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**Ruth Dowd**  
**Senior Manager Waste Industries – Licensing and Approvals**  
Department of Environment Regulation  
168 St. Georges Terrace  
PERTH  
WA 6000

Dear Ruth,

**STANLEY ROAD LANDFILL (LICENCE REFERENCE L8949/2016/1)**  
**Licence Amendment – Supporting Information**

Following on from the recent meeting between the Department of Environment Regulation (DER), the Bunbury Harvey Regional Council (BHRC) and Talis Consultants (Talis) held on the 10th March 2015, Talis has prepared this letter to provide Additional Information to support the existing Licence Amendment submitted in March 2015.

There has been a variety of communications between the various parties over the time that has passed since the original Licence Amendment was submitted in March 2015. Therefore, a key objective of this correspondence is to clarify the proposed works that the BHRC wishes to seek approval from the DER for through a Licence Amendment.

## 1 Closure and Post Closure Management Plan

In February 2016, Talis submitted a Closure and Post Closure Management Plan (CPCMP) for Stanley Road (the Site) to the DER. As outlined within the CPCMP, the BHRC is committed to rehabilitating the Site to best practice standards as stipulated within the Victoria Environmental Protection Agency Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills (2014) (Best Practice Landfill Guidelines) to address current and long term environmental liabilities associated with the Site.

Through the implementation of the CPCMP, the BHRC is committed to implementing environmental engineering and management measure to ensure that:

- A restoration profile is constructed which will incorporate a low permeability capping layer to restrict the infiltration of rainwater into the waste mass and stop the production of leachate;
- All waste materials are covered to mitigate long term environmental impacts;
- Final fill profile and slopes that are greater than 1V:20H and less than 1V:5H to:
  - Ensure the long term stability and integrity of the capping material and containment layer;
  - Promote natural surface water run-off;
  - Provide an aesthetically acceptable landform;
  - Minimise long term maintenance requirements;
- A system of surface water management to positively deal with any accumulation of the rainwater; and

- A gas management regime to control the generation of landfill gases and reduce any significant risk of adversely impacting the surrounding environment.

To achieve the above, it is proposed that the landfill footprint be extended along with excavation of some waste to ensure that suitable final fill profiles can be achieved at the Site in preparation of the Closure Works including installation of the capping system. As outlined within **Section 6.7** of the CPCMP, the BHRC proposes to phase the Closure Works, with works commencing as soon as practically possible within Phase 1. This will result in the progressive rehabilitation of the landfill.

## 2 Approval Sought

Following on from the recent meeting, Talis can confirm that the BHRC is seeking approval to facilitate the Closure Works for Phase 1, 2 and 3 at the Site through the Licence Amendment process. Therefore, the BHRC is requesting that the DER amend the current licence to allow for the Closure Works of Phases 1, 2 and 3 which will include an alteration to the current landfill boundary as stipulated within Schedule 1 of the current licence.

**Drawing TW1505DG100** provides a map and co-ordinates of the proposed new landfill boundaries. This will allow the BHRC to commence waste excavation, filling and reprofiling works in this location to achieve the suitable final fill profile within these areas to support the progressive rehabilitation of the landfill to mitigate current and future environmental liabilities. Once this is approved, the BHRC will immediately concentrate its efforts in the Phase 1 areas so that capping and progressive rehabilitation of the Site commence as soon as practically possible.

## 3 Gabion Wall

As outlined within the CPCMP, Phase 1 has slopes that exceed the 1V:5H side slopes specified within the Best Practice Landfill Guidelines. It is originally proposed that the conventional solution of extending the landfill footprint would be utilised here. However, this approach would cause significant incursion into the footprint of the current Community Recycling Centre along the south western corner of the Site. The Community Recycling Centre has been highly successful recycling initiative so this option was discounted. Alternatively, substantial excavation of waste would be required which would result in significant environmental and health risks at the Site during this process. The excavation works would take a considerable amount of time due to the anticipated volume of material that would require excavation, which would prolong the exposure/life of the health and environmental risks associated with these activities.

Therefore, the preferred approach to facilitate the development of Best Practice profiles in this area is the construction of a gabion wall along the length of Community Recycling Centre. This would then transition to a natural 1V:5H slope once passed the confines of the Community Recycling Centre.

As requested at the recent meeting, the DER has requested a Structural Report and associated calculations to determine the suitability and long term integrity of the Gabion Wall within the Closure Works. Following discussions with our engineers, it was recognised that the Gabion Wall is actually an earthworks element and not a structural element such as a retaining wall constructed from reinforced concrete or similar. Therefore, a Structural Report and associated calculations are not the appropriate analytical tools to determine the suitability and long term

integrity of the Gabion Wall. Talis' Geotechnical and Civil Engineers advise that Slope Stability and Earth Pressures Modelling are more appropriate tools for the analysis required of this earthworks element of the project.

Talis has commenced the Slope Stability and Earth Pressures Modelling utilising LimitState's Geo geotechnical software. It is anticipated that these works will be completed within the next fortnight with a Geotechnical Report prepared and submitted thereafter to the DER for assessment along with relevant extracts from the model.

## 4 Deviation from Best Practice Final Fill Profiles

During the recent meeting, the DER requested that consideration be given to deviations from the Best Practice Landfill Guidelines specified final fill profiles which the BHRC proposes to comply with as part of the Closure Works at the Site.

The maximum gradient at which a restoration profile can be constructed depends on the shear strength of the various materials employed within the capping. Normally this is referred to as the Interface friction angle. The steeper the gradient the higher the angle of friction needed to maintain stability with a sufficient factor of safety.

At an angle of 1:5 the vast majority of textured geosynthetics will provide sufficient friction to withstand the destabilising forces of the restoration profile. Hence why the value of 1:5 is used in the Best Practice Landfill Guidelines, which based on our international experience, Talis can confirm is common in other developed countries of the world.

To construct slopes at steeper angles requires greater friction angles. Whilst some geosynthetics and clays can have sufficient shear strength, certain manufactured characteristics are required of geosynthetics and natural properties of clays.

For clays, sufficient low permeability is created by a minimum clay content. The higher the clay content usually ends up as a lower permeability, but a lower angle of friction. The lower the clay content often means the friction angle is higher, but so is the permeability. So to get an acceptable permeability at a higher gradient can require a careful balancing act of material characteristics. However, Talis and BHRC have been unable to determine suitable local sources of low permeability clay for the Closure Works at the Site.

For geosynthetics, in particular geomembranes, the interface friction angle will be dependent on the magnitude of the asperities placed on the surface during manufacture. Most normal asperities in the texture will enable 1:5 side slopes to be maintained. However, to go steeper the asperities need to be higher. This requires specialist manufacture and will only be manufactured abroad. Unfortunately, this will require research and samples to be shipped to a suitable Australian lab so that shear box testing can be performed. This may have to be done on a number of manufactured products so that we get the correct product. However, there is no certainty that such specialist products and the sands proposed to be utilised for the Closure Works will result in a favourable Shear Box result. Some parts of the southern slope reach 1:3 or steeper which further restricts the use of geosynthetics and, as stated above, may render it impossible to utilise these materials.

As discussed during the meeting, Talis is of the view that any deviation from the final fill profiles as stipulated within the Best Practice Landfill Guidelines, which are consistent with similar international standards, would unnecessarily increase the risk to the Closure Works, the long

term environmental and health and safety liabilities associated with the landfill as well as the BHRC significant investment in rehabilitation of the Site.

As part of the Geotechnical Report that Talis is preparing further detailed justification and calculations for the adoption of the proposed final fill profiles at the Site. As outlined above, Talis anticipates that this will be provided to the DER within the same timeframe for review.

## 5 Phase 2 Hydrogeological Investigation Report

Talis has provided a DRAFT of the Phase 2 Hydrogeological Investigation Report to support the Licence Amendment application sought. Leading on from the Phase 1 Hydrogeological Investigation Report, this DRAFT Phase 2 Report includes a detailed review of the hydrogeological conditions on and surrounding the site to the establishment of additional monitoring points surrounding the site. As outlined previously, Hydrogeological Modelling is currently being undertaken by AQ2 utilising LandSim. These modelling works are not anticipated to be completed for another 2 weeks. At this stage, these results will be incorporated into this Phase 2 Hydrogeological Investigation Report and submitted to the DER as a final version.

### Closing

We trust the above satisfactorily addresses the DER data requirements arising from the recent meeting. If you require any further information please do not hesitate to contact me by any of the means below.

*Yours sincerely,*



Ronan Cullen  
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*Encl:*

Drawing TW1505DG100: Proposed Landfill Footprint for Phases 1,2 and 3