



## **RECOMMENDATIONS FOR THE MINIMUM QUALIFICATIONS OF ON-SITE CONSTRUCTION QUALITY ASSURANCE (CQA) PERSONNEL SUPERVISING CONSTRUCTION USING GEOSYNTHETIC MATERIALS**

Prepared by the Australasian Chapter of the International Geosynthetic Society (ACIGS)

March 2020

### **BACKGROUND**

The introduction of Construction Quality Control (CQA) in the Australian geosynthetic industry over the past 10 years has without a doubt improved the quality of the materials used. The learning curve has been steep, but most parties involved have a reasonably good understanding of what is required.

With higher quality standards, the demand for more experienced on-site CQA personnel is paramount, as these positions have a significant impact on the efficiency of the construction phases. As new standards are introduced industry transitions to efficiently apply such changes.

Several Jurisdictions require on-site CQA controls on geosynthetic construction sites. Many other asset owners and regulators require a similar focus to ensure that projects are completed to the design intent and regulation requirements. However, the definition of what CQA representative qualifications and experience should be is not well defined; below.

#### **Examples Include;**

##### **Victorian EPA - BPEM**

(Best practice environmental management – Siting, design, operation and rehabilitation of landfills)

Section D6.3

*“For this purpose, an independent third-party CQA consultant with experience with geomembranes and knowledge of geomembrane and seam performance characteristics must be appointed to verify that the works have been carried out to the agreed standards. The duties of the third-party CQA consultant include inspections, verifications, audits and evaluation of materials and workmanship, provision of advice on installation, testing, repair, and covering of the geomembrane lining system and issuing a final CQA report documenting the quality of the constructed facility.”*

##### **NSW EPA -Environmental Guidelines Solid waste landfills**

Preparation of technical reports

*“Technical reports must be prepared and signed by appropriately qualified and experienced persons. In the case of landfill design reports and Construction Quality Assurance documentation for major landfill works, this person should be an engineer such as a civil or geotechnical engineer with professional qualifications acceptable to Engineers Australia, or equivalent, with at least 5 years of experience in landfill design and construction, and currently practising competently in this field.”*

## SA EPA – Environmental Management of Landfill Facilities – solid waste disposal

Construction quality assurance (CQA) plan

### **“Objective**

*The objective of the CQA during construction of landfill facilities is to ensure that the materials, construction methods and completed works comply with the requirements of the construction drawings, technical specification and basis of design report.*

### **Required outcomes**

- *Development and implementation of a CQA plan to ensure that the liner and leachate collection system meets the requirements of the specifications and drawings.*
- *Variations and design changes are assessed and accepted by the designer and EPA.*
- *The licensee submits to EPA for approval a CQA report **containing a statement from an independent CQA engineer registered on the National Engineering Register stating that the installed liner and leachate collection system meet the requirements of the specification and drawings.***

and

***The designer must prepare a CQA plan to address the following minimum requirements for geosynthetic materials (ie geomembranes, geosynthetic clay liners, geotextiles, geonet drainage geocomposites and geogrids) in addition to the minimum guideline requirements of the CQA plan.***

***The CQA report must be prepared by a CQA engineer who is independent of the contractor and principal, suitably experienced and competent, and registered on the National Engineering Register.”***

### **QLD BPEQ (Queensland Board of Professional Engineers)**

*Engineering services shall only be provided by Registered Professional Engineer in Queensland (RPEQ) or an engineer who is “directly” supervised by an RPEQ. Direct supervision requires supervision of each individual professional engineering service. A general workplace or reporting relationship will not satisfy the direct supervision requirements. An assessment of direct supervision will be transaction-based, not relationship-based.*

*Strict compliance is required with each professional engineering service undertaken.*

*The following five elements must exist for there to have been direct supervision by a RPEQ:*

1. *the supervision must be **direct**;*
2. ***the supervising RPEQ must direct** the person in the carrying out of the service;*
3. ***the supervising RPEQ must oversee** the carrying out of the service by the person;*
4. ***the supervising RPEQ must evaluate** the carrying out of the service by the person; and*
5. ***the supervising RPEQ must take full professional responsibility** for the service.*

*Direct supervision can be undertaken remotely, including interstate, provided that the above elements exist. Clear records will be required, to show what direct contact there was between the supervising RPEQ and the unregistered person and what direction, oversight, and evaluation was provided.*

### **Observations**



The CQA contribution to the success of a project is critical. The CQA role has a direct influence on the critical path and efficient delivery of projects and ensuring the designers CQA requirements are met.

To achieve this, qualifications, roles, and responsibilities must be clearly defined in the project specification. The following recommendations are given on the minimum qualifications and experience required by CQA personal in order to provide effective services to the client.

### **Recommendations**

The Geosynthetics CQA role should be undertaken by an independent organisation having site representatives experienced with geosynthetic materials, including knowledge of geosynthetics and seam performance characteristics. The appointment to verify that the works have been carried out to the project technical standards and the staff performing these duties should be experienced in this task.

The duties of the third-party CQA consultant typically include the works necessary to prepare and certify an as-constructed CQA report by a registered professional engineer, including:

- Responsible to ensure that sampling and testing of subgrade, fill, geosynthetics material properties is undertaken on representative samples to the requirements of the specification;
- Inspection and documentation of all subgrade, fill, geosynthetic materials, construction works including panel placement, joining/welding and anchoring;
- Monitoring of material placement in contact with geosynthetics;
- Inspection and documentation of weld/join integrity testing;
- Inspection, verification and documentation of all repairs.
- Identification of design changes, their assessment, referral for approval to the designer (and EPA).
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The extent of CQA supervision and oversight, part time or full time, depends on the requirements of the project.

It is recommended that in all cases, the CQA activities shall be oversighted and “signed-off” by a CQA Engineer (Certifying Engineer) who is a Professional Engineer (RPEQ/CP Eng) or equivalent, registered on the National Engineering Register (or as required by State legislation, e.g. RPEQ).

The works on site should be monitored by a combination, depending on the project requirements, of a “Senior CQA Representative” who communicates on-site as representative of the CQA Engineer and a “CQA Representative” who monitors works as representative of the CQA Engineer. The proposed role and qualifications of these positions are summarised below.

Recognising the need to train new CQA staff should the on-site CQA role be undertaken by an individual not meeting the minimum qualifications, an oversight plan must be prepared by the CQA Engineer (Certifying Engineer) and include as a minimum weekly on-site monitoring of the staff member.

<p><b><u>CQA Engineer (Certifying Engineer)</u></b></p> <p>Qualifications: Professional Engineer (CP Eng) or Registered on the National Engineering Register (or as required by State legislation, e.g. RPEQ) or equivalent</p>
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<p>Geosynthetic Certification Institute – Inspectors Certification (GCI-ICP) or approved equivalent</p> <p>Experience: 10 plus years Geosynthetics CQA experience</p> <p>Responsibility: Must understand the design basis to know when to seek advice from the design engineer, or response from EPA (or Auditor). Responds to Major issues, Direct supervision of activities undertaken by CQA Engineers site representatives, approve responses to significant issues, approve responses to Request For Information (RFI) raised by contractor, approve action/response to Non Conformance Report (NCR)</p> <p>signs off on final report</p> <p>Office based, site visits targeting project major milestones, NCR's or RFI's (design changes).</p>
<p><b><u>Senior CQA Site Representative</u></b></p> <p>Qualifications: Engineer (B Eng) or Technologist (Grad Dip) or equivalent Geosynthetic Certification Institute – Inspectors Certification (GCI-ICP) or approved equivalent</p> <p>Experience: min 5 years' experience, min 5 projects, min 500,000m<sup>2</sup> project size requiring Geosynthetics installation</p> <p>Responsibility: Responses to site queries on day to day issues as representative of the CQA Engineer, prepare/review draft response to Request For Information (RFI) raised by contractor for approval by Certifying engineer, prepare/review draft action/response to Non Conformance Report (NCR) for approval by Certifying engineer</p> <p>Office based, Regular/periodic site visits, or site based</p>
<p><b><u>CQA Site Representative</u></b></p> <p>Qualifications: Graduate Engineer (B Eng) or Technologist (Grad Dip) or Qualified by Experience Geosynthetic Certification Institute – Inspectors Certification (GCI-ICP) or approved equivalent</p> <p>Graduate engineer - experience: min 2 projects, min 50,000m<sup>2</sup> project size requiring Geosynthetics installation</p> <p>Technologist - experience: min 4 projects, min 100,000m<sup>2</sup> project size requiring Geosynthetics installation</p> <p>Qualified by Experience: min 15 projects, min 750,000m<sup>2</sup> project size requiring Geosynthetics installation</p> <p>Responsibilities: Monitors the works on site and records daily progress and Responds to daily issues.</p> <p>Site based</p>