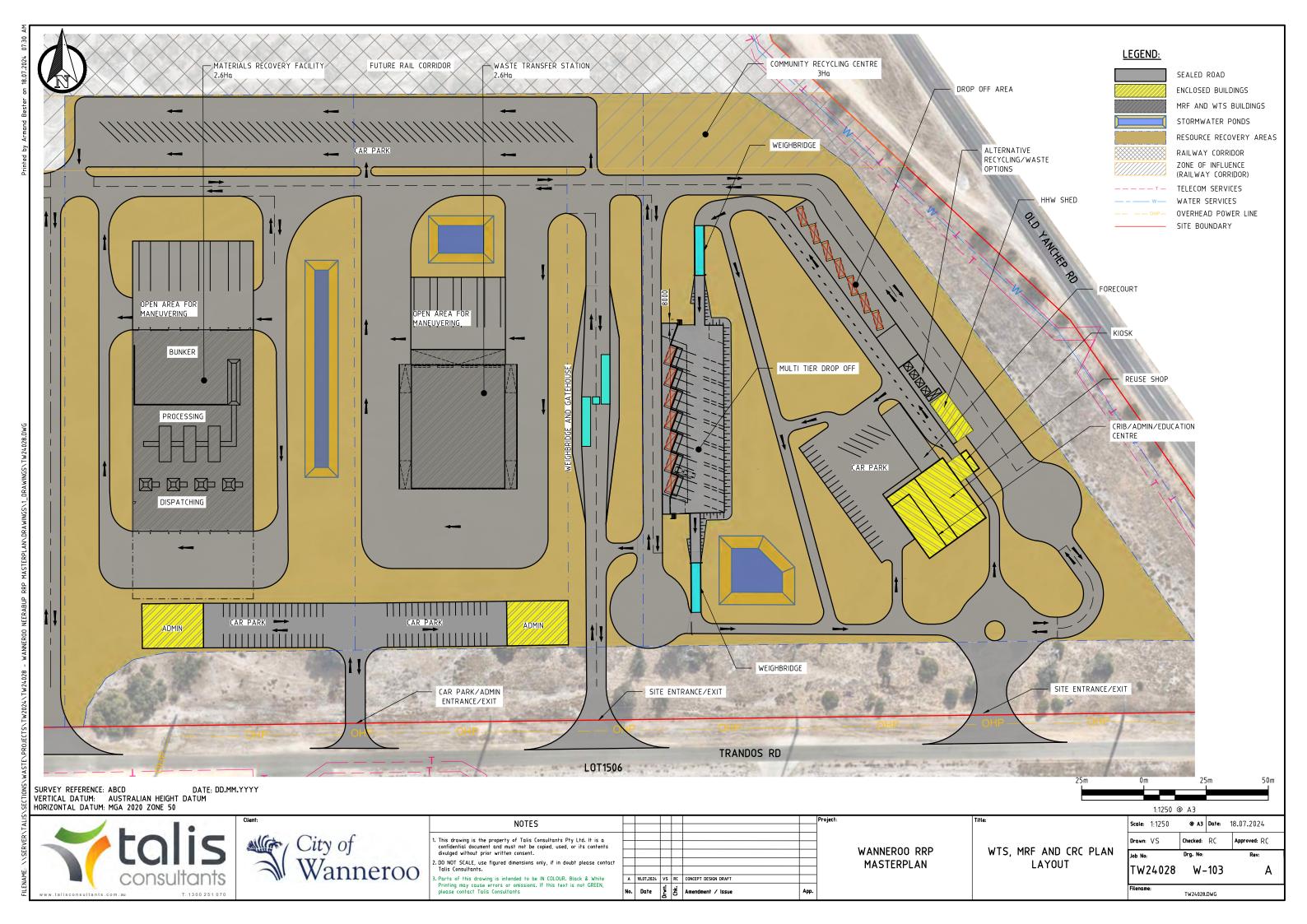
# **Drawings**

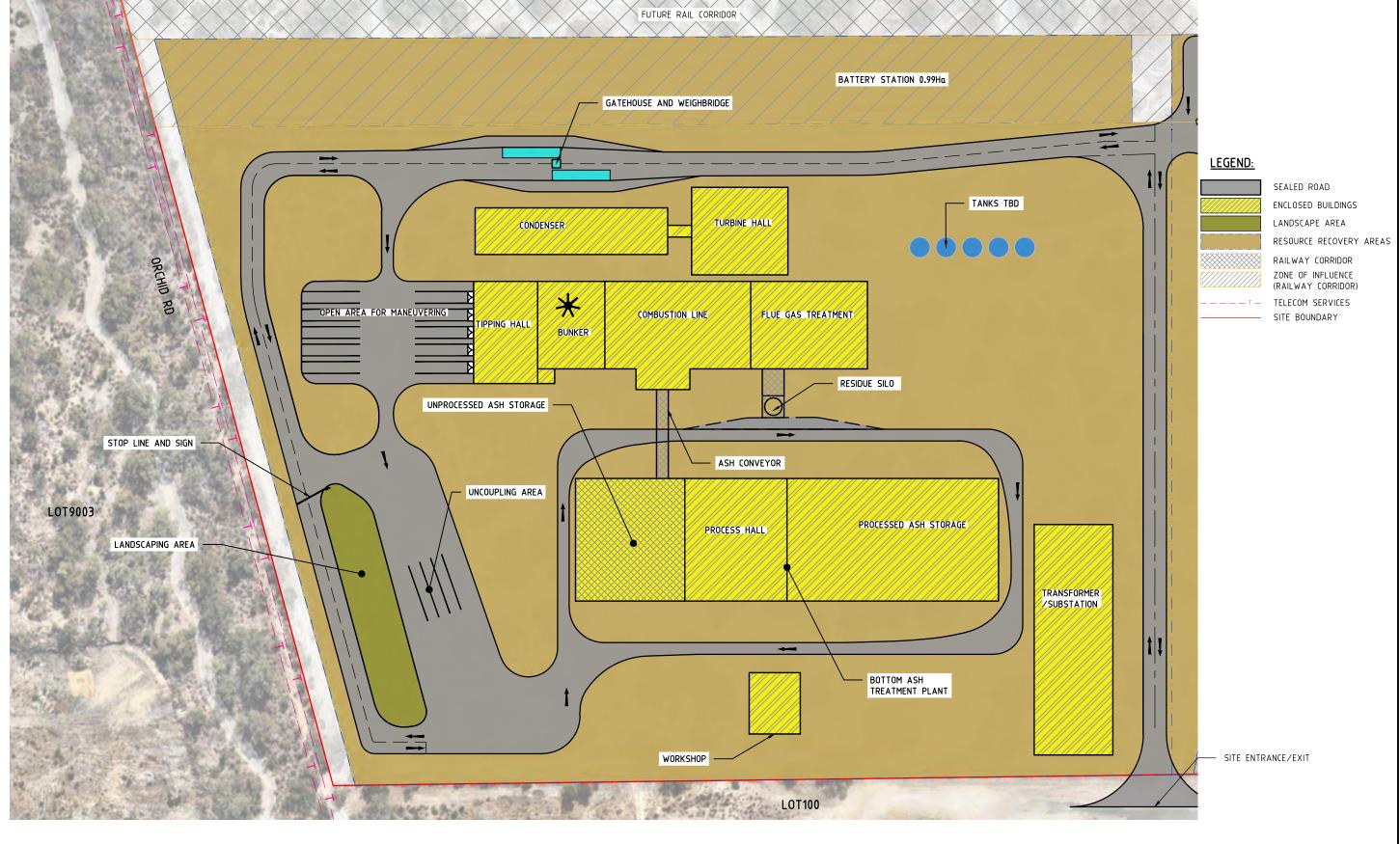
# **Drawings**

W-101	NRRP Masterplan Layout
W-102	Waste to Energy facility Plan
W-103	WTS, CRC and MRF Plan Playout
W-104	NRRP Masterplan Swept Paths
S-101	HHW Shed – Proposed Floor Plan and Typical Section
S-201	Multi-Tier Drop-Off floor plan and Section
S-301	Reuse Shop Floor Plan and Section
S-401	Typical Section – Waste Transfer Shed















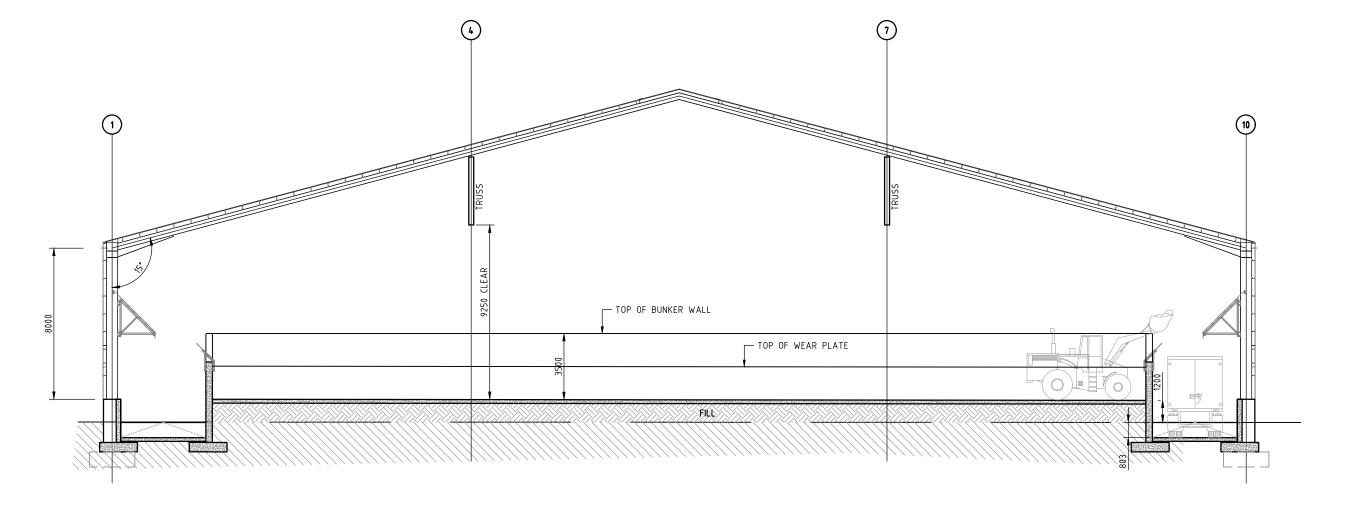
<ol> <li>This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.</li> </ol>
2. DO NOT SCALE, use figured dimensions only, if in doubt please contact

NOTES

3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

WANNEROO RRP WASTERPLAN

WASTE TO ENERGY FACILITY
PLAN



TYPICAL SECTION - WTS





1. This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.
3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

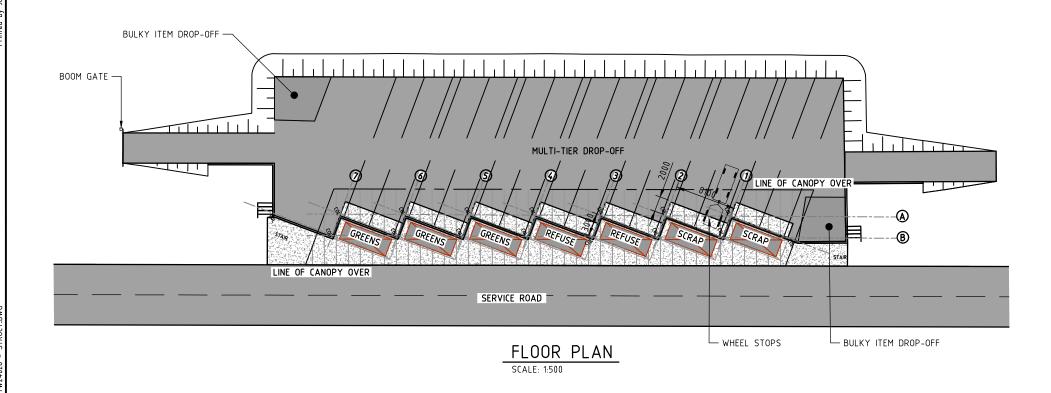
NOTES

A 19.07.2024 VS AB PRELIMINARY ISSUE

No. Date \$\frac{1}{5}\$ Amendment / Issue App.

WANNEROO RRP MASTERPLAN TYPICAL SECTION - WASTE TRANSFER SHED

	Scale:	AS SHOW	√N @ A3	Date: 1	9.07.2024	
	Drawn:	VS	Checked:	AB	Approved:	
:	Job No:		Drg. No:		Rev:	
	TW2	24028	S-	401		A
	Filenam		24028 - ST	RUCT.DWG		



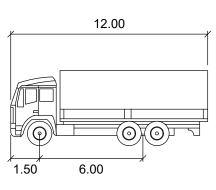
NOTES

 This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.

DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.

3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

City of Wanneroo



## Hooklift RORO 12m BIN

meters

Scale: AS SHOWN @ A3 | Date: 19.07.2024

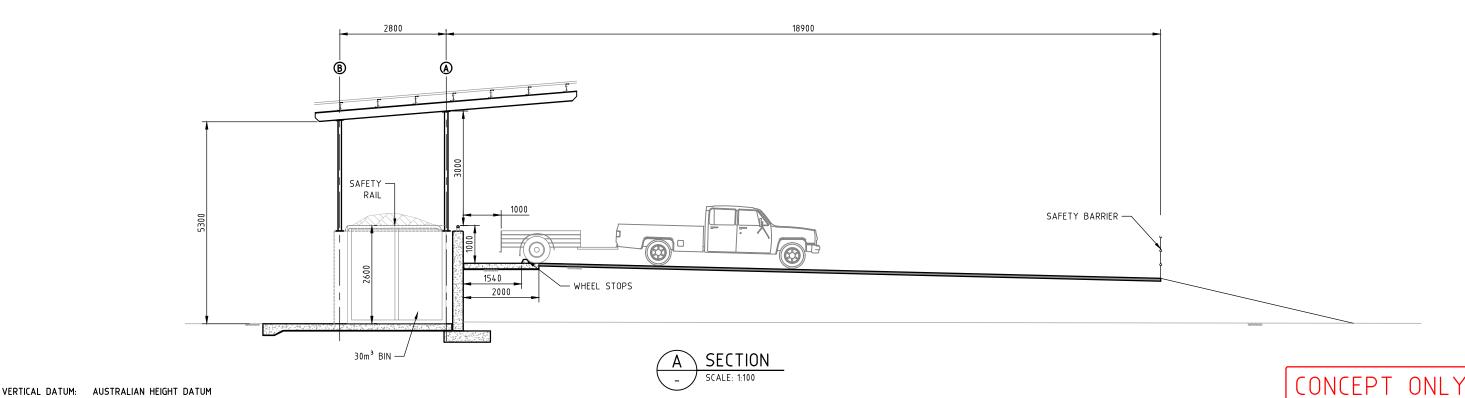
TW24028 - STRUCT.DWG

TW24028 S-201

Width : 2.50
Track : 2.50
Lock to Lock Time : 6.0
Steering Angle : 27.9

MULTI-TIER DROP-OFF FLOOR

PLAN AND SECTION

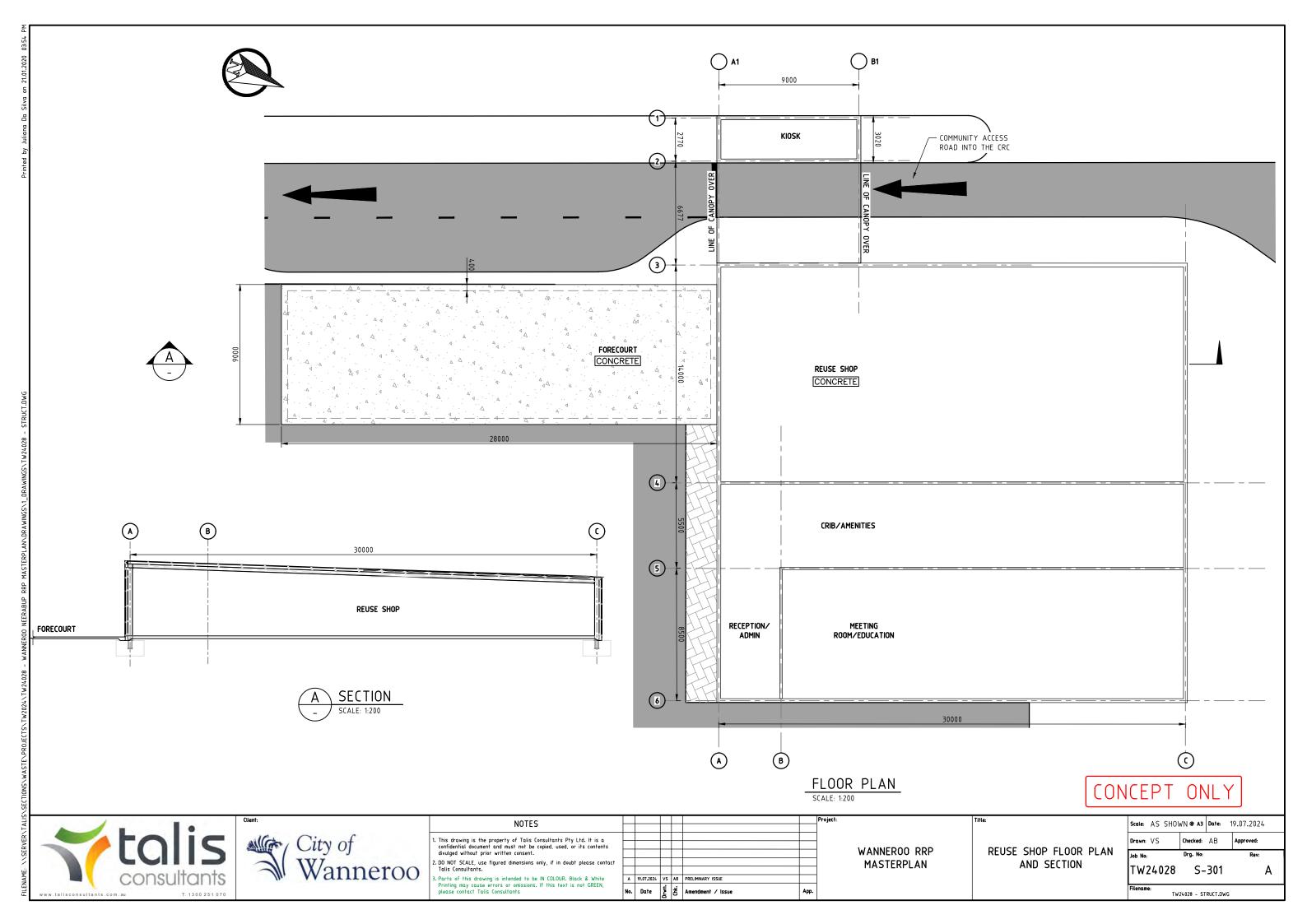


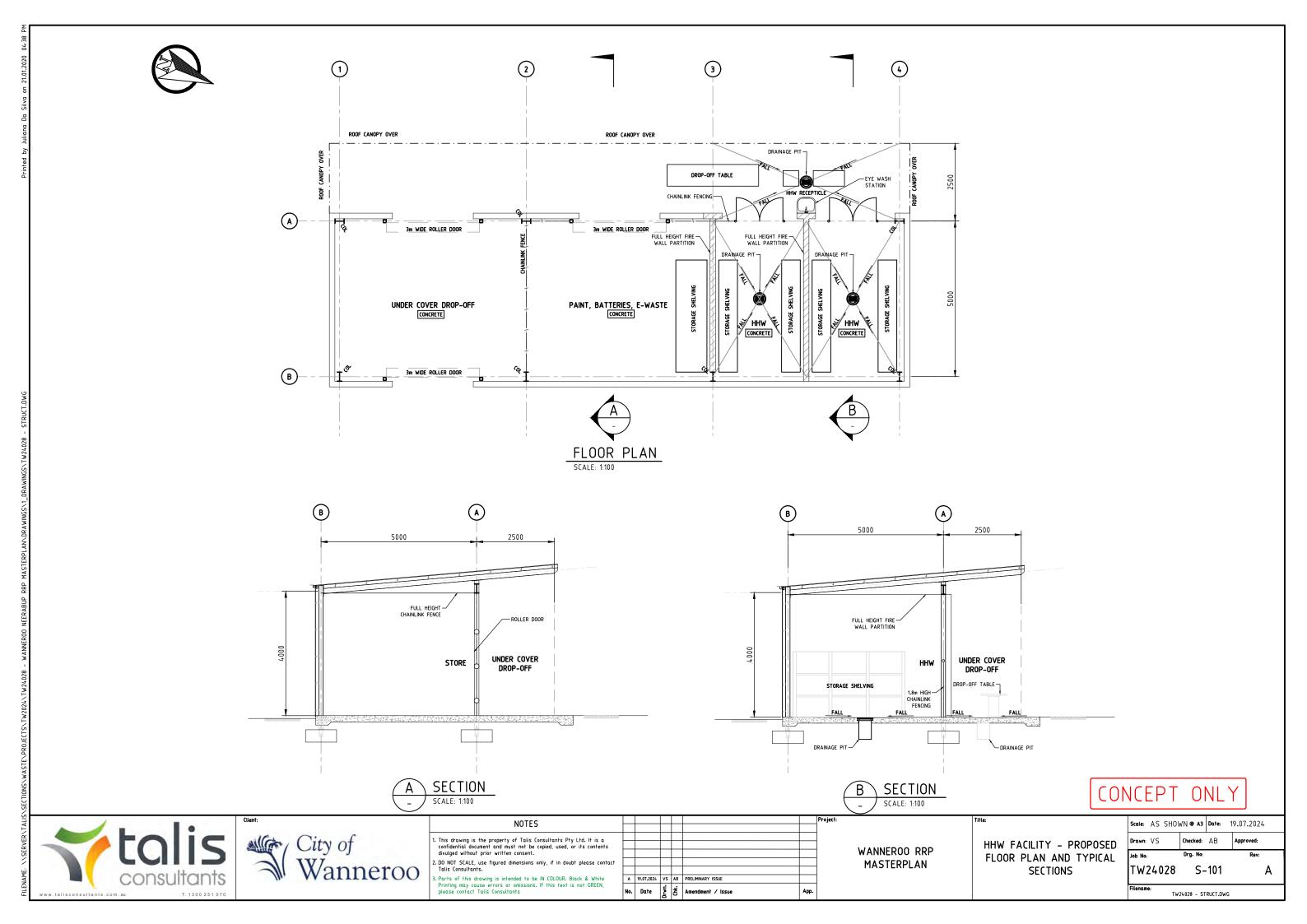
A 19.07.2024 VS AB PRELIMINARY ISSUE

No. Date 볼 送 Amendment / Issue

WANNEROO RRP

MASTERPLAN







# **APPENDIX C**Cost Estimates

# **Masterplan Cost Estimate**



Clear vegetation	Stage	Stage: Masterplan						
Pellminaries   Item   1.0   \$ 410,900.00   \$ 122,000.00   \$ 22,000.00			Unit	Quantity		Rate		Amount
Pellminaries   Item   1.0   \$ 410,900.00   \$ 122,000.00   \$ 22,000.00								
Clear vegetation   m2   31,170.0   \$ 0,70   \$ 122,000.00     Reuse shop   m2   400.0   \$ 1,173.40   \$ 179,000.00     Reuse shop   m2   400.0   \$ 1,173.40   \$ 1,734.00     Hill Wished   m2   150.0   \$ 1,733.40   \$ 2,553.00     Recycling drop off   m2   150.0   \$ 1,733.40   \$ 2,610,000     Multi tier drop off   m2   1,900.0   \$ 476.25   \$ 920,000.00     Surface water pond   m2   1,900.0   \$ 2,46   \$ 19,000.00     Pavement   m2   11,905.0   \$ 2,46   \$ 19,000.00     Pavement   m2   11,905.0   \$ 2,46   \$ 19,000.00     Pavement   m2   11,905.0   \$ 5,56.4   \$ 683,000.00     Perlininaries   lem   1.0   \$ 75,000.00   \$ 75,000.00     Balance cut and fill across site to level   m3   2,900.0   \$ 11.45   \$ 34,000.00     Pavement   m2   2,880.0   \$ 5.56.4   \$ 151,000.00     Pavement   m2   2,880.0   \$ 5.66.4   \$ 151,000.00     Pavement   m2   2,880.0   \$ 5.66.4   \$ 151,000.00     Pavement   m2   2,880.0   \$ 5.66.4   \$ 151,000.00     Pavement   m2   2,880.0   \$ 3,636,300.00   \$ 3,637,000.00     Surface water pond   m2   2,5350.0   \$ 11.45   \$ 3,400.00     Surface water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Surface water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Recycling water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Recycling water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Recycling water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Recycling water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Recycling water pond   m2   2,5350.0   \$ 11.45   \$ 3,700.00     Recycling water pond   m2   2,5350.0   \$ 24.29   \$ 11.31,000.00     Recycling water pond   m2   2,5350.0   \$ 24.29   \$ 11.31,000.00     Recycling water pond   m2   1,150.0   \$ 2,400.00   \$ 3,637.00.00     Recycling water pond   m2   1,150.0   \$ 2,400.00   \$ 3,637.00.00     Recycling water pond   m2   2,5350.0   \$ 24.29   \$ 1,131,000.00     Recycling water pond   m2   2,5350.0   \$ 24.29   \$ 1,131,000.00     Recycling water pond   m3   2,400.00   \$ 2,400.00   \$ 2,400.00     Recycling water pond   m3   2,400.00   \$ 2,400.00   \$ 2,400.00			Item	1.0	\$	410,900.00	\$	411,000.00
Balance cut and fill across site to level   m3   15,585.0   \$ 1,145   \$ 490,000   \$ 1,224.9   \$ 490,000   \$ 1,224.9   \$ 490,000   \$ 1,224.9   \$ 490,000   \$ 1,224.9   \$ 490,000   \$ 1,224.9   \$ 490,000   \$ 1,224.9   \$ 490,000   \$ 1,225.2   \$ 5,530,000   \$ 1,233.0   \$ 2,512.25   \$ 533,000   \$ 1,233.0   \$ 2,512.25   \$ 2,530.000   \$ 1,281.8   \$ 244,000.00   \$ 1,285.0   \$ 1,281.8   \$ 244,000.00   \$ 1,285.0   \$ 2,512.25   \$ 2,242,000.00   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 1,200.000   \$ 2,461.5   \$ 2,249.5   \$ 2,		Clear vegetation	m2	31,170.0		·		22,000.00
Reuse shop Crity-joinnistration/education centre HIW shed HIW shed Recycling drop off Must liter drop off			m3	15,585.0		11.45		179,000.00
HHW shed Recolling top off Recolling top of the top of t		Reuse shop	m2	400.0		1,224.94	\$	490,000.00
Recycling drop off		Crib/administration/education centre	m2	220.0	\$	2,512.25	\$	553,000.00
Multi tier drop off   m2		HHW shed	m2	150.0	\$	1,733.40	\$	261,000.00
Surface water pond Pawement m2 11,905.0 \$ 24.61 \$ 19,000.00		Recycling drop off	m2	· ·		192.81	\$	244,000.00
Pawement   m2		· ·	m2	· ·		476.25	\$	920,000.00
Services		l .	1					19,000.00
WEIGHBRIDGE			1	1				663,000.00
Preliminaries		Services	m2	31,170.0	\$	24.29	\$	758,000.00
Clear vegetation   m2   5,800.0   \$ 0,70   \$ 5,000.0   \$ 34,000.00   \$ 11.45   \$ 34,000.00   \$ 10.00   \$	2	WEIGHBRIDGE						
Balance out and fill across site to level   m3   2,900.0   \$   11.45   \$   34,000.00   \$   408,312.00   \$   409,300.00   \$		Preliminaries	Item	1.0		75,000.00	\$	75,000.00
Weighbridges and office		Clear vegetation	m2	5,800.0		0.70	\$	5,000.00
Pavement   m2   2,880.0   \$ 55.64   \$ 161,000.00		1	1	•				34,000.00
Services			1			·		409,000.00
MATERIAL RECOVERY FACILITY   Preliminaries   Item   1.0   \$ 3,636,300.00   \$ 3,637,000.00     Balance cut and fill across site to level   m3   12,675.0   \$ 1.000.00     Equipment and Fire Supressant Technology   Item   1.0   \$ 30,306,272.73   \$ 30,307,000.00     Equipment and Fire Supressant Technology   Item   1.0   \$ 30,306,272.73   \$ 30,307,000.00     Administration building   m2   458.0   \$ 2,511.25   \$ 1,131,000.00     Surface water pond   m2   1,150.0   \$ 24.61   \$ 29,000.00     Pawment   m2   7,430.0   \$ 55.64   \$ 414,000.00     Services   m2   25,350.0   \$ 24.29   \$ 616,000.00     Services   m2   25,350.0   \$ 24.29   \$ 616,000.00     Services   m2   25,350.0   \$ 24.29   \$ 616,000.00     Order of the supressant Technology   Item   1.0   \$ 479,800.00   \$ 480,000.00     Clear vegetation   m2   18,800.0   \$ 1479,800.00   \$ 480,000.00     WTS building   m2   2,600.0   \$ 949.09   \$ 2,468,000.00     WTS building   m2   2,600.0   \$ 949.09   \$ 2,468,000.00     Administration building   m2   2,600.0   \$ 949.09   \$ 2,468,000.00     Surface water pond   m2   500.0   \$ 2,512.25   \$ 1,131,000.00     Pawment   m2   10,900.0   \$ 5,564   \$ 607,000.00     Services   m2   18,800.0   \$ 24.29   \$ 457,000.00     Services   m2   18,800.0   \$ 24.29   \$ 457,000.00     Services   m2   14,2800.0   \$ 750,000,000.00   \$ 750,000,000.00     Tell minaries   Item   1.0   \$ 750,000,000.00   \$ 750,000,000.00     Services   m2   14,2800.0   \$ 14,55   \$ 18,8000.00     Services   m2   14,2800.0   \$ 14,55   \$ 18,8000.00     Services   m2   14,2800.0   \$ 14,55   \$ 18,8000.00     Services   m2   14,2800.0   \$ 14,55   \$ 14,5000.00     Services reticulation   m3   14,2800.0   \$ 4,86   \$ 694,000.00     Services reti			1	•				•
Preliminaries   Item   1.0   \$ 3,636,300.00   \$ 1,637,000.00		Services	m2	5,800.0	\$	24.29	\$	141,000.00
Clear vegetation   m2   25,350.0   \$ 0.70   \$ 18,000.00	3	MATERIAL RECOVERY FACILITY						
Balance cut and fill across site to level   m3   12,675.0   \$   11.45   \$   146,000.00   MRF building   m2   3,900.0   \$   949.09   \$   3,702,000.00   \$   30,306,272.73   \$   30,307,000.00   \$   2450.0   \$   2,512.25   \$   1,131,000.00   \$   2,512.25   \$   1,131,000.00   \$   2,512.25   \$   2,900.00   \$   2,900.00   \$		Preliminaries	Item	1.0		3,636,300.00	\$	3,637,000.00
MRF building   Fquipment and Fire Supressant Technology   Item   1.0   \$ 30,306,272.73   \$ 30,307,000.00		Clear vegetation	m2	25,350.0		0.70	\$	18,000.00
Equipment and Fire Supressant Technology Administration building m2 450.0 \$ 2,512.25 \$ 1,131,000.00		Balance cut and fill across site to level	m3	12,675.0	\$	11.45	\$	146,000.00
Administration building   m2		MRF building	m2	3,900.0		949.09	\$	3,702,000.00
Surface water pond   m2   1,150.0   \$ 24.61   \$ 29,000.00		Equipment and Fire Supressant Technology	1			30,306,272.73	\$	30,307,000.00
Pavement   Services   M2		_	1			2,512.25		1,131,000.00
Services		·	1	·				29,000.00
A			1	-				414,000.00
Preliminaries		Services	m2	25,350.0	\$	24.29	\$	616,000.00
Clear vegetation   m2   18,800.0   \$ 0.70   \$ 14,000.00       Balance cut and fill across site to level   m3   9,400.0   \$ 11.45   \$ 108,000.00       WTS building   m2   2,600.0   \$ 949.09   \$ 2,468,000.00       Administration building   m2   450.0   \$ 2,512.25   \$ 1,131,000.00       Surface water pond   m2   500.0   \$ 24.61   \$ 13,000.00       Pavement   m2   10,900.0   \$ 55.64   \$ 607,000.00       Services   m2   18,800.0   \$ 750,000,000.00   \$ 457,000.00       WASTE TO ENERGY FACILITY   WTE facility   Item   1.0   \$ 750,000,000.00   \$	4	WASTE TRANSFER STATION						
Balance cut and fill across site to level   m3   9,400.0   \$   11.45   \$   108,000.0   \$   109,000.0   \$   2,468,000.0   \$   2,469,000.0		Preliminaries	Item	1.0		479,800.00	\$	480,000.00
WTS building Administration building Surface water pond Pavement Services         m2 450.0 \$ 2,512.25 \$ 1,131,000.00 \$ 24.61 \$ 13,000.00 \$ 13,000.00 \$ 24.61 \$ 13,000.00 \$ 24.61 \$ 13,000.00 \$ 24.61 \$ 13,000.00 \$ 24.61 \$ 13,000.00 \$ 24.62 \$ 24.29 \$ 457,000.00 \$ 24.62 \$ 24.29 \$ 457,000.00 \$ 24.62 \$ 24.29 \$ 457,000.00 \$ 24.62 \$ 24.29 \$		Clear vegetation	m2	18,800.0		0.70	\$	14,000.00
Administration building Surface water pond Pavement Solution Services		Balance cut and fill across site to level	m3	9,400.0	\$	11.45	\$	108,000.00
Surface water pond   Pavement		WTS building	m2	2,600.0		949.09	\$	2,468,000.00
Pavement   Services   m2   10,900.0   \$   55.64   \$   607,000.00		Administration building	m2	450.0		2,512.25	\$	1,131,000.00
Services		· ·	1					13,000.00
Section   Sect							Ψ	
MTE facility		Services	m2	18,800.0	\$	24.29	\$	457,000.00
Battery Station	5	WASTE TO ENERGY FACILITY						
Rattery Station		WTE facility	Item	1.0	\$	750,000,000.00	\$	750,000,000.00
Rattery Station	6	BATTERY STATION						
Preliminaries			Item	1.0	\$	155,000,000.00	\$	155,000,000.00
Preliminaries	_							
Clear vegetation	<b>'</b>	FUTURE EXPANSION AREA						
Balance cut and fill across site to level m3 71,400.0 \$ 11.45 \$ 818,000.00   Pavement m2 11,602.0 \$ 55.64 \$ 646,000.00   Services reticulation m3 142,800.0 \$ 4.86 \$ 694,000.00    Estimated Total Construction Cost		Preliminaries	Item	1.0	\$	225,800.00	\$	226,000.00
Balance cut and fill across site to level		Clear vegetation	m2	142,800.0	\$	0.70	\$	100,000.00
Pavement m2 11,602.0 \$ 55.64 \$ 646,000.00   Services reticulation m3 142,800.0 \$ 4.86 \$ 694,000.00    Estimated Total Construction Cost			m3			11.45		818,000.00
Services reticulation   m3   142,800.0   \$   4.86   \$   694,000.00								·
Professional Services         6%         \$ 57,486,420.00           Construction Contingency         20%         \$ 191,621,400.00           Cost escalation         7%         \$ 67,067,490.00								694,000.00
Professional Services         6%         \$ 57,486,420.00           Construction Contingency         20%         \$ 191,621,400.00           Cost escalation         7%         \$ 67,067,490.00	Estimate	d Total Construction Cost					Ś	958,107,000,00
Construction Contingency         20%         \$ 191,621,400.00           Cost escalation         7%         \$ 67,067,490.00				6%			1	
Cost escalation 7% \$ 67,067,490.00								
				.,,			\$	1,274,282,310.00



# APPENDIX D Services and Utilities Report



# Wanneroo Neerabup Resource Recovery Precinct Masterplan

Services and Utilities Report



**Prepared for City of Wanneroo** 

20 May 2024

**Project Number: TW24028** 



#### **DOCUMENT CONTROL**

Version	Description	Date	Author	Reviewer	Approver
1.0	First Approved Release	3/05/2024	MA	PG/BC	PG
2.0	Update following Client's comments	20/05/2024	MA	ВС	ВС

## **Approval for Release**

Name	Position	File Reference
Brice Campbell	Waste Strategy and Circular Economy Team Lead	TW24028_Services and Utilities Report_2.0.docx

### Signature

Copyright of this document or any part of this document remains with Talis Consultants Pty Ltd and cannot be used, transferred or reproduced in any manner or form without prior written consent from Talis Consultants Pty Ltd.



# **Table of Contents**

1	intro	auction	1
	1.1	Proposed Development	1
	1.2	Location of Potential Sites	1
	1.3	Report Methodology	1
2	Lot 6	00 Services and Utilities	2
	2.1	Gas	2
		2.1.1 NewGen Neerabup Pipeline	2
	2.2	Telecommunications	3
		2.2.1 NBN <sup>TM</sup>	3
		2.2.2 Optus	3
		2.2.3 Telstra	3
		2.2.4 TPG Telecom (WA)	3
	2.3	Water	3
		2.3.1 Water Supply	4
		2.3.2 Wastewater Disposal	4
	2.4	Power	4
	2.5	Public Transport Authority (PTA) Rail Corridor Easement	4
	2.6	Access	4
	2.7	Existing Services on Plan	5
	2.8	Developable Area on Lot 600	5
3	Lot 8	01 Services and Utilities	. <b>7</b>
	3.1	Gas	. 7
	3.2	Telecommunications	. 7
		3.2.1 NBN <sup>TM</sup>	. 7
		3.2.2 Optus	. 7
		3.2.3 Telstra	. 8
		3.2.4 TPG Telecom (WA)	. 8
	3.3	Water	8
		3.3.1 Water Supply	8
		3.3.2 Wastewater Disposal	8
	3.4	Power	8
	3.5	Access	8
	3.6	Existing Services on Plan	9
	3.7	Developable Area on Lot 801	9



4	Lot 5	02 Services and Utilities	10
	4.1	Gas	10
		4.1.1 NewGen Neerabup Pipeline	10
	4.2	Telecommunications	10
		4.2.1 NBN <sup>TM</sup>	10
		4.2.2 Optus	10
		4.2.3 Telstra	11
		4.2.4 TPG Telecom (WA)	11
	4.3	Water	11
		4.3.1 Water Supply	11
		4.3.2 Wastewater Disposal	11
	4.4	Power	11
	4.5	Access	12
	4.6	Existing Services on Plan	12
	4.7	Developable Area on Lot 502	13
5	Lot 5	03 Services and Utilities	15
	5.1	Gas	15
	5.2	Telecommunications	15
		5.2.1 NBN <sup>TM</sup>	15
		5.2.2 Telstra	15
	5.3	Water	16
		5.3.1 Water Supply	16
		5.3.2 Wastewater Disposal	16
	5.4	Power	16
	5.5	Access	16
	5.6	Existing Services on Plan	17
	5.7	Developable Area on Lot 503	
6	Sumr	mary and Conclusion	18



# **Figures**

Figure 2-1: Site location of Proposed Precinct on Lot 600
Figure 2-2: Neerabup Pipeline Easement inside Lot 600
Figure 2-3: Tandem Drive Network 25
Figure 2-4: Existing Services on and around Lot 600
Figure 2-5: Buildable Area on Lot 6006
Figure 3-1: Site location of Proposed Site in Lot 801
Figure 3-2: Tandem Drive Network 2 – conditional on Pederick Road9
Figure 3-3: Existing Services on and around Lot 8019
Figure 4-1: Site location of Proposed Site in Lot 502
Figure 4-2: Tandem Drive Network 2 (solid line without condition, dash line with condition) 12
Figure 4-3: Existing Services on and around Lot 502
Figure 4-4: Buildable Area on Lot 502
Figure 5-1: Site location of Proposed Site in Lot 503
Figure 5-2: Tandem Drive Network 2 along Old Yanchep Road with no Condition17
Figure 5-3: Existing Services on and around Lot 503
Tables
Table 2-1: Developable Areas on Lot 600 6

# **Appendices**

**APPENDIX A** GIS MAPS



### 1 Introduction

Talis Consultants Pty Ltd (Talis) has been engaged by the City of Wanneroo (the City) to develop a Services Report for the City's proposed Neerabup Resource Recovery Precinct (Precinct).

Talis has undertaken a desktop investigation to determine the existing services and potential future infrastructure within the project area. The findings are presented within this report.

The major infrastructure service requirements assessed include:

- Gas Pipeline: NewGen Neerabup Power Station;
- Underground and Overhead Power Lines;
- Telecommunications;
- Railway corridor; and
- Water Corporation proposed Alkimos Seawater Desalination Plant (SDP) Trunk Main.

The recommendations of this report are based on the information and data available at the time.

#### 1.1 Proposed Development

The City is proposing to develop the following infrastructure at the Precinct:

- Waste to Energy (WtE);
- Material Recovery (MRF);
- Organics Facility (FO, GO or FOGO);
- City Depot;
- Other waste management facilities such as tyres, metals, CDS, plastic etc; and
- A Ground Mounted Solar Facility (GMSF) and Battery.

#### 1.2 Location of Potential Sites

The City has nominated the following sites for the Precinct:

- Lot 600, situated at 570 Wattle Ave East, Neerabup, excluding the Wanneroo International Kartway;
- Lot 801, situated at 109 Pederick Road, Neerabup 6031. This site is currently occupied by the Mindarie Regional Council's Resource Recovery Facility which is not operating;
- Lot 502, situated at 100 Pederick Street, Neerabup 6031. Half of the site is currently occupied by the Pinjar Motorcycle Park; and
- Lot 503, situated at 1851 Old Yanchep Road Pinjar, 6078. This site is a former landfill site.

Existing services of all above-mentioned sites have been investigated and the findings are summarised in this report.

#### 1.3 Report Methodology

Talis has used Before You Dig Australia (BYDA) to search for existing infrastructure adjacent the nominated sites. No site investigations, survey or service locating has been undertaken.



#### 2 Lot 600 Services and Utilities

The preferred site for the Precinct is located inside Lot 600 on Plan 302260 as shown in Figure 2-1. The site is bound by Old Yanchep Road on the east, Orchid Road on the west, Trandos Road on the south, and Wanneroo International Kartway and Wattle Park on the north.

Lot 600 is considered of a good size for a GMSF, WtE and other waste infrastructure. In addition, considering the connection point for power transmission be the existing Neerabup Power Station, Lot 600 might be the most suitable site.

However, this site is subject to considerable services which might affect the constructability of the Precinct. Identified services and restrictions are discussed in the following sections.



Figure 2-1: Site location of Proposed Precinct on Lot 600

#### 2.1 Gas

#### 2.1.1 NewGen Neerabup Pipeline

NewGen Neerabup is a joint venture partnership between Shell Energy and Energy Infrastructure Trust that owns a 330 MW open cycle gas-fired power station in Neerabup, located opposite the site, south of Trandos Road. The power station is connected to the South West Interconnected System and operated by Infrastructure Capital Group.

Neerabup Pipeline is located within the eastern side of the proposed site, with an easement in place. This easement is about 5m wide and covers 3,056m<sup>2</sup> of the site. Figure 2-2 shows the Neerabup pipeline easement in relation to Lot 600.

Developments within the proximity of the pipeline require a formal HAZID Workshop. It is recommended that the proposed site for the Precinct is situated outside the easement. However, any activity in the vicinity of the easement that might compromise the integrity of the pipeline might still need to be reviewed and approved by relevant authorities. Such activities include but are not limited to heavy vehicle movements, ground penetration vibrations and excavations.





Figure 2-2: Neerabup Pipeline Easement inside Lot 600

#### 2.2 Telecommunications

#### **2.2.1** NBN<sup>TM</sup>

NBN<sup>TM</sup> owns underground services along the western boundary of Lot 600, as well as a 100mm PVC conduit that extends from the Wanneroo International Kartway along the south-east direction for about 334.3m. This conduit needs to be physically located on site and either avoided or relocated prior to any construction.

#### **2.2.2** Optus

There are underground Optus Fibre Optic Telecommunication assets (Optus cables in other utility conduit) along the eastern boundary of the Site, under Orchid Road.

#### 2.2.3 Telstra

There are some Telstra cables and pits on the east, south and west sides of the site. The Telstra along the eastern boundary appears to be within the Lot boundary.

#### 2.2.4 TPG Telecom (WA)

There are Pipe Networks Pit and Duct at the north-west and south-west corner of the proposed site.

#### 2.3 Water

There are no existing Water Corporation assets inside or around the proposed Site.

A future underground water Trunk Main is proposed to convey drinking water from the proposed Alkimos SDP to Wanneroo. The preferred alignment for the proposed underground pipeline passes along Old Yanchep Road on the east side of Lot 600.



#### 2.3.1 Water Supply

The closest existing point for water supply connection would be 2.2 km away, at the corner of Mather Driver and Peak Road.

The future Alkimos SDP Trunk Main could potentially provide the nearest water supply connection to Lot 600.

#### 2.3.2 Wastewater Disposal

An on-site wastewater disposal system will be required for this site.

#### 2.4 Power

Western Power owns the following infrastructure within the vicinity of Lot 600:

- Overhead transmission cables on the western and southern boundaries; and
- Underground high voltage distribution cables next to the eastern boundary.

In addition to the services noted above, Western Power has restriction zones either side of the overhead power lines as following:

- 35m either side of the transmission power lines along Trandos Road; and
- 10m either side of the transmission power lines along Orchid Road.

Restriction zones shall be avoided during all construction activities.

## 2.5 Public Transport Authority (PTA) Rail Corridor Easement

As a part of the proposed structure plan for the area, an easement needs to be allocated to future rail corridor. The proposed alignment for the railway passes through Lot 600 in an east-west direction, from Old Yanchep Road to Orchid Road. PTA has advised that 100m zone of influence either side of the proposed alignment must be considered.

#### 2.6 Access

Lot 600 is currently accessible for B-Double trucks through Old Yanchep Road with no conditions. Neither Trandos Road nor Orchid Road are currently accessible for B-Double trucks.

However, Orchid Road and Trandos Road are proposed to undergo future upgrades as parts of the City's Long Term Financial Plan (LTFP) to accommodate for RAV 7 heavy vehicles, which would permit B-Doubles. In this case, access to site from Old Yanchep Road, Trandos Road and Orchid Road will be possible.





Figure 2-3: Tandem Drive Network 2

## 2.7 Existing Services on Plan

Figure 2-4 below shows all the existing known services and proposed rail corridor on and around Lot 600 while Figure 01 in Appendix A shows these services on a GIS map.

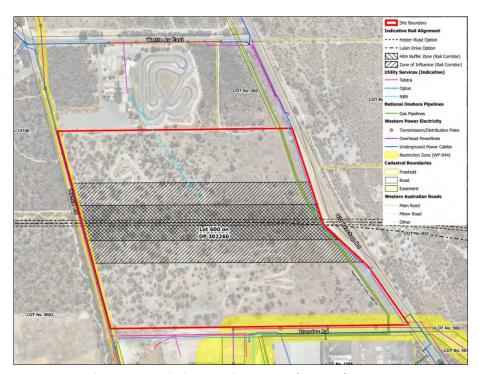


Figure 2-4: Existing Services on and around Lot 600

### 2.8 Developable Area on Lot 600

Given the services, easement and clear zone in place across and near Lot 600, Figure 2-5 shows available buildable areas across the Lot. An indicative area of about 13.3 hectares on the north side of the rail corridor and an approximate area of 16.4 hectares on the south side of the railway corridor are considered buildable for the future Precinct at this site. Table 2-1 outlines the restricted and available areas on Lot 600.



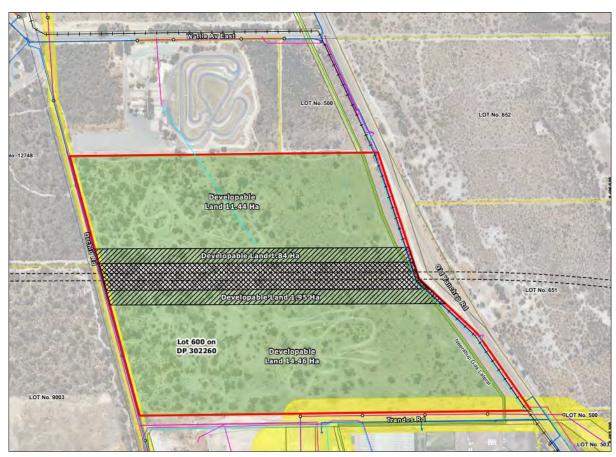


Figure 2-5: Buildable Area on Lot 600

Table 2-1: Developable Areas on Lot 600

Description	Area (ha)
Developable land – North of the rail corridor	11.44
Developable land – South of the rail corridor	14.46
Developable zone of influence – North of the rail corridor	1.84
Developable zone of influence – South of the rail corridor	1.95
Total Developable Area (ha)	29.69



#### 3 Lot 801 Services and Utilities

The second proposed site for the Precinct is Lot 801 on Plan 57533 as shown in Figure 3-1. The site is bound by Pederick Road on the north, Lot 800 on the east, Lot 901 on the south and Lot 103 on the west. This site is 10.3 hectares and has existing facilities belonging to the Mindarie Regional Council which is currently unused.

Given the size of the Lot and existing facilities on the Lot, the site might be suitable for a smaller GMSF or WtE compared to Lot 600. A rooftop solar system might be suitable for the existing buildings.

The following sections discuss identified existing services and restrictions for this site.



Figure 3-1: Site location of Proposed Site in Lot 801

#### 3.1 Gas

The BYDA database has no records of gas pipelines in the vicinity of Lot 801.

#### 3.2 Telecommunications

## 3.2.1 NBN<sup>TM</sup>

NBN<sup>™</sup> owns underground services along the northern boundary of Lot 801.

#### 3.2.2 **Optus**

There are underground Optus Fibre Optic Telecommunication assets (Optus underground conduit and cable) along the north side of Pederick Road. Optus services seem to be outside the site boundaries.



#### 3.2.3 Telstra

There are Telstra cables and pits along the north boundary of the site, with a Main Cable duct leading into the Lot.

#### 3.2.4 TPG Telecom (WA)

There is a Pipe Networks Duct at the north-west corner of the site.

#### 3.3 Water

There are no Water Corporation assets inside or near Lot 801.

#### 3.3.1 Water Supply

The closest point for water connection would be 2 km away, either at the corner of Mather Driver and Peak Road or at the corner of Old Yanchep Road and Flynn Drive.

#### 3.3.2 Wastewater Disposal

An on-site wastewater disposal system will be required for this site.

#### 3.4 Power

Western Power owns in the following infrastructure within the vicinity of Lot 801:

- Overhead transmission cables on the northern boundary of the site;
- Underground high voltage distribution cables on the northern boundary of the site;
- Underground low voltage distribution cables on the northern boundary of the site;
- Pillars on the north side and north-west corner of the site; and
- A ring main unit inside the Lot.

In addition to the services noted above, Western Power has restriction zones either side of the overhead power lines as following:

• 20m either side of the transmission power lines along Pederick Road.

Restriction zones shall be avoided during all construction activities.

#### 3.5 Access

Lot 801 is currently accessible for B-Double trucks through Pederick Road with the condition that all operators carry written support from the road manager acknowledging the operator's use of the road.



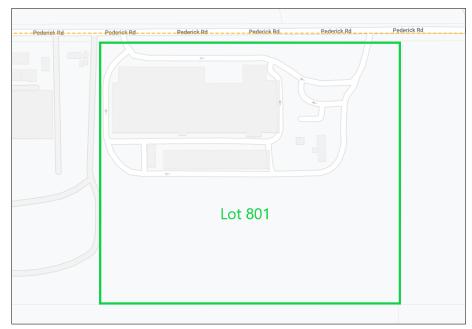


Figure 3-2: Tandem Drive Network 2 – conditional on Pederick Road

Pederick Road is proposed to undergo future upgrades to accommodate for RAV 7 heavy vehicles, which would permit the use of B-Doubles.

## 3.6 Existing Services on Plan

Figure 3-3 below shows all the existing known services on and around Lot 801 while Figure 02 in Appendix A shows these services on a GIS map.

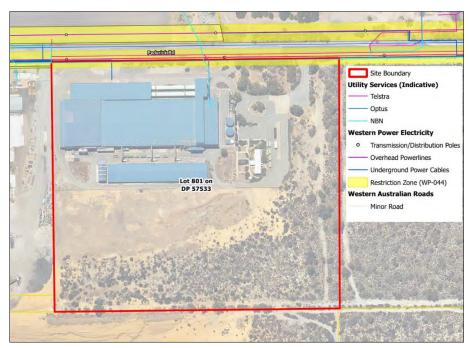


Figure 3-3: Existing Services on and around Lot 801

# 3.7 Developable Area on Lot 801

Given the services in place across and near Lot 801, the whole site is usable for the Precinct.



#### 4 Lot 502 Services and Utilities

The third proposed site for the precinct is Lot 502 on Plan 404876 as shown in Figure 4-1. The site is bound by Old Yanchep Road on the north-east side, Pederick Road on the south and Lot 1506 on the west. This site is 34.8 hectares and is partially occupied by the Pinjar Motorcycle Park. The eastern half of the Lot is a bush forever land.

Lot 502 is considered of a good size for a GMSF or WtE. However, with the restrictions associated with the bush forever land on the west side, only 22.8 hectares will remain available which includes the Motorcycle Park.

The following sections discuss identified existing services and restrictions for this site.



Figure 4-1: Site location of Proposed Site in Lot 502

#### 4.1 Gas

#### 4.1.1 NewGen Neerabup Pipeline

The Neerabup Pipeline is located outside the north-west corner of the proposed site.

#### 4.2 Telecommunications

#### 4.2.1 **NBN**<sup>TM</sup>

NBN<sup>™</sup> owns underground services along Old Yanchep Road and Pederick Road. The BYDA search indicated that there may be NBN services inside Lot 502 next to the southern entry to the site from Pederick Road.

#### **4.2.2** Optus

There are underground Optus Fibre Optic Telecommunication assets along the southern boundary of Lot 502, under Pederick Road.



#### **4.2.3** Telstra

Telstra owns underground services under Old Yanchep Road on the north-east side of the Lot as well as under Pederick Road on the south.

There are some services in the middle of the Lot on the south to north direction, including concrete pits and PVC conduits.

#### 4.2.4 TPG Telecom (WA)

There is a Pipe Networks Duct along and outside the southern boundary of the proposed site under Pederick Road.

#### 4.3 Water

There are no existing Water Corporation assets inside or around Lot 502.

The future Alkimos SDP Trunk Main is proposed with its alignment passing along Old Yanchep Road on the north-east side of Lot 502.

#### 4.3.1 Water Supply

The closest existing point for water connection would be 1.7 km away, at the corner of Old Yanchep Road and Flynn Drive.

The future Alkimos SDP Trunk Main could potentially provide the nearest water supply connection to Lot 502.

#### 4.3.2 Wastewater Disposal

An on-site wastewater disposal system will be required for this site.

#### 4.4 Power

Western Power owns the following infrastructure within the vicinity of Lot 502:

- Transmission overhead cables along Old Yanchep Road and Pederick Road;
- High voltage overhead cables on the north-west corner, extending to Lot 1506;
- Underground high voltage distribution cables on the eastern Lot boundary along Old Yanchep Road;
- Underground Crossing and high voltage distribution cables on the northern and eastern corners of the Lot;
- Underground Crossing and low voltage cables on the south-western side of the Lot;
- Five fibre network pits along Old Yanchep Road; and
- A 63mm conduit along Old Yanchep Road.



#### 4.5 Access

Lot 502 is currently accessible for B-Double trucks through Old Yanchep Road with no condition, and through Pederick Road conditionally, provided that the operators carry written support from the road manager acknowledging the operator's use of the road.



Figure 4-2: Tandem Drive Network 2 (solid line without condition, dash line with condition)

Pederick Road is proposed to undergo future upgrades to accommodate for RAV 7 heavy vehicles, in such case, access to site from both roads will be possible.

#### 4.6 Existing Services on Plan

Figure 4-3 below shows all the existing known services on and around Lot 502 while Figure 03 in Appendix A shows these services on a GIS map.



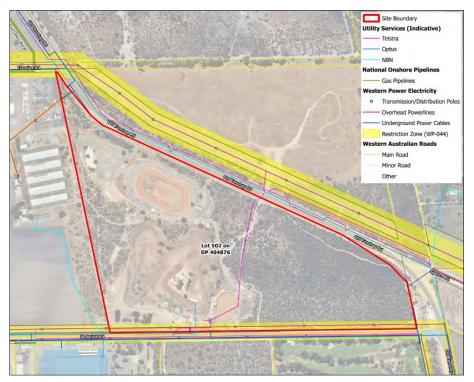


Figure 4-3: Existing Services on and around Lot 502

#### 4.7 Developable Area on Lot 502

Given the services and restrictions in place (bush forever land) across and near Lot 502, Figure 4-4 shows available buildable area across the Lot. An approximate area of 19 hectares is considered developable for the future Precinct at this site. However, this would require the removal of the Pinjar Motorcycle Park for the area to be used for waste infrastructure.





Figure 4-4: Buildable Area on Lot 502



#### 5 Lot 503 Services and Utilities

The fourth and last nominated site for the Precinct is Pinjar Park which is a bush forever land and an old landfill, located at Lot 503 on Plan 406406 as shown in Figure 5-1. The site is bound by Old Yanchep Road on the south-west side and Lot 500 on Plan 424352 on the north and east sides. This site is 25.1 hectares and used to be a landfill site.

Being an old landfill site, this Lot does not deem suitable for placement of waste infrastructure. Moreover, the Lot is considered a bush forever land which makes it unsuitable for construction.

The following sections discuss identified existing services and restrictions for this site.



Figure 5-1: Site location of Proposed Site in Lot 503

#### 5.1 Gas

No gas pipeline was found in BYDA search in the vicinity of Lot 801.

#### 5.2 Telecommunications

#### **5.2.1** NBN<sup>TM</sup>

NBN<sup>™</sup> owns underground services along Old Yanchep Road, next to the south-west boundary of Lot 503.

#### 5.2.2 Telstra

Telstra owns underground services inside and along the south-west boundary of Lot 503 and a 2 pair lead-in to the Lot from Pit on the boundary. There are two sets of PVC conduits along the southern half of the Lot boundary along Old Yanchep Road.



#### 5.3 Water

There are no existing Water Corporation assets inside or around Lot 503.

The future Alkimos SDP Trunk Main is proposed with its alignment passing along Old Yanchep Road on the south-west side of Lot 503.

#### 5.3.1 Water Supply

The closest existing point for water connection would be 1.8 km away, at the corner of Old Yanchep Road and Flynn Drive.

The future Alkimos SDP Trunk Main could potentially provide the nearest water supply connection to Lot 503.

#### 5.3.2 Wastewater Disposal

An on-site wastewater disposal system will be required for this site.

#### 5.4 Power

Western Power owns the following infrastructure inside and around Lot 503:

- Transmission overhead cables inside the Lot along Old Yanchep Road;
- High voltage overhead cables outside the south-eastern corner of the Lot,
- Underground high voltage distribution cables on the south-western Lot boundary along Old Yanchep Road;
- Underground Crossing and high voltage distribution cables under Old Yanchep Road;
- Five fibre network pits inside and along the south-western boundary; and
- A 63mm conduit inside and along the south-western boundary.

In addition to the services noted above, Western Power has restriction zones either side of the overhead power lines as following:

• 35m either side of the transmission power lines along Old Yanchep Road.

Restriction zones shall be avoided during all construction activities.

#### 5.5 Access

Lot 503 is currently accessible for B-Double trucks through Old Yanchep Road with no conditions.





Figure 5-2: Tandem Drive Network 2 along Old Yanchep Road with no Condition

#### **5.6** Existing Services on Plan

Figure 5-3 below shows all the existing known services on and around Lot 503 while Figure 04 in Appendix A shows these services on a GIS map.

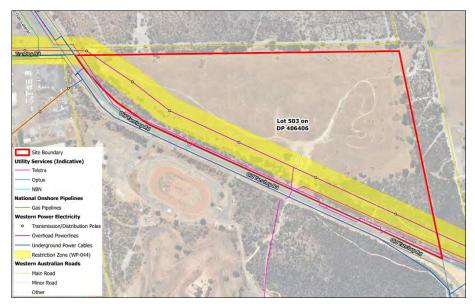


Figure 5-3: Existing Services on and around Lot 503

#### 5.7 Developable Area on Lot 503

Given the Lot is a bush forever land, Lot 503 does not deem suitable for the Precinct.



#### **6** Summary and Conclusion

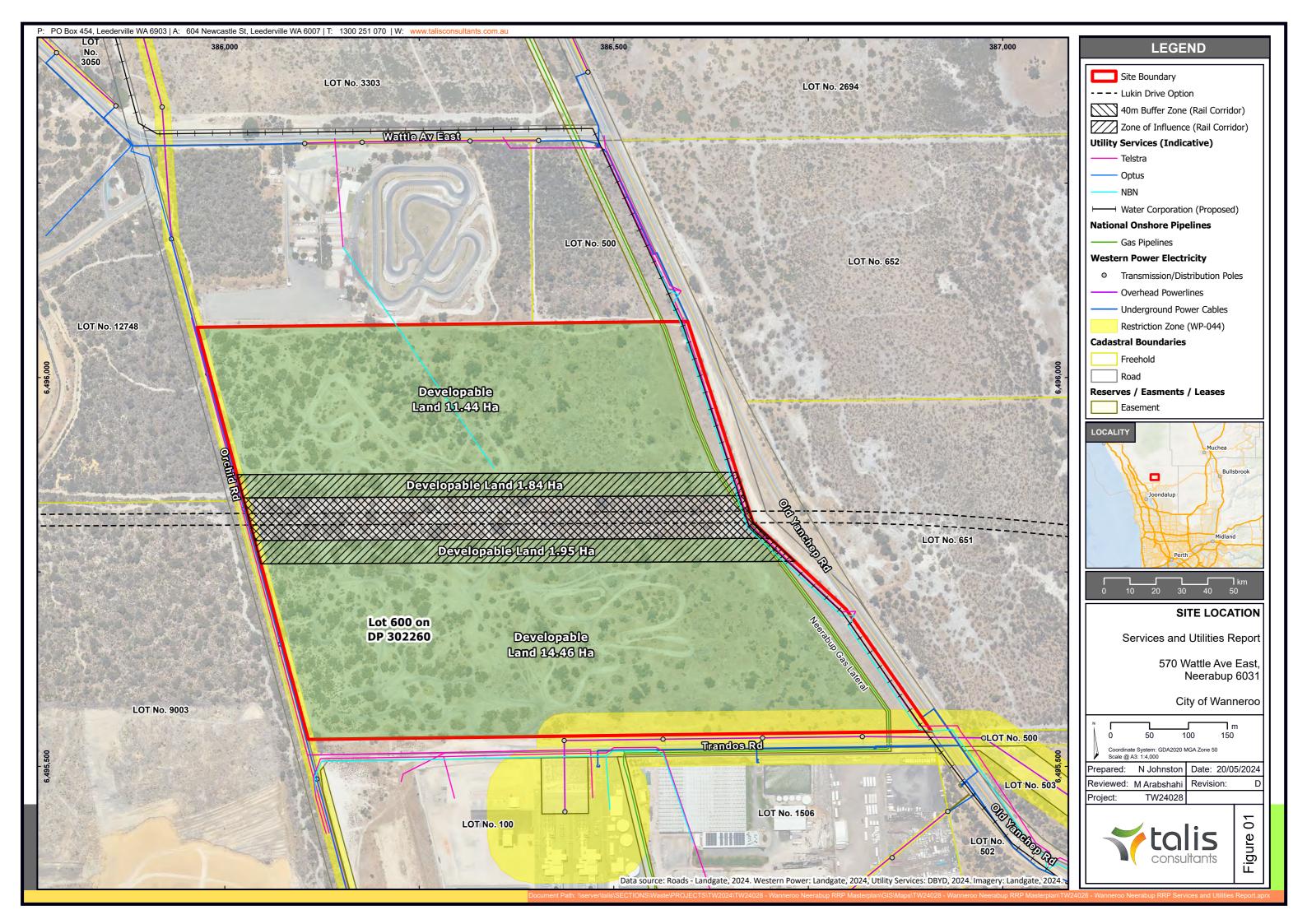
This report has been prepared for the City of Wanneroo to outline the existing services and restrictions as a pre-requisite for the Master Plan for the City's Neerabup Recovery Precinct.

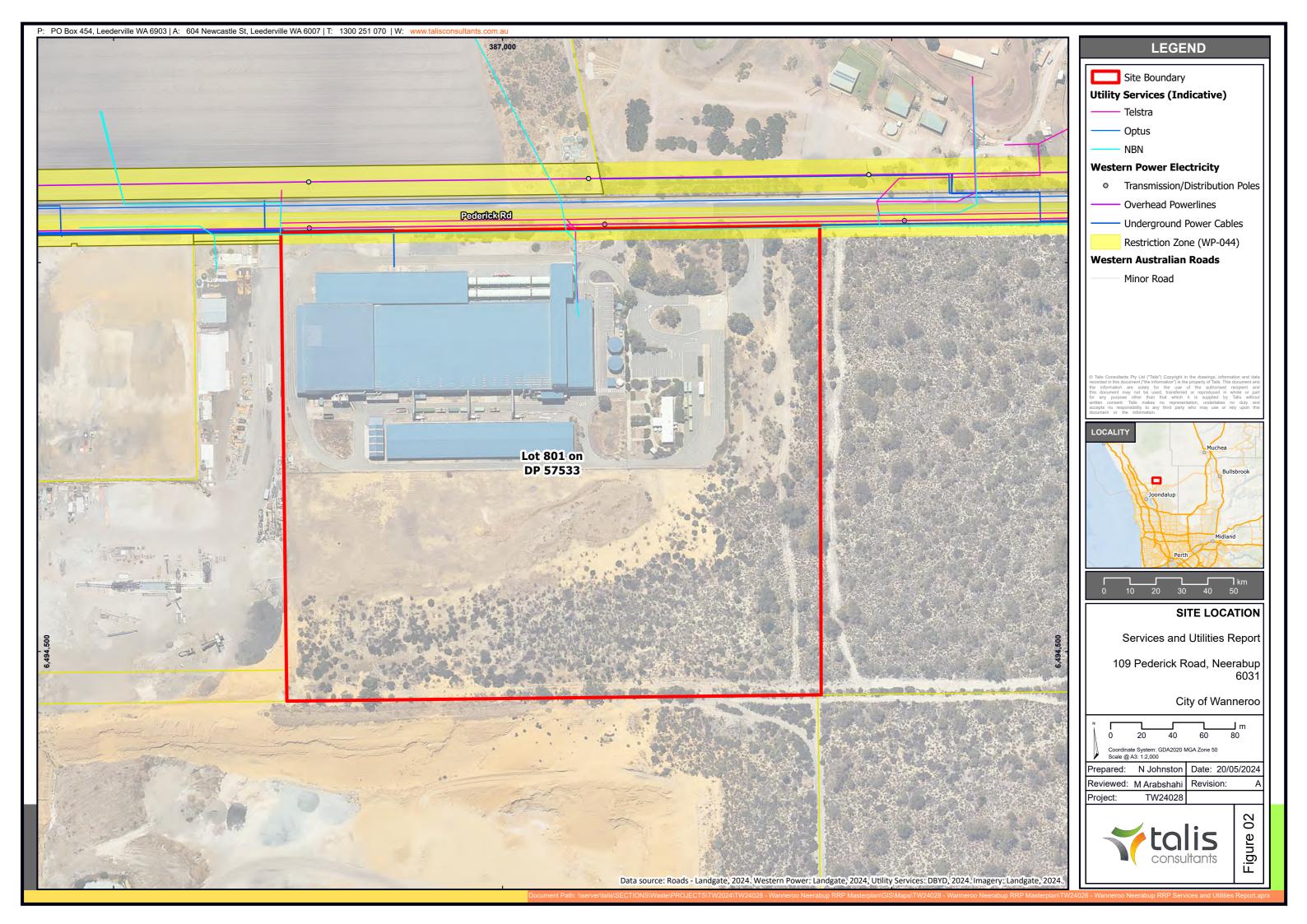
Four (4) nominated sites were assessed based on their existing services infrastructure, heavy vehicle networks and proposed road upgrades to the best of Talis' knowledge at the time of preparing this report. A summary of the assessment results is presented below:

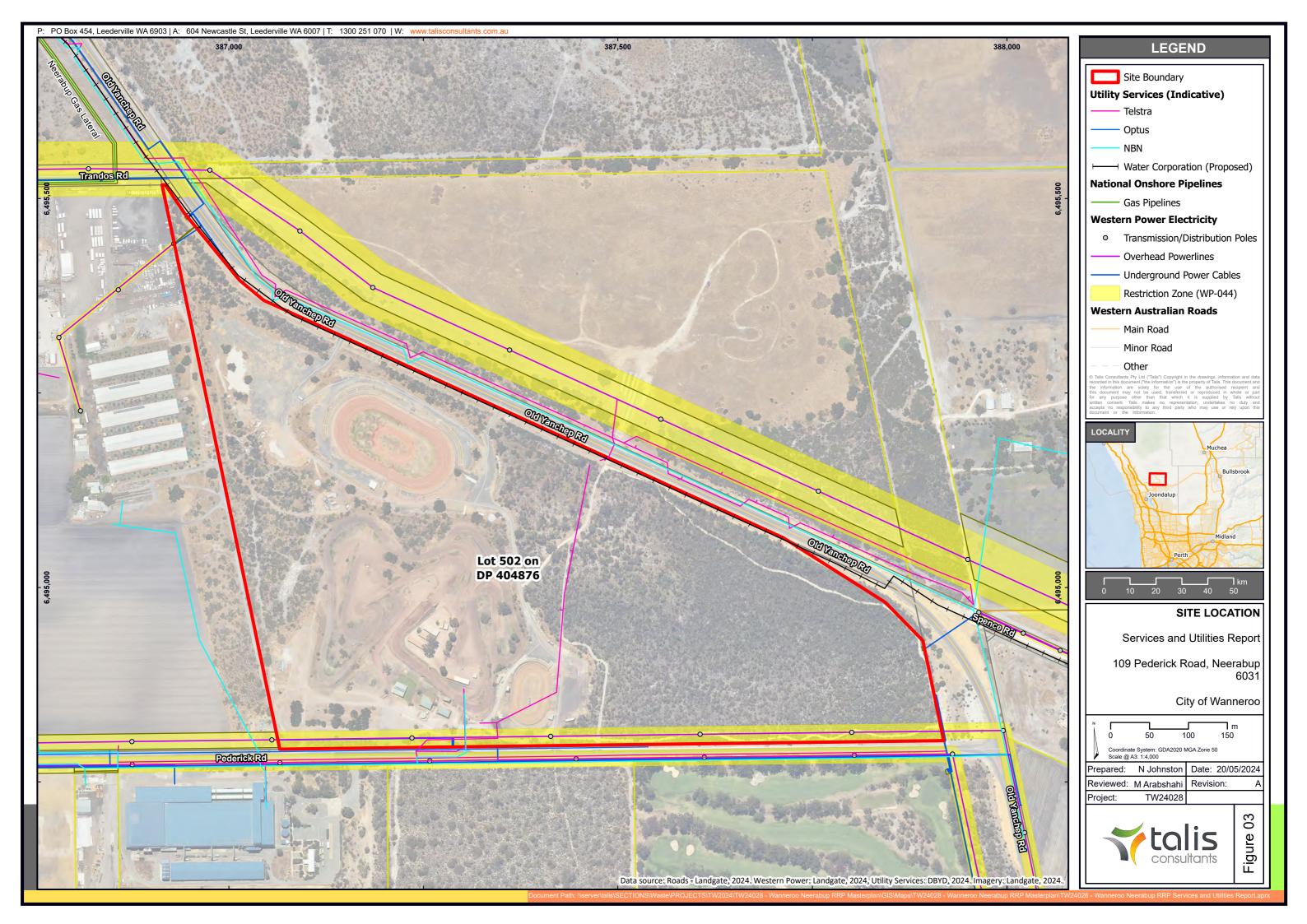
- Lot 600 is the City's preferred site which includes considerable number of services and easements across the Lot. 18 hectares of this Lot, separated in two sections, is considered suitable for the Precinct.
- Lot 801 is the smallest among nominated sites with minimum clashed with existing services.
   This site includes existing facilities belong to Mindarie Regional Council. The whole 10 hectares of this Lot is considered suitable for the Precinct.
- Lot 502 is partially occupied by the Pinjar Motorcycle Park and partially covered with a bush forever land. Existing underground Telstra services pass through the middle of the Lot. Approximately 19 hectares of this Lot is considered suitable for the Precinct.
- Lot 503 is a bush forever land and a former landfill site. Overhead powerlines and underground telecommunication services exist on the southern boundary of the Lot. This Lot does not seem suitable for either a WtE Facility or a GMSF, unless restrictions with "bush forever" land is raised.

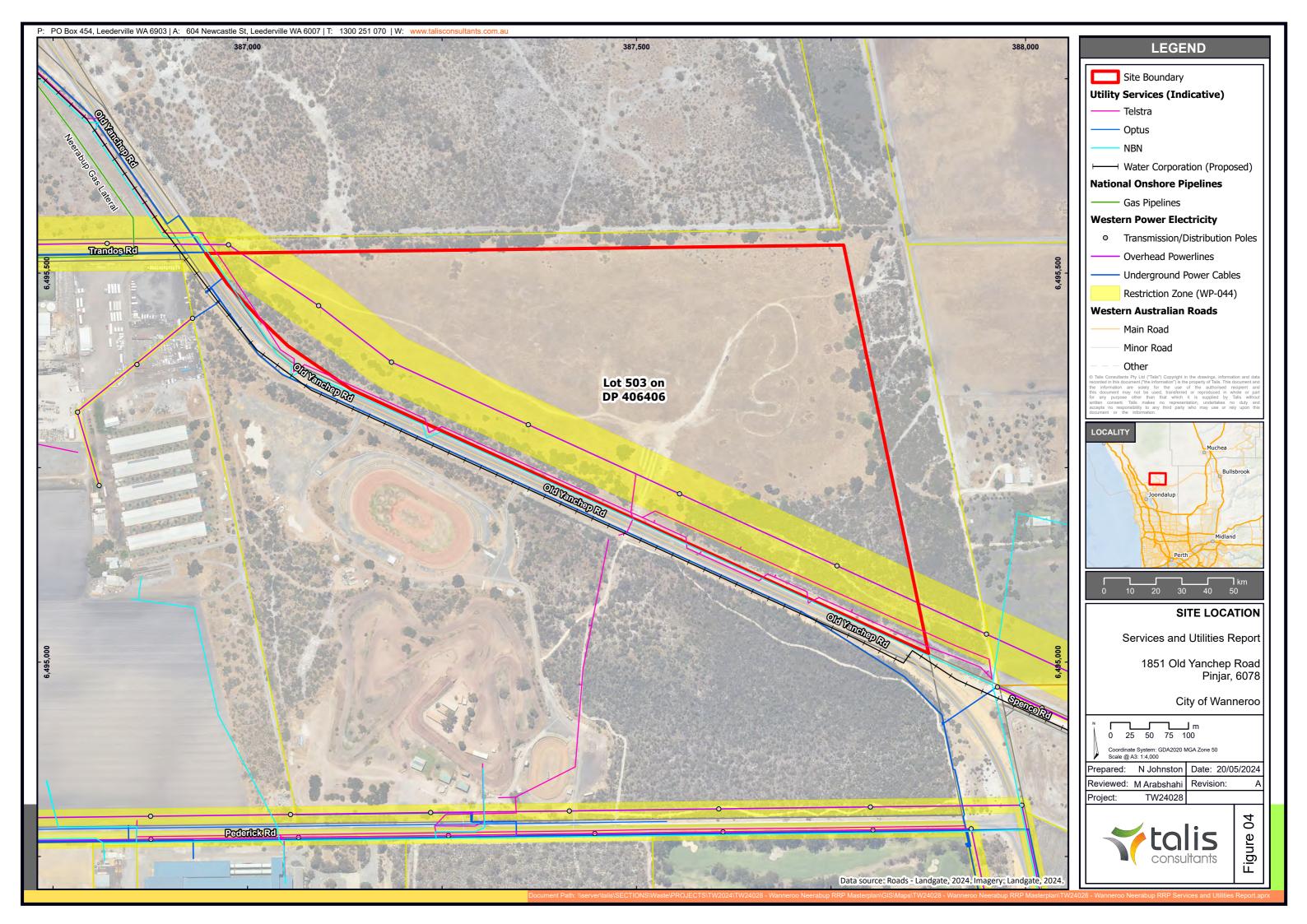


## **APPENDIX A**GIS MAPS











#### 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



## **APPENDIX E**Waste to Energy Strategic Advice



# Report and recommendations of the Environmental Protection Authority and the Waste Authority



Environmental and health performance of waste to energy technologies

Advice of the Environmental Protection Authority to the Minister for Environment under Section 16(e) of the Environmental Protection Act 1986

Report 1468

April 2013

#### Conclusions and recommendations

- Conclusion 1 Waste to energy plants have the potential to offer an alternative to landfill for the disposal of non-recyclable wastes, with the additional benefit of the immediate capture of stored energy.
- Conclusion 2 It has been demonstrated internationally that modern waste to energy plants can operate within strict emissions standards with acceptable environmental and health impacts to the community when a plant is well designed and operated using best practice technologies and processes.
- Recommendation 1 Given the likely community perception and concern about waste to energy plants, a highly precautionary approach to the introduction of waste to energy plants is recommended.
- Recommendation 2 As part of the environmental assessment and approval, proposals must address the full waste to energy cycle from accepting and handling waste to disposing of by-products, not just the processing of waste into energy.
- Recommendation 3 Waste to energy proposals must demonstrate that the waste to energy and pollution control technologies chosen are capable of handling and processing the expected waste feedstock and its variability on the scale being proposed. This should be demonstrated through reference to other plants using the same technologies and treating the same waste streams on a similar scale, which have been operating for more than twelve months.
- Recommendation 4 Waste to energy proposals must characterise the expected waste feedstock and consideration made to its likely variability over the life of the proposal.
- Recommendation 5 The waste hierarchy should be applied and only waste that does not have a viable recycling or reuse alternative should be used as feedstock. Conditions should be set to require monitoring and reporting of the waste material accepted over the life of a plant.
- Recommendation 6 Waste to Energy operators should not rely on a single residual waste stream over the longer term because it may undermine future recovery options.
- Recommendation 7 Regulatory controls should be set on the profile of waste that can be treated at a waste to energy plant. Plants must not process hazardous waste.
- Recommendation 8 In order to minimise the discharge of pollutants, and risks to human health and the environment, waste to energy plants should be required to use best practice technologies and processes. Best practice technologies should, as a minimum and under both steady state and non-steady state operating conditions, meet the equivalent of the emissions standards set in the European Union's Waste Incineration Directive (2000/76/EC).

- Recommendation 9 Pollution control equipment must be capable of meeting emissions standards during non-standard operations.
- Recommendation 10 Continuous Emissions Monitoring must be applied where the technology is feasible to do so (e.g. particulates, TOC, HCl, HF, SO<sub>2</sub>, NOx, CO). Non-continuous air emission monitoring shall occur for other pollutants (e.g. heavy metals, dioxins and furans) and should be more frequent during the initial operation of the plant (minimum of two years after receipt of Certificate of Practical Completion). This monitoring should capture seasonal variability in waste feedstock and characteristics. Monitoring frequency of non-continuously monitored parameters may be reduced once there is evidence that emissions standards are being consistently met.
- Recommendation 11 Background levels of pollutants at sensitive receptors should be determined for the Environmental Impact Assessment process and used in air dispersion modelling. This modelling should include an assessment of the worst, best and most likely case air emissions using appropriate air dispersion modelling techniques to enable comparison of the predicted air quality against the appropriate air quality standards. Background monitoring should continue periodically after commencement of operation.
- Recommendation 12 To address community concerns, proponents should document in detail how dioxin and furan emissions will be minimised through process controls, air pollution control equipment and during non-standard operating conditions.
- Recommendation 13 Proposals must demonstrate that odour emissions can be effectively managed during both operation and shut-down of the plant.
- Recommendation 14 All air pollution control residues must be characterised and disposed of to an appropriate waste facility according to that characterisation.
- Recommendation 15 Bottom ash must be disposed of at an appropriate landfill unless approval has been granted to reuse this product.
- Recommendation 16 Any proposed use of process bottom ash must demonstrate the health and environmental safety and integrity of a proposed use, through characterisation of the ash and leachate testing of the by-product. This should include consideration of manufactured nanoparticles.
- Recommendation 17 Long term use and disposal of any by-product must be considered in determining the acceptability of the proposed use.
- Recommendation 18 Standards should be set which specify the permitted composition of ash for further use.
- Recommendation 19 Regular composition testing of the by-products must occur to ensure that the waste is treated appropriately. Waste by-products must be tested whenever a new waste input is introduced.
- Recommendation 20 Waste to energy plants must be sited in appropriate current or future industrial zoned areas with adequate buffer distances to

sensitive receptors. Buffer integrity should be maintained over the life of the plant.

Recommendation 21 For a waste to energy plant to be considered an energy recovery facility, a proposal must demonstrate that it can meet the R1 Efficiency Indicator as defined in WID.



#### **APPENDIX F**

## Market Sounding Detailed Response Overview

#### 15.1 Responses to NRRP Master Plan

The City and Talis have recognised that there is insufficient waste processing infrastructure in the northern area of Perth. A clear example of this is the two WTE facilities set to open in late 2024 being located within close proximity of each other in East Rockingham and Kwinana, approximately 70 kilometres south of Wanneroo.

By creating the NRRP specifically for waste processing infrastructure, the City's vision is to ensure that its future recycling and waste management needs can be met locally, without having to transport waste significant distances. This will reduce the cost of transporting waste for the City as well as reducing greenhouse gas emissions and creating local employment opportunities.

This section discusses participants responses to the broader NRRP master plan.

All participants responded to this section of the questionnaire.

#### 15.1.1 Vision and Design of the NRRP

All received responses have shown support for the City's vision of the NRRP, recognising that the NRRP is a needed solution for the lack of waste infrastructure in the northern area of Perth. Comments also recognised the project would provide benefits towards circular economy initiatives.

Most responses agreed the plan was well laid out, providing sufficient space for the WtE plant, MRF, WTS and organics processing facility. The location was deemed well serviced by major road infrastructure and utilities.

Veolia noted that the designs were missing a connection between the MRF and WTS.

NALG Envirotech presented a design for a 165,000tpa organics processing facility within the northwestern portion which was allocated for organics processing.

#### 15.1.2 Opportunities of the NRRP

Participants were asked which opportunities they believed the NRRP could deliver. A range of responses were received with many similarities that the project would provide opportunities to:

- Demonstrate commitment to responsible waste management, aligning with the states avoidance and recovery objectives by presenting more sustainable alternatives to landfill;
- Provide improved business confidence and enhance local employment opportunities;



- Help bridge the gap between northern and southern waste infrastructure;
- Identify and implement newer technologies and waste management techniques;
- Educational opportunities with residents and communities to dispel myths surrounding waste processing and disposal, leading to improved social perceptions;
- Promote circular economy initiatives and product life cycles by providing ways to re-use rejected waste on the precinct; and,
- Improve efficiencies and reduce costs.

#### 15.1.3 Constraints/Barriers of the NRRP

Participants were asked which constraints and barriers may present themselves in the delivery of the NRRP master plan. The following points were raised by responses:

- All responses commented on the lack of available feedstock impacting the economic viability
  of the WtE facility, and to a lesser extent, the MRF;
- A lack of suitable experience within the industry and partners across WA and Australia;
- Macroeconomics and the need for financial institutions to better understand precinct scale systems and increase their willingness to finance projects;
- Misalignments in existing LGA waste contracts leading to difficulties in securing supply agreements;
- The low cost of the WA landfill levy still making landfill the cheapest disposal option;
- Licencing and Regulatory requirements to obtain a 'social licence to operate' and potential negative community perceptions; and,
- TBH noted the location of the NRRP being far from the port being problematic for incoming construction materials. The project may wish to consider options for modular parts.

#### 15.1.4 Additional commentary

Participants were asked to provide any additional comments regarding the proposed NRRP and associated Master Plan. The following points were raised for consideration:

- Integration of waste streams in the layout of the design to clarify potential synergies in the processing and/or transfer of those waste streams. For example, by implementing a conveyor belt system between facilities with synergistic material flows to help streamline operations
- Being mindful not to underestimate the complexity of the facilities and the time required to complete various stages of each project; and,
- Incorporation of glass processing in the MRF design;

Veolia made an offer to operate the NRRP as an extension of its existing infrastructure network to provide flexibility and redundancy.

Solo raised that WtE technologies other than incineration should also be considered.



#### 15.2 Responses to WtE Facility

The City has proposed that a WtE facility be constructed within the NRRP to process residual waste and maximise the recovery of materials and energy. The following section discusses participants responses to the proposed WtE facility.

The following participants provided feedback to this section of the questionnaire:

- Kanadevia INOVA;
- KER, via interview process and presentation submitted;
- Remondis;
- TBH;
- Veolia; and,
- Solo.

#### 15.2.1 Technology

Incineration has been proposed as the most appropriate WtE technology for the NRRP over other methods due to its proven track record and general acceptance in Australia along with its cost-effectiveness. Participants were asked to comment on the use of incineration as the preferred technology option and provide supporting justification or alternative technology options.

Most responses received agreed that moving grate incineration was the most suitable WtE technology currently available. Many of the participants pointed out that it is a well-established and widely used technology in WtE plants across Europe. Kanadevia INOVA and KER both noted that the moving grate incineration would be most suitable for MSW and C&I waste due to the feedstock streams being highly variable, and that other technologies such as gasification would be unsuitable due to requiring homogenous feedstock to operate efficiently.

The response from Solo was the only one to disagree with the preferred use of incineration (mass burn) due to its linear approach to waste management. Their response proposed using gasification ("Waste-to-hydrogen"), stating it would generate 30% more electricity than incineration and that other outputs could be used for fuels and construction purposes. Solo has also stated that upcoming WtE plants using gasification have been approved for development in Victoria.

KER also expressed that technology mattered less in the long term, as such, limiting the project to only one technology could become a hinderance.

#### 15.2.2 Timeframes

The City has recognised that WtE projects take a significant time to deliver, assumed to be 8-10 years. Participants broadly agreed that this timeframe was a realistic for the development of a WtE facility in WA assuming all stages proceed according to their timeframes. The following range of timeframes were provided by participants for the various stages:



- 1-3 years for completing the RFT process, site development including geotechnical and heritage studies, securing waste supply and off-take agreements and finalising EPC and O&M agreements;
- 1-2 years for approvals, permitting and financial close; and,
- 3-5 years for detailed design, construction and commission

Kanadevia INOVA noted that full delivery time can be as low as 3-5 years in more established and experienced areas such as Europe. However, it is believed to be unlikely that Australia will see similar timeframes due to a lack of experience within the waste and construction industries.

Due to the current lack of processing capacity in the Northern Suburbs the City also wishes to assist with expediting the delivery of the NRRP and the WtE facility. When asked how the City could provide assistance the most common responses included:

- Conducting early site studies and geotechnical investigations;
- Assisting with regulatory approvals and advocating for policy support. For example, advocating for integration of regulations surrounding processing options for residue such as incinerator bottom ash (IBA) in construction;
- Providing confidence to the market by securing waste supply agreements and supporting infrastructure early in the process;
- Identifying and applying for funding opportunities presented through state, federal, and private grants benefitting sustainable energy projects; and,
- Facilitating community engagement early in the process to address any community concerns and feedback to help build trust towards the project.

#### 15.2.3 Master Plan Feedback

The WtE facility is proposed to be positioned within an allocated area of 7.3 hectares in the southwestern corner of the NRRP with access off a new proposed road with direct links to Trandos Road. The location was selected for its close proximity to the Neerabup Power Station (NPS) and associated grid connection. The facility was designed to be serviced by semi-trailers and B-doubles entering through a two-way access road with designated routes based on their purpose.

Participants were asked to provide comment on the proposed location, allocated area, layout and access points for the WtE facility.

All received responses indicated that the location and allocated area would be suitable for the proposed WtE facility. Responses also expressed that a detailed traffic assessment and general review of traffic flows should be undertaken.

Further discussion with Solo indicated the proposed gasification model they suggested would require a footprint size of 4-5 hectares including a pre-treatment facility.

KER suggested that additional space for a laydown area (even if temporary) should be considered within the NRRP precinct. A proposed workforce of 300 staff the area would need to be similar in size to the area of the WtE facility. KER also indicated that additional space could provide other benefits during development stages, such as allowing for pre-assembly of components during construction.



Kanadevia INOVA noted that sufficient water supply and natural gas availability to the facility would be beneficial.

#### 15.2.4 Feedstocks and Sizing

There is a significant lack of waste processing infrastructure in the northern suburbs, with two new WtE facilities nearing completion in Rockingham and Kwinana. The State Wast Infrastructure Plan 2024 (Infrastructure Plan 2024) states that additional WtE processing capacity will be required beyond the two facilities currently under construction.

Potential feedstocks for the WtE facility are residual waste from the City, along with the Cities of Joondalup and Stirling. Combined, these LGAs currently have approximately 142,000 tonnes per annum growing to approximately 200,000 tonnes per annum by 2042.

Participants were asked to provide guidance on the minimum required facility tonnages and sizing required to make the facility viable.

Responses for an incineration-based WtE facility were mixed, with minimum viable sizing and tonnages varying from 150,000tpa to 500,000tpa as follows:

- KER proposed a facility as small as 150,000 200,000tpa could be viable for the NRRP, noting that securing enough feedstock for 250,000tpa or larger facilities would be difficult;
- Kanadevia INOVA, TBH and Veolia proposed a minimum facility size of 300,000tpa, many comparing it to the existing East Rockingham WtE facility of the same size; and,
- Remondis proposed a minimum facility size of 500,000tpa.

Smaller facilities were generally seen as unattractive due to requiring higher gate fees to enable financial viability. Several participants also indicated that a feedstock ratio of 70-80% MSW would be necessary for the project to be seen viable for financing.

The response from Solo proposed using a waste-to-hydrogen facility with a minimum viable size of 100,000tpa. Their response recommended a 200,000tpa facility for the project based on the provided tonnage volumes.

All responses expressed that the current available tonnages are insufficient. When asked to provide commentary on other potential waste streams sources the following examples were provided:

- MSW from other surrounding LGAs;
- Third party C&I waste;
- Medical waste;
- Sludges, provided they are no more than 10% of the annual throughput due to low calorific value; and,
- Biomass for a gasification option, including wood, plants, food scraps and Greenwaste.



#### 15.2.5 Cost Estimate

The anticipated capital cost for the WtE facility is \$750 million (in current day value). This value is based on comparison to other reference facilities and consultation with industry professionals.

All responses proposing incineration agreed that the estimated cost of \$750 million is a realistic assumption for a WtE facility sized around 300,000tpa. Solo stated that a gasification of 200,000tpa option would likely have an estimated cost around \$420 million including pre-treatment facilities.

Responses indicated that certain factors could impact the costs further and that the following should be considered to ensure the project remains competitive versus landfills and the other two WtE plants:

- Ground conditions of the chosen site;
- Exchange rates and the commodities market;
- Construction labour rates at the time of project execution;
- Ongoing financing for operational and by-product disposal cost. KER proposed that WtE facility lifetime operational costs were in the range of \$8 \$10 billion; and,
- Depreciation over the lifespan of the project, an example rate of \$120/tonne over 25 years was provided.

#### 15.2.6 Project Delivery Model

#### 15.2.6.1 Contractual Land Arrangement

The City's preference is to retain ownership of the WtE site and enter into a long-term lease with the proponent. When asked to provide comment on the prospect of a long-term lease all Participants indicated that a long-term lease would be suitable for the project. The suggested minimum term for the lease ranged between 20-30 years depending on the selected technology. Participants indicated a longer lease is required for reasonable return on investment.

KER emphasised the need for the City to be comfortable with long-term commitments.

#### **15.2.6.2** *Merchant Plant Approach*

There has been a significant shift towards private sector-led waste infrastructure (regarded as Merchant Plants) in WA and Australia. For Merchant Plant facilities, the private proponent secures the relevant approvals, capital funding and delivers the facility design, construction and operation. When asked if the project would be best delivered through a Merchant Plant approach responses varied.

Most participants indicated that a Merchant Plant arrangement would likely be suitable for the project, while Remondis and Veolia instead proposed that a PPP arrangement may be best suited for the project to allow for risk to be shared. Remondis noted that the majority of WtE projects in Europe have had success using PPP arrangements.

#### **15.2.6.3** Waste Supply Agreement

Some Merchant Plant facilities often secure long-term waste supply agreements with local and regional councils that provide the foundation feedstocks to assist with securing financial close. Under



the Merchant Plant model, the City's (and other LGs) main risk would be the supply of waste under a long-term Waste Supply Agreement (WSA). However, this would be mitigated through a waste arising contract that commits these LGs to provide its residual streams generated (as opposed to an actual tonnage value).

When asked what minimum term for a WSA with the City would best support the development of a WtE facility responses varied between 5 to 25 years, with most stating a minimum of 20 years would be required. Participants generally indicated that it would be preferable for a WSA last for the lifespan of the project and that extension options of 5 to 10 years should be considered for shorter terms. Longer terms would present less risk making the project more attractive for investment.

#### **15.2.7** Energy Outputs

Participants were asked to provide insight on the potential energy output for the WtE facility, preferred market(s) and feasibility of the WtE suppling a microgrid across the NRRP and Neerabup industrial area.

Kanadevia INOVA and Veolia suggested the energy output would range between 28-30MW for a 300,000tpa incineration-based facility. Additional energy output would be attainable through providing excess heat or process steam to other nearby facilities and locations.

The response from Solo suggested the typical output of a 100,000tpa gasification facility would be around 10MW. No energy generation was specified for a 200,000tpa facility. Solo also noted that a facility designed and integrated to the peaking power needs of the South West Interconnected System (SWIS) could potentially generate over 100MW depending on local connection and other market factors. This level of energy output is however not directly linked to the feedstock tonnages.

Meanwhile, the response from Kanadevia INOVA preferences incineration but notes that hydrogen electrolysis could be used to capture and store the generated energy. However, they believed it would be unviable in WA due to the current low cost of electricity and general lack of demand.

Responses received indicate that providing 'behind the meter' electricity or heat and/or steam to colocated energy consumers in a micro-grid for the NRRP and/or surrounding industrial area is feasible but may be dependent on the local infrastructure agreements. Since converting heat into electricity reduces efficiency, utilising heat and steam directly can enhance overall efficiency, potentially approaching 100%. Suggestions were also made for excess energy being stored using batteries during off-peak periods or routed to the main electricity network.

#### 15.2.8 Residues

The City recognises that the WtE facility will generate incinerator bottom ash (IBA). Consequently, the Master Plan includes an area for an IBA recovery facility. The WtE will also generate air pollution control residue (APCr) which require further processing for material recovery and/or disposal which has not been included in the Master Plan.

Participants were asked to provide insight on the types and tonnages of residue generated by the WtE facility, and what the preferred treatment process of each would be. Responses have been summarised below in Table 15-1.

Table 15-1: WtE generated residue, tonnages and preferred treatment methods

Residue Material Estimated Tonnages	Preferred Treatment
-------------------------------------	---------------------



IBA	Generated from incineration: 20-30% of feedstock tonnages, approx. 60,000 – 90,000tpa based on suggested 300,000tpa feedstock  Generated from gasification:  From additional discussions with Solo, estimate of 10-15% of feedstock tonnages, c. 20,000 – 30,000tpa based on suggested 200,000tpa feedstock.	<ul> <li>Recovery of ferrous and non-ferrous metals from IBA. Kanadevia INOVA estimated this will produce c. 6,200tpa.</li> <li>After metals recovery, maturation and grading aggregate for disposal or reuse in construction industry.</li> </ul>
APCr	Generated from incineration:  2-5% of feedstock tonnages, approx.  6,000 – 15,000tpa based on suggested 300,000tpa feedstock  Generated from gasification:  Solo indicated this would be minimal as produced syngas would be contained in a closed loop process, but noted a site specific assessment would be required.	<ul> <li>Stabilising APCr with cement at 1:1 ratio then disposing to Class III landfill.</li> <li>Washing and removing chlorides and sulphates from APCr, then disposing via Waste Water Treatment Plant and reuse salts in industrial and agricultural settings. Washed residue sent to landfill.</li> <li>Carbonising APCr with water and sand to produce manufactured limestone for reuse in construction industry.</li> </ul>

Most responses indicated that an on-site IBA recovery facility would be beneficial to the project. However, Veolia replied that the inclusion of an IBA recovery facility was not standard in most WtE projects, stating that it would normally be subcontracted to companies that manage aggregates.

#### **15.2.9** Opportunities and Constraints

Participants were asked for input on the potential opportunities the NRRP could provide the WtE facility and what constraints and barriers there might be for the delivery of a WtE facility at the NRRP.

Many responses focused on the potential environmental benefits and employment opportunities providing examples such as:

- WtE providing a more environmentally friendly option for waste disposal than landfill. The NRRP would also co-located recovery facilities to dispose of reject materials using WtE;
- A co-located organics facilities providing odours as combustion air in WtE eliminating the need for a biofilter in the organics facility. Produced biogas could also be used as auxiliary burner fuel;
- The WtE facility providing power and steam to co-located NRRP facilities;
- Admin, maintenance and infrastructure being shared between facilities at the NRRP; and,
- Creation of the WtE facility presenting future employment opportunities via encouraging further development of nearby and associated industries.

Constraints and barriers highlighted in responses included:

- Concerns around the lack of available feedstock to supply the project which may adversely affect the success in securing financing;
- Regulatory requirements to obtain a 'social licence to operate' and potential negative community perceptions if education and engagement if support is not provided by the City;



- A lack of experience in the industry across WA and Australia, potentially impacting the ability to deliver a WtE facility on cost and schedule;
- The low cost of the WA landfill levy still making landfill the cheapest disposal option; and,
- The location of the NRRP being far from the port being problematic for incoming construction materials. The project may wish to consider options for modular parts.

Kanadevia INOVA recommended waiting another 2-3 years before considering the process of developing the WtE facility. This time would allow for greater understanding of the market and available feedstocks as the two soon to be operational WtE facilities in Kwinana and Rockingham would have been in operation for some time.

#### 15.3 Responses to MRF

Material recovery facilities (MRFs) are critical components of modern waste management systems, enabling the efficient sorting and processing of commingled recyclables collected from kerbside collections systems. Currently, that are no operational MRF located in Perth's northern suburbs. The City's commingled recyclables are processed in Bibra Lake, located approximately 50 km south from Wanneroo.

The City has proposed that a MRF be constructed within the NRRP to process recyclables from the surrounding areas to reduce transport distances. The following section discusses participants responses to the proposed MRF.

The following participants provided feedback to this section of the questionnaire:

- Remondis;
- Veolia,; and;
- Solo.

#### 15.3.1 Technology

The questionnaire provided a range of potential MRF processing plant equipment. Participants were asked if they felt the list was applicable to the NRRP project.

Responses generally agreed with the initial list of proposed equipment, in addition to making suggestions for including the following:

- Mobile equipment for incoming and outgoing materials (eg. Forklifts, bale grabbers, telehandlers etc.);
- A modern fire suppression system including infrared cameras and automated water cannons;
- Equipment for refining glass recovery;
- Waste compactors for dealing with residual waste; and,
- Data tracking and management systems to collect analytics to help optimise operations and provide insights into material flows.



Veolia also noted a preference for using disc screens and ballistic separators over trommel screening in modern MRFs.

#### 15.3.2 Timeframes

The City has recognised the lack of waste processing capacity within the northern suburbs and wishes to assist with expediting the delivery of the NRRP and MRF facility.

Responses have indicated that the delivery of a MRF at the NRRP would range between 2.5-5 years, with 1-1.5 years dedicated to the RFP process followed by 2-3 years from award to the licencing and commissioning of the site.

When asked how the City could assist in expediting the process, participants suggested:

- Conducting early site studies and Geotech;
- Fostering partnerships and collaboration with industry stakeholders and other local councils, encouraging sharing of resources, knowledge and best practices;
- Helping guarantee feedstock from nearby and participating councils; and,
- Providing early community engagement and education to inform of the benefits and environmental considerations of MRF facilities

#### 15.3.3 Master Plan Feedback

The MRF is proposed to be situated within an allocated area of 2.5 hectares in the southern portion of the NRRP, between the proposed locations for the WtE facility and WTS. The location would allow for an interconnected road network with shared facility elements. The MRF has been designed as a fully enclosed warehouse building with a footprint of 3,840m² (81m x 48m) and a minimum clearance height of 8m at the eaves.

Participants were asked to provide comment on the proposed location, allocated area, layout and access points for the MRF. Responses generally agreed the NRRP location would be suitable for the MRF and for servicing the northern areas of Perth. Additional feedback on the area and layout was mostly absent, responses indicated it would remain limited until more detailed plans, drawings and flow diagrams of the MRF were released.

Veolia suggested the creation of a separate building at least 35m apart for the purpose of storing recovered commodities, stating that segregation would reduce the overall fire risk to the facility. They also suggested for glass recovery to be included in the MRF design.

When asked to provide commentary on the proposed shared infrastructure elements and the access road and weighbridge being operated by the City, responses noted that an effective traffic management plan would be required to avoid bottlenecks.

Veolia also proposed managing the MRF in addition to the WTS to offer a combined solution that would be integrated with their existing waste infrastructure network.

#### 15.3.4 Feedstocks and Sizing

There is a significant lack of waste processing infrastructure in the northern suburbs including MRFs. Potential feedstocks for the MRF facility are kerbside commingled recycling services from the City, and



the Cities of Stirling and Joondalup. These LGs currently have approximately 48,000 tonnes per annum growing to approximately 65,000 tonnes per annum by 2042

Participants were asked to provide guidance on the minimum required facility tonnages and sizing required to make the facility viable.

All responses provided different minimum viable sizes of a modern MRF, ranging from 20,000tpa upwards to 100,000tpa as follows:

- Solo minimum 20,000 to 30,000tpa, with larger facilities above 50,000tpa;
- Veolia minimum 60,000tpa at a rate of 30t/hour with options to scale up; and,
- Remondis minimum 80,000 to 100,000tpa.

Currently available throughput tonnages were deemed to be somewhat short of requirements. The following examples were provided for potential inclusion to help make up the shortfall:

- Collections from other surrounding LGAs, noting that the introduction of kerbside recycling in Geraldton would offer a good opportunity for additional tonnages;
- Third party C&I waste; and,
- If provided the space, collection and aggregation of hazardous waste such as paints and household chemicals.

#### 15.3.5 Cost Estimate

The anticipated capital cost for the MRF is approximately \$23 million (in current day value). This value is based on comparison to other reference facilities and consultation with industry professionals.

Solo agreed the proposed cost of \$23 million seemed appropriate for a facility handling 40,000-50,000tpa. Other participants indicated the proposed cost estimate would be insufficient, estimating that actual costs were anticipated to be in the region of \$30-40 million. Approximately \$10-15 million of the additional costs being for plant and equipment and \$4-5 million being suggested for investment in a fire suppression system.

#### 15.3.6 Project Delivery Model

#### 15.3.6.1 Contractual Land Arrangement

The City's preference is to retain ownership of the MRF site and enter into a long-term lease with the proponent. When asked to provide comment on the prospect of a long-term lease all responses indicated that a long-term lease would be suitable for the project. The suggested minimum term for the lease ranged between 10-15 years with options to extend the lease for an additional 5 years. Participants expressed that a 20 year lease to match the lifespan of the MRF was most preferred.

#### **15.3.6.2** *Merchant Plan Approach*

There has been a significant shift towards private sector-led waste infrastructure (regarded as Merchant Plants) in WA and Australia. For Merchant Plant facilities, the private proponent secures the relevant approvals, capital funding and delivers the facility design, construction and operation.



When asked if the project would be best delivered through a Merchant Plant approach the majority of responses agreed it would be a suitable arrangement. Veolia also suggested the WTS should be included in the arrangement to improve efficiencies. Meanwhile, only Remondis indicated a preference for a PPP arrangement to enable risks to be shared.

#### **15.3.6.3** Waste Supply Agreement

Responses indicated the minimum viable term for a waste supply agreement ranged between 10-15 years, with a preference for either back-to-back agreements or a 15-20 year agreement. Participants noted that longer terms would provide the following benefits:

- Financial stability and investment security. Longer terms are more attractive to investors and financiers who often seek stability;
- Improved operational efficiencies;
- Demonstrating commitment towards sustainability goals by ensuring consistent waste diversion and promotion of renewable energy production; and,
- Mitigation of risk and supply shortages. Longer terms help protect against supply volatility.

#### **15.3.7** Outputs and Residues

Participants were asked to provide insight on a list of anticipated outputs from the MRF and potential markets. Responses generally agreed with the list of outputs, adding that Tetra Pak potentially be included as a target commodity for the container deposit scheme (CDS) value. The list of anticipated outputs and potential markets has been summarised in Table 15-2 below. None of the responses provided any indication of the volumes that would be generated.

Table 15-2: MRF output materials and potential markets

Output Materials	Potential Markets
Plastics Sorted by type, eg. PET, HDPE, Polypropylene, then processed into flakes or pellets  Recycled Paper and Cardboard Sorted and processed paper products, often baled for use	<ul> <li>Manufacturers of new plastic products (eg. containers, bottles, packaging)</li> <li>Construction (plastic lumber, pipes etc.)</li> <li>Paper mills for the production of new paper products (newsprint, cardboard, tissues)</li> <li>Packaging companies</li> <li>Craft and recycling programs (for reuse in arts and crafts)</li> </ul>
Metals (Ferrous and Non-Ferrous) Sorted scrap metal including aluminium, steel, copper and brass	Metal recycling companies
Recycled Glass (Cullet) Crushed glass	<ul> <li>Glass manufacturing companies (eg. beverage bottles, jars)</li> <li>Construction and landscaping (eg. glass aggregates for concrete, decorative materials)</li> <li>Road base materials and drainage applications</li> </ul>
Tetra Pak	Inherent value from CDS



When asked for input on the potential residues and their preferred treatment process responses noted that residues would be categorised as non-target recyclables and general contamination. Some examples of expected contamination included but not limited to:

- General household waste;
- Batteries;
- Electrical appliances and cables;
- Soft plastics and plastic film;
- Hazardous household waste;
- Expanded polystyrene;
- Nappies; and,
- Textiles

Veolia proposed that the preferred treatment for most residues was energy recovery via WtE facilities. The response from Solo generally agrees, the use of specialised e-waste recycling for batteries and electrical appliances.

#### 15.3.8 Opportunities and Constraints

Participants were asked for input on the potential opportunities the NRRP could provide the MRF and what constraints and barriers there might be for the delivery of a MRF at the NRRP. Responses all concluded that a MRF located in the Northern Metro region would help meet recovery targets and help address a lack of waste infrastructure in northern Perth. Other opportunities mentioned included reducing transportation costs and environmental impacts, integrating synergies between facilities at the NRRP and using the NRRP to showcase best practices and technologies.

The primary constraint raised by most participants was the lack of available feedstock, which could lead to difficulties securing financing. Some other constraints mentioned were delays from regulatory and permitting challenges, recyclables market demand fluctuations and difficulties with coordination between contractors, industry and local governments.

When asked for further comments, Remondis suggested that additional source separation of paper and cardboard would ensure higher quality output commodities. Suggestions were also made for considering using some space at the MRF for collecting and transferring Product Stewardship Scheme materials such as soft plastics, coffee pods or similar.

Veolia also made an offer to operate the MRF as a secondary facility in combination with their existing Bibra Lake facility.



# **APPENDIX G**Market Sounding Questionnaire



XX/XX/2024

**Company Address** 

#### Dear X,

#### City of Wanneroo: Neerabup Resource Recovery Precinct - Market Sounding: Project Questionnaire

Upon receipt of a signed Consultation Undertaking, participating parties (Participants) are now invited by the City of Wanneroo (the City) to provide responses to the questions outlined within this questionnaire (Project Questionnaire). The Project Questionnaire covers the overall Neerabup Resource Recovery Precinct (NRRP) and the delivery of key facilities, including:

- Waste to Energy (WtE); and
- Materials Recovery Facility (MRF).

Participants are requested to respond to relevant sections of the Questionnaire that they are interested in.

The City commissioned Talis Consultants Pty Ltd (Talis) to prepare a Master Plan for the NRRP which included waste tonnages, waste infrastructure needs analysis, master plan designs and cost estimates as well as project delivery models across all the various key waste infrastructure elements. The Master Plan is currently in a Draft format.

The City recognises the importance of private industry involvement to assist with the delivery of the NRRP master plan vision and the delivery of key recovery and waste processing facilities. Therefore, the City wishes to engage with the market to obtain input into the Master Plan report prior to its finalisation and presentation to the Elected Members. These responses may also guide the discussions with the Participant during future meetings. All responses provided will remain confidential.

### THIS IS NOT AN INVITATION FOR EXPRESSIONS OF INTEREST AS PER THE LOCAL GOVERNMENT (FUNCTIONS AND GENERAL) REGULATIONS

As part of this process, Participants will remain bound by the Consultation Undertaking signed between the Participant Company and the City. The deadline for submitting the responses to these questions is 4pm (AWST) on the 8th of October 2024. The City may request Participant Interviews which will be held at the City's Administration Office (23 Dundebar Road, Wanneroo WA 6065) on the Monday and Tuesday the 14<sup>th</sup> and 15<sup>th</sup> of October 2024. Video conferencing arrangements can be arranged if required.



#### 1 NRRP Master Plan

The City commissioned Talis Consultants Pty Ltd (Talis) to prepare a Master Plan for the proposed NRRP to ensure that the City's future objectives and requirements for the NRRP can be catered for (the Project). The NRRP is intended to provide much needed waste processing infrastructure within the northern suburbs and cater the City's waste streams, including recyclables, organics and residual waste including both short and longer term. It is the City's vision that the NRRP will also accept waste from other waste generators including local government (LG) and industrial premises in the northern suburbs. Therefore, multiple waste processing facilities may be required at the NRRP including WtE, MRF and Food Organics/Greens Organics processing (FOGO). To facilitate the phasing of any development, the NRRP may also require a Waste Transfer Station (WTS) for the efficient transportation of waste longer distances to treatment facilities. The proposed location for the NRRP is Lot 600, 570 Wattle Avenue, Neerabup (the Preferred Site).

The City and Talis recognise that there is insufficient waste processing infrastructure in the north of Perth. A clear example of this is the two WTE facilities set to open in late 2024 being located within close proximity of each other in East Rockingham and Kwinana, approximately 70 kilometres south of Wanneroo. By creating the NRRP specifically for waste processing infrastructure, the City's vision is to ensure that its future recycling and waste management needs can be met locally, without having to transport waste significant distances. This will reduce the cost of transporting waste for the City as well as reducing greenhouse gas emissions and creating local employment opportunities.

The current Master Plan determined a split in the NRRP, divided by the proposed future rail corridor and zone of influence into:

- Southern Area: that can satisfy all the City's high priority infrastructure with access provided from the existing Trandos Road and collocating the WtE facility close to the existing grid connection associated with Neerabup Power Station. The waste infrastructure to be included in the Southern Area include:
  - WtE;
  - o MRF;
  - o WTS
  - Community Recycling Centre (CRC);
  - Battery storage facility; and
  - Supporting site infrastructure including communal weighbridge for the WTS, MRF and back of house for the CRC, associated roads, etc.
- Northern Area: which will provide lots for smaller specialist and downstream waste processing infrastructure which can be delivered as required.

The Master Plan layout is detailed in Drawing W-101 (APPENDIX A).



QUESTION 1.1 — What are your thoughts on the City's vision for the NRRP?
Click or tap here to enter text.
QUESTION 1.2 – Please provide some comments on the overall NRRP Master Plan designs?
Click or tap here to enter text.
QUESTION 1.3 - What opportunities do you think the NRRP can deliver?
Click or tap here to enter text.
QUESTION 1.4 - What are the constraints and/or barriers to the delivery of the NRRP?
Click or tap here to enter text.
QUESTION 1.5 – Please provide any additional comments regarding the proposed NRRP and the associated Master Plan
Click or tap here to enter text.



## 2 Waste To Energy Facility

The City proposes that a WtE facility will be constructed within the NRRP to process residual waste to maximise the recovery of materials and energy. The following questions relate to the proposed WtE facility. Participants interested in the WtE facility are required to complete all questions 2.1 to 2.18

#### 2.1 Technology

Incineration has been proposed as the most appropriate WtE technology for the NRRP over other methods due to its proven track record and general acceptance in Australia (including regulators) along with its cost-effectiveness. Incineration is the preferred technology adopted in Australia for the processing of residual waste as all proposed WtE facilities have adopted this technology to date. Additionally, incineration plants can handle large volumes of waste efficiently, making them suitable for high waste generation areas like the northern suburbs.

**QUESTION 2.1** – Do you agree that incineration (mass burn) is the preferred WtE technology option for the NRRP? If you think an alternative technology option is more appropriate, please specify. Please provide supporting justification within your response.

Click or tap here to enter text.

#### 2.2 Timeframes

Due to the lack of waste processing capacity within the northern suburbs, the City wishes to assist with expediting the delivery of the NRRP and the WtE facility. However, it is recognised that WtE projects can take significant timeframes to deliver (assumed to be 8-10 years).

**QUESTION 2.2** – Provide guidance on the potential timeframe for the delivery of the WtE project including the key stages (waste supply agreements, approvals, design, construction, commissioning, etc)? Please provide commentary on the key factors contributing to this timeframe.

Click or tap here to enter text.

**QUESTION 2.3** – Provide guidance on what actions the City can undertake to help expedite the delivery of the WtE project (including enabling site infrastructure, assistance with approvals, waste supply agreements, etc).



#### 2.3 Master Plan Feedback

The WtE facility is proposed to be positioned within an allocated area of 7.3 hectares in the southwestern corner of the NRRP with access off a new proposed road with direct links to Trandos Road. This location has been strategically selected for its close proximity to the Neerabup Power Station (NPS) and associated grid connection. The NPS is situated immediately to the south, with overhead power lines connecting to the grid 60 meters east of the proposed WtE Transformer/Substation. The WtE facility plan is shown in Drawing W-102 (APPENDIX A).

The Master Plan design includes the following key elements of the WtE:

- Tipping Hall;
- Bunker;
- Combustion Line;
- Flue Gas Treatment;
- Incinerator Bottom Ash recovery facility;
- Turbine Hall;
- Condenser; and
- HV Transformer/Substation.

The facility has been designed to be serviced by semi-trailers and B-doubles. Vehicles entering the WtE facility use a two-way access road and have designated routes based on their purpose. They first pass through a weighbridge and gatehouse situated in the northern part of the facility.

After passing the weighbridge vehicles depositing waste turn left into the manoeuvring area adjacent to the tipping hall. Conversely, vehicles coming to pick up residues proceed straight onto a two-way road leading to a one-way loop road around the incinerator bottom ash recovery facility, located in the southern part of the WtE facility. If a vehicle is equipped with more than one trailer, it will proceed to the decoupling area, located south of the manoeuvring area.

**QUESTION 2.4** – Provide any comments on the proposed location, allocated area, layout and access points for the WtE facility within the Master Plan?

Click or tap here to enter text.

## 2.4 Feedstocks and Sizing

There is a significant lack of waste processing infrastructure in the northern suburbs with the two new WtE facilities about to come online located in Rockingham and Kwinana respectively. The State Waste Infrastructure Plan 2024 (Infrastructure Plan 2024) states that an additional WtE processing capacity of 164,500 tonnes per annum is needed beyond the two facilities currently under construction. Talis is of the view that this capacity is significantly under-estimated as the Infrastructure Plan 2024 modelling works was based on the satisfaction of the Waste Avoidance and Resource Recovery Strategy 2030 (Waste Strategy 2030) targets including 20% waste avoidance and achieving the



material recovery targets particularly across the municipal solid waste (MSW) and commercial and industrial (C&I) waste streams.

Potential feedstocks for the WtE facility are residual waste from the City, along with the Cities of Joondalup and Stirling. As outlined within **Error! Not a valid bookmark self-reference.**, these LGs currently have approximately 142,000 tonnes per annum growing to approximately 200,000 tonnes per annum by 2042. There are a variety of alternative sources of residual waste within the northern suburbs including MSW and C&I sources.

Table 2-1: Current and projected potential WtE feedstocks (in tonnes per year)

	2022	2032	2042	2052
Total	142,651	167,015	199,800	232,333
Wanneroo	53,338	74,371	103,697	132,640
Joondalup	35,120	36,188	37,288	38,422
Stirling	54,194	56,457	58,815	61,271

**QUESTION 2.5** – Please provide guidance on the minimum facility tonnages and sizing required to make the facility viable? Within your response, please provide commentary on the City's and the Cities' of Joondalup and Stirling residual waste tonnages.

Click or tap here to enter text.

**QUESTION 2.6** – Please provide commentary on the potential alternative waste streams, sources and volumes?

Click or tap here to enter text.

#### 2.5 Cost Estimate

The anticipated capital cost for the WtE facility is \$750 Million (in current day value). This value is based on comparison to other reference facilities and consultation with industry professionals.

**QUESTION 2.7** – Please provide guidance on the anticipated capital costs for the WtE? Please provide relevant supporting information within your response.



#### 2.6 Project Delivery Model

There has been a significant shift towards private sector-led waste infrastructure (regarded as Merchant Plants) in WA and Australia, aligning with global trends. For Merchant Plant facilities, the private proponent secures the relevant approvals, capital funding and delivers the facility design, construction and operation as shown in Table 2-2. These facilities accept waste from multiple waste sources and generators. Some Merchant Plant facilities often secure long-term waste supply agreements with local and regional councils that provide the foundation feedstocks to assist with securing financial close.

Under the Merchant Plant model, the City's (and other LGs) main risk would be the supply of waste under a long-term waste supply agreement. However, this would be mitigated through a waste arising contract that commits these LGs to provide its residual streams generated (as opposed to an actual tonnage value).

The City's preference is to retain ownership of the WtE site and enter into a long-term lease with the proponent.

**Table 2-2: Preferred WtE Delivery Model Framework** 

Land	Waste	Approvals	Capital	Facility	Facility	Facility
Ownership	Supply		Funding	Design	Construction	Operation
City	City	Private	Private	Private	Private	Private

**QUESTION 2.8** – Would a long term lease agreement with the City be an appropriate contractual land arrangement for the WtE facility? If so, what would be the minimum term for a lease agreement? If an alternative contractual land arrangement is desired, please specify and provide supporting justification within your response.

Click or tap here to enter text.

**QUESTION 2.9** – Do you agree with the concept that this project would be best delivered through a Merchant Plant approach with waste supply agreements with the City, other LGs and commercial waste generators? If you think an alternative approach is more appropriate, please specify. Please provide supporting justification within your response.



**QUESTION 2.10**— What is the minimum term for a waste supply agreement with the City to support the development of the WtE facility at the NRRP? Please provide supporting justification within your response.

Click or tap here to enter text.

#### 2.7 Energy Outputs

The City is seeking insights into the WtE potential energy output and the most advantageous markets for this energy. Understanding the capacity of the facility to generate energy and identifying the most suitable market for this output are crucial for aligning the project with regional energy needs and economic growth opportunities. Considering the diverse facilities within the NRRP that rely on power supply, the City is also considering a microgrid to provide renewable energy from the WtE within the NRRP and the wider Neerabup industrial area.

**QUESTION 2.11** – What is the potential energy output for the facility (based on an assumed feedstock capacity) and what is the preferred market(s)?

Click or tap here to enter text.

**QUESTION 2.12** – Please provide comments on the feasibility of the WtE energy output supplying a microgrid across the NRRP and the wider Neerabup industrial area? Please provide commentary on any opportunities or constraints associated with this approach.

Click or tap here to enter text.

#### 2.8 Residues

The City recognises that the WtE facility will generate incinerator bottom ash. Consequently the Master Plan includes an area for an incinerator bottom ash recovery facility. The WtE will also generate air pollution control residue (APCr) which require further processing for material recovery and/or disposal which has not been included in the Master Plan.

**QUESTION 2.13** – What residues would be generated by the facility and what are their respective tonnages (and based on an assumed feedstock capacity)?



**QUESTION 2.14** – What are the preferred treatment processes for these residues including both on and off site?

Click or tap here to enter text.

**QUESTION 2.15** – The current Master Plan includes an incinerator bottom ash recovery facility. Do you think this is required for the facility?

Click or tap here to enter text.

#### 2.9 Opportunities and Constraints

The delivery of waste infrastructure can be a complex process. One particular challenge can be identifying and securing suitable sites. The City hopes that the NRRP can overcome this challenge.

**QUESTION 2.16** – What opportunities do you think the NRRP brings for the delivery of a WtE facility?

Click or tap here to enter text.

QUESTION 2.17 – What constraints and/barriers are there to the delivery of a WtE facility at the NRRP?

Click or tap here to enter text.

**QUESTION 2.18** – Please provide any additional comments regarding the proposed WtE facility for the NRRP



## 3 Materials Recovery Facility

Material recovery facilities (MRFs) are critical components of modern waste management systems, enabling the efficient sorting and processing of commingled recyclables collected from kerbside collections systems. Currently, that are no operational MRF located in Perth's northern suburbs. The City's commingled recyclables are processed in Bibra Lake, located approximately 50 km south from Wanneroo.

### 3.1 Technology

Modern MRFs can include a range of processing plant and equipment including:

- Feed Hopper;
- Conveyor Belts;
- Trommel Screen;
- Air separator;
- Disc Screen Separator;
- Air-Conditioned Picking Station;
- Magnetic belt Separator;
- Eddy Current Separator;
- Optical Sorts;
- Al Robotic Sorting Station;
- Bottle Perforators; and
- Balers.

**QUESTION 3.1** – Do you agree with the list of potential MRF equipment contained above would be applicable for the NRRP project? If you don't agree with the listed equipment, please specify. Please provide supporting justification within your response.

Click or tap here to enter text.

#### 3.2 Timeframes

Due to the lack of waste processing capacity within the northern suburbs, the City wishes to assist with expediting the delivery of NRRP and the MRF facility. However, it is recognised that modern MRFs take significant time to deliver (3-4 years).



**QUESTION 3.2** – What are your thoughts on the potential timeframe for the delivery of the MRF project at NRRP including the key stages (waste supply agreements, approvals, design, construction, commissioning, etc)? Please provide commentary on the key factors contributing to this timeframe.

Click or tap here to enter text.

**QUESTION 3.3** – Provide guidance on what actions the City can undertake to help expedite the delivery of the MRF project at the NRRP (including enabling site infrastructure, assistance with approvals, waste supply commitments, etc).

Click or tap here to enter text.

#### 3.3 Master Plan Feedback

The MRF is proposed to be situated within an allocated area of 2.6 hectares in the southern portion of the NRRP between the WtE facility and the WTS. This strategic co-location allows for an interconnected road network and shared facility elements, ensuring efficient access and traffic flow between facilities. Elements shared between MRF and WTS include:

- Access road off Trandos Road leading to a weighbridge operated by the City;
- Access to staff parking and admin buildings off Trandos Road;
- Site access off Trandos Road; and
- Allocated parking area for the truck fleets.

The MRF has been designed as a fully enclosed warehouse building with a footprint of 3,840m<sup>2</sup> (81m x 48m) and a minimum clearance height of 8m at the eaves.

The MRF facility plan is shown in Drawing W-103 (APPENDIX A).

**QUESTION 3.4** – Please provide comments on the proposed location, design and layout of the MRF?

Click or tap here to enter text.

**QUESTION 3.5** – Please provide comments on proposed shared infrastructure elements with the WTS including the access road and weighbridge to be operated by the City?



#### 3.4 Feedstocks and Sizing

There is a significant lack of waste processing infrastructure in the northern suburbs including MRFs. The Infrastructure Plan 2024 states that an additional MRF processing capacity of 100,000 tonnes per annum is needed. Talis is of the view that this capacity is potentially overstated as the Infrastructure Plan 2024 modelling works was based on achieving the material recovery targets within the State Waste Strategy 2030 particularly for MSW and C&I waste streams.

Potential feedstocks for the MRF facility are kerbside commingled recycling services from the City, and the Cities of Stirling and Joondalup. These LGs currently have approximately 48,000 tonnes per annum growing to approximately 65,000 tonnes per annum by 2042. The current and projected future annual tonnages are summarised in Table 3-1. There are a variety of alternative sources of recyclable materials within the northern suburbs including across both MSW and C&I streams.

Table 3-1: Current and projected potential MRF MSW feedstocks (in tonnes per year).

	2022	2032	2042	2052
Total	47,727	54,950	64,596	74,179
Wanneroo	15,296	21,328	29,738	38,038
Joondalup	14,389	14,827	15,278	15,742
Stirling	18,042	18,796	19,581	20,398

**QUESTION 3.5**— What are your thoughts on the minimum facility throughput and sizing required to make the facility viable? Within your response provide commentary on the City's and the Cities' of Joondalup and Stirling kerbside commingled recycling tonnages.

Click or tap here to enter text.

**QUESTION 3.6**– Please provide commentary on the potential alternative waste streams, sources and volumes?

Click or tap here to enter text.

#### 3.5 Cost Estimate

The anticipated capital cost for the MRF facility is approximately \$23 Million (in current day value) as shown in Table 3-2. This value is based on comparison to other reference facilities and consultation with industry professionals.



Table 3-2: Summary of Cost Estimate for the MRF

Description	Cost Estimate (ex. GST)
Preliminaries	\$2,106,000
Site Clearance & Earthworks	\$164,000
Roadworks & Surfacing	\$414,000
Buildings	\$4,833,000
MRF Plant and Equipment	\$15,000,000 (estimated)
Surface Water Management	\$29,000
Services	\$616,000
Total	\$23,162,000

**QUESTION 3.7**— Please provide guidance on the anticipated capital costs for the MRF, particularly the costs associated with the MRF Plant and Equipment? Please provide relevant supporting information within your response.

Click or tap here to enter text.

## 3.6 Project Delivery Model

There has been a shift towards private sector-led waste infrastructure (regarded as Merchant Plants) in WA and Australia, aligning with global trends. For Merchant Plant facilities the private proponent secures the relevant approvals, capital funding and delivers the facility design, construction and operation as shown in Table 3-3. These facilities accept waste from multiple waste sources and generators. Some Merchant Plant facilities often secure long-term waste supply agreements with local and regional councils that provide the foundation feedstock.

Under the Merchant Plant model, the City's (and other LGs) main risk would be the supply of waste under a long-term waste supply agreement. However, this would be mitigated through a waste arising contract that commits these LGs to provide its kerbside commingled recycling collections generated (as opposed to an actual tonnage value).

The City's preference is to retain ownership of the MRF site and enter into a long-term lease with the proponent.



Table 3-3: Preferred MRF Delivery Model Framework

Land	Waste	Approvals	Capital	Facility	Facility	Facility
Ownership	Supply		Funding	Design	Construction	Operation
City	City	Private	Private	Private	Private	Private

**QUESTION 3.8** – Would a long term lease agreement with the City be an appropriate contractual land arrangement for the MRF facility? If so, what would the minimum term for a lease agreement be? If an alternative contractual land arrangement is desired, please specify and provide supporting justification within your response.

Click or tap here to enter text.

**QUESTION 3.9** – Do you agree with the concept that this project would be best delivered through a Merchant Plant approach with waste supply agreements from multiple parties including the City and other LGs? If you think an alternative approach is more appropriate, please provide supporting justification within your response.

Click or tap here to enter text.

**QUESTION 3.10** – What is the minimum term for a waste supply agreement with the City to support the development of the MRF facility at the NRRP? Please provide supporting justification within your response.

Click or tap here to enter text.

## 3.7 Outputs and Residues

Talis understands that the commonly separated fractions in an MRF are the following:

- Plastics:
  - o HDPE;
  - PET; and
  - Mixed plastics.
- Aluminium;
- Steel;
- Glass;
- Clean Paper and Cardboard; and
- Residues and Contaminants.



**QUESTION 3.11** – What are the anticipated outputs of the MRF and what are the potential markets for these materials?

Click or tap here to enter text.

**QUESTION 3.12** – What are the residues from the MRF, and what are their preferred treatment processes for these?

Click or tap here to enter text.

## 3.8 Opportunities and Constraints

The delivery of waste infrastructure can be a complex process. One particular challenge can be identifying and securing suitable sites. The City hopes the NRRP can overcome this challenge.

**QUESTION 3.13** – What opportunities do you think the NRRP brings for the delivery of a MRF facility?

Click or tap here to enter text.

QUESTION 3.14 – What constraints and/barriers are there to the delivery of a MRF facility at the NRRP?

Click or tap here to enter text.

**QUESTION 3.15** – Please provide any additional comments regarding the proposed MRF facility for the NRRP



## 4 Responses

The Participant may provide a maximum of two page per question listed above.

Please respond to the questions via email to procurement@wanneroo.wa.gov.au no later than 4 pm (AWST) on Tuesday the 8th October 2024.

Additional information and clarification can be provided by contacting procurement@wanneroo.wa.gov.au or Ian Ireland on 08 9405 5616.

Yours sincerely,

#### **Christopher Forde**

Project Director – Strategic Projects Assets City of Wanneroo



# **APPENDIX A**

# **Drawings**

Please see attachments titled 'Appendix A – Drawings - ...'

# **Drawings**

W-101 RRP Masterplan Layout

W-102 Waste to Energy facility Plan

W-103 WTS, CRC and MRF Plan Playout



# APPENDIX H

# Further discussions with Solo

Further discussions were held with Solo following the Market Sounding interview on Friday 25 October 2024. High level responses were provided to some queries regarding additional info surrounding the gasification model that was suggested, based on a proposed facility in South Australia. Questions and answers from the additional discussions can be found below.

#### Based on a 200,000tpa (pre-treatment) WtE facility using gasification plant:

Q: What footprint would be required for the gasification plant and how big is the footprint and the proposed capacity of proposed facilities in South Australia? Does this facility have on site pretreatment facilities?

The gasification footprint for a 200,000 tpa facility, including for feedstock receiving bays and any pretreatment, may be between 2 and 3 Hectares (20,000 - 30,000 m2). If the feedstock bays are not required (i.e. as it is duplication) then up to 10,000 m2 may be required for the gasification alone, dependent upon overall scope requirements including site and technology configurations etc. This would additionally be dependent upon clearances and local development approval requirements.

Q: What is the ideal breakdown of the feedstock composition across the various waste types? I.e. % of each waste type. We are mindful that the City's biggest waste type is kerbside residual waste and how much other waste types and volumes would be required to make the project viable?

Dependent upon the technology chosen, generally a plant can accept a wide range of fuels subject to the overall waste mass meeting the calorific value (CV) criteria. The plant has the potential to be suitable for processing a wide band of materials including MSW, biosolids and C&I waste streams. Generally an 80:20 (MSW:C&I) mix is suitable however this is subject to confirmation of the various waste stream characteristics. In a green manufacturing process, we would be required to carry out a more complete assessment to establish viability, including gate fee and downstream use/products of the produced syngas.

Q: What kind of pre-treatment facilities would be required to enable the project?

- What pre-treatment processes are involved (at a high level)?
- Have these been included in the costing estimates?
- What kind of footprints would these facilities have?

Pre treatment facilities required will be dependent upon the overall scope requirements and may vary dependent upon final technology configurations. Generally, the waste is prepared for shredding with any prohibited items and/ or recyclables removed prior to shredding. The sorted waste is then mixed and shredded with any metals and other contaminants removed via mechanised sorting for recycling.

Costings for pre treatment have been included in the costing estimates.

Pre treatment facilities may require a footprint of up to 10,000 m2.



#### Q: What would the expected bottom ash % compared to the output of the facility?

Dependent upon the feedstock composition and the technology selected, the solid output as bottom ash /biochar may typically be around 10-15%, however a more complete assessment specific for this site would need to be undertaken to confirm an estimate. Bottom ash is generally suitable for recycling into road base or in an asphalt plant.

# Q: What would the expected Air Pollution Control residue (APCr) % compared to the output of the facility?

We would expect this to be minimal as the produced syngas would be contained in a closed loop process, however a more complete assessment specific for this site would need to be undertaken to confirm an estimate.



# **APPENDIX I**Wangara WTS Assessment



Rev: TW24028 - Wangara WTS Options\_1.0

604 Newcastle St Leederville WA 6007 PO Box 454 Leederville WA 6903 enquiries@talisconsultants.com.au www.talisconsultants.com.au 1300 251 070

# **Wangara Waste Transfer Station Options Assessment**

То:	Christopher Forde – Project Director: Strategic Projects	City of Wanneroo	
From:	Ronan Cullen - Project Director Talis Consultants		
Project:	TW24028 - Neerabup Resource Recovery Precinct Master Plan		
Date:	8 July 2024		

#### 1 Introduction

Talis is currently assisting the City of Wanneroo (the City) on the Neerabup Resource Recovery Precinct (NRRP) Master Plan (Project) which investigates the siting of a range of resource recovery and waste infrastructure within the Neerabup industry area. As part of these works, the requirement for a Waste Transfer Station (WTS) has become apparent with the forthcoming closure of Tamala Park landfill and the significant distance to waste treatment and disposal facilities including material recovery facilities (MRF) and waste to energy (WtE) in the southern Perth metropolitan area. Therefore, a WTS is essential for the City to continue to provide waste services to its rates payers in a cost effective manner.

To ensure that an informed decision is made on the preferred location for the WTS, the City requested Talis Consultants (Talis) to consider the options of developing a WTS at the Neerabup Resource Recovery Precinct as well as the City's old Wangara MRF site. Talis undertook a site visit of the Wangara site and building on the 5<sup>th</sup> of July to assist with determining a variety of options to transform the facility into a WTS. As part of these works, Talis has prepared a variety of designs options, cost estimates and undertook a technical comparison analysis. The objective of these works is to assist the City in determining if the Wangara site is a better location for the WTS as opposed to NRRP. Based on these works, the City will decide what is the preferred infrastructure requirements for the NRRP and incorporate into the Master Plan.

This document summarises the works undertaken as part of this comparison assessment, the key findings and associated recommendations.

# 2 Design Options

Talis has prepared a variety of designs to assist with determining potential options associated with transforming the Wangara site into a WTS including:



- Storage capacity potential including waste streams to be accepted and associated tonnages;
- Kerbside collection fleet access;
- Transfer Trailers (semi-trailer and B-double) access;
- Load out lanes and compaction systems; and
- Alterations to the existing infrastructure including access, building expansions and the inclusion of load out lanes.

Arising from the design works, Talis has determined 4 Options for the redevelopment of the Wangara site and assessed access arrangements for both semi-trailer and B-double configurations. All Design Options have been based on 2039/40 tonnages for recycling and residual waste, providing 1 day storage capacity with 25% contingency in the WTS building. For completeness, Option 1 also includes the same storage requirements for FOGO. A summary of the waste data and storage capacities providing a basis for the designs have been provided in Table 1.

Table 1 – Waste Data and Storage Capacities						
Key Parameters						
Population growth	3.38%	3.38%				
Days storage	1	1				
Contingency	25%	25%				
Target Storage Capa	cities					
Waste Stream	Recorded 2022/23 tonnage	Projected 2039/40 tonnage	Target bunker capacity (tonnes)	Target bunker capacity (m3)		
Residual	55,139	97,025	465	1,549		
Recycling	15,296	26,915	129	2,046		
FOGO	24,265	42,697	204	682		

The Design Options as well as pros and cons for each option have been outlined in the sections below.

#### 2.1 **Option 1 - Existing Facility Modifications**

In Option 1, the existing MRF building is utilised with an extension to the western side as well as modifications to the eastern and southern side of the building. Kerbside collection vehicles will enter via the southern side of the facility, tipping in the receival area or directly into the bunkers. Load out lanes have been placed on the eastern and western sides of the building to facilitate material load out and haulage. Due to site boundary constraints, load out lanes with compactors were utilised which will accommodate semi-trailers only. Semi-trailers will navigate around the WTS building in a one-way traffic loop to minimise instances of crossing traffic, and reverse into the load out lanes to receive waste. Loaders within the WTS building will transfer waste from bunkers arranged along the northern side of the building into hoppers for compaction. For Option 1, bunkers have been sized to accommodate the storage of recyclable, residual and FOGO kerbside collection streams.



Drawings of Option 1 (attached within Appendix A) include:

- Semitrailer swept path: W-105-A-C\_WTS Wangara op 1; and
- B-Double swept path: W-105-A-C\_WTS Wangara op 1 Bdub.

Storage capacities for each waste stream is as follows:

- Recyclables 2,200m³
- Residual 1,584m<sup>3</sup>
- FOGO 1,1014m<sup>3</sup>

Key aspects of the design have been outlined in Table 2.

Table 2 - Pros and Cons Option 1

PROS	CONS
<ul> <li>All desired waste streams are catered for in the building layout (recyclables, FOGO and residual).</li> </ul>	B-doubles and semi-trailer movements cannot be accommodated within the site boundary in this configuration.
<ul> <li>Kerbside trucks approach the access to the receival area from the side, facilitating a preferred manoeuvre to turn and reverse into the receival area.</li> <li>Existing infrastructure has been utilised in the design minimising construction costs.</li> </ul>	<ul> <li>To accommodate semi trailer movements, the redesigned area will need to extend past the site boundary to the north, encroaching on the landfilled area to the south, and on the boundary to the Cache Bnd easement to the east.</li> </ul>
<ul> <li>Compactor has been incorporated maximising tonnages in haulage vehicles.</li> <li>Good ESD outcomes in incorporating</li> </ul>	<ul> <li>Expansion of the existing circulation areas at the site (particularly the south) will require significant earthworks and increase construction costs.</li> </ul>
existing structures into the design.	To facilitate use of the compactor, the loadout lane will need to be positioned lower in order to load into the hopper. This increases the length of the load out lane needed, further limiting haulage vehicle movements on site.
	<ul> <li>The design is limited to the existing ceiling height with a clearance of 7m - some collection vehicles, such as hook lift trucks, will not be able to tip here.</li> </ul>

# 2.2 Option 2A – Western Unloading Vehicles Access

As with Option 1, the existing building is utilised with an extension to the western side of the building, along with modifications to the southern and northern side of the building. Kerbside vehicles will approach the building front on and complete a 180 degree turn before entering the building via doors on the western side of the building to dispose of waste into the bunkers. Loadout lanes are positioned on the northern and southern sides of the building. Due to site constraints, the southern load out lane will contain a compactor with vehicles reversing in, while the northern load out lane will be a drive through configuration. Like Option 1, access around the building will be provided via a one-way traffic



loop. Bunkers have been arranged on the eastern side of the building for the storage of recyclable and residual streams.

Drawings of Option 2A (attached within Appendix A) include:

- Semitrailer swept path: W-106-A-C\_WTS Wangara op 2A; and
- B-Double swept path: W-106-A-C\_WTS Wangara op 2A Bdub.

Storage capacities for each waste stream is as follows:

- Recyclables 2,112 m<sup>3</sup>
- Residual 1,600 m<sup>3</sup>
- FOGO None provided

Key aspects of the design have been outlined in Table 3.

#### Table 3 – Pros and Cons Option 2A

PROS	CONS
A semi-trailer can make the necessary manoeuvres within the site boundaries in order to service the WTS through the loadout lanes provided.	<ul> <li>Only two desired waste streams are catered for in the building layout (recyclables and residual).</li> <li>Due to site boundary constraints, a B-</li> </ul>
A drive through loadout lane can be utilised	double cannot be accommodated.
<ul> <li>on the northern side of the site, requiring a shallower load out lane as a hopper is not required.</li> <li>Compactor has been incorporated in the southern load out lane maximising haulage tonnages.</li> <li>Existing infrastructure has been utilised in the design minimising construction costs.</li> <li>Good ESD outcomes in incorporating existing structures into the design.</li> </ul>	<ul> <li>Kerbside collection vehicles will approach the WTS receival area "head-on" requiring trucks to complete a 180 degree turn in</li> </ul>
	order to reverse through the doors into the building.
	Semitrailers will need to make a sharp turn to access the northern load out lane.
	To facilitate use of the compactor, the
	southern loadout lane will need to be positioned lower in order to load into the hopper. This increases the length of the load out lane needed, further limiting haulage vehicle movements on site.
	<ul> <li>The design is limited to the existing ceiling height with a clearance of 7m - some collection vehicles, such as hook lift trucks, will not be able to tip here.</li> </ul>

## 2.3 Option 2B – Western Unloading Vehicles Access

Option 2B, has the same layout as Option 2A with the exception of the existing building north west of the weighbridge being decommissioned to facilitate smoother access to the northern load out lane. Bunkers are located on the eastern side of the building for the storage of recyclable and residual streams.



Drawings of Option 2B (attached within Appendix A) include:

- Semitrailer swept path: W-107-A-C\_WTS Wangara op 2B; and
- B-Double swept path: W-107-A-C WTS Wangara op 2B Bdub.

Storage capacities for each waste stream is as follows:

- Recyclables 2,112 m<sup>3</sup>
- Residual 1,600 m<sup>3</sup>
- FOGO None provided

Key aspects of the design have been outlined in Table 4.

#### Table 4 – Pros and Cons Option 2B

PROS	CONS
• Semi-trailers can make a smooth movement to access the northern load out lane after exiting the weighbridge.	Only two desired waste streams are catered for in the building layout (recyclables and residual).
A semi-trailer can make the necessary manoeuvres within the site boundaries in	Due to site boundary constraints, a B-double cannot be accommodated.
order to service the WTS through the loadout lanes provided.	Kerbside collection vehicles will approach the WTS receival area 'head-on' and require
A drive through loadout lane can be utilised on the northern side of the site, requiring a shallower load out lane as a hopper is not	trucks to complete a 180 degree turn in order to reverse through the doors into the building.
<ul><li>required.</li><li>Compactor has been incorporated in the</li></ul>	To facilitate use of the compactor, the southern loadout lane will need to be
southern load out lane maximising haulage tonnages.	positioned lower in order to load into the hopper. This increases the length of the load
• Existing infrastructure has been utilised in the design minimising construction costs.	out lane needed, further limiting haulage vehicle movements on site.
Good ESD outcomes in incorporating existing structures into the design.	The design is limited to the existing ceiling height with a clearance of 7m - some collection vehicles, such as hook lift trucks, will not be able to tip here.

## 2.4 Option 3 – New WTS Building

This Option features a new WTS building in order to maximise circulation space at the site. The WTS building layout will be the same as Option 2A with bunkers positioned along the eastern wall and load out lanes on the northern and southern side of the building. Drive through lanes will be utilised for both the northern and southern load out lanes and in addition the WTS building will be raised to achieve some of the height difference required. The drive through lane, along with the raised WTS building, will reduce the loadout lane ramp length required and provide extra manoeuvring space around the WTS building. An alternate entry has also been provided for kerbside collection vehicles, taking a right after exiting the weighbridge, vehicles will approach the receival area access from the south.



Drawings of Option 3 (attached within Appendix A) include:

- Semitrailer swept path: W-108-A-C\_WTS Wangara op 3; and
- B-Double swept path: W-108-A-C\_WTS Wangara op 3 Bdub.

Storage capacities for each waste stream is as follows:

- Recyclables 2,112 m<sup>3</sup>
- Residual 1,600 m<sup>3</sup>
- FOGO None provided

Key aspects of the design have been outlined in Table 5.

Table 5 – Pros and Cons Option 3

PROS	CONS
<ul> <li>A semi-trailer can make the necessary manoeuvres within the site boundaries in order to service the WTS through the loadout lanes provided.</li> <li>A shallower load out lane is required as a hopper is not required for drive through loadout lanes, reducing construction costs and maximising circulation space.</li> <li>The WTS building has been raised reducing the loadout lane ramps required, as such, a B-double can be accommodated at the site.</li> <li>Kerbside trucks approach the access to the receival area from the side, facilitating a preferred manoeuvre to turn and reverse into the receival area within the building.</li> <li>WTS building can be designed with clearance height to accommodate all tipping vehicles required.</li> </ul>	<ul> <li>As no existing buildings will be utilised, a new WTS building will be constructed requiring a greater capital input.</li> <li>Only two desired waste streams are catered for in the building layout (recyclables and residual).</li> <li>Less preferred ESD outcome as no existing infrastructure is utilised. There is however opportunity to incorporate structural steel from the demolition works.</li> </ul>

#### 2.5 Cost Estimate

The Master Plan designs have been used to generate Bills of Quantities and capital cost estimates for each Option. All costings have been based on the semi-trailer configuration as B-doubles do not work for all sites. These have been summarised in Table 1Table 6.



Table 6 - Options Cost Estimate

	Description	OPTION 1	OPTION 2A	OPTION 2B	OPTION 3
1	Preliminaries	\$551,500	\$318,500	\$26,700	\$442,200
2	Site Preparation and Earthworks	\$760,300	\$335,700	\$352,500	\$417,900
3	WTS Building	\$4,259,300	\$2,560,500	\$2,560,500	\$3,598,100
4	External Works	\$495,200	\$288,200	\$353,200	\$352,600
	Estimated Total Cost	\$6,066,300	\$3,502,900	\$3,592,900	\$4,863,300
	Professional Services (8%)	\$485,400	\$280,300	\$287,500	\$389,100
	Contingencies (30%)	\$1,819,900	\$1,050,900	\$1,077,900	\$1,459,000
	Cost escalations (7%)	\$424,700	\$245,300	\$251,600	\$340,500
	Total	\$8,796,300	\$5,079,400	\$5,209,900	\$7,0 51,900

As outlined above, Option 2A/B is the cheapest option to establish a WTS at the Wangara Site, however it is important to note that only Option 1 will service all waste streams required by the City.

Additionally, a major cost associated with the construction of Option 1 and Option 2A/B is the significant earthworks required as well as the use of compactors in one or both of the load out lanes at these facilities, with an estimated cost of approximately \$1,000,000 each. This significantly increases the costs of these two options.

The costs estimate for the WTS at NRRP is \$7,019,740, which is similar to the Option 3.

#### 2.6 Preferred Design Option

Based on the analyses provided in the sections above, the below Options are recommended if the City choose to establish a WTS at the Wangara Site:

- Option 3 is preferred to facilitate B-Doubles access, maximising material haulage and reducing haulage costs. Additionally, Option 3 can receive a greater variety of tipping vehicles, such as hook lift trucks, as the clearance height for the building is not limited by the existing structure and can be designed based on this requirement.
- If utilising semi-trailers only, **Option 2A/B** is also a viable option with the best ESD outcomes. In using a considerable amount of the existing structure in the proposed design, materials required for construction are reduced. Additionally reclaimed steel can be used for modifications in the design where possible. If desired, Option 2 could be altered by removing the eastern bay of the existing building and adding an additional bay to the western side, facilitating drive through load out lanes for semitrailers on both sides.
- Option 1 is not recommended as the orientation of the building does not allow use of drive through load out lanes, reverse in load out lanes with compactors are needed which require a significant amount of circulation space in the historic landfill area. Additionally, resulting



from the close proximity of the southern loadout lane to the Cache Bnd Easement, semi-trailers will need to cross into the easement to reverse straight into the load out lane.

### 2.7 Comparisons with NRRP

Additional considerations to the comparison between the two sites at Neerabup and Wangara have been provided in the sections below.

#### 2.7.1 Catchments Assessment

As part of these works, Talis has utilised GIS mapping works to undertake catchment assessments determining the number of households within a 10 and 20 minute drive time radii from both NRRP and the Wangara site, with results shown in Table 7. Additionally, figures showing the 10 and 20 minute travel radii have been enclosed in Appendix B.

No. of Properties within the Neerabup No. of Properties within the Wangara **Travel Radius** Site Travel Radius Travel **Only Residential Only Residential Radius** All Residential **Properties within** All Residential **Properties within Properties** the City of **Properties** the City of Wanneroo Wanneroo 961 10 minutes 13,700 74,361 41,420 20 minutes 116,899 58,434 358,228 79,125

Table 7 – Catchment Assessment

As outlined above, there is a significantly greater number of properties within a 10 and 20 min drive to the Wangara site than the Neerabup site.

The Neerabup site has only 2.5% of the number of City's residences that Wangara has within its 10min radius. However, the gap reduces significantly with Neerabup covering 75% of the number of City' residences within the Wangara 20 min radius.

With the future growth scheduled for the northern corridors, this gap will further reduce over the coming decade. If the City can provide some future growth factors for these northern corridors, Talis can prepare some projections of these catchments.

#### 2.7.2 Surrounding Road Networks

Both the Wangara and Neerabup sites are accessible by B-doubles with a maximum mass of 72.0 tonne (under AMMS1). As such, where the chosen WTS design permits, B-doubles can be used for the haulage of materials from the Site. At the Wangara site, this is only feasible with the adoption of Design Option 3, in which the existing MRF is entirely demolished and a new WTS building constructed to facilitate B-double movements within the current site boundaries.



#### 2.7.3 Future Expansion

Owing to constraints at the Wangara site, the close proximity of the landfill to the south and the existing road network to the north, there is limited opportunity for future expansion at the facility. The facility has been designed for the projected waste volumes expected in 2039/40, giving the facility a design life of a maximum of 10-15 years assuming construction of the facility in the next 5 years.

The Neerabup site, with a much larger area and as a green fields site, has a greater opportunity to design for a larger volume of waste should the City require. The Neerabup WTS could present a greater return on investment as opposed to the Wangara WTS.

## 3 Findings

The City is currently working on a number of projects to assist with determining preferred solutions for the delivery of their waste services, all of which are recognised as essential community services and disruption to these can result in significant environmental and social issues. There are significant costs associated with the delivery of these services so the City wishes to ensure that these can be delivered in an efficient and cost effective manner.

There are currently many active projects and moving parts that are feeding into the City's decision making process. Generally, local government determine their preferred treatment option for its various waste streams and from there determines the most efficient transportation arrangements to get the materials to these locations. The City's long term vision is that its various waste streams including kerbside recycling, FOGO and residual waste will be processed at the NRRP as per the Master Plan. The City is about to commence a Market Sounding exercise to engage with the private waste sector to obtain industry input in relation to the City's overall vision for the NRRP as well as the delivery of some of the key infrastructure elements, particularly the WtE and MRF facilities. Some key questions for both facilities are the viability, tonnage requirements and anticipated timeframes associated with their delivery. This information will provide valuable insight to assist the City with determining its preferred treatment solutions and then the associated transportation arrangements. Talis is of the view that both facilities should be viable, but it could be a question of when in relation to achieve sufficient tonnage feedstocks. However, in the interim the City may be dependent on MRFs and WtE facilities in the southern suburbs. In addition, the City may wish to transport its FOGO material to processing facilities beyond the Perth metropolitan area including existing facilities in Gingin or North Bannister. Therefore, the City will require access to a WTS to ensure that cost effective and efficient transportation arrangements for these materials can be delivered.

The costs to developing a WTS at the Wangara site is comparable to the establishment of a WTS at the NRRP as per the Master Plan. However, the WTS at the NRRP could present greater return on investment as:

- It has a greater opportunity to design for a larger volume of waste should the City require; and
- The facility can provide for B-Double transfer trailer configurations, providing significantly greater pay loads per trip.

Recognising that the NRRP WTS could only be required for a shorter period of time, the facility could be designed to allow for easy repurposing for future waste activities as it is basically just a large shed.



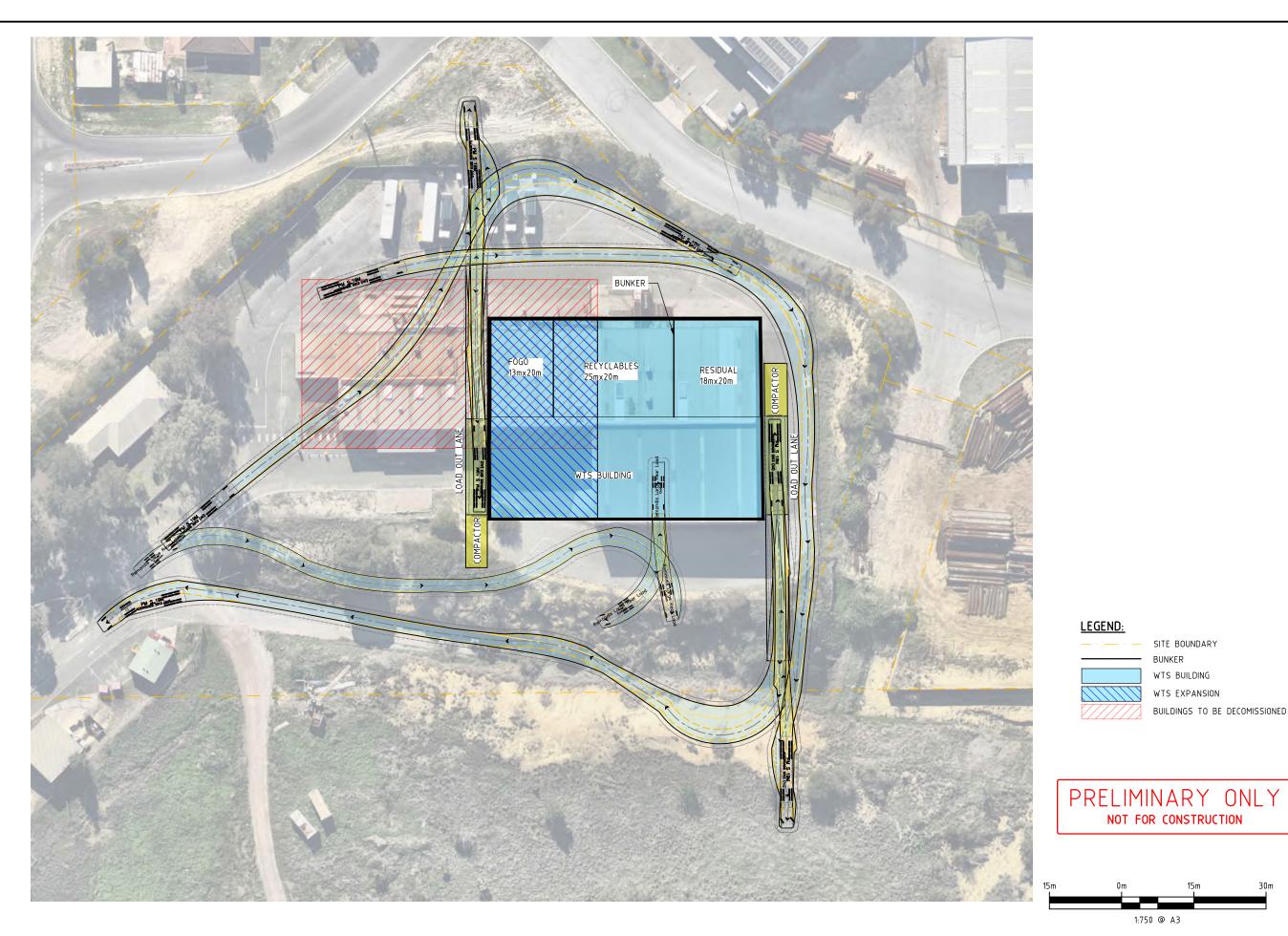
#### 4 Recommendations

As part of these works, Talis has investigated the use of the existing Wangara MRF building for WTS operations and compared this against the proposed WTS at NRRP. Arising from these works, Talis puts forward the following recommendations for the City's consideration:

- Following the market sounding exercise and other related projects, the City needs to
  determine the various waste streams that need to be accepted at the WTS and the potential
  duration (number of years);
- The City needs to assess its preferred WTS operations including the use of dedicated compactors or bulk haulage through load out lanes;
- The WTS at NRRP should be prioritised recognising the greater return on investment opportunities that facility brings along with supporting the overall delivery of the NRRP;
- If the City requires a WTS for a short period of time and for two waste streams (recycling and residual waste), Options 2A and 2B for the retrofit of Wangara building should be prioritised; and
- If the City anticipates that the WTS arrangement will be required for long-term arrangements and require a B-Double configuration, the City should prioritise the development of a WTS at Neerabup as opposed to Option 3 at Wangara site.



# **APPENDIX A**WTS Option Drawings







# NOTES

- DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.
- 3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

	No.	Date	Drwn.	ŧ.	Amendment / Issue	App.
	Α	08.08.2024	٧s	AB	PRELIMINARY ISSUE	
act						

WANNEROO RRP MASTERPLAN

WANGARRA WTS OP1

Scale: AS SHOWN @ A3 Date: 08.08.2024 TW24028 W-105 TW24028 - WANGARRA WTS.DWG

LEGEND: \_\_ · \_\_ SITE BOUNDARY

BUNKER WTS BUILDING

NOT FOR CONSTRUCTION

WTS EXPANSION

BUILDINGS TO BE DECOMISSIONED



PRELIMINARY ONLY

BUILDINGS TO BE DECOMISSIONED

— SITE BOUNDARY BUNKER WTS BUILDING WTS EXPANSION

LEGEND:

1:1000 @ A3

NOT FOR CONSTRUCTION





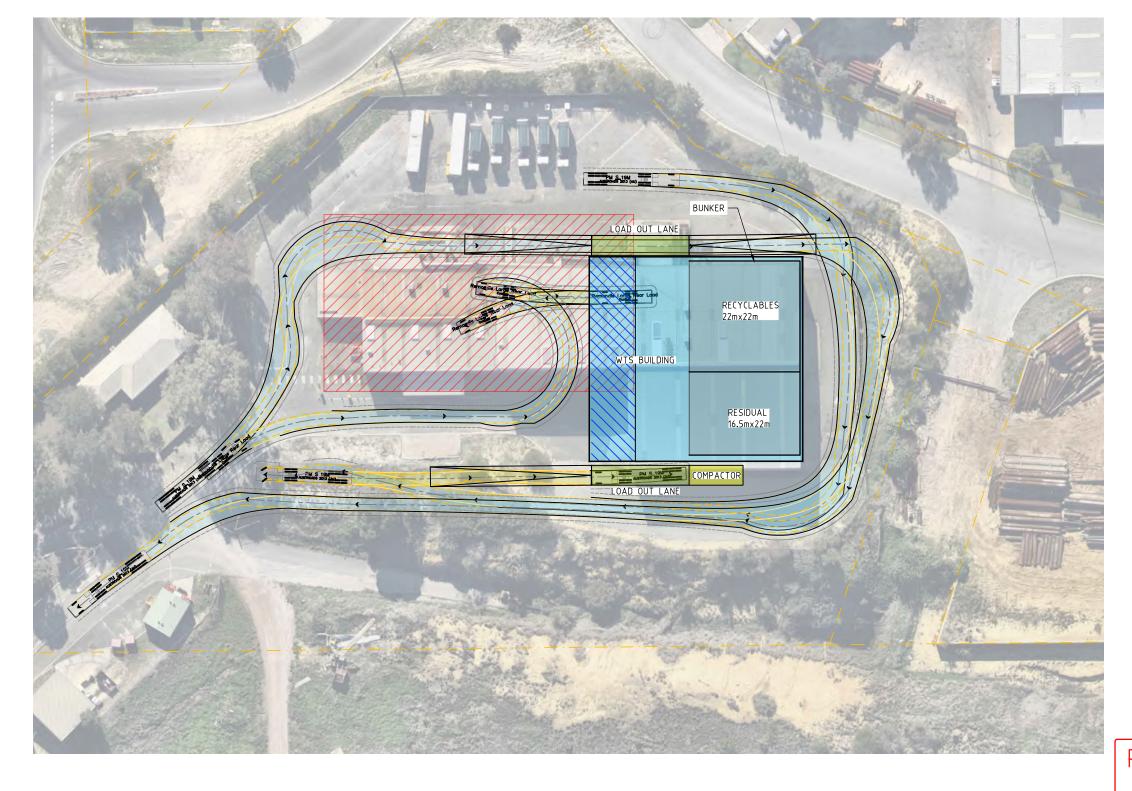
- This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent. DO NOT SCALE, use figured dimensions only, if in doubt please conta Talis Consultants.
- 3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

No.	Date	Drwn.	ŧ	Amendment / Issue	App.
Α	08.08.2024	_	АВ	PRELIMINARY ISSUE	

WANNEROO RRP MASTERPLAN

WANGARRA WTS OP1

Scale: AS SHOWN @ A3 | Date: 08.08.2024 TW24028 W-105 TW24028 - WANGARRA WTS.DWG



— · — SITE BOUNDARY BUNKER

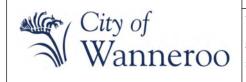
WTS BUILDING WTS EXPANSION

BUILDINGS TO BE DECOMISSIONED

PRELIMINARY ONLY NOT FOR CONSTRUCTION







# NOTES

This drawing is the property of Talis Consultants Pty Ltd. It is a
confidential document and must not be copied, used, or its contents
divulged without prior written consent.
DO NOT SCALE, use figured dimensions only, if in doubt please contact
Talis Consultants.

3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

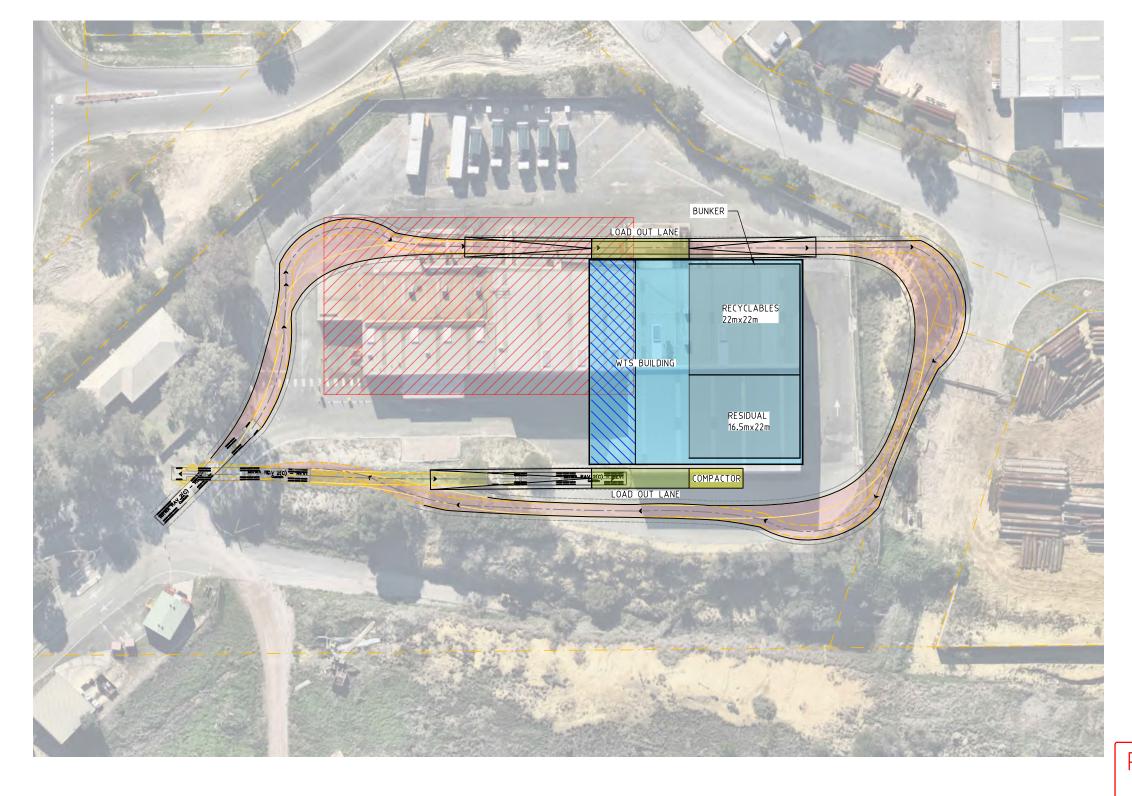
	No.	Date	Drwn.	ŧ	Amendment / Issue	App.	
			ċ	J			1
	Α	08.08.2024	٧s	АВ	PRELIMINARY ISSUE		1
t							
							1

WANNEROO RRP MASTERPLAN

WANGARRA WTS OP2A

Scale: /	S SHO	√N @ A3	Date:	08.08.2024
Drawn: \	/S	Checked:	AB	Approved:
Job No:		Drg. No:		Rev:
TW2	4028	W-	-106	Α







— · — SITE BOUNDARY BUNKER

WTS BUILDING WTS EXPANSION

BUILDINGS TO BE DECOMISSIONED

PRELIMINARY ONLY NOT FOR CONSTRUCTION







NOTES

3. Parts of this drawing is intended to be IN COLOUR. Black & White
Printing may cause errors or omissions. If this text is not GREEN,
please contact Talis Consultants

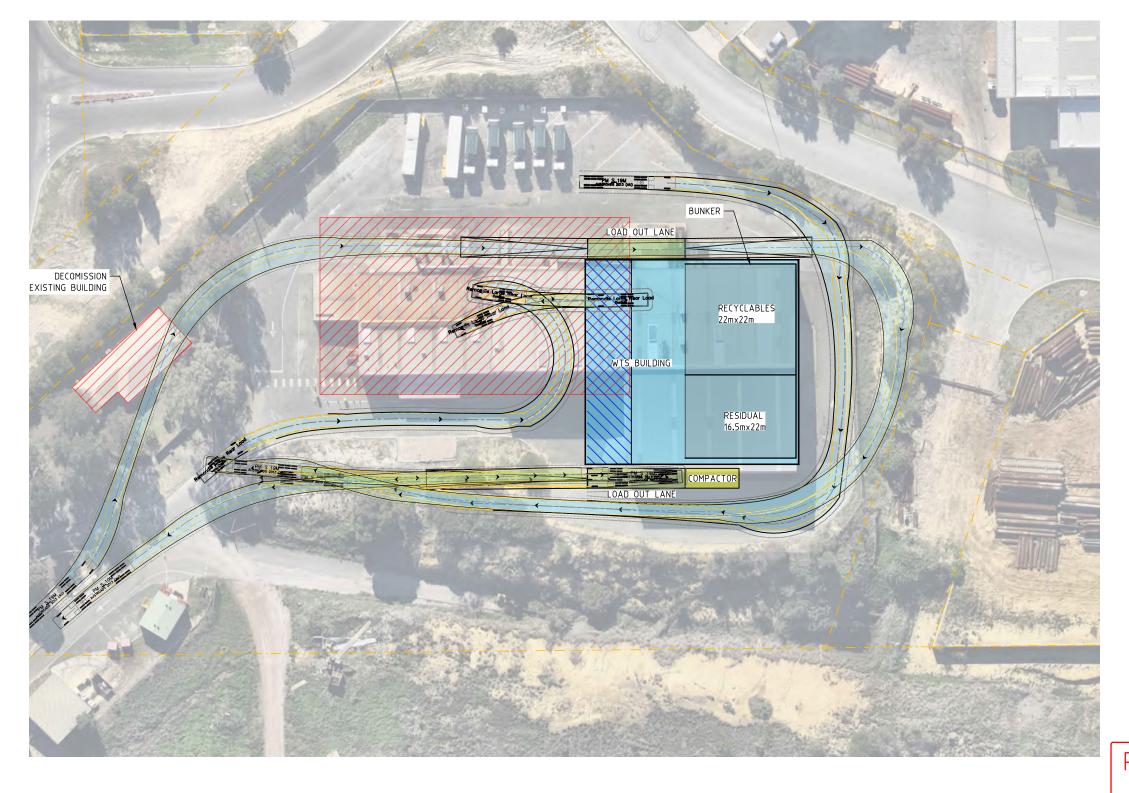
	No.	Date	P.	ŧ	Amendment / Issue	App.	
				<b>-</b>			ł
	Α	08.08.2024	vs	AB	PRELIMINARY ISSUE		1
ıct							
							١.

WANNEROO RRP MASTERPLAN

WANGARRA WTS OP2A

Scale:	AS SHOV	√N @ A3	Date: (	8.08.2024
Drawn:	VS	Checked:	AB	Approved:
Job No:		Drg. No:		Rev:
TW2	4028	\a/_	-106	٨





SITE BOUNDARY

BUNKER

WTS BUILDING
WTS EXPANSION

BUILDINGS TO BE DECOMISSIONED

PRELIMINARY ONLY
NOT FOR CONSTRUCTION







This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.

 ON NOT SCALE use figured dimensions only if in doubt please contact.

NOTES

2. DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.

3. Parts of this drawing is intended to be IN COLOUR. Black & White
Printing may cause errors or omissions. If this text is not GREEN,
please contact Talis Consultants

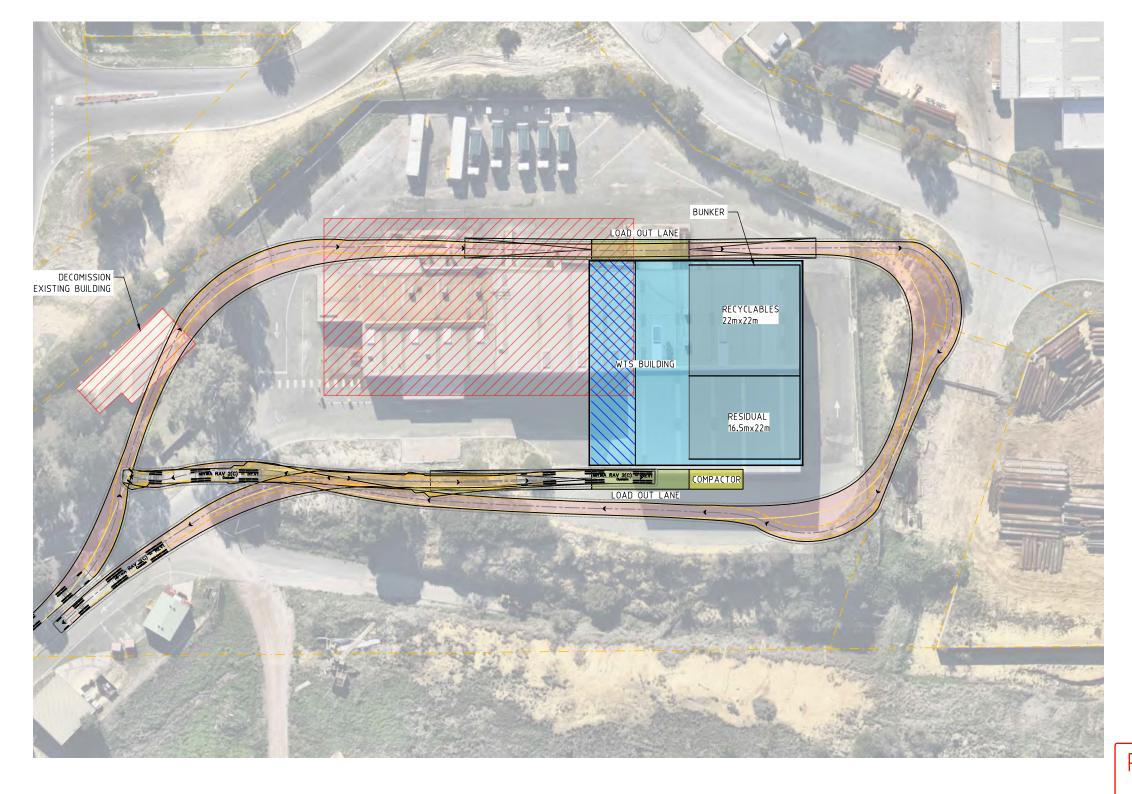
	No.	Date	Drwn.	ŧ.	Amendment / Issue	App.
	Α	08.08.2024	_	AB	PRELIMINARY ISSUE	
ıct						

WANNEROO RRP MASTERPLAN

WANGARRA WTS OP2B

Scale: /	AS SHO	√N @ A3	Date:	08.08.2024
Drawn: \	/S	Checked:	AB	Approved:
Job No:		Drg. No:		Rev:
TW2	4028	W-	-107	1





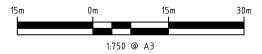
SITE BOUNDARY

BUNKER

WTS BUILDING
WTS EXPANSION

BUILDINGS TO BE DECOMISSIONED

# PRELIMINARY ONLY NOT FOR CONSTRUCTION







 This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
 DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.

NOTES

Talis Consultants.

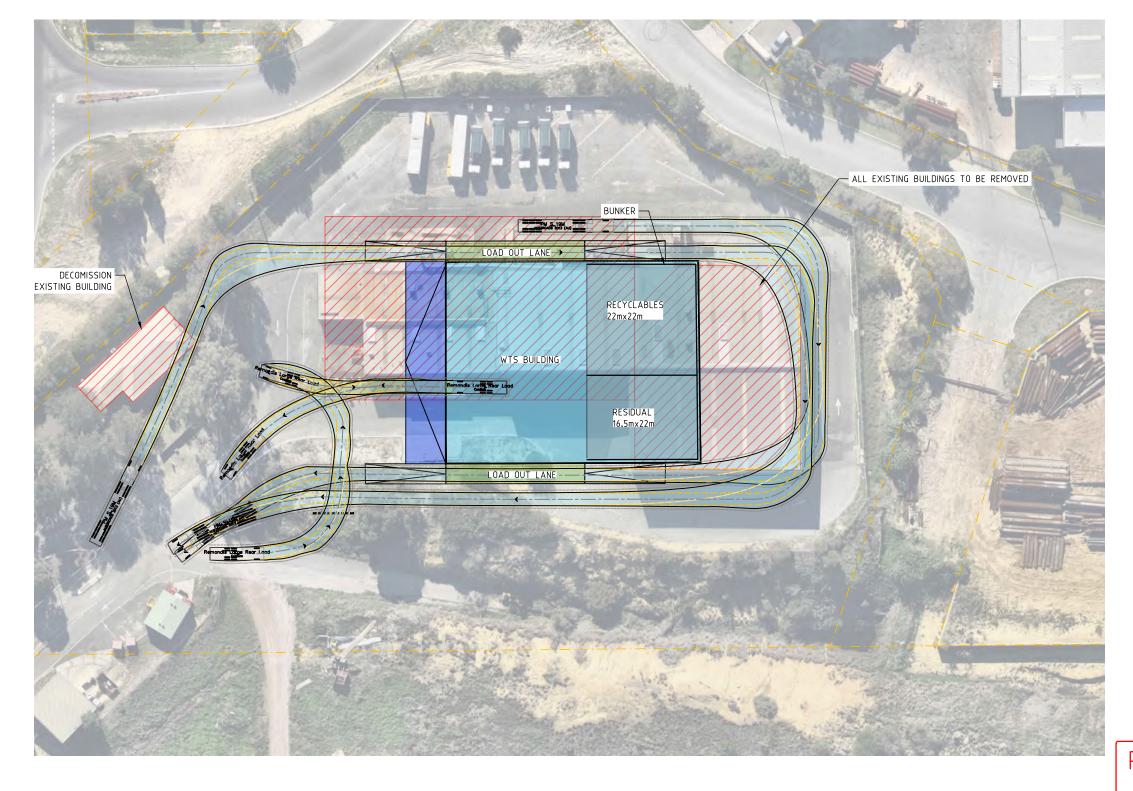
3. Parts of this drawing is intended to be IN COLOUR. Black & White Printing may cause errors or omissions. If this text is not GREEN, please contact Talis Consultants

	No.	Date	Drwn.	ŧ	Amendment / Issue	App.
	Α	08.08.2024	_	AB	PRELIMINARY ISSUE	
t						

WANNEROO RRP MASTERPLAN

WANGARRA WTS OP2B





\_\_ · \_\_ SITE BOUNDARY

BUNKER
WTS BUILDING

В

BUILDINGS TO BE DECOMISSIONED

# PRELIMINARY ONLY NOT FOR CONSTRUCTION







 This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
 DO NOT SCALE, use figured dimensions only, if in doubt please contar

NOTES

2. DO NOT SCALE, use figured dimensions only, if in doubt please contact Talis Consultants.

3. Parts of this drawing is intended to be IN COLOUR Black & White

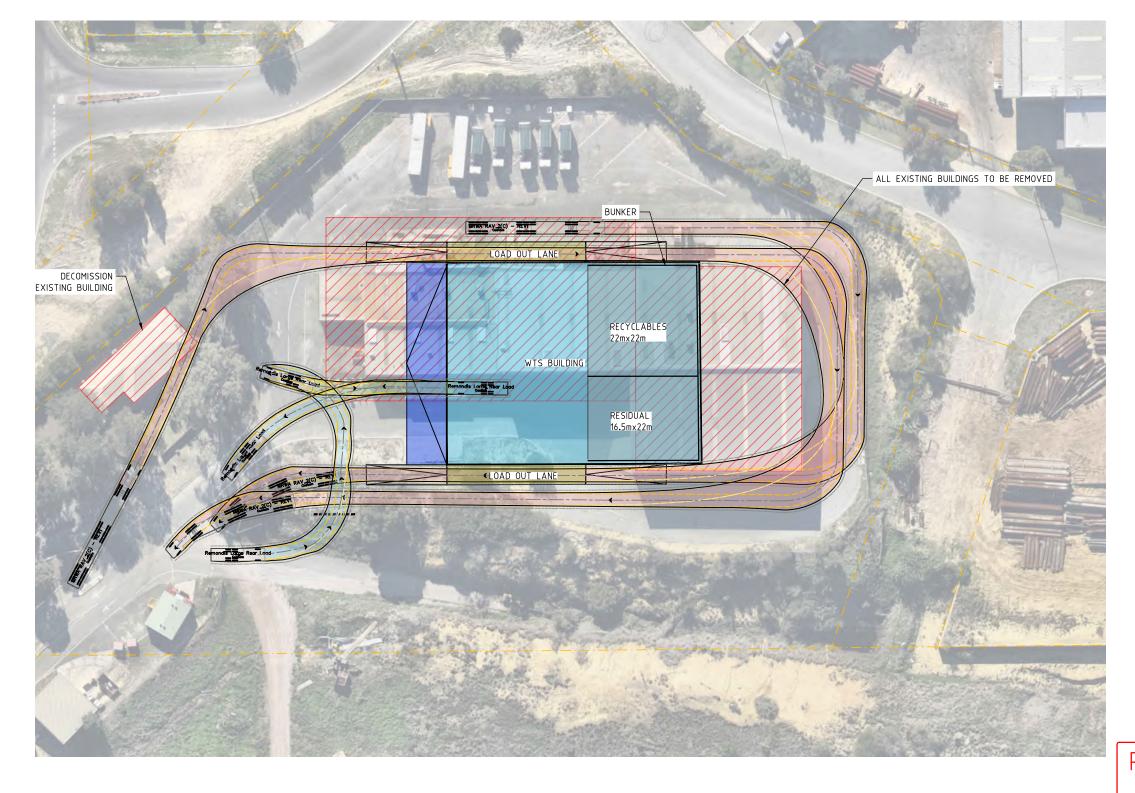
3. Parts of this drawing is intended to be	IN	COLOUR.	Black & White
Printing may cause errors or omissions.	If	this text	is not GREEN,
please contact Talis Consultants			

	No.	Date	Drwn.	ŧ	Amendment / Issue	App.
	Α	08.08.2024	_	AB	PRELIMINARY ISSUE	
t						

WANNEROO RRP MASTERPLAN

WANGARRA WTS 0P3





— · — SITE BOUNDARY

BUNKER WTS BUILDING

BUILDINGS TO BE DECOMISSIONED

PRELIMINARY ONLY NOT FOR CONSTRUCTION







 This drawing is the property of Talis Consultants Pty Ltd. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent. 2. DO NOT SCALE, use figured dimensions only, if in doubt please contac Talis Consultants.

NOTES

3. Parts of this drawing is intended to be	N COLOUR. Black & White
Printing may cause errors or omissions.	. If this text is not GREEN,
please contact Talis Consultants	

	No.	Date	Drwn.	ŧ.	Amendment / Issue	App.
	Α	08.08.2024	_	AB	PRELIMINARY ISSUE	
аст						
act						
	-		_	_		

WANNEROO RRP MASTERPLAN

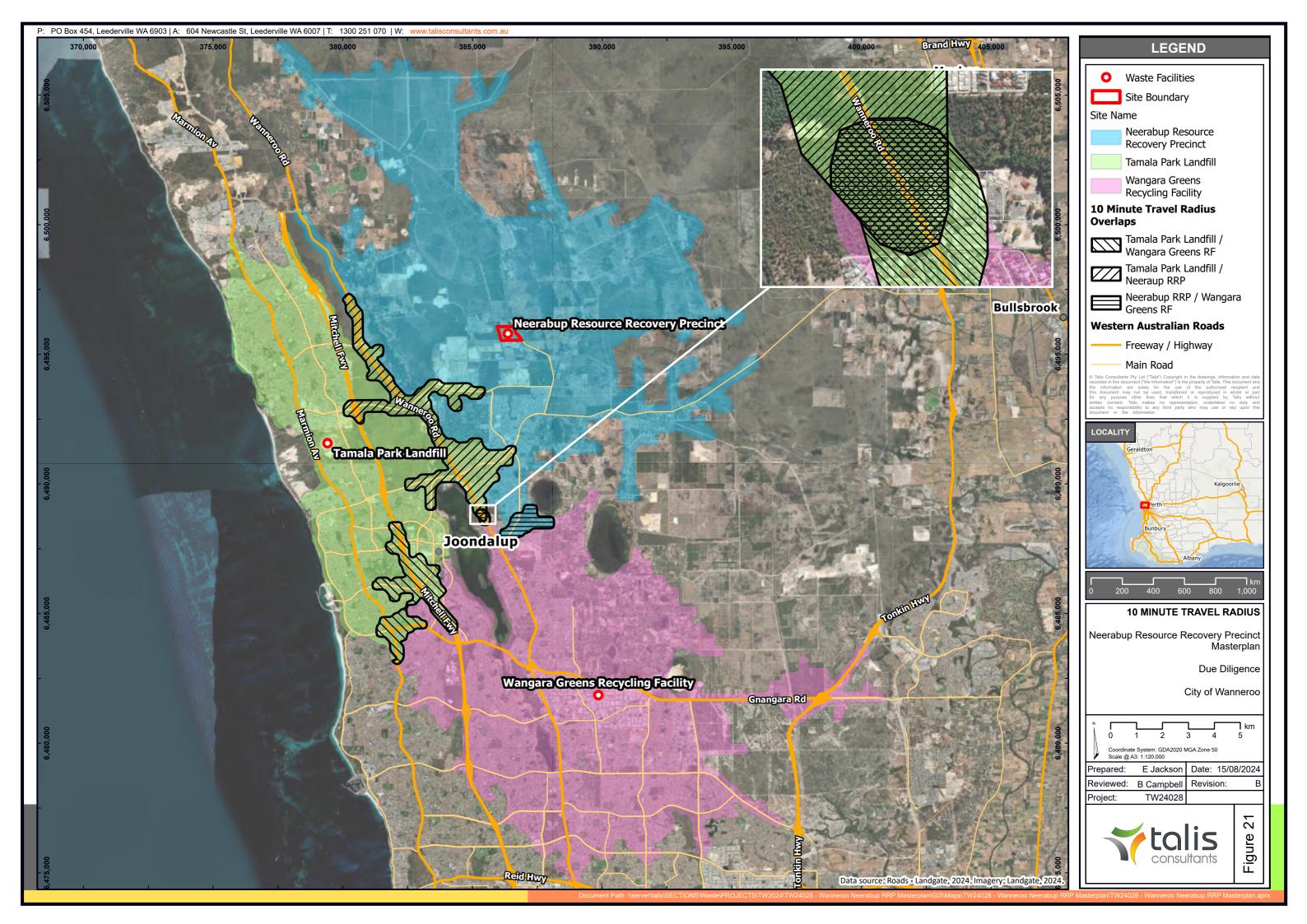
WANGARRA WTS 0P3

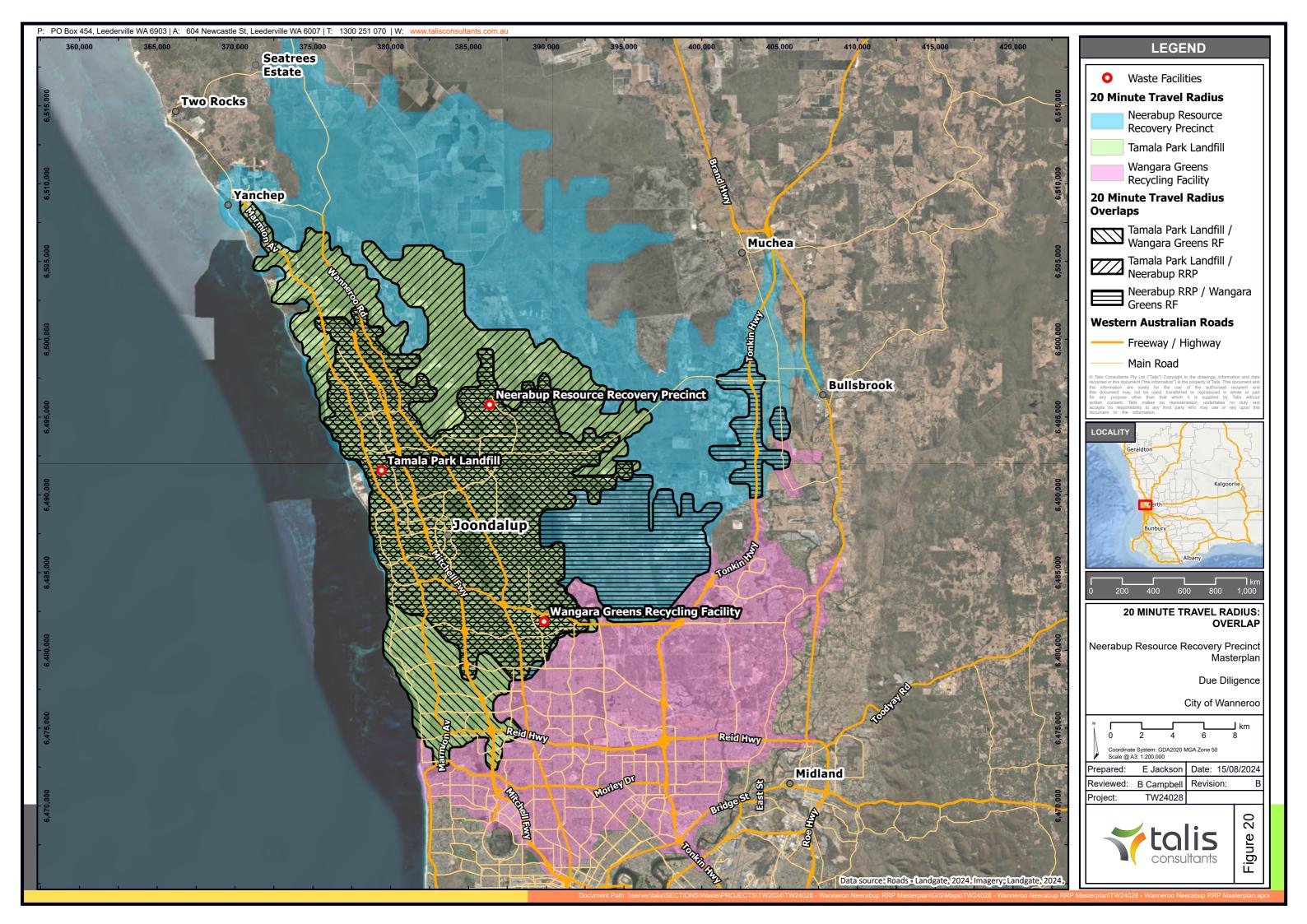
Scale:	AS	SHOV	√N @ A3	Date:	0	18.08.2024
Drawn:			Checked:	AB		Approved:
Job No:			Drg. No:			Rev:
TW2	240	28	W-	-108		Α



# **APPENDIX B**

# **Travel Time Figures**







#### 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



#### 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