Construction Quality Assurance Plan

North Bannister Resource Recovery Park – Cell 7 Lining Works

Prepared for Veolia Recycling and Recovery (Perth) Pty Ltd

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Project Number: TW23075

DOCUMENT CONTROL

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Approval for Release

Name	Position	File Reference
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Signature	[redacted]	

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1 Introduction

The purpose of the Construction Quality Assurance Plan (CQA) Plan is to detail the testing methods and quality assurance procedures during the installation of the geosynthetic lining and leachate collection system for the development of Cell 7 (the Lining Works) at the North Bannister Resource Recovery Park (NBRRP), located 6364 Albany Highway, North Bannister, Western Australia (WA) (the Site) for Veolia Recycling and Recovery (Perth) Pty Ltd (Veolia/the Principal). The Works comprise the following:

- Earthworks to form the required subgrade levels and geometry on the base and side slopes of the cell comprising;
  - Excavation to 250mm below finished surface level on the base of the cell and proof roll surface;
  - Ripping, moisture conditioning and recompacting, as necessary, the lower 250mm thick layer of in-situ soils on the base of the cell;
  - Placement and compaction of Engineered Fill on the base of the cell up to and including the lower 250mm layer of Engineered Fill; and
  - Placement and compaction of upper 250mm thick layer of Engineered Fill on the base of the cell;
  - Placement and compaction of 500mm thick Engineered Fill on the side slopes of the cell; and
  - Placement and compaction of Engineered Fill to construct the southern side slope of the cell.
  - Preparation of the subgrade surface for installation of the geosynthetic lining system.
- Supply and installation of the composite geosynthetic lining system;
  - Type 1 Geosynthetic Clay Liner (GCL) on the base of the cell;
  - Type 2 Geosynthetic Clay Liner (GCL) on the side slopes of the cell;
  - 2mm High Density Polyethylene (HDPE) Double Textured Geomembrane;
  - Protection Geotextile;
  - Leachate Collection Layer – 300mm highly permeable low calcareous aggregate; and
  - Separation geotextile.
- Supply and installation of leachate collection pipework and fittings comprising:
  - DN 225mm HDPE perforated primary pipework; and
  - DN 160mm HDPE perforated secondary pipework.
- Electrical Leak Detection Survey.

This plan shall be read in conjunction with the Cell 7 Lining Works Technical Specification and Drawings for the Works (the Specification). Further detailed and specific construction procedures and requirements are outlined in the Specification and Drawings. This document does not replace the Specification or Drawings.

2 Definitions

For the purposes of the CQA Plan guidelines, the following terms are defined below:

'**Construction Quality Assurance**' (CQA) – A planned system of activities that provide assurance that materials or construction activities are undertaken and installed as specified in the design.

'**Construction Quality Control**' (CQC) - The process of measuring and controlling the characteristics of the item/product in order to meet the manufacturers or project specifications.

'**The Principal**' shall be as defined in the Conditions of Contract and for this Project will be Veolia Recycling and Recovery (Perth) Pty Ltd.

'**The Contractor**' shall mean the future company contracted by the Principal to execute the Works and complete the project; and

'**The Superintendent**' shall be as defined in the Conditions of Contract and for this Project will be the Principal's appointed representative.

2.1 Material Definitions

'Subgrade': In-situ soils with suitable geophysical characteristics to form a firm and unyielding surface for engineering purposes.

'Engineering Fill': Site-won soils supplied by the Principal that are compacted to >95% MMDD with a moisture content, during compaction, of optimum moisture content (OMC) -3% to +3% as determined by the test methods of AS1289.

'Geosynthetic Clay Liner': A factory-manufactured hydraulic barrier consisting of sodium bentonite clay supported by geotextiles held together by needling, stitching, or adhesives.

'Geomembrane': A geomembrane is very low permeability synthetic membrane liner or barrier used with any geotechnical engineering related material so as to control fluid (or gas) migration in a human-made project, structure, or system.

'Protection Geotextile': Any permeable non-woven textile, used with foundation, soil, rock, earth, or any geotechnical engineering related material as an integral part of a human-made project, structure, or system.

'Leachate Collection Pipe': 160mm and 225mm HDPE perforated SDR17 solid wall pipe.

'Leachate Drainage Aggregate': Nominal 20-40mm washed low calcareous aggregate

'Separation Geotextile': Any permeable textile woven or non-woven, used with foundation, soil, rock, earth, or any geotechnical engineering related material as an integral part of a human-made project, structure, or system.

'Protection Soils': Site-won soils used as a sacrificial layer to protect the in-situ or engineered soils from detrimental weathering; desiccation and scouring, and the installed protection geotextile from UV degradation.

'Minimum Average Roll Value' (MARV): The minimum average value of a particular physical property of a material, for 95 percent of all of the material in the lot.

'Overlap': Where two adjacent geosynthetic panels contact, the distance measuring perpendicular from the overlying edge of one panel to the underlying edge of the other.

3 Role of Participants

The participants and/or parties that have been identified as key personnel in the delivery of this Project include, but are not necessarily limited to Principal and Superintendent; Design Engineer; CQA Consultant; Contractor; Resin Supplier; and Soils Testing Laboratory. The roles and responsibilities of the participants and/or parties are detailed below

3.1 Superintendent

During the construction, the Superintendent acting on behalf of the Principal will serve as a single point of contact for the design engineer, Contractor and CQA consultant during construction.

3.2 Design Engineer

The design engineering services for the Lining Works will be provided by Talis. The design engineer reviews and approves any proposed changes in design during construction.

3.3 CQA Consultant

The CQA Consultant is an independent party not affiliated with the contractor, subcontractors, suppliers or manufacturers. The CQA consultant may be the design engineer. The CQA Consultant has the overall responsibility for managing, coordinating and implementing the CQA activities and confirming that the Contractor's construction quality control activities are performed in accordance with the CQA Plan, construction drawings and technical specifications. Critical activities related to the construction, manufacture and installation of the earthwork, civil improvements and other project components will be monitored and documented by the CQA consultant. The CQA Consultant will be responsible for issuing a Final Certification Report containing CQA documentation sufficient to satisfy regulatory requirements and the requirements of this CQA Plan.

3.4 Contractor

The Contractor is responsible for the timely construction of the project, as delineated in the Drawings and Technical Specifications and in accordance with this CQA Plan. The Contractor is also responsible for the CQC. In particular, the Contractor shall ensure that only materials meeting the requirements set forth in the Technical Specifications and Drawings are used.

3.5 Soil Testing Laboratory

In the performance of the works, the Contractor shall engage an Independent Geotechnical Testing Laboratory. The testing laboratory will conduct tests on representative samples to evaluate their properties and compliance with the Technical Specifications.

3.6 Resin Supplier

The Resin Supplier produces and delivers the resin to the Geosynthetics Manufacturer. Qualifications of the Resin Supplier are specific to the manufacturer's requirements.

3.7 Geosynthetic Manufacturer

The Geosynthetic Manufacturer is responsible for the production of finished material from appropriate raw materials. The Geosynthetic Manufacturer reports to the Geosynthetics Installer.

3.8 Geosynthetic Installer

The Geosynthetics Installer is the Contractor or his subcontractor. The Geosynthetics Installer is responsible for field handling, storage, placement, seaming, loading or anchoring against wind uplift and other aspects of the geosynthetic material installation. The Geosynthetic Installer will be trained and qualified to install geosynthetic materials of the type specified for this Project.

3.9 Materials Testing Laboratory

In the performance of the CQA activities, the CQA Consultant may engage a Materials Testing Laboratory, independent from the Contractor, subcontractors, or any material supplier or manufacturer. The testing laboratory will conduct tests on representative samples to evaluate their properties and compliance with the Technical Specifications.

4 Description of Works

The works to be carried out under the Specification include, but are not limited to the following:

- Earthworks to form the required subgrade levels and geometry on the base and side slopes of the cell comprising;
  - Excavation to 250mm below finished surface level on the base of the cell and proof roll surface;
  - Ripping, moisture conditioning and recompacting, as necessary, the lower 250mm thick layer of in-situ soils on the base of the cell;
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- Electrical Leak Detection Survey.

5 Daily Reporting and Documentation

5.1 General

An effective CQA Plan recognises all construction activities that should be monitored and assigns responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The CQA consultant will document that all quality assurance requirements have been satisfied. The CQA consultant will also maintain at the job site a complete file of Construction Drawings, Technical Specifications, CQA Plan, test procedures, daily logs, and other pertinent documents.

5.2 Daily Record Keeping

Standard reporting procedures will include preparation of CQA documentation which, at a minimum, will consist of:

- Field notes, including memoranda of meetings and/or discussions with the design engineer or construction manager;
- CQA logs and testing data sheets; and
- Construction problems and solution summary sheets.

This information will be reviewed by the CQA consultant, signed, and transmitted to the construction manager on a daily basis.

Monitoring logs and testing data sheets will be prepared for all site inspections. At a minimum, these logs and data sheets will include the following information:

- Date, project name, location and other identification;
- Data on weather conditions;
- A site plan showing work areas and locations selected for random CQA testing;
- Descriptions and locations of ongoing construction;
- Equipment and personnel in each work area;
- Location where in-site CQA tests and samples were taken;
- A summary of test results;
- Calibration of test equipment;
- Decisions made regarding acceptance of units of work and/or corrective actions to be taken; and
- Signature of CQA Consultant representative.

5.3 Construction Issues

The Contractor will be informed by the CQA Consultant about any significant recurring non-conformance with the Construction Drawings, Technical Specifications, or CQA Plan. The cause of the non-conformance will be determined and appropriate changes in procedures of Specifications may be recommended. These changes will be submitted to the design engineer for approval. When changes are made, they will become part of the construction documents.

5.4 Photographic Records

Photographs will be taken by the CQA Consultant and documented in order to serve as a pictorial record of work progress, problems and mitigation activities. The basic file will contain colour prints and they will be identified with the date, time, and location of the photograph.

5.5 Design and/or Specification Change

Design and/or specification changes may be required during construction. In such cases, the CQA consultant will notify the design engineer and Construction Manager.

6 Requirements of the CQA Validation Report

At the completion of the work, the CQA consultant will submit to the Superintendent a signed final certification report. This report will document that:

- Work has been performed in compliance with the construction documents;
- Physical sampling and testing has been conducted at the appropriate frequencies specified in the Specification; and
- The required CQA documentation has been completed.

At a minimum, this report will include:

- A summary describing the CQA activities and indicating compliance with the Drawings and Technical Specifications;
- A summary of CQA testing, including failures, corrective measures and retest results;
- Progress photographs;
- Any other relevant information; and
- As built drawings.

The validation report must contain a statement by the CQA Consultant that the works have been carried out in accordance with the CQA Plan (and specifications attached to it) and that the validation report (including the drawings and appendices) represent a fair and accurate record of the works.

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