GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

Great Southern Landfill at Allawuna Farm, Great Southern Highway, St. Ronans

Alkina Holdings Pty Ltd

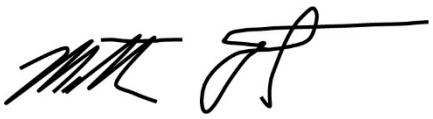
Report 1738

May 2023

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA). It describes the outcomes of the EPA's assessment of the Great Southern Landfill at Allawuna Farm, Great Southern Highway, St. Ronans proposal by Alkina Holdings Pty Ltd.

This assessment report is for the Western Australian Minister for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- the EPA's recommendations as to whether or not the proposal may be implemented and, if it recommends that implementation be allowed, the conditions and procedures, if any, to which implementation should be subject to
- other information, advice and recommendations as the EPA thinks fit.



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Proposal

The proposal is to construct and operate a landfill and associated infrastructure for receiving Class II or III solid waste of up to 250,000 tonnes per annum (tpa). The landfill is located approximately 80 kilometres east of Perth in the Shire of York (Figure 1).

The proponent for the proposal is Alkina Holdings Pty Ltd (Alkina). The proposal includes the construction of 7 landfill cells, leachate ponds, retention ponds, sediment management structures, stormwater diversion measures and supporting infrastructure, including amenities, weighbridge and internal roads.

The development envelope for the proposal is 136.83 hectares (ha), with a disturbance area of 84.04 ha. The proposed operational life of the landfill is 28 years with additional time for decommissioning and closure.

Context

The proposal was originally referred to the EPA by Sita Australia Pty Ltd in December 2012 and a determination to not assess the proposal was made in July 2013. The decision was subject to appeals which were dismissed after consideration by the Minister for Environment at the time.

In 2018, the proposal had not been implemented and the Minister for Environment consulted with the EPA on potential additional matters that had arisen since the determination on the proposal. The EPA advised the Minister that additional matters had arisen and subsequently the Minister directed the EPA to assess the proposal under section 43 of the *Environmental Protection Act 1986* (EP Act).

The EPA notes that the proponent progressed planning approval processes in parallel with EP Act approvals processes. Between 2014 and 2018, several planning decisions issued by the Shire of York and the Mid-West/Wheatbelt Joint Development Assessment Panel in relation to the proposal were referred to the State Administrative Tribunal (SAT) and were subsequently overturned.

The EPA acknowledges that there has been community opposition to the proposal over many years, and that as a result of changes to the local planning scheme in 2018, waste disposal facilities are now a non-conforming land use in all zones.

Further decisions relating to planning approvals for this development are likely to be progressed following publication of this assessment.

Proposal alternatives

The original Allawuna Landfill proposal included the consideration of the environmental siting of the development through a comprehensive site selection process which considered the separation distances between sensitive receptors and the landfill infrastructure amongst the site selection criteria. The current proposal site was the preferred landfill site. The alternative options that the proponent considered for this assessment include aspects of landfill design and the amount of land required to be included within the development envelope.

In establishing a new landfill, the proponent considered the waste minimisation principle and the waste hierarchy. It is noted that while the disposal of waste to landfill is recognised within the waste hierarchy and targets outlined in the *Waste Avoidance and Resource Recovery Strategy 2030*, landfilling of waste is the least preferred option for waste management and a last resort for disposal of waste that cannot be reused or recycled.

Environmental values

Terrestrial Fauna, Terrestrial Environmental Quality, Flora and Vegetation, Inland Waters and Social Surrounds are the key environmental factors that may be impacted by the proposal. Greenhouse Gas Emissions were also considered as an environmental factor in the assessment.

Consultation

The Environmental Protection Authority (EPA) published the proponent's referral information for the proposal on its website for 7 days public comment in April 2019. The EPA also published the proponent's Environmental Review Document (ERD) on its website for public review for 5 weeks (from 6 July 2020 to 10 August 2020). The EPA considered the comments received during these public consultation periods in its assessment of environmental factors.

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts and emissions. The sequence commences with avoidance, then moves to minimisation, and rehabilitation, and offsets are considered as the last step in the sequence.

The proponent has considered the mitigation hierarchy in the development and assessment of its proposal, and as a result has:

- avoided and minimised potential impacts to hydrology, and quality of groundwater, surface water, soil and land through site selection
- committed to implement management measures, including infrastructure design and operation, to minimise impacts to inland waters and terrestrial environmental quality

- refined the development envelope and proposal footprint to avoid trees that provide suitable or potentially suitable breeding habitat for black cockatoos
- proposed planting of trees to minimise impacts on, and to further enhance existing black cockatoo foraging habitat
- committed to infrastructure design measures and followed a recommended feral animal management, monitoring and response strategy to minimise impacts on terrestrial fauna
- committed to the implementation of measures to manage and reduce greenhouse gas (GHG) emissions from the landfill
- avoided and minimised the impact to native vegetation, local drainage and social surroundings through site selection, design and layout of infrastructure as well as implementation of operational controls
- proposed progressive interim capping of landfill cells with inert material; and
- proposed post-closure capping and revegetation of landfill and disturbed areas.

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) during the assessment. For each factor, the EPA has assessed the residual impacts of the proposal on the environmental values and considered whether the environmental outcomes are likely to be consistent with the EPA environmental factor objectives.

Terrestrial Fauna

Residual impact or risk to environmental value		Assessment finding
1.	Direct impact to habitat for significant fauna (black cockatoo species) including the clearing of • 331 individual trees (Marri/Wandoo).	The proposal is located close to the boundary of the Wheatbelt bioregion and includes good quality foraging habitat and potential breeding habitat for 2 black cockatoo species. The clearing of good quality foraging habitat trees adds to the cumulative impact to black cockatoo habitat loss and habitat fragmentation within the region. The EPA considers that the retention of remaining habitat and restoration of habitat are important to counterbalance the cumulative impacts of habitat loss. The following conditions are recommended to counterbalance the significant residual impact to black cockatoo foraging habitat to achieve the environmental factor objective for terrestrial fauna: • condition A1 - Limitations and extent of proposal • condition B1 - Terrestrial fauna • condition B4 – Environmental Offsets. The conditions include limiting the footprint of the proposal and application of the proponent's proposed tree replanting as an offset condition.
2.	Potential direct and indirect impacts to significant fauna from increased numbers of feral animals.	The landfill operations may contribute to a localised but potentially significant increase in feral animals, impacting conservation significant fauna within nearby conservation areas and the Department of Biodiversity and Attractions (DBCA) Western Shield program area. The environmental outcome is likely to be consistent with the EPA's objective for this factor, subject to: • condition B1 - Terrestrial Fauna which includes requirements to limit feral animal numbers in an established control area surrounding the development envelope, and to implement a management plan to achieve this outcome. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act will contribute to meeting the EPA objectives for this factor.

Terrestrial Environmental Quality

Residual impact or risk to environmental value		Assessment finding
1.	Potential impacts to soil quality through leachate seepage, and loss of containment (overtopping of ponds).	The EPA considers that the proponent has provided a design for the landfill to standards equivalent of current industry practice and suitable for management of leachate and containment in the specific location. The EPA has taken into account regulation by other decision-making authorities, specifically Part V of the EP Act which can apply conditions to the design, acceptance and management of waste. While the volumes and types of waste accepted for disposal are likely to be included in regulatory instruments under Part V of the EP Act, the EPA considers that the proposal's waste acceptance methods be required to align with the state's waste strategy. The EPA therefore recommends: • condition B6 - Waste minimisation. The condition would also ensure continuous improvement and consideration of evolving waste management options, consistent with the State Waste Management Strategy. The environmental outcome for terrestrial environmental quality is likely to be consistent with the EPA's objective for this factor.
2.	Potential impacts to soil quality from erosion, and spills.	In reaching this finding, the EPA had regard to other decision-making processes, specifically the ability, processes, considerations and likely outcomes under Part V of the EP Act and the *Rights in Water and Irrigation Act* (RiWI Act). The EPA regards that regulation under these decision-making processes will be able to manage impacts, consistent with the EPA's objective for terrestrial environmental quality.

Flora and Vegetation

Residual impact or risk to environmental value		Assessment finding
1.	Clearing of up to 6 ha of vegetation in a 'completely degraded' to 'excellent' condition.	No locally significant vegetation units would be impacted by implementation of the proposal. The proposal has the potential to impact 2 individuals of *Hemigenia* species.

Residual impact or risk to environmental value		Assessment finding
	Direct impact to 2 occurrences of a *Hemigenia* species	The environmental outcome is likely to be consistent with the EPA's objective for this factor, subject to: • condition A1 - Limitations and extent of proposal • condition B5 - Flora which include limits on the proposal footprint and development envelope, indirect impacts to *Hemigenia* species outside the development envelope and an environmental management plan. The environmental outcome for flora and vegetation is likely to be consistent with the EPA's objective for this factor.

Inland Waters

Residual impact or risk to environmental value		Assessment finding
1.	Potential impact to surface and groundwater quality from discharges, loss and seepage of leachate from waste landforms and containment infrastructure.	The EPA considers that the proponent provided sufficient information on the geological and hydrogeological characteristics of the local and regional area to provide confidence in the suitability of the proposed location for a landfill. The environmental outcome is likely to be consistent with the EPA's objective for this factor. In reaching this finding, the EPA has taken into account regulation by other decision-making authorities, specifically Part V of the *Environmental Protection Act 1986* (EP Act) which can apply conditions relating to the design and operation of landfill infrastructure to prevent potential impacts to surface water and groundwater.
2.	Potential impacts to hydrological and groundwater regimes from proposal infrastructure establishment and water use.	The proposed mitigation measures for the design and management of the landfill, including surface water, stormwater, sediment and erosion management are appropriate in the proposed location. The EPA regards that regulation under other decision-making processes, including Part V of the EP Act and the RiWI Act will be able to manage impacts, consistent with the EPA's objective for inland waters.

Social Surroundings

Residual impact or risk to environmental value		Assessment finding
1.	Potential impacts to social surroundings including visual amenity, emissions of landfill gas, dust, noise, on-site fire, odour and windblown waste.	While the proponent selected the site to provide buffer distances between sensitive land uses and proposal infrastructure, visual amenity and surrounding land use may be impacted by the proposal implementation. The environmental outcome is likely to be consistent with the EPA's objective for this factor, subject to: • condition B3 'Social Surroundings' The EPA has taken into account regulation by other decision-making authorities, specifically Part V of the EP Act which can apply conditions to the control relevant emissions and discharges related to the operation of a landfill. The EPA advises that the environmental outcome is likely to be consistent with the EPA's objective for social surroundings.

Greenhouse Gas Emissions

Residual impact or risk to environmental value		Assessment finding
1.	Scope 1 GHG emissions may exceed the 100,000 t $CO_{2\text{-}e}$ per annum threshold with inefficient GHG management. Greenhouse gas (GHG) emissions contribute to climate change, which impacts on WA's environment.	The information provided by the proponent indicates that management is required to provide confidence that methane from landfill would be captured efficiently to ensure there are no residual impacts from GHG emissions. The environmental outcome for GHG emissions is likely to be consistent with the EPA's objective for the factor, subject to: • condition B2 'Greenhouse Gas Emissions' which requires the achievement of a capture rate of 75%, an emission limit and a GHG avoidance environmental management plan. In addition, the EPA has had regard to regulation by other decision-making authorities, specifically Part V of the EP Act which can mitigate landfill gas. Regulatory conditions under a works approval and/or licence include design and operation specifications to limit emissions to air.

		The environmental outcome for greenhouse gas is likely to be consistent with the EPA's objective for this factor.

Holistic assessment

The EPA considered the connections and interactions between relevant environmental factors and values to inform a holistic view of impacts to the whole environment.

In considering the interactions between terrestrial fauna, terrestrial environmental quality, flora and vegetation and inland waters within the context of social surroundings and greenhouse gas emissions, the EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA factor objectives.

In considering the principle of waste minimisation, and within the context of the *Western Australia Waste Avoidance and Resource Recovery Strategy 2030*, the EPA considers that recommended conditions in combination with approvals required by other decision-making authorities will meet the principle of the EP Act and would support the intended outcomes for other EPA factor objectives.

Conclusion and recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values which may be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA's objectives for the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the *Environmental Protection Act 1986*.

Consistent with the scope for this report and recommendations under the EP Act, the EPA has recommended that the proposal may be implemented subject to conditions recommended in Appendix A.

Other advice

In providing its recommendation to the Minister, the EPA is limited in its assessment of this proposal to environmental considerations consistent with the EP Act. Specifically, the EPA is not able to consider impacts to society, economic benefit and land use planning through this assessment except where they relate to the protection of the environment as defined in the EP Act.

The EPA notes that the proposal is not consistent Shire of York's current planning scheme and that it was not supported by the Mid-West/Wheatbelt Joint Development Assessment Panel. It is also clear that there is considerable community interest in the proposal.

In considering a recommendation based on this report, the EPA encourages consultation across all relevant State Government portfolios to ensure that matters that the EPA is unable to consider, particularly with respect to land use planning and other social and economic impacts, are fully regarded.

1 Proposal

The Great Southern Landfill is a proposal to construct and operate a landfill and associated infrastructure for receiving Class II or Class III solid waste of up to 250,000 tonnes per annum. The proposal is located 80 kilometres east of Perth, in the wheatbelt region of Western Australia (see Figure 1).

The proposal includes the staged development of up to 7 landfill cells, leachate ponds, stormwater retention ponds, sediment management structures, stormwater diversion structures and supporting infrastructure, including weighbridge, dual lane creek crossing over Thirteen Mile Brook and an upgrade to the intersection of the site access road and Great Southern Highway.

The proponent for the proposal is Alkina Holdings Pty Ltd (Alkina). The Minister for Environment directed the Environmental Protection Authority (EPA) to assess the proposal on 28 March 2019. The referral information was published on the EPA website in April 2019 for public comment. On 29 April 2019, the EPA determined that the level of assessment at 'Public Environmental Review'. The EPA published the environmental review document (ERD) (Alkina Holdings Pty Ltd, June 2020) on its website for public review for 5 weeks from 6 July 2020 to 10 August 2020.

The elements of the proposal which have been subject to the EPA's assessment are included in Table 1.

Table 1: Location and proposed extent of proposal elements

Proposal element	Location	Maximum extent or range
Physical elements		
Landfill cells, leachate ponds and associated infrastructure. Great Southern Highway (GSH) intersection upgrade.	Figure 2	Disturbance of no more than 84 ha and clearing of up to 6 ha of vegetation within a development envelope of 136.83 ha.
Operational elements		
Landfilling of putrescible waste and leachate management.	Figure 2	Landfilling of class II & III waste up to 250,000 tonnes per annum (tpa). Lifetime capacity of landfill of up to 5.6 million cubic metres.
Timing elements		
Project life	Landfill operations of up to 28 years from commencement of landfilling.	

	Decommissioning and rehabilitation after completion of final landfill cell with closure works, maintenance and monitoring of up to 30 years.

Units and abbreviations
ha – hectare
tpa – tonne per annum

Proposal amendments

A proposal to develop a landfill at Allawuna Farm was originally referred to the EPA, by a different proponent, in December 2012 (original proposal). The original proposal description is set out in section 3 of the original proponent's referral report (SITA Australia Pty Ltd 2013), which is available on the EPA website. The EPA determined not to assess that proposal in July 2013. The decision was subject to 35 appeals. The Minister for Environment determined that the EPA's decision was appropriate based on the known information at the time.

In 2018, the Minister for Environment consulted with the EPA on whether additional information had arisen on the proposal since its original decision. On 28 March 2019, the Minister for Environment directed the EPA to assess the proposal based on new information that became available and emerging issues that related to potential significant impacts.

During the assessment process, the EPA encouraged the new proponent (Alkina) to identify avoidance and mitigation measures for the proposal in addition to those included in the original proposal. The proponent reduced the total capacity for the landfill from 12.8 million cubic metres to 5.6 million cubic metres, set out in the Environmental Scoping Document (ESD; 29 August 2019).

Subsequent to the commencement of the assessment of the proposal, the proponent requested changes to the proposal during the assessment. The changes requested pertained to:

- reduction in the development envelope to remove areas of the Allawuna Farm that did not relate to the proposed landfill development.
- modification of the development envelope and disturbance footprint to
- incorporate intersection upgrades to Great Southern Highway.
- change of the proposal name to 'Great Southern Landfill at Allawuna Farm, Great Southern Highway, St. Ronans'.

The changes were unlikely to significantly increase any impacts of the proposal, and some reduced the likely impacts to the environment. The EPA Chair's notice of 7 February 2020, consenting to the change is available on the EPA website.

The consolidated and updated elements of the proposal which has been subject to the EPA's assessment is included in Table 1.

Proposal alternatives

The proponent submitted that the original proponent of the Allawuna Landfill proposal conducted a site selection process over several local government areas based on factors including a large site to retain protective buffers to sensitive receptors and a low and manageable environmental risk profile.

The proposal site for this assessment was the preferred option from 19 shortlisted alternative sites and was the location included in the original referral to the EPA in 2012. The Minister's direction to the EPA to assess this proposal included only the preferred site location. Throughout the assessment, the proponent considered alternatives to the landfill infrastructure design and layout, and a reduction to the previous development envelope as noted above were considered and incorporated into the proposal description for this assessment.

In establishing the landfill development, the proponent considered the waste hierarchy and the targets outlined in the *Waste Avoidance and Resource Recovery Strategy 2030*. The waste hierarchy is recognised as a tool to inform waste management options to be used alongside others, to inform the broader assessment of environmental impacts associated with waste management infrastructure, including the adoption of better operational management practices and understanding the environmentally preferrable options that can be considered as alternatives to waste disposal to landfill (*Waste Authority Position Statement on the waste hierarchy, 2020*).

While the *Waste Avoidance and Resource Recovery Strategy 2030* for Western Australia includes a vision of a sustainable, low-waste circular economy, landfill was identified as continuing to play a role (*State Infrastructure Strategy 2022*) in the management of waste for the foreseeable future. It is noted that landfilling of waste is the least preferred option for waste management and a last resort for disposal of wastes that cannot be reused or recycled. The waste strategy contains objectives and targets to protect the environment, including targets to reduce the amounts and types of wastes being disposed of to landfill (Perth and Peel) and for waste to be managed/disposed of at better-practice facilities.

The EPA has considered the principal of waste minimisation for this proposal in the context of Object and Principles of the *Environmental Protection Act 1986* (EP Act).

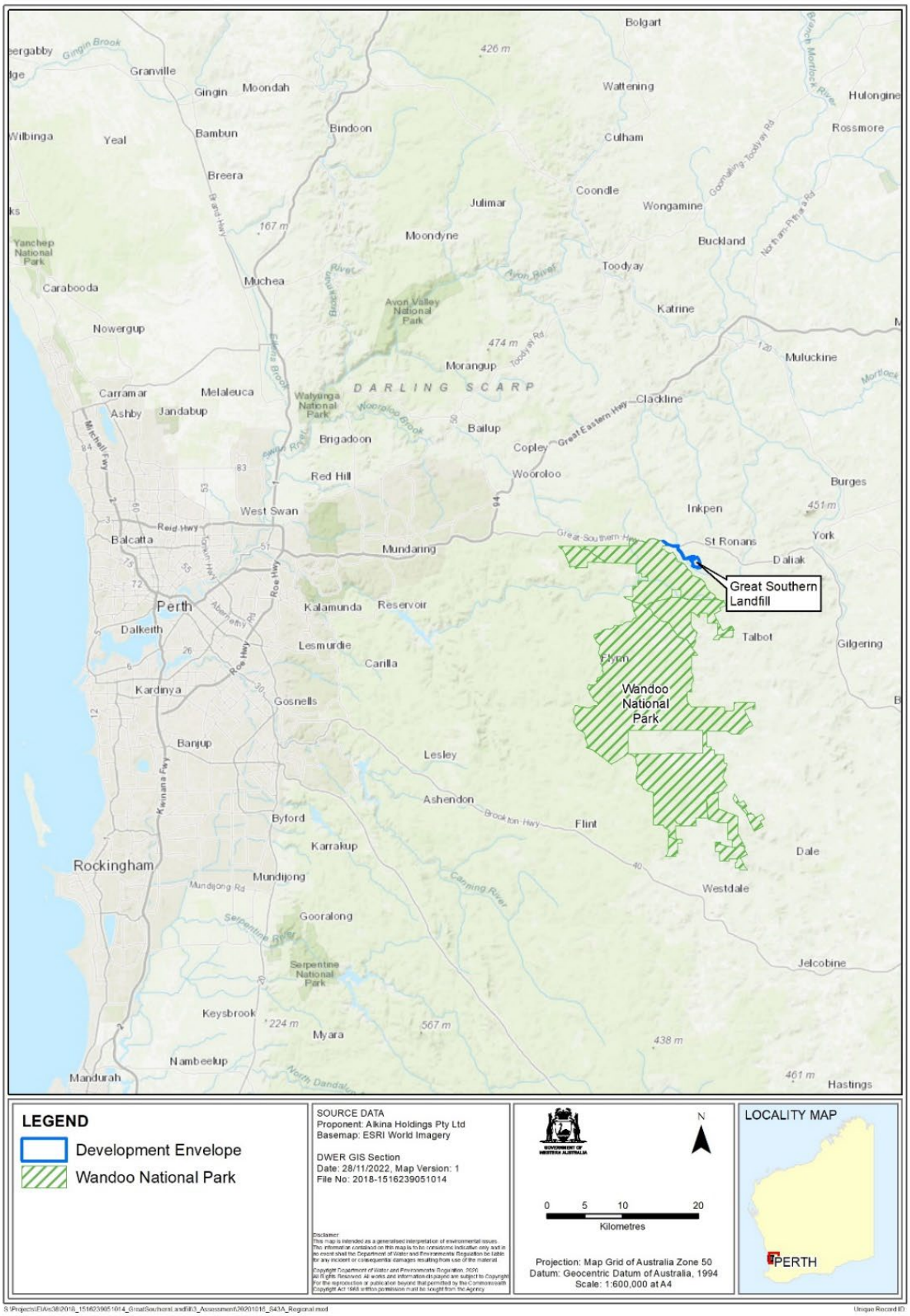

Figure 1: Project location

Figure 2: Development envelope and proposal footprint

Proposal context

The proposal is located in the Shire of York. Regionally, the closest lined landfills to the proposal site are the Salt Valley Road landfill, Toodyay (approximately 31 kilometres north of the development envelope) and the Red Hill Waste Management Facility, Hoddys Well (some 48 kilometres west north west of the development). The proposed Great Southern Landfill is located approximately 15 km west of the York Townsite in a rural area.

The original proponent's 'Application for Approval to Commence Development' under the relevant Shire of York scheme was assessed by the Wheatbelt Joint Development Assessment Panel (JDAP). JDAP's refusal to grant planning approval for the proposed landfill was overturned by the State Administration Tribunal in March 2016.

The EPA notes that there has been a community opposition to the proposal over many years and changes to the local planning scheme in 2018 introduced use of waste disposal as a 'use not allowed in all zones'. The EPA recognises that there are public concerns with the placement of large landfills outside the Swan Coastal Plain but cannot consider these factors in this assessment.

Planning approvals context

Separate to the consideration of this proposal under section 38 of the EP Act, the proponent is required to seek other approvals to commence the development of the landfill, including approvals required under the *Planning and Development Act 2005*.

For this proposal, the proponent has sought to progress planning approval processes in parallel with EP Act assessment processes.

The development application associated with the original proposal, submitted by the previous proponent, was referred to the Mid-West / Wheatbelt JDAP in April 2014 and was refused. The previous proponent filed an application for review with the State Administration Tribunal (SAT). As part of this review, an amended development application was submitted to JDAP. This application was refused in 2015. The SAT overturned the JDAP's decision in 2016 and granted planning approval for the proposal. During the time, the assessment of the proposal under Part V of the EP Act was placed on hold pending the outcome of the planning process.

The proponent has sought extensions of planning approvals conditions that required substantial commencement of construction of the landfill within a stipulated timeframe. In 2018, JDAP rejected a request from the proponent to extend the timeframe for substantial commencement. This decision was subsequently overturned by SAT. The proponent has lodged further applications to extend the term of the planning approval.

Changes to the Shire of York's new local planning scheme in 2018 deemed waste disposal facilities a non-conforming land use within the scheme. The Planning scheme noted that a landfill development proposal had been approved, but that waste disposal was not an allowed use within all zones. This had the effect of making the proposal a non-conforming land use.

The EPA is aware that there has been considerable community interest in this proposal within the Shire of York since the previous proponent first sought to develop a landfill at this location. The EPA also acknowledges that there are public concerns associated with the siting of large domestic and commercial and industrial waste landfills outside the Swan Coastal Plain.

In its assessment of the proposal, the EPA is limited consideration of impacts on the environment and will only make recommendations that protect the environment in a manner consistent with the definition found in section 3 under the EP Act:

> **environment**, subject to subsection (2), means living things, their physical, biological and social surroundings, and interactions between all of these.

Specifically, the EPA draws attention to the definition of social surrounds in the EP Act:

> For the purposes of the definition of environment in subsection (1), the social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings *directly* affect or are affected by his physical or biological surroundings (subsection 3(2)).

The EPA's assessment of key environmental factors, including social surroundings, considers social, economic, cultural and aesthetic impacts from a proposal if these are *directly* linked to the changes to the physical or biological environment. It is unable to consider other matters (for example, impacts to society, community sentiment, economic benefit and land use planning) where they are inconsistent with the EPA's remit under this legislation.

2 Assessment of key environmental factors

This section includes the EPA's assessment of the key environmental factors. The EPA also evaluated the impacts of the proposal on other environmental factors relevant to the proposal and concluded that greenhouse gas emissions is a key environmental factor for the assessment. No further key environmental factors were identified. This evaluation is included in Appendix D.

2.1 Terrestrial Fauna

2.1.1 Environmental objective

The EPA's environmental objective for terrestrial fauna is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained* (EPA 2021).

2.1.2 Investigations and surveys

The EPA advises the following investigations, surveys and peer reviews were used to inform the assessment of the potential impacts to terrestrial fauna:

- Great Southern Landfill at Allawuna Farm, Great Southern Highway, St. Ronans – Environmental Review Document, June 2020, Alkina Holdings
- Allawuna Landfill Vegetation and Fauna Assessment (12/111) ENV Australia Pty Ltd, 31 October 2012 (appendix 2.10 of the Environmental Review Document (ERD)).
- Flora, Vegetation and Fauna Assessment, Allawuna Roadside (12/088) ENV Australia Pty Ltd, 20 March 2013 (appendix 2.9 of the ERD).
- Reconnaissance Flora and Vegetation Assessment – Part Lots 3060, 4869 and 29259 Great Southern Highway, Saint Ronans (EP19-091(01)--003C RAW) Emerge Associates, February 2020 (appendix 2.6 of the ERD).
- Basal feral animal survey – Part Lots 3060, 4869 and 29250 Great Southern Highway, Saint Ronans (EP19-091(02)--004B MS) Emerge Associates, January 2020 (appendix 2.7 of the ERD).
- Black Cockatoo Habitat Tree Assessment - Part Lots 3060, 4869 and 29250 Great Southern Highway, Saint Ronans (EP19-091(02)-005B), Emerge Associates, 30 January 2020 (appendix 2.8 of the ERD).
- Tree survey to support Native Vegetation Clearing Permit (NVCP) application for the proposed Great Southern Landfill (1777179-036-M-Rev0), Golder Associates, 17 January 2018 (appendix 2.11 of the ERD).
- Great Southern Landfill Feral Animal Management Plan, Alkina Holdings Pty Ltd, v3 April 2020.
- Great Southern Landfill Feral Animal Management Plan, Alkina Holdings Pty Ltd, v4 July 2022.

- Proposed Great Southern Landfill - Response to the EPA Public Review submission, Alkina Holdings Pty Ltd, 20 July 2022.

In addition to the relevant current policy and guidance above, the EPA also had regard to the:

- Carnaby's Cockatoo *(Calyptorhynchus latirostris*) Recovery Plan (Department of Parks and Wildlife 2013)
- Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan (Department of Environment and Conservation 2008).
- Referral guideline for 3 WA threatened black cockatoo species Carnaby's Cockatoo (*Zanda latirostris*), Baudin's Cockatoo (*Zanda baudinii*) and the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*) (Commonwealth of Australia, 2022)
- EPA Advice: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region (EPA, 2019)

The surveys are consistent with technical guidance for terrestrial fauna – *Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020b).

2.1.3 Assessment context – existing environment

Fauna habitat

The proposal is located in the Northern Jarrah Forest subregion of the Jarrah Forest bioregion, bordered by the Wheatbelt bioregion approximately 5.5 km to the east and the Swan Coastal Plain about 49 km to the west.

The development envelope is situated approximately 1 km east of the Wandoo National Park. The National Park is included in the Department of Biodiversity, Conservation and Attractions (DBCA) north-eastern section of the Western Shield (Western Shield Perth Hills cell) wildlife conservation program area. Western Shield is working to protect Western Australia's native wildlife through the broadscale management of introduced predators. The program provides increased fox management, integration of feral cat management, enhanced wildlife surveillance and native fauna population monitoring.

The St. Ronans Nature Reserve is located approximately 3 km north of the proposal area and the Wambyn Nature Reserve approximately 2 km east of the landfill site.

The development envelope comprises remnant native vegetation amongst previously cleared paddocks used for agriculture. Scattered and isolated mature native trees are found within the cleared paddocks.

The following fauna habitats were identified within the development envelope:

- cleared cropland with scattered marri and wandoo trees

- minor, ephemeral creek line which flows into Thirteen Mile Brook, lined with wandoo, flooded gum and she-oak
- Woodlands of eucalypt species with a native understorey in the northern parts of the proposal area.

Significant fauna

Species of conservation significance that were recorded or had a high likelihood of occurring within the development envelope include:

- Carnaby's black cockatoo (*Zanda latirostris*) listed as Endangered under the Environmental Protection and Biodiversity Conservation Act (EPBC Act) and the Biodiversity Conservation Act (BC Act).
- Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) listed as Vulnerable under the EPBC Act and BC Act.

The distribution of habitat for Carnaby's black cockatoo (Endangered) and Forest red-tailed black cockatoo (Vulnerable) overlaps the proposal area and includes both foraging and potential breeding habitat. Survey observations within the site include evidence of foraging by Forest red-tailed black cockatoo. The proposal is approximately 2 km outside the Baudin's cockatoo's current known distribution.

A total of 331 trees with a diameter, at breast height, of greater than 500 millimetres within the proposal footprint were investigated by drone or pole-mounted camera. It was found that 13 trees have hollows unsuitable for breeding and 318 have the potential to develop breeding hollows for black cockatoos (referred to as potential black cockatoo breeding habitat trees). No evidence of roosting was recorded on the site during surveys, with the closest recorded roosting site being 16 km from the proposal footprint.

Feral animals

Fauna surveys identified 4 introduced species, declared as pests under the *Biosecurity Agriculture Management Act 2007* in the study area:

- feral cat
- rabbit
- pig
- European red fox

The red fox was the most common species recorded (recorded 67 times) during the survey period.

Evidence of feral animal movement between neighbouring properties to and from the woodland and forested areas indicates that the conservation estate is likely a refuge for these animals.

Both the cat and red fox are direct predators of a variety of small- to medium-sized animals. DBCA's Western Shield program is concentrating efforts to actively reducing the impact of these species in the Northern Jarrah Forest.

2.1.4 Consultation

Matters raised during the 5-week public review and the proponent's responses are provided in the *Alkina response to EPA submissions* (Alkina Pty Ltd, 2022).

Matters raised during the public review period were:

- impacts to black cockatoo habitat
- management of feral animals and vermin, including the potential introduction of parasites and diseases from feral animal activity
- the effectiveness of the proposed *Feral Animal Management Plan* to control numbers of feral animals.

2.1.5 Potential impacts from the proposal

The proposal has the potential to significantly impact terrestrial fauna by the:

- loss of up to 331 trees (Marri/Wandoo) that provide good quality black cockatoo foraging and potential breeding habitat comprising:
- 13 trees containing unsuitable hollows; and
- 318 trees with the potential to develop hollows for black cockatoo
- potential impacts to native fauna from predation and competition for habitat from increased numbers of feral animals.

2.1.6 Avoidance measures

The proponent has designed the proposal to avoid:

- impacts to the large intact areas of vegetation on the property
- clearing of any trees with hollows suitable for black cockatoo breeding.

2.1.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the implementation of the *Great Southern Landfill Feral Animal Environmental Management Plan* (v 4.0 July 2022) (Feral Animal Management Plan) to minimise impacts to terrestrial fauna. The Feral Animal Management Plan has been developed based on advice from the DBCA and includes management targets, monitoring, response strategies and reporting measures.

The proponent's key management strategy is focused on the prevention of feral animal access to the landfill through appropriate design of infrastructure and operational controls that include fencing and regular covering of active landfill disposal areas. The proponent also proposes to work with DBCA and neighbouring stakeholders to manage any increased feral animals attributed to the landfill activity. The proposal location was selected to allow an internal buffer of at least 600 metres around the development envelope, which would be owned by the proponent. The proponent committed to the maintenance and management of the internal buffer.

Environmental Protection Act 1986 Part V

The disposal of waste to land is an activity consistent with the description of a Category 64: Class II or III putrescible landfill site under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). The proposed maximum waste acceptance rate would require the proponent to obtain a works approval and licence to regulate emissions and discharges under Part V of the EP Act.

The Department of Environment and Regulation (DWER) have advised the EPA that conditions can be placed on the works approval and/or licence to regulate emissions of leachate and waste, the acceptance of waste for disposal, and the conducting of feral animal monitoring within the prescribed premises boundary. Further, conditions on the works approval can include requirements for design and construction of landfill infrastructure to prevent the discharge of waste to the environment. Monitoring results would usually be required to be reported to the DWER in periodic environmental reports (usually annually for landfill infrastructure).

2.1.8 Rehabilitation measures

The proponent has proposed rehabilitation and habitat enhancement measures within Lot 4869 for terrestrial fauna, including replanting to native tree seedlings to provide future black cockatoo foraging habitat (and eventual breeding habitat) and to re-establish fauna habitat where possible in the post closure final land use.

2.1.9 Assessment of impacts to environmental values

The EPA considers that the key terrestrial fauna values likely to be impacted by the proposal are conservation significant terrestrial fauna species. The residual impacts to these values are predominately from clearing of foraging and potential future breeding habitat and indirect impacts from the increased presence of feral animal species.

Significant fauna

The implementation of this proposal will require clearing of native vegetation which includes direct impact to trees that provide:

- good quality foraging habitat for Carnaby's black cockatoo and Forest red-tailed black cockatoo; and
- the potential to develop hollows and provide future breeding habitat for Carnaby's black cockatoo and Forest red-tailed black cockatoo.

The proponent's assessment of cumulative impacts to black cockatoo habitat regarded loss of foraging habitat as insignificant when compared to foraging habitat within remnants of bushland, nature reserves and national parks in the vicinity of the proposal (ERD, June 2020, Alkina Holdings).

The EPA recognises that existence of foraging habitat and potential future breeding habitat in the region is important for long-term support of a species survival. Regionally, the proposal is located on the margins of the Wheatbelt bioregion which includes a large amount of land that has been cleared for agriculture. The loss and fragmentation of habitat in this region resulted in a shift of Carnaby's black cockatoo breeding distribution westward through the Jarrah Forest region, where it now also breeds.

The proponent has proposed to avoid clearing of trees that have suitable hollows for black cockatoo breeding, regardless of whether or not they are currently being utilised, and to re-establish fauna habitat where possible in the closure and rehabilitation of the landfill infrastructure. The proponent has also proposed to counterbalance the loss of foraging habitat through the planting of native tree species to restore foraging habitat in the medium term and provide a long-term potential for breeding habitat.

While the clearing of black cockatoo foraging habitat within the development envelope may not represent a large area of habitat, it is considered that the implementation of the proposal adds to the cumulative impacts of black cockatoo foraging habitat loss in the region. The EPA considers that the retention and restoration of habitat in the regional context is important to counterbalance the cumulative impacts of the permanent loss of habitat for the 2 conservation significant black cockatoo species.

Thus, the EPA requires restoration for enhancement of habitat within close proximity of the impacted area to increase habitat connectivity, reduce fragmentation and provide habitat corridors to provide support for species resilience and recovery. Proximity of foraging habitat to breeding habitat has also been demonstrated to be critical to support improved breeding success.

The application of the Western Australia Offset metric to the proponent's proposed replanting indicated that 495 established foraging habitat trees for black cockatoo are required to adequately offset the loss of black cockatoo foraging habitat within the development envelope. The proponent has proposed to plant a number of native tree seedlings consistent with the offset calculation to restore the impact to black cockatoo foraging habitat. While the planting of new trees would not replace foraging

habitat in the near future, the EPA considers that the application of this offset would counterbalance the significant residual impact of foraging habitat loss in the area over the long term. The EPA considers that the rehabilitation and restoration of degraded areas within close proximity of the impacted area increases the habitat available for black cockatoo and enhance local environmental values.

The EPA therefore recommends offset conditions to counterbalance the significant residual impact to black cockatoo foraging habitat and that are likely to meet the environmental objective for terrestrial fauna. Refer to section 4 for further discussion on this aspect of the assessment.

Feral animals

Habitat removal or habitat modification caused by the construction of infrastructure and disposal of waste may result in indirect impacts to conservation significant fauna species from the attraction or increased abundance of introduced feral animal species.

Feral animals are already present within the area surrounding the development envelope, and it is recognised that the proposal may be a potential contributor to an increase in feral animal numbers rather than being the primary source. Specifically, the acceptance of certain types of waste such as putrescible food wastes, may contribute to a localised but potentially significant increase in feral animal numbers.

Evidence of feral animal movement between neighbouring properties to and from the woodland and forested areas indicates that the conservation estate may facilitate movement of these animals. Given the current presence of feral animals in the area surrounding the proposal, an increase in the availability of food sources (putrescible waste) associated with the proposed landfill is likely to increase the cumulative indirect impacts to native fauna.

Indirect impacts associated with potential increases in feral animal activity will need to be appropriately managed to prevent increased predation, habitat modification and competition for food and habitat resources. The *Great Southern Landfill Management Plan* (March 2021, Alkina01_Rev5) provides control measures including daily cover of the active waste tipping area and use of portable litter screens to prevent feral animal access to food sources in waste. The proponent has also proposed to implement the *Feral Animal Management Plan* to minimise and manage indirect impacts to terrestrial fauna.

The Department of Primary Industries and Regional Development (DPIRD) indicates that while no clear evidence exists that the operation of putrescible waste landfills in rural areas poses an unacceptable biosecurity risk for vector transmission of disease, management measures are required to mitigate specific risks such as European house borer spread.

The proponent has proposed to implement the *Feral Animal Management Plan*. DWER have advised that the implementation of monitoring for feral animals within the prescribed premises boundary can be conditioned under an approval determined under Part V of the EP Act in the context of waste emission sources. Regulatory instruments under Part V can include specifications for infrastructure design and implementation to minimise the discharge and containment of waste to prevent the attraction of feral animals to the facility. Conditions may also be applied for the monitoring, record keeping, review, implementation of management actions and reporting to mitigate against any increase in feral animal and vermin numbers on the landfill site. As conditions imposed on Part V approvals may only relate to emissions and discharges associated with prescribed activities and directly relates activities undertaken within the prescribed premises, imposing feral animal control actions outside of the development envelope may not be able to be considered under Part V of the EP Act.

While the measures in the *Feral Animal Management Plan* would achieve mitigation of feral animal numbers within the development envelope, the EPA considers that the monitoring and management of feral animals outside the development envelope is necessary to gather data on movements from potential refuge areas in the vicinity of the proposal and to understand changes in the amount and nature of feral animal activity following implementation of the proposal. The EPA considers that a requirement for no increase in feral animal numbers within an established control area beyond the development envelope would provide appropriate protection for native fauna, including populations that exist within the Western Shield and nearby conservation areas.

In assessing impacts to terrestrial fauna, the EPA has had regard of other decision-making processes that are able to regulate in a manner that is consistent with EPA objectives. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act, including controls for the design and operation of the landfill infrastructure to limit feral animal activity will contribute to meeting the EPA objectives for this factor.

The EPA also recommends a condition be imposed that requires the implementation of feral animal control within an established area surrounding the development envelope, specifically to protect native fauna within the Western Shield and protected areas. The intent of the condition is to provide certainty that feral animal activity will be monitored and mitigated to achieve the EPA's objective for terrestrial fauna.

2.1.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective.

The EPA summary assessment findings are presented in Table 2.

The EPA has also considered the principles of the EP Act (Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 2: Summary of assessment for terrestrial fauna

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Direct impact to habitat for significant fauna (black cockatoo species) including the clearing of • 331 individual trees (Marri/Wandoo).	The EPA advises that these impacts are likely to result in a significant residual impact. Significant residual impacts are likely to be able to be regulated through the limitation of the extent of the development envelope and the number of trees cleared. The EPA considers that, in the context of cumulative impacts, that offsets be considered for the purpose of enhancing remaining black cockatoo foraging habitat. Offset conditions are recommended to require the proponent to counterbalance the significant residual impact to black cockatoo foraging habitat to achieve an environmental outcome that is consistent with the EPA's objective for terrestrial fauna.	Regulated through: • condition A1 - Limitations and extent of proposal • condition B1 – Terrestrial Fauna outcomes • condition B4 – Environmental Offsets.

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
2.	Potential direct and indirect impacts to significant fauna from an increase in feral animal numbers, including predators.	Residual impacts can be regulated through reasonable conditions so the environmental outcome is consistent with the EPA's objective for terrestrial fauna. Conditions are recommended to achieve the outcome of controlling feral animal numbers and activity within an established area outside of the development envelope. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act, including controls to specify the design and operation of the landfill infrastructure, including monitoring, to limit feral animal activity, will contribute to meeting the EPA's objectives for this factor.	Regulated through: • condition B1 – Terrestrial fauna DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act.

2.2 Terrestrial Environmental Quality

2.2.1 Environmental objective

The EPA's environmental objective for terrestrial environmental quality is *to maintain the quality of land and soils so that environmental values are protected* (EPA 2021).

2.2.2 Investigations and surveys

The EPA advises the following investigations were used to inform the assessment of the potential impacts to terrestrial environmental quality:

- Addendum to Great Southern Landfill Stability Analysis for Leachate Pond, Retention Pond and Stormwater Dam (1777197-056-M-Rev0) Golder, 9 June 2020 (appendix 1.10 of the ERD).
- Great Southern Landfill – Leachate pond sizing (1777197-052-M-Rev1) Golder, 9 June 2020 (appendix 3.6 of the ERD).
- Hydrogeological site characterisation – Great Southern Landfill (1777197-008-R-Rev1) Golder Associates, September 2017 (appendix 3.1 of the ERD).
- Proposed Great Southern Landfill – Landfill Closure Objectives and measures (1777197-048-M-Rev1) Golder, 9 May 2020 (appendix 6.3 of the ERD).
- Siting, design, operation and rehabilitation of landfills. State Government Victoria. Environmental Protection Authority (Victoria), August 2015 (https://www.epa.vic.gov.au/about-epa/publications/788-3)
- Works Approval Application – Desktop assessment – Stability Assessment (147645033-012-R-Rev0) Golder Associates, March 2015 (appendix 1.5 of the ERD).
- Works Approval Application – Desktop assessment - Topsoil handling and sediment management (1777197-029-M-Rev0) Golder Associates, 25 October 2017 (appendix 1.7 of the ERD).
- Works Approval Application – Supporting Geotechnical Information (1777197-003-M-Rev0) Golder Associates, 17 July 2017 (appendix 1.1 of the ERD).
- Works Approval W5830/2015/1 Decision Document for the Allawuna Farm Landfill, Department of Environmental Regulation, 17 March 2016 (https://www.der.wa.gov.au/images/documents/your-environment/Consultation/W5830-2015-1d.pdf).

DWER advised that the work conducted was technically sound and appropriate to inform the environmental impact assessment.

2.2.3 Assessment context – existing environment

The proposal is located on the Darling Plateau, east of the Darling fault. Local geology mapping indicates predominantly porphyritic granite (granite comprised of a mix of large and smaller crystals) beneath the footprint of the landfill. The development envelope is located on a southern slope of an alluvial valley in the upper reaches of the Thirteen Mile Brook. Refer to section 2.4.3 for a description of the hydrogeological context.

Records in the Geoscience Australia database indicate that 3 minor earthquake events have occurred within a 15 km radius of the landfill since 2000. The nearest was recorded approximately 5.7 km NNW of the landfill (1.94 magnitude) and the largest was measured at 2.5 magnitude 13 km SE of the landfill in 2008. Earthquakes below the magnitude of 3 are not usually felt by humans and do not usually cause damage to infrastructure.

Waste and Infrastructure

The proponent proposes to accept putrescible waste meeting the Class II and Class III criteria as currently defined in the *Landfill Waste Classification and Waste Definitions (1996)*. The proponent's ERD indicates that wastes will principally include commercial and industrial wastes that are putrescible and of a Class II nature. Other waste types that may be accepted include Class II medical waste.

The proponent proposed a landfill design that incorporates a leachate collection and leachate management system within each landfill cell. The landfill lining system includes a low-permeable sub-base, geosynthetic clay liner (GCL) and a high-density polyethylene (HDPE) liner. Construction will be overseen by a third-party and verified through a construction quality assurance programme.

2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in Response to the *Alkina response to EPA submissions* (Alkina Pty Ltd, 2022). The key issues raised during the public consultation period include:

- erosion and dust emissions
- contamination to soil from landfill operations
- key infrastructure such as pond sizing
- leachate generation and leakage
- storage of topsoil
- failure of containment infrastructure due to seismic activity.

2.2.5 Potential Impacts from proposal

The key potential impacts to terrestrial environmental quality are:

- soil contamination through:
  - leachate release from containment infrastructure by:
    - seepage from landfill, evaporation ponds, or retention ponds
    - liner failure through subsidence, instability of waste cells or seismic activity
    - overtopping of ponds
- erosion and sediment loss (for example, completed cell capping allowing water to infiltrate or waste to be exposed, implementation – Thirteen Mile Brook crossing).

2.2.6 Avoidance measures

The proponent submitted that the original proponent of the Allawuna Landfill proposal sought to avoid unmanageable impacts to terrestrial environment quality through a site selection process that considered site geology and topography.

The *Siting, design, operation and rehabilitation of landfills (Environmental Protection Authority Victoria*) states that a reasonable degree of assurance of the long-term protection of the landfill from an earthquake is to avoid sites within 100 metres of a fault line. The proposal site is located 41 km from the Meckering Fault and 54 km from the Darling Fault.

As part of the landfill design, the stability of the updated design for landfill cells, leachate pond and stormwater pond have been assessed under static and pseudo-static conditions to understand potential impacts from operational and seismic activity during operation and post-closure. The integrity of the proposed landfill, containment infrastructure (including the leachate pond stormwater pond) and capping system under normal and earthquake conditions exceed the required factors of safety, thereby avoiding the prevalence of conditions that could lead to failure of the containment infrastructure.

2.2.7 Minimisation measures (including regulation by other DMAs)

The proponent has designed the proposal to minimise impacts to terrestrial environmental quality by:

- landfill design in accordance with best practice and overseen by a third-party construction compliance verification program
- minimising the size of the development envelope and disturbance footprint of the infrastructure
- minimising clearing
- replacing sandy soils within the containment infrastructure footprint with low permeability engineered fill

- minimising the size of the active landfill area (tipping face), including progressive capping to reduce leachate generation
- sediment control infrastructure and stormwater diversions to minimise erosion loss and sediment management, including stockpile management of cover materials.

The proponent has proposed to implement a *Landfill Management Plan* (set out in the ERD) which includes detail on operational control measures to contain and manage waste acceptance procedures, landfilling of waste, management of leachate and inadvertent spills of hydrocarbons and chemicals, with a focus on training, maintaining containment infrastructure, confinement of spills and clean-up.

Environmental Protection Act 1986 Part V

The disposal of waste to land is an activity consistent with the description of a Category 64: Class II or III putrescible landfill site under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). The proposed maximum waste acceptance rate would require the proponent to obtain a works approval and licence to regulate emissions and discharges under Part V of the EP Act.

In relation to the maintenance of land and soil quality, DWER have advised the EPA that conditions can be placed on the works approval to specify the design, construction and operation of the landfill cells, liner system, leachate collection system, ponds and ancillary infrastructure to minimise contamination of soil. Subsequent approvals can contain conditions to specify discharge criteria and monitoring of landfill leachate, unplanned discharges and chemical spills, regulate volumes of leachate in storage, and to set limits on any discharges of waste or modified stormwater flow to the environment. Conditions can also specify waste acceptance methods, including the monitoring and reporting of waste volumes, types and disposal specifications. A Closure Management Plan, detailing the capping design, final landform, capping and revegetation management and environmental monitoring would likely be required closer to the completion of waste disposal activities.

In accordance with the *Guideline – Industry regulation guide to licensing* the compliant construction of critical containment infrastructure, including landfill infrastructure, is required to be demonstrated prior to the acceptance of a licence application for the operation of the landfill infrastructure. Emission and environmental monitoring results are usually required to be reported to the DWER in periodic environmental reports (usually annually for landfill infrastructure).

Rights in Water and Irrigation Act 1914

The proponent would be required to apply for approvals for interference with any creek system under the *Rights in Water and Irrigation Act 1914* (RiWI Act) to mitigate

direct impacts to the riparian zone and indirect downstream impacts from construction of stream crossings. Assessment of permits under the RiWI Act considers erosion controls to prevent sediment runoff and modification to surface water and stormwater controls that affect the creek bed.

2.2.8 Rehabilitation measures

The proponent has proposed to rehabilitate and revegetate the landfill site similar to pre-development vegetation following closure. In relation to terrestrial environmental quality, measures include that:

- the final landform will be geotechnically stable and designed to reduce soil erosion;
- infrastructure will be removed unless agreed by regulator and future landowner;
- all contaminated soils will be remediated, if required, following immediate recovery of spills to a level fit for purpose for post-closure land use;
- progressive rehabilitation of completed landfill areas and final capping is fit for purpose;
- native vegetation is planted to prevent erosion and increase soil stability and quality.
- post-closure monitoring and maintenance of capping and revegetation.

In addition, the proponent has committed to working with a local catchment group to restore and protect Thirteen Mile Brook riparian vegetation within the property including controls to prevent sediment erosion.

2.2.9 Assessment of impacts to environmental values

The EPA considered that the environmental value for terrestrial environmental quality to be impacted by the proposal is soil quality. Impacts to groundwater are considered in section 2.4.

The proponent has provided an infrastructure design report, technical specifications report and a landfill operational management plan with the ERD for this assessment. The proponent's approach to management of the landfill, included leachate control, monitoring and contingency measures, and maintenance actions that prevent direct and indirect impacts to soil quality. The EPA notes that the proponent gave consideration to the Victoria EPA guidelines for the design, operation and rehabilitation of landfills in outlining the relevant controls for implementation of the proposal.

The proponents' *Landfill Management Plan* provides an appropriate approach to stormwater and surface water management, erosion and topsoil management, and monitoring and contingency measures for closure actions. In response to advice from the Department of Primary Industries and Regional Development, the

proponent has clarified that vegetation resembling pre-landfill vegetation (for instance pasture grasses) will be established during rehabilitation of the landfill area to prevent soil erosion on rehabilitated areas.

The EPA considers that the proponent has provided sufficient information that demonstrates the design of containment infrastructure is suitable to contain leachate from the proposed Classes of waste in the specific location to mitigate seismic risk (refer to section 2.4). The proponent's proposed post-closure objectives and *Closure Plan* (ERD Appendix 6.3) are also consistent with current requirements and information for landfill closure. While site-wide closure is anticipated to commence 28 years after commencement of landfilling operations, closure and capping of cells and installation of landfill gas management infrastructure will be undertaken progressively throughout operations.

In assessing impacts to terrestrial environmental quality, the EPA has had regard of other decision-making processes that are able to regulate in a manner that is consistent with EPA objectives. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act will contribute to meeting the EPA objectives for this factor; including, conditions imposed for construction, operation and closure activities.

Furthermore, permits required for any modification or interference of a stream or waterway consider application of controls to prevent erosion of sediment of impacts associated with modified surface water flows. One of the primary objects of the assessments under the RiWI Act is the management of water resources, including regulation of activities which are detrimental to that water resource, protection of the water resource ecosystems and protection of the environment in which the water resource is situated.

A key aspect to limiting impacts associated with terrestrial environmental quality is the control of the amounts of waste and the types of waste that are being disposed of to landfill. In assessing the proposal, the EPA considers that the landfill is proposed to be operated within the context of the implementation of the Western Australia *Waste Avoidance and Resource Recovery Strategy 2030* which specifies the types of waste that may be appropriate to landfill, as opposed to being recycled or recovered for reuse.

In consideration of the waste minimisation principle, the EPA recommends that a requirement for the proposal's waste acceptance methods be applied to ensure that the proponent applies practices that demonstrate consistency with the waste hierarchy and waste minimisation targets, as set out in the *Waste Avoidance and Resource Recovery Strategy 2030* to ensure that appropriate waste types are received for disposal. The intent of the condition is to ensure continuous improvement and regular reporting on how the proponent considers waste recovery and minimisation goals for the proposal in line with the likely evolution of waste management options in the State through the life of the proposal. The EPA considers

that the condition recommended for the proposal's waste acceptance methods, in combination with the ability of the DWER to monitor the waste types and volumes accepted under a future licence, will mitigate the potential impacts to soil quality.

It is noted that the landfilling of waste will result in a future registered contaminated site which may be subject to future contaminated site classification but may not result in sterilisation of the land in a manner that restricts future land uses that may be consistent with the proponent's closure approach.

The EPA considers that there are no significant residual impacts to soil quality likely to be inconsistent with the EPA objective for terrestrial environmental quality.

2.2.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely environmental outcomes of the proposal on terrestrial environmental quality. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 3.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 3: Summary of assessment for terrestrial environmental quality

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Potential impacts to soil quality through leachate seepage, and loss of containment (overtopping of ponds).	The EPA considers that the proponent has provided a design for the landfill to standards equivalent of current industry practice and suitable for management of leachate and containment within the geological and environmental setting of the proposal area. Conditions are recommended that require the volumes and types of waste accepted for disposal be recorded, categorised and reported to ensure continuous improvement of waste management consistent with the *Waste Avoidance and Resource Recovery Strategy 2030* (and any future versions). The EPA considers that the regulation of waste disposal activities under Part V of the EP Act, including controls to specify the design and operation of the landfill infrastructure, will contribute to meeting the EPA's objectives for this factor. The EPA advises that there is unlikely to be any residual impact from leachate seepage and loss of containment. The environmental outcome is likely to be consistent with the EPA's objective for terrestrial environmental quality.	Regulated through: • condition B6 -Waste minimisation DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act.

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
2.	Potential impacts to soil quality from erosion, and spills.	The EPA advises that there is unlikely to be any residual impact from erosion or spills. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act, will contribute to meeting the EPA's objectives for this factor.	DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act, and approvals under the RiWI Act for interference of any creek system to mitigate impacts to watercourses.

2.3 Flora and Vegetation

2.3.1 Environmental objective

The EPA environmental objective for flora and vegetation is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2021).

2.3.2 Investigations and surveys

The EPA advises the following investigations, surveys and peer reviews were used to inform the assessment of the potential impacts to terrestrial fauna:

- *Allawuna Landfill Vegetation and Fauna Assessment* (12/111) ENV Australia Pty Ltd, 31 October 2012 (appendix 2.10 of the ERD)
- *Flora, Vegetation and Fauna Assessment, Allawuna Roadside*, (12/088) ENV Australia Pty Ltd, 20 March 2013 (appendix 2.9 of the ERD).
- *Tree survey to support Native Vegetation Clearing Permit application for the proposed Great Southern Landfill* (1777179-036-M-Rev0) Golder Associates, 17 January 2018 (appendix 2.11 of the ERD).
- *Reconnaissance Flora and Vegetation Assessment, Part Lots 3060, 4869 and 29259 Great Southern Highway, Saint Ronans* (EP19-091(01)--003C RAW) Emerge Associates, February 2020 (appendix 2.6 of the ERD).
- *Black Cockatoo Habitat Tree Assessment - Part Lots 3060, 4869 and 29250 Great Southern Highway, Saint Ronans* (EP19-091(02)—005B) Emerge Associates, 30 January 2020 (appendix 2.8 of the ERD).

The surveys were consistent with the *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016c).

2.3.3 Assessment context – existing environment

The proposal is located in the Northern Jarrah Forest subregion of the Jarrah Forest bioregion. The proposal area is in the ‘Bannister 4’ vegetation association, described as marri, jarrah and wandoo woodland, which is well represented within the local area.

The vegetation condition in the southern portion of the development envelope is completely degraded. Relatively small portions of intact remnant native vegetation with low levels of disturbance are present in the northern portion of the development envelope along the Great Southern Highway and the access road from the highway. A portion of native vegetation adjacent to the site access road in the northern portion of the development appears to have been impacted by a fire event, but once fully regenerated is expected to be of ‘excellent’ condition, based on the condition of adjacent vegetation.

The riparian vegetation at the proposed Thirteen Mile Brook area is described as degraded within evidence of salt scalding along large sections (Emerge, 2020). No flora species listed as threatened under the EPBC Act or the BC Act were recorded during the surveys. No Threatened Ecological Communities (TEC) listed under the EPBC Act or the BC Act were recorded in the survey area (Emerge Associates, February 2020).

Two priority flora species were recorded in the northern portion of the development envelope. These include *Drosera albonotata* (P2) and an unconfirmed *Hemigenia* species that closely resembles *Hemigenia platyphylla* (P4). *Drosera albonotata* (P2) was recorded in 2 locations in the north western portion of the site, within the Great Southern Highway road reserve (see Figure 3) and only one individual of *D. albonotata* will be impacted by the proposal.

The proposal may directly impact 2 individuals of a priority flora species with some characteristics of *Hemigenia platyphylla* (P4). Two individual specimens that were flowering and in good condition could not be confirmed to species level, as some morphological characters were not representative of *H. platyphylla* but were also not consistent with any other *Hemigenia* species. This species was observed throughout the native vegetation areas in the northern part of the site.

A total of 30 introduced flora species were recorded within the development envelope, none of which represent weeds of national significance or are currently listed under the *Biosecurity and Agricultural Management Act 2007*.

2.3.4 Consultation

Matters raised during the stakeholder consultation and the proponent's responses are provided in Response to the EPA Public Review submission (Alkina Pty Ltd, 2022).

Matters raised during the public review period included:

- cumulative impacts of vegetation clearing
- conservation areas, the introduction and spread of weeds.

2.3.5 Potential Impacts from proposal

The proposal has the potential to impact on flora and vegetation from:

- clearing of up to 6 ha of native vegetation within a 163.46 ha footprint
- impacts to one individual of *Drosera albonotata* (P2)
- impacts to 2 plants which may be *Hemigenia platyphylla* Priority flora (P4)
- indirect impacts to native flora due to introduction and spread of weed species.

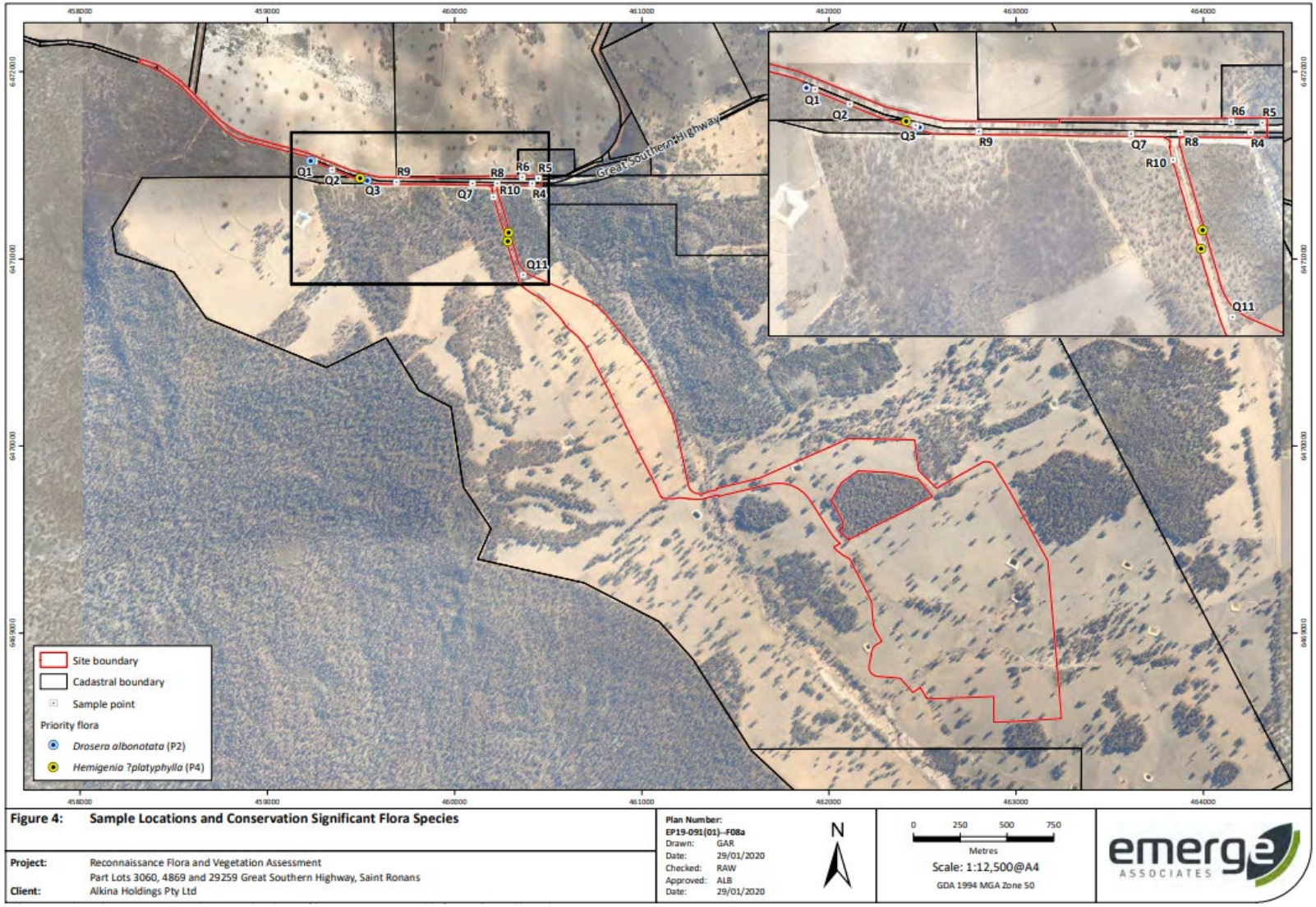

Figure 3: Location of conservation significant flora species

2.3.6 Avoidance measures

The landfill location avoided Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), critical vegetation types and threatened flora. The site layout avoids the clearing of remnant bushland and areas of good quality woodland vegetation on Allawuna Farm, demonstrated by the exclusion of a 'D-shaped' remnant vegetation patch immediately north of the landfill infrastructure from the development envelope.

2.3.7 Minimisation measures

The proponent has proposed the following measures to minimise impacts to flora and vegetation:

- minimise the size of the development envelope and proposal footprint.
- prevent impacts from weeds by:
  - not processing green waste that could result in weed introduction
  - direct disposal of waste to landfill cells upon receival at site
  - use onsite soils / uncontaminated / clean fill soils for daily cover (or use of alternative daily covers)
  - train staff to identify weeds and undertake regular inspections.

2.3.8 Rehabilitation measures

As part of the proposed rehabilitation measures, the proponent proposes progressive rehabilitation of completed landfill areas, planting of native trees to prevent erosion and increase soil stability and post-closure monitoring and maintenance of landfill capping and revegetation.

2.3.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for flora and vegetation likely to be impacted by the proposal are significant flora species (Priority) and vegetation in 'excellent' condition.

Vegetation communities

Construction activities associated with the proposal will result in the clearing of up to 6 ha of native vegetation within the development envelope of which 5 ha is in a 'degraded' to 'completely degraded' condition. The proposal footprint is mapped as Bannister 4 association within the Northern Jarrah Forest. This vegetation association has approximately 38% of its pre-European extent remaining, with the clearing of 6 ha reducing this vegetation association by 0.003%.

The proponent confirmed that communication with Main Roads WA in relation to the Great Southern Highway intersection modifications indicates that clearing for road

upgrades is not expected to impact vegetation in the adjacent DBCA managed conservation estate.

Priority flora species

The clearing may impact upon one individual of *Drosera albonotata* (P2), located within the Great Southern Highway road reserve. The species were flowering during the survey which supported the identification of occurrences of 2 populations of at least 30 individuals of *D. albonotata* outside the development envelope. DBCA records confirmed that *D. albonotata* has also been recorded 700 m west of the recorded location and is known from 9 other locations in the state. As such, the EPA considers that the impact of the proposal is unlikely to be a significant residual impact to the species.

The clearing may impact upon 2 individuals of a *Hemigenia* species which may be *Hemigenia platyphylla* (P4). The individuals are located on either side of the access road in remnant bushland. The observations of this species throughout the native vegetation in the northern portion of the site during surveys are indicative of a greater distribution and population size of this species; however, a targeted survey was not conducted for the ERD. Limited records of the species in the region are likely to be related to the restricted areas of survey, rather than a restriction in the population and distribution of the taxon. In the absence of the identification of the occurrence to species level and occurrence outside the development envelope, it is recommended that the impact to 2 individuals be mitigated. The EPA would not generally require mitigation for similar potential impacts to priority species, but in this instance, the proponent did not provide sufficient information to demonstrate that the species were not significant, and to provide confidence that the EPA's objective for this factor is likely to be achieved.

The EPA has assessed impacts to the *Hemigenia* species and recommends a limitation on the maximum extent of the development is applied as well as a requirement for an objective of no indirect impact on occurrences of the species within a specified area outside the development envelope. The EPA has assessed the likely residual impacts of the proposal on flora and vegetation and considers that residual impacts to vegetation communities and priority flora can be managed.

The EPA advises that, subject to recommended conditions, the environmental outcomes of the proposal are expected to be consistent with the EPA's factor objective.

2.3.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely environmental outcomes of the proposal on flora and vegetation environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 4.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 4: Summary of assessment for flora and vegetation

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Clearing of up to 6 ha of vegetation in a 'completely degraded' to 'excellent' condition. Direct impact to 2 occurrences of a *Hemigenia* species (P4).	The proposal will impact 2 individuals of a potential priority flora species. The EPA considers the recommended limit for clearing and a requirement for an environmental objective of no indirect impacts to the *Hemigenia* species will be able to manage impacts from clearing consistent with the EPA objective for flora and vegetation.	Regulated through: • condition A1 - Limitations and extent of proposal • condition B5 - Flora

2.4 Inland Waters

2.4.1 Environmental objective

The EPA environmental objective for inland waters is *to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected* (EPA 2021).

2.4.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to inland waters:

- *Alkina Holdings Pty Ltd – Great Southern Landfill Works Approval Supplementary Information* (1777197- 026-R-Rev0) Golder Associates, October 2017 (appendix 1.6 of the ERD).
- *Great Southern Landfill – Desktop review – Surface water management* (1777197-007-M-Rev0), Golder Associates, 18 July 2017 (appendix 3.2 of the ERD).
- *Great Southern Landfill – Leachate pond sizing* (17777197-052-M Rev 0), Golder, 9 June 2020 (appendix 3.6 of the ERD).
- *Great Southern Landfill Desktop Geochemical Risk Characterisation* (1777197-049-MRevA) Golder, 13 November 2019 (appendix 3.4 of the ERD).
- *Great Southern Landfill EPA Peer Review* (ALK001), SRK Consulting, 8 November 2019 (appendix 3.7 of the ERD).
- *Great Southern Landfill Inland Waters – Hydrogeological conceptualisation and contingency planning* (1777197-051-Rev1), Golder, 13 November 2019 (appendix 3.5 of the ERD).
- *Hydrogeological site 42eology42rization – Great Southern Landfill* (1777197-008-R-Rev1), Golder Associates, September 2017 (appendix 3.1 of the ERD).
- *Proposed Great Southern Landfill – Landfill Closure Objectives and measures* (1777197-048-M-Rev1), Golder, 29 May 2020 (appendix 6.3 of the ERD).
- *Proposed Great Southern Landfill – Response to the EPA Public Review submission,* Alkina Holdings Pty Ltd, 20 July 2022.
- *Siting, design, operation and rehabilitation of landfills*. State Government Victoria. Environmental Protection Authority (Victoria), August 2015. Link
- *Works Approval Application – Desktop assessment – Topsoil handling and sediment management* (1777197-029-Mrev0), Golder Associates, 25 October 2017 (appendix 1.7 of the ERD).
- *Works Approval Application – Supporting Geotechnical Information*, (1777197-003-M-Rev0) Golder Associates, 19 July 2017 (appendix 1.1 of the ERD).

- *Works Approval W5830/2015/1 Decision Document for the Allawuna Farm Landfill*, Department of Environmental Regulation, 17 March 2016. Link
- *York Proposed Landfill site – Water level gauging and sampling event* (1777197-001- M-Rev0), Golder Associates, 12 May 2017 (appendix 3.3 of the ERD).

To inform the assessment of the proposal, an independent peer reviewer was undertaken of the hydrogeological and hydrological study components of the *Great Southern Landfill works* (SRK Consulting, 8 November 2019). The peer review is included as appendix 3.7 of the proponent's ERD.

2.4.3 Assessment context – existing environment

The proposal is located on the western aspect in the upper reaches of the Thirteen Mile Brook catchment. The Thirteen Mile Brook catchment forms part of the Avon River Sub-catchment within the Swan Avon – Main Avon Catchment of the Avon River Management Area (*Waterways Conservation Act 1976*). The Avon River catchment is a proclaimed water area under the RiWI Act. The Thirteen Mile Brook is located approximately 310 m southwest and west of the proposed landfill cell footprint and 150 m from the proposed retention pond footprint. A small ephemeral creek is located directly adjacent to the development area. Following rainfall, surface water from the brook flows into Thirteen Mile Brook to flow in a north westerly direction.

Rainfall in the area is highly variable with inter-annual variability ranging from 286 mm (2010) to a maximum of 998 mm (1955) (Alkina Holdings, 2020). Rainfall events are most common between May and September.

The Mundaring Weir Catchment, a Public Drinking Water Source Protection Area (PDWSPA), is located approximately 1 km west of the proposed landfill. The catchment divide is located on the Allawuna Farm and Wandoo National Park boundary which places the proposal in a separate catchment to the PDWSPA.

The proponent conducted investigations to inform the assessment of surface water and groundwater within the development envelope. Groundwater levels generally align with topography, with groundwater elevations being highest in the upper reaches of the catchment to the east and gradually declining in a westerly direction towards the Thirteen Mile Brook valley floor to the west. Groundwater flow is typically from west to east within the development envelope, shifting to flow to north-west along the alignment of Thirteen Mile Creek where a groundwater flow barrier prevents groundwater flow further west.

Investigations described groundwater quality in the surficial aquifer, beneath the development envelope as brackish to saline, with no existing beneficial uses identified. There are no identified off site groundwater users and no groundwater dependant ecosystems in proximity to the development envelope. Potential beneficial uses may include stock water, but as flow rates are low and the water has

higher salinities, future realisation of this beneficial use of groundwater is unlikely in the vicinity of the proposal area.

Water supply and storage

The EPA requested the proponent to undertake an investigation into climate independent water supply and storage for the construction and operation of the proposed landfill. The proponent submitted a report, *Water balance assessment* (Golder June 2022). A water balance model, based on average long-term average climate conditions indicate that:

- adequate water supply will be available from water run-off for landfill construction and operation from May to October of each year
- surplus water from a farm dam on the surrounding Alluwuna Farm is modelled as adequate supply for landfill activities from November to April except under a scenario of heavy irrigation for canola farming
- external water supply would on occasion be necessary for the month of November.

The proponent identified potential external sources of water as a contingency. None of the sources are likely to generate additional impacts associated with the proposal implementation. The options for temporary storage of supplemental water include utilisation of excess storage capacity in empty leachate ponds or construction of new storage dams within the development envelope.

Characterisation of hydrogeology

To inform the assessment of the proposal, an independent peer reviewer was commissioned to undertake a review of the hydrogeological and hydrological study components of the Great Southern Landfill proposal.

The proponent's conceptual model for hydrogeological site characterisation was developed based on historical site data from the previous proponent, regional geological data sourced from publicly available datasets, and from targeted site investigation and monitoring programs.

The peer review considered the conceptual hydrogeological model is reasonable and addresses the site geology and geography, the groundwater flow regimes, and aquifer characterisation. The peer review agreed that it is unlikely that paleochannels or similar features along potential hydraulic pathways are present and that data likely indicates the presence of a geological barrier that prevents groundwater flow to the west of the proposal area.

The peer review advised the work to date, including site characterisation and the development of a conceptual site model, mitigation planning, and the risk assessment as competent, thorough and to the satisfaction of industry standard

practices. The hydrogeological and hydrological information provided by the proponent is appropriate for the assessment of potential impacts.

2.4.4 Consultation

Matters raised during the stakeholder consultation and the proponent's responses are provided in *Response to the EPA Public Review submission* (Alkina Pty Ltd, July 2022).

The key issues raised during the public consultation period include:

- contamination of surface water and groundwater from landfill operations
- potential groundwater connection to the Mundaring Weir PDWSPA
- potential impacts of waste disposal on nearby groundwater supplies
- leachate discharge and emissions
- climate independent water supply.

2.4.5 Potential impacts from proposal

The proposal has the potential to significantly impact on inland waters from:

- disturbance to surface water, sub-surface flows and groundwater flow regimes
- seepage of leachate causing contamination of surface water and groundwater
- overtopping of ponds
- increased sediment load and runoff that alters surface water quality.

2.4.6 Minimisation measures (including regulation by other DMAs)

The proponent proposes to minimise impacts through the following:

- landfill design in accordance with best practice with construction overseen by a third-party and verified through a construction compliance verification program
- maintenance of separation between the base of the landfill liner and the highest maximum groundwater table as part of the design
- construction of surface water infrastructure to minimise impacts to riparian zones and hydrological regimes
- construction of leachate ponds to store and evaporate leachate
- implementation of leachate and groundwater monitoring as well as environmental monitoring
- implementation of operational landfill management plans
- management of the landfill and associated infrastructure as a prescribed premise and in accordance with works approval and/or licence conditions under Part V of the EP Act.

Rights in Water and Irrigation Act 1914

For the construction of surface water retention dams on the creek line, and for modifications to natural surface water flows, the proponent would be required to apply for approvals for interference with any creek system under the RiWI Act. Assessment of permits includes controls to mitigate direct impacts to the riparian zone and indirect downstream impacts from construction of stream crossings. Approvals would also be required for the harvesting of surface water run-off into any on-stream dams.

Environmental Protection Act 1986 Part V

The disposal of waste to land is an activity consistent with the description of a Category 64: Class II or III putrescible landfill site under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). The proposed maximum waste acceptance rate would require the proponent to obtain a works approval and licence to regulate emissions and discharges under Part V of the EP Act.

In relation to the prevention of impacts to inland waters including surface water, groundwater, DWER have advised the EPA that conditions can be placed on the works approval to specify the design, construction and operation of the landfill cells, liner system, leachate collection system, ponds and ancillary infrastructure to minimise potential impacts to the quality and flow characteristics of surface water and groundwater. Subsequent approvals can contain conditions to specify discharge criteria and monitoring of landfill leachate, unplanned discharges and chemical spills, regulate volumes of leachate in storage, and to set limits on any discharges of waste or modified stormwater flow to the environment. Conditions can also specify waste acceptance methods, including the monitoring and reporting of waste volumes, types and disposal specifications. In relation of the maintenance of quality of surface and groundwater, conditions including monitoring frequency, locations and parameters for leachate, waste and groundwater would likely be applied.

A Closure Management Plan, detailing the capping design, final landform, capping and revegetation management and environmental monitoring to prevent leachate emissions post-closure would likely be required closer to the completion of waste disposal activities.

In accordance with the *Guideline – Industry regulation guide to licensing* the compliant construction of critical containment infrastructure, including landfill infrastructure, is required to be demonstrated prior to the acceptance of a licence application for the operation of the landfill infrastructure. Emission and environmental monitoring results are usually required to be reported to the DWER in periodic environmental reports (usually annually for landfill infrastructure).

2.4.7 Rehabilitation measures

The proponent proposes the following rehabilitation measures:

- rehabilitation and progressive capping
- remediation of any soil or groundwater contamination post closure

2.4.8 Assessment of impacts to environmental values

The EPA considered the key environmental values for inland waters likely to be impacted by the proposal are groundwater quality, surface water quality and hydrological regimes. The residual impacts to these values are predominately from surface and groundwater contamination from loss, leakage or seepage of leachate from containment infrastructure and changes in hydrological regimes (stormwater flow) from proposal implementation.

Surface water

The surface water availability within the region from the harvesting of on-site water run-off and changes in surface water flow due to infrastructure placement are unlikely to change notably, as the development envelope covers approximately 7% of the size of the catchment for the Thirteen Mile Brook.

Direct impacts on the riparian zone of the construction footprint and indirect downstream impacts associated with construction activities are unlikely to be significant but require management. DWER advised that construction of any infrastructure within a creek line is subject to permits required under the RiWI Act.

Groundwater and surface water contamination

The proponent plans for a smaller quantity of waste and a larger separation distance between the proposed landfill cells and the groundwater table than the previous application for the Allawuna landfill (SRK, 8 November 2019). These measures will increase the effectiveness of leachate retention within the geological barrier in the unlikely event that there is a breach of the liner.

The results from groundwater modelling indicates that contamination impacts from liner breaches or minor spills, if they occur, are likely to be localised, noting that the hydrogeological characteristics of the surficial aquifer show low groundwater flow rates, with very slow movement of potential contaminant plumes between the closest landfill cells to Thirteen Mile Brook. Due to the hydrogeological setting of the landfill site, any unintended leachate discharges or spills are unlikely to result in material impact to groundwater or surface water.

The geological, hydrogeological and geophysical investigations on the site suggest there is likely to be a hydraulic barrier to groundwater flow beyond the catchment boundary to the west and there is no evidence of hydrogeological connection

between the catchments. Consequently, the landfill is not considered to pose a significant threat to water quality in the Mundaring Weir PDWSPA.

Suitability of containment infrastructure

The primary minimisation measure to mitigate impacts to inland waters from the proposal is the design, construction, implementation and operation of waste and leachate containment infrastructure including the landfill cells and leachate ponds. The proponent has provided a design report, technical specifications and management measures as outlined in the ERD.

The infrastructure design and operational management plans are considered suitable for containment of waste and leachate in the specific proposal location and consistent with current industry practice and standards, including the consideration of potential seismic events (refer to section 2.2).

Other decision-making processes

In assessing impacts to inland waters, the EPA has had regard to other decision-making processes that are able to regulate in a manner that is consistent with the EPA objective for inland waters. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act including controls that relate to the maintenance of groundwater and surface water quality, as well as hydrological regimes will contribute to meeting the EPA objectives for this factor.

The proponent would also be required to apply for approvals for interference of any creek system and harvesting of surface water run-off into on-stream dams under the RiWI Act to mitigate direct impacts to the riparian zone and indirect downstream impacts from construction of stream crossings and any on-stream dam. One of the primary objects of the assessments is the management of water resources, including regulation of activities which are detrimental to that water resource, protection of the water resource ecosystems and protection of the environment in which the water resource is situated.

The EPA considers that there are no significant residual impacts to inland waters that are likely to be inconsistent with the EPA's environmental factor objective.

2.4.9 Summary of key factor assessment and recommended regulation

The EPA has considered the likely environmental outcomes of the proposal on inland waters environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 5.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the potential impacts will be consistent with its environmental

factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 5: Summary of assessment for inland waters

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Potential impact to surface and groundwater quality from discharges, loss and seepage of leachate from waste landforms and containment infrastructure.	The proponent provided sufficient information on the geological, hydrological, hydrogeological and geophysical characteristics of the siting of the infrastructure to demonstrate that there are no significant residual impacts to inland waters. The proponent's design for containment infrastructure and liner specifications are consistent with current industry practice and standards and suitable for the proposed landfill location. The environmental outcome is likely to be consistent with the EPA's objective for this factor. In reaching this finding, other decision-making processes have been taken into account. Specifically, Part V of the EP Act can regulate impacts to surface water and groundwater through the regulation of emissions and discharges.	DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act.
2.	Potential impacts to hydrological and groundwater regimes from proposal infrastructure establishment and water use.	The EPA considers that changes to stormwater flow and potential for increased sedimentation may occur as a result of proposal implementation. The EPA regards that regulation under other decision-making processes, specifically Part V of the EP Act (as above) and the RiWI Act will be able to manage impacts to be consistent with the	DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act and approvals under the RiWI Act for interference of any creek system to mitigate impacts to watercourses.

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
		EPA's objective for inland waters. DMA legislation (RiWI Act) will mitigate direct impacts to the riparian zone and indirect downstream impacts under a Bed and Banks Permit.	

2.5 Social Surroundings

2.5.1 Environmental objective

The EPA's environmental objective for social surroundings is *to protect social surroundings from significant harm* (EPA 2021).

2.5.2 Investigations and surveys

The EPA advises the following investigations, surveys and peer reviews were used to inform the assessment of the potential impacts to social surroundings:

- *Great Southern Landfill Management Plan* (Alkina01_Rev2), Alkina Holdings, May 2020 (appendix 6.1 of the ERD).
- *Works Approval Application Great Southern Landfill – review of noise, odour and dust assessments and management plans for approved Allawuna Landfill* (1777197-004-M-Rev1), Golder Associates, 24 October 2017 (appendix 5.2 of the ERD).
- *Great Southern Landfill Works Approval Supplementary Information* (1777197-026-R-Rev0), Golder Associates, October 2017 (appendix 1.6 of the ERD).
- *Great Southern Landfill Site – Desktop review – Gas Assessment* (1777197-030-M-Rev0), Golder Associates, 23 October 2017 (appendix 4.1 of the ERD).
- *Works Approval Application – Desktop assessment – supporting heritage information* (1777197-006-M-Rev0), Golder Associates, July 2017 (appendix 5.3 of the ERD).
- *Desktop Environmental and Social Risk Assessment* (1777197-009-R-Rev0), Golder Associates, July 2017 (appendix 5.8 of the ERD).
- *Proposed Great Southern Landfill – Landfill Closure Objectives and measures* (1777197-048-M-Rev1), Golder, 29 May 2020 (appendix 6.3 of the ERD).
- *Allawuna Landfill Facility for SITA Australia*, Larry Smith Planning, November 2013 (appendix 5.6 of the ERD).
- *Allawuna Landfill Facility for SITA Australia – Supplementary Report*, Larry Smith Planning, February 2015 (appendix 5.7 of the ERD).
- *Transport Impact Statement – Great Southern Landfill Development* (1908016-TIS-001), Shawmac Pty Ltd, 30 August 2019 (appendix 5.4 of the ERD).
- *Siting, design, operation and rehabilitation of landfills*. State Government Victoria. Environmental Protection Authority (Victoria), August 2015. Link
- *Works Approval W5830/2015/1 Decision Document for the Allawuna Farm Landfill*, Department of Environmental Regulation, 17 March 2016. Link
- *State Register of Heritage Places*, Department of Planning, Lands and Heritage, 19 November 2020 Link

2.5.3 Assessment context – existing environment

The proposal is located within a rural, agricultural land setting approximately 15 km west from the town of York. The closest residence to the landfill is approximately 1.8 km, with a distance of 600 m from the landfill cells to the adjacent farm boundaries.

The surrounding land use is primarily agriculture with the Wandoo National Park (conservation area) located to the west of the site.

Heritage and culture

The proposal is within the Ballardong People Indigenous Land Use Agreement. The closest Registered Aboriginal Site, the Helena River (Site ID 3758), is 700 m to the west of the proposal. The Helena River Registered Aboriginal Heritage Site (Site ID 3758) is close to the boundary of Lot 4869, however, the advice provided by the Department of Planning, Lands and Heritage in December 2017 indicated that the actual administered boundary of the Site does not intersect with the property boundary.

In 2012, the previous proponent met with 3 Elders of the Local Aboriginal Community to discuss the social and cultural values of the project area, and it was determined that the landfill and surrounding development envelope lands are not a Place of Significance.

The closest historic European Heritage listed site is St. Ronan's Well (place number 04183), approximately 2.5 km to the north of the proposed landfill.

2.5.4 Consultation

Matters raised during the stakeholder consultation and the proponent's responses are provided in *Response to the EPA Public Review submission* (Alkina Pty Ltd, July 2022).

The key issues raised during the public consultation period include generation of landfill gases, noise, dust and odour, a reduction in amenity and tourism, increased traffic, and risk of bushfires.

2.5.5 Potential Impacts from proposal

The proposal has the potential to significantly impact on social surroundings from:

- odour, noise and dust impacts to nearby residences
- changes to visual amenity and tourism benefits
- bushfires, traffic congestion and windblown litter
- landfill gases.

Proposal generated traffic is estimated to result in an increase to current traffic levels of 1.5%. The majority of traffic will be covered trucks containing commercial and industrial waste.

2.5.6 Avoidance measures

The proponent proposed location for the landfill provides a separation distance of greater than 500 m to sensitive receptors and does not intersect with Aboriginal or other heritage sites. The proponent also indicated that the location was selected specifically for its remoteness, an on-site buffer (600 m around the development envelope) between sensitive receptors and landfill infrastructure, and effective screening of potential visual impacts by native vegetation and natural topography.

2.5.7 Minimisation measures (including regulation by other DMAs)

The proponent outlined the following minimisation measures to reduce direct and indirect impacts to social surroundings:

Noise, Dust and Odour

- no operations on Sundays, or public holidays
- investigate and respond to complaints including maintenance of a complaints register
- intermediate cover for sections of the landfill that will receive waste for extended periods (up to 3 months)
- seal site entry road and speed limits on internal roads to avoid dust generation.
- spray down operational areas to manage potential dust
- require waste trucks to be enclosed to minimise risk of littering, odour etc. during waste transport
- place potential food wastes lower within the waste profile where possible.

Visual amenity

- maintain intervening landforms that provide screening
- no signage at the site entry point on the Great Southern Highway to identify the landfill
- proponent operated trucks carting waste to the site from Perth metropolitan locations will not be marked as waste trucks.

Litter

- install and maintain 2 m high perimeter fencing around landfill containment infrastructure
- manage transport, and tipping operations

- cover and rehabilitate cells.

Fires

- maintain suitable dedicated water for fire-fighting purposes
- no burning of waste or smoking within the landfill premises
- provide appropriate storage for flammable materials
- instal firebreaks around the facility
- reduce fuel loads during November to April (bushfire season).

Environmental Protection Act 1986 Part V

The disposal of waste to land is an activity consistent with the description of a Category 64: Class II or III putrescible landfill site under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). The proposed maximum waste acceptance rate would require the proponent to obtain a works approval and licence to regulate emissions and discharges under Part V of the EP Act.

In relation to the prevention of impacts to social surroundings, DWER have advised the EPA that conditions can be placed on the works approval to specify the design, construction and operation of the landfill cells, leachate collection system, landfill gas infrastructure and ancillary infrastructure to minimise potential impacts from noise, dust, odour, landfill gas emissions, fire and windblown waste. Subsequent approvals can contain conditions to specify landfill gas management emissions, regular covering of waste, operational controls to mitigate noise, dust and windblown waste emissions, and preventative controls to impact the likelihood and severity of fires. Conditions can also specify waste acceptance methods, including the monitoring and reporting of waste volumes, types and disposal specifications.

A Closure Management Plan, detailing the capping design, final landform, capping and revegetation management and environmental monitoring would likely be required closer to the completion of waste disposal activities. Emission and environmental monitoring results are usually required to be reported to the DWER in periodic environmental reports (usually annually for landfill infrastructure).

2.5.8 Assessment of impacts to environmental values

The EPA only considers social, economic, cultural and aesthetic impacts from a proposal, if these are directly linked to the changes to the physical or biological environment.

The EPA therefore considered that the key social surroundings values likely to be impacted by the proposal are potential indirect and direct impacts from changes to visual amenity and emissions of dust, noise, odour and landfill gas. Based on the

information provided by the proponent, potential impacts to Aboriginal heritage are not likely to occur during the implementation of the proposal.

While the proponent selected the site to provide buffer distances between sensitive land uses and proposal infrastructure, the EPA recognises that the implementation of a large-scale landfill proposal has the potential to impact the above social values and requires mitigation.

The *Great Southern Landfill Management Plan* (March 2021, Alkina01_Rev5) provides a *Fire Management Plan* and operational management measures and responses for landfill gas, dust, odour, noise and weed management. The plan also provides for controls to manage traffic risk and mitigation measures to maintain visual impacts, including daily cover of waste to improve visual amenity and prevent odour, the use of portable litter screens to prevent windblown litter beyond the landfill boundary and revegetation of disturbed areas. The plan includes community communication on relevant aspects of the landfill operations and details of complaints management.

In assessing impacts to social surroundings, the EPA has had regard of other decision-making processes that are able to regulate in a manner that is consistent with EPA objectives. The EPA considers that the regulation of emissions and discharges under Part V of the EP Act including landfill gas, dust, odours and windblown litter associated with the proposal will contribute to meeting the EPA objectives for this factor.

Noise emissions would also be subject to the *Environmental Protection (Noise) Regulations 1997*.

Conditions imposed under Part V of the EP Act may only be applied within a prescribed premises boundary. For this reason, the EPA recommends that a condition be imposed that require the proponent to implement the *Great Southern Landfill Management Plan* (March 2021, Alkina01_Rev5 and any future revisions) to achieve the environmental objective of minimising and avoiding impacts to visual amenity and surrounding land uses. The intent of the condition is to ensure that a buffer area around the development envelope is maintained and managed to provide certainty that the potential impacts on social surroundings will be mitigated to achieve the EPA's objective for this factor.

2.5.9 Summary of key factor assessment and recommended regulation

The EPA has considered the likely environmental outcomes of the proposal on social surroundings environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 6.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the potential impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 6: Summary of assessment for social surroundings

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Potential impacts to social surroundings including visual amenity and surrounding land use.	The EPA advises that the potential impacts to social surroundings are unlikely to include any residual impact from the generation of landfill gas, dust, noise and odour and that the environmental outcome is likely to be consistent with the EPA's objective for social surroundings with reasonable conditions. It is recommended that a condition be required to ensure that the proponent meets the objectives for social surrounds through the implementation of an operational management plan. The EPA regards that regulation under other decision-making processes, specifically Part V of the EP Act will contribute to the manage of impacts to be consistent with the EPA's objective for this factor.	Regulated through: • condition B3 – Social surroundings DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act.

2.6 Greenhouse Gas Emissions

2.6.1 Environmental objective

The EPA environmental objective for greenhouse gas (GHG) emissions is *to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change.*

2.6.2 Investigations and surveys

List of resources used:

- *Works Approval Application – Desktop assessment – Landfill gas assessment* (1777197-030-M-Rev0) Golder Associates, October 2017 (appendix 5.1 of the ERD).
- *Great Southern Landfill greenhouse gas assessment* (1777197-030-M-Rev0) Golder, November 2019 (appendix 4.2 of the ERD).
- *Works Approval Application Great Southern Landfill – Review of noise, odour and dust assessment and management plans for approved Allawuna Landfill* (1777197-004-M-Rev1) Golder Associates, October 2017 (appendix 5.2 of the ERD).
- *Great Southern Landfill Management Plan* (Alkina01_Rev2), Alkina Holdings, May 2020 (appendix 6.1 of the ERD).
- *Review Greenhouse Gas Emissions Assessment Reportability of Biogenic Carbon Proposed Great Southern Landfill at Allawuna Farm* CarbonIntel, January 2022 (DWERDT573785).
- *Greenhouse gas clarification: Propose Great Southern Landfill* (1777197-058-M-Rev0) Golder, December 2020 (DWERDT389173).
- *Greenhouse gas clarification: Propose Great Southern Landfill* (1777197-058-M-Rev0) Golder, February 2021 (DWERDT432679).
- *Further information – Draft response to submissions – Great Southern Ladnfill at Allawuna Farm, Great Southern Highway, St. Ronans* (1777197-060-TM-Rev0) Golder, July 2021 (DWERDT478155).

In 2021, the EPA requested a peer review of the GHG assessment conducted by the proponent for the Great Southern Landfill. The peer review (Carbon Intelligence Pty Limited, 2021) concluded that the carbon accounting in the assessment is correct and accurately reflects the approach specified in the National Greenhouse and Energy Reporting (NGER) scheme (Clean Energy Regulator 2019).

2.6.3 Potential emissions from the proposal

The proposal will produce GHG emissions from:

- construction – clearing of vegetation, excavation of soil, diesel powered generator, and equipment and machinery
- operation – decomposing putrescible material, diesel powered generator, transport of waste by third parties and equipment and machinery
- post-closure – decomposing putrescible material.

The Environmental Factor Guideline – Greenhouse Gas Emissions (EPA 2020a) that was current at the time the EPA assessed this proposal provides that, generally, GHG emissions from a proposal will be considered where they exceed 100,000 tonnes of scope 1 emissions each year measured in tonnes of CO_2-e. This is currently the same as the threshold criteria for designation of a large facility under the Australian Government's *Safeguard Mechanism*.

The proponent has provided the following estimates of GHG emissions:

- unmitigated scope 1 emissions for the proposal includes:
  - emissions from landfill that increase from 34,657 tonnes CO_2-e/annum in year 1, peaking at 543,929 tonnes CO_2-e/annum in the final year before capping, and declining over several decades.
  - average annual emissions from stationary and mobile plant combustion sources, and changes in land u se estimated at 1,229 tonnes CO_2-e/annum
- scope 2 emissions are estimated as zero, as the landfill will not be connected to the local electricity grid.
- Unmitigated scope 3 are estimated at 622 tonnes CO_2-e/annum, associated with third party haulage of waste to the project.

The proponent proposes a GHG mitigation technique that is widely adopted in the waste management industry, of collecting landfill gas and flaring before release to the atmosphere to reduce GHG emissions. A summary of the projected emissions for the operational life of the landfill is presented in Table 3 in the proponent's *Technical Memorandum – Great Southern Landfill Greenhouse Gas Assessment* (Golder, 2019).

2.6.4 Consultation

Consultation on the proposal raised concerns about:

- greenhouse gas emissions exceeding 100,000 tonnes CO_2-e per year
- contribution to climate change

2.6.5 Minimisation measures (including regulation by other DMAs)

The proponent has identified the following measures to minimise GHG emissions:

- selection of efficient design and equipment technologies, including landfill gas extraction system and flare
- Implementation of the *Landfill Gas Management Plan – Allawuna Farm Landfill* (LGMP) which includes requirements for monitoring and annual review
- Implementation of the *Great Southern Landfill Management Plan* Appendix 6.1 of the ERD) including emissions limits for methane in the landfill and gases that will be flared and a landfill gas destruction efficiency of 98%.

With these mitigation measures, the proponent estimates that the lifetime (28 years) scope 1 fugitive landfill emissions would be reduced from 9,999,068 tonnes CO_2-e to 499,953 tonnes of CO_2-e (Golder 2021 – DWERDT478155) with annual GHG emissions not exceeding 100,000 tonnes of CO_2-e per year.

Environmental Protection Act 1986 Part V

The disposal of waste to land is an activity consistent with the description of a Category 64: Class II or III putrescible landfill site under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). The proposed maximum waste acceptance rate would require the proponent to obtain a works approval and licence to regulate emissions and discharges under Part V of the EP Act.

In relation to the GHG emissions, DWER have advised the EPA that the management and mitigation of landfill gas under Part V of the EP Act includes regulation of components of the landfill gas stream that are consistent with greenhouse gases that are included within GHG emissions regulated under Part IV of the EP Act. A works approval and/or licence would authorise the construction, commissioning and time limited operations of landfill infrastructure, including specifications for landfill gas extraction infrastructure design, implementation, monitoring, record keeping, review and analysis of landfill monitoring data and reporting. Monitoring results would usually be required to be reported to the DWER in periodic environmental reports (usually annually for landfill infrastructure).

2.6.6 Assessment of impacts to environmental values

The intent of the EPA's GHG Guideline is to inform the development and assessment of proposals, not determine the outcome of the EPA's assessment.

The GHG Guideline acknowledges GHGs from a cumulative range of sources may have an impact on WA's environment, even if the specific impact of a particular proposal's emissions may not be known with certainty. In response to this, and to minimise cumulative impacts to WA's environment, the GHG guideline therefore generally applies to proposals emitting greater than 100,000 tonnes $CO_{2\text{-}e}$ per year of scope 1 emissions, so the GHG Guideline's objective to reduce emissions can be applied to those particular proposals. When assessing proposals where greenhouse gas emissions are a key environmental factor, the EPA therefore usually considers a

proposal's annual and total contributions to GHG emissions. The EPA's consideration of the GHG Guideline in its assessment of this proposal therefore means the impact of cumulative emissions on WA's environment have been taken into account for this proposal.

The primary gaseous emissions from the landfill are methane produced from the decomposition of putrescible wastes. There will be additional gaseous emissions, but these emissions are categorised as biogenics and are not usually considered as GHG emissions for regulatory purposes. The peer review of the *Great Southern Landfill Greenhouse Gas emissions assessment* confirmed that biogenic emissions are not likely to be significant for this proposal. The exclusion accurately reflects the approach specified in *National Greenhouse and Energy Reporting Act 2007* (NGER) regulations.

The peer review confirmed that Scope 1 GHG emissions from other sources including land use change associated with clearing of native vegetation and the operation of heavy-duty and stationary mobile plant are not significant and will not be key considerations for the mitigation of impacts over the 28-year estimated timeframe of this proposal. The EPA's assessment has therefore focused on methane emissions associated with the landfilling of waste. The calculation of GHG emissions from landfill included the higher global warming potential of methane at 28 times that of CO_2, as updated by the Clean Energy Regulator in 2020.

The peer review considered the GHG emissions inventory and estimated GHG emissions of the proposal without and with mitigation. The proponent proposed to implement mitigation for landfill emissions, expecting to capture 95% of generated methane for flaring. The peer review stated that this capture rate for mitigation by flaring is not consistent with the implementation of similar proposals involving the landfilling of waste. Typically, methane is emitted to atmosphere through fugitive emissions of gas from side walls, edges and joints such as the outside of leachate sumps, cracks due to differential settlement and leaks before the installation of capping systems and gas capture equipment. The peer review stated that the landfill gas capture rates for landfill sites across Australia in 2018/19 are estimated to be around 43% including landfill sites that don't have active landfill gas recovery and flaring systems. Based on this estimate, the implementation of this proposal may result in poorer than estimated landfill gas capture rates.

The peer review compared annual GHG emission estimates for the proposal by the proponent (USEPA LandGEM model) with GHG emission estimates using the NGER Solid Waste Calculator. The Clean Energy Regulator requires eligible landfill operators to use this calculator in determining and reporting their emissions.

In applying capture rates of 75% and 50%, which are regarded as realistic rates for GHG emissions prediction for this landfill (Table 7), the peer review demonstrates estimated GHG emissions in:

- year 7 of landfill operations, ranging between 26,438 and 92,090 t $CO_{2\text{-}e}$ per year

- year 28 of landfill operations, ranging between 66,618 and 271,965 090 t CO_{2-e} per year.

The peer review calculation of annual GHG emission scenarios for the landfill with different gas capture rates indicates that exceedance of the 100,000 t CO_{2-e} per year threshold is not expected at a capture rate of 75%, but likely at a less efficient capture rate of 50% (Table 7) for a high emissions scenario (100% municipal solid waste).

Table 7: Comparison of estimated annual GHG emissions for different gas capture rates

Years after opening	Annual emissions (t CO_{2-e})			
	Golder Associates (LandGEM model)		NGER calculator (high emission scenario)	
	50% gas capture	75% gas capture	50% gas capture	75% gas capture
1	17,329	8,664	9,996	4,463
5	64,407	32,203	44,448	19,843
7	92,090	46,045	59,222	26,438
28	271,965	135,982	149,223	66,618

In considering the assessment, the EPA has noted:

- the proponent's proposed rate for the capture and flaring of landfill gas is 95%
- the uncertainty associated with the likely capture rate of GHG emissions from engineered landfills prior to closure
- that scope 1 GHG emissions other than methane generation from landfill are insignificant
- That scope 2 GHG emissions are negligible
- that GHG emissions from landfill increase annually due to the increase in the cumulative volume of waste disposed to the landfill cells over time and are predicted to peak in the final year before capping and decrease exponentially after capping.

The EPA therefore considers it reasonable to recommend a condition that requires the implementation of both a GHG emission outcome and an objective target to ensure continual improvement in the implementation of management practices for mitigation of GHG emissions from landfill. The intent of the condition is to provide certainty that the management of GHG emissions will be consistent with the EPA's objective over the life of the proposal implementation.

The EPA considers that a requirement for the effective capture of GHG would limit the GHG emissions below the threshold requiring a GHG management plan.

In assessing impacts to GHG emissions, the EPA has had regard of other decision-making processes that are able to regulate in a manner that is consistent with EPA objectives. The EPA considers that the regulation of waste disposal activities under Part V of the EP Act, including design and operation of the landfill infrastructure for the implementation of appropriate technology, monitoring, continual review of operational performance and reporting for landfill gas emissions are actions that have been conditioned for other landfill operations and can be conditioned in regulatory instruments under Part V to contribute to meeting the EPA objectives for this factor.

The EPA notes the science and policy of GHG emissions and climate change is rapidly evolving. The EPA advises the GHG conditions are expected to be able to be responsive to this, particularly by enabling reviews and reporting of the performance of the landfill gas management system to reflect any significant changes (for example, if there are material changes to relevant State, Commonwealth or international GHG science, policy or market mechanisms to support the achievement of net zero emissions for landfill operations). The EPA also notes the Minister can direct the EPA to inquire into Ministerial Statement conditions (including GHG conditions) at any time should it become clear that capture rates are less than expected.

2.6.7 Summary of key factor assessment and recommended regulation

The EPA has considered the likely environmental outcomes of the proposal on greenhouse gas emissions environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 8.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

Table 8: Summary of assessment for greenhouse gas emissions

Residual impact or risk to environmental value		Assessment finding or Environmental outcome	Recommended conditions and DMA regulation
1.	Scope 1 emissions might exceed the 100,000 t CO2-e per annum threshold with inefficient GHG gas management (low capture rate of methane from landfill). GHG emissions contribute to climate change, which impacts on WA's environment.	The EPA found that the implementation of management practices for mitigation of GHG emissions from landfill is necessary to ensure there are no residual impacts from the generation of greenhouse gas emissions. The EPA notes advice that the design, operation and reporting for landfill gas emissions, which includes GHG emissions are actions that can be conditioned in regulatory instruments under Part V. As a result, the environmental outcome through regulation is likely to be consistent with the EPA's objective for GHG emissions.	Regulated through: • condition B2 – Greenhouse gas emissions DMA processes: • The proponent will be required to obtain a works approval and licence under Part V of the EP Act.

3 Holistic assessment

While the EPA assessed the impacts of the proposal against the key environmental factors and environmental values individually in the key factor assessments above, the EPA also considered connections and interactions between them to inform a holistic view of impacts to the whole environment. The consideration included the context of greenhouse gas emissions, which indirectly link to other environmental factors.

The EPA's evaluation of other environmental factors (that is, those which were not considered key factors for assessment) is included in Appendix D. Figure 4 illustrates the connections and interactions between the key environmental factors to inform the EPA's holistic assessment.

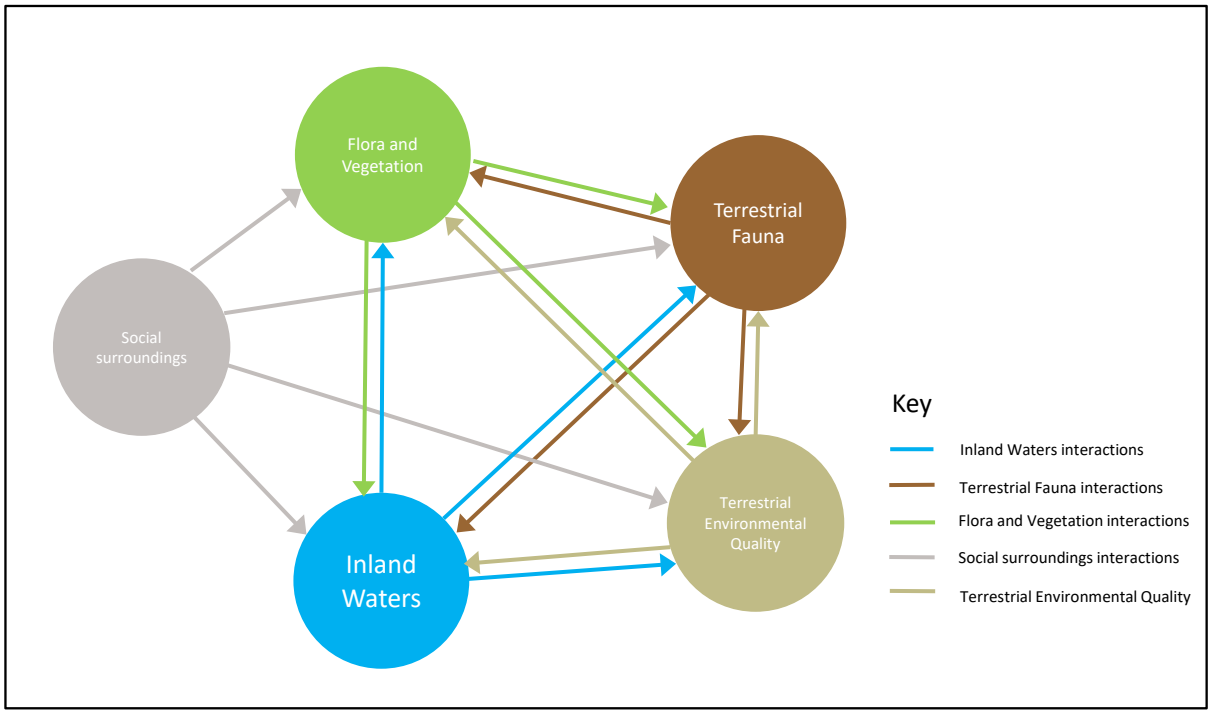

Figure 4: Intrinsic interactions between environmental factors

Inland Waters

The EPA notes that the groundwater quality underneath the site is unlikely to have beneficial uses and the Thirteen Mile Brook is impacted by salinity, but considers that further degradation of the quality and yields of inland waters pose a risk to groundwater dependent and riparian flora and vegetation, terrestrial fauna and also terrestrial environmental quality and social surroundings through potential impacts to the soil quality and productivity of adjacent agricultural land.

The proposal has been designed with sufficient detail on the design, implementation and operation of containment infrastructure to prevent leachate discharges, which is the mostly likely source of impact to water quality and soil quality.

The EPA considers that the regulation of proposed mitigation and management measures for impacts to inland waters by decision-making authorities will also consider the inter-related impacts to other factors of the environment including the values associated with flora and vegetation, terrestrial fauna, social surroundings and terrestrial environmental quality. Assessments under Part V of the EP Act consider risk associated with emissions and discharges and typically consider the connection of emissions sources to receptors, such as groundwater dependent vegetation or riparian ecosystems, through the movement of surface water and/or groundwater. Assessments under the RiWI Act also consider the acceptability of activities which have the detrimental to that quality and availability of water resources and seek to protect ecosystems which are dependent on the water resource. These considerations are likely to be consistent with the relevant EPA environmental factor objectives for this assessment.

Terrestrial Environmental Quality

Terrestrial environmental quality has the potential to impact on environmental outcomes associated with inland waters quality and yield. The unintended emission of leachate and spills during operation, has the potential to contaminate sediment or soil. Subsequent movement of rainfall or groundwater through the soil profile may carry contaminants that can impact on surface water or groundwater quality through the formation of a contaminant plume. The degraded water quality may in turn impact flora, vegetation and fauna through reduced quality or quantity of vegetation and impact on the productivity of agricultural land in adjacent areas.

The EPA considers that the regulation of proposed mitigation and management measures for impacts to terrestrial environmental quality by decision-making authorities will also mean the inter-related impacts to the health of other factors of the environment including the values associated with flora and vegetation, terrestrial fauna, inland waters and social surroundings are likely to be consistent with the EPA environmental factor objectives.

Flora and Vegetation and Terrestrial Fauna

The EPA's assessment has considered that there are connections and interactions between terrestrial fauna, flora and vegetation, inland waters and social surroundings related to the proposed landfill.

Terrestrial fauna typically relies on the presence of specific flora and vegetation communities, and availability of good quality water for habitat. The EPA notes the landfill site layout has been designed to minimise impacts from further clearing of remnant vegetation and fauna habitat, specifically black cockatoo foraging and potential breeding habitat trees.

Historic impacts to native vegetation in the proposal area have resulted in loss and fragmentation of habitat, and impacts to soil, surface and groundwater quality through processes such as dryland salinisation and erosion. Further clearing of

remnant vegetation may result in increased salinisation and increased impact to the quality of soil, surface and groundwater, and the quality and distribution of habitat in and around the development envelope. These impacts may directly or indirectly impact on the quality of land available for future agricultural activities.

The EPA has considered the proposal in the context of cumulative and holistic impacts associated with flora and vegetation and terrestrial fauna. While the total area of proposed clearing is small in proportion to the presence of similar vegetation communities and fauna habitat towards the west of the proposal area, setting specific proposal limitations and requiring offsets to counterbalance impacts are recommended to ensure consistency with the relevant EPA environmental factor objectives. The planting of trees that provide connectivity between existing vegetation communities will enhance habitat and increase the overall health and resilience of remnant vegetation into the future.

These measures and recommended conditions will also mean the inter-related impacts to the environmental values of terrestrial environmental quality, social surroundings and inland waters are likely to be consistent with the EPA environmental factor objectives.

Social Surroundings

The potential changes to the biological and physical environment from the proposal have the potential to interact with social surroundings. Impacts to terrestrial environmental quality, inland waters quality and quality, flora and vegetation, and emissions of GHG may indirectly impact on future surrounding land use options, amenity for current residents and for tourism and the maintenance of cultural and ethnographic value attached to known Aboriginal heritage sites.

The proponent proposed a location for the landfill that provides a reasonable separation distance between operational infrastructure and sensitive receptors, is not close to a densely populated area and does not disturb or impact on known Aboriginal heritage or other heritage sites. The proponent also proposed management approaches and controls to manage potential impacts from emissions and discharges from the proposal, including maintenance of a buffer area surrounding the landfill operation. In considering interactions between environmental factors, the EPA remains of the view that emissions of landfill gas, dust and odour can be managed under social surroundings and statutory processes of other decision-making authorities.

The EPA considers that the proposed condition to minimise impacts to visual amenity and surrounding land uses in combination with regulation under Part V for social surroundings imply that all other environmental factors are mitigated to likely to be consistent with the EPA environmental factor objectives.

Greenhouse Gas Emissions

GHG emissions have the potential to impact on all other environmental factors through the effects of climate change. The potential interactions of GHG with the environmental factors are not likely to be directly related to localised proposal emissions, but through cumulative and global scale processes that impact on regional weather patterns and climate.

The EPA considers that the proposed condition for the implementation and continual improvement of management practices in combination with regulation of landfill gas under Part V will ensure that net GHG emissions from the proposal are reduced and its objective for GHG emissions likely to be achieved.

Consideration of relevant principles of the EP Act

In addition to the environmental factors, in assessing the proposal, the EPA considered the principle of waste minimisation. The manner in which all EP Act principles were considered is discussed in Appendix C.

As outlined in section 4 the EP Act, the principle establishes that all reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment. The very nature of this landfill proposal development is concerned with the receipt and burial of waste in perpetuity. In considering the principle, the EPA had regard of the types of waste proposed to be received and the context of the siting of the landfill in proximity to the Perth metropolitan area.

The proponent has outlined that waste intending to be received at the proposal site includes waste generated within the Perth metropolitan area and waste generated from commercial and industrial operators. The EPA considers that it is reasonable that the proponent may consider reasonable and practicable measures to understand the types of waste being received at the landfill and to regularly review the role of a landfill in the context of a future circular economy. It has also considered that the waste types proposed to be disposed of are Class II and II putrescible waste types. These waste types are less hazardous in nature and are suited to disposal within the composite lined landfill type that has been designed for this site.

The proposal has been designed with sufficient detail on the design, implementation and operation of containment infrastructure to prevent the discharge of waste and leachate to the environment. Minimisation of the amount of waste disposed and the restriction of waste types that can be disposed of in the landfill will also protect the environment from emissions and discharges that have the potential to impact terrestrial environmental quality, and inland waters.

The landfill is proposed to be operated within the context of the implementation of the Western Australia *Waste Avoidance and Resource Recovery Strategy 2030.* The waste strategy contains objectives and targets to protect the environment, including targets to reduce the disposal of waste to landfill (Perth and Peel). While the

Strategy includes a vision of a sustainable, low-waste circular economy, landfill was identified as continuing to play an important role but is the least preferred management option in the waste hierarchy. The diversion of waste from landfill is a continuous improvement objective for the management of waste in Western Australia.

The EPA has recommended a condition for the proposal's waste acceptance methods to be subject to continuous improvement in line with the evolvement of waste management options in the State. This condition in combination with the requirement for the proposal to be regulated under Part V of the EP Act will ensure alignment with the principles EP Act and the *Waste Avoidance and Resource Recovery Strategy 2030* as well as any future iterations of the Strategy. The EPA considers its objectives for terrestrial environmental quality and inland waters and inter-related environmental values are likely to be achieved.

Summary of holistic assessment

When the separate environmental factors and values affected by the proposal were considered together in a holistic assessment, no additional significance was identified for any environmental factor. The EPA confirms that the impacts from the proposal would not alter the EPA's views about consistency with the EPA's factor objectives as assessed in section 2.

In considering the interactions between terrestrial fauna, terrestrial environmental quality, flora and vegetation and inland waters within the context of social surroundings and greenhouse gas emissions, the EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA factor objectives.

In considering the principle of waste minimisation, and within the context of the *Western Australia Waste Avoidance and Resource Recovery Strategy 2030*, the EPA considers that recommended conditions to prevent impact to terrestrial environmental quality with also require that the proposal's waste acceptance methods continuously improve in line with the evolution of waste management strategies in the State. This condition in combination with monitoring and reporting of waste stream acceptance under Part V will ensure consistency with the principles of waste minimisation and would support the intended outcomes for other EPA factor objectives.

4 Offsets

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal.

Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), the EPA may consider the application of environmental offsets to a proposal where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued.

In the case of this proposal, likely (and potential) significant impacts are clearing of up to 311 habitat trees, providing foraging habitat of good quality to:

- Carnaby's black cockatoo (*Zanda latirostris*); and
- Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) foraging habitat.

In this case, the EPA considers offsets are appropriate for terrestrial fauna values given the:

- proponent's application of the mitigation hierarchy to reduce potential impacts (principle 1 of the *WA Environmental Offsets Policy*)
- magnitude of the likely significant residual impacts on environmental biodiversity values including threatened fauna habitat (principle 2 of the *WA Environmental Offsets Policy*)
- residual impacts can be counterbalanced by the provision of offsets that are expected to have a long-term strategic environmental benefit (principle 6 of the *WA Environmental Offsets Policy*).

While the proposed clearing of black cockatoo foraging and potential breeding habitat may not be individually significant, the EPA has assessed the cumulative impacts of the ongoing and permanent loss of foraging and breeding habitat of 2 conservation significant black cockatoo species as potentially significant in the regional context. Further, the opportunistic restoration of habitat is important to enhance the resilience and recovery of the species.

The proponent has proposed to replant black cockatoo foraging habitat on the Allawuna Farm surrounding the proposal development envelope which is under its ownership. (Alluwuna Farm Lots 4869 5931, 9926 and 26934 Great Southern Highway, St. Ronans). The proponent has also agreed to provide measures for protection of the offset area under other suitable mechanism(s) for the purpose of conservation.

The EPA has considered that the replanting of trees suitable for foraging habitat is an activity which is likely support the resilience of remnant black cockatoo foraging and potential breeding habitat in the vicinity of the proposal and provide enhanced

protection for the species in a regional context. The EPA's view is that the protection and conservation of significant fauna habitat through the enhancement activity, applied as an offset is likely to counterbalance residual significant impacts and achieve the EPA's objectives for terrestrial fauna.

The EPA considers that the proponent's proposed replanting of black cockatoo habitat trees be applied, consistent with current recognised offset calculations and therefore recommends: condition B4 - Environmental offsets

The condition requires the proponent to implement offset measures to contribute to counterbalancing the significant residual impact of regional direct and indirect impacts to terrestrial fauna habitat. Condition B4 sets out the requirements to develop and implement an Offset Management Plan including management measures, completion criteria and contingency to demonstrate that the objective to counterbalance the significant residual impacts will be met. Condition B4 also requires that the Offset Management Plan be developed in consultation with DBCA as the Allawuna Farm borders DBCA managed land.

5 Matters of national environmental significance

The proponent submitted that the original landfill proposal for Allawuna Farm included the referral of the proposed action of clearing of black cockatoo habitat to the Commonwealth Department Climate Change, Energy, the Environment and Water (former Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)). The Commonwealth advised in August 2013 that clearing of the vegetation would not be a controlled action.

6 Recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values which may be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA's objectives for the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment; and
- principles of the EP Act.

The EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix A.

In making this recommendation, the EPA notes that it cannot consider the social or economic matters outside its legal remit under Part IV of the EP Act. The EPA, in providing its advice to the Minister, advises that is has considered the proposal as it relates to significant environmental impacts but is not able to require a proponent to adhere to other government policy, that does not relate to these matters.

7 Other advice

The EPA may, if it sees fit, include other information, advice or recommendations relevant to the environment in its assessment reports, even if that information has not been taken into account by the EPA in its assessment of a proposal.

Planning processes

In providing its recommendation to the Minister, the EPA has only considered environmental matters as per the EP Act. Specifically, the EPA is not able to consider impacts to society, economic benefit and land use planning where they are inconsistent with the EPA's remit under this legislation.

The EPA is aware of the considerable community interest in this proposal and its complex planning history. In addition to the environmental matters considered in this report, there are broader concerns related to indirect social and economic impacts and land use planning considerations. Of particular note is that the proposal is not consistent with the Shire of York's 2018 local planning scheme and that it is not supported by the Mid-West/Wheatbelt Joint Development Assessment Panel.
The EPA recognises that other decision-making processes and decisions relevant to this proposal may be progressed following the publication of this assessment. This includes further planning approval decisions that may progress through the SAT and the relevant regional JDAP.

Given the complex planning history and level of community interest, when considering the future implementation of the proposal, the EPA encourages consultation across all relevant State Government portfolios to ensure that any recommendation has regard to matters that the EPA is unable to consider, particularly with respect to land use planning and other social and economic impacts.

Other decision-making authorities

Consistent with the *Interim guidance for taking decision making processes into account*, the EPA had regard to the processes undertaken by other decision-making authorities, the impacts that can be managed, relevant considerations, likely conditions or requirements and whether the EPA's objectives for environmental factors would be met by the likely outcomes.

The EPA considers that the DWER's works approval and licensing requirements under Part V of the EP Act will be critical to ensuring acceptable environmental outcomes associated with the implementation of the proposal.

The EPA provides the following information for consideration by the Minister. The EPA recognises that DWER has a long history of managing potential environmental impacts associated with the operation of putrescible waste landfills and the disposal

of waste to land. This is achieved through the regulation of emissions and discharges associated with activities that are prescribed under Part V of the EP Act. DWER has advised the EPA that given the proposed volume of waste acceptance, that the proponent will be required to obtain a works approval and licence under Part V of the EP Act and a range of conditions may be applied to any future approval.

In consultation with DWER, the EPA expects that any future works approval and licence granted under Part V of the EP Act will align with its recommendations where it relates to an EPA factor objective outlined in this report. Similarly, the EPA expects DWER to regulate potential impacts to waterways and water resources through permits required under the RiWI Act.

This report and any subsequent statement issued under Part IV of the EP Act does not absolve the proponent's responsibility for ensuring that all required approvals are obtained prior to commencement of the proposal.

Appendix A: Recommended conditions

Section 44(2)(b) of *Environmental Protection Act 1986* specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This appendix contains the EPA's recommended conditions and procedures.

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
***(Environmental Protection Act 1986*)**

GREAT SOUTHERN LANDFILL AT ALLAWUNA FARM

Proposal:	The Great Southern Landfill proposal is to construct and operate a landfill and associated infrastructure 80 kilometres (km) east of Perth in the Shire of York
Proponent:	Alkina Holdings Pty Ltd Australian Company Number 124 202 491
Proponent address:	50 Clune Street BAYSWATER WA 6053
Assessment number:	2204

Report of the Environmental Protection Authority: 1738

Introduction: Pursuant to section 45 of the *Environmental Protection Act 1986,* it has been agreed that the proposal entitled Great Southern Landfill described in the section 43 direction, as amended by the change to proposal approved under 43A on 7 February 2020, may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

Conditions and procedures

Part A: Proposal extent

Part B: Environmental outcomes, prescriptions and objectives

Part C: Environmental management plans and monitoring

Part D: Compliance and other conditions

Part A: Proposal extent

Limitations and extent of proposal

A1-1 The proponent must ensure that the proposal is implemented in such a manner that the following limitation or maximum extents / capacities / ranges are not exceeded:

Proposal element	Location	Maximum extent or range
Physical elements		
Development envelope	Figure 1	Disturbance of up to 84 hectares and clearing of up to 6 hectares within a Development Envelope of 136.83 hectares
Carnaby's black cockatoo (*Zanda latirostris*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) **foraging habitat**	Figure 1	No more than 331 **black cockatoo foraging habitat** trees within a Development Envelope of 136.83 hectares
Operational elements		
Landfilling of waste	Within the development envelope shown in Figure 1	Up to 250,000 tonnes per annum Lifetime capacity of landfill of up to 5.6 million cubic metres
Timing elements		
Project life	-	Landfilling operations of up to 28 years from date of substantial **commencement of operations** Decommissioning with closure works, maintenance and monitoring of up to 30 years

PART B – ENVIRONMENTAL OUTCOMES, PRESCRIPTIONS AND OBJECTIVES

B1 Terrestrial Fauna

B1-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcomes:

(1) direct disturbance of **black cockatoo foraging habitat** shall not exceed 331 trees;

(2) there shall be no impacts to trees with suitable hollows for **black cockatoo** breeding; and

(3) no increase in **feral animal** numbers within the **feral animal** control area outside of the Development Envelope as shown in Figure 2.

B1-2 The proponent must prepare an environmental management plan, in consultation with **DBCA**, to satisfy the requirements of condition C4 and demonstrate how achievement of the terrestrial fauna environmental outcome in condition B1-1(3) will be monitored and substantiated, and submit it to the **CEO.**

B2 Greenhouse Gas Emissions

B2-1 The proponent must ensure the implementation of the proposal achieves the following environmental outcome:

(1) a capture rate of **CO_{2-e}** from landfill of greater than 75 per cent and emissions of no more than 100,000 tonnes of **CO_{2-e}** /annum.

B2-2 The proponent must implement the proposal to meet the following environmental objective:

(1) a capture rate of **CO_{2-e}** from landfill of 95 per cent.

B2-3 The proponent must, prepare an environmental management plan to satisfy the requirements of conditions C4 and C5 and that demonstrates how achievement of the **greenhouse gas emissions** environmental outcome in condition B2-1 will be monitored and substantiated, and how the **greenhouse gas emissions** environmental objective in condition B2-2 will be achieved, and submit it to the **CEO.**

B3 Social Surroundings

B3-1 The proponent must implement the proposal to meet the following environmental objectives:

(1) avoid where practicable and otherwise minimise impacts to visual amenity; and

(2) avoid where practicable and otherwise minimise impacts to surrounding land uses from the proposal.

B3-2 The proponent must implement the Great Southern Landfill Management Plan with the purpose of ensuring the social surroundings environmental objectives in condition B3-1 are achieved.

B4 Environmental Offsets

B4-1 The proponent must implement offsets to counterbalance the significant residual impacts of the proposal on the following environmental value:

(1) Carnaby's black cockatoo (*Zanda latirostris*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) **foraging habitat**.

B4-2 The proponent must ensure the implementation of the offsets achieve the following environmental objectives:

(1) counterbalance the significant residual impact listed in condition B4-1;

(2) ensure a net-gain for the environmental value element identified in condition B4-1 in the local region; and

(3) demonstrate a strategic conservation benefit for Carnaby's cockatoo (*Zanda latirostris*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) by restoration of **foraging habitat** in locations to increase connectivity to existing **foraging habitat**.

Black cockatoo Offset Environmental Management Plan

B4-3 The proponent must, in consultation with **DBCA**, prepare a **Black Cockatoo** Offset Environmental Management Plan that satisfies the requirements of condition C5 and demonstrate how the environmental offsets environmental objectives in condition B4-2 will be achieved, and how this achievement will be substantiated, and submit it to the **CEO**.

B4-4 The **Black Cockatoo** Offset Environmental Management Plan must include the implementation of the offset measures to the extent and at the locations as set out and described in Table 1:

Table 1: Environmental values, locations and extent and type of offset measures required to meet condition B4-1

Environmental value	Offset location	Extent of area to receive offset measures	Type of offset measures
Black cockatoo foraging habitat	Allawuna Farm Lot 4869 on plan L224502 Great Southern Highway, St. Ronans (Figure 1)	As shown in Figure 1	**On-ground management** – established **foraging habitat** trees (495 trees) for black cockatoo, with tree species similar to species directly disturbed, and in locations to increase local connectivity of **foraging habitat**

B4-5 The **Black Cockatoo** Offset Environmental Management Plan must:

(1) demonstrate that the environmental objectives in condition B4-2 will be met;

(2) describe how the offset measures will be implemented consistent with condition B4-4;

(3) be prepared in consultation with **DBCA**;

(4) spatially identify the areas (**Proposed Offset Conservation Areas**) in condition B4-4 proposed as offset areas or lands to receive **on-ground management** offset measures.

(5) demonstrate how the environmental values within the **Proposed Offset Conservation Areas** will be maintained and improved in order to counterbalance the significant residual impact to the environmental value element in condition B4-1 and achieve the environmental objectives in condition B4-2;

(6) identify how the **Proposed Offset Conservation Areas** will be protected, to ensure the sites are managed under a suitable mechanism for the purpose of conservation as agreed by the **CEO** by notice in writing;

(7) demonstrate application of the principles of the WA Environmental Offsets Policy, the WA Environmental Offsets Metric and the WA Offsets Template, as described in the WA Environmental Offsets Guidelines, or any subsequent revisions of these documents;

(8) identify how the ongoing performance of the offset measures, and whether they are achieving the objectives in condition B4-2, will periodically be made publicly available;

(9) For the **on-ground management** offsets identified in condition B4-4:

(a) state the targets for each environmental value to be achieved, including completion criteria, which will result in a tangible improvement to the environmental values being enhanced. Completion criteria including, but not be limited to:

(i) number of established (growing) **black cockatoo foraging habitat** trees achieved every five (5) years from substantial **commencement of operations**;

(ii) number of trees replanted; and

(iii) adaptive management to inform successful habitat revegetation of **black cockatoo foraging habitat** trees;

(b) demonstrate the consistency of the targets with the environmental objectives in condition B4-2 and the objectives of any relevant guidance, including but not limited to, recovery plans or area management plans;

(c) detail the **on-ground management** actions, with associated timeframes for implementation and completion, to achieve the targets identified in condition B4-9(a); and

(d) detail the monitoring, reporting and evaluation mechanisms for the targets and actions identified under conditions B4-9(a).

B5 Flora

B5-1 The proponent must ensure the implementation of the proposal achieves the following environmental objective:

(1) no **indirect impacts** to occurrences of the taxon *Hemigenia ?platyphylla* (undescribed) outside of the Development Envelope within Lot 4869 in Figure 1.

B5-2 The proponent must confirm the taxonomy of *Hemigenia ?platyphylla* (undescribed) and prepare an environmental management plan that satisfies the requirements of condition C5 and demonstrates how the flora environmental objective in condition B5-1 will be achieved, and submit it to the **CEO**.

B6 Waste Minimisation

B6-1 The proponent must implement the proposal to meet the following environmental objectives:

(1) the proposal's acceptance of waste volumes, types of waste and disposal methods:

(a) are consistent with the principles of waste minimisation and the waste hierarchy;

(b) align with Western Australia's **Waste Avoidance and Resource Recovery Strategy 2030;**

(c) are consistent with diversion of relevant waste streams away from landfill where practicable;

(d) are consistent with waste being accepted from producers and/or suppliers who operate in accordance with a waste minimisation policy consistent with the Western Australia's **Waste Avoidance and Resource Recovery Strategy 2030** and recognised state and national **product stewardship schemes**; and

(e) are reviewed every five (5) years and continuous improvements are implemented to ensure consistency with the above are included.

B6-2 The proponent must prepare an environmental management plan that satisfies the requirements of condition C5 and demonstrates how the waste minimisation environmental objectives in condition B6-1 will be achieved, and submit it to the **CEO.**

PART C – ENVIRONMENTAL MANAGEMENT PLANS AND MONITORING

C1 Environmental Management Plans: Conditions Related to Commencement of Implementation of the Proposal

C1-1 The proponent must not undertake:

(1) **operations** until the **CEO** has confirmed in writing that the environmental management plan required by condition B1-2 for terrestrial fauna meet the requirements of that conditions and condition C4;

(2) **operations** until the **CEO** has confirmed in writing that the environmental management plan required by conditions B2-3 for **greenhouse gas emissions** meets the requirements of that condition and condition C4 and C5;

(3) **ground disturbing activities** until the **CEO** has confirmed in writing that the environmental management plans required by conditions B4-3 for offsets and B5-2 for flora meet the requirements of those conditions and condition C5; and

(4) **operations** until the **CEO** has confirmed in writing that the environmental management plans required by condition B6-2 for waste minimisation meets the requirement of that conditions and condition C5.

C2 Environmental Management Plans: Conditions Relating to Approval, Implementation, Review and Publication

C2-1 Upon being required to implement an environmental management plan under Part B, or after receiving notice in writing from the **CEO** under condition C1-1 that the environmental management plan(s) required in Part B satisfies the relevant requirements, the proponent must:

(1) implement the most recent version of the **confirmed** environmental management plan; and

(2) continue to implement the **confirmed** environmental management plan referred to in condition C2-1(1), other than for any period which the **CEO** confirms by notice in writing that it has been demonstrated that the relevant requirements for the environmental management plan have been met, or are able to be met under another statutory decision-making process, in which case the implementation of the environmental management plan is no longer required for that period.

C2-2 The proponent:

(1) may review and revise a **confirmed** environmental management plan provided it meets the relevant requirements of that environmental

management plan, including any consultation that may be required when preparing the environmental management plan;

(2) must review and revise a **confirmed** environmental management plan and ensure it meets the relevant requirements of that environmental management plan, including any consultation that may be required when preparing the environmental management plan, as and when directed by the **CEO**.

C2-3 Despite condition C2-1, but subject to conditions C2-4 and C2-5, the proponent may implement minor revisions to an environmental management plan if the revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, outcomes or objectives which the environmental management plan is required to achieve.

C2-4 If the proponent is to implement minor revisions to an environmental management plan under condition C2-3, the proponent must provide the **CEO** with the following at least twenty (20) business days before it implements the revisions:

(1) the revised environmental management plan clearly showing the minor revisions;

(2) an explanation of and justification for the minor revisions; and

(3) an explanation of why the minor revisions will not result in new or increased **adverse impacts** to the environment or result in a risk to the achievement of the limits, outcomes or objectives which the environmental management plan is required to achieve.

C2-5 The proponent must cease to implement any revisions which the **CEO** notifies the proponent (at any time) in writing may not be implemented.

C2-6 **Confirmed** environmental management plans, and any revised environmental management plans under condition C2-4(1), must be published on the proponent's website and provided to the **CEO** in electronic form suitable for on-line publication by the Department of Water and Environmental Regulation within twenty (20) business days of being implemented, or being required to be implemented (whichever is earlier).

C3 Conditions Related to Monitoring

C3-1 The proponent must undertake monitoring capable of:

(1) substantiating whether the proposal limitations and extents in Part A are exceeded; and

(2) **detecting** and substantiating whether the environmental outcomes identified in Part B are achieved (excluding any environmental outcomes in Part B where an environmental management plan is expressly required to monitor achievement of that outcome).

C3-2 The proponent must submit as part of the Compliance Assessment Report required by condition D2, a compliance monitoring report that:

(1) outlines the monitoring that was undertaken during the implementation of the proposal;

(2) identifies why the monitoring was capable of substantiating whether the proposal limitation and extents in Part A are exceeded;

(3) for any environmental outcomes to which condition C3-1(2) applies, identifies why the monitoring was scientifically robust and capable of **detecting** whether the environmental outcomes in Part B are met;

(4) outlines the results of the monitoring;

(5) reports whether the proposal limitations and extents in Part A were exceeded and (for any environmental outcomes to which condition 3-1 (2) applies) whether the environmental outcomes in Part B were achieved, based on analysis of the results of the monitoring; and

(6) reports any actions taken by the proponent to remediate any potential non-compliance.

C4 Environmental Management Plans: Conditions Relating to Monitoring and Adaptive Management for Outcomes Based Conditions

C4-1 The environmental management plans required under condition B1-2 and condition B2-3 must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include:

(1) **threshold criteria** that provide a limit beyond which the environmental outcomes are not achieved;

(2) **trigger criteria** that will provide an early warning that the environmental outcomes are not likely to be met;

(3) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies which will be used to measure **threshold criteria** and **trigger criteria**. Include methodology for determining alternate monitoring sites as a contingency if proposed sites are not suitable in the future;

(4) baseline data;

(5) data collection and analysis methodologies;

(6) adaptive management methodology;

(7) **contingency measures** which will be implemented if **threshold criteria** or **trigger criteria** are not met; and

(8) reporting requirements.

C4-2 Without limiting condition C3-1, failure to achieve an environmental outcome, or the exceedance of a **threshold criteria**, regardless of whether threshold **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.

C5 Environmental Management Plans: Conditions Related to Management Actions and Targets for Objective Based Conditions

C5-1 The environmental management plans required under condition B2-3, condition B4-3, condition B5-2 and condition B6-2 must contain provisions which enable the achievement of the relevant objectives of those conditions and substantiation of whether the objectives are reasonably likely to be met, and must include:

(1) **management actions**;

(2) **management targets**; and

(3) **contingency measures** if **management targets** are not met; and

(4) reporting requirements.

C5-2 The environmental management plan required under condition B6-2 is also required to:

(1) provide a protocol or procedure for the five (5) yearly review of the Waste Minimisation Environmental Management Plan to ensure that the Waste Minimisation Environmental Management Plan is meeting the objective specified in condition B6-1;

C5-3 Without limiting condition C2-1, the failure to achieve an environmental objective, or implement a **management action**, regardless of whether **contingency measures** have been or are being implemented, represents a non-compliance with these conditions.

PART D – COMPLIANCE, TIME LIMITS, AUDITS AND OTHER CONDITIONS

D1 Non-compliance Reporting

D1-1 If the proponent becomes aware of a potential non-compliance, the proponent must:

(1) report this to the **CEO** within seven (7) days;

(2) implement **contingency measures**;

(3) investigate the cause;

(4) investigate environmental impacts;

(5) advise rectification measures to be implemented;

(6) advise any other measures to be implemented to ensure no further impact; and

(7) provide a report to the **CEO** within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(1) to D1-1(6) above.

D1-2 Failure to comply with the requirements of a condition, or with the content of an environmental management required under a condition, constitutes a non-compliance with these conditions, regardless of whether the **contingency measures**, rectification or other measures in condition D1-1 above have been or are being implemented.

D2 Compliance Reporting

D2-1 The proponent must provide an annual Compliance Assessment Report to the **CEO** for the purpose of determining whether the implementation conditions are being complied with.

D2-2 Unless a different date or frequency is approved by the **CEO**, the first annual Compliance Assessment Report must be submitted within fifteen (15) months of the date of this Statement, and subsequent plans must be submitted annually from that date.

D2-3 Each annual Compliance Assessment Report must be endorsed by the proponent's Chief Executive Officer, or a person approved by proponent's Chief Executive Officer to be delegated to sign on the Chief Executive Officer's behalf.

D2-4 Each annual Compliance Assessment Report must:

(1) state whether each condition of this Statement has been complied with, including:

(a) exceedance of any proposal limits and extents;

(b) achievement of environmental outcomes;

(c) achievement of environmental objectives;

(d) requirements to implement the content of environmental management plans;

(e) monitoring requirements;

(f) implement **contingency measures**;

(g) requirements to implement adaptive management; and

(h) reporting requirements;

(2) include the results of any monitoring (inclusive of any raw data) that's has been required under Part C in order to demonstrate that the limits in Part A, any outcome or any objectives are being met;

(3) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance;

(4) include the corrective, remedial and preventative actions taken in response to any potential non-compliance;

(5) be provided in a form suitable for publication on the proponent's website and online by the Department of Water and Environmental Regulation;

(6) be prepared and published consistent with the latest version of the Compliance Assessment Plan required by condition D2-5 which the **CEO** has confirmed by notice in writing satisfies the relevant requirements of Part C and Part D.

D2-5 The proponent must prepare a Compliance Assessment Plan which is submitted to the **CEO** at least six (6) months prior to the first Compliance Assessment Report required by condition D2-2, or prior to implementation of the proposal, whichever is sooner.

D2-6 The Compliance Assessment Plan must include:

(1) what, when and how information will be collected and recorded to assess compliance;

(2) the methods which will be used to assess compliance;

(3) the methods which will be used to validate the adequacy of the compliance assessment to determine whether the implementation conditions are being complied with;

(4) the retention of compliance assessments;

(5) the table of contents of Compliance Assessment Reports, including audit tables; and

(6) how and when Compliance Assessment Reports will be made publicly available, including usually being published on the proponent's website within sixty (60) days of being provided to the **CEO**.

D3 Contact Details

D3-1 The proponent must notify the **CEO** of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

D4 Time Limit for Proposal Implementation

D4-1 The proposal must be substantially commenced within five (5) years from the date of this Statement.

D4-2 The proponent must provide to the **CEO** documentary evidence demonstrating that they have complied with condition D4-1 no later than fourteen (14) days after the expiration of period specified in condition D4-1.

D4-3 If the proposal has not been substantially commenced within the period specified in condition D4-1, implementation of the proposal must not be commenced or continued after the expiration of that period.

D5 Public Availability of Data

D5-1 Subject to condition D5-2, within a reasonable time period approved by the **CEO** upon the issue of this Statement and for the remainder of the life of the proposal, the proponent must make publicly available, in a manner approved by the **CEO**, all validated environmental data collected before and after the date of this Statement relevant to the proposal (including sampling design, sampling methodologies, monitoring and other empirical data and derived information products (e.g. maps)), environmental management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

D5-2 If:

(1) any data referred to in condition D6-1 contains trade secrets; or

(2) any data referred to in condition D6-1 contains particulars of confidential information (other than trade secrets) that has commercial value to a person that would be, or could reasonably be expected to be, destroyed or diminished if the confidential information were published,

the proponent may submit a request for approval from the **CEO** to not make this data publicly available and the **CEO** may agree to such a request if the **CEO** is satisfied that the data meets the above criteria.

D5-3 In making such a request the proponent must provide the **CEO** with an explanation and reasons why the data should not be made publicly available.

D6 Independent Audit

D6-1 The proponent must arrange for an independent audit of compliance with the conditions of this statement, including achievement of the environmental outcomes and/or the environmental objectives and/or environmental performance with the conditions of this statement, as and when directed by the **CEO**.

D6-2 The independent audit must be carried out by a person with appropriate qualifications who is nominated or approved by the **CEO** to undertake the audit under condition D6-1.

D6-3 The proponent must submit the independent audit report with the Compliance Assessment Report required by condition D2, or at any time as and when directed in writing by the **CEO**. The audit report is to be supported by credible evidence to substantiate its findings.

D6-4 The independent audit report required by condition D6-1 is to be made publicly available in the same timeframe, manner and form as a Compliance Assessment Report, or as otherwise directed by the **CEO**.

Table 2: Abbreviations and definitions

Acronym or abbreviation	Definition or term
Adverse impact /adversely impacted	Negative change that is neither trivial nor negligible that could result in a reduction in health, diversity or abundance of the receptor/s being impacted, or a reduction in environmental value. Adverse impacts can arise from direct or indirect disturbance, or other impacts from the proposal such as (but not limited to) hydrological change, spread or introduction of environmental weeds, altered fire regimes, introduction or spread of disease, changes in erosion/deposition/accretion and edge effects.
Black cockatoo	Carnaby's black cockatoo (*Zanda latirostris*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*)
Detecting/ Detectable	The smallest statistically discernible effect size that can be achieved with a monitoring strategy designed to achieve a statistical power value of at least 0.8 or an alternative value as determined by the **CEO**.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or the **CEO's** delegate.
$CO_{2\text{-}e}$ or GHG Emissions	Greenhouse gas emissions expressed in tonnes of carbon dioxide equivalent ($CO_{2\text{-}e}$) as calculated in accordance with the definition of 'carbon dioxide equivalence' in section 7 of the National Greenhouse and Energy Reporting Act 2007 (Cth), or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
Commencement of operations	Means commencing operation of the proposal and includes pre-commissioning, commissioning, start-up and operation of the proposal.
Confirmed	In relation to a plan required to be made and submitted to the **CEO**, means, at the relevant time, the plan that the **CEO** confirmed, by notice in writing, meets the requirements of the relevant condition. In relation to a plan required to be implemented without the need to be first submitted to the **CEO**, means that plan until it is revised, and then means, at the relevant time, the plan that the **CEO** confirmed, by notice in writing, meets the requirements of the relevant condition.
Contingency measures	Planned actions for implementation if it is identified that an environmental outcome, environmental objective, threshold criteria or management target are likely to be, or are being, exceeded. Contingency measures include changes to operations or reductions in disturbance to reduce impacts and must be decisive actions that will quickly bring the impact to below any relevant threshold, management target and to ensure that the environmental outcome and/or objective can be met.

DBCA	The government agency responsible for the administration of the *Biodiversity and Conservation Act* 2006, which at the time of this Ministerial Statement is the Department of Biodiversity, Conservation and Attractions.
Disturb	Flora – result in death, destruction, removal, severing or doing substantial damage to (*from EP Act Clearing*) Fauna – has the effect of altering the natural behaviour of fauna to its detriment (*from BC Act*) Direct – causes or immediately has the disturbance effect Indirect – materially contributes to the disturbance effect
Environmental value	A beneficial use, or ecosystem health condition (*from EP Act*)
Environmental weeds	Any plant declared under section 22(2) of the *Biosecurity and Agriculture Management Act 2007*, any plant listed on the Weeds of National Significance List and any weeds listed on the Department of Biodiversity, Conservation and Attractions' Pilbara Impact and Invasiveness Ratings list, as amended or replaced from time to time.
Feral animal	'declared pest' pursuant of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act); An introduced animal, formerly in domestication, with an established, self-supporting population in the wild; A species occurring as a result of human activities beyond its accepted normal distribution and which threatens valued environmental, agricultural or personal resources by the damage it causes.
Foraging habitat	Means native tree species known to be utilised by Carnaby black cockatoo (*Zanda latirostris*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) for foraging which either has a hollow or has a diameter at breast height (DBH) of 500 millimetres or greater.
Greenhouse gas or GHG	Has the meaning given by section 7A of the *National Greenhouse and Energy Reporting Act 2007* (Cth) or, if that definition is amended or repealed, the meaning set out in an Act, regulation or instrument concerning greenhouse gases as specified by the Minister.
Ground disturbing activities	Any activity or activities undertaken in the implementation of the proposal, including any clearing, civil works or construction.
Indirect impacts	Any potential impacts outside the development envelope or constructed footprint as a result of the clearing and disturbance authorised in this Statement. This includes but is not limited to: hydrological change, spread or introduction of environmental weeds, altered fire regimes, introduction or spread of disease, changes in erosion/deposition/accretion and edge effects.

Management action	The identified actions implemented with the intent of to achieving the environmental objective.
Management target	A type of indicator to evaluate whether an environmental objective is being achieved.
On-ground management	This includes revegetation (re-establishment of native vegetation in degraded areas) and rehabilitation (repair of ecosystem processes and management of weeds, disease or feral animals) with the objective to achieve a tangible improvement to the environmental values in the offset area.
Operations / operational	Operation of the infrastructure for the proposal and includes pre-commissioning, commissioning, start-up and operation of the infrastructure for the proposal.
Trigger criteria	Indicators that have been selected for monitoring to provide a warning that if exceeded the environmental outcome may not be achieved. They are intended to forewarn of the approach of the threshold criteria and trigger response actions.
Product stewardship schemes	State and national schemes that are consistent with the provisions in the national *Recycling and Waste Reduction Act 2020* and the Western Australian *Waste Avoidance and Resources Recover Act 2007.*
Proposed Offset Conservation Areas	The areas of land identified in the Black Cockatoo Offset Environmental Management Plan within the Offset location (Figure 1).
Threshold criteria	The indicators that have been selected to represent limits of impact beyond which the environmental outcome is not being met.
Waste Avoidance and Resource Recovery Strategy 2030	The current strategy or any subsequent revisions that drive long-term continuous improvement of waste services, waste avoidance and resource recovery; and set targets for waste reduction, resource recovery and the diversion of waste from landfill in Western Australia in accordance with section 24 of the *Waste Avoidance and Resources Recover Act 2007.*

Figures (attached)

Figure 1 Great Southern Landfill development envelope (This map is a representation of the coordinates referenced in Schedule 1)

Figure 2 **Feral animal** control area outside the development envelope

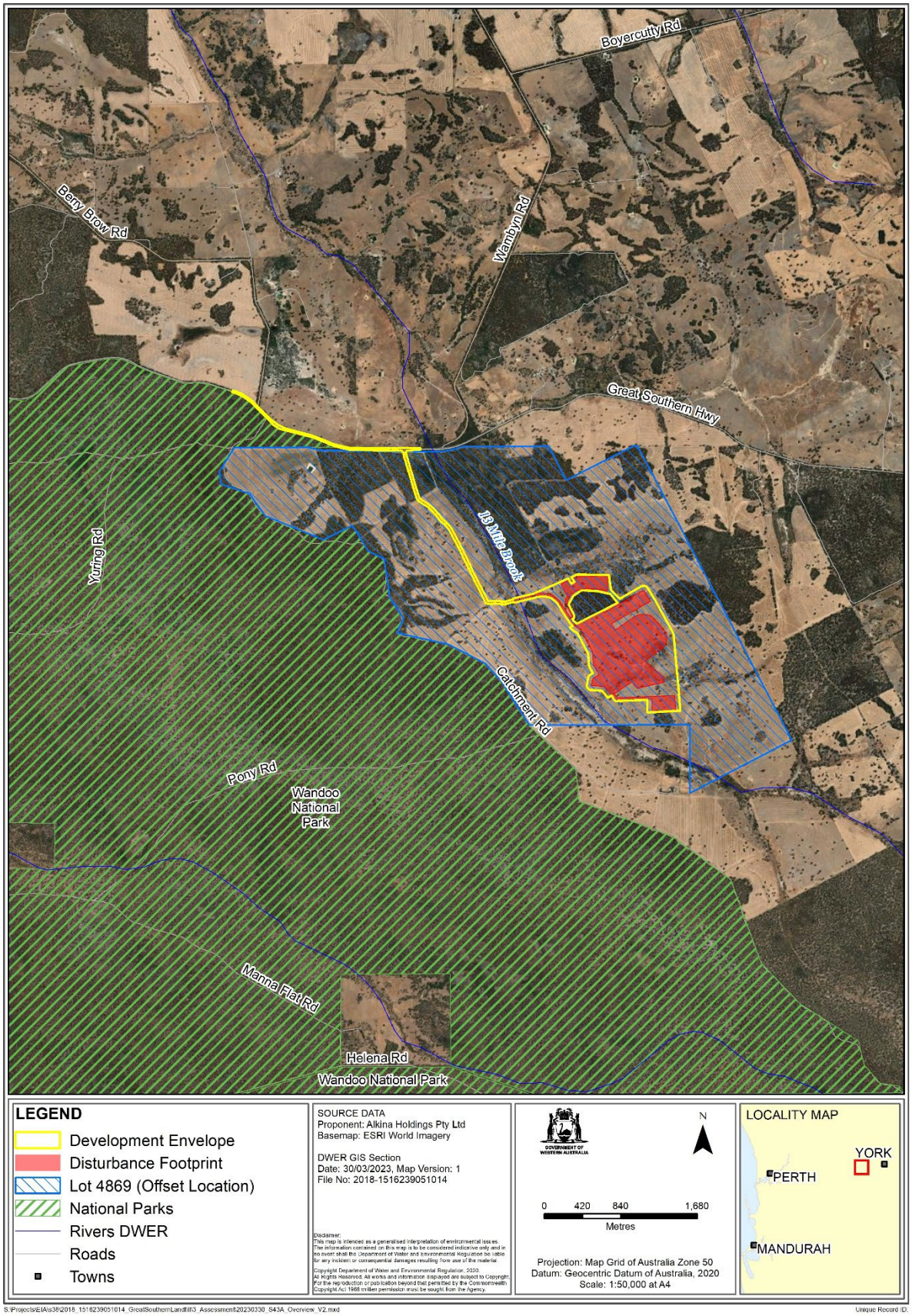

Figure 1: Great Southern Landfill development envelope and offset location

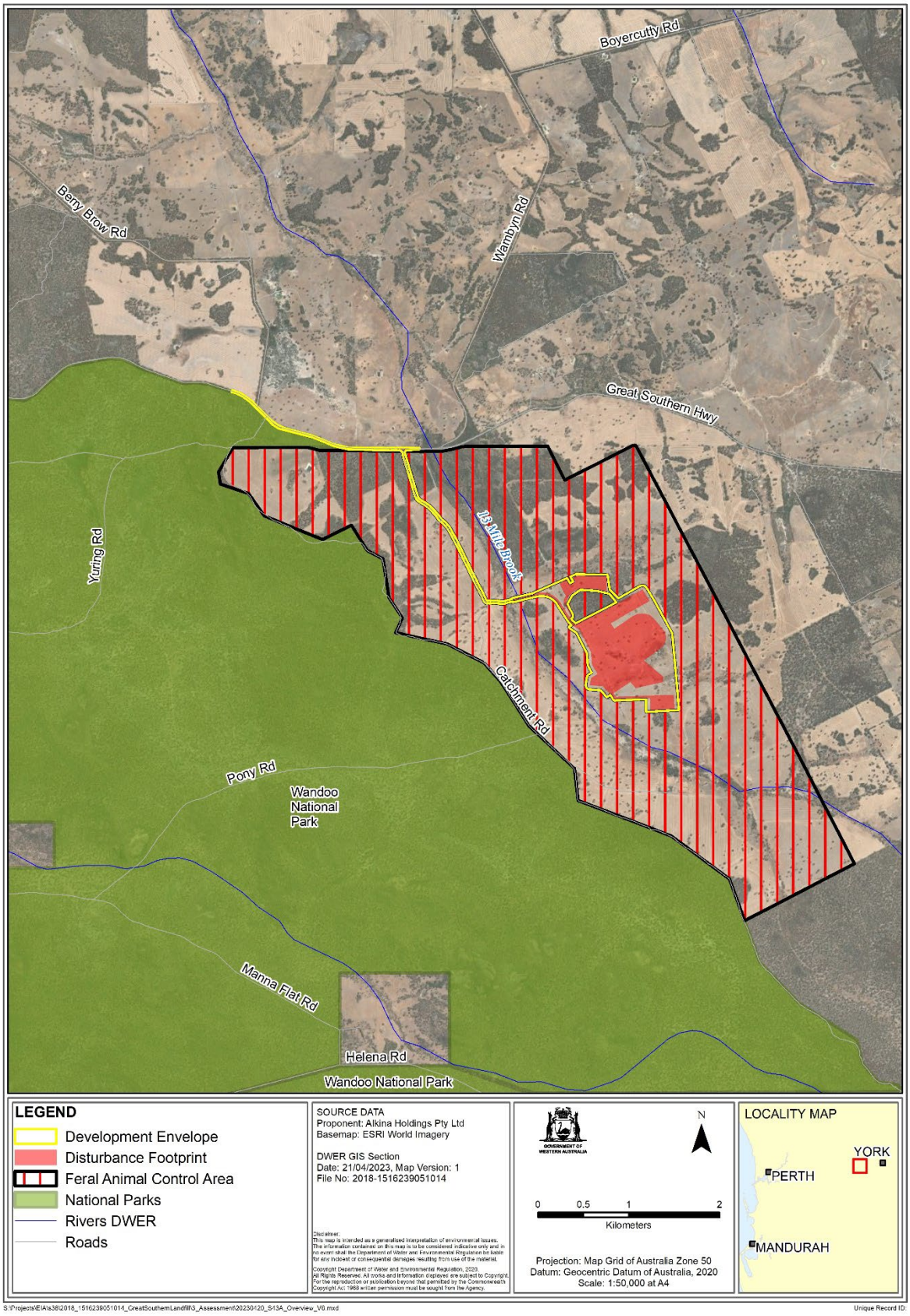

Figure 2: Feral animal control area outside the development envelope

Schedule 1

All coordinates are in metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50), datum of Geocentric Datum of Australia 2020 (GDA20).

Spatial data depicting the figures are held by the Department of Water and Environmental regulation. Record no. 2018-1516239051014.

Appendix B: Decision-making authorities

Table B1: Identified relevant decision-making authorities for the proposal

Decision-Making Authority		Legislation (and approval)
1	Minister for Water	*Rights in Water and Irrigation Act 1914* - permit to interfere with beds and banks
2	Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	*Biodiversity Conservation Act 2016* - authority to take flora and fauna (other than threatened species)
3	Chief Executive Officer, Department of Water and Environmental Regulation	*Environmental Protection Act 1986* - part V works approval and licence - part V clearing permit - approval for noise management plans for construction outside of prescribed hours - part IV compliance (Ministerial Statements)
4	President State Administrative Tribunal	*Planning and Development (Development Assessment Panel) Regulations 2015 (WA)* *Regulation 17*
5	Commissioner of Soil and Land Conservation, Department of Agriculture and Food	*Soil and Land Conservation Act 1945* s.32 clearing of vegetation under a Soil Conservation Notice
6	Chief Executive Officer Shire of York	*Planning and Development Act 2005* - planning approval/development approval *Building Act 2011* - building permit (workshop etc) *Health Act 1911* and *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulation 1974* treatment of sewage for a single dwelling or any other building that produces less than 540 litres of sewage per day

Appendix C: Environmental Protection Act principles

Table C1: Consideration of principles of the *Environmental Protection Act 1986*

EP Act principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In application of this precautionary principle, decisions should be guided by –* • *careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* • *an assessment of the risk-weighted consequences of various options.*	The EPA has considered the precautionary principle in its assessment and has had particular regard to this principle in its assessment of impacts to inland waters, terrestrial environmental quality and from GHG emissions. The EPA noted that the proponent has provided infrastructure design and management plans suitable for containment of waste, emissions and discharges in the specific location and consistent with current industry practice and standards. The EPA had regard to DWER advice that the design and operation of containment infrastructure can be managed under Part V of the EP Act, specifically as a category 64 Class II or III putrescible landfill site under Schedule 1 of the EP Regulations. DWER have advised that conditions can be placed on the works approval and/or licence to specify discharge criteria and monitoring for landfill leachate, discharges and chemical spills, waste acceptance methods and a Closure Management Plan closer to the completion of waste disposal activities. From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm to inland waters and terrestrial environmental quality, provided that the Part V regulatory requirements are complied with. The EPA notes that climate change as a result of cumulative GHG emissions has the potential to cause serious damage to WA's environment. The specific impacts of any single proposal's GHG emissions are not able to be known with certainty at this time. However, the EPA has not used this as a reason for postponing assessment of the proposal's contribution to the State's GHG emissions or recommending practicable conditions to reduce emissions in order to minimise the risk of environmental harm associated with climate change. For this proposal, the EPA accepted peer review advice that the capture rate of GHG emissions from landfill are uncertain and that exceedance of the 100,000 t $CO_{2\text{-}e}$ per year threshold is possible in the future years of landfill operation.

EP Act principle	Consideration
	The EPA considered the overall avoidance of GHG emissions below the threshold of 100,000 tonnes of $CO_{2\text{-}e}$ /annum from the beginning of operations a better environmental outcome. The EPA has recommended condition B2 for the effective capture of GHG including a GHG avoidance environmental management plan to mitigate GHG emissions and provide a mechanism for the proposal to respond to changes in GHG management and science. The EPA also noted advice that the management, mitigation and review of operational performance for landfill gas include emissions of GHG which can be regulated under EP Act Part V statutory decision-making processes. The EPA has recommended conditions and relevant statutory decision-making processes as measures to prevent environmental degradation associated with GHG emissions.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	The EPA has considered the principle of intergenerational equity in its assessment and has had particular regard to this principle in its assessment of terrestrial fauna and flora and vegetation. The implementation of the proposal requires the clearing of good quality foraging habitat for Carnaby's black cockatoo (endangered) and Forest red-tailed black cockatoo (vulnerable). The EPA recommended restoration of foraging habitat as an offset to increase habitat connectivity for long term support to species recovery. The EPA considers that the rehabilitation and restoration of degraded areas increases the habitat available for black cockatoo and enhance local environmental values. The EPA noted advice that emissions and discharges including dust, odours, discharges and windblown litter associated with the proposal can be adequately managed under Part V of the EP Act, the *Environmental Protection Regulations 1987* and the *Environmental Protection (Noise) Regulations 1997*. Regulatory instruments under Part V can include conditions for infrastructure design, operation and control of feral animal numbers within the landfill site. From its assessment of this proposal, the EPA has concluded that the environmental values will be protected and that the health, diversity and

EP Act principle	Consideration
	productivity of the environment will be maintained for the benefit of future generations.
3. The principles of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	The EPA has considered to what extent the potential impacts from the proposal to flora and vegetation and terrestrial fauna can be ameliorated to ensure consistency with the principle. The EPA is of the view that consistency with this principle could be achieved with the implementation of its recommended conditions, which requires the proponent to: • limit the extent of disturbance to flora, vegetation, and fauna habitat • achieve the specified objective for no indirect impacts to occurrences of *Hemigenia* species • control feral animal numbers within the area specified around the development envelope to specifically protect native fauna within the Western Shield and protected areas • implement restoration planting as an offset to increase the habitat available for black cockatoo and enhance local environmental values. The EPA has concluded that the actions to avoid and minimise impact to terrestrial fauna and flora and vegetation, which are also recommended as conditions, will likely conserve terrestrial biological diversity and ecological integrity, so that environmental outcomes are achieved.
4. Principles relating to improved valuation, pricing and incentive mechanisms • *Environmental factors should be included in the valuation of assets and services.* • *The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.*	The EPA considered this principle within the context of the State *Waste Avoidance and Resource Recovery Strategy 2030* and the waste levy which supports objectives of the strategy. The waste levy provides a financial incentive to reduce the quantity of landfill disposal generated within the Perth metropolitan area. While the waste levy provides a market mechanism that makes landfill disposal more expensive and less attractive to the proponent, the EPA considered a condition to support increased recovery and recycling where feasible, over the life of the facility. The EPA therefore recommended a condition for waste minimisation

EP Act principle	Consideration
• *The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.* • *Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*	to ensure that the facility aligns with the *Waste Avoidance and Resources Recovery Strategy* and its revisions over time. The EPA notes that the proponent will bear the costs relating to implementing the proposal to achieve environmental outcomes, and management and monitoring of environmental impacts during construction, operation and decommissioning of the proposal. The EPA has had particular regard to this principle in considering the residual impacts of the proposal on inland waters, terrestrial environmental quality, terrestrial fauna, social surroundings and GHG emissions, including the costs of continual improvement of management practices to mitigate GHG emissions.
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	While the *Waste Avoidance and Resource Recovery Strategy 2030* for Western Australia includes a vision of a sustainable, low-waste circular economy, landfill was identified as continuing to play an important role (*State Infrastructure Strategy (2022)*). The disposal of waste to landfill waste is the least preferred management option in the waste hierarchy, with the diversion of waste from landfill a continuous improvement objective for the management of waste in Western Australia. The EPA has had particular regard to the principle of waste minimisation in its assessment of terrestrial environmental quality. In its consideration of continuous improvement objectives for the management of waste in the State, specifically increased recovery and recycling objectives, the EPA recommended condition B6 for waste minimisation. The condition requires the proponent to demonstrate that waste volumes and flows at the facility are consistent with the diversion of relevant waste streams away from landfill where practicable, the waste hierarchy and the State's *Waste Avoidance and Resources Recovery Strategy* and its revisions over time. The design, construction and operation of landfill infrastructure are consistent with the description of a category 64 Class II or III putrescible landfill site under Schedule 1 of the EP Regulations. Relevant to waste disposal activities under Part V of the EP Act, the DWER advised that regulatory instruments may include

EP Act principle	Consideration
	conditions for waste acceptance methods, monitoring and reporting of waste volumes, types and disposal. From its assessment of the proposal the EPA has concluded that reasonable and practical measures have been recommended and can be conditioned in processes under Part V of the EP Act to minimise the generation of waste and its discharge into the environment.

Appendix D: Other environmental factors

Table D1: Evaluation of other environmental factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
Land			
Subterranean fauna	Leachate generation and seepage from landfill operations may have an impact on subterranean fauna, particularly in the hyporheic zone beneath Thirteen Mile Brook.	DWER advice noted that the presence of hyporheic fauna at the site has not been considered.	Subterranean fauna was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal. Thirteen Mile Brook is highly disturbed and has variable salinity. The proponent's assessment indicates that a significant stygofauna community is unlikely, due to the low-suitability aquifer, low permeability clay layer forming a barrier to surface nutrient supply, and land salinisation limiting suitable habitat. Accordingly, the EPA did not consider subterranean fauna to be a key environmental factor at the conclusion of its assessment.
Landforms	The landfill design may have impacts on the visual amenity of the landscape as viewed from Catchment Road.	One public comment was received on the visual amenity of the landform as viewed from surroundings areas, which was considered under social surroundings.	Landforms was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal. The EPA considers the risk posed to visual amenity can be managed under social surroundings. Accordingly, the EPA did not consider landforms to be a key environmental factor at the conclusion of its assessment.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
Air			
Air quality	Air emissions of dust from landfill operations include excavation, movement and storage of soil, clearing of vegetation, vehicle movements on unsealed roads, and handling of waste. Decomposing material can result in the generation of landfill gases. Where emissions are not managed appropriately, these gases escape into the atmosphere and can reduce the quality of the surrounding air. During operations, decomposing waste or leachate ponds can result in fugitive odour. As a result of landfill operations, an increased likelihood and/or severity of fire can impact the air quality through smoke or the migration of pollutants to the atmosphere.	Numerous public and agency comments related to air quality were received, such as: • Landfill gases, such as methane, can pose a risk to human health • Dust from landfill construction and operation • Odour from landfill operation. The comments related to air quality were considered under social surroundings or greenhouse gas emissions.	Air quality was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal. The EPA identified greenhouse gas emissions as an environmental factor relevant to the proposal, requiring an estimate of emissions and best management practices. Greenhouse gas emissions were confirmed as a key environmental factor during the assessment. The EPA considers that risk posed by landfill gas, dust and odour can be managed under social surroundings and statutory processes of other decision-making authorities. Accordingly, the EPA did not consider air quality to be a key environmental factor at the conclusion of its assessment.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
People			
Human health	Human health impacts that are considered in environmental impact assessment are limited to potential emissions of radiation to the environment and subsequent exposure of the public to radiation doses.	The waste types able to be accepted in Class II or III putrescible landfills under relevant legislation do not include radioactive wastes.	Human health was not identified as a preliminary key environmental factor when the EPA decided to assess the proposal. Based on the waste types proposed to be accepted at the landfill, the EPA considers that potential impacts to human health are not likely and can be regulated through the statutory processes of other decision-making authorities. Accordingly, the EPA did not consider human health to be a key environmental factor at the conclusion of its assessment.

Appendix E: Relevant policy, guidance and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

- *Environmental factor guideline – Flora and vegetation* (EPA 2016)
- *Environmental factor guideline – Greenhouse gas emissions* (EPA 2020)
- *Environmental factor guideline – Inland waters* (EPA 2018)
- *Environmental factor guideline – Social surroundings* (EPA 2016)
- *Environmental factor guideline – Terrestrial environmental quality* (EPA 2016)
- *Environmental factor guideline – Terrestrial fauna* (EPA 2016)
- *Environmental impact assessment (Part IV Divisions 1 and 2) procedures manual* (EPA 2021)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014)
- *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021)
- Environmental impact assessment (Part IV Divisions 1 and 2) administrative procedures 2021 (State of Western Australia 2021)
- *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016)
- *Technical guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020)
- *Interim Guidance- Taking decision-making processes into account in EIA*, EPA (2021).

Appendix F: List of submitters

7-day comment on referral

Organisations and public

- 92 submissions were received from the public during the 7-day public comment period.

Government agencies

- Shire of York

Public review of proponent information

Organisations and public

- 32 submissions were received from the public during the 5-week public comment period.
- Four comments were received from The Water Corporation of Western Australia.

Government agencies

- Department of Biodiversity, Conservation and Attractions
- Department of Fire and Emergency Services
- Department of Primary Industries and Regional Development
- Department of Water and Environmental Regulation
- Shire of York

Appendix G: Assessment timeline

Date	Progress stages	Time (weeks)
24 April 2019	Minister directed the EPA to assess proposal – level of assessment set	
29 August 2019	EPA approved Environmental Scoping Document	18 weeks
22 June 2020	EPA accepted ERD	43 weeks
6 July 2020	ERD released for public review	2 weeks
10 August 2020	Public review period for ERD closed	5 weeks
2 September 2022	EPA accepted proponent's Response to Submissions	108 weeks
1 March 2023	EPA received final information for assessment	25 weeks
16 March 2023	EPA completed its assessment (s. 44(2b))	2 weeks
17 May 2022	EPA provided report to the Minister for Environment	9 weeks
22 May 2023	EPA report published	3 days
12 June 2023	Appeals period closed	3 weeks

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the EPA met its timeline objective to complete its assessment and provide a report to the Minister.

The EPA must give the Assessment report to the Minister so far as is practicable, no later than 6 weeks after the EPA completes its assessment or reassessment (s. 44(2b)) or within 12 weeks or less from the date that the final information for assessment was received.

In this case, the EPA provided its assessment report to the Minister 9 weeks after completing its assessment as it was not practicable to provide it within 6 weeks, due to finalisation of the report coinciding with the Easter and ANZAC day public holidays.

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