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Regional Landfill Strategy

Feasibility Study

NEWROC

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Report produced by:
GILES PERRYMAN BSc, DMS
JOHN CAVANAGH

ASK Waste Management
PO BOX 401
Brunswick Heads
NSW. 2483
AUSTRALIA

+ 61 (0)447 393363
admin@askwm.com
www.askwm.com

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EXECUTIVE SUMMARY

The North Eastern Wheatbelt Regional Organisation of Councils (the NEWROC) engaged ASK Waste Management (ASK) to assess their current facilities and regional situation and develop achievable concepts to improve waste management across the region.

ASK has completed a desktop assessment of the NEWROC landfills and modelled four Options to consider as a future strategy for the Shires to adopt.

Landfill Assessment

Initially the landfills were assessed for fatal flaws, which resulted in only five facilities passing.

Table E.1 - Fatal flaw test results

Facility name	Result	Reason
Koorda Landfill (Existing)	Fail	<5 years of capacity
Koorda Landfill (New)	Pass	
Mt Marshall - Bencubbin LF	Pass	
Mt Marshall - Beacon LFI	Pass	
Mukinbudin Landfill	Fail	< 2m to bedrock
Nungarin Landfill	Fail	< 2m to bedrock
Trayning - Kununoppin LF	Fail	<1km from airport
Trayning - Trayning LF	Fail	Closed
Trayning - Yelbeni Landfill	Pass	
Wyalkatchem Landfill	Pass	

The new Koorda site has been "knocked-out" because the costs related to setting up the site as a landfill could easily be in excess of $250,000.

Trayning's Yelbeni landfill has been "knocked-out" on account of its close proximity to the Wyalkatchem landfill. Similarly, the Beacon landfill has been "knocked-out" due to its remoteness in relation to the other facilities in the region.

The remain two landfill sites are ranked as:

1. Wyalkatchem site
2. Mt Marshall's Bencubbin site,

Options Assessment

The Options assessed and the net annual income is shown in **Table E.2**. Options 2, 3 & 4 all allow for the collection of gate fees for commercial waste, this is estimated to generate approximately $300,000 of revenue per year.

The assessment shows that Options 3 and 4 would provide better environmental outcomes as the other landfills would be closed and transfer stations established. These two Options would also result in better compliance as transfer stations have less regulatory issues to consider, and the remaining landfills would be staffed and have sufficient revenues to fund full compliance.

Table E.2 - Financial summary for each option

Option	Net annual income)
Option 0: Baseline cost of current operation	-145,287
Option 1: All landfills unstaffed (remote access)	-180,255
Option 2: All landfills (remote access) plus two staffed landfills	60,786
Option 3: All transfer stations (remote access) plus two staffed landfills - weekly collection	67,193
Option 3: All transfer stations (remote access) plus two staffed landfills - fortnightly collection	104,633
Option 4: All transfer stations (remote access) plus one staffed landfill - weekly collection	115,473
Option 4: All transfer stations (remote access) plus one staffed landfill - fortnightly collection	137,313

Recommendations

The key recommendations made are listed below, the full details of recommendations are provided in **Section 8**.

1. *The NEWROC Shires should adopt Option 3 or Option 4 as their future waste disposal strategy.*
2. *Complete a thorough sensitivity analysis with the model to determine that the preferred option is consistent under all likely scenarios.*
3. *Ask Avon Waste to review the transport modelling assumptions and rationale.*
4. *The NEWROC Shires should consider and decide to either establish a single staffed Regional landfill at Bencubbin, or two staffed landfills at Bencubbin and Wyalkatchem.*
5. *The NEWROC Shires should agree to set one uniform waste fee (per capita) for the operation of all the facilities and transport of waste between the facilities. This will mean no Shire is disadvantaged, based on the location of the staffed landfills.*
6. *A maximum quantity of domestic waste per rate payer should be adopted by the NEWROC.*
7. *Should NEWROC adopt one of the Options then a detailed implementation plan should be*

developed and communicated to residents explaining the reasons for and benefits of the changes.

8. *The community should be made aware of the need to 'self-police' the remote access facilities.*
9. *Complete a Whole of Life cost analysis of the current waste services and the estimated costs for the selected future services to determine the costs and appropriate fees and charges for residential rates and commercial gate fees.*
10. *Operational Management Plans (OMP) should be produced for the transfer stations, a general OMP may be sufficient for all the sites.*
11. *An Operational Management Plan should be produced for the staffed landfill(s).*
12. *Develop or purchase an electronic gatehouse records system for the staffed landfill(s).*
13. *Produce Landfill Closure Management Plans (LCMP) for all the landfills as required under the Rural Landfill Regulations.*
14. *All landfills should be surveyed to determine the current landform, this will be required to produce the LCMPs.*
15. *NEWROC should plan to increase the gate fees over the next 3 – 5 years to meet breakeven costs.*
16. *The data provided by the remote access systems (the user and when used, plus CCTV footage) and the electronic gatehouse records system for the staffed landfill(s), will provide accurate information about when facilities are used and by whom, together with waste quantities brought from each transfer station or remote access landfill to the staffed landfill(s). This information should be reviewed after 18 – 24 months, and the rationalisation of the number of facilities should be considered, based on the frequency of use.*

Immediate next steps

The initial steps suggested would ensure the projects detailed assessment are completed and NEWROC are able to select an Option, develop the plan, communicate with the community and seek funding, these steps include:

1. NEWROC provisionally agree to one or more of the Options for further consideration.
2. Complete a more detailed assessment of the preferred Option(s), including:
   a. Ask Avon Waste to review and provide feedback on the transport modelling assumptions, costs and rationale.
   b. Complete a sensitivity analysis with the financial model (changes to waste quantities and other assumptions) to quantity these impacts on the validity of the economic results.
3. NEWROC select a preferred Option for implementation.
4. Produce a detailed project plan, with costing and an implementation schedule including most of the recommendations listed above. This will provide the information for the Shires and towards any funding application. The project plan should be developed with consideration of the criteria and information required for any funding stream.
5. Develop and implement a communication plan with the NEWROC community explaining the reasons, benefits and changes to services resulting from the project.
6. Liaise with potential funding stream providers to explain the project benefits and potential for replication throughout rural WA, then complete funding applications.
7. Implement the remainder of the project.

1 INTRODUCTION

The North Eastern Wheatbelt Regional Organisation of Councils (the NEWROC) engaged ASK Waste Management (ASK) to assess their current facilities and regional situation and develop achievable concepts and strategies to improve waste management across the region.

The NEWROC is a voluntary organisation that unites councils from the Shires of Koorda, Mount Marshall, Mukinbudin, Nungarin, Trayning and Wyalkatchem to work together for the economic prosperity of the region which covers close to 19,500 square kilometres and is home to around 2,500 people.

Within the NEWROC region, there are eight operating landfills. The Trayning landfill is currently closed. Koorda Shire Council has started exploring sites to develop a new landfill.

There are varying services across the district in regard to kerbside collections. Avon Waste is the primary provider holding individual agreements with each Shire.

Table 1.1 shows the Shires and their corresponding landfill/s as well as information about populations, land size and distance to the state capital.

Table 1.1 - NEWROC Landfills

Shire	Shire Population	Shire Land Size	Facility	Town Population	Distance to Perth (km)
Koorda	414	2836 km²	Koorda Landfill	268	236
Mt Marshall	521	10190 km²	Bencubbin Landfill	242	275
			Beacon Landfill	160	333
Mukinbudin	555	3414 km²	Mukinbudin Landfill	355	298
Nungarin	257	1145 km²	Nungarin Refuse Disposal Site	145	278
Trayning	350	1651 km²	Kununoppin Landfill	100	257
			Yelbeni Landfill	50	222
			Trayning Landfill (closed)	194	-
Wyalkatchem	516	1595 km²	Wyalkatchem Landfill	397	192

1.1 ISSUES

The nine waste facilities across the NEWROC region are registered, however, none are gated or manned. Common challenges seen at these facilities include commercial waste being dumped (sometimes illegally), non-residents depositing waste at the sites, and maintaining site compliance.

The uncontrolled disposal of waste at all the NEWROC sites also means that there are no gate fees being recovered. Currently residential rates are subsidising commercial waste disposal from businesses, organisations and State departments located in the region.

Without any monitoring, there is also no way to collect data or be sure of exactly what kinds of waste are being deposited. Potential environmental risks of unmonitored landfills include air pollution, groundwater contamination and public health issues, for example contact with hazardous substances or disease spread through live-in rodents and other animal vectors.

It is also possible that waste generated in Shires close to the NEWROC are transported to the NEWROC landfills to avoid paying gate fees elsewhere.

As per DWER policy and in alignment with the NEWROC objective to solve problems as a collective, this report intends to recommend scenarios that aggregate landfills to create a regional solution that results in less but larger and more efficiently run landfills.

1.2 REPORT APPROACH

This report has been produced in line with the following methodology;

- Complete a desktop assessment of the existing landfills operated by the Shires in NEWROC to identify the facilities that would be suitable as regional sites, based on;
    - Proximity of watercourses and depth to groundwater (where available)
    - Proximity to sensitive receptors (residential and commercial properties)
    - All weather access (sealed roads)
    - Potential airspace (operational life) based on site size and depth of excavatable soil
    - Suitability of location within the NEWROC region.
- Assess five potential options for the future operation of the facilities, including:
    0. All landfill operations stay as they are.
    1. Keep all the current sites but install remote access systems for Shire residents and CCTV to control the use of the sites.
    2. As above, but also staff two key sites for a limited time each week for the receival of commercial waste, for which a gate fee would be paid.
    3. Maintain two sites as landfills to service the NEWROC area, these would be staffed with limited opening hours each week. The other sites would be converted to transfer stations, with remote access system for Shire residents and CCTV to monitor the use of the sites.
    4. Maintain a single staffed landfill facility for the region, supported by remote access system and CCTV monitored transfer stations at all other locations.
- Assess each option on their environmental, compliance, social and technical merits.
- Produce an economic assessment based on the capital and operational costs for each option and include any additional revenue that the option may generate.
- Summarise the findings to provide NEWROC with the information needed to make an informed decision about their future strategic direction, including recommendations and the next steps required.

2 DEFINITIONS OF INFRASTRUCTURE OPTIONS

In this report, ASK proposes several different scenarios which illustrate situations that may be foreign to the reader. The following section aims to outline the definition of each of these situations and the related technologies.

2.1 REMOTE ACCESS SYSTEM

A remote access system is an automated, unmanned system that allows access to a site via an electronic key (e.g. swipe card, RFID or 'fob' tag, or electronic keypad). A CCTV camera provides extra security and monitoring of people entering and exiting. **Figure** 2.1 shows an example of a remote access system used at a landfill in NSW. This system has a remote power source (solar panel) which powers the automatic gate, CCTV camera and remote access technology as mains power is unavailable at the site.

Figure 2.1 Example of Remote Access System (Warialda Rail Landfill - Gwydir Shire Council, NSW)

This system can be used for both landfills and transfer stations and has the added benefit of recording data about who is using the facility, at what time, and how often.

2.2 TRANSFER STATION

A transfer station is a processing site for the temporary disposal of waste. This waste is then picked up and taken to a landfill to be disposed of properly. There are many different ways to design a transfer station. Generally, waste is disposed into skip bins and, when full, hauled to a central landfill which then buries the waste. Considering the scale of the NEWROC facilities, it is most likely that several front lift bins, as seen in **Figure** 2.2, would be placed at the facility for customers to place their waste into. Once full, these front lift bins would be picked up and replaced with empty bins by Avon Waste who would then transfer the waste to a central location for landfilling.

Figure 2.2 Example of Avon Waste front lift bin used at a transfer station

There are significant environmental and operational advantages to transfer stations. Since the waste is not buried on site, there are virtually no environmental impacts or liabilities normally associated with landfills, which are important issues for DWER. There are, however, costs related to transporting the waste from the transfer station to a landfill.

As mentioned above, unmanned transfer stations could be fitted with a remote access system to keep track of the comings and goings of waste and users and restrict entry by only giving access to rate-paying residents.

2.3 STAFFED LANDFILLS

A landfill is a site where waste is amassed and buried. A specified area is dug, waste placed in the hole and intermittently covered with dirt or cover material. All waste facilities currently in the NEWROC region are considered landfills.

A staffed landfill has a gatehouse where at least one staff member monitors and interrogates waste loads entering the site. The staff member checks the wastes and often issues a gate fee for the waste to be deposited. The staff on site also provide operational management of the landfill, ensuring that it is neat, safe and managed correctly. Staff can also direct customers to the most appropriate place to dump waste and educate residents on improving the way they manage their waste at home.

When combined with a remote access system, a staffed landfill does not need to be staffed every day. In small rural areas, it is common to have specific opening hours (for example three days a week, four hours per day) which allows those without an access key to enter the landfill. This is particularly useful to monitor and monetise the waste brought in by commercial entities who cannot access landfills (since they may not have a key for the remote access system).

With staff on site, gate fees can be introduced, providing an income stream for the Shire or regional group. Staffed landfills also mean that wastes that cannot be accepted at the facility (for example uncovered asbestos) are not dumped illegally.

2.4 REGIONAL LANDFILL

A regional landfill is very similar to a staffed landfill; however, it is open more often, staffed more often and accepts waste from a larger area (e.g. the entire region). A regional landfill would be the primary disposal point for all commercial waste. Generally, all surrounding facilities in the region would be turned into transfer stations with remote access systems (to discourage unwanted dumping by commercial entities), with the waste being transferred to the central regional landfill.

There are many advantages to this practice. One is the economic advantage of a centralised operation which would only require the staff, facilities and plant for one location. Another advantage is the environmental benefits of having a landfill which is monitored and maintained on a regular basis allowing an improved level of compliance with DWER guidelines.

Nevertheless, there is a cost associated with transporting waste from a widespread number of transfer stations to the one regional facility. This may require a coordinated, 'milk-run' style operation which would gain the advantages of economies of scale.

3 EXISTING FACILITES

The NEWROC is a voluntary organisation of Councils working together for the economic prosperity of its member communities. Established in 1994, the NEWROC includes councils from the Shires of Koorda, Mt Marshall, Mukinbudin, Nungarin, Trayning and Wyalkatchem.

The region hosts nine landfills, as shown in **Figure** 3.1. All landfills are currently unmanned and most have unrestricted 24-hour access. The following section describes each Shire and the landfills residing within the Shire's bounds. Information for these descriptions was provided by the Shires and gathered from research undertaken by Ian Watkins (2012) and site visits conducted by ASK in 2019.

Figure 3.1 Map of the NEWROC waste facilities

3.1 SHIRE OF KOORDA

The Shire of Koorda stretches over 2836 square kilometres in the north-western portion of the NEWROC region and is home to 414 people. Koorda has one landfill site which is reaching capacity. The Shire has done preliminary siting for a new landfill at the old golf course; however, ASK was unable to obtain verified information about planning and approvals that confirm the new site. Avon Waste service the town with a kerbside pickup which is disposed of at the Koorda landfill.

3.1.1 Koorda Landfill

Annual Disposed (tonnes)	750
Town Population	270
Approx. Site Size	15 ha
Facility Lifespan	<10 years

The Koorda landfill is an unmanned site with a perimeter fence which is open and free to the public with 24 hours access.

In a recent visit, it was observed that the site was not maintained adequately; waste was not covered or disposed in a central spot, stockpiles of metal, greenwaste and timber were mixed together, and there were litter issues particularly because the waste was not covered, no fencing surrounded the waste area and the bunds encompassing the dump site were not high enough to prevent litter.

The site was found to be sandy with clay and gravel 2m below the surface. Although it is said to be close to full, recent observations saw that the life of the site could be extended if managed to landfill best practice standards.

The closest receptor to the current Koorda landfill is a property approximately 600m northeast of the landfill. There is an 80m unsealed access road into the landfill.

3.1.2 New Koorda Landfill

Approx. Site Size	14 ha (5 ha usable)

Koorda has done preliminary work repurposing the old golf course into a new landfill site. There is limited information about this site at present. Test pits have been dug and approximately 5 ha of the site can be excavated to a depth of 3m (test pit seen in picture on right). The Shire of Koorda is relatively confident that the site will be appropriate, however, ASK does not know the extent of surveyance, planning and approvals that have been completed.

3.2 SHIRE OF MT MARSHALL

The Shire of Mount Marshall is the geographically largest of the six NEWROC shires, covering 10190 square kilometres with a population of 521. There are two landfills situated in the towns of Bencubbin and Beacon, in the southern section of the Shire. These towns are situated in relative proximity to the other landfills in the NEWROC region, with Beacon being the northernmost facility. Only 33% of the population reside outside these two town centres.

Both sites are land tenure on private property and leased by the Shire.

3.2.1 Bencubbin Landfill

Annual Disposed (tonnes)	560
Town Population	240
Approx. Site Size	10 ha
Facility Lifespan	10 – 15 years

Bencubbin landfill is located in the southern part of the Shire of Mount Marshall. It is unmanned with lockable gates. Avon Waste disposes of kerbside waste at this facility from Bencubbin and Beacon. The site is well-fenced and recycling activities are present, however there is some concern about whether there is a viable end market for some of the recyclable materials. The site is sand based and there is currently room for more pits to be dug inside the site.

The closest receptor to the Bencubbin landfill is the adjacent golf course, followed by a property located 800m north. The access road is an 300m unsealed track.

3.2.2 Beacon Landfill

Annual Disposed (tonnes)	380
Town Population	160
Approx. Site Size	1 ha
Facility Lifespan	>30 years

The Beacon Landfill is a small site that takes waste from the local community. The site was recently extended 0.8 hectares to the west and is situated on sandy soil which allows for easy excavation. Avon Waste does not dispose of kerbside waste at this facility. It is unmanned and has unrestricted 24 hours access. Both the extended site and original site are well-fenced.

The closest property to the Beacon landfill is approximately 2km away. The site is accessed via an 500m unsealed road.

3.3 SHIRE OF MUKINBUDIN

The Shire of Mukinbudin has a population of 555 and is located on 34 hectares on the eastern edge of the NEWROC region. There is only one landfill in the Shire and Avon Waste takes the towns kerbside collection to that site.

3.3.1 Mukinbudin Landfill

Annual Disposed (tonnes)	1000
Town Population	355
Approx. Site Size	20 ha
Facility Lifespan	>30 years

The Mukinbudin landfill is a relatively new landfill, having been built about 10 years ago, and is an unmanned, fenced site with unrestricted 24-hour access. The site is built on an expired shallow gravel quarry, resulting in a hard rock base that does not allow excavation and means all cover material is brought in from an external source. In 2012, extensive

evidence of past fires was recorded, as well as a general observation that significant management was necessary to retain the site. The road into the landfill site is a 500m unsealed road with all-weather access. The closest property is approximately 2.5km away.

3.4 SHIRE OF NUNGARIN

The Shire of Nungarin is a relatively small Shire spanning over 1145 square kilometres and housing approximately 257 people. There is one landfill that services the small town of Nungarin, with Avon Waste depositing the town's kerbside waste at the site.

3.4.1 Nungarin Landfill

Annual Disposed (tonnes)	470
Town Population	145
Approx. Site Size	5 ha
Facility Lifespan	>30 years

The Nungarin landfill is an unmanned site with 24hours unrestricted access. It has partly fenced around the perimeter. The entrance to the landfill is along a 360m unsealed road which does not allow all-weather access. The closest property is 1.53km away.

3.5 SHIRE OF TRAYNING

The Shire of Trayning is situated in the central southern portion of the NEWROC region and has three landfills within its 1651 square kilometres, servicing a population of 350. One landfill, Trayning, is currently closed but may still be used by residents as it has unrestricted access. The Shire has a kerbside collection that is handled by Avon Waste, with all waste being disposed of at the Kununoppin landfill. Trayning and Yelbeni have a kerbside recycling collection as well as central drop-off recycling facilities in town.

3.5.1 Kununoppin Landfill

Annual Disposed (tonnes)	180
Town Population	100
Approx. Site Size	10 ha
Facility Lifespan	<10 years

The Kununoppin landfill is a small unmanned site built on sand and gravel and has 24-hour unrestricted access. The site is fenced with a basic farming fence and no gates. It is adjacent to the airport. In recent observations, the site has been in need of a major clean up as rubbish has begun to pile up and requires levelling.

3.5.2 Trayning Landfill

Annual Disposed (tonnes)	360
Town Population	200
Approx. Site Size	25 ha
Facility Lifespan	Closed

The Trayning facility is currently marked as closed to the public, however, is unmanned and unfenced, allowing 24hour unrestricted access. When visiting in June 2019, despite having a "closed" sign, the site was observed

to have recently been used to dump waste. It was also observed that the site was in desperate need of tidying up and rehabilitation.

3.5.3 Yelbeni Landfill

Annual Disposed (tonnes)	100
Town Population	50
Approx. Site Size	15 ha
Facility Lifespan	10 – 15 years

The Yelbeni Landfill is the main Shire landfill and is within 1km from the Yelbeni township. It is an unmanned site with basic fencing that is accessible 24 hours. Avon Waste disposes all kerbside waste here from Kununoppin, Trayning and Yelbeni townships. The site is built on sandy/gravel and is easy to excavate despite being an old gravel quarry.

3.6 SHIRE OF WYALKATCHEM

The Shire of Wyalkatchem is the south-western position of the NEWROC group. It has a total population of 516 and covers 1595 square kilometres. There is only one landfill in Wyalkatchem which receives all of the waste from the kerbside collection serviced by Avon waste.

3.6.1 Wyalkatchem Landfill

Annual Disposed (tonnes)	930
Town Population	400
Approx. Site Size	35 ha
Facility Lifespan	20 – 30 years

The Wyalkatchem landfill is one of the largest facilities in the NEWROC. The current landfill facility occupies 20.8 ha of the total space. It is unmanned, has unrestricted 24-hour access and is fenced. The site is adjoined to the cemetery. The facility is well managed, and the current use space is about 8000 square meters, with approximately 50,000 square meters available for future expansion. There is also good documentation of previously buried waste.

The closest property is approximately 2.5km away. The road leading from the main (sealed) road into the main cell is unsealed and 200m long with all-weather access.

4 WASTE QUANTITIES

Without a gatehouse or weighbridge, no NEWROC facility has the technical capabilities to gather accurate waste quantity data. In order to produce waste quantity data for this report, ASK has taken the 8-year average of non-metropolitan landfills in Western Australia from the Recycling Activity Review (ASK, 2010-2018).

Table 4.1 shows the kilograms of waste per person according to the 8-year average by waste type (MSW is Municipal Solid Waste (domestic waste), C&I is Commercial & Industrial, and C&D is Construction & Demolition). For simplicity, ASK has rounded the results to the nearest hundred kilograms.

Table 4.1 - Per capita landfill (kg/person)

Waste type	WA Rural Average 2010 -18	Rounded values used for report
MSW	511	500
C&I	496	500
C&D	835	800
Total (kg)	**1,842**	**1,800**
Total (tonne)	**1.84**	**1.8**

Table 4.2 shows the approximate tonnage, extrapolated from the population statistics, for the NEWROC region as a whole and each individual Shire.

Table 4.2 - Waste tonnage per Shire

Description	NEWROC TOTAL	Koorda	Mt Marshall	Mukinbudin	Nungarin	Trayning	Wyalkatchem
Population	2613	414	521	555	257	350	516
Pop percent of NEWROC	100%	16%	20%	21%	10%	13%	20%
MSW	1320	210	260	280	130	180	260
C&I	1320	210	260	280	130	180	260
C&D	2090	330	420	440	210	280	410
Total tonne	**4730**	**750**	**940**	**1000**	**470**	**640**	**930**

Table 4.3 gives a further breakdown of the origin of the different wastes likely to be deposited at the landfills, including:

- Domestic waste (MSW) collected via MGB (Mobile Garbage Bin or "wheelie bin"): Figure based on the proportion of the Shire population living within each key town, assuming that 90% of MSW generated in each town is collected via kerbside MGBs, with the remaining 10% taken to landfill as 'bulky waste'.
- Commercial waste (C&I) collected by contractors: Figure based on the proportion of the Shire population living within each key town, assuming that 40% of C&I generated in each town is collected via kerbside MGBs and front lift commercial collections, with the remaining 60% taken to landfill as self-hauled C&I waste.
- Domestic waste (MSW) dropped off to facilities by rate-paying residents
- Commercial waste (C&I) 'leakage' dropped off to facilities: Meaning the C&I waste that will be disposed of by residents using their 'resident' passes at the remote facilities, assumed at a rate of 50%
- Commercial waste (C&I), not including 'leakage', taken to the landfill by business owners who would pay a gate fee to dispose of the waste
- Construction & Demolition waste (C&D) taken to the landfill by the waste generator (e.g. building contractor) who would pay a gate fee to dispose of the waste

Table 4.3 - Waste landfilled - baseline

Description	NEWROC TOTAL	Koorda	Mt Marshall	Mukinbudin	Nungarin	Trayning	Wyalkatchem
MSW collected via MGB	877	122	185	163	67	158	182
C&I collected by contractor	379	53	80	70	29	68	79
Total collected waste	**1256**	**175**	**265**	**234**	**95**	**226**	**261**
MSW drop-off (to facilities)	443	88	75	117	63	22	78
C&I drop-off 'leakage' (to facilities)	470	79	90	105	51	56	91
Total drop-off to facilities	**913**	**166**	**165**	**222**	**114**	**78**	**168**
C&I (exc. 'leakage') to landfill	470	79	90	105	51	56	91
C&D to landfill	2090	330	420	440	210	280	410
Total 'gate fee' incurring waste	**2560**	**409**	**510**	**545**	**261**	**336**	**501**
TOTAL ALL WASTE	**4730**	**750**	**940**	**1000**	**470**	**640**	**930**

Table 4.4 indicates the tonnage of waste that would be deposited at each of the landfill sites if Option 1 was adopted. Option 1, as illustrated in **Section 6.1.2**, implements remote access systems at every landfill, however, this Option does not accommodate commercial users who are not rate-paying residents. Thus **Table** 4.4 only displays waste that is brought in by rate-paying residents who are assumed to use their access rights to deposit 50% of the total C&I waste generated (i.e. 'leakage').

Table 4.4 - Waste quantities expected at each facility once all landfills have remote access (Option 1)

Facility	Total MSW drop-off	C&I 'leakage' to Facilities	Total waste drop-off
Koorda - Koorda	88	79	**166**
Mt Marshall - Bencubbin	45	54	**100**
Mt Marshall - Beacon	30	36	**66**
Mukinbudin	117	105	**222**
Nungarin	63	51	**114**
Trayning - Kununoppin	6	16	**23**
Trayning - Trayning	12	31	**44**
Trayning - Yelbeni	3	8	**11**
Wyalkatchem	78	91	**168**
TOTAL (tonnes per annum)	**443**	**470**	**913**

5 DESKTOP ASSESSMENT OF LANDFILLS

The following desktop assessment of landfills in the NEWROC region has been performed in two stages; first, a fatal flaw test to deduce which landfills are viable options, and second, a multi-criteria analysis that uses a scoring and weighting system to determine the ranking, from best (1) to worst (10), of the landfills.

The criteria for the fatal flaw test and multi-criteria analysis are based on ASK's extensive experience in the waste industry, constraints identified via DWER requirements, and the landfill characteristics ranking system appropriated from Neal Bolton's *The Handbook of Landfill Operations* (1995).

5.1 FATAL FLAW TEST

A fatal flaw test was used to "knock-out" landfill sites which were not suitable as regional facilities. Some of the qualities of a regional landfill are explained in **Section 2.4**. Characteristics that would result in a 'failed' grade are outlined in **Table** 5.1.

Table 5.1 - Fatal flaw test conditions

Category	Fatal Flaw
Soils	Less than 2m to bedrock
Surface Water	Within wetland; <100m from surface water
Airport Safety	<1km from airport/aerodrome
Habitat Value	Critical habitat
Visual Impacts	Within 500m of visual public impact
Groundwater	<5m below lowest point
Remaining Site Capacity	<5 years of capacity remaining

Table 5.2 shows the results for the fatal flaw test and the reason for the 'fail' grade.

Table 5.2 - Fatal flaw test results

Facility name	Pass/Fail	Reason
Koorda Landfill (Existing)	Fail	<5 years of capacity remaining
Koorda Landfill (New)	Pass	
Mt Marshall - Bencubbin landfill	Pass	
Mt Marshall - Beacon Landfill	Pass	
Mukinbudin Landfill	Fail	Less than 2m to bedrock
Nungarin Landfill	Fail	Less than 2m to bedrock
Trayning - Kununoppin Landfill	Fail	<1km from airport/aerodrome
Trayning - Trayning Landfill	Fail	Closed
Trayning - Yelbeni Landfill	Pass	
Wyalkatchem Landfill	Pass	

Koorda's new landfill site, Mt Marshall's Bencubbin and Beacon landfills, Yelbeni landfill in Trayning and Wyalkatchem landfill passed the fatal flaw test. These sites were considered for the regional sites in Options 2, 3 and 4 in **Section 6.1**.

5.2 MULTI-CRITERIA ANALYSIS

5.2.1 Selection criteria

A multi-criteria analysis was used in this report to rank the suitability of the sites. The factors for the multi-criteria analysis are detailed in **Table** 5.3, including the marking criteria for each category and weighting.

These factors have been selected for their environmental, operational, social and technical impacts on the suitability of the waste facility.

Weighting of factors allows for a score that corresponds to the importance of the category. Remaining site capacity, for example, is given a weighted value of 8, while road access is given a weighted value of 2. This is because it would be inaccurate to assume that a score of 10 for road access and a score of 10 for remaining site capacity are of equal value.

Table 5.3 – Scoring system for multi-criteria analysis

Category	Scoring			Weighting
	10	5	1	
Road Access	<1.5km to paved road; on all weather road <500m	Requires <1.5km road improvement	Requires >1.5km road improvement	2
Remaining Site Capacity	>30 years of capacity	15 to 30 years of capacity	<10 years of capacity	8
Soils	Clay or low permeability	Sandy loam	<2m to bedrock (FATAL FLAW)	5
Depth to Groundwater	>20m	>10m to <20m	<5m	6
Surface Water	>500m from lake, wetland, perennial stream	>100m or <300m from surface water	Within wetland; <100m from surface water (FATAL FLAW)	7
Flood Hazard	No apparent flood hazard	100 to 500 year flood plain	Within 100 year floodplain; effects cannot be mitigated	7
Airport Safety	>2km from any airport/aerodrome	>1km to <1.5km from any airport/aerodrome; can demonstrate "no hazard"	<1km from any airport/aerodrome (FATAL FLAW)	8
Land Ownership	Council owned	Lease >10 years	Lease <10 years	4
Habitat Value	Low habitat value	High habitat value	Critical habitat value	3
Visual Impacts	Operation not visible off-site	Operation visible off-site	Impairment of scenic vistas	2
Downwind Impacts	>3km upwind from dwellings	>1 to <3km upwind from dwellings	<1km upwind from dwellings	3
Current Landfill Size (ha)	40	20	5	8
Available Space for Separating/Stockpiling	Well-established separation piles large suitable area >10ha	<2ha >5ha	No separation or stockpiling space available	8
Annual MSW Tonnage (current)	>400 tonnes	200 tonnes	50 tonnes	4
Town Population	>450	>200	>50	4
Possibility for Extension	Planned extension	Possible extension; not researched	No possibility for extension	5
Average Driving Distance to Other Facilities in Region	<20km	50 to 60km	>100km	5

5.2.2 *Multi-criteria analysis scoring*

Table 5.4 reveals the scores for each facility in each category according to the scoring and weighting system outlined in **Table** 5.3. For each landfill, the appropriate score was given for each category and this score was multiplied by the weighting to give the result shown in **Table** 5.4.

The right-hand columns show the total value for each landfill and its corresponding rank. Rows highlighted in green represent landfills which passed the fatal flaw test from **Section 5.1**, while the rows shaded red represent the landfills that failed. Failed landfills were included in the multi-criteria analysis, despite their "knocked-out" status, for the purpose of transparency.

Table 5.4 - Multi-criteria analysis scores

Facility name	Road Access	Remaining Site Capacity	Soils	Depth to Groundwater	Surface Water	Flood Hazard	Airport Safety	Land Ownership	Habitat Value	Visual Impacts	Downwind Impacts	Current Landfill Size (ha)	Available Space for Separating/Stockpiling	Annual MSW Tonnage (current)	Town Population	Possibility for Extension	Average Driving Distance to Other Facilities in Region	**Total**	**Rank**
Koorda Landfill (Existing)	20	8	25	18	70	70	80	40	30	20	15	32	8	20	24	5	15	**500**	**7**
Koorda Landfill (New)	14	40	35	30	49	70	80	40	30	14	15	32	80	20	20	25	15	**609**	**3**
Mt Marshall - Bencubbin landfill	20	24	25	30	49	70	80	20	30	20	9	32	56	16	24	35	25	**565**	**5**
Mt Marshall - Beacon Landfill	18	80	25	30	35	56	80	20	30	20	15	8	8	12	16	35	10	**498**	**8**
Mukinbudin Landfill	18	80	5	30	35	70	80	40	30	18	15	40	80	28	32	35	20	**656**	**2**
Nungarin Landfill	20	80	35	30	35	70	80	40	30	20	15	8	24	16	16	35	20	**574**	**4**
Trayning - Kununoppin Landfill	20	8	25	18	35	70	8	40	30	20	15	16	40	4	12	15	25	**401**	**9**
Trayning - Trayning Landfill	0	0	0	0	0	0	0	0	0	0	0	48	0	12	16	0	20	**96**	**10**
Trayning - Yelbeni Landfill	20	16	25	18	35	70	80	40	30	20	15	32	64	4	4	25	25	**523**	**6**
Wyalkatchem Landfill	20	64	25	30	70	70	80	40	30	18	15	72	80	24	32	40	35	**745**	**1**

5.2.3 *Multi-criteria analysis results*

Table 5.4 reveals the rankings of the NEWROC landfills. Of the eligible landfills (shaded green), Wyalkatchem has the most suitable landfill, followed by the new Koorda site, Mt Marshall's Bencubbin site, Trayning's Yelbeni site and Mt Marshall's Beacon landfill.

For the purposes of this report, the new Koorda site has been "knocked-out" because the costs related to setting up the site as a landfill are unquantifiable at this stage of its development. It is understood that DWER has asked the Shire to complete a Flora and Fauna Survey of the site. In addition, the site may require a hydrogeological survey and other site assessments, together with the infrastructure required to establish the site. The costs of these works could easily be in excess of $250,000.

Trayning's Yelbeni landfill has been "knocked-out" on account of its close proximity to the Wyalkatchem landfill. From ASK's experience and common-sense logic, it would not make sense to have two regional sites so close together, especially when Wyalkatchem landfill had a significantly higher score.

Similarly, the Beacon landfill within the Shire of Mt Marshall has been "knocked-out" due to its remoteness in relation to the other facilities in the region (see **Figure** 3.1 for map of landfill sites).

From the results of the multi-criteria analysis and the extra common sense "knock-outs", the following has been deduced:

- Wyalkatchem landfill and Bencubbin landfill are the most suitable sites for the regional landfills mentioned in Options 2 and 3 (See **Sections 6.1.3** and **6.1.4**)
- Wyalkatchem landfill is the most suitable site for the single regional landfill described in Option 4 (See **Section 6.1.5**)

Before conducting the desktop assessment of landfills, ASK proposed three staffed landfill sites for Options 2 and 3. However, after analysing the results, it became clear that two sites would be adequate to service the NEWROC region.

Wyalkatchem landfill scored almost 100 points higher than the next landfill (Mukinbudin – 'failed' fatal flaw test) making it a clear winner for Option 4 which proposes the establishment of one staffed regional landfill site that would service all commercial entities in the region. Option 4, as described in **Section 6.1.5**, requires all other landfill sites to be converted into transfer stations. **Section 6.3** discusses the additional transportation costs that accompanies this option.

6 FUTURE STRATEGY ASSESSMENT

6.1 OPTIONS ASSESSMENT

ASK has identified five potential options available to the NEWROC:

- Option 0: No change (Baseline)
- Option 1: All landfills fitted with remote access
- Option 2: All landfills fitted with remote access plus two staffed landfills
- Option 3: All transfer stations fitted with remote access plus two staffed landfills
- Option 4: All transfer stations fitted with remote access plus one staffed regional landfill

The following section will break down each option including the capital and operational expenditures, transport costs, revenue streams and cessation of existing costs.

See **Appendix A** for a full breakdown of costs.

6.1.1 Option 0: No change

If no change was to be implemented, the current situation in the NEWROC region would remain the same; every Shire would operate their waste facility independently with varying levels of operational capacities, planning and budgets. **Table** 6.1 indicates the costs associated with waste facilities in the NEWROC region in its current state. This is considered the baseline for the other options.

Table 6.1 - Baseline economic analysis

		Facility cost		Transport
Facility	Capital	Operational	Annualised Capex & Opex	N.A.
Collection truck mobilisation				
Koorda Landfill (Existing)		14,000	14,000	
Mt Marshall - Bencubbin landfill		19,436	19,436	
Mt Marshall - Beacon Landfill		12,851	12,851	
Mukinbudin Landfill		25,000	25,000	
Nungarin Landfill		12,000	12,000	
Trayning - Kununoppin Landfill		15,000	15,000	
Trayning - Yelbeni Landfill		15,000	15,000	
Wyalkatchem Landfill		32,000	32,000	
NEWROC TOTAL		**145,287**	**145,287**	
		TOTAL ANNUAL COST		**145,287**

Additional Revenue		Income		
Commercial' waste gate fee income		-		

Net income		-145,287		

There are no capital expenditures necessary for this option. All landfills are operational in their current state. This current state, however, lends itself to an environmentally dangerous legacy and the forfeiture of potential funds. Economically, the NEWROC region's waste facilities are presently running at a loss of approximately $145,000.

As will be discussed in Options 2, 3 and 4, the introduction of staffed facilities and gate fees would allow NEWROC to charge for the use of their waste facilities. This would generate income for the NEWROC Shire councils and cover the cost of maintaining the waste facilities, as well as reducing the unfair financial burden

of compliance and closure costs on the rate paying portion of landfill users (who currently fund all the costs associated with landfills in the region).

Currently, waste is not being transferred between Shires. Avon Waste services each Shire individually and occasionally directs waste to one landfill within the Shire (e.g. Shire of Trayning, where all waste is directed to the Yelbeni facility). This current strategy does avoid transport costs, however, in the long term, creates a disparate and individualised system that increases environmental risks, regulatory non-compliance and operational costs since each facility must be maintained separately.

6.1.2 Option 1: All landfills with remote access

Option 1 requires all landfills to be converted into fenced and monitored landfills with a remote access system. All landfills would be eligible for this option. As described in **Section 2.1**, a remote access system would be set up at each landfill that would include an automated sliding gate, an electronic key/keypad to open the gate, and a CCTV camera monitoring the entrance. **Table** 6.2 outlines the estimated costs of Option 1 for each facility.

Table 6.2 - Option 1: All landfills with remote access economic analysis

	Facility cost			Transport
Facility	Capital	Operational	Annualised Capex & Opex	N.A.
Collection truck mobilisation				-
Koorda Landfill (Existing)	39,000	18,371	20,971	-
Mt Marshall - Bencubbin landfill	24,000	23,807	25,807	-
Mt Marshall - Beacon Landfill	24,000	17,222	19,222	-
Mukinbudin Landfill	24,000	29,371	31,371	
Nungarin Landfill	24,000	16,371	18,371	-
Trayning - Kununoppin Landfill	39,000	19,371	21,971	
Trayning - Yelbeni Landfill	31,500	19,371	21,671	
Wyalkatchem Landfill	24,000	36,371	38,371	-
NEWROC TOTAL	**229,500**	**180,255**	**197,755**	
			TOTAL ANNUAL COST	**197,755**

Additional Revenue		Income		
Commercial' waste gate fee income		-		

Net income		-197,755		

The annual cost for the NEWROC to have remote access at all the landfills would be approximately $200,000. This includes all the operational costs and the amortised capital costs. The capital expenditure of setting up each landfill with a remote access system has been costed at approximately $21,000. This figure accounts for:

- The design and approvals (licencing) process;
- Any necessary groundworks (level site);
- Any chain-link fencing (at entrance of facility) if required;
- Any additional 1.8m stock fencing needed (around remaining perimeter of drop off area);
- Signage to indicate new procedure for customers;
- An automated access gate;

- The access and CCTV system (single camera); and
- Installation of the gate and access/CCTV system.

Option 1 does not require any transport between facilities, nor does it generate any revenue streams or savings for the NEWROC.

Option 1 does not cater to commercial customers as access would only be given to rate-paying residents for the disposal of domestic waste. Therefore, commercial waste (C&I and C&D) generated in the region would have to be transported by the waste generator to landfills outside the NEWROC region.

Option 1 is problematic unless paired with other strategies, as evidenced in Options 2, 3 and 4.

6.1.3 Option 2: All landfills with remote access plus two staffed landfills

Option 2 was originally defined to include three staffed landfills, however, once the assessment of the landfills had been completed, the result showed that of the landfills that passed the fatal flaw assessment, there would be no benefit to include three facilities (see **Section 5**).

Therefore Option 2 includes the staffing of two landfills in conjunction with Option 1 (all landfills fitted with a remote access system). As described in **Section 2.3**, introducing two staffed landfills in the NEWROC region would require the construction of a gatehouse with appropriate amenities (including a GenSet to provide air-conditioning and power) and additional staff who would work at least three half-days per work week at the two staffed facilities. **Table** 6.3 outlines the estimated costs of Option 2 for each facility.

Table 6.3 - Option 2: All landfills with remote access plus two staffed landfills economic analysis

	Facility cost			Transport
Facility	Capital	Operational	Annualised Capex & Opex	N.A.
Collection truck mobilisation				
Koorda Landfill (Existing)	39,000	18,371	20,971	
Mt Marshall - Bencubbin landfill (staffed)	41,130	52,647	56,163	
Mt Marshall - Beacon Landfill	24,000	17,222	19,222	
Mukinbudin Landfill	24,000	29,371	31,371	
Nungarin Landfill	24,000	16,371	18,371	
Trayning - Kununoppin Landfill	39,000	19,371	21,971	
Trayning - Yelbeni Landfill	31,500	19,371	21,671	
Wyalkatchem Landfill (staffed)	41,130	65,211	68,727	
NEWROC TOTAL	**263,760**	**237,935**	**258,466**	
		TOTAL ANNUAL COST		**258,466**

Additional Revenue		Income		
Commercial' waste gate fee income		298,721		

Net income		40,255		

The annual net income for the NEWROC to have remote access at all the landfills, and two landfills being staffed part-time would be approximately $40,000. This includes all the operational costs and the amortised capital costs (approximately $260,000) and income from gate fees at approximately $300,000 per year (see **Section 6.2** for details of the gate fee income).

The capital expenditure to fit all landfills with a remote access system is the same as in Option 1.

Option 2 requires added capital expenditure at the two staffed landfills to:

- Purchase and install
    1. 3m x 4m Gatehouse (second hand)
    2. Boom gate
    3. 3KW Generator for gatehouse a/c and computer

Option 2 also has associated operational costs including:

- Site staff (gatehouse operator) for three half-days per week for each staffed landfill
- Electronic waste records system (waste records and finance)

Since commercial traffic would be directed to the two staffed landfills, the NEWROC would be able to collect gate fees and generate an income from the waste disposed by these commercial entities. Rate-paying residents would still have access to their local landfill via the remote access system.

6.1.4 Option 3: All transfer stations with remote access plus two staffed landfills

Option 3 requires the same as Option 2 (All sites with remote access and three landfills staffed) but all non-staffed sites are converted to transfer stations. A transfer station, as described in **Section 2.2**, does not store waste. As the name suggests, residential waste deposited at a transfer station would be collected and transferred to one of the two staffed landfills for disposal.

Table 6.4 outlines the estimated costs of Option 3 for each facility.

Table 6.4 - Option 3: All transfer stations with remote access plus three staffed landfills economic analysis

	Facility cost			Transport	
Facility	Capital	Operational	Annualised Capex & Opex	Weekly collection	Fortnightly collection
Collection truck mobilisation				29,120	14,560
Koorda Transfer Station (Existing)	94,270	10,371	16,715	9,360	4,680
Mt Marshall - Bencubbin Landfill (staffed)	41,130	47,211	50,727		
Mt Marshall - Beacon Transfer Station	94,270	10,371	16,715	16,640	8,320
Mukinbudin Transfer Station	94,270	10,371	16,715		
Nungarin Transfer Station	94,270	10,371	16,715	19,760	9,880
Trayning - Kununoppin Transfer Station	94,270	10,371	16,715		
Trayning - Yelbeni Transfer Station	94,270	10,371	16,715		
Wyalkatchem Landfill (staffed)	41,130	47,211	50,727		
NEWROC TOTAL	**647,880**	**156,648**	**201,740**	**74,880**	**37,440**
		TOTAL ANNUAL COST		**276,620**	**239,180**

Additional Revenue		Income		Weekly	Fortnightly
Commercial' waste gate fee income				298,721	298,721

Net income				22,101	59,541

The annual net income for the NEWROC to convert six landfills to transfer stations with remote access and maintain two landfills (staffed part-time) would be approximately $60,000 based on a fortnightly collection of waste from the transfer stations or approximately $20,000 based on a weekly collection of waste from the transfer stations (see **Section 6.3** for details about the transport cost modelling).

This includes all the operational costs and the amortised capital costs (approximately $200,000) and income from gatefees at approximately $300,000 per year (see **Section 6.2** for details of the gatefee income). The

capital expenditure to fit all the transfer stations with a remote access system is $1000 more than in Option 1, as there would be a second camera viewing the transfer station bin area.

No budget has been included for the closure, capping and rehabilitation of the existing landfills. This will be a significant expenditure and is likely to cost $50,000 - $250,000 per hectare, depending on the cap design, availability of capping material and other soils. The capping of a landfill should be progressive, as the site is utilised.

Extra capital expenditure would be required for converting the current landfills into transfer stations. This would involve setting up a front lift bin system (as pictured in **Figure** 2.2) that allows for easy disposal and transportation of waste.

Although Option 3 would incur significant transport costs, there are many benefits to eliminating the number of landfills in the region. The biggest benefit is the reduction in possible environmental contamination from the uncontrolled disposal of waste at unstaffed landfills and there is less chance of an unsafe operational situation occurring.

As in Option 3, commercial customers would be directed to the two staffed landfills, thus allowing gate fees to be collected for this waste stream. Rate-paying residents could have access to their local transfer station and the two landfills via the remote access entry system.

In terms of expenditure, there is an added benefit to having a transfer station instead of a landfill; a transfer station does not require earthworks to excavate new cells nor does it require cover (e.g. soil) to be placed over the waste regularly.

The costs allowed for the establishment of the transfer stations include:

- Develop a facility design
- Gain DWER approvals (licencing)
- Complete groundworks (level site)
- Construct
    1. Hardstand area for placement of waste bins (compacted unsealed)
    2. Ramped and raised platform
- Create stormwater perimeter bunds (earthworks)
- Prepare landscaping
- Fencing the transfer station with 1.8m chain link at the front and 1.8m stock fencing on the other three sides
- Purchase four 6m^3 front lift bins for each transfer station
- Remote access CCTV system (with two cameras)

The capital expenditure for the two staffed landfills includes:

- Purchase and install
    1. 3m x 4m Gatehouse (second hand)
    2. Boom gate
    3. 3KW Generator for gatehouse a/c and computer
- Operational costs including:
    1. Site staff (gatehouse operator) for three half-days per week for each staffed landfill
    2. Electronic waste records system (waste records and finance)

6.1.5 Option 4: All transfer stations with remote access plus one staffed regional landfill

Option 4 is almost identical to Option 3 except that instead of two staffed landfills, there would be only one staffed landfill in the NEWROC region. As described in **Section 2.4**, the regional landfill would be the single point

for all commercial customers to dispose of their waste. All other landfills would be converted into transfer stations, accessible by rate-paying residents, with the waste being transferred to the single regional landfill.

Table 6.5 outlines the cost of converting all landfills to transfer stations except one, which would then be converted into a staffed regional landfill.

Table 6.5 - Option 4: All transfer stations with remote access plus one staffed regional landfill economic analysis

	Facility cost			Transport	
Facility	Capital	Operational	Annualised Capex & Opex	Weekly collection	Fortnightly collection
Collection truck mobilisation				22,880	11,440
Koorda Transfer Station (Existing)	94,270	10,371	16,715		
Mt Marshall - Bencubbin Transfer Station	94,270	10,371	16,715		17,680
Mt Marshall - Beacon Transfer Station	94,270	10,371	16,715		
Mukinbudin Transfer Station	94,270	10,371	16,715	40,560	
Nungarin Transfer Station	94,270	10,371	16,715		12,480
Trayning - Kununoppin Transfer Station	94,270	10,371	16,715		
Trayning - Yelbeni Transfer Station	94,270	10,371	16,715		
Wyalkatchem Regional Landfill	41,130	47,211	50,727	-	-
NEWROC TOTAL	**701,020**	**119,808**	**167,728**	**63,440**	**41,600**
		TOTAL ANNUAL COST		**231,168**	**209,328**

Additional Revenue			Income	Weekly	Fortnightly
Commercial' waste gate fee income				298,721	298,721

Net income				67,553	89,393

The annual net income for the NEWROC to convert seven landfills to transfer stations with remote access and maintain a single landfill (staffed part-time) would be approximately $90,000 based on a fortnightly collection of waste from the transfer stations or approximately $65,000 based on a weekly collection of waste from the transfer stations (see **Section 6.3** for details about the transport cost modelling).

Option 4 requires the same capital and operation costs as Option 2, however, these costs would only need to be spent on one facility, instead of two. The remaining landfills would be converted into transfer stations, as discussed in Option 3.

Although increasing transport costs, a single regional landfill allows for a consolidated, economical approach to waste management. All commercial customers would be directed to the single facility, potentially extending the transport time for commercial customers located far from the single facility's location. Similarly, all waste disposed at the transfer stations would need to travel to the one central location.

Option 4 also allows for costs to be centralised in one location; only one facility would require staff, a gatehouse, and operational attention (e.g. cell excavation and daily cover). This would save money in the long-term and allow for a concentrated effort in one location instead of spreading the responsibility and expenditure over several facilities.

In the landfill assessment, the Wyalkatchem landfill was ranked first, therefore it has been used for the modelling. However, this will result in a round trip of approximately 250km to bring commercial wastes from Beacon. Therefore, ASK has also modelled the transport costs if the Regional Landfill was located at Bencubbin, and the difference was negligible (approximately $1,500 per year).

6.2 GATE FEE QUANTITIES AND INCOME

Once facilities are staffed, gate fees can be collected for the waste that is received. Currently no gate fees are collected, so any commercial waste (which includes the waste types Commercial & Industrial (C&I) and Construction & Demolition (C&D)) incurs no fee and the cost of operating the landfills is paid for from Council rates.

Option 2, 3 and 4 all include staffed facilities for the receival of commercial wastes and the collection of gate fees.

6.2.1 Gate fees

Gate fees should be based on the whole of life (WoL) cost to operate a landfill, which includes asset depreciation, operations, closure and post closure monitoring cost. This can be broken down to a cost per tonne (or cubic metre) and can be used to develop an equitable gate fee structure for the facility's customers, while ensuring all current and future costs can be fully funded from the revenue sources.

The WoL modelling can be expanded to include all waste services (e.g. waste collection, recycling programmes, etc) to provide a clear understanding of the NEWROC Shire's financial position and allow it to plan for the future.

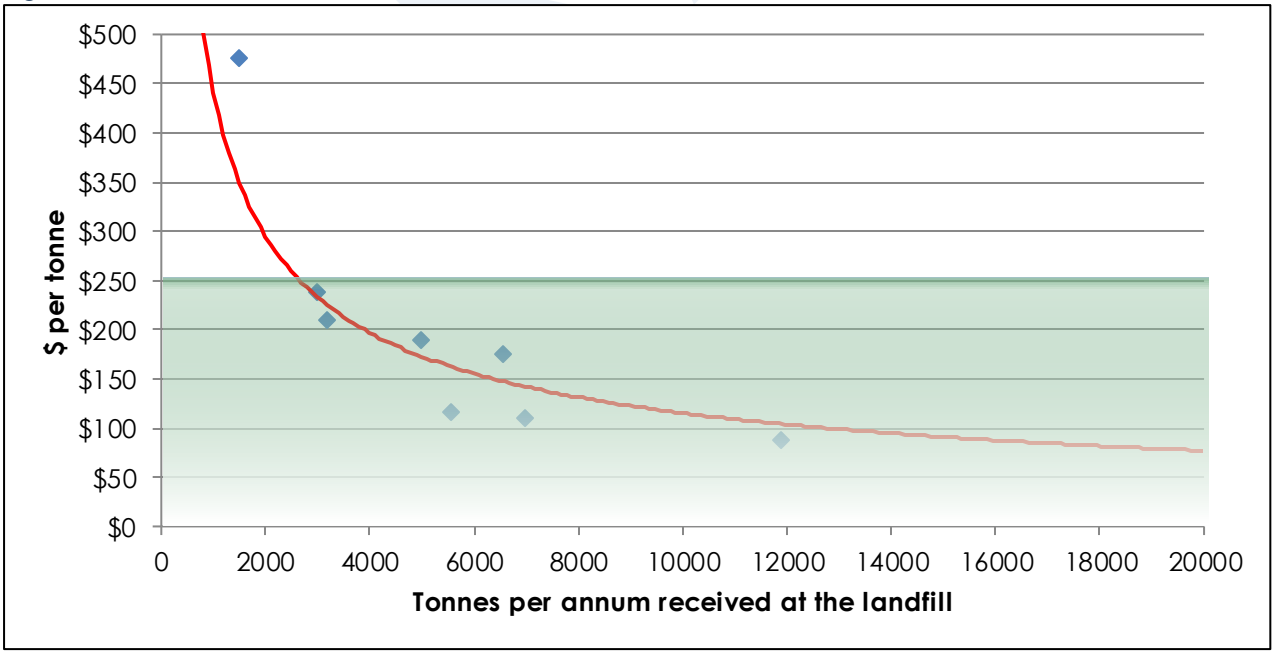
The capital and operational cost for the transfer stations, together with waste transport cost, would also be calculated, thus allowing an estimate to be made for the annual cost for each Shire to provide the waste services to their communities.

Once the full costs have been determined, the NEWROC can decide how to recover these costs through:

- Commercial waste gate-fees
- Waste management rates / levy
- Other sources of income / rate

Completing a whole of life analysis was not included in this project, however, based on the other landfills that ASK has assessed over the last decade, **Figure** 6.1 below provides an indication of the likely breakeven WoL costs for landfills with a variety of throughput, and this suggests that a compliant landfill with a throughput of approximately 3,000tpa would have a breakeven cost of $250 per tonne.

Figure 6.1 Whole of life costs for rural landfills in WA



Given that the introduction of gate fees in the region will result in a significant change for some organisations, ASK has modelled the revenue based on a modest gate fee of $35 per cubic metre (approximately $125 per

tonne), this would need to be increased over the following years to a gate fee of $60 per cubic metre or more to achieve breakeven. Whole of Life cost modelling would define the required gate fee more precisely.

6.2.2 *Quantity of commercial wastes*

It has been estimated that approximately 2,500 tonnes of commercial waste would be received at the staffed facilities each year. This is based on the assumptions that:

- All residential waste (MSW) would not be charged at the gate fee, as the cost is received via the Council rates
- 40 percent of the C&I waste generated in the region is collected via the 240L MGB kerbside collection or via a front lift collection contract with Avon Waste
- Half of the remaining C&I waste would be falsely declared as residential waste to avoid paying a gate fee (i.e. disposed of by residents with businesses that would use access the facilities with their 'pass' and avoid any fees.)
- All C&D waste would be delivered at the staffed facilities and incur a gate fee.

Table 6.6 - A summary of wastes that would incur a gate fee charge and the revenue generated

	NEWROC TOTAL	Koorda	Mt Marshall	Mukinbudin	Nungarin	Trayning	Wyalkatchem
MSW (tpa)	1,320	210	260	280	130	180	260
C&I (tpa)	1,320	210	260	280	130	180	260
C&D (tpa)	2,090	330	420	440	210	280	410
Total (tpa)	**4,730**	**750**	**940**	**1000**	**470**	**640**	**930**
Total commercial (C&I and C&D) waste (tpa)	3,410	540	680	720	340	460	670
C&I waste leakage (tpa)	470	79	90	105	51	56	91
C&I kerbside collected waste (tpa)	379	53	80	70	29	68	79
Remaining C&I and C&D waste (tpa)	2,560	409	510	545	261	336	501
Revenue from gate fees ($ per annum)	**298,721**	**47,669**	**59,510**	**63,555**	**30,404**	**39,182**	**58,402**

Therefore, given the estimated 2,560 tonnes of commercial waste expected to be received at the staffed facilities, combined with a 'below breakeven' initial gate fee of $35 per cubic metre, the NEWROC shires should expect to collect approximately $300,000 per annum in gate fee revenue.

6.3 WASTE TRANSPORT RATIONALE

The waste dropped off at the transfer stations in Options 3 and 4 must be transported to the remaining landfill(s). The cost of the transportation of this waste is based on:

- The quantity of MSW waste and C&I 'leakage' waste as calculated in **Table** 4.4
- Waste being collected into 6 cubic meter front lift bins
- A bulk density of 200kg/m^3 for the front lift bins (therefore each bin holding 1.2 tonnes of waste)
- Waste collected by a compaction front lift truck with a capacity to collect 16 of the 6m^3 bins
- A cost of $2.00 per km for truck movements

- Collection truck mobilising from and back to Northam

The routes used to model each option are shown in **Appendix B**. ASK liaised with Avon Waste and the distance shown are a 'worst case scenario' as Avon Waste would aim to combine the collections with other services and thus reduce the transport cost.

6.3.1 *Transport cost for two staffed landfills (Option 3)*

The cost to transport the waste from the six transfer stations to the staffed landfills at Bencubbin and Wyalkatchem is shown in **Table** 6.7, the cost based on a weekly collection of the waste is approximately $75,000 per year, and for a fortnightly collection it would be a cost of approximately $40,000 per year.

Table 6.7 - Transportation costs for Option 3 – Two staffed landfilled

Description	No. of 6m3 bins per wk	Kms per run	No of bins per route	Transport cost per route	Annual cost for weekly collection	Annual cost for fortnightly collection
Mobilisation		280		560	29,120	14,560
Koorda	2.7	90	2.7	180	9,360	4,680
Bencubbin	0.0	0	0			
Beacon	1.1	160	4.6	320	16,640	8,320
Mukinbudin	3.6					
Nungarin	1.8	190	3.1	380	19,760	9,880
Kununoppin	0.4					
Yelbeni	0.9					
Wyalkatchem	0.0	0	0			
TOTALS	**10.3**	**720.0**	**10.3**	**1,440**	**74,880**	**37,440**

6.3.2 *Transport cost for one staffed landfill (Option 4)*

The cost to transport the waste from the seven transfer stations to a single staffed landfill at either Bencubbin or Wyalkatchem is shown in **Table** 6.8. The cost based on a weekly collection of the waste is approximately $65,000 per year, and for a fortnightly collection is would be a cost of approximately $40,000 per year.

For this option, a fortnightly collection requires the collection truck to return to the landfill and empty once during each collection run as the truck would become full before visiting all the transfer stations.

Table 6.8 - Transportation costs for Option 3 – One staffed landfilled

Description	No. of 6m3 bins per wk	Kms per run (weekly)	No of bins per route	Transport cost per route	Annual cost for weekly collection	Kms per run (fortnightly)	Annual cost for fortnightly collection
Mobilisation		220		440	22,880	220	11,440
Koorda	2.7	390	11.9	780	40,560	340	17,680
Bencubbin	1.6						
Beacon	1.1						
Mukinbudin	3.6					240	12,480
Nungarin	1.8						
Kununoppin	0.4						
Yelbeni	0.9						
Wyalkatchem	N.A.						
TOTALS	**11.9**	**610**	**11.9**	**1,220**	**63,440**	**800**	**41,600**

The transport cost based on the single landfill being located at Bencubbin was also modelled to check the sensitivity of the landfill's location, however the transport cost only differed by $1,500 per year, which is negligible.

6.4 FINANCIAL MODELLING RESULTS – ALL OPTIONS

The financial results from each option have been summarised in **Table** 6.9, the final column shows the net annual income for each option based on the operational costs and the expected revenue from gate fees, note this does not include the amortised capital costs.

This shows that Option 0 (current baseline situation) is costing the NEWROC Shires approximately $145,000 per year and Option 1 would cost approximately $180,000 per year.

However, the approximate annual income generated by Option 2 is $60,000 per year, Option 3 is $65,000 - $105,000 and Option 4 is $115,000 - $140,000.

Table 6.9 - Financial summary for each option

Option	Capital	Operational	Annualised Capex & Opex	Transport	Opex and transport	Revenue (from gate fees)	Net annual income (exc capex amortisation)
Option 0: Baseline cost of current operation	-	145,287	145,287	-	145,287	-	**-145,287**
Option 1: All landfills unstaffed with remote access	229,500	180,255	197,755	-	180,255	-	**-180,255**
Option 2: All landfills with remote access plus two staffed landfills	263,760	237,935	258,466	-	237,935	298,721	**60,786**
Option 3: All transfer stations with remote access plus two staffed landfills - weekly collection	647,880	156,648	201,740	74,880	231,528	298,721	**67,193**
Option 3: All transfer stations with remote access plus two staffed landfills - fortnightly collection	647,880	156,648	201,740	37,440	194,088	298,721	**104,633**
Option 4: All transfer stations with remote access plus one staffed regional landfill - weekly collection	701,020	119,808	167,728	63,440	183,248	298,721	**115,473**
Option 4: All transfer stations with remote access plus one staffed regional landfill - fortnightly collection	701,020	119,808	167,728	41,600	161,408	298,721	**137,313**

6.5 ENVIRONMENTAL, COMPLIANCE AND SOCIAL ASSESSMENT

The assessment of the four options allows NEWROC to obtain a more comprehensive understanding of the associated Environmental, Compliance and Social risks with each of the options.

The Environmental Assessment considers how the options may impact the natural environment on issues such as air quality, surface and groundwater, along with impacts on land. The Compliance Assessment considers how the options address current regulations, approvals and guidelines while the Social Assessment considers implications on residents, employment, potential complaints and public safety. A summary of the implications for each option is provided in **Table** 6.10.

Table 6.10 - Options assessment matrix (Environmental, Compliance and Social)

Option	Environmental	Compliance	Social
Baseline/Current	Risks to pollute groundwater, surface water and litter adjoining lands. Risks of air pollution from fires and Green House Gas emissions. Risks of many unlined landfills with little rehabilitation. A legacy of uncontrolled landfills results in an unknown and potentially high risk to the environment, as there will have been no control or records about the wastes that have been landfilled. Thus, could contain chemical drums, used engine oil, etc that once the containers rust can impact soil and groundwater	Lack of control for waste acceptance. No oversight of waste disposal activities. Some sites are sprawling and lack any capping or rehabilitation which may not be funded. While this project has not included a regulatory compliance audit, there are many non-compliances with the Rural Landfill Regulations (see **Appendix C**). Correcting these for all the sites will be very costly	There is an equity issue with residential rates paying for the disposal of commercial waste. There is the perception of a 'free' service. There is expected uncontrolled use of facilities for the disposal of wastes generated outside the NEWROC region. There is little opportunity for recycling. There are significant safety risks to the facility users i.e. trips, injuries, disease etc
Option 1: (All Landfills with remote access)	Similar to Baseline. May be some reduced risks due to controlling access. An increased risk of waste dumping from commercial operators or out of region users.	This option restricts who enters the sites. Does not restrict waste types disposed. May eliminate all 'out of area' waste. Improved control over where waste is placed (two camera system). While this project has not included a regulatory compliance audit, there are many non-compliances with the Rural Landfill Regulations (see **Appendix C**). Correcting these for all the sites will be very costly	Possible community complaint due to restricting uncontrolled access. No landfilling option for C&I and C&D wastes generated in the region which would no doubt create backlash. However, may control some commercial operators. Improved recycling opportunities but dependant on user's initiative. No additional employment.
Option 2: (Option 1 plus two staffed Landfills)	Improved management of two (as opposed to eight landfills). Associated reduced risk to air, water and land pollution. Potentially an increased risk of illegal waste dumping from commercial operators or out of region users.	Improved level of compliance possible with staffed landfills. Restricts who enters the sites. Does not restrict waste types disposed at unmanned sites. May eliminate all 'out of area' waste. Improved control over where waste is placed with staffed and two camera system NB Transfer stations have two cameras while landfills have only one.	Improved employment opportunities. Should eliminate the majority of those obtaining use without paying i.e. non ratepayers. May not control some commercial operators. Further improved recycling opportunities with staffed sites to direct users. Provides two landfills for the disposal of C&I and C&D wastes generated in the region, thus a landfill within 50km for most residents.

Option	Environmental	Compliance	Social
		Reduces the number of landfills that need to achieve regulatory compliance, thus less non-compliance risk and cost.	
Option 3: (Transfer stations and two staffed Landfills)	Major improvement with the closure of six landfills and replaced by transfer stations thereby reducing potential adverse environmental impact. Potentially an increased risk of illegal waste dumping from commercial operators or out of region users.	Improved management of two landfills with a greater level of compliance possible at all sites. Transfer stations have minimal environmental issues. Possible odour problems at transfer stations depending on frequency of collections. Reduces the number of landfills that need to achieve regulatory compliance, thus less non-compliance risk and cost.	Same opportunities as Option 2. Provides two staffed landfills for the disposal of C&I and C&D wastes generated in the region, therefore if the landfills are at Wyalkatchem and Bencubbin the transport of waste from other towns should be within 50km one way.
Option 4: (Transfer stations and one staffed Landfill)	Best option for minimising all environmental risks. Only one landfill has potential to impact the environment. Closing and rehabilitating all other sites also reduces ongoing environmental risks. Potentially an increased risk of illegal waste dumping from commercial operators or out of region users.	Significant improvement opportunity to address compliance issues. With one landfill, resources can focus on all compliance issues for design and operations while transfer stations have minimal risks. The improved economies of scale would result in more cost-effective compliance measures being implemented.	Improved employment opportunities. Most equitable option with Commercial operators paying for actual use. Likely complaints from Commercial operators due to some distances to the single regional landfill. Improved public safety at all sites. Same opportunities for improving recycling as Option 3. Provides one regional landfill for the disposal of C&I and C&D wastes generated in the region, so if the landfill is at Wyalkatchem the transport of waste from Beacon and eastern towns would be more than 100km one way.

7 CONCLUSIONS

Based on the information provided, assessments and modelling completed for this project, the following key conclusions can be made:

- There are now viable options available for NEWROC to make equitable changes to benefit ratepayers.
- It is becoming clear that Federal and State Governments have an increasing focus on regulatory compliance with waste operations for improved environmental outcomes which will have a flow on effect to Local Government. For example, the Office of the Auditor General (WA) has started looking at service delivery by local governments, with the following criteria:
    - Are waste services planned to minimise waste and meet community expectations?
    - Do local governments deliver effective waste services?
    - Does the State Government provide adequate support for local waste planning and service delivery?
- If the NEWROC Shires are proactive in improving their waste facilities, this will show the regulator there is already an action plan in place and reduce the likelihood of DWER setting the actions to achieve compliance.
- It is in the best interests of NEWROC and its residents to take immediate steps on improving the current operations by adopting one of the Options. The current system of uncontrolled access to landfills has significant risks and possible long term environmental and financial legacies.
- The report contains sufficient data for NEWROC to look at other options and understand the likely costs and implications.
- Should NEWROC choose to change the current system then the community needs to be adequately engaged to ensure there is an understanding and acceptance of the change.

7.1 CURRENT SITUATION

- The nine waste facilities across the NEWROC region are registered, however, none are gated or manned. This had led to the common challenges of commercial waste being dumped (sometimes illegally), non-residents dumping at the sites, and difficulties in maintaining site compliance.
- The provision of nine waste facilities to a community of less than 3000 people is above the 'norm' for effective rural waste services.
- No gate fees are being recovered, therefore residential rates are subsidising commercial waste disposal from businesses, organisations and State departments located in the region.
- There is very little data about the waste types or quantities received at each Facility. Therefore, there is no information for the Shires to make informed operational and strategic decisions.

7.2 DESKTOP LANDFILL ASSESSMENT

- Based on a fatal flaw assessment of the 10 potential sites for future development as regional facilities only five sites passed, as shown in **Table** 7.1

Table 7.1 - Fatal flaw test results

Facility name	Pass/Fail	Reason
Koorda Landfill (Existing)	Fail	<5 years of capacity remaining
Koorda Landfill (New)	Pass	
Mt Marshall - Bencubbin landfill	Pass	
Mt Marshall - Beacon Landfill	Pass	
Mukinbudin Landfill	Fail	Less than 2m to bedrock
Nungarin Landfill	Fail	Less than 2m to bedrock
Trayning - Kununoppin Landfill	Fail	<1km from airport/aerodrome
Trayning - Trayning Landfill	Fail	Closed
Trayning - Yelbeni Landfill	Pass	
Wyalkatchem Landfill	Pass	

- The results of the multi criteria analysis (MCA) of the landfills that passed the fatal flaw assessment, ranked the remaining landfills as follows:
    1. Wyalkatchem site
    2. New Koorda site,
    3. Mt Marshall's Bencubbin site,
    4. Trayning's Yelbeni site
    5. Mt Marshall's Beacon landfill.
    - However, the new Koorda site has been "knocked-out" because the costs related to setting up the site as a landfill are unquantifiable but could easily be in excess of $250,000.
    - Trayning's Yelbeni landfill has been "knocked-out" on account of its close proximity to the Wyalkatchem landfill, which had a significantly higher score.
    - Similarly, the Beacon landfill within the Shire of Mt Marshall has been "knocked-out" due to its remoteness in relation to the other facilities

7.3 OPTIONS ASSESSMENT

- Option 0 (Current baseline situation) and Option 1 (All landfills with remote access) do not allow for the collection of any gate fees and result in negative net annual income between -$145,000 - -$180,000.
- Option 1 does not allow for any commercial waste (C&I and C&D) to be landfilled in the NEWROC region.
- Options 2, 3 & 4 all allow for the collection of gate fees for commercial waste, this is estimated to generate approximately $300,000 of revenue per year, resulting in positive net income as shown in **Table** 7.2.
- Option 4 (fortnightly collection) is modelled as the most financially viable option and would generate approximately $135,000 of net income per year.

Table 7.2 - Financial summary for each option

Option	Capital	Operational	Transport	Revenue (from gatefees)	Net annual income (exc capex amortisation)
Option 0: Baseline cost of current operation	-	145,287	-	-	**-145,287**
Option 1: All landfills unstaffed with remote access	229,500	180,255	-	-	**-180,255**
Option 2: All landfills with remote access plus two staffed landfills	263,760	237,935	-	298,721	**60,786**
Option 3: All transfer stations with remote access plus two staffed landfills - weekly collection	647,880	156,648	74,880	298,721	**67,193**
Option 3: All transfer stations with remote access plus two staffed landfills - fortnightly collection	647,880	156,648	37,440	298,721	**104,633**
Option 4: All transfer stations with remote access plus one staffed regional landfill - weekly collection	701,020	119,808	63,440	298,721	**115,473**
Option 4: All transfer stations with remote access plus one staffed regional landfill - fortnightly collection	701,020	119,808	41,600	298,721	**137,313**

- The baseline situation (Option 0) presents significant environmental risks and impacts and fails to meet regulation compliance for a range of issues. From a social perspective, it does provide free waste disposal, seven days a week. However, it penalises the rate paying residents by using these funds to provide free waste disposal for commercial waste and any waste generated outside the NEWROC region. The current facilities present a significant safety risk to the users.
- The assessment of environmental impacts shows that Options 3 and 4 would provide better outcomes as the other landfills would be closed and transfer stations established, which have a much lower environmental risk and impact. Also, the remaining landfill(s) would be staffed for the receival of commercial waste which will allow for appropriate waste acceptance controls and site management.
- The assessment of regulatory compliance shows that Options 3 and 4 would provide the better outcomes as the other landfills would be closed and transfer stations established, which have less regulatory issues to consider. The remaining landfill(s) would be staffed for the receival of commercial waste which will allow for appropriate site management. The improved economies of scale combined with revenue from gate fees will fund the operations required to achieve full regulatory compliance at the remaining landfill(s).
- From a social perspective, Option 1 fails to provide a waste disposal service for the businesses within the NEWROC region. Option 2 and 3 would provide two landfills for the disposal of commercial waste, while Option 4 would provide a single landfill. For residents, all the options would provide them with access to the current facilities (as landfills or transfer stations), however Option 2, 3 and 4 would ensure a 'producer pays' approach was taken to waste disposal and provide a more equitable outcome for the NEWROC community. Staffed facilities would also provide local jobs and may lead to other recycling positions in the future.
- The adoption of a single landfill at Wyalkatchem (Option 4) would result in commercial waste generated in Beacon requiring a 250km round trip for disposal at the landfill. However, if the landfill was located at Bencubbin, the town farthest away would be Wyalkatchem at a distance of approximately 80km.

8 RECOMMENDATIONS

The report has provided NEWROC with a clear assessment of the options modelled, while many assumptions have been required to allow for the lack of data relating to waste quantities, the results clearly show that adopting either Option 2, 3 or 4 would lead to an environmental, regulatory and economic improvement on the current system.

However, this report is just the start of the process to modernise the waste disposal service in the NEWROC region, and the Shire's made need to consider combinations of facility types that haven't been assessed in options above. This could include the staged transition of facilities from landfill to transfer stations, or future options such as the rationalisation (closure) of some facilities. A more detailed series of recommendation is provided below.

8.1 RECOMMENDED OPTION

Option 3 and Option 4 clearly result in the best economic, environmental and regulatory outcomes. Socially the community are still provided with the same service as they currently receive, but via remotely accessed transfer stations.

Organisations generating commercial waste in the region will have to self-haul or engage a waste collection company to transfer their waste to the staffed landfill(s), which will be a significant change to the current system. These organisations will also have to pay a gate fee for the disposal of their waste, which will introduce an equitable 'producer pays' system. There is a need to engage commercial operators and residents on the reasons and advantages of changing the current system.

While Wyalkatchem landfill ranked highest in the MCA assessment, the site is located in the southwest corner of the region and would result in commercial waste generated in Beacon being transported over 120km to the landfill.

17. *The NEWROC Shires should adopt Option 3 or Option 4 as their future waste disposal strategy.*
18. *Complete a thorough sensitivity analysis with the model (i.e. changes to waste quantities and other assumptions) to determine that the preferred option is consistent under all likely scenarios.*
19. *Ask Avon Waste to review the transport modelling assumptions and rationale.*
20. *The NEWROC Shires should consider and decide to either establish a single staffed Regional landfill at Bencubbin, or two staffed landfills at Bencubbin and Wyalkatchem.*
21. *The NEWROC Shires should agree to set one uniform waste fee (per capita) for the operation of all the facilities and transport of waste between the facilities. This will mean no Shire is disadvantaged, based on the location of the staffed landfills. Essentially this would result in the total cost being divided between the Shires based on their population.*
22. *A maximum quantity of domestic waste per rate payer should be adopted by the NEWROC. For example, all properties with a kerbside collection would be allowed five 6'x4' trailers (or equivalent) per year, while properties with no kerbside collection would have the same, plus the equivalent of 52 x 240L per year. This will help limit the exploitation of C&I waste disposal via residential remote access and provide a limit to assist with enforcement of any significant abuse of this system.*
23. *Should NEWROC adopt one of the Options then a detailed implementation plan should be developed and communicated to residents explaining the reasons for and benefits of the changes.*
24. *The community should be made aware of the need to 'self-police' the remote access facilities. A message used in another rural area that introduced a similar system was "Abuse*

it and you will lose it", meaning if the local community didn't respect the facilities it may be closed.

25. *Complete a Whole of Life cost analysis of the current waste services and the estimated costs for the selected future services to determine the costs and appropriate fees and charges for residential rates and commercial gate fees.*
26. *Operational Management Plans (OMP) should be produced for the transfer stations, a general OMP may be sufficient for all the sites.*
27. *An Operational Management Plan should be produced for the staffed landfill(s).*
28. *Develop or purchase an electronic gatehouse records system for the staffed landfill(s). This would record the commercial waste received and calculate the fee for each load. In addition, as loads were received from the transfer stations and from kerbside collections this would be recorded, thus providing the Shires with an instant record of all the wastes received and transactions.*
29. *Produce Landfill Closure Management Plans (LCMP) for all the landfills as required under the Rural Landfill Regulations. If produced together there should be savings as some of the content would be common for the sites. The LCMP will produce the Shire with the final landform of their landfills, estimated closure costs and a staged filling plan for the landfills that will be staffed in the future.*
30. *All landfills should be surveyed to determine the current landform, this will be required to produce the LCMPs.*
31. *NEWROC should plan to increase the gate fees over the next 3 – 5 years to meet breakeven costs. The breakeven costs would be determined by a Whole of Life cost analysis, it is likely the WoL cost would be between $50 - $70 per cubic metre.*
32. *The data provided by the remote access systems (the user and when used, plus CCTV footage) and the electronic gatehouse records system for the staffed landfill(s), will provide accurate information about when facilities are used and by whom, together with waste quantities brought from each transfer station or remote access landfill to the staffed landfill(s). This information should be reviewed after 18 – 24 months, and the rationalisation of the number of facilities should be considered, based on the frequency of use.*

8.2 FUNDING SOURCES

The potential funding sources that ASK are aware of for this project are listed below.

8.2.1 Waste Authority: Community and Industry Engagement

The Waste Authority has just completed its 2019 round of project funding via the Community and Industry Engagement (CIE) program, this includes:

Stream 1: CIE - Recycling Infrastructure Funding Stream The aim of the CIE Recycling Infrastructure Funding Stream is to support investment in local enabling infrastructure, and in particular recycling infrastructure, to support the achievement of the Waste Strategy's objectives and targets. Priority will be given to infrastructure projects that support recovery and reprocessing of focus materials as described in the Waste Strategy. A maximum $250,000 grant limit applies per project.

For the purposes of this funding stream, infrastructure means physical infrastructure such as plant and equipment to support the sorting and processing of materials collected for recovery and recycling. Projects that are eligible for the CIE - Recycling Infrastructure Funding Stream are:

Projects that support infrastructure which recovers value and resources from focus materials, including plastics, paper and cardboard, organics, construction and demolition waste, metals, glass and textiles.

It is envisaged that recycling infrastructure projects will primarily support the Waste Strategy's recover objective, however projects that support the Waste Strategy's avoid and protect objectives are eligible.

More details can be found at https://www.wasteauthority.wa.gov.au/programs/view/cie

The NEWROC group should liaise with the Waste Authority to define the criteria of this fund stream. Funding should be sought for a project that would include the capital cost to establish the transfer stations with remote access systems, then collect and assess the data these systems will provide (number of users, times of use, etc) and finally produce a report after 12 months of use that would assess the effectiveness of the system, actual costs incurred and any 'lessons learnt'. This will potentially produce a blueprint for a system that could be replicated throughout rural WA generating the same economic, environmental, regulatory and social benefits.

Items that could be included in the funding application could include:

- The capital and installation cost for the transfer stations
- The capital and installation cost for the staffed landfill(s)
- The documentation required to support these facilities (LCMP and OMP)
- Complying and analysing the data from the remote access system and landfill electronic system
- Producing a report after 12 months of operations that would list the 'actual' costs and assess the effectiveness of the project and any lessons learnt.

The funding application most be phrased and written to align with the funding stream's objectives and maximise the likelihood of success.

8.2.2 Building Better Regions Fund (BBRF)

The $841.6 million Building Better Regions Fund (BBRF) supports the Australian Government's commitment to create jobs, drive economic growth and build stronger regional communities into the future.

The fund invests in projects located in or benefiting eligible areas outside the major capital cities of Sydney, Melbourne, Brisbane, Perth, Adelaide, and Canberra.

Round four of this project has just closed, the Federal Government is yet to confirm if there will be a Round five of funding.

Grant funding is available through two funding streams:

- The Infrastructure Projects Stream: Supports projects that involve construction of new infrastructure, or the upgrade or extension of existing infrastructure.
- The Community Investments Stream: Funds community development activities including, but not limited to, new or expanded local events, strategic regional plans, leadership and capability building activities.

The NEWROC Shires should regularly check to see if a fifth round of funding is announced: https://www.regional.gov.au/regional/programs/

8.3 IMMEDIATE NEXT STEPS

This report provides the NEWROC group with a range of viable Options, included cost estimates. However, the implementation of any of the Options recommended will require additional analysis and assessment, the development of an action plan, identification of funding sources and close liaison with the region's community.

The initial steps suggested would ensure the projects detailed assessment are completed and NEWROC are able to select an Option, develop the plan, communicate with the community and seek funding, these steps include:

8. NEWROC provisionally agree to one or more of the Options for further consideration.
9. Complete a more detailed assessment of the preferred Option(s), including:
    a. Ask Avon Waste to review and provide feedback on the transport modelling assumptions, costs and rationale.

b. Complete a sensitivity analysis with the financial model (changes to waste quantities and other assumptions) to quantity these impacts on the validity of the economic results.

10. NEWROC select a preferred Option for implementation.
11. Produce a detailed project plan, with costing and an implementation schedule including most of the recommendations listed above. This will provide the information for the Shires and towards any funding application. The project plan should be developed with consideration of the criteria and information required for any funding stream.
12. Develop and implement a communication plan with the NEWROC community explaining the reasons, benefits and changes to services resulting from the project.
13. Liaise with potential funding stream providers to explain the project benefits and potential for replication throughout rural WA, then complete funding applications.
14. Implement the remainder of the project.

REFERENCES

ASK Waste Management (ASK). 2010-2018. *Recycling Activity Review*. Produced for Waste Authority WA.

Australian Bureau of Statistics (ABS). 2016. *Local Government Census*.

Bolton, Neal. 1995. *The Handbook of Landfill Operations: A practical guide for landfill, engineers, owners and operators*. Blue Ridge Solid Waste Consulting. California, USA.

Watkins, Ian. 2012. *Landfill Assessment and Waste Management Future Strategy*. Produced for North Eastern Wheatbelt Regional Organisation of Councils (NEWROC).

APPENDIX A – BREAKDOWN OF COSTS FOR OPTIONS

Capital and operational cost estimate for remote access system

Item	Unit Cost	Transfer station (two cameras)	Landfill (one camera)
Additional camera	800.00	800.00	
No power available	5,300.00	5,300.00	5,300.00
Pin code entry pad etc	2,500.00	2,500.00	2,500.00
Tracked gate (4m) inc. motor and solar power	6,000.00	6,000.00	6,000.00
Installation of concrete foundation	3,000.00	3,000.00	3,000.00
Contingency at 25%	25%	4,400.00	4,200.00
TOTAL CAPEX		**22,000.00**	**21,000.00**
Amortisation cost (15 years)	15	1,466.67	1,400.00
Operational cost			
OpenALPR subscription per pole (up to 2 cameras)	871	871	871
10 Hours of Remote Assistance	1000	1000	1000
1Tb Internet Access Per Year Per Camera	1000	2000	1000
Gate maintenance	1500	1500	1500
TOTAL OPEX		**5,371**	**4,371**

Capital and operational costs for remote access landfills

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Infrastructure & Equipment purchase (for all sites)							
	Signage	3,000	No.	1	3,000	5	600
	Automated access gates	21,000	m	1	21,000	15	1,400
				Total	**24,000**		**2,000**

Site Specific Costs (Operational and fencing requirements)

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Koorda	Current budget / cost for landfill operations				14,000		14,000
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	200	15,000	25	600
	1.8m stock fencing (remining perimeter of drop off area)	10	m			25	
	Generic cost to install remote access system				24,000		2,000
Koorda Landfill (Existing)				**Total**	**57,371**		**20,971**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Mt Marshall - Bencubbin	Current budget / cost for landfill operations				19,436		19,436
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	0		25	
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		25	
	Generic cost to install remote access system				24,000		2,000
Mt Marshall - Bencubbin Landfill				**Total**	**47,807**		**25,807**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Mt Marshall - Beacon	Current budget / cost for landfill operations				12,851		12,851
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	0		25	
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		26	
	Generic cost to install remote access system				24,000		2,000
Mt Marshall - Beacon Landfill				**Total**	**41,222**		**19,222**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Mukinbudin	Current budget / cost for landfill operations				25,000		25,000
	Operational cost assocated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	0		25	
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		25	
	Generic cost to install remote access system				24,000		2,000
Mukinbudin Landfill				**Total**	**53,371**		**31,371**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Nungarin	Current budget / cost for landfill operations				12,000		12,000
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	0		25	
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		25	
	Generic cost to install remote access system				24,000		2,000
Nungarin Landfill				**Total**	**40,371**		**18,371**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Trayning - Kununoppin	Current budget / cost for landfill operations				15,000		15,000
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	200	15,000	25	600
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		25	
	Generic cost to install remote access system				24,000		2,000
Trayning - Kununoppin Landfill				**Total**	**58,371**		**21,971**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Trayning - Yelbeni	Current budget / cost for landfill operations				15,000		15,000
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	100	7,500	25	300
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		25	
	Generic cost to install remote access system				24,000		2,000
Trayning - Yelbeni Landfill				**Total**	**50,871**		**21,671**

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Wyalkatchem	Current budget / cost for landfill operations				32,000		32,000
	Operational cost associated with remote access				4371		4,371
	Chainlink fencing (at entrance of drop off area)	75	m	0		25	
	1.8m stock fencing (remining perimeter of drop off area)	10	m	0		25	
	Generic cost to install remote access system				24,000		2,000
Wyalkatchem Landfill				**Total**	**60,371**		**38,371**

Capital and operational costs for remote access transfer stations

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Design & Approvals							
	Facility design	20,000	ea	0.2	4,000	30	133
	DWER approvals (licencing)	15,000	ea	1	15,000	20	750
Site establishment							
	Groundworks (level site)	10.00	m2	1200	12,000	20	600
	Drop off apron area (compacted unsealled)	3.50	ea	1200	4,200	20	210
	Allocation for construction of ramped and raised platform	10,000	ea	1	10,000	20	500
	Perimeter bunds (earthworks)	10.00	m	140	1,400	20	70
	Add regional price index for construction	20%	percent	1	9,320		453
Infrastructure & Equipment purchase							
	Transfer containers (6m with lid)	2,500	No.	4	10,000	7	1,429
	Chainlink fencing (at entrance of drop off area)	75	m	30	2,250	25	90
	1.8m stock fencing (remaining perimeter of drop off area)	10	m	110	1,100	26	42
	Signage	3,000	No.	1	3,000	5	600
	Automated access gates	22,000	m	1	22,000	15	1,467
				Capex Total	**94,270**		**6,344**

Operational (exc transport)

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Operational costs for remote access							
	Data management opex and gate maintenance	5,371	No.	1	5,371		5,371
	Shire monitoring and maintenance (estimate)	5,000	No.	1	5,000		5,000
				Opex Total	**10,371**		**10,371**

Capital and operational costs for staffed landfills (Additional cost which are then added to remote access landfill cost)

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Site establishment							
	Perimeter bunds (earthworks)	10.00	m	140	1,400	20	70
	Add regional price index for construction	20%	percent	1	280		14
Infrastructure & Equipment purchase							
	Automated access gates	6,000	m	1	6,000	15	400
	Access and CCTV system	6,100	No.	1	6,100	10	610
	Installation of gates and access system	3,000		1	3,000	15	200
	Chainlink fencing (at entrance of drop off area)	75	m	30	2,250	25	90
	1.8m stock fencing (remaining perimeter of drop off area)	10	m	110	1,100	25	44
	Signage	3,000	No.	1	3,000	5	600
	3m x 4m Gatehouse (second hand, installed)	15,000		1	15,000	15	1,000
	Boom gate	1,500	each	1	1,500	8	188
	3KW Generator for gatehouse a/c and computer	1,500	each	1	1,500	5	300
				Capex Total	**41,130**		**3,516**

Extra Operational (exc transport)

Description	Parameter	Unit cost ($)	Unit	No. of units	Total cost	Life (years)	Annualised cost
Operational costs for remote access							
	Site staff (gatehouse operator)	72,800	FTE	0.3	21,840		21,840
	Electronic waste records system	7,000		1	7,000		7,000
			Opex Total		**28,840**		**28,840**

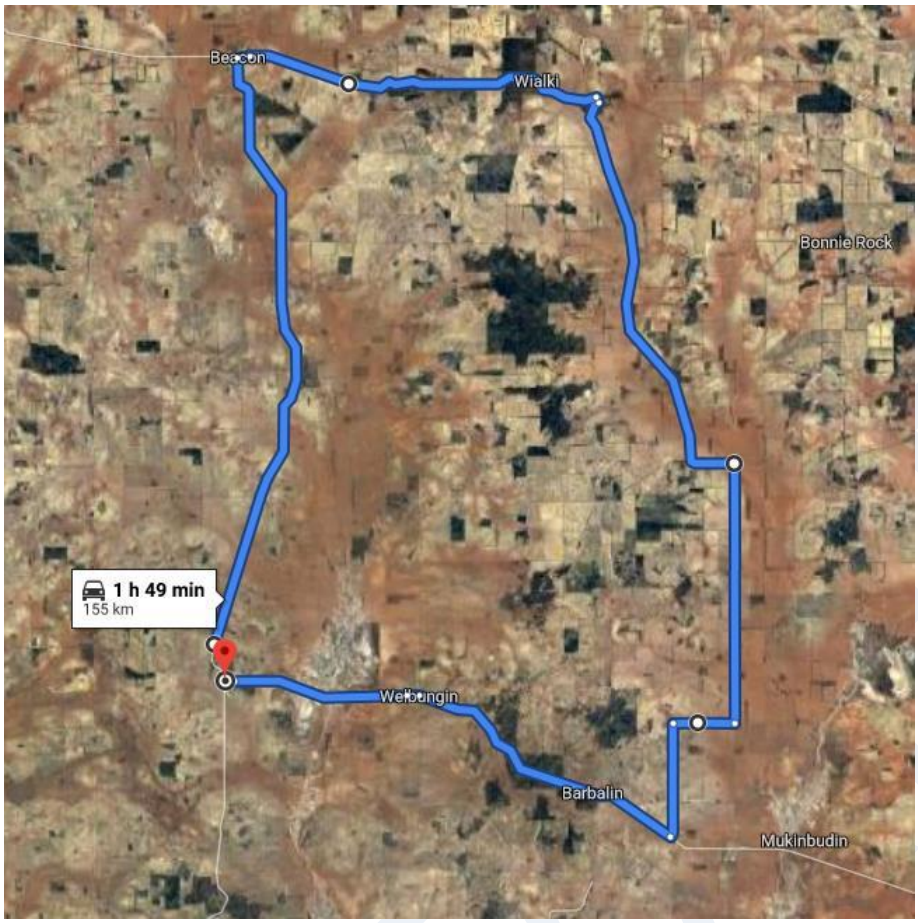
APPENDIX B – MODELLED ROUTES FOR EACH OPTION

TRANSPORT MODELLING FOR TWO LANDFILLS – WYALKATCHEM AND BENCUBBIN

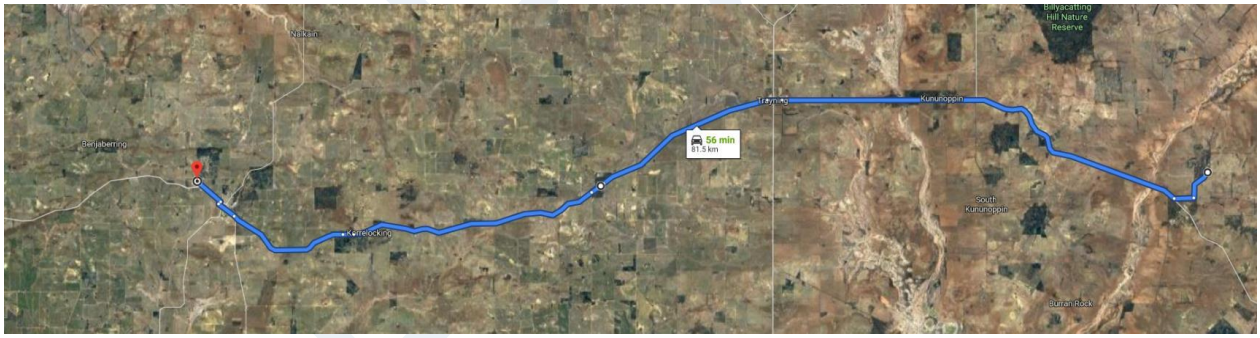
As per advice given by Avon Waste, in a worst-case scenario, a truck would be mobilised from Northam to Wyalkatchem and Bencubbin. This has been built into the financial modelling. The following shows the routes used for the modelling.

Route: Wyalkatchem – Koorda – Bencubbin

Route: Bencubbin – Mukinbudin – Beacon –Bencubbin



Route: Wyalkatchem – Yelbeni – (Trayning) –Kununoppin – Nungarin – Wyalkatchem



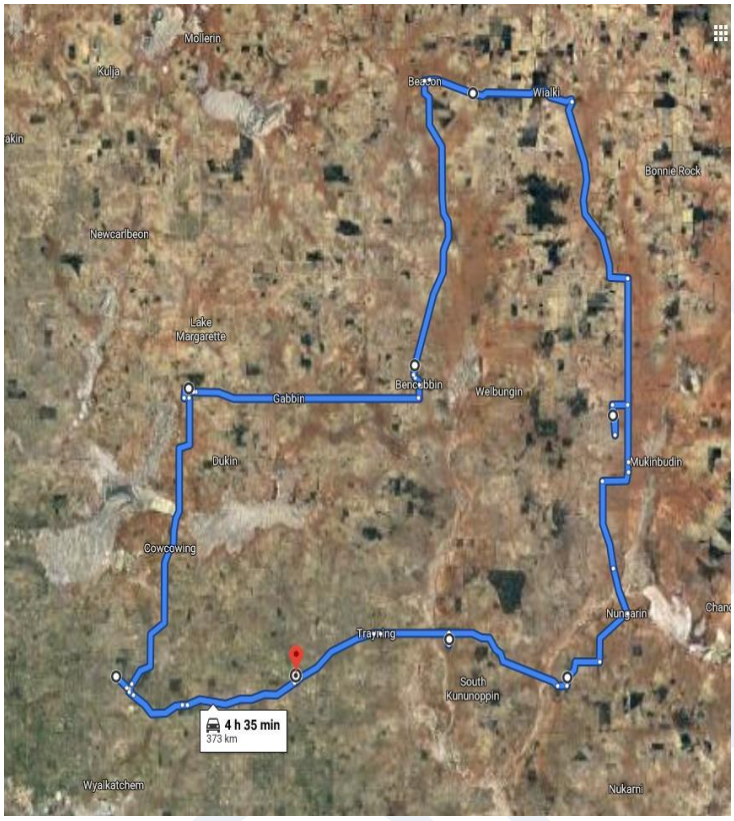
TRANSPORT MODELLING FOR SINGLE REGIONAL LANDFILL – WYALKATCHEM

As per advice given by Avon Waste, in a worst-case scenario, a truck would be mobilised from Northam to Wyalkatchem and back. This has been built into the financial modelling. The following shows the routes used for the modelling.

Route if weekly pickup implemented

If waste is picked up on a weekly basis, a single round trip would be enough to pick up all of the waste.

Wyalkatchem – Yelbeni – Trayning – Kununoppin – Nungarin – Mukinbudin – Beacon – Bencubbin – Koorda – Wyalkatchem



Route if fortnightly pickup implemented

Because of the amount of waste collected in a fortnight, waste could only be picked up by approximately half the facilities before having to be dumped at the Wyalkatchem facility.

Wyalkatchem – Yelbeni – Trayning – Koorda – Bencubbin – Beacon – Wyalkatchem

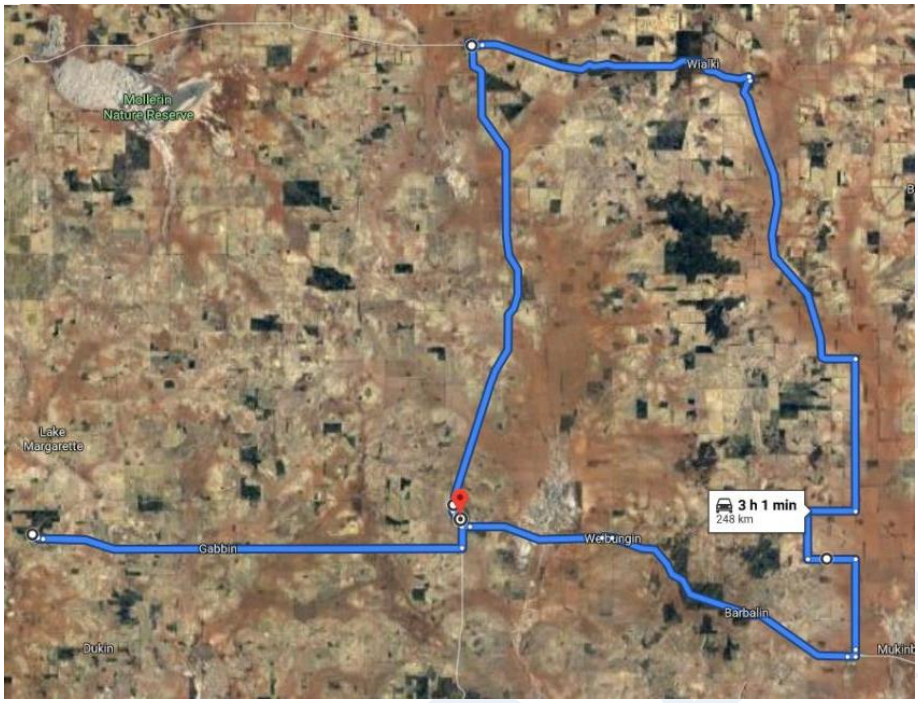
Wyalkatchem – Kununoppin – Nungarin – Mukinbudin – Wyalkatchem

TRANSPORT MODELLING FOR SINGLE REGIONAL LANDFILL – BENCUBBIN

As per advice given by Avon Waste, in a worst-case scenario, a truck would be mobilised from Northam to Bencubbin and back. This has been built into the financial modelling. The following shows the routes used for the modelling.

Route if fortnightly pickup implemented

Bencubbin – Beacon – Mukinbudin – Koorda – Bencubbin



Bencubbin – Nungarin – Kununoppin – Trayning – Yelbeni – Wyalkatechem – Bencubbin

APPENDIX C – ENVIRONMENTAL PROTECTION (RURAL LANDFILL) REGULATIONS 2002 (EXTRACT)

An extract of the key requirements of the Rural Landfill Regulations is provided below. As the NEWROC landfills are Registered facilities, they must comply with these regulations. This project did not include a compliance audit of the sites, however based on the information provided and the landfills visited by Giles Perryman there appear to be a number of non-compliances at a number of sites, such as:

- 6. Covering of waste (Giles observed large quantities of uncovered waste)
- 12. Firebreaks
- 16. Disposal of clinical waste and material containing asbestos, particularly:

  (3) The occupier of a landfill site is to ensure that there is kept at the landfill site an accurate and up to date —

  (a) register of clinical waste and material containing asbestos disposed of at the landfill site; and

  (b) a plan of the landfill site showing the position of clinical waste and material containing asbestos disposed of at the landfill site.

  (4) The person supervising the disposal of clinical waste or material containing asbestos at a landfill site is to make an entry in the register within 2 hours of supervising the covering of waste under subregulation (2), stating —

  (a) the date;

  (b) the person's name;

  (c) that the waste has been covered in accordance with that subregulation; and

  (d) where more than one square metre of waste was covered, grid coordinates with reference to the plan of the landfill site so that the position of the waste can be easily and accurately ascertained.

  (5) The occupier of a landfill site is to ensure that the grid references entered in the register are marked on the plan of the landfill site.
- 17. Post closure plan, specifically '*The occupier of a landfill site must prepare and submit to the Chief Executive Officer for approval a post closure rehabilitation plan, in accordance with subregulation (2), for the site within 18 months of the site being registered under regulation 5B of the Environmental Protection Regulations 1987.*'

An extract of the key sections is below, the complete Regulations can be downloaded from https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1401_homepage.html

5. Tipping area

The occupier of the landfill site must ensure that the tipping area of the site is not greater than —

(a) 30 metres in length; and

(b) 2 metres above ground level in height.

Penalty: $5 000.

6. Covering of waste

(1) The occupier of a landfill site must ensure that waste in the tipping area of the site is covered —

(a) at least as often as is specified in the Table to this regulation; and

(b) in accordance with subregulation (2).

Penalty: $5 000.

(2) Waste is to be —

(a) covered with a dense, inert and incombustible material, or such other material as is approved in respect of a particular landfill site; and

(b) totally covered, so that no waste is left exposed.

(3) The occupier of a landfill site must ensure that there is enough cover material at any time stored and readily available on the site for the tipping area of the site to be covered, in accordance with this regulation, at least twice.

Penalty: $5 000.

Table

Tonnes of waste received per year	**Frequency waste is to be covered**
Less than 500 tonnes	Monthly
Between 500 and 2 000 tonnes	Fortnightly
Between 2 000 and 5 000 tonnes	Weekly

7. Fencing of landfill site

The occupier of a landfill site must ensure that there is a fence around the boundary of the site which is an effective barrier to cattle, horses and other stock.

Penalty: $5 000.

8. Waste to be contained on landfill site

The occupier of a landfill site must ensure that —

(a) waste does not get washed, or blown, outside the site; and

(b) waste that has been washed, or blown, away from the tipping area of the site is returned to the tipping area at least once in each month.

Penalty: $5 000.

9. Separation of waste from water and site boundary

Unless otherwise approved in writing, the occupier of a landfill site must ensure that there is no waste within —

(a) 35 metres from the fence surrounding the site;

(b) 100 metres of any surface water body at the site; or

(c) 3 metres of the highest level of the water table aquifer at the site.

Penalty: $5 000.

10. Stormwater management

The occupier of a landfill site must ensure that stormwater on the site is adequately managed so that —

(a) it is diverted from areas of the site where there is waste; and

(b) water that has come into contact with waste is to be diverted into a sump on the site, or otherwise retained on the site.

Penalty: $5 000.

11. Dust suppression

The occupier of a landfill site must ensure that no visible dust escapes from the landfill site.

Penalty: $5 000.

12. Firebreaks

The occupier of a landfill site must ensure that there is a firebreak of at least 3 metres around the boundary of the site.

Penalty: $5 000.

13. Burning of greenwaste only

(1) The occupier of a landfill site must ensure that waste is not burnt at the site, other than greenwaste burnt in accordance with this regulation.

Penalty: $5 000.

(2) Greenwaste may be burnt if —

(a) it is dry and seasoned for at least 2 months before it is burnt;

(b) it is burnt in a designated burning area of the landfill site;

(c) it is burnt in trenches or windrows;

(d) it is burnt quickly and in such a way that the generation of smoke is minimised;

(e) burning does not commence before 8 a.m. and the Fire Control Officer for the landfill site declares the area safe by 12 noon on the same day; and

(f) there is present in the area from the time burning commences until the Fire Control Officer for the landfill site declares the area safe —

(i) a fire fighting vehicle carrying at least 500 litres of water, fitted with at least 30 metres of 19 mm diameter rubber hose and with a pump capacity capable of delivering a minimum of 250 litres of water per minute at a minimum of 700 kPA through a nozzle capable of projecting water by spray or by jet; and

(ii) 2 persons, who have such qualifications in fire fighting as are approved.

(3) In this regulation —

"designated burning area" means an area of a landfill site that has been designated by the occupier of the site as a designated burning area and which —

(a) is at least 50 metres from the boundary of the site;

(b) has no inflammable material on it, other than the greenwaste and live trees, for a radius of 50 metres;

(c) is positioned on an area of the site where waste (other than the greenwaste to be burnt) has not been deposited; and

(d) is at least 500 metres from any person's residence or place of employment (other than the landfill site) or an educational institution, hospital or other public place;

"greenwaste" means waste that originates from flora.

14. Outbreak of fire

(1) The occupier of a landfill site must ensure that there are appropriate procedures in force at the site so that —

(a) any unauthorised fire on the site is promptly extinguished; and

(b) appropriate alarm and evacuation procedures are in place.

(2) The occupier of a landfill site must ensure that an unauthorised fire on the site is extinguished as soon as possible.

(3) Within 14 days of an unauthorised fire at a landfill site, the occupier of the site must give to the Chief Executive Officer a report on the fire containing —

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

(b) the time the location of the fire was declared safe by the Fire Control Officer for the site; and

(c) the cause, or suspected cause, of the fire.

Penalty: $5 000.

15. Approval for disposal at landfill site of clinical waste or material containing asbestos

(1) The occupier of a landfill site must ensure that clinical waste or material containing asbestos is not disposed of at the site unless the site is approved for the disposal of that waste or material, as is relevant.

(2) The occupier of a landfill site must ensure that clinical waste and material containing asbestos is disposed of in accordance with the relevant approval.

Penalty: $5 000.

(3) Where there is a conflict between a requirement of regulation 16 and a requirement of an approval, the requirement of regulation 16 prevails.

16. Disposal of clinical waste and material containing asbestos

(1) The occupier of a landfill site is to ensure that clinical waste and material containing asbestos disposed of at the site is disposed of under the occupier's personal supervision or the personal supervision of a person nominated by the occupier.

(2) The person supervising the disposal of clinical waste or material containing asbestos at a landfill site is to ensure that it is covered as soon as is practicable after its disposal —

(a) with a dense, inert and incombustible material; and

(b) to a depth of at least one metre.

(3) The occupier of a landfill site is to ensure that there is kept at the landfill site an accurate and up to date —

(a) register of clinical waste and material containing asbestos disposed of at the landfill site; and

(b) a plan of the landfill site showing the position of clinical waste and material containing asbestos disposed of at the landfill site.

(4) The person supervising the disposal of clinical waste or material containing asbestos at a landfill site is to make an entry in the register within 2 hours of supervising the covering of waste under subregulation (2), stating —

(a) the date;

(b) the person's name;

(c) that the waste has been covered in accordance with that subregulation; and

(d) where more than one square metre of waste was covered, grid coordinates with reference to the plan of the landfill site so that the position of the waste can be easily and accurately ascertained.

(5) The occupier of a landfill site is to ensure that the grid references entered in the register are marked on the plan of the landfill site.

Penalty: $5 000.

17. Post-closure plan

(1) The occupier of a landfill site must prepare and submit to the Chief Executive Officer for approval a post-closure rehabilitation plan, in accordance with subregulation (2), for the site within 18 months of the site being registered under regulation 5B of the *Environmental Protection Regulations 1987*.

Penalty: $5 000.

(2) A post-closure rehabilitation plan is to set out a plan for the rehabilitation of the site after it has ceased to be a landfill site and, in particular, is to specify —

(a) options for the use of the site after it has ceased to be a landfill site, and is to specify the preferred option;

(b) a conceptual design of the infrastructure needed for the preferred option for the use of the site after it has ceased to be a landfill site;

(c) the estimated final contours of the site, after allowing for settlement, and specifying to what extent settlement has been allowed for;

(d) the capping materials proposed to be used on the site;

(e) a proposed system of drainage of the site;

(f) measures proposed for the protection of the environment and the monitoring of the site; and

(g) the estimated period for which the site will require protection and monitoring.

Attachment 10.3.2

Assessment Report and Vegetation Management Plan

We're working for Western Australia.

Goomalling-Merredin Road (M016) Seal Widening SLK 56-100

August 2020

1666

D20#683264

Contents

Amendments

Report Compilation & Review	Name and Position	Document Revision	Date
Author:	Shadila Venkatasamy Environment Officer	Draft v1	20/08/2020
Reviewer:	Gaynor Owen Senior Environment Officer	Rev 0	21/8/2020

1 SUMMARY

1.1 Project Information

Project Name: Goomalling-Merredin Road (M016) Seal Widening SLK 56-100

Project Location(s): The project is on Goomalling-Merredin Road (M016), between the towns of Wyalkatchem and Trayning (SLK 56.4 and 99.6), within the Shires of Wyalkatchem and Trayning.

Project Purpose / Components: The project involves the widening of Goomalling-Merredin Road between SLK 56.4 and 99.6 to accommodate a 9 m sealed formation. The aim of this project is to reduce the number of 'run off road' crashes by improving the safety and functionality within this road segment.

Area Proposed to be Cleared: Approximately 14.62 ha of native vegetation will be cleared.

Temporary Clearing Required: None

An assessment report (AR) of the project was undertaken. The AR outlined the key activities associated with the project, the existing environment and an assessment of native vegetation clearing. This assessment provided an evaluation of the vegetation clearing impacts associated with the project using the ten clearing principles and strategies used to manage vegetation clearing. Key items associated with the AR are listed below.

The proposed clearing of 14.62 ha of native vegetation under CPS 818/15 is considered: (i) 'at variance' to Principles c and e, (ii) 'not likely to be at variance' to Principles a, b, h and i, and (iii) 'not at variance' to principles d, f, g and j.

The key impacts associated with native vegetation clearing associated with the project are as follows:

- Clearing of 0.33 ha of the Eucalypt woodlands of the Western Australian Wheatbelt TEC.
- Clearing of eight individuals of the Threatened flora, *Acacia caesariata*.
- Clearing of 76 plants of *Acacia ancistrophylla* var. *perarcuata* (P3), four small trees of *Eucalyptus erythronema* subsp. *inornata* (P3) and 15 individuals of sterile *Eucalyptus erythronema* (potential P3).
- Clearing of 10.25 ha of significant remnant vegetation (4.65 ha and 5.6 ha of Vegetation Association 1049 and Vegetation Association 1413 respectively).

Main Roads Statewide Purpose Clearing Permit CPS 818 will be used to undertake native vegetation clearing for the project. Project clearing will be undertaken in accordance with the conditions of CPS 818 and detailed records of native vegetation clearing will be maintained as required under the permit.

2 ASSESSMENT SCOPE

This clearing impact assessment involved a desktop analysis of environmental aspects and impacts, a site investigation, and an assessment of native vegetation clearing impacts. The study area is confined to a 15 km radius surrounding the proposed clearing footprint which will be referred to as the project area. This assessment determined the need to develop and obtain approvals from the Department of Water and Environmental Regulation (DWER) for a Revegetation Plan, a Vegetation Management Plan (VMP), a Dieback Management Plan or an Offset Proposal.

3 PROJECT DESCRIPTION

MRWA Wheatbelt region is proposing to upgrade Goomalling-Merredin Road, SLK 56.4 and 99.6, within the Shires of Wyalkatchem and Trayning. According to Main Roads crash statistics, Goomalling-Merredin Road has a poor safety record and a total of 40 'run off road' crashes were recorded along this road during the past five years. In an effort to improve the safety and functionality of Goomalling-Merredin Road, widening to a 9m sealed formation will be undertaken. This project will also include the installation of audible edge lines.

Table 1 describes the project in detail, including the full extent of the proposed work and all the components of the proposal.

Table 1. Project Description

Project Components	**Clearing Required (Y/N)**	**Estimated Clearing Area (ha)** *TBC if unknown*
Road Widening/Overtaking lanes/Realignment SLK 56.4 – 99.6	☒	A total of 14.62 ha of native vegetation located along the outer edges of the project area will be cleared

3.1 Project Location

The project area is located on Goomalling-Merredin Road SLK 56.4 – 99.6 within the Shires of Wyalkatchem and Trayning as shown in Figure 1.

- Latitude: -31.182462
- Longitude: 117.378558

to

- Latitude: -31.113955
- Longitude: 117.789455

The location and boundaries of the study area (15 km radius) for the project are shown in Figure 2.

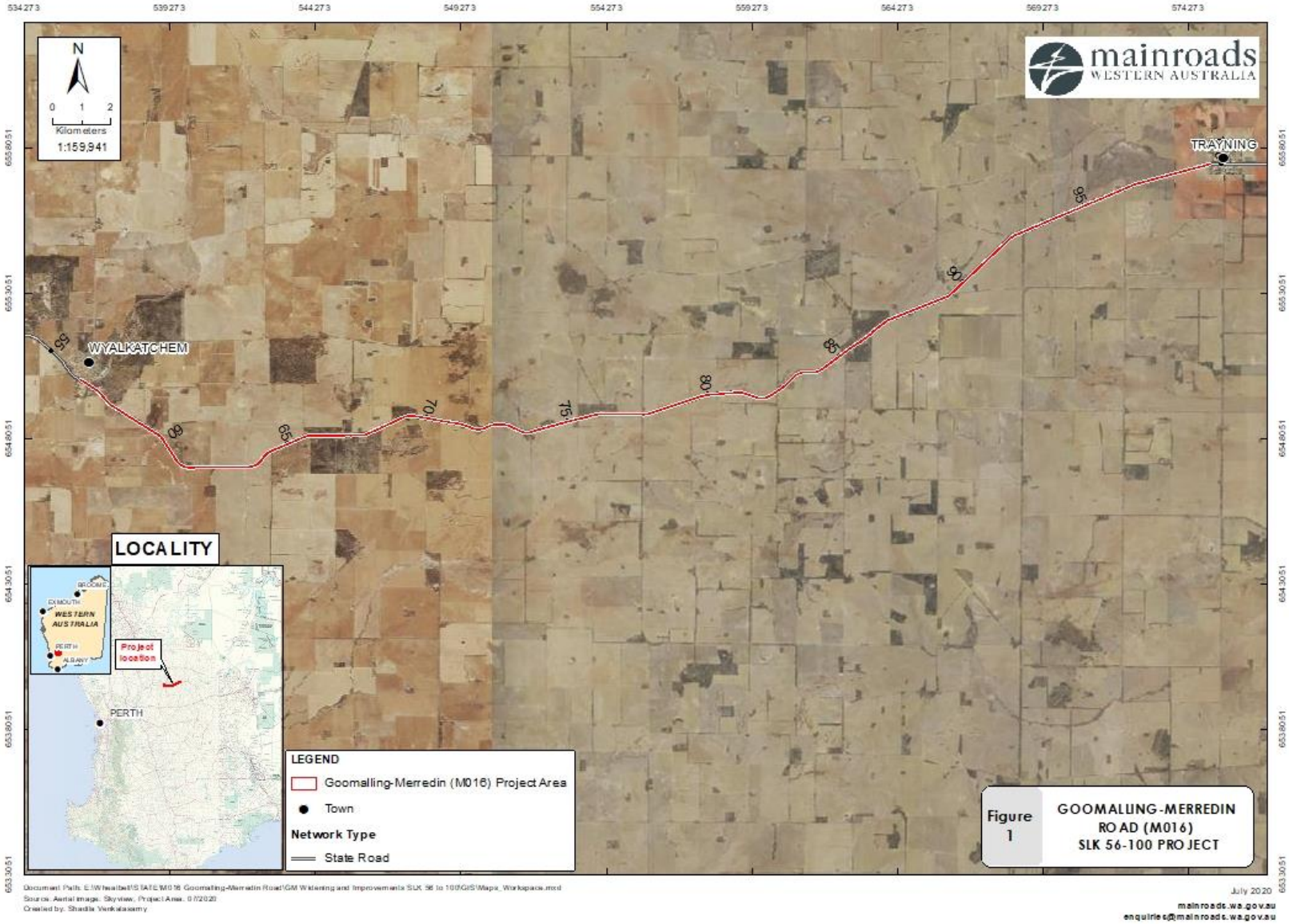


Figure 1. Project Area

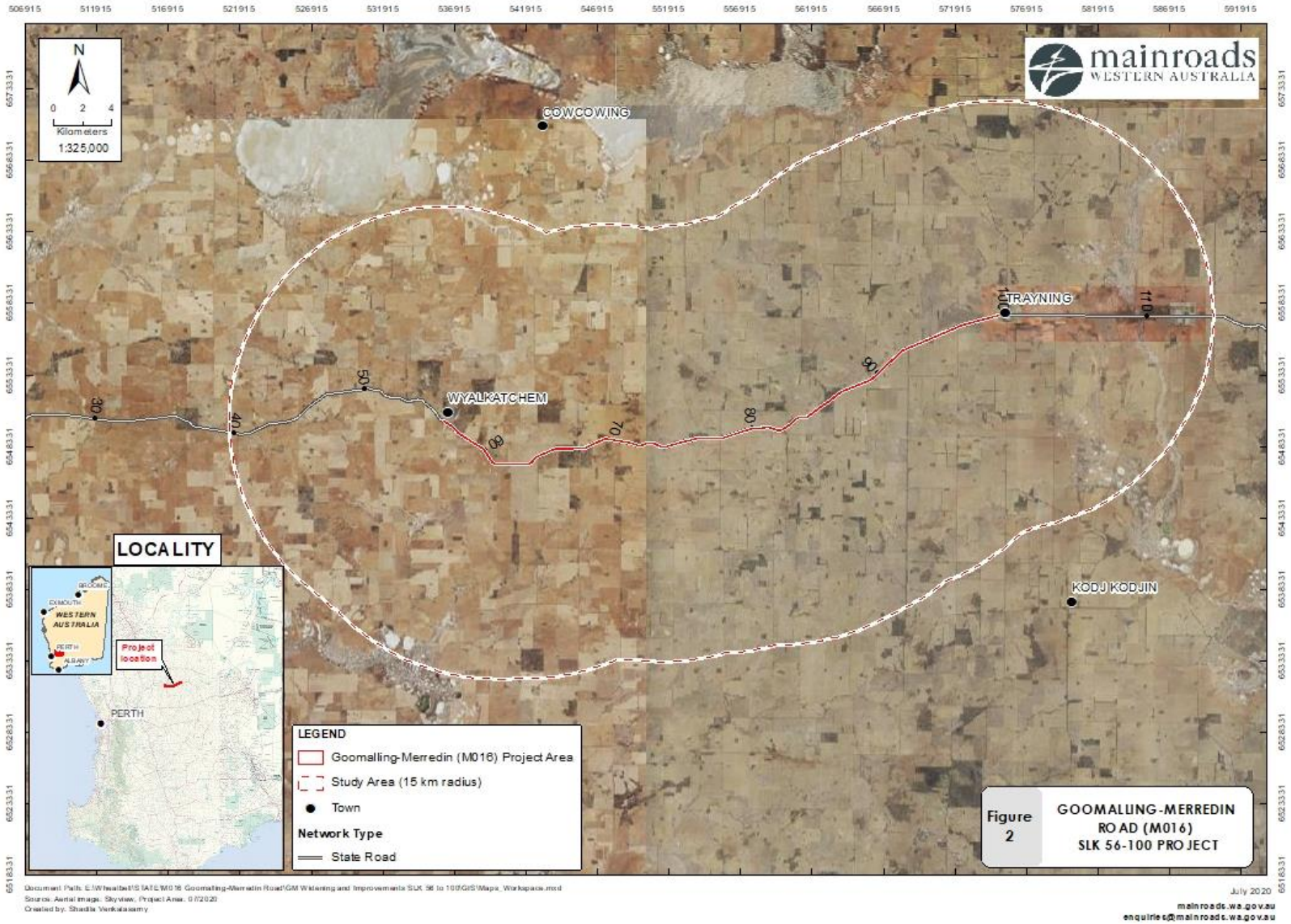


Figure 2. Project Location and Study Area

4 Methodology

4.1 Preliminary Desktop Study

A preliminary desktop study was undertaken as part of the Assessment Report, to assess the proposed native vegetation clearing and potential constraints associated with the project. The desktop assessment included viewing GIS shapefiles, reviewing government agency managed databases (where necessary) and consulting with relevant stakeholders. The outcome of the desktop study, identified that native vegetation clearing is at variance with Principle e and may be at variance with Principle a.

The methodology used when completing an assessment of the clearing principles is provided in Section 5.3. Mapping was completed using ArcMap.

4.2 Detailed Clearing Impact Assessment

Further environmental assessment of the impacts of native vegetation clearing was undertaken and a CIA report completed. The CIA included a site visit to verify desktop information and a biological survey conducted by Biota Environmental Sciences (Biota), to delineate key environmental elements of the project area. A summary of the outcome of the biological survey is provided in Section 6.

The methodology used for the biological survey is provided in the 'Goomalling-Merredin Road Upgrade (M016) SLK 56-100 Biological Survey' report in Appendix 1.

4.3 Assessment Report

A preliminary desktop study was undertaken, to assess the proposed native vegetation clearing and potential constraints associated with the project. The desktop assessment included viewing GIS shapefiles, reviewing government agency managed databases (where necessary) and consulting with relevant stakeholders. The outcome of the desktop study, identified that native vegetation clearing is at variance with Principles c and e.

The methodology used when completing an assessment of the clearing principles is provided in Section 5.3. Mapping was completed using ArcMap.

Further environmental assessment of the impacts of native vegetation clearing undertaken for the project, included a site visit to verify desktop information and a biological survey to delineate key environmental elements of the project area. A summary of the outcome of the biological survey is provided in Section 6. The methodology used for the biological survey is provided in the 'Goomalling-Merredin Road Upgrade (M016) SLK 56-100 Biological Survey' report in Appendix 1.

5 Clearing of Native Vegetation

Native vegetation describes all indigenous aquatic and terrestrial vegetation (living or dead). The term does not include vegetation that was intentionally sown, planted or propagated unless it was required under a statutory condition.

Apart from activities that are exempt under the clearing regulation (Section 5 – Prescribed Clearing), all native vegetation clearing completed by Main Roads will be undertaken using a permit.

5.1 Measures to Avoid, Minimise, Mitigate and Manage Project Clearing Impacts

The design and management measures implemented to avoid and minimise the project clearing impacts are provided in Table 2.

Table 2. Justification of Avoiding, Minimising, Mitigating and Managing Project Clearing Impacts

Design or Management Measure	Applied to Current Design	Discussion and Justification
Reduction of Clearing Footprint	Yes	The original clearing footprint has been reduced as far as practicable to minimise impacts to the patches of the 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC and significant flora species. As a result, clearing within areas mapped as the 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC has decreased from 1.7 ha to 0.33 ha and a number of significant flora has been avoided.
Construction buffer		In areas where the TEC occurs, the footprint has been reduced as much as possible and no construction buffer has been included in these areas with a view to minimise impacts to this community. This management measure will result in higher construction costs and more elaborate construction procedures that will include staging of the works and using equipment specialised for tight spots. A pricier pavement stabilisation treatment will also be implemented in these areas to achieve an acceptable outcome. For sections of the road where significant flora are located in close proximity to the clearing footprint, a minimal buffer of 1m or less has been allowed to enable the construction of the required batter slope and table drain.
Steepen batter slopes	Yes	In order to further reduce clearing within the patches of 'Eucalypt Woodlands of the Western Australian Wheatbelt' TEC, a 4:1 slope will be implemented for the project batters instead of the usual 6:1 batter slope.
Installation of safety barriers	No	The installation of safety barriers would not reduce the clearing footprint due to the requirements of roadside drainage.
Alignment to one side of existing road	No	The project is funded under the Road Safety Initiative program. Low cost widening and alignment to one side would have triggered significant costs due to reconstruction. Due to the existing road formation and nearby railways and vegetation on both sides of the road, any deviation from the existing centreline will significantly increase the impacts to roadside native vegetation.

Design or Management Measure	Applied to Current Design	Discussion and Justification
Alternative alignment to follow existing road (or) to preferentially locate within pasture or a degraded areas	No	Not Applicable. Project scope is a widening on existing geometry project.
Installation of kerbing	Yes	Kerbing has been considered and implemented in the design where possible.
Simplification of design to reduce number of lanes and/or complexity of intersections	No	The scope of work is to maintain the current serviceability and improve the safety by widening the formation to a 9 m seal. The widening scope of works cannot be further simplified whilst retaining the necessary safety benefits. If the widening was not undertaken, this would likely result in no improvements in crash density on this dangerous stretch of road network.
Preferential use of existing cleared areas for access tracks, construction storage and stockpiling	Yes	Additional vegetation clearing will be avoided as the site office, materials storage areas, construction vehicles/machinery and access tracks will be located on previously cleared areas.
Drainage modification	Yes	Wherever possible, minimum value of batter slope and drainage back slope have been selected to minimise environmental impacts.

Design or Management Measure	Applied to Current Design	Discussion and Justification
Other design treatment	Yes	A localised drainage and batter slopes have been adopted to reduce the clearing footprint as far as practicable.
Management measures to minimise impacts to Threatened Flora	Yes	We are currently liaising with the DBCA to mitigate impacts to the Threatened species, *Acacia caesariata*, through the implementation of *in situ* management measures. These will include the transfer of topsoil to areas specified by the DBCA to allow the recruitment of *Acacia caesariata* from the soil seed bank.

5.2 Vegetation Details

5.2.1 Project Site Vegetation Description

The project area includes the Goomalling-Merredin Road and covers a total area of 83.95 ha, out of which 14.62 ha represents native vegetation. This native vegetation occurs as narrow strips (average of 3 m) along sections of the project area.

Based on a biological assessment undertaken in October 2019 (Biota 2020), 15 vegetation types were defined for the project area as shown below.

Vegetation Code	Vegetation Description
A1	*Allocasuarina acutivalvis* subsp. *acutivalvis* low woodland over *Hakea francisiana, H. invaginata,* (*Acacia neurophylla* subsp. *erugata*) tall shrubland over *Grevillea paradoxa,* (*Acacia densiflora*) open shrubland over *Dianella revoluta* var. *divaricata* scattered herbs over *Austrostipa elegantissima* very open tussock grassland over *Rytidosperma caespitosum, Amphipogon caricinus* var. *caricinus, Neurachne alopecuroidea* very open bunch grassland.
A2	*Allocasuarina campestris* tall open scrub with *Acacia lasiocalyx, Melaleuca lateriflora* tall open shrubland over *Melaleuca protrusa, Grevillea paradoxa* low open shrubland over *Ecdeiocolea monostachya,* (*Lepidosperma costale*) open sedgeland over *Borya sphaerocephala* open to very open forbland.
C1	*Atriplex paludosa* subsp. *baudinii,* (*A. bunburyana, A. amnicola*) low chenopod shrubland over *Austrostipa elegantissima* scattered tussock grasses over very open bunch grassland of introduced grasses.
E1	*Eucalyptus loxophleba* subsp. *lissophloia* low open forest over *Melaleuca adnata,* (*M. hamata*) tall shrubland over *Acacia acuaria, A. ancistrophylla* var. *ancistrophylla, Grevillea paniculata* open shrubland over *Rhagodia drummondii,* (*Acacia merrallii*) low open shrubland over *Austrostipa elegantissima* very open tussock grassland.
E2	*Eucalyptus wandoo* subsp. *wandoo, E. capillosa* closed forest over *Hakea multilineata,* (*Melaleuca hamata*) tall open shrubland over *Acacia stereophylla* var. *stereophylla,* (*A. acuaria*) open shrubland over *Rhagodia drummondii,* (*A. hemiteles*) low open shrubland over *Dianella revoluta* var. *divaricata* scattered herbs over *Austrostipa elegantissima* very open tussock grassland with *Lepidosperma* ? sp. Bandalup Scabrid (N. Evelegh 10798), *Lomandra effusa* very open sedgeland over *Rytidosperma caespitosum*, *Neurachne alopecuroidea* very open bunch grassland.
E3	*Eucalyptus salmonophloia,* (*E. salubris*) closed forest over *Acacia merrallii* shrubland over *Rhagodia drummondii* low shrubland over *Austrostipa elegantissima* very open tussock grassland.
E4	*Eucalyptus salubris, E. salmonophloia* woodland with *Eucalyptus moderata, E. loxophleba* subsp. *lissophloia* mallee woodland over *Eucalyptus celastroides* subsp. *virella, E. erythronema* low mallee woodland over *Acacia merrallii, Senna artemisioides* subsp. *filifolia* open shrubland over *Atriplex* spp., *Rhagodia drummondii,* (*Enchylaena tomentosa* var. *tomentosa*) low open shrubland over *Austrostipa elegantissima* very open tussock grassland over **Lolium rigidum* scattered grasses.

M1	*Eucalyptus erythronema, E. subangusta* subsp. *subangusta* low mallee woodland over *Melaleuca hamata, M. adnata* tall shrubland over *Melaleuca marginata* open shrubland over *Eremophila drummondii, Enchylaena lanata* scattered low shrubs over *Austrostipa elegantissima* very open tussock grassland over *Rytidosperma caespitosum* scattered bunch grasses.
M2	*Eucalyptus loxophleba* subsp. *lissophloia* mallee woodland over *Eucalyptus celastroides* subsp. *virella, E. kochii* subsp. *plenissima, E. moderata* (*E. erythronema, E. subangusta* subsp. *subangusta*) low open mallee forest over *Westringia cephalantha* open shrubland over *Rhagodia drummondii,* (*Olearia muelleri*) low open shrubland over *Austrostipa elegantissima* very open tussock grassland over *Rytidosperma caespitosum* scattered bunch grasses.
M3	*Eucalyptus oldfieldii* low open mallee forest with *Allocasuarina acutivalvis* subsp. *acutivalvis* low open woodland over *Melaleuca hamata, Acacia longispinea, Hakea francisiana, H. erecta* tall shrubland over *Melaleuca pauperiflora* subsp. *fastigiata, Phebalium filifolium* open shrubland over *Austrostipa elegantissima* very open tussock grassland over *Rytidosperma caespitosum* scattered bunch grasses.
E1/E2	Mosaics of vegetation types E1 and E2 (Smooth-barked York Gum over Melaleuca & Acacia **with** Wandoo & Wheatbelt Wandoo over Acacia).
E2/E3	Mosaics of vegetation types E2 and E3 (Wandoo & Wheatbelt Wandoo over Acacia **with** Salmon Gum & Gimlet Closed Forest over *Acacia merrallii*).
E3/E4	Mosaics of vegetation types E3 and E4 (Salmon Gum & Gimlet Closed Forest over *Acacia merrallii* **with** Gimlet & Salmon Gum Woodland over 'Sock' Mallees).
E4/A1	Mosaics of vegetation types E4 and A1 (Gimlet & Salmon Gum Woodland over 'Sock' Mallees **with** Allocasuarina over Hakea & Acacia).
RR	Exposed sands cleared for access, stockpiles of aggregate, and vegetation regrowth in poor condition

The area covered by each vegetation type is given in the table below.

Vegetation Code	Area Mapped (ha)	% within Project Area
A1	1.64	1.95
A2	1.73	2.06
C1	0.12	0.14
E1	1.24	1.48
E1/E2	0.03	0.03
E2	0.81	0.97
E2/E3	1.10	1.31
E3	0.64	0.76
E3/E4	0.89	1.06
E4	2.15	2.56
E4/A1	0.06	0.07
M1	1.67	2.00
M2	1.95	2.33
M3	0.28	0.33
RR	0.30	0.36

Most of this vegetation was ranked as being in a Very Good (42.9%), Degraded (22.9%) and Excellent (22.6%) condition. The remaining extent of this vegetation were assessed as being in Good (5.4%) and Completely Degraded (6.2%) condition. However, it is important to note that this vegetation condition ranking represents a broad mapping of the survey area where the strip of vegetation adjoining the cleared maintenance zone has not been assessed separately. This edge vegetation is subjected to disturbances associated with the road and is generally in a poorer condition compared to vegetation occurring some distance away. Consequently, in reality, the narrow segments of edge vegetation located within the outer sections of the project area are not in an Excellent or Very Good condition.

Tables 3 and 4 provide details of the pre-European Vegetation Associations within the project area and the remaining extents of these associations.

At the national level, the aim of biodiversity conservation is to prevent clearance of ecological communities having an area of below 30% compared to their pre-1750 cover given that below this threshold, species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia 2001). According to Beard's mapping (Shepherd et al. 2001), the project area lies within Vegetation Associations 1049 and 1413.

Vegetation Association 1049 is defined as 'Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet' and as shown in Table 4 has 6.24 - 6.79% of its extent remaining at the State, IBRA bioregion, IBRA subregion and local government authority (Shires of Trayning and Wyalkatchem) levels. This vegetation association is therefore considered as a significant remnant vegetation at all levels.

Vegetation Association 1413 is defined as 'Shrublands; acacia, casuarina & melaleuca thicket' and has more than 30% of its extent remaining at the State, IBRA bioregion, IBRA subregion levels as indicated in Table 4. However, only 12.6% and 9.82% of this vegetation association persist within the Shires of Trayning and Wyalkatchem respectively. Consequently, this vegetation association is classified as a significant remnant vegetation only at the Local Government Authorities levels.

Table 3. Summary of Project Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
Vegetation Association 1049 described as 'Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet' (Government of Western Australia, 2019)	Clearing of up to 11.71 ha for road widening on Goomalling-Merredin Road.	Completely Degraded Degraded Excellent Good Very Good (EPA 2016)	Vegetation description and condition determined from Biological survey conducted in October 2019.
Vegetation Association 1413 described as 'Shrublands; acacia, casuarina & melaleuca thicket' (Government of Western Australia, 2019)	Clearing of up to 2.91 ha for road widening on Goomalling-Merredin Road.	Completely Degraded Degraded Excellent Good Very Good (EPA 2016)	Vegetation description and condition determined from Biological survey conducted in October 2019.

Table 4. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 1049	**Statewide**	833,384.77	56,618.34	6.79	0.41
	IBRA Bioregion				
	Avon Wheatbelt	833,384.77	56,618.34	6.79	0.41
	IBRA Sub-region				
	Merredin	577,982.14	36,045.59	6.24	0.52
	Local Government Authority				
	Shire of Trayning	79,907.02	5,096.97	6.38	0.24
	Shire of Wyalkatchem	115,476.18	7,345.26	6.36	0.62
Veg Assoc No. 1413	**Statewide**	1,679,916.32	1,286,855.48	76.60	13.22
	IBRA Bioregion				
	Avon Wheatbelt	546,675.55	174,102.84	31.85	2.33
	IBRA Sub-region				
	Merredin	546,675.55	174,102.84	31.85	2.33
	Local Government Authority				
	Shire of Trayning	27,781.25	3,500.69	12.60	0.95
	Shire of Wyalkatchem	16,161.18	1,587.51	9.82	0.93

5.3 Assessment against the Ten Clearing Principles

In assessing whether the project's proposed clearing is likely to have a significant impact on the environment, the project was assessed against the ten clearing principles (EP Act 1986, Schedule 5).

Each principle has been assessed in accordance with DWER's 'A Guide to the Assessment of Applications to Clear Native Vegetation'.

The proposed clearing of 14.62 ha under CPS 818/15 is considered to be at variance to Principles (c) and (e), not likely to be at variance to Principles (a), (b), (h) and (i) and not at variance to Principles (d), (f), (g) and (j).

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	Following a biological survey undertaken within and in the vicinity of the proposed clearing footprint, 15 vegetation types were defined for the project area (Section 5.2). The vegetation communities cover approximately 14.62 ha and are distributed over a distance of 43.2 km along the outer edges of the project area on both sides of Goomalling-Merredin Road. Vegetation condition within the project area was ranked as being in a Very Good (42.9%), Degraded (22.9%), Excellent (22.6%), Completely Degraded (6.2%) and Good (5.4%) condition. However, it is important to note that this vegetation condition ranking represents a broad mapping of the survey area, which extends over 303.3 ha. The strip of vegetation adjoining the cleared maintenance zone has hence not been assessed separately. This edge vegetation is subjected to constant disturbances associated with the road and is generally in a poorer condition compared to vegetation occurring some distance away (Appendix 3). Consequently, the narrow segments of edge vegetation, which constitute the only vegetation present in the project area cannot be classified as being in an Excellent or Very Good condition. As discussed above, these narrow strips of vegetation which stretch over an average width of 3 m are mostly disturbed due to its close proximity of the road and cleared maintenance zone. The vegetation assemblages recorded during the survey (Biota 2020) are not exclusive to the project area and occur in this locality within sections of the road reserve on both sides of Goomalling-Merredin Road. Consequently, clearing of these narrow segments of vegetation is not expected to significantly impact the extent of significant remnant vegetation in the locality. Results from a desktop assessment indicated that there are known records of 25 significant flora species within the study area. Of these, 19 species were assessed as having the potential to occur within the project area due to the availability of suitable habitats. A detailed survey for vegetation and flora (including targeted flora) undertaken in October 2019, identified the presence of one Threatened species under the BC Act and six Priority species within the survey area which extends well beyond the boundary of the project area. They are: *Acacia caesariata* (T), *Dampiera glabrescens* (P1), *Dampiera scaevolina* (P1), *Grevillea* sp. Trayning (W. Johnston WJ 071) (P1), *Acacia ancistrophylla* var. *perarcuata* (P3), *Eucalyptus erythronema* subsp. *inornata* (P3) and *Grevillea haplantha* subsp. *recedens* (P3). During the survey, an unusual wattle that could not be matched to any described species was also recorded at one location. It is believed that this specimen could represent a new

	species but better plant material would be required to confirm its taxonomic identification (Biota 2020). In the interim, this location will not be disturbed by project activities. Of the species recorded during the biological survey, *Acacia caesariata* (T), *Acacia ancistrophylla* var. *perarcuata* (P3) and *Eucalyptus erythronema* subsp. *inornata* (P3) were found to occur within the project area. During the biological survey, 91 individuals of *Acacia caesariata* were recorded in the survey area and eight of these plants occur in the project area. Findings from the survey also show that a total of 319 plants of *Acacia ancistrophylla* var. *perarcuata* are located in the survey area and 76 of them are found within the project area. A number of plants were identified as *Acacia ?ancistrophylla* due a lack of sufficient morphological diagnostic characters for a positive taxonomic identification. Seven of these records were treated as potential *A. ancistrophylla* var. *perarcuata* as they spatially overlap the confirmed records of *A. ancistrophylla* var. *perarcuata*. However, none of them occur in the project area. In addition to the 331 flowering trees of *Eucalyptus erythronema* subsp. *inornata* recorded in the survey area, 156 specimens of sterile *E. erythronema* were noted. These sterile *E. erythronema* plants could not confidently be ascribed to either *E. erythronema* subsp. *inornata* or *E. erythronema* subsp. *erythronema* due to an absence of flowering material (Biota 2020). It was therefore recommended to adopt a precautionary approach and consider all the specimens of sterile *E. erythronema* as the P3 species (Biota 2020). Four small trees of *Eucalyptus erythronema* subsp. *inornata* and 15 individuals of sterile *E. erythronema* were observed in the project area. The impacts of clearing on the populations of these significant flora species were calculated at both the local (study area) and regional (Avon Wheatbelt bioregion) levels. In the absence of data regarding population sizes for the majority of the DBCA records, a count of one plant was assigned to records with no frequency data for the purpose of this exercise. *Acacia ancistrophylla* var. *perarcuata* which is listed as a Priority 3 species is a low shrub that can grow to 1.6 m high and typically occurs over undulating plains on red sand clay loams and loams (Western Australian Herbarium, 2020). DBCA data showed that there are 24 known records of this species , mostly recorded south-east of the project area with a distribution spanning over a distance of 540 km. Aerial imagery shows that these locations are found in the vicinity of three major state roads and five local roads which are areas which have been subjected to flora surveys. These results would strongly indicate that additional surveys in the region would most likely uncover more records of *A. ancistrophylla* var. *perarcuata* as suitable habitats are present throughout the region. Past records show that this species is locally common and would occur in patches of more than 100 individuals (Biota 2020, WA Herbarium 2020). Based on available data, the overall impact of clearing 76 individuals of this P3 species at the local level was estimated as 23.7% while at the regional level 16.6% of this species will be impacted. The calculated impacts are higher than expected due to incomplete data regarding the population size for the DBCA records. *Eucalyptus erythronema* subsp. *inornata* which is listed as a Priority 3 species is a mallee growing to 7 m tall and favours a variety of well-drained sites including lateritic to sandy gravel rises and small rises with pale red-grey loamy soils (Nicolle and French 2012). DBCA data indicated that there are 43 known records for this species, distributed mostly south of the project area within a range of 205 km. As noted above, for the other two significant flora species, the locations for *E. erythronema* subsp. *inornata* are concentrated along major state and local roads, where biological surveys were undertaken. It can therefore be expected that there will be an increase in the number *E. erythronema* subsp. *inornata* if more flora surveys are undertaken in the region. The overall impact of clearing 19

	individuals of *E. erythronema* subsp. *inornata* was calculated as being 3.9% at the local level and 1.9% at the regional level. Based on available data, there is reasonable expectation that the significant flora species recorded within the project area also occur throughout the surrounding vegetation. Given that only narrow segments of the existing vegetation assemblages will be cleared, the loss of native vegetation within the project area is unlikely to significantly reduce the biodiversity of the locality. A desktop assessment showed records of 13 significant fauna species within the study area. Based on the habitats present within the project area, nine of these species were considered as having the potential to occur. During the fauna survey conducted in October 2019 (Biota 2020), only the DBCA listed Priority 4 species, Tree-Stem Trapdoor Spider was recorded in the survey area. This spider was observed within the better quality vegetation some distance away from the project area. No significant fauna species were recorded in the project area during the survey. It is noteworthy that the project area is located outside the modelled distribution of the Carnaby's Black-Cockatoo (DSEWPaC 2012, DotEE 2017) and this species has rarely been recorded in the locality with the latest sighting of one individual dating back to 2013 in Wyalkatchem. Given the absence of suitable habitats for significant fauna species and the fact that the project area is in close proximity to a road and its associated disturbance, would indicate that clearing will not have a significant impact on any fauna species. Consequently, this project is not expected to have any significant impacts on fauna species or fauna habitats. The desktop assessment identified the presence of one TEC, the Eucalypt woodlands of the Western Australian Wheatbelt TEC (Wheatbelt TEC, Commonwealth Critically Endangered; State Priority 3) within the study area. During the 2019 biological survey, the Wheatbelt TEC was recorded within the project area and broader survey area. A total of 180.7 ha of the Wheatbelt TEC was mapped across the survey area and its vicinity. Of this extent, approximately 0.33 ha (0.2%) will be cleared as part of this project. Given that clearing will be undertaken along the edge of the Wheatbelt TEC and removal of eucalypt trees will be avoided as far as practicable, no significant impacts to this TEC is expected. The clearing of native vegetation is of similar condition or poorer condition to the surrounding vegetation. Given the nature of the clearing (long and linear) and its disturbed condition, the proposed clearing is unlikely to clear vegetation with a higher biological diversity than the surrounding vegetation, as such, the clearing is unlikely to be variance to this Principle.
Methodology	Biological Survey (Biota 2020) DBCA shapefiles Department of Agriculture, Water and the Environment (DAWE) website DotEE 2017 DSEWPaC 2012 EPA (2016) Government of WA (2018) Main Roads GIS Shapefiles Nicolle and French 2012 NatureMap (Accessed 10/08/2020) Shepherd et al 2001

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments	Proposed clearing is not likely to be at variance to this Principle
	A desktop assessment showed records of 13 significant fauna species within the study area. Based on the habitats present within the project area, nine of these species were considered as having the potential to occur. No significant fauna species were recorded in the project area during the survey (Biota 2020). Within the broader survey area, the only significant fauna species recorded was the DBCA listed Priority 4 species, the Tree-Stem Trapdoor Spider within the better quality vegetation some distance away from the project area. Five fauna habitats were defined for the project area as follows: (a) Eucalypt woodland, (b) Eucalypt mallee, (c) *Allocasuarina* woodland, (d) Shrubland on granite and (e) Chenopod plain. Findings from the 2019 survey indicated that these habitats were not occupied by any significant fauna species. The five habitats occur within an edge vegetation that is subjected to disturbances such as traffic, noise and vibration from the adjacent road. Following the survey, the Shield-backed Trapdoor Spider and Central-eastern Wheatbelt Shield-backed Trapdoor Spider were assessed as 'likely to occur' while the Yorkrakine Trapdoor Spider and Western Spinytailed Skink were considered as 'may potentially occur' within the survey area. The Chuditch, Malleefowl, Fork-tailed Swift, and Peregrine Falcon were classified as 'may potentially occur' but only on occasion to forage or in transit, as the survey area was not considered to represent core habitats for these species. The Carnaby's Black-Cockatoo was assessed as 'may potentially occur' due to a small number of potential habitat trees and potential foraging plants within the survey area. The Shield-backed Trapdoor Spider prefers heavy clay soils in Eucalypt woodlands and the nearest record which dates back to 1992, is located approximately 530 m north-east of the project area. According to quadrat data and fauna sample sites descriptions provided by Biota, the soil of the project area has been described as being sandy and would be unsuitable for the construction and maintenance of spider burrows. The Shield-backed Trapdoor Spider is a mygalomorph species that exhibit the short range endemic (SRE) traits of low mobility, low dispersal, low fecundity, slow growth, restriction to particular habitats with the entire distribution being less than 10,000 km2 (Mason et al. 2018). The poor dispersal capabilities of mygalomorphs suggest that SREs would favour small patches of high-quality remnant vegetation (Mason et al. 2016). Studies have also revealed that it is rare for mygalomorphs to move as adults, as any long distance movement would result in a high energy cost and leave them vulnerable to predation and desiccation (Mason et al. 2013). Species richness estimators for the 2019 survey indicated that only two-thirds of the plant taxa predicted to be present were recorded (Biota 2020), hence showing that vegetation of the survey area cannot be classified as intact remnant vegetation. The Shield-backed Trapdoor Spider is therefore not expected to occur in the project area as it was not recorded during the biological survey and the soil of the project area is sandy rather than clayey. In addition, the vegetation to be cleared is located in a disturbed area that is invaded by weeds (including Declared Pests) and only a narrow 3 m strip on average is to be cleared. As such, the vegetation proposed to be cleared does not represent high quality remnant vegetation.

	The Central-eastern Wheatbelt Shield-backed Trapdoor Spider which is also a mygalomorph species, and is distributed from Bruce Rock North to Lake Moore (Rix et al. 2018). Although the Central-eastern Wheatbelt Shield-backed Trapdoor Spider is considered as likely to occur within the survey area (Biota 2020), this species is not expected to be present in the project area as it does not represent an appropriate burrow site for the mygalomorph spider. Indeed, the construction and maintenance of trapdoor spider burrows require a reasonably compact and stable substrate that is able to remain cool below the surface and retain moisture (Main 2010). The sandy substrate of the project area does not represent a suitable habitat for the Central-eastern Wheatbelt Shield-backed Trapdoor Spider and the vegetation to be cleared is located in a disturbed area that is invaded by weeds (including Declared Pests) and only a narrow 3 m strip on average is to be cleared. Given the vegetation proposed to be cleared does not represent high quality remnant vegetation, this species is not expected to occur in the project area. The Yorkrakine Trapdoor Spider generally inhabits heath shrubland adjacent to open salmon gum and gimlet woodland. This habitat does not occur within the project area and as discussed above, the existing sandy substrate is not suitable for the construction and maintenance of trapdoor spider burrows. It is therefore unlikely that the Yorkrakine Trapdoor Spider would occur in the project area. It is also worth noting that the choice of microhabitat by a dispersing spiderling is a crucial first step to successful investment in a life-long burrow (Mason et al. 2018). Besides the reasonably compact soil structure, high relative humidity is a physiological requirement for mygalomorphs (Mason et al. 2013) and these requirements cannot be met by the sandy substrate of the project area. Additionally, the upper soil profile of the project area is usually subjected to rainfall run-offs from the road surface and this sudden water flow may result in burrows becoming waterlogged and unusable. Given that Burrows are investments in terms of effort and time to establish and mygalomorph matriarchs can live up to 43 years (Mason et al. 2016), it is highly unlikely that the project area would be selected as a burrow site by the trapdoor spiders. In fact, none of the other trapdoor species recorded during the 2019 survey are located in the project area. Clearing within the project area is thus unlikely to represent a loss of potential habitat for the three trapdoor spider species. The Western Spiny-tailed Skink was reported to inhabit rock crevices and hollow logs. In habitats where logs were present, it was evident that there was a preference for log piles with several overlapping hollow logs (How et al. 1999). This species was previously recorded in the vicinity of the project area, with the nearest sighting dating back to 2008 and located 3 m south of the project area in Korrelocking. According to the biological survey report, an assessment of 'may potentially occur' for this species was determined to take into account that microhabitats in the form of fallen logs may occur in the future. There are no rock crevices or large fallen logs within the strips of vegetation (strips of vegetation average 3 m wide) located in the project area, thus indicating that this species would not occur in the project area. There is evidence to show that *Egernia* species live in stable social aggregations consisting of closely related individuals (adults, sub-adults and juveniles) and appear to utilise chemical cues to recognise group members and allow enhanced vigilance against predators (Chapple 2003). *Egernia* species were also found to display an attachment to a permanent home site which is generally a rock crevice, burrow or tree hollow (Chapple 2003). Other studies have revealed that dispersal in and out of populations is generally low in *Egernia stokesii badia*, indicating the existence of stable populations (How et al. 2003). As a long linear feature in the landscape, the existing Goomalling-Merredin Road would act as a physical barrier to the movement of the Western Spiny-tailed Skink and would also be an ongoing source of disruptive noise and vibration. It is reasonable to assume that the lack of large fallen logs coupled with disturbance associated with the road would impede the establishment of an aggregation

	of Western Spiny-tailed Skinks. Given that there are no suitable refuges in the project area to support a thriving population of the Western Spiny-tailed Skink and this species is known to live in stable social aggregations, it is highly unlikely that individuals would occur in the patchy linear roadside vegetation where the risk of predation is high. Therefore, the project area does not represent any significant habitat value for the Western Spiny-tailed Skink. The are no records of the Chuditch in the locality, the nearest one being 54 km south-west of the project area and dates back to 1899. It has been established that the Chuditch generally needs sizeable areas of woodland habitat (>20,000 ha) to persist (DEC 2012). Given the small size of remnant vegetation occurring in the locality, no resident population is expected to occur within and in the vicinity of the project area. According to Biota (Biota 2020), individual males may potentially occur as transients through the area during the breeding season. Nonetheless, it is highly unlikely that this species would occur as vagrants in the narrow strip of vegetation to be cleared since it has never been recorded within 50 km of the project area and there are no ecological linkages between the vegetation communities along Goomalling-Merredin and habitats where the Chuditch was recorded. The Malleefowl are mainly found in the semi-arid and arid zones of Australia in mallee dominated shrublands or low woodlands (Benshemesh 2007). Despite intensive searches, no recent or historical nesting mounds were found within the survey area during the 2019 biological survey. However, it was considered possible that the species may occur in the survey area on a transitory basis given records in the broader locality. One of the more recent records that is nearest to the project area is a 2006 sighting approximately 942 m north of the project area (near the Wyalkatchem Nature Reserve). Since the project area only consists of narrow strips of vegetation located close to the disturbance associated with roads, the probability that this species would occur as a transient visitor is very low. The Fork-tailed Swift and Peregrine Falcon are almost entirely aerial and while they may fly over the survey area to forage, they would not be reliant on habitats within the project area. Impacts to these species are not anticipated. The Carnaby's Black-Cockatoo generally occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum and wandoo, and in shrubland or kwongan heathland dominated by hakea, dryandra, banksia and grevillea species. Carnaby's Cockatoos are also opportunistic feeders and will utilise introduced food sources, including pine plantations, liquid amber and agricultural crops such as canola, pecan and almond. The project area occurs just east of the modelled breeding distribution of the species (DSEWPaC 2012a, DotEE 2017) with the closest known breeding area (Wongan Hills), located 80 km to the north-west. DBCA data show that this species has rarely been recorded in the locality with the latest sighting of one individual dating back to 2013 in Wyalkatchem. Given that the project area is composed of edge vegetation that does not support any habitat tree (i.e. hollow-bearing trees with a Diameter at Breast Height (DBH) of > 300 mm or > 500 mm, depending on species), the Carnaby's Black-Cockatoo is not expected to be reliant on the existing habitat for food sources or shelter. Therefore, clearing within the project area is unlikely to represent a loss of potential habitat for the Carnaby's Black-Cockatoo. It should be noted that the edge habitats along Goomalling-Merredin Road has less vegetation coverage with thinner and smaller trees and reduced vertical heterogeneity. As a result, there is greater visibility and therefore, a potentially higher predation risk. Based on the findings of the 2019 survey and published information, it is considered that the vegetation of the project area does not provide niches for the establishment of significant fauna species. Consequently, this project is not expected to have any significant impacts on fauna species or fauna habitats.

	Based on the above, the proposed clearing is not likely to be at variance to this Principle.
Methodology	Benshemesh 2007 Biological Survey (Biota 2020) Chapple 2003 DEC (2012) Department of Agriculture, Water and the Environment (DAWE) website DBCA Shapefiles DBCA website DotEE 2017 DSEWPaC 2012 EPA (2016) How et al. 1999 How et al. 2003 Main 2010 Mason et al. 2013 Mason et al. 2016 Mason et al. 2018 Rix et al. 2018

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments	**Proposed clearing is at variance to this Principle**
	The desktop assessment indicated records of two Threatened flora species, namely *Acacia caesariata* and *Eremophila viscida*, within 15 km of the project area. *Acacia caesariata* is listed as a Threatened species under the BC Act. This wattle generally grows as a dense, spreading shrub to 1.6 m tall, and is generally found in mallee scrub and eucalypt woodland, on gritty loams and clays (Western Australian Herbarium, 2020). During the biological survey, 91 individuals of *Acacia caesariata* were recorded in the survey area and eight plants occur in the project area. A review of the DBCA records showed that there are 20 known records of this species in WA extending over a range of 216 km from the project area. These populations are located south of the project area and are clustered along three major state roads and one local road. This distribution would suggest that *A. caesariata* was recorded during flora surveys undertaken along these road arteries. Clearing of eight individuals during construction works is expected to impact approximately 5.26% and 4.73% of *A. caesariata* at the local and regional levels respectively. It should be noted that only a few surveys have been conducted in this area and the occurrence of *A. caesariata* is likely to be more widespread as evidenced by the high number plants found in the survey area (Biota 2020). It is therefore highly likely that with additional flora surveys in the region, more plants of *A. caesariata* would be recorded as suitable habitats occur across the Avon Wheatbelt bioregion as well as the Mallee and Jarrah Forest bioregions. An additional 11 individuals of *Acacia caesariata* are located within 3 m of the project area and the proposal may have potential indirect impacts on these plants through the loss of contiguous habitat. However, *Acacia caesariata* appears to be a robust species that is not adversely affected by disturbance, as evidenced by several records along disturbed road verges (WA Herbarium 2020). In fact, during the 2019 biological survey, this species was observed to grow on the edges of the cleared maintenance zone. Consequently, the plants located just outside of project area are not expected to be impacted by the proposed clearing. Nonetheless, in an

	effort to minimise the indirect impacts to these 11 plants, management measures will be included in the Vegetation Management Plan (Appendix 2) to ensure their protection. An application for the authorisation to take Threatened flora will be submitted to the DBCA and will address the direct and indirect impacts to *Acacia caesariata*. *Eremophila viscida* is a shrub that is 1.2-4 m tall and favours granitic soils or sandy loam over stone gullies and sandplains (Western Australian Herbarium, 2020). A detailed flora survey undertaken during the flowering period of *Eremophila viscida* did not identify this species in the project area (Biota 2020). Given the survey effort, this species is unlikely to occur within the project area. Based on the above, the proposed clearing is at variance to this Principle.
Methodology	Biological Survey (Biota 2020) DBCA shapefiles Florabase (Accessed 10/08/2020)

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments	**Proposed clearing is not at variance to this Principle**
	The desktop assessment did not identify any State listed TECs within the desktop study area. No State listed TECs were recorded within the project area during the survey. Based on the above, the proposed clearing is not at variance to this Principle.
Methodology	Biological Survey (Biota 2020) DBCA shapefiles

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments	**Proposed clearing is at variance to this Principle**
	According to a broad scale mapping undertaken by Beard (Shepherd et al 2001), the project area lies within Vegetation Associations 1049 and 1413, which are described as 'Medium woodland; wandoo, York gum, salmon gum, morrel & gimlet' and 'Shrublands; acacia, casuarina & melaleuca thicket' respectively (Government of Western Australia, 2019).

Pre-European Vegetation Association	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Statewide				
Vegetation Association 1049	833,384.77	56,618.34	6.79	0.41
Vegetation Association 1413	1,679,916.32	1,286,855.48	76.60	13.22
IBRA Bioregion				
Avon Wheatbelt				
Vegetation Association 1049	833,384.77	56,618.34	6.79	0.41
Vegetation Association 1413	546,675.55	174,102.84	31.85	2.33
IBRA Subregion				
Merredin				
Vegetation Association 1049	577,982.14	36,045.59	6.24	0.52
Vegetation Association 1413	546,675.55	174,102.84	31.85	2.33

Local Government Authority				
Shire of Trayning				
Vegetation Association 1049	79,907.02	5,096.97	6.38	0.24
Vegetation Association 1413	27,781.25	3,500.69	12.60	0.95
Shire of Wyalkatchem				
Vegetation Association 1049	115,476.18	7,345.26	6.36	0.62
Vegetation Association 1413	16,161.18	1,587.51	9.82	0.93

Vegetation that has less than 30% remaining is said to represent an area that is significant as a remnant vegetation. The objective of the EPA is to retain more than 30% of the pre-European vegetation cover of each ecological community, as below this threshold, species loss appears to accelerate exponentially at an ecosystem level.

As shown in the table above, Vegetation Association 1049 has 6.24 - 6.79% of its extent remaining at the State, IBRA bioregion, IBRA subregion and local government authority (Shires of Trayning and Wyalkatchem) levels. This vegetation association is therefore considered as a significant remnant vegetation at all levels.
The table also shows that Vegetation Association 1413 has more than 30% of its extent remaining at the State, IBRA bioregion, IBRA subregion levels as indicated in Table 4. However, only 12.6% and 9.82% of this vegetation association persist within the Shires of Trayning and Wyalkatchem respectively. Consequently, this vegetation association is classified as a significant remnant vegetation only at the Local Government Authorities levels.
Based on the biological survey (Biota 2020), it was estimated that 7.64 ha of the vegetation defined for the project area can be classified as Vegetation Association 1049. The available data also indicate that approximately 6.57 ha supports species that broadly align with Vegetation Association 1413. These areas include vegetation patches assessed as being in a Degraded and Completely Degraded condition and they do not satisfy the 'Medium Woodland' and 'Shrublands' descriptions for Vegetation Association 1049 and Vegetation Association 1413 respectively. Taking into account this rationale, 4.65 ha and 5.6 ha of the vegetation mapped within the project area can be considered as representing the significant remnant Vegetation Association 1049 and Vegetation Association 1413 respectively. An analysis of pre-European vegetation and remnant vegetation mapping extents indicate that there are approximately 8333 ha of Vegetation Association 1049 and 3774 ha of Vegetation Association 1413 within the study area. Therefore, within the study area, the impact of clearing 4.65 ha of Vegetation Association 1049 was estimated as 0.06% whilst a 0.15% impact was calculated for Vegetation Association 1413. Consequently, clearing for the project will not significantly impact Vegetation Associations 1049 and 1413.

Given that the project area has a very narrow and linear geometry and the vegetation is predominantly disturbed (Appendix 3), it is unlikely that the removal of a small amount of native vegetation (3 m wide strip on average) along a stretch of 43.2 km will reduce ecosystem functioning or will be a barrier to ecological linkages.

Given the above, the proposed clearing is at variance to this Principle.

Methodology

Aerial photography
Biological Survey (Biota 2020)
DAFWA Shapefiles
EPA (2016)
Government of Western Australia (2018)
Shepherd et al. 2001

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments	Proposed clearing is not at variance to this Principle
	A small number of un-named minor and non-perennial drainage lines intersect the study area, and these would only support water flow following substantial rainfall. These minor drainage lines generally drain into the salt lake systems to the south, particularly the Derdibin Lakes, located nearly 18 km south-southwest of Wyalkatchem; and Sachses Lakes, approximately 21 km south-east of Trayning. The 2019 biological survey did not record any permanent wetlands or perennial watercourses in the project area. Also, no riparian vegetation communities were identified during the survey (Biota 2020). The project area is located within a Proclaimed Surface Water Area (Avon River System). A bed and banks permit will be obtained to conduct works within the un-named minor and non-perennial drainage lines watercourses. Given the absence of permanent wetlands or perennial watercourses in the locality of the project area, it is unlikely that the proposed works will alter or interrupt any natural water flow. Based on the above the proposed clearing is not at variance to this Principle.
Methodology	Biological Survey (Biota 2020) DWER and DBCA shapefiles

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments	Proposed clearing is not at variance to this Principle
	The desktop assessment determined that the soils of the project area have the following characteristics:

Aspect	Risk
Flood Risk	<3% of map unit has a moderate to high flood risk
Salinity	10-30% of map unit has a moderate to high salinity risk
Waterlogging	<3-10% and 50-70% of map unit have a moderate to very high waterlogging risk
Water Erosion	<3-10% of map unit has a high to extreme water erosion risk
Wind Erosion	<3%, 10-30% and 50-70% of map unit have high to extreme water erosion risk
Acid Sulphate Soils (ASS)	Low Probability of Occurrence

As evident from the table above, the project area exhibits predominately low risk of flooding, salinity and water erosion but moderate to high risk of waterlogging and wind erosion.
Data from the biological survey indicate that the project area occurs over sandy soils. This soil type has a relatively good infiltration rate implying that the risk of waterlogging is relatively low. As small areas of native vegetation will be removed along a flat topography and the area to be cleared will be sealed, wind erosion is unlikely to cause any significant deterioration.

	In addition, it is unlikely that acid sulphate soils will be an issue as the area is classified as low risk and there will be no dewatering or excavation below the water table. Consequently, it is unlikely that this project will cause appreciable land degradation because of the minor nature of the road works and most of the existing vegetation will remain after the proposed clearing. Based on the above the proposed clearing is not likely to be at variance to this Principle
Methodology	CSIRO (2014) DAFWA shapefiles

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	A search of ArcGIS shapefiles indicated that there are 10 Nature Reserves in the study area. However, none of these reserves are found in the immediate vicinity of the project area. The nearest ones, namely, Nembudding Nature Reserve and Yelbeni Nature Reserve are located approximately 80 m north of the project area. Both nature reserves are separated from the project area by the railway reserve. Given the small-scale nature of the works and the presence of the rail reserve between the project area and the nearby nature reserves, the proposed clearing is not likely to impact any conservation areas. Based on the above, the proposed clearing is not likely to be at variance to this Principle.
Methodology	DBCA shapefiles

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	A search of ArcGIS shapefiles indicated that the project area intersects a few minor and perennial drainage lines in a Proclaimed Surface Water Area (Avon River System). A bed and banks permit will be obtained to conduct works within the watercourses. These drainage lines would only support water flow following substantial rainfall. The project area does not occur on any Public Drinking Water Source Area or Groundwater Area. It is unlikely that this project will cause a deterioration in the quality of the surface or underground water because of the minor nature of the road works and most of the existing vegetation will remain after the proposed clearing. Based on the above, the proposed clearing is not likely to be at variance to this Principle.
Methodology	DWER and DBCA shapefiles EPA (2016)

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments	**Proposed clearing is not at variance to this Principle**
	The project area receives a moderate annual average rainfall of 329.1 mm (Wyalkatchem, Station No 010140, BoM 2020) and the desktop assessment indicated low risk of flooding but a moderate to high risk of waterlogging in that area due to the presence of minor drainage lines. As the project area is composed predominately of sandy soils, it will have high infiltration rates that will lower the probability of flooding and waterlogging. Furthermore, the project area has a linear and narrow geometry and the removal of a thin segment of native vegetation on each side of the road, makes it unlikely that the incidence or intensity of flooding will increase. Based on the soil properties, small area of native vegetation to be removed and the amount of remaining native vegetation in the surrounding area, it is unlikely that this project will cause or exacerbate the incidence or intensity of flooding. Based on the above the proposed clearing is not at variance to this Principle.
Methodology	Biological Survey (Biota 2020) DAFWA shapefiles

6 SUMMARY OF BIOLOGICAL SURVEYS

Biota Environmental Sciences was commissioned to undertake a biological assessment along Goomalling-Merredin Road between SLK 56-100 (between Wyalkatchem and Trayning). The survey was conducted in October 2019 over a 70 m wide corridor centred on the road.

Below are findings from the survey:

Vegetation and Flora

The detailed vegetation survey included quadrat sampling, mapping of vegetation types and vegetation condition (based on sampling within the survey area, and extrapolation out to a 500 m buffer 'contextual area'). Targeted searches for significant flora were also completed, during which significant weeds (Declared Pests and Weeds of National Significance) were also recorded.

Vegetation mapping

Almost two-thirds of the survey area (192.9 ha, or 63.6%) comprised cleared, modified or otherwise degraded areas. Eleven intact vegetation types, four mosaic vegetation types and eight other units were identified for the remainder of the survey area.

Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC)

The 'Eucalypt Woodlands of the Western Australian Wheatbelt' was identified within the survey area. The extent within the survey area comprised 30.4 ha, which was 17% of the total extent of this Threatened Ecological Community mapped within the broader contextual area. These patches of TEC also correspond to the State-listed Priority Ecological Community of the same name.

Vascular Plant Taxa

A total of 269 native vascular flora taxa from 122 genera and 53 families were recorded from the survey area.

Significant Flora

No Commonwealth listed Threatened flora were recorded, however the State-listed Threatened species *Acacia caesariata* was recorded within the survey area.

The following six State-listed Priority species were also recorded:

- *Dampiera glabrescens* (Priority 1);
- *Dampiera scaevolina* (Priority 1);
- *Grevillea* sp. Trayning (W. Johnston WJ 071) (Priority 1);
- *Acacia ancistrophylla* var. *perarcuata* (Priority 3);
- *Eucalyptus erythronema* subsp. *inornata* (Priority 3) and
- *Grevillea haplantha* subsp. *recedens* (Priority 3).

In addition to the formally listed species, a potentially new species of *Acacia* was recorded, however better material would be required to confirm the identity of this taxon.

Introduced Flora

A total of 46 introduced species were recorded. These included several significant weed species, such as **Asparagus asparagoides* (Bridal Creeper), **Echium plantagineum* (Paterson's Curse), **Opuntia stricta* (Common Prickly Pear), **Genista linifolia* (Flaxleaf Broom), and **Tamarix aphylla* (Athel Tree), but none were abundant in the survey area.

Fauna

The entire length of the survey area was traversed by vehicle as a reconnaissance, before fauna habitats were selected for ground-truthing and fauna sampling. Targeted searching for evidence of potentially occurring significant vertebrate fauna was undertaken when suitable habitat for these species was encountered. Targeted searches were undertaken for both primary evidence (i.e. sightings of individuals) and secondary evidence of occurrence (e.g. tracks, scats, diggings).

Fauna Habitats

Over half of the survey area (175 ha, or 57.7%) comprised cleared or degraded areas of no particular value as fauna habitat. Five fauna habitats were described for the remainder of the survey area:

Eucalypt woodland (56.1 ha), Eucalypt mallee (45.8 ha), *Allocasuarina* woodland (13.5 ha), Shrubland on granite (12.0 ha) and Chenopod plain (0.9 ha).

Significant Fauna

No significant vertebrate fauna were recorded during the field survey. One significant invertebrate species was recorded during the field survey: the Tree-stem Trapdoor Spider (*Idiosoma castellum*) which is a Priority 4 species and was recorded from its distinctive burrows at two locations.

In addition, indeterminate specimens and burrows of the spider genera *Idiosoma* and *Euoplos* were recorded. These may represent significant taxa, however additional collections and/or further genetic analysis would be required to identify these specimens.

One species listed under both the BC Act and EPBC Act was considered likely to occur in the survey area, the Shield-backed Trapdoor Spider (*Idiosoma nigrum*).

The Priority 1 Central-eastern Wheatbelt Shield-backed Trapdoor Spider (*Idiosoma mcnamarai*) were considered likely to occur in the survey area, while the Critically Endangered Yorkrakine Trapdoor Spider (*Kwonkan eboracum*) may potentially occur.

The following significant fauna species may potentially occur but only on occasion to forage or in transit, as the survey area was not considered to represent core habitat: Western Quoll/Chuditch (*Dasyurus geoffroii*), Malleefowl (*Leipoa ocellata*), Fork-tailed Swift (*Apus pacificus*), and Peregrine Falcon (*Falco peregrinus*). While rarely recorded from the locality, there are also eight potential breeding habitat trees for the Endangered Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*). Little micohabitat for the Western Spiny-tailed Skink (*Egernia stokesii badia*) was noted within the survey area, however, it has been recorded within the context area and was assessed as "may potentially occur".

7 ADDITIONAL ACTIONS REQUIRED

Table 6 summarises what further pre-clearing impact assessment and vegetation management is required in accordance with CPS 818.

Table 6. Summary of Additional Management Actions Required by CPS 818

Impact of Clearing	Yes/No or NA	*Further Action Required*
1. The Assessment Report indicates that the clearing is 'Seriously at Variance', At Variance' or 'May be at Variance' with one or more of the clearing principles.	**Yes**	**1.** Submissions are required to be sought from relevant parties. **2.** A VMP is required. The VMP has been provided as Appendix 2.1 of this AR. **3.** An offset proposal has been prepared for submission to DWER. The offset proposal proposes to offset the project clearing impacts through financial contribution to the DWER offsets fund.
2. The PCIA indicates that the clearing is at variance or may be at variance with clearing principle (g) land degradation, (i) surface or underground water quality or (j) the incidence of flooding.	**No**	No further action required.
3. The project involves clearing for temporary works (as defined by the permit under Condition 11 of CPS 818).	**No**	No further action required.
4a. The project is in part of a region that has annual rainfall greater than 400mm and is south of the 26th parallel of latitude. **4b.** The project will require movement of soil in conditions other than dry conditions.	**No**	**4a.** No further action required.
5. Main Roads has been notified by DWER or an environmental specialist that the area to be cleared is susceptible to a pathogen other than dieback	**No**	No further action required.
6. The proposal requires referral to either the WA EPA or the Commonwealth DAWE.	**No**	No further action required.
7a. The vegetation within the area to be cleared and/or the surrounding vegetation in a good or better condition **7b.** Are weeds likely to spread to and result in environmental harm to adjacent areas of native vegetation that are in good or better condition	**Yes**	**7a.** Refer to 7b **7b.** VMP/CEMP requires that all vehicles and machinery arrive on site clean and remain within the extent of the demarcated clearing line. A weed management plan will be prepared to avoid the spread of these weeds.

8 STATEMENT ADDRESSING STAKEHOLDER SUBMISSIONS

Main Roads invited submissions from specified stakeholders, in accordance with condition 7 of CPS 818. Table 7 identifies the stakeholders who were invited to make a submission regarding the impacts of the proposed clearing associated with the project.

Table 7. Summary of Submissions Received from Stakeholders

Name	Position	Agency	Submission Received
Taryn Dayman	Chief Executive Officer	Shire of Wyalkatchem	TBC
Brian Jones	Chief Executive Officer	Shire of Trayning	TBC
Eddy Wajon	Chairman	Wildflower Society of WA	TBC

9 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided then this clearing is kept to a minimum. A VMP has been developed to manage and minimise vegetation clearing for the project (refer to Appendix 2).

10 REFERENCES

Benshemesh, J. (2007). National Recovery Plan for Malleefowl *Leipoa ocellata*. Prepared for the Department for Environment and Heritage, South Australia.

Biota Environmental Sciences (2020). Goomalling-Merredin Road Upgrade (M016) SLK 56-100 Biological Survey, Report prepared for Main Roads WA by Biota Environmental Sciences, July 2020.

Bureau of Meteorology Australia. (2020). Climate Averages for Australian Sites – Wyalkatchem, Station No 010140 – Available online from http://www.bom.gov.au/climate/data/index.shtml Accessed 10/08/2020.

Chapple, D. G. (2003). Ecology, life-history, and behavior in the Australian scincid genus *Egernia*, with comments on the evolution of complex sociality in lizards. *Herpetological Monographs*, 17: 145-180.

CSIRO. (2014). Australian Soil Resource Information System (ASRIS) Database. Available online from http://www.asris.csiro.au Accessed 07/08/2020.

DEC (2012). Chuditch (*Dasyurus geoffroii*) National Recovery Plan. Wildlife Management Program No. 54, Department of Environment and Conservation. Retrieved from http://www.environment.gov.au/biodiversity/threatened/publications/recovery/chuditch/index.html

DotEE (2017). Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Baudin's Cockatoo (*Calyptorhynchus baudinii*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*). Department of the Environment and Energy, Commonwealth of Australia.

DSEWPaC (2012). EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered), *Calyptorhynchus latirostris*; Baudin's cockatoo (vulnerable), *Calyptorhynchus baudinii*; Forest red-tailed black cockatoo (vulnerable), *Calyptorhynchus banksia naso*. Department of Sustainability, Environment, Water, Population and Communities, Commonwealth of Australia.

Environmental Protection Authority (2016). *Technical Guide – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (eds. K Freeman, G Stack, S Thomas and N Woolfrey). Perth, Western Australia.

Government of Western Australia. (2019). 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of April 2019. WA Department of Biodiversity, Conservation and Attractions, Perth. Available online from: https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

How, R.A., Dell, J. and Aplin, K.P. (1999). Assessment of the central wheatbelt populations of the endangered skink, Egernia stokesii badia. Unpublished report to the Department of Conservation and Land Management, Perth. 8 pages.

How, R.A, Dell, J. and Robinson, D. (2003). The Western Spiny-tailed Skink, *Egernia stokesii badia*. *The Western Australian Naturalist* 24:138–146.

Main, B. Y. (2010). Interactions of Water, Plants and Ground-Dwelling Fauna: Water Harvesting and Tapping by Trapdoor Spiders. Landscapes: the Journal of the International Centre for Landscape and Language, 4(1). Retrieved from http://ro.ecu.edu.au/landscapes/vol4/iss1/31.

Mason, L.D., Tomlinson, S., Withers, P.C. and Main, B.Y. (2013). Thermal and hygric physiology of Australian burrowing mygalomorph spiders (*Aganippe* spp). Journal of Comparative Physiology B 183(1):71–82.

Mason, L.D., Wardell-Johnson. G.W. and Main, B.Y. (2016). Quality not quantity: conserving species of low mobility and dispersal capacity in south-western Australia urban remnants. Pacific Conservation Biology 22(1):37–47.

Mason, L.D., Bateman, P.W. and Wardell-Johnson, G.W. (2018). The pitfalls of short-range endemism: high vulnerability to ecological and landscape traps. PeerJ 6:e4715.

Nicolle, D. and French, M.E. (2012). A review of *Eucalyptus erythronema* (Myrtaceae) from the wheatbelt of south-western Australia. *Nuytsia* 22(6):455–463.

Rix, M.G., Huey, J.A., Cooper, S.J.B., Austin, A.D. and Harvey, M.S. (2018). Conservation systematics of the shield-backed trapdoor spiders of the nigrum-group (Mygalomorphae, Idiopidae, Idiosoma): integrative taxonomy reveals a diverse and threatened fauna from south-western Australia. Zookeys 756:1-121. DOI: 10.3897/zookeys.756.24397.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia: Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia, South Perth.

Threatened Species Scientific Committee. (2015). Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt. Department of the Environment, Canberra, Australia.

Western Australian Herbarium (2020). *FloraBase* - The Western Australian Flora. Department of Biodiversity, Conservation and Attractions. Available online from: https://florabase.dpaw.wa.gov.au/ Accessed 10/08/2020.

11 APPENDICES

Appendix	Title
Appendix 1	2019 Biological Survey Report
Appendix 2	Vegetation Management Plan
Appendix 3	Images showing the vegetation condition of the project area

Appendix 1: 2019 Biological Survey Report

Goomalling-Merredin Road Upgrade (M016) SLK 56-100 Biological Survey

D20#606126

Appendix 2: Vegetation Management Plan

GOOMALLING-MERREDIN ROAD (M016) SEAL WIDENING SLK 56-100

Purpose and Scope

This Vegetation Management Plan (VMP) has been prepared by Main Roads for the purpose of managing native vegetation clearing impacts associated with the Goomalling-Merredin Road (M016) Seal Widening SLK 56-100 project.

The project involves the widening of Goomalling-Merredin Road between SLK 56.4 and 99.6 to accommodate a 9 m sealed formation. The aim of this project is to reduce the number of 'run off road' crashes by improving the safety and functionality within this road segment. The works will involve clearing, earthworks, pavement works, sealing, line-marking and new signage. Water and materials will be supplied by the contractor.

In specified circumstances, Main Roads VMP is required to be approved by Department of Water and Environmental Regulation (DWER) as a condition of Main Roads Statewide Clearing Permit CPS 818.

Action

Appendix 2.1 references the standard Principal Environmental Management Requirements (PEMRs) that will be utilised for all projects that involve clearing to avoid, mitigate and manage the environmental impacts of the project.

Project Specific Environmental Management Requirements are addressed in Tables 1-8.

Timeframes

Actions shall be undertaken in accordance with those described in the relevant PEMR and the Project Specific Environmental Management Requirements.

Responsibilities

It is the responsibility of the Superintendent's Contract Management Team that the requirements are implemented by the Contractor. This shall be done by adhering to the Environmental Measurement and Evaluation Checklist.

Appendix 2.1: Vegetation Management

VMP Requirement	Standard Management Action	Specific Management Action
Clearing	Refer to Table 1: Clearing PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan • Specification 301 Vegetation Clearing and Demolition • Environment Measurement and Evaluation Checklist (for release of HOLD POINTS) Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	• Prior to construction, a qualified surveyor will clearly and accurately demarcate the Limits of Vegetation Clearing. • During clearing activities, daily pre-start meetings attended by all clearing crews will thoroughly review and discuss approved clearing maps, planned clearing activities, methodologies and controls to prevent unapproved clearing. These pre-start meetings attendance forms will be signed by all in attendance and forwarded to the Superintendent each day. • The locations of mapped patches of the Eucalypt woodlands TEC/PEC and the requirements to protect the vegetation outside of the pegged clearing line will be clearly communicated through site inductions and pre-start meetings, particularly on dates when clearing is undertaken. • Within the section of the road where *Acacia caesariata* occur, the topsoil will be harvested and spread to locations specified by the DBCA. During clearing, the vegetation and other soil materials in those particular areas will be pushed to the extremes of the proposed table drain backslopes to allow regeneration of seeds in these areas. The pushed vegetation and soil will not be placed on known *Acacia caesariata* locations. • In consultation with DBCA, seed will be harvested from *Acacia caesariata* prior to clearing.

VMP Requirement	Standard Management Action	Specific Management Action
Erosion and Sedimentation Control	Refer to Table 2: Erosion and Sedimentation Control PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Fauna	Refer to Refer to Table 3: Fauna PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	• A fauna spotter will be on site at the time of clearing to check for the presence of fauna species. If fauna species are observed, the fauna spotter will ensure that they find their way to nearby vegetation.
Machinery and Vehicle Management	Refer to Table 4: Machinery and Vehicle Management PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	• Copies of completed Vehicle/Machine Hygiene Checklists will be provided by the contractor within two weeks of completion of site works.
Mulch and Topsoil Management	Refer to Table 5: Mulch and Topsoil Management • Specification 204 Environmental Management • Construction Environmental Management Plan • Specification 301 Vegetation Clearing • Specification 304 Revegetation and Landscaping Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	• Storage, disposal and/or reuse of vegetation, mulch and topsoil materials, including for the segregation of 'clean' materials from 'contaminated' materials (e.g. materials contaminated by weeds) will be planned prior to clearing.
Pegging and Flagging	Refer to Table 6: Pegging and Flagging PEMR	• Areas where the patches of 'Eucalypt Woodlands of the Western Australian Wheatbelt TEC' occur will

VMP Requirement	Standard Management Action	Specific Management Action
	• Specification 204 Environmental Management • Construction Environmental Management Plan • Specification 301 Vegetation Clearing and Demolition Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	be pegged at 10 m intervals and exclusion zones will be demarcated using appropriate flagging. • Significant flora located just outside of the project area boundary will be demarcated and flagged to avoid any indirect impacts to these plants. These areas will be mapped as exclusion zones and these maps will be discussed during site inductions and pre-start meetings.
Water Drainage Management	Refer to Table 7: Water Drainage PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan	Not Applicable
Weed Management	Refer to Table 8: Weed Management PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	• Maps indicating the locations of the significant weeds will be distributed and discussed during the pre-start meeting. • A weed management plan to address measures that will avoid the spread of significant weeds will be prepared. • Where known locations of significant weeds will be cleared, weed control through removal and burial at an approved locations will be undertaken. • Exclusion zones for significant weeds located just outside of the project area will be demarcated and flagged. • Adequate inspections will ensure that all plant and equipment are clean and certified weed free prior to entering the project area.

VMP Requirement	Standard Management Action	Specific Management Action
		• There will be no movement of vegetation, topsoil materials or mulch from areas where the significant weeds occur to other sections of the project area. • Any stockpiles with significant weeds germinating will be disposed of as weedy topsoil. • Any other weeds germinating from stockpiled topsoil will be controlled with herbicide. • Weed monitoring to be undertaken post construction and where weed infestation is evident, herbicide application shall be undertaken to ensure no establishment of declared weed species.
Monitoring	• Specification 204 Environmental Management • Construction Environmental Management Plan • Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	
Auditing	• Specification 204 Environmental Management • Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	

Principal Environmental Management Requirements (PEMR's)

Table 1: Clearing PEMR

STANDARD MANAGEMENT ACTIONS

STANDARD MANAGEMENT REQUIREMENTS
PRE WORKS 1. The Contractor must prepare, implement and maintain processes to ensure that the movement of all vehicles, plant and machinery does not occur outside of the Limits of Vegetation Clearing. This must include all turnaround areas. 2. The Contractor must minimise vegetation clearing and the area of disturbance on ground by utilising existing cleared area where possible.
DURING WORKS 1. The Contractor must report any damage to vegetation beyond the Limits of Vegetation Clearing as an Environment Incident. 2. The Contractor must ensure Movements are confined to the Limits of Vegetation Clearing during the works 3. The Contractor must undertake the clearing in accordance with the Fauna PEMR.
POST WORKS 1. NIL

Table 2: Erosion and Sedimentation

PRE WORKS

1. The Contractor must develop, implement and maintain processes and procedures to ensure that:
   - The Contractor is responsive to and addresses incidents of erosion and sedimentation within and adjacent to the work areas.
   - Prevent water and wind soil erosion within and adjacent to the works areas.
   - Prevent the sedimentation and siltation of watercourses located within and adjacent to the works area.
   - Ensure that sedimentation and siltation of drainage lines due to the removal of riparian vegetation is avoided, minimised and mitigated.
   - Ensure that loose surfaces and recently cleared areas are protected from wind and soil erosion.
   - Minimise exposed soil working surfaces or protect them from stormwater erosion.
   - Ensure material such as gravel, crushed rock and excavated material is stockpiled away from drainage paths and covered to prevent erosion.
   - Ensure that water quality monitoring is undertaken when turbidity and sedimentation is an issue.

DURING WORKS

1. Implement, monitor and adhere to the sedimentation and erosion processes developed to address the requirements in the pre-works.

POST WORKS

1. If required, the Contractor must continue to monitor water quality until the turbidity/sedimentation dissipates.
2. The Contractor must ensure that disturbed areas are stabilised as soon as is practicable after construction activities are completed.

Table 3: Fauna

PRE WORKS

1. The Contractor must ensure that fauna management requirements are communicated to the crew undertaking the clearing works during the induction and pre-start meeting.
2. Where active nests, burrows or dens are identified, works must not proceed until the Contractor obtains the Superintendents approval of the management of active nests, burrows or dens adheres to the Superintendents advice.

DURING WORKS

1. The Contractor must undertake the clearing in the following manner to allow fauna to move out of the clearing area;
   i. Prior to the clearing activities commencing, use machinery to tap large trees with habitat hollows to encourage any animals evacuate.
   ii. Undertake the clearing in one direction and towards areas of native vegetation to allow the animals to escape to adjacent habitat.
2. The Contractor must ensure that all onsite personnel undertake visual monitoring and are vigilant to the presence of fauna. Any sightings of fauna, including injury or fatality, must be reported as an Environmental Incident.
3. The Contractor must ensure that;
   i. No pets, traps or firearms are brought into the project area.
   ii. Fauna are not fed
   iii. Fauna are not intentionally harmed or killed
   iv. Fauna that venture into the work area are encouraged to leave in a manner that does not harm the animal or operator (loud noise, slowly approaching in a vehicle etc.)
4. The Contractor must ensure that in the event that sick, injured or orphaned native wildlife are located on the project site, the WILDCARE Helpline ((08) 9474 9055) will be contacted for assistance. The Contractor must maintain records of any animal taken to a wildlife carer.

POST WORKS

1. The Contractor must provide any records of fauna impact to the Superintendent.

Table 4: Machinery and Vehicle Management

PRE WORKS

1. The Contractor must ensure that all areas associated with the storage, parking, servicing, wash down and refuelling of all vehicles, plant and machinery is located within the Limits of Clearing and approved by the Superintendent.
2. The Contractor must ensure that all vehicles, machinery and plant are clean on entry (i.e. free of all soil and vegetation material) and comply with the requirements of 204.B.32.
3. The Contractor must ensure that vehicle servicing and refuelling will be undertaken at designated areas approved by the Superintendent.
4. The Contractor must ensure that all staff suitably qualified and competent to undertake works, especially refuelling activities.

DURING WORKS

1. The Contractor must maintain records of checking all vehicles, machinery and plant are clean on entry.

POST WORKS

Table 5: Mulch and Topsoil Management

PRE WORKS

1. The Contractor must ensure that the movement of soil and vegetation is only undertaken in dry conditions unless otherwise approved and / or directed by the Superintendent.
2. The Contractor must ensure that poor quality topsoil and mulched vegetation does not contaminate the good quality topsoil and vegetation.

DURING WORKS

1. The Contractor must ensure that all machinery used in the removal of weed-infested topsoil must be cleaned down before and between operations to prevent the introduction and spread of weeds.
2. The Contractor must ensure the movement of large equipment over topsoil materials is avoided to minimise compaction.
3. The Contractor must ensure that Dieback and weed infected topsoil and mulch vegetation must be handled separately to minimise the risk of spreading dieback and weed species across the site and stockpiles.
4. The Contractor must ensure that stockpiling operations must occur in a manner to ensure that the properties of the topsoil are not degraded and the topsoil made unsuitable for use in revegetation.

POST WORKS

Table 6: Pegging and Flagging

PRE WORKS

1. Pegging must be done in accordance with the requirements detailed in Specification 301.
2. The Contractor must clearly communicate, either at the pre-start meeting or equivalent, to the crew undertaking the clearing works, through clear maps and other additional means, what the Pegging represents.

DURING WORKS

1. The Contractor must peg the Limits of Clearing by PINK flagging tape.
2. The Contractor peg/demarcate vegetation proposed to be retained is demarcated by WHITE flagging tape.
3. The Contractor must ensure that the vegetation demarcated with PINK and WHITE flagging tape is consistent with the approved clearing areas.

POST WORKS

1. The Contractor remove and dispose of appropriately any demarcation, pegging or flagging once project works are completed.

Table 7: Water Drainage

PRE WORKS

1. Use pollution control and containment strategies for project activities in Public Drinking Water Source Areas (PDWSAs) / Underground Water Pollution Control Areas (UWPCAs) and liaise with the DWER where necessary

DURING WORKS

1. Existing natural drainage paths and channels along the road or the vicinity of the project area will not be unnecessarily blocked or restricted.
2. Temporary drainage systems may be installed to carry surface water away from the areas where excavation and foundation construction work is taking place or from any other area where the accumulation of water could cause delay or damage to the work.
3. Maintain these drainage systems in proper working order at all times.
4. Runoff from disturbed areas must be managed to minimise adverse impacts on surrounding vegetation, watercourses and properties.
5. Booms and silt fences must be used when working over or adjacent to areas of surface water in order to protect the quality of surface water from construction impacts.

POST WORKS

1. Water quality monitoring to be undertaken (if turbidity/ sedimentation is an issue).

2. Prior to backfilling the completed pipe work certify that the entire system is flushed clean and tested
3. Disturbed areas will be stabilised soon after construction activities are completed.
4. Culvert and drainage structures will be free of all grass, weeds, silt and debris

Table 8: Weed Management

PRE WORKS

1. The Contractor must remove or kill any weeds growing in project area that are likely to spread and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.
2. The Contractor must develop, implement and maintain procedures to identify and control declared and invasive weed species within the Contract areas, to the satisfaction of the Superintendent.
3. The Contractor must prepare a weed control program, for nominated weed species for control and disposal, to the satisfaction of the Superintendent.
4. The Contractor must undertake weed management in Stockpiles as directed by the Superintendent.

DURING WORKS

1. The Contractor must implement the weed control procedures and management plan and record and manage records of its implementation.
2. The Contractor must treat nominated weed infestations as many times as necessary to control and eradicate the weed species in accordance with the approved weed control program
3. The contractor must ensure that no known weed, pest or diseased affected soil, mulch, fill or other material is brought into the Site.

POST WORKS

1. The relevant Vegetation Maintenance Record Sheets available at: https://www.mainroads.wa.gov.au/BuildingRoads/Contracting/Pages/ReportingForms.aspx must be completed and sent to the Superintendent.

Appendix 3: Vegetation along Goomalling-Merredin Road

Image facing east and shows vegetation representative of area near the town of Wyalkatchem

Image facing east and shows vegetation representative of area near the town of Korrelocking

Image facing east and shows vegetation near Fenwick Road

Image facing east and shows vegetation representative of area near Nembudding Nature Reserve

Image facing east and shows vegetation representative of area near the town of Yelbeni

Image showing vegetation in the vicinity of the intersection of Gale Road and Nungarin-Wyalkatchem Road

Image facing east and showing vegetation near Huandanning Road

Image facing east and showing vegetation near the town of Trayning

Image facing east and showing area has been mapped as the Eucalypt Woodlands of the Western Australian Wheatbelt TEC between Swamp Well Road and Travers Road. The footprint has been reduced in these sections of the road and minimal vegetation clearing will be undertaken in this area.

Image facing east and showing vegetation mapped as being in an Excellent condition near the town of Korrelocking. As can be seen in the image the strip of vegetation located in close proximity to the road is not in an excellent condition.

Image facing east and showing vegetation located between Allan Road and Nembudding Nature Reserve and mapped as being in an Excellent condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in an excellent condition.

Image facing east and showing vegetation located between Allan Road and Nembudding Nature Reserve and mapped as being in an Excellent condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in an excellent condition.

Image facing east and showing vegetation located between Allan Road and Nembudding Nature Reserve and mapped as being in an Excellent condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in an excellent condition.

Image facing north and showing vegetation located 3 km south-east of Yelbeni and mapped as being in an Excellent condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in an excellent condition.

Image facing east and showing vegetation located near the town of Yelbeni and mapped as being in an Excellent condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in an excellent condition.

Image facing north and showing vegetation located near the town of Wyalkatchem and mapped as being in a Very Good condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in a Very Good condition.

Image facing north and showing vegetation located near the town of Korrelocking and mapped as being in a Very Good condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in a Very Good condition.

Image facing east and showing vegetation located near Fenwick Road and mapped as being in a Very Good condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in a Very Good condition.

Image facing east and showing vegetation located near the town of Trayning and mapped as being in a Very Good condition. As can be seen in the image the strip of vegetation located in close proximity to the road is not in a Very Good condition.

Western Australian Planning Commission

Our Ref : 1117-20
Previous Ref :
Your Ref :
Enquiries : Rosa Rigali (6551 9306)

20 August 2020

Application No: 1117-20 - Lot No 298 Flint Street Wyalkatchem

The Western Australian Planning Commission has received an application for planning approval as detailed below. Plans and documentation relating to the proposal are attached. The Commission intends to determine this application within 90 days from the date of lodgement.

Please provide any information, comment or recommended conditions pertinent to this application by 1 October 2020 being 42 days from the date of this letter. The Commission will not determine the application until the expiry of this time unless all responses have been received from referral agencies. If your response cannot be provided within that period, please provide an interim reply advising of the reasons for the delay and the date by which a completed response will be made or if you have no comments to offer.

Referral agencies are to use the Model Subdivision Conditions Schedule in providing a recommendation to the Commission. Non-standard conditions are discouraged, however, if a non-standard condition is recommended additional information will need to be provided to justify the condition. The condition will need to be assessed for consistency against the validity test for conditions. A copy of the Model Subdivision Conditions Schedule can be accessed: www.dplh.wa.gov.au

Send responses via email to referrals@dplh.wa.gov.au. **Always quote reference number "1117-20" when responding.**

This proposal has also been referred to the following organisations for their comments: *Western Power, Water Corporation, Telstra, Dept Biodiversity, Conser & Attraction and LG Shire Of Wyalkatchem.*

Yours faithfully

Ms Sam Fagan
Secretary
Western Australian Planning Commission

APPLICATION DETAILS

Application Type	Survey Strata	***Application No***	1117-20
Applicant(s)	Jurovich Surveying		
Owner(s)	Wyalkatchem Senior Citizens' Homes Trust Inc		
Locality	Lot No 298 Flint Street Wyalkatchem		
Lot No(s).	298	***Purpose***	Residential,Common Property

Western Australian Planning Commission

Location		***Local Gov. Zoning***	Residential,Public Purposes - Police
Volume/Folio No.	1410/263	***Local Government***	Shire Of Wyalkatchem
Plan/Diagram No.	180377	***Tax Sheet***	
Centroid Coordinates	mE mN		
Other Factors	THREATENED ECOLOGICAL COMMUNITY BUFFER, THREATENED FAUNA BUFFER		

WESTERN AUSTRALIA

REGISTER NUMBER	
298/DP180377	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	15/7/2006

VOLUME 1410 FOLIO 263

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 298 ON DEPOSITED PLAN 180377

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

WYALKATCHEM SENIOR CITIZENS' HOMES TRUST INC OF CARE OF WYALKATCHEM SHIRE COUNCIL OF POST OFFICE BOX 42, WYALKATCHEM

(XE A000001A) REGISTERED 1/1/0001

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

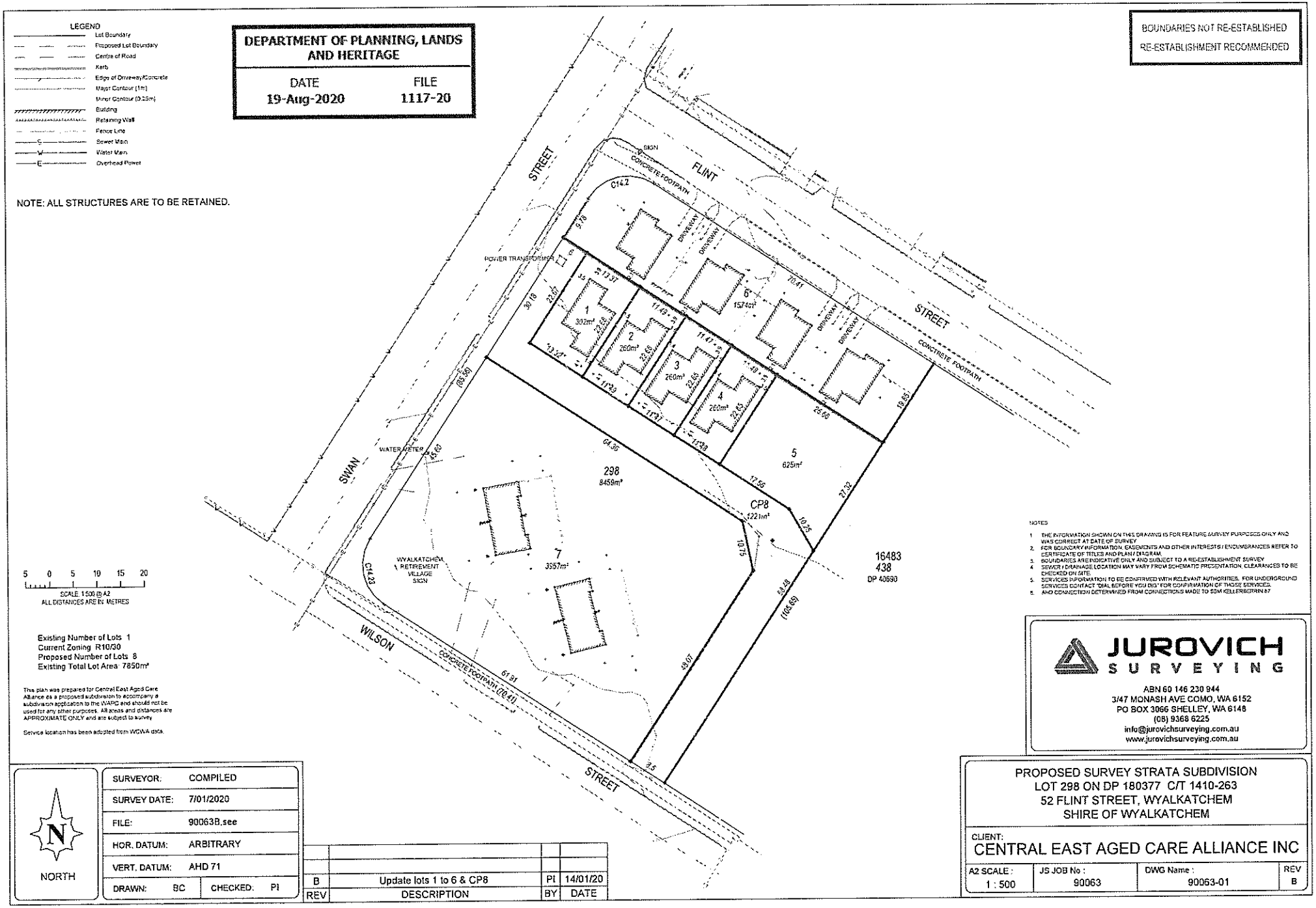
STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1410-263 (298/DP180377)
PREVIOUS TITLE:	1410-263
PROPERTY STREET ADDRESS:	52 FLINT ST, WYALKATCHEM.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF WYALKATCHEM

NOTE 1: A000001A LAND PARCEL IDENTIFIER OF WYALKATCHEM TOWN LOT/LOT 298 (OR THE PART THEREOF) ON SUPERSEDED PAPER CERTIFICATE OF TITLE CHANGED TO LOT 298 ON DEPOSITED PLAN 180377 ON 10-JUL-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF TITLE.

NOTE 2: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE OF TITLE OR ON THE CURRENT EDITION OF DUPLICATE CERTIFICATE OF TITLE.


LEGEND
Lot Boundary
Proposed Lot Boundary
Centre of Road
Kerb
Edge of Driveway/Concrete
Major Contour (1m)
Minor Contour (0.25m)
Building
Retaining Wall
Fence Line
Sewer Main
Water Main
Overhead Power
DEPARTMENT OF PLANNING, LANDS AND HERITAGE
DATE 19-Aug-2020
FILE 1117-20
BOUNDARIES NOT RE-ESTABLISHED
RE-ESTABLISHMENT RECOMMENDED
NOTE: ALL STRUCTURES ARE TO BE RETAINED.
FLINT STREET
SWAN STREET
WILSON STREET
SIGN
CONCRETE FOOTPATH
DRIVEWAY
POWER TRANSFORMER
WATER METER
WYALKATCHEM RETIREMENT VILLAGE SIGN
1 302m²
2 260m²
3 260m²
4 260m²
5 625m²
6 1574m²
7 3557m²
298 8459m²
CP8 1221m²
16483 438 DP 40690
5 0 5 10 15 20
SCALE: 1:500 @ A2
ALL DISTANCES ARE IN METRES
Existing Number of Lots 1
Current Zoning R10/30
Proposed Number of Lots 8
Existing Total Lot Area 7850m²
This plan was prepared for Central East Aged Care Alliance as a proposed subdivision to accompany a subdivision application to the WAPC and should not be used for any other purposes. All areas and distances are APPROXIMATE ONLY and are subject to survey
Service location has been adopted from WCWA data.
NOTES
1. THE INFORMATION SHOWN ON THIS DRAWING IS FOR FEATURE SURVEY PURPOSES ONLY AND WAS CORRECT AT DATE OF SURVEY.
2. FOR BOUNDARY INFORMATION, EASEMENTS AND OTHER INTERESTS / ENCUMBRANCES REFER TO CERTIFICATE OF TITLES AND PLAN / DIAGRAM.
3. BOUNDARIES ARE INDICATIVE ONLY AND SUBJECT TO A RE-ESTABLISHMENT SURVEY
4. SEWER / DRAINAGE LOCATION MAY VARY FROM SCHEMATIC PRESENTATION. CLEARANCES TO BE CHECKED ON SITE.
5. SERVICES INFORMATION TO BE CONFIRMED WITH RELEVANT AUTHORITIES. FOR UNDERGROUND SERVICES CONTACT "DIAL BEFORE YOU DIG" FOR CONFIRMATION OF THOSE SERVICES.
6. AHD CONNECTION DETERMINED FROM CONNECTIONS MADE TO SSM KELLERBERRIN 87
JUROVICH SURVEYING
ABN 60 146 230 944
3/47 MONASH AVE COMO, WA 6152
PO BOX 3066 SHELLEY, WA 6148
(08) 9368 6225
info@jurovichsurveying.com.au
www.jurovichsurveying.com.au
NORTH
SURVEYOR: COMPILED
SURVEY DATE: 7/01/2020
FILE: 90063B.sec
HOR. DATUM: ARBITRARY
VERT. DATUM: AHD 71
DRAWN: BC CHECKED: PI
REV DESCRIPTION BY DATE
B Update lots 1 to 6 & CP8 PI 14/01/20
PROPOSED SURVEY STRATA SUBDIVISION
LOT 298 ON DP 180377 C/T 1410-263
52 FLINT STREET, WYALKATCHEM
SHIRE OF WYALKATCHEM
CLIENT:
CENTRAL EAST AGED CARE ALLIANCE INC
A2 SCALE: 1 : 500
JS JOB No : 90063
DWG Name : 90063-01
REV B

Location Plan for:
Survey Strata Application

This data is to be used only for the processing of a Survey Strata Application

Application Number: **1117-20**
Decision: Outstanding
Printed: 19/08/2020

Western Australian Planning Commission

Produced by Data Analytics,
Department of Planning, Lands and Heritage, Perth WA

Base information supplied by
Western Australian Land Information Authority SLIP 1096-2018-1

Application Status
- Outstanding

Existing LPS Zones and Reserves
- R Code boundaries
- Commercial
- Light industry
- Parks and recreation
- Public purposes
- Railway
- Residential
- Rural

Easements and Referrals

Region Scheme Reserves

Localities & Local Government Boundaries
- Local government boundary
- Locality

N

0 10 20 30 40
metres

Department of Planning | eLodgement

Western Australian Planning Commission

Application for Approval of Freehold or Survey Strata Subdivisions

Lodgement ID: 2020-218786

Your Reference	90063
Location of Subject Property	52 Flint Street, Wyalkatchem
No. of applicants	1
Are you applying on your own behalf?	No
Are you the primary applicant?	No
Do you have consent to apply from all landowners?	Yes
Lodgement Type	Survey Strata
Submitted by	Gordon Jones
Email	info@jurovichsurveying.com.au

DEPARTMENT OF PLANNING, LANDS AND HERITAGE

DATE	FILE
19-Aug-2020	1117-20

About the land

Number of current lots on the land	1	**Total number of proposed lots on the land including balance lots**	8
Drainage Reserves	0	**Public Access Ways**	0
Recreation Reserves	0	**Right of Ways**	0
Road Reserves	0	**Road Widening**	0
Number of fee paying lots	8	**Number of fee exempt lots**	0

What is the proposed use/development?

Proposed Use	Lot size	Number of Lots
Residential	3000 - 3999 Sqm	1
Residential	235 - 319 Sqm	4
Residential	600 - 699 Sqm	1
Residential	1500 - 1999 Sqm	1
Common Property	1000 - 1499 Sqm	1

Local Government	Shire Of Wyalkatchem	**Existing dwellings**	Yes
Is common property proposed	Yes		

Applicants

Primary applicant (1)

Is the applicant a company/organisation?	Yes	**Is the applicant a landowner?**	No
Name/Company	Jurovich Surveying	**ABN / ACN**	60146230944
Email	mjackson@jurovichsurveying.com.au	**Phone number**	0893686225

Address

Street address	3/47 Monash Avenue	**Town / Suburb or City**	Como
State	WA	**Post Code**	6152
Country	AUSTRALIA	**OR Non-Australian Address, P.O. Box, & etc**	N/A

Certificate of Title Details

Lots with certificate (1)

Volume	1410	**Folio**	263
Lot Number	298	**Plan Number**	180377
Total land area	8459	**Land Area Units**	Square metres
Reserve number (if applicable)	N/A	**No. of landowners**	1

Is the Landowners name different to that shown on the Certificate of Title? No

Landowners

Landowner (1)

Full name	N/A	**Company / Agency**	Wyalkatchem Senior Citizens' Homes Trust Inc
ACN / ABN	51 033 590 996	**Landowner type**	Sole Company

Address

Street address	42	**Town / Suburb or City**	Wyalkatchem

State	WA	**Post code**	6485
Country	AUSTRALIA	**OR Non-Australian Address, P.O. Box, & etc**	N/A

Company signatory 1

First name	Last name	Position
Dale	Tyler	Chairperson

Company signatory 2

First name	Last name	Position
Only	Signatory	NA

Subdivision detail

Number of dwellings	10	**Dwelling retained**	Yes
Dwelling description	All structures are to be retained.		
Number of outbuildings/structures	0	**Structure/s retained**	Yes
Other description	N/A		
Structure description	All structures are to be retained.		

Is a battleaxe lot/s proposed?	No
Does plan show the width and length of the access leg, the area of the access leg and total area of the rear lot	Yes
Has the land ever been used for potentially contaminating activity	No
Does the land contain any sites that have been classified under the Contaminated Sites Act 2003	No
Does the land contain any sites that have been reported or required to be reported under the Contaminated Sites Act 2003	No
Is the land located in an area where site characteristics or local knowledge lead you to form the view that there is a significant risk of acid sulfate soils in this location	No
Is this application to be assessed under the Liveable Neighbourhoods policy and is supporting documentation attached?	No
Is the development with in a Bushfire Prone Area?	N/A
Are there any dewatering or drainage works proposed to be undertaken	No
Is excavation of 100 cubic metres or more of soil proposed	No
If yes did the Acid Sulfate Soils investigation indicate acid sulfate soils were present	No
Is a Termination Proposal Attached	No
Is a Strata Company Resolution Attached	No

Fee & Payment

Fee amount	$3,943.00	**Payment Type**	By Anyone

Attachments

Attachment name	Attachment type
1. 90063-01B-prosup-3.pdf	Subdivision Plan
2. Certificate of Title with Sketch 1410-263 52 Flint Street_ WYALKATCHEM 6485 - Certificate of Title 1410-263-1.pdf	Certificate of Title
3. Form_1A_CheckList-4.pdf	Required Information about the Proposal
4. WAPC CONSENT-2.pdf	Authorised Letter of Consent

7 Required information about the proposal

An application may not be accepted and will be returned to the applicant with the submitted fee if the requirements are incorrect or incomplete.

General information required for all applications

1.	Subdivision plans are based on an accurate and up-to-date feature survey that includes existing ground levels relative to AHD or topography of the subject lot/s. A feature survey is not required for amalgamation approval.	✓ Yes	
2.	Relevant copies of the subdivision plans and supporting documentation or accompanying information are attached.	✓ Yes	
3.	The subdivision plan is capable of being reproduced in black and white format.	✓ Yes	
4.	The subdivision plan is drawn to a standard scale (ie 1:100, 1:200, 1:500, 1:1000) at A3 or A4.	✓ Yes	
5.	All dimensions on the subdivision plan are in metric standard.	✓ Yes	
6.	The north point is shown clearly on the subdivision plan.	✓ Yes	
7.	The subdivision plan shows all lots or the whole strata plan (whichever is applicable).	✓ Yes	
8.	The subdivision plan shows all existing and proposed lot boundaries.	✓ Yes	
9.	The subdivision plan shows all existing and proposed lot dimensions (including lot areas).	✓ Yes	
10.	The subdivision plan shows the lot numbers and boundaries of all adjoining lots.	✓ Yes	
11.	For battleaxe lots, the subdivision plan shows the width and length of the access leg, the area of the access leg and the total area of the lot.	Yes	✓ n/a (battleaxe lot not proposed)
12.	The subdivision plan shows the name/s of existing road/s.	✓ Yes	
13.	The subdivision plan shows the width of proposed road/s.	Yes	✓ n/a (no road proposed)
14.	The subdivision plan shows all buildings and/or improvements, including driveways and crossovers (including setbacks) which are to be retained, or removed.	✓ Yes	n/a (land is vacant)
15.	The subdivision plan shows all physical features such as watercourses, wetlands, significant vegetation, flood plains and dams.	Yes	✓ n/a (land does not contain such features)
16.	The subdivision plan shows all electrical, sewer and water infrastructure. For on-site sewage disposal, the indicative disposal areas for wastewater distribution are to be shown.	✓ Yes	

17. Additional information required in the case of applications for residential infill subdivision within existing residential zoned areas

Applications which propose to create two or more residential lots in existing residential areas must show all existing features (in addition to item 16 above) located in the road reserve/s adjoining the subject land and all existing improvements on the subject land and including:

- driveways and crossovers
- kerb lines
- manholes
- bus stops
- gully pits
- boundary setbacks for dwelling/s to be retained
- fencing
- street trees
- water supply
- swimming pools
- pedestrian paths
- retaining walls
- telecommunication pillars
- electricity transmission lines and poles
- sewer, water and electricity connections
- on-site sewage disposal systems, including treatment and wastewater disposal areas

The WAPC has published a guide to applications and fees to assist applicants preparing to submit applications. The guide and other information about the planning system is available online:

www.dplh.wa.gov.au

Transport impacts

Transport Impact Statements and Transport Impact Assessments are required to determine the likely transport impact of a proposal. Information to assist proponents is available on the DPLH website at www.dplh.wa.gov.au/policy-and-legislation/state-planning-framework/fact-sheets,-manuals-and-guidelines/transport-impact-assessment-guidelines

1. Are there 10 - 100 vehicle trips in the subdivision's peak hour? Yes ✓ No
   If yes, a transport Impact statement is to be provided
2. Are there more than 100 vehicle trips in the subdivision's peak hour? Yes ✓ No
   If yes, a transport impact assessment is to be provided.

Access to/from right-of-way or private road

Access is to be provided from an existing right of way or private road. Yes ✓ No

If you indicate 'yes', you must provide a copy of the plan or diagram of survey on which the subject right-of-way was created to confirm its exact width and whether a right of access exists. Right of access may be an easement under section 167A of the *Transfer of Land Act 1893*, an implied easement for access or other arrangement.

Road and rail noise

Is the proposal within the trigger distance of a strategic transport route as defined by State Planning Policy 5.4? Yes ✓ No

Contaminated sites

Information to assist applicants to respond to the following questions is on the Department of Water and Environmental Regulation (DWER) website at www.der.wa.gov.au/your-environment/contaminated-sites.

1. Has the land ever been used for a potentially contaminating activity? Appendix B of Assessment and Management of Contaminated Sites (DWER Contaminated sites guidelines) lists potentially contaminating industries, activities and land uses. The list is not exhaustive. Yes ✓ No

If yes, please attach details of the activities/uses.

2. Does the land contain any site or sites that have been classified under the *Contaminated Sites Act 2003*? Yes ✓ No
3. Does the land contain any site or sites that have been reported or are required to be reported under the *Contaminated Sites Act 2003*? Yes ✓ No

If you indicated 'yes' to question 2 or 3 you must provide a Basic Summary of Records (BSR). Where a BSR is not available from the public Contaminated Sites Database, the form requesting a BSR from DWER is available online at www.der.wa.gov.au/your-environment/contaminated-sites/57-forms or by calling DWER on 1300 762 982.

If a BSR is not available, a copy of the letter from DWER notifying the applicant that the site or the sites are under assessment must be provided, followed by the BSR when available.

Is a BSR or letter from DWER attached? Yes ✓ No

Information requirements for Liveable Neighbourhoods

Subdivision applications proposing to create 20 or more lots on greenfield and urban infill sites will be assessed against the requirements of Liveable Neighbourhoods.

Such applications should be supported by documentation addressing the relevant criteria of Liveable Neighbourhoods, as identified in the application guidelines within the policy document.

Is this application to be assessed under the Liveable Neighbourhoods policy and is supporting documentation attached? Yes ✓ No

Acid sulfate soils

Is the land located in an area where site characteristics or local knowledge lead you to form the view that there is a significant risk of disturbing acid sulfate soils at this location? Yes ✓ No

Bushfire Prone Areas

Is all, or a section of the subdivision in a designated bushfire prone area? Yes ✓ No

If 'yes', has a BAL Contour Map been prepared; and

If the BAL Contour Map indicates areas of the subject site as BAL-12.5 or above, has a Bushfire Management Plan been provided with the application? Yes ✓ No

If NA is selected and the proposal is in a designated bushfire prone area then a statement advising why SPP 3.7 does not apply should be included. n/a

On-site sewage disposal

Is on-site sewage disposal proposed? Yes ✓ No

If yes, proposals for on-site sewage disposal should be accompanied by a site and soil evaluation as per the Government Sewerage Policy. n/a (Greater than 4ha)

Has a site and soil evaluation been provided? If no, then a statement is to be provided as to why an evaluation has not been provided.

Information on preparing site and soil evaluations may be found on the Department of Health's website https://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/water/Wastewater/Site-Soil-Evaluation.pdf

Survey Strata Title lots

Is strata title subdivision proposed?

If yes, either the plan of subdivision or accompanying servicing plan is to show the indicative internal sewer and water connections to each lot. ✓ Yes No

If applicable, easements are to be shown.

Information on the water and sewer detail for survey-strata lots to be shown can be found on the Department of Mines, Industry Regulation and Safety website: www.commerce.wa.gov.au/publications/plumbers-technical-note-services-survey-strata-lots-0

NEXT