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Copping C-cell Construction Contract Technical and QAQC specification RevB 20161124

Introduction

This letter report is a peer review of the document entitled, "Copping C-cell Construction Contract Technical and QAQC specification RevB 20161124". The document (hereafter referred to as 'the QA/QC document') describes the technical and QA/QC (quality assurance/quality control) specifications for the construction of the Southern Waste Solutions C-cell at Copping, Tasmania.

Documents provided

Aside from the above mentioned document, pitt&sherry also provided detailed design drawings and three sets of laboratory test results provided by the Geosynthetic Research Laboratory on material to be used as part of the C-cell at Copping. In addition to these recently received documents, documents previously provided by pitt&sherry included:

- pitt&sherry (February 2014) Copping Landfill Site Groundwater Monitoring Review
- pitt&sherry (2015) Copping C Cell Geotechnical Investigations Factual Report
- Cromer, W.C. and Brooker, J.K. (February 2016) Copping RDS: C Cell Hydrogeology – Data review, conceptual model and Stage 2 recommendations

The above three (bullet-pointed) documents were reviewed and commented on by Andy Fourie prior to 20th June 2016. The comments provided have all clearly either been addressed and incorporated into the November 2016 QAQC document, or satisfactory reasons given for not doing so.

This current report focusses on the recently received documents, but incorporates comments previously provided on the earlier documents. It has been prepared after some comments were provided by Fourie to pitt&sherry on a draft version of the QA/QC document provided by pitt&sherry on 15th November 2016. These comments have been adequately addressed in RevB of the QA/QC document.

Review findings

The QA/QC document is extremely detailed and is comprehensive. Review of the initial draft found some lack of detail in regards to the compacted clay layer, whereas relatively little comment was provided on the geosynthetics aspects of the document because this was particularly well addressed.

The various layers to be used in the lining system are detailed in Table 1 of the QA/QC document. This table usefully summarises the layers, distinguishing between base layers and side wall layers. Each of the layers in the lining system have different functions, some being for limiting moisture migration, others for protection and/or drainage. In some instances the synergistic effects are utilised, such as the composite primary liner that consists of a geomembrane overlying a geosynthetic clay liner (GCL).

The choices of the specific materials for use in the various liner components (e.g. a HDPE membrane as the geomembrane) are all entirely appropriate and consistent with current accepted practice. It is not possible to comment on the specifics of a particular product that was chosen, as this would require information on pricing and availability, which the reviewer (Fourie) does not have. Nevertheless, the key conclusion here is that all the liner components are consistent with accepted practice.

As is commonly done, some material properties for the geosynthetic components are based on data supplied by manufacturers, as these are part of the product manufacture specifications, e.g. mass per unit area for geotextiles. Where necessary, additional specialised tests were commissioned to an independent laboratory (the Geosynthetic Research Laboratory (GRL)). Specific tests carried out included:

- Interface friction tests to determine the frictional resistance. These were done to determine the frictional resistance between various geosynthetic components, such as between a geomembrane and a GCL.
- Transmissivity tests to determine the in-plane hydraulic conductivity of geotextile layers.
- Protection efficiency tests to determine the puncture resistance of specific geotextile layers.

The results of these tests, which were conducted in accordance with industry-standard procedures, were correctly incorporated into calculations in the QA/QC document. For example, the calculations of strains that were done for the cushion geotextile comprising Layer D. In RevB of the QA/QC document, suitable calculations were completed, showing that the designed anchorage trench will be adequate to ensure individual layers secured within the trench are not able to be pulled out.

A hold point was placed on the ordering of materials, with a proviso being that adequate and suitable calculations were completed. With the results reported in RevB of the QA/QC document, these conditions are now considered to have been met.

Provision has been made for a Supervisor (or their nominated representative) to oversee the installation of the lining system. The roles and responsibilities of this person are described in some detail. Having such a person on site will contribute significantly to ensuring that the best possible construction practices are adhered to. It is not a universally used procedure, but is highly desirable and consistent with accepted good practice.

Table 2 summarises the required liner construction approach. Detailed descriptions are provided for construction according to the lay-as-you-go approach and, very importantly, clear indications are given about which particular layers machinery may work from. The clear indication is that machinery may not (without the approval of the Supervisor) work from other layers. As with all the procedures outlined in the QA/QC document, adherence to instructions of this type are critically important to ensuring the lining system is suitable constructed.

It is noted that a Construction Environmental Management Plan has been approved by the EPA and separately provided to the contractor(s).

Details are provided on plant and equipment, materials and workmanship, safety management, as-constructed survey and drawings, bulk earthworks and subgrade construction. These are all consistent with current construction industry standards and are suitable and appropriate for construction of a lining system.

To prevent groundwater rising to a level such that it impacts negatively on the lining system (e.g. by providing uplift forces), a substantial groundwater relief system has been designed. This groundwater relief system has sufficient drainage capacity, provided by the 0.3 x 0.3m drainage trenches.

A compacted clay layer is utilised as part of the tertiary liner for the base of the landfill. The specifications and testing requirements for this layer are appropriate. One aspect that requires further consideration is the maximum clod size, which is currently set at 50mm. This is considered too large, with 20mm being more desirable. However, larger clod sizes may be acceptable, but if clods of this size (or larger) are prevalent, then the specified in-situ hydraulic conductivity tests (e.g. using a Guelph permeameter) should be carried out in the vicinity of such clods. The reason being that excessive clod sizes can increase hydraulic conductivity by orders of magnitude, which is unacceptable.

The QA/QC document provides extensive guidance for issues that include roll labelling, handling and storage, surface preparation and panel deployment. This indicates suitable attention to detail on 'housekeeping' issues; such issues are a critical component of ensuring the design intent of the designer is achieved and the appointed Supervisor must ensure these are adhered to.

Specific QA/QC procedures are provided for the GCL and for the geomembrane components of the lining system. These should be strictly adhered to, particularly procedures that have a direct influence on the key engineering properties of a product, an example being the correct hydration procedure to ensure optimal hydraulic conductivity performance of a GCL. Another extremely important specification relates to the testing of geomembrane seams and associated welding. These are critical considerations and must be strictly adhered to, as failure to do so could compromise the performance of geomembrane components.

The final section (clause 28) summarises the 8 hold points in the project. These have been well thought out and must be adhered to. It would be an easy mistake to overlook one (or more) of these hold points during the construction activity that will ramp up quickly once construction starts. The Supervisor will be well advised to pay particular attention to these hold points, and to enforce the expectations associated with each of them.

The lining system in context

A great deal of attention has been focussed by some stakeholders on the geology underlying the site for Cell C. This is an understandable consideration, but such concerns should be tempered by accounting for the extremely comprehensive lining system proposed for Cell C. Although the material to be stored in Cell C is not highly hazardous waste, the lining system is of a more onerous design than most hazardous waste cells. The underlying geology is thus not required to provide substantial resistance to deep drainage, as the lining system is designed with two levels of back-up (the secondary and the tertiary liner). Having said that, the underlying geology does indeed provide some additional redundancy, as the cell is located within dolerite, not the underlying sandstone.

Concluding comments

Now that the comprehensive material description and QA/QC procedures have been documented and described, it is apparent that the proposed design for Copping Cell C is extremely comprehensive, providing multiple levels of back-up to ensure the potential percolation of leachate to the underlying geology is minimised and indeed prevented entirely. Appropriate account has been taken of the underlying geology and likely groundwater levels, and measures taken to control any temporary rise of groundwater to close to the deepest component of the lining system.

To ensure the optimal and desired performance of the lining system, the role of the construction Supervisor cannot be over-emphasised. The contribution of this person to ensuring the lining system is correctly installed and constructed is critical and the Supervisor should be given every support he or she requests. Continuity in this oversight capacity is critical. Consideration should thus be given to providing adequate training to someone who could replace the appointed Supervisor at short notice (e.g. an absence of the Supervisor due to leave or sickness). This back-up person should thus be apprised of progress and key concerns at the site during construction, facilitating possible call-up at short notice if required.

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