

Post Closure Rehabilitation Plan – Pingrup Refuse Site

Shire of Kent



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Acknowledgements

ASK Waste Management acknowledges the Traditional Owners of the land in which we work and live, and pays respects to Elders past, present, and emerging.

ASK also gratefully acknowledge the cooperation of the Shire of Kent staff that provided information and assistance in the development of this report.

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1 INTRODUCTION

This Post Closure Rehabilitation Plan 2022 (PCRP or the Plan) has been prepared to satisfy regulation 17 of the *Environmental Protection (Rural Landfill) Regulations 2002* (the Regulations). It contains a plan for the rehabilitation of the site after landfilling on the site has ceased and contains:

- Site overview
- Current site layout
- Future use of the site after it has ceased to be a landfill site
- A conceptual site layout design for future use of the site
- Capping and closure design which includes:
 - the estimated final contours of the site, cap design, vegetation, and drainage systems
- Post closure management and monitoring requirements

Following the Regulations, the plan should have been submitted to the Chief Executive Officer of DWER for approval within 18 months of the site being registered. The site was registered as a Category 89 landfill in 2004.

A Post Closure Rehabilitation Plan was developed for the site in 2007; however, neither DWER nor the Shire of Kent (the Shire) have records of this plan being submitted.

This 2022 PCRP reviews and updates the previous 2007 plan to ensure compliance with the Regulations.

2 SITE OVERVIEW

The Shire operates the Pingrup Refuse Site and Transfer Station, located approximately 2km west of Pingrup on Crown Reserve 45153 Sanderson Street Pingrup. The site has been operated by the Shire of Kent after being commissioned in approximately 1924. The site was registered as a Category 89 landfill in 2004. The site is 14.1 hectares in size.

The site currently has a slight fall from west to east with a salt lake forming part of the eastern boundary. The lake area on the site was first used as a convenient location for refuse disposal with a road being constructed directly from the townsite to the lake. It is estimated that 25% of the salt lake has been reclaimed through landfill (PCMP, 2007). In later years when landfill trenches became the preferred method of refuse disposal, the lake area continued to be used as a site mostly for metal and green waste until it was closed in 2006 for any disposals. All other refuse was disposed of in the trenching system on site.

Trenching and fill have been used for many years. There are no records of historic waste disposal areas on site, but it is understood that a substantial portion of the site contains buried waste that has already been capped, closed and revegetated.

The general landscape of the site has minimal vegetation with some areas undergoing natural regrowth of shrubs.

An aerial image of the facility and relevant detail is contained in **Figure 2.1** and **Figure 2.2**.

Figure 2.1 Pingrup Refuse Site aerial image (Google Maps 2021)

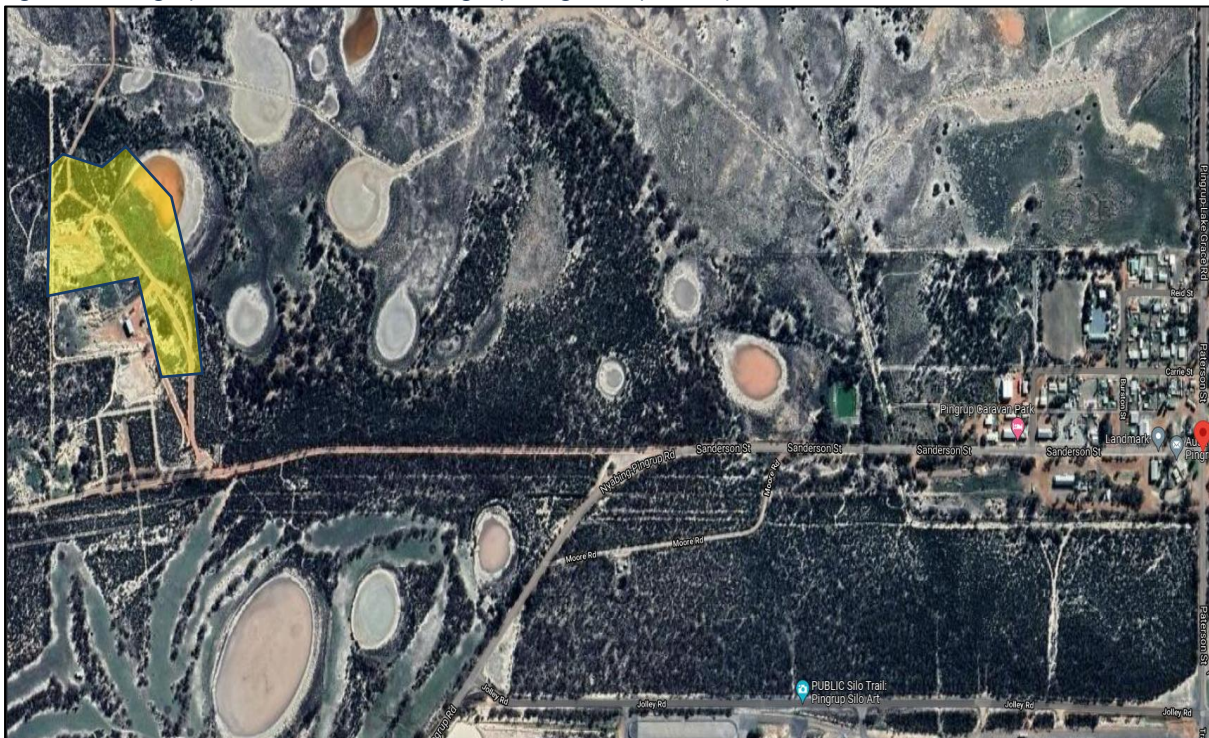


Figure 2.2 Pingrup Refuse Site infrastructure



3 CURRENT SITE LAYOUT

The current site services and infrastructure are summarised in **Table 3.1**.

Table 3.1 Pingrup Refuse Site attributes

Waste types accepted	Greenwaste, Commercial Bulk Waste/Builders Demolition Waste, Commercial Liquid Waste, Asbestos, and Commercial/General Putrescible Waste.
Infrastructure on site	Storage shed, waste transfer station building, general waste bins(30m ³), waste oil disposal facility, drummuster compound, solar panel and battery, CCTV, and signage.
Cell construction	Below ground trenches.
Remaining capacity	Most of the site has already been used for below-ground landfilling. The remaining virgin ground will not meet Environmental Protection (Rural landfill) Regulations 2002 siting requirements due to proximity of groundwater (0.5m – 3mbgl).
Roads	Gravel roads.
Equipment	None on site.
Utilities	There is no mains water supply or electricity connection (solar panel and battery storage system used to operate gate and CCTV).
Residential receptors	Closest residence 2km away.

Since its inception, the site has been unstaffed and unsecured. The Shire recently secured access to the facility through a gated swipe card access system to prevent non-ratepayers from exploiting free waste disposal at the site.

The current site layout is provided in **Figure 3.2**, which includes a transfer station shed structure that was constructed as part of a grant-funded program. The structure's design includes a raised drop-off platform that allows for the placement of a bulk bin below the platform for residents to dispose of waste. The area within the shed is sealed concrete and the shed has three sides to provide all-weather access.

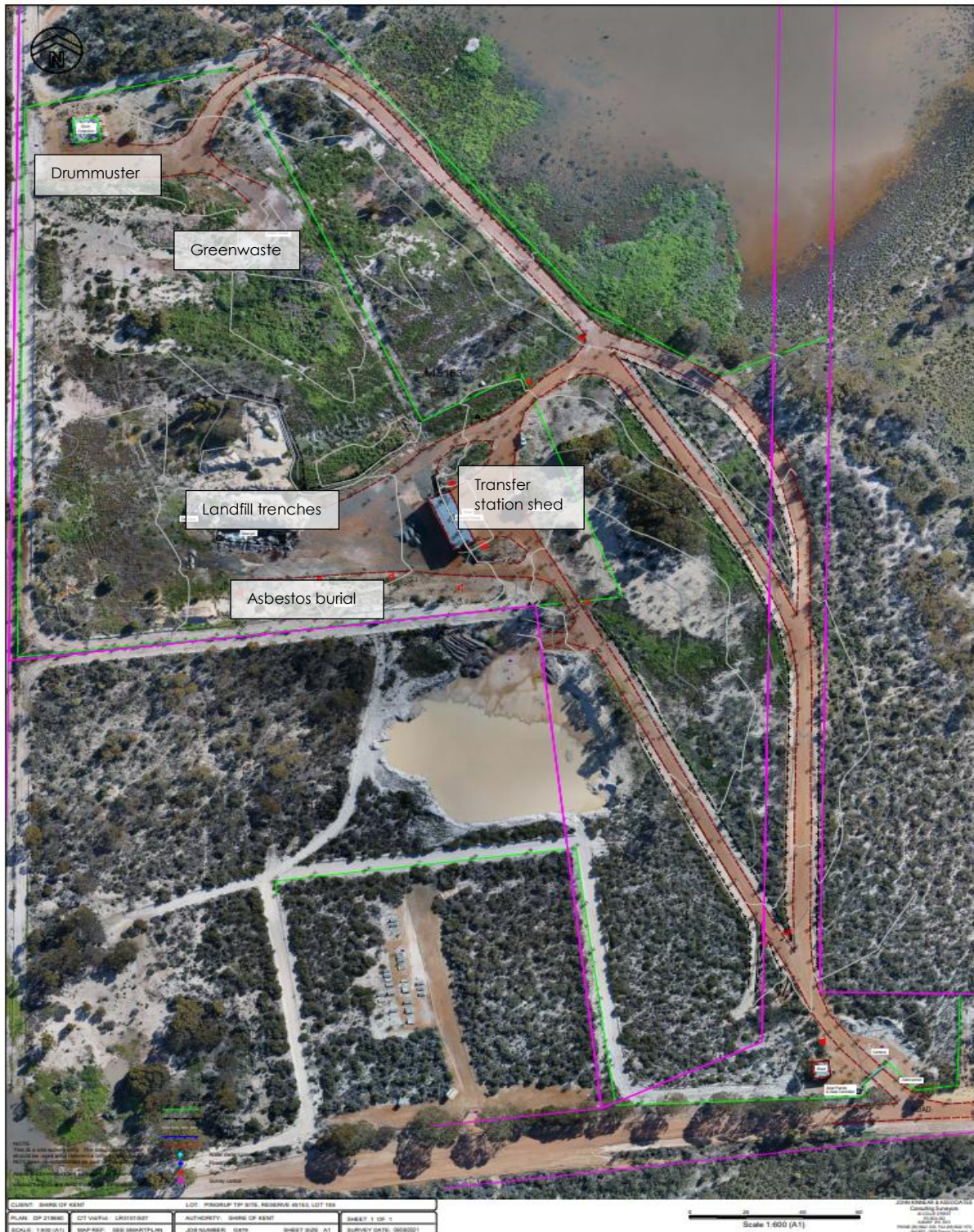
Figure 3.1 Pingrup Transfer Station Shed



General waste disposed into the bulk bin within the transfer station is transferred monthly to Nyabing landfill for disposal. Facilities are also provided for greenwaste collection, metal collection, drummuster and recycled oil. Greenwaste is burnt in accordance with the Regulations as required, and metal, drummuster and recycled oil are collected from time to time by recyclers.

A landfill cell is also open for the disposal of bulky waste on site. The cell is covered with soil and capped and closed at the end of the trench life, approximately 18 months.

Figure 3.2 Pingrup transfer station current site layout (Shire of Kent, 2021)



4 FUTURE USE OF THE SITE

The Shire is in the process of transitioning the Pingrup refuse site from landfill to a transfer station only, with the transfer station to be operational by 2024 (Shire of Kent Planning Strategy 2019¹).

General waste collected at the facility will be transported from Pingrup for disposal at Nyabing. Other waste streams will be collected for off site recycling.

It is envisaged the transfer station at Pingrup would receive less than 500 tonnes of waste per annum, as such it will not be required to be licenced under the *Environmental Protection Regulations 1987* as a Category 62 Solid waste depot.

The remainder of the site will be revegetated in accordance with this Plan.

¹ Confirmed by Acting CEO Rob Stewart October 2021

5 CONCEPTUAL LAYOUT

5.1 SITE LAYOUT PLAN

A site layout plan has been developed in conjunction with the Shire to guide the future development of the site, a plan of the full site showing traffic flows and gates (to limit access to the north of the site) is provided in **Figure 5.1**. The proposed site layout detail and considerations are contained in **Table 5.1** to follow.

Table 5.1 Pingrup Site layout considerations

Element	Detail
Transfer station footprint	A reduced transfer station footprint is proposed through the relocation of stockpile areas from the greater site to a location in close vicinity to the current transfer station drop-off shed. This provides for greater control of material disposal locations, minimises public liability and safety issues in relation to greater site access and minimises the operational costs associated with maintenance of a smaller site area.
Site access	The public access to the greater site is proposed to be restricted to the immediate transfer station drop off area through the provision of fencing.
Traffic flow	A one-way traffic flow is proposed using a loop circuit in and out of the facility. Sufficient area is provided for vehicles to manoeuvre and reverse safely without affecting traffic flow to other areas. Effective traffic control devices such as signage and speed limits will be required.
General waste disposal	The current transfer station shed containing a bulk waste bin is to remain for domestic users of the transfer station to drop off waste materials. Customers will unload domestic self-hauled mixed general waste into the bin. Any items that due to their size and/or dimensions is unable to fit in bins, the customer will need to self-haul to Nyabing landfill for disposal.
Greenwaste stockpile	The current greenwaste disposal will be discontinued. Greenwaste will be placed on a compacted in situ clay bunded hardstand on an area within the reduced transfer station footprint that has not previously contained waste. The area will contain two bunded areas, one for seasoning of greenwaste in preparation for burning, and the other for fresh greenwaste. Customers will unload material directly into stockpile areas.
Scrap metal stockpile	Currently, scrap metal and whitegoods are generally discarded within the landfill cell on site. Given the site will no longer be 'landfilling' waste, a scrap metal and whitegoods stockpile area will be constructed. A compacted in situ clay bunded hardstand will be constructed to contain metal and whitegoods. The material will be stockpiled for collection by a metal recycler. Customers will unload material directly into stockpile areas.
Tyre stockpile	A storage area is proposed for the recovery of separated tyres. The tyre collection area should be fitted with a hardstand of sufficient size and have adequate drainage. Tyre stockpiles should be located away from flammable material and ignition sources.
Drummuster compound	The current drummuster compound will be relocated to an area within the reduced transfer station footprint.
E-waste, HHW, gas bottles	An area will be provided within the current transfer station shed to provide containers for materials not generally suitable for landfill disposal including e-waste, HHW and gas bottles. A suitable screen wall (e.g., 1800mm (h) x 3000mm (l)) is to be constructed on the lip of raised concrete platform to both restrict entry to the pit below and provide a suitable covered location where collection containers can be placed.
Oil recovery	Waste oil recovery infrastructure is to remain in its current location.

Element	Detail
Asbestos	No asbestos will be accepted on site and must be taken to the Nyabing landfill by the generator for controlled disposal.
Area for expansion	Sufficient area is provided to allow for expansion in drop-off streams to be provided by the Shire at a later date. This could include comingled recyclables, etc.
Signage	Signage will need to provide consistent information and be clearly and prominently displayed.

Figure 5.1 Pingrup Site Layout Plan – full site: traffic flow and gates

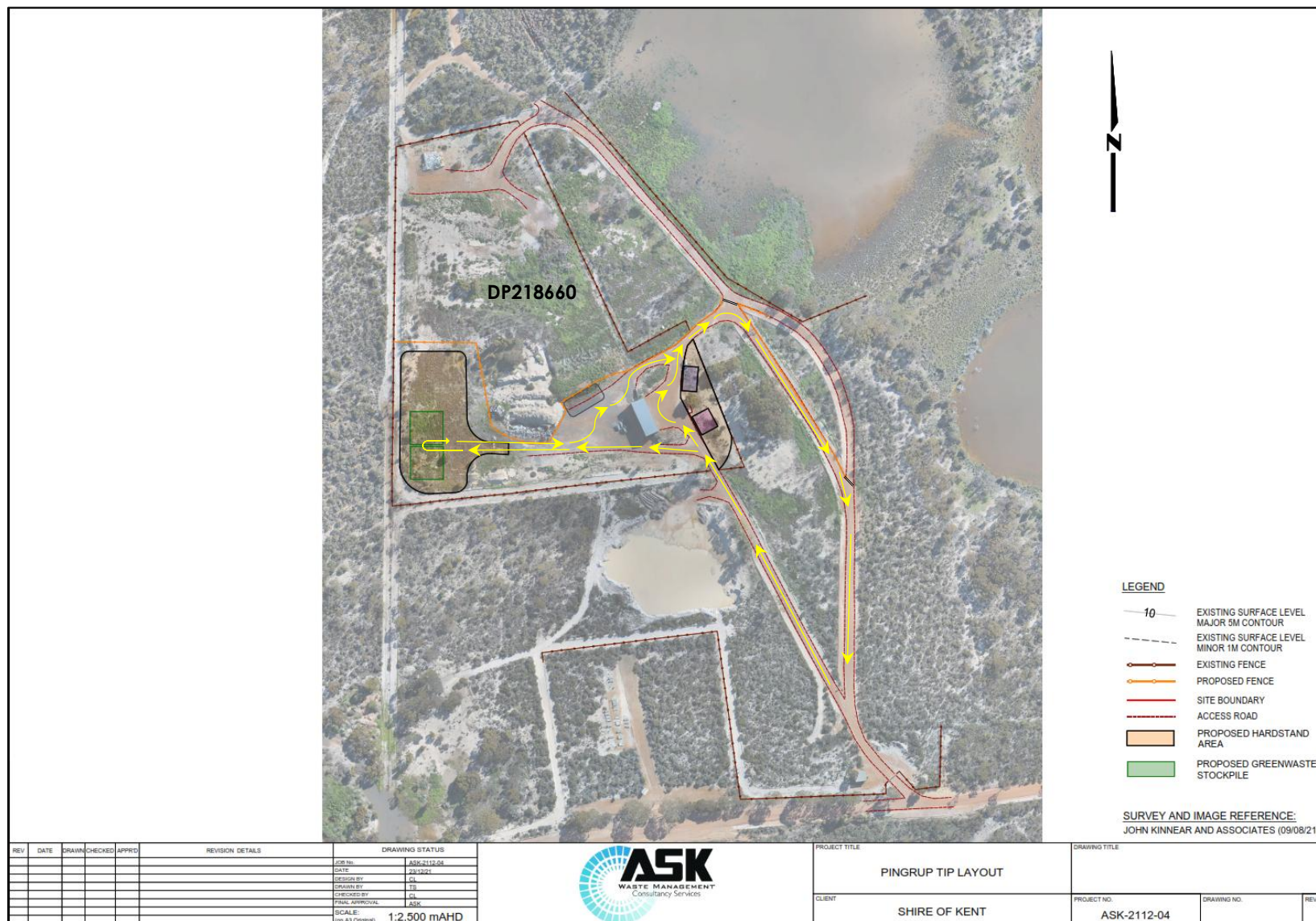
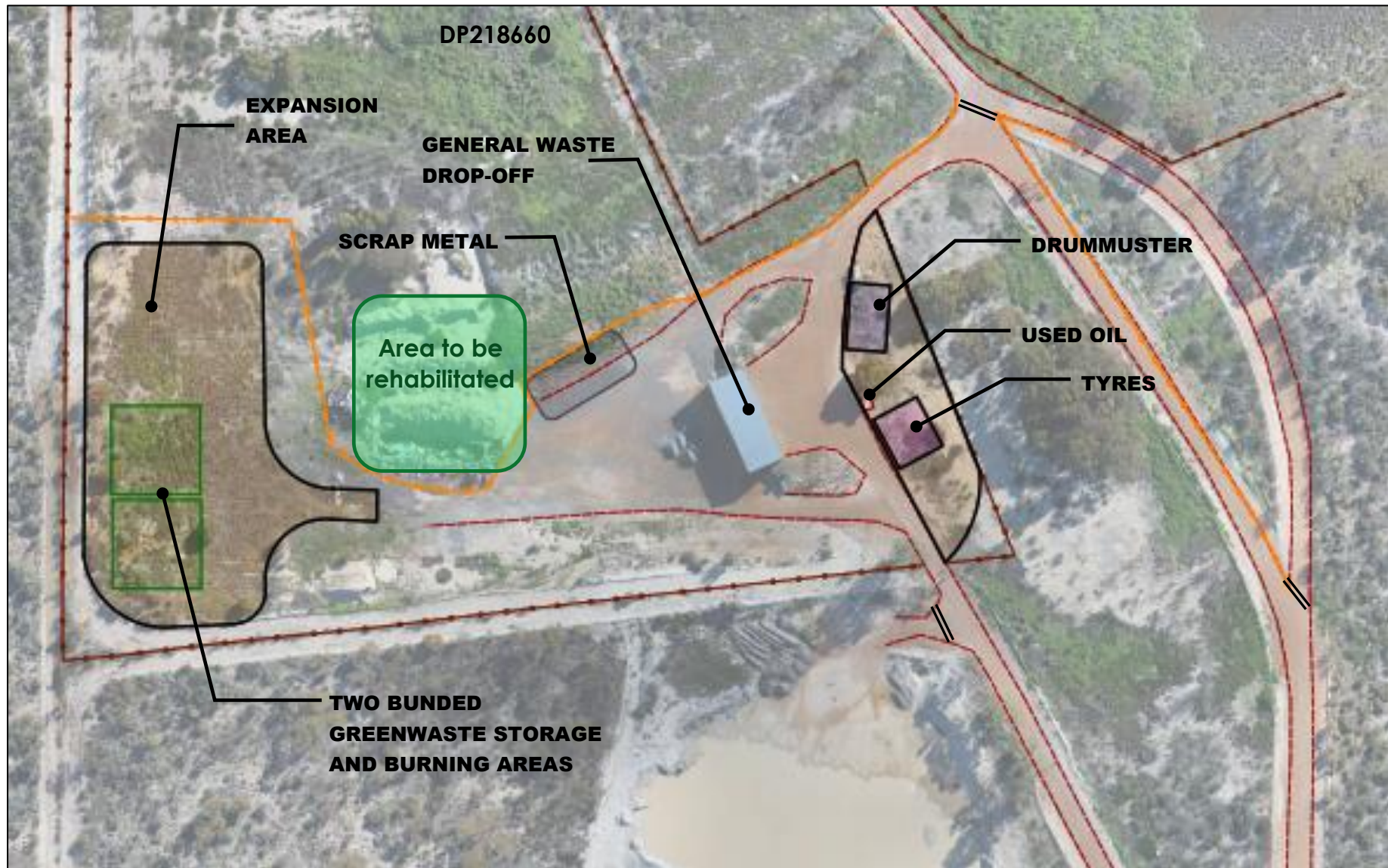


Figure 5.2 Pingrup Site Layout Plan – details of active portion of site



6 CAPPING AND CLOSURE DESIGN

In line with the best practice guidance, the objective of the cap design is to:

- Provide a long-term stable barrier between the waste and the environment.
- Improve the visual amenity of the site.
- Manage surface water flows to minimise the potential for leachate generation and surface ponding.

The following sections provide detail on the proposed cap design for the below-ground landfill cells/trenches on site and general provisions for the greater site to ensure it does not pose a risk to the environment after the site stops receiving waste for onsite disposal.

6.1 ESTIMATED FINAL CONTOURS OF THE SITE

The final landform for the site has been developed to facilitate surface run-off, while avoiding the pooling of water or the risk of erosion to the cap. Old trenches will be capped with at least 700mm of soil over the interim cover layer and form a domed mound to facilitate surface run-off. It is assumed the old trenches will only settle a further 10% (200mm for a 2m deep trench) and any new trenches (less than two years old) will settle up to 30% (600mm). Caps over trenches will be monitored, and if there is excessive settlement resulting in a risk of rain pooling on the capped area, additional capping material will be added.

6.2 CAP DESIGN

The Pingrup landfill is unlined, therefore the base of the cells/trenches are constructed from naturally occurring subsoils that are largely comprised of low permeability clays.

There is no current Western Australian standards or guidelines as to the capping design for registered landfills and as such guidance is taken from current industry practice.

The cap design for landfill cells will comprise of the following layers.

1. **Soil/vegetation rooting zone.** This 200mm layer of topsoil will provide the rooting zone for the cap's vegetation.
2. **Low permeability layer.** A 500mm low permeability (clay-rich soil) layer has been provided. This will be spread and tracked in/compacted over the interim cover layer within 12 months of the trench being filled.
3. **Interim cover layer.** An interim cover layer of 300mm will be spread over the last layer of waste to ensure a uniform layer with no exposed waste that the capping can be constructed over.

Portions of the existing site that have already been closed will be revegetated where required in line with this plan.

6.3 VEGETATION

The landfill will be rehabilitated to natural vegetation after its closure; therefore, the plantings should be of species found in the surrounding natural vegetation.

Advice should be sought regarding suitable species that are indigenous to the area and local provenance. To avoid inappropriate planting, ensure the species are adaptable to the local climate; and enhance the local habitat.

Shallower rooting species should be used, as any roots penetrating the low permeability layer into the waste body may provide a conduit for water to flow through the cap. In addition, as the waste

is likely to be producing small quantities of methane (which is a toxic gas to flora) for several years after capping, any roots penetrating the cap would be exposed to methane and possibly result in the death of the plant.

6.4 PROPOSED DRAINAGE SYSTEM

A surface water management system for the Facility has been developed to minimise the environmental risks associated with the potential infiltration of surface water into the waste cells and to minimise the production of leachate.

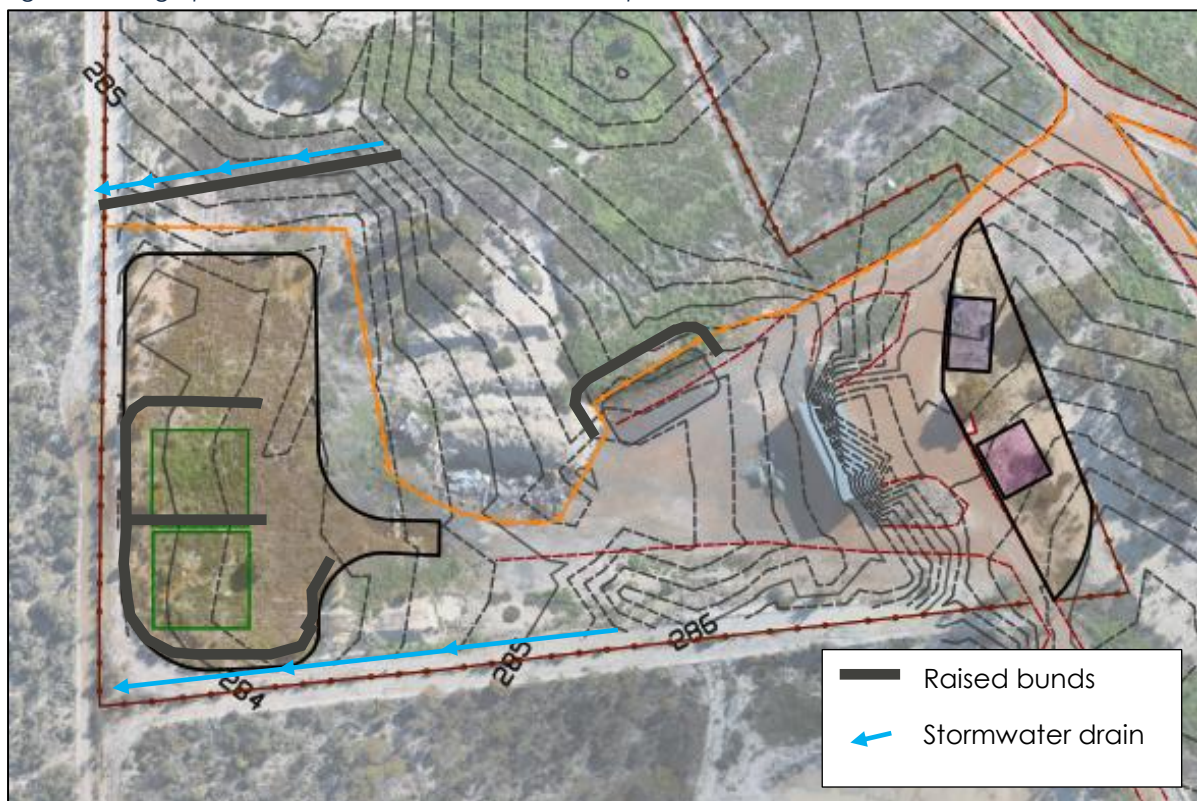
The key features utilised to achieve these objectives include:

- Capping of active landfill trenches at completion (immediate action)
- Development of a perimeter drainage system around the site to maximise stormwater diversion
- Diversion of stormwater away from the active waste trench (soon to be capped and rehabilitated) and the greenwaste area, through the use of soil bunds

A conceptual plan of the stormwater infrastructure is shown in **Figure 6.1**. The raised bunds will either divert clean stormwater from the waste storage areas, or in the case of the bunds around the greenwaste areas, act to contain any contaminated stormwater within the site.

Further detailed design work is required before construction to ensure the system will meet the local climatic conditions.

Figure 6.1 Pingrup Site stormwater control: Schematic plan



6.5 LANDFILL GAS MANAGEMENT

Landfill gas (LFG) is a natural by-product of the anaerobic biological decomposition of the organic fraction of solid waste disposed of in putrescible landfills. LFG consists primarily of Methane (CH₄) and Carbon Dioxide (CO₂) but may contain many other constituents in small quantities.

Given the input to the site is less than 500 tonnes per year it is unlikely that the site will produce significant quantities of landfill gases. Gases that have been produced over the years are likely to have progressively escaped.

As such, no landfill gas management systems are proposed for the site.

7 POST CLOSURE MANAGEMENT AND MONITORING

Once the landfill ceases to dispose of waste, it must still be managed to prevent any environmental impact until the waste within the landfill has sufficiently decomposed or stabilised such that it no longer presents a risk to the environment. The standard industry period for post closure management and monitoring of a putrescible landfill is about 20 - 30 years.

7.1 MONITORING PROGRAM

Post closure management and monitoring procedures for the Facility shall include:

- Maintenance of site to:
 - Prevent/control erosion on capped cells
 - Restore depressions, seal and monitor cracks in the cap caused by settlement
 - Restore/maintain vegetation
- Maintenance and operation of stormwater infrastructure

The Shire shall ensure that post closure monitoring of the site is undertaken in accordance with the specifications detailed in **Table 7.1**. Given the low volumes of waste disposed at the facility, the proposed monitoring period is 20 years. The frequency of monitoring is annually for the first two to five years and then decreases as the cell cap stabilises and vegetation becomes established during the aftercare period for the following 18 years.

Table 7.1 Post-closure monitoring program

Aspect	Monitoring Method	Frequency	Duration
Surface water drainage channels	Physical inspections to identify damage or evidence of failure	Annually	First 5 years
Site maintenance	Site walkover inspections to identify: <ul style="list-style-type: none"> • Signs of erosion in capped cells; • Cracking of the cap on landfill cells; • Differential settlement; • Vegetation death; and • Surface-water ponding. 	Annually or after severe weather events	First 2 years
		Biannually or after severe weather events	Following 18 years
Site vegetation	Site walkover inspections to identify areas where vegetation needs to be restored or maintained	Annually	First 5 years

7.2 RECORDS AND REPORTING

Given the lengthy monitoring period, the site inspections, monitoring and corrective actions will most probably be completed by a number of different officers. To ensure consistency and good record keeping, the Shire should use a standardised form for recording post-closure monitoring and maintenance activity. The record forms should include:

- Date and time of visit
- Results of all inspections / monitoring / actions
- Corrective actions completed (as required)
- Signed and dated by a responsible officer

All the forms should be recorded in the Shire's record management system and made available to DWER on request if required.

REFERENCES

Shire of Kent (2007). ***Post -Closure Rehabilitation Plan, Pingrup Refuse Site.***