Required amendments to the ERD

Requirement	EPA Services advice	Alkina Response
Flora and Vegetation		
1. ESD requirement 6. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and WA Offset Template (Appendix 1) in the *WA Environmental Offsets Guidelines* (2014).	**Comments** The draft ERD does not provide significant detail on the assessment of residual impacts associated with Flora and Vegetation. **Action/s** Provide a completed Residual Impact Significance Model (p11) and WA Offset Template (Appendix 1) as detailed in the *WA Environmental Offsets Guidelines* (2014).	Section 6 has been updated / expanded to include a residual impact significance model for all biodiversity assets. This has also resulted in the inclusion of two additional Tables (being Table 41 and Table 42). Predicted outcome section 4.2.7 has also been updated accordingly.
Terrestrial Fauna		
2. ESD requirement 15. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and WA Offset Template (Appendix 1) in the *WA Environmental Offsets Guidelines* (2014).	**Comments** The draft ERD does not provide significant detail on the assessment of residual impacts associated with Terrestrial Fauna. **Action/s** Provide a completed Residual Impact Significance Model (p11) and WA Offset Template (Appendix 1) as detailed in the *WA Environmental Offsets Guidelines* (2014).	Section 6 has been updated / expanded to include a residual impact significance model for all biodiversity assets. This has also resulted in the inclusion of two additional Tables (being Table 41 and Table 42). Predicted outcome section 4.3.7 has also been updated accordingly.
Terrestrial Environmental Quality		
3. ESD requirement 18. Characterise the	**Comments**	The Summary Investigations Figure (Figure 21 in the ERD) has been updated to show the

Requirement	EPA Services advice	Alkina Response
baseline geology and geotechnical attributes at the site.	Appendix 1.1 - *Works Approval Application – Supporting Geotechnical Information, July 2017* includes cone penetrometer test results, test pit report, geotechnical laboratory test data. Figure 4 within the Supporting Geotechnical Information document identifies the location of the cone penetrometer tests, test pitting and groundwater incursion within the proposed landfill footprint and borrow areas. DWER notes that this figure does not specify the location of the proposed leachate pond, however is inferred to be within (and adjacent) to the area labelled Borrow Area 1. It is unclear from the figure the proximity of the nearest test pitting locations to the final leachate pond location, though DWER have assumed TP1, TP83 and BA16 as the closest test pit locations to the design leachate pond location (as inferred from Figure 3, page 40 and figure 4, page 49 of the draft ERD). **Action/s** • Provide detailed location information (for the leachate pond) with respect to the baseline geotechnical data and figures provided in the draft ERD.	location of the proposed infrastructure, including the leachate pond (and future ponds), retention pond, stormwater dam and sit offices, relative to the geotechnical test locations. An additional Table (Table 23) has been included. It provides a summary of geotechnical testing (test pits, cone penetrometer tests(CPT) and monitoring bores) at infrastructure locations.
4. ESD requirement 19. Demonstrate conformance with recognised design	**Comments** Attachments to the draft ERD include the *Great Southern Landfill – Technical Specification for Construction of Cell 1 and*	Advice from Golder on this matter is that the HDPE geomembranes are manufactured using controlled manufacture process with Manufacturer's Quality Control (MQC) testing undertaken on samples recovered at the time of

Requirement	EPA Services advice	Alkina Response
criteria for containment cell design. The design of cells shall ensure long term encapsulation of waste that reduces risk to the environment and environmental values to an acceptable level	*Ancillary Works, Golder, September 2017*. DWER note that a detailed assessment of this technical specification will be required during the assessment of a Works Approval for the proposal. DWER note that the test frequency for HDPE liner thickness under ASTM D5994 (1 test per two rolls rather than 1 test per roll) is at variance to both the standard required in the Vic BEPM, as well as recently granted Part V Works Approvals, where 1 test per each roll is required. **Action/s** Justify this variation. The proponent is advised that detailed cell design and construction drawings will be required to be provided and assessed as part of any future Works Approval assessment.	manufacture. Independent testing is undertaken in addition to MQC testing on samples recovered by a party independent of the manufacturer upon delivery of the rolls to site. An independent testing frequency of one test per two rolls for HDPE geomembrane thickness is considered to be appropriate when considering the nature of the test and the expectation that MQC testing will be undertaken on the supplied geomembrane in accordance with the Geosynthetics Research Institute publication GRI GM13 which requires thickness testing to be undertaken at a frequency of 1 test per roll. Alkina have no objection to increasing the testing frequency for HDPE geomembrane thickness to that required by the Victoria EPA best practice environmental guidelines (Vic BPEM) if that is preferable to DWER
5. ESD requirement 19. Demonstrate conformance with recognised design criteria for containment cell design. The design of cells shall ensure long term encapsulation of waste that reduces risk to the environment and environmental values to an acceptable level	**Comments** References to the landfill class are inconsistent throughout the supporting documentation. For example, draft ERD reference document Appendix 1.3 - Golder 2017c – GSL Design Report, identifies a Class II landfill is to be constructed. This is consistent with the works approval application submitted in 2017. It is further noted (section 10.4, page 10 of Golder, 2017c) that the general assumptions that form the basis of the design of the GSL include a landfill	Alkina is aware of the perceived discrepancy and has inserted an additional paragraph under Section 2.3.1 to clarify the position. Alkina is proposing to construct a lined landfill, which by definition of the LWCWD document should allow the acceptance of Class III wastes. On this basis, Alkina is seeking approval under Part IV of the EP Act to accept up to Class III wastes based on the design.

Requirement	EPA Services advice	Alkina Response
	classification as Class II. The primary ERD document however (for this GSL proposal) refers to the construction of the Class II or III landfill, and waste acceptance for Class II or Class III wastes. While a Category 64 putrescible landfill is considered a Class II or III landfill under the *Environmental Protection Regulations 1997*, the *Landfill Waste Classification and Waste Definitions document* (DWER 2019) separately defines a Class II landfill (an unlined landfill designed to accept putrescible and inert wastes for burial) and Class III landfill (a lined landfill, which may include leachate collection, designed to accept putrescible and inert wastes for burial). **Action/s** Please provide clarification on the discrepancies.	Alkina has however applied to DWER under Part V of the EP Act (works approval application on hold) to accept Class II wastes as it plans it initially plans to accept waste meeting the Class II criteria. By seeking approval from the EPA process to accept Class III wastes provides Alkina greater flexibility to apply for a licence amendment under Part V of the EP Act in future should it be required to accept Class III wastes, without having to vary any Ministerial Statement granted under Part IV.
6. ESD requirement 20. Provide a Stability Risk Assessment to determine the potential stability risks and engineering requirements for the landfill.	**Comments** DWER notes that the draft ERD submission does not include a discussion or assessment of the stability of the proposed leachate pond, retention pond or stormwater pond embankment designs, nor assessment of the geotechnical suitability of the proposed locations of these ponds. Depending on the risks associated with the siting and/or design of the pond embankments, stability analysis may be required to ensure the proposed pond	Golder has undertaken geotechnical stability analyses for the proposed leachate pond, retention pond and stormwater dam embankments. The findings of these assessments are included in an Addendum report - see Appendix 1.10 of the ERD. Section 2.3.2.1 has been updated to refer to this stability assessment, which is further detailed under added Section 4.4.3.9.

Requirement	EPA Services advice	Alkina Response
	design and location is suitable to prevent failure of the liner and subsequent impact to terrestrial environment, particularly for the leachate pond. **Action/s** Provide an assessment of the stability of the proposed leachate pond, retention pond or stormwater pond embankment designs, and an assessment of the geotechnical suitability of the proposed locations of these ponds.	The foundation and embankment stability analyses show acceptable factors of safety for the scenarios analysed, and that the leachate pond, retention pond and stormwater dam are suitably located in regard to underlying geology and materials on site.
7. ESD requirement 23. Identify management measures to ensure residual impacts are not greater than predicted. This shall include measures to: a. manage leachate from the landfill and evaporation ponds b. manage hydrocarbon and chemical spills from equipment and machinery c. minimise impacts on the land and soil from the Proposal.	**Comments** DWER consider the nominated controls to avoid residual impacts are typical and in general terms reasonable for leachate management for Class II/III landfills however additional contemporary controls have not been addressed. **Action/s** Provide a discussion on the inclusion of additional leachate operational controls and leachate pond contingency measures such as automatic pond level sensors and management considerations for out of season rainfall events to ensure leachate storage capacity is adequate prior to seasonal high rainfall periods.	Site-specific operational controls and contingency measures for the leachate pond will be detailed in a Leachate Management Plan (LMP) (see Appendix 6.1) that will prepared for the Great Southern Landfill site. The LMP will include the following operational control measures for the leachate pond: ■ A daily record will be maintained of the water level in the leachate pond. ■ Visual alarm in the office and at the pond when the operation limit (500 mm freeboard) has been reached ■ The leachate pond will be inspected on a monthly basis for signs of leakage or damage to the embankments and liner system. ■ A programme for inspection, maintenance and repair of the leachate extraction system. The leachate extraction system and pumps

Requirement	EPA Services advice	Alkina Response
		will be serviced in accordance with manufacturer specification. ■ A minimum freeboard of 0.5 m between maximum operating level and the embankment crest elevation will be maintained in the pond. This freeboard has been designed to contain a 1 in 100-year 72-hour rainfall event. The leachate pond will be located near to the site office facilities, which will provide additional supervision and oversight of the pond during operational hours. During non-operational hours (e.g. overnight and public holidays), the risk of the pond overtopping will be controlled by switching the leachate extraction system from automatic to manual operation thereby preventing leachate inflows and reducing the likelihood of the pond overtopping while nobody is on site. However, the system will not be inactive for more than a 12-hour period. This procedure will be clearly detailed in the LMP and will include monitoring of weather forecasts and conditions during non-operational periods. Prior to the end of each shift, the water level in the pond will be checked to confirm that the minimum freeboard is present so that the pond has capacity to contain rainfall events that occur outside of operational hours. The LMP will also include a trigger action response plan that Alkina personnel will follow

Requirement	EPA Services advice	Alkina Response
		should leachate levels in the leachate pond exceed the operational limits. It is anticipated that action measures will include, in order of preference: 1) Utilising a vacuum truck or vacuum tanker to transport the excess leachate off-site for disposal at an alternate licenced treatment facility. 2) Pumping of the excess leachate from the leachate pond into the lined retention pond for temporary storage. Storage of leachate in the retention pond will only be permitted for a maximum period of 2 weeks, after which it must be pumped back into the leachate pond (if levels permit) or disposed of off-site as per Item 1. **3)** Recirculation of the leachate through the landfill. Recirculation of leachate will only be carried out as a last resort and only with approval of the design engineer, due to the potential for increased leachate levels to affect the stability of the landfill (Note: These restrictions would not apply to other forms of leachate re-use such as dust suppression within the landfill footprint and enhanced evaporation though irrigation). Section 4.4.6 has accordingly also been updated.

Requirement	EPA Services advice	Alkina Response
8. ESD requirement 23. Identify management measures to ensure residual impacts are not greater than predicted. This shall include measures to: a. manage leachate from the landfill and evaporation ponds b. manage hydrocarbon and chemical spills from equipment and machinery c. minimise impacts on the land and soil from the Proposal.	**Comments** DWER considers further detail is required applying to hydrocarbon and chemical spills section of the ERD. **Action/s** Provide a discussion on the inclusion of the provision of earth moving equipment to assist in contaminated material recovery, details on re-fueling procedures, details of spill response training for onsite personnel and details on the removal/correct disposal of the contaminated material.	The Landfill Management Plan details the management strategies to manage hydrocarbon and chemical spills referred to in comments received. The Landfill Management Plan (Section 11.14) has been updated, and these strategies have also now been reflected in the ERD Section 4.4.6.2
9. ESD requirement 24. Provide a comprehensive water balance for the operation of landfill cells and wastewater ponds for a range of climatic conditions on at least a monthly basis using a suitable methodology to demonstrate that leachate from the facility can be adequately managed without	**Comments** The draft ERD details the development of leachate generation water balance utilising the Hydrogeological Evaluation of Landfill Performance (HELP) model. Supporting documentation with the draft ERD (refer to Appendix 3.2 and 3.6) also details the water balance calculations conducted for the proposals surface water management. DWER notes that there are a number of inconsistencies with the proposed leachate pond size:	<u>Leachate pond sizing</u> The leachate pond sizing undertaken for the Allawuna Farm Landfill in 2015 (see attachment in Golder,2017f in Appendix 3.2) and 2019 (see Golder, 2019d in Appendix 3.6a and 3.6b) was based on estimates of leachate generation from Hydrologic Evaluation of Landfill Performance (HELP) modelling software. HELP modelling software considers a variety of proposed landfill conditions to estimate leachate generation, including rainfall, vegetation, cover soils, waste cells, drainage layers, low permeability barrier layers and the moisture condition of the incoming waste. The leachate

Requirement	EPA Services advice	Alkina Response
discharge to the environment.	The leachate water balance model conducted in 2015 suggested a leachate pond with nominal dimensions of 40 m wide x 40 m long x 2.5 m deep (storage volume of 2500 m3 **(2.5ML**) excluding freeboard or 3500 m3 (**3.5ML**) including 0.5 m freeboard) (refer to Appendix 3.2) The leachate water balance model conducted in 2019 suggested a leachate pond with nominal dimensions of 100 m wide x 100 m long x 3 m deep (storage volume **25 ML** including 0.5m freeboard) (Refer to Appendix 3.6a); Leachate pond design, as presented in the design report (page 20, Appendix 1.3), indicates the leachate pond will be constructed with the dimensions 40 m x 50 m 2 m (storage volume 2580m3 (**2.58ML**)) DWER notes that the leachate modelling conducted between 2015 and 2019 indicate an order of magnitude variation in leachate storage capacity, with the proposed leachate pond design reflecting a lower capacity, rather than a conservative higher capacity. **Action/s** Provide further information in the ERD on:	volumes estimated using the HELP modelling software are sensitive to the assumed moisture condition of the incoming waste, above all the other landfill conditions. The 2015 HELP modelling assumed the incoming waste had an initial moisture condition of 5% dry of field capacity, where the field capacity is defined as the water content reached if a sample of the waste is initially saturated and then subjected to prolonged free drainage. This initial moisture condition was adopted based on Golder's observations from other similar landfills in Western Australian and following an assessment of the site conditions and the likely waste to be received. The Golder (2019d) HELP modelling assumed the incoming waste had an initial moisture condition of 2% dry of field capacity. This was adopted to represent waste that is close to saturation when deposited at the landfill and provide a conservative estimate of leachate that may be generated. i.e. the worst-case scenario. Therefore, the 2015 Golder modelled leachate pond sizing (2.5 ML, without freeboard) is considered to be based on a scenario that is considered to be likely for the site whilst the Golder (2019a) leachate pond sizing (25 ML, without freeboard) is based on a more conservative scenario.

Requirement	EPA Services advice	Alkina Response
	1. How the 2019 leachate balance was considered with regards to leachate pond design under the current proposal. 2. How approvals and constructing timing has been considered, noting that the recommendation by Golder to construct a smaller pond, where leachate storage capacity may be exceeded within the first year (based on Figure 25 of draft ERD).	Leachate generation varies across landfills and it is recommended that, where practical, leachate volumes are estimated based on HELP modelling calibrated with monitoring data of leachate generation at the site. Therefore, Golder recommend initially constructing a smaller 40 m x 50 m x 2.5 m (width, length and depth, including 0.5 m freeboard) leachate pond which was estimated based on the Golder 2015 HELP modelling and amended to suit site topography. Golder also recommend monitoring ongoing leachate generation and the moisture condition of the incoming waste to assess if additional leachate storage capacity, through the construction of additional ponds, is required in future. <u>Approvals and constructing timing</u> Golder recommend calibrating the HELP modelling based on monitoring data of leachate generation and incoming waste moisture condition for a minimum period of 12 months from when landfill operations commence. Based on the outcomes of the HELP modelling, an assessment can be made on whether an additional pond may be considered appropriate to manage leachate at the site.
10. ESD requirement 25. Discuss the closure and rehabilitation measures	**Comments** Section 4.4.6 of the draft ERD discusses elements relating to rehabilitation of the	Golder has updated the previously issued landfill closure memorandum (Golder, 2019e see ERD Appendix 6.3) to include further information

Requirement	EPA Services advice	Alkina Response
to be implemented, and outcomes/objectives to be achieved.	landfill post closure, including closure objectives, as well as the measures to be implemented. DWER notes that the ERD document does not detail how the closure objective will be measured/determined, and what monitoring timeframes will be considered post closure. Rather the ERD details that a post closure plan will be developed at a later stage. **Action/s** Provide details in the ERD on how the closure objective will be measured/determined, and what monitoring timeframes will be considered post closure.	relating to how closure objectives will be measured and determined. Additionally, a maximum timeframe for post-closure monitoring and maintenance activities, in line with the Vic BPEM recommendations, is also clearly stated; whilst individual timeframes for monitoring activities are also provided. Given the project is currently undergoing assessment, operating licence and/or Shire conditions relating to landfill closure are yet to be imposed. Should such conditions be written into GSL licencing or approval documents, then they will be captured in future revisions of the Landfill Management Plan, and included in the final GSL Closure Plan The Closure and Rehabilitation heading under 2.3.2.2 has been given a separate heading (Section 2.3.3) in the ERD to include the updated detail with the inclusion of an additional Table (Table 9) that outlines the post-closure monitoring activities. Section 4.4.6 has also been subsequently updated.
11. ESD requirement 26. Determine and quantify any significant residual impacts by applying the Residual Impact Significance Model (page 11) and WA Offset Template (Appendix 1) in	**Comments** The draft ERD does not provide significant detail on the assessment of residual impacts associated with Terrestrial Environmental Quality. The ERD rather, includes a summary statement regarding residual impacts, declaring that due to the proposed landfill design and management controls, the EPA	Section 6 has been updated / expanded to include a residual impact significance model for all biodiversity assets. This has also resulted in the inclusion of two additional Tables (being Table 41 and Table 42) Predicted outcome section 4.4.7 has also been updated accordingly.

Requirement	EPA Services advice	Alkina Response
the WA Environmental Offsets Guidelines (2014).	objective of maintaining terrestrial environmental quality will be protected and an environmental offset will not be required. **Action/s** Provide a completed Residual Impact Significance Model (p11) and WA Offset Template (Appendix 1) as detailed in the *WA Environmental Offsets Guidelines* (2014).	