



TECHNICAL ADVISORY NOTE: COST CONTAINMENT FOR BARRIER SYSTEMS

1. Introduction

There needs to be a clear separation of roles and responsibilities between the designer and the regulator. This is emphasised particularly in forensic analysis following geotechnical structure failures such as of a tailings dam (Morgenstern et. al. 2015). The reliance on observational methods and government inspections alone is inadequate to avoid many an incident, because no amount of inspection will reveal the hidden flaws. Hence further actions may be prescribed from time to time. Nevertheless, it is axiomatic that the regulator cannot regulate its own activities, and if the regulator were to usurp the role of the designer it would usurp its own role. Thus reviews result in an assessment of acceptability, whereas the designer is responsible for the approval of reports and drawings.

Nevertheless, the responsibility for cost effectiveness and socio-economic impacts may extend beyond the role of the design engineer or be influenced by the engineer's decisions. The following advice is thus provided without prejudice for the benefit of role players in the industry.

2. Legislation

It is recommended that the applicant and his/her agents are familiar with all pertinent legislation for the particular license application, however, particular attention is given to inter alia the following regulations in respect of cost control measures:

- The Public Finance Management Act, Act 1 of 1999 as amended (PFMA)
- Competitions Act, Act 89 of 1998
- Prevention and Combating of Corrupt Activities Act, Act 12 of 2004 (PCCAA)
- Broad Based Black Economic Empowerment Act, Act 53 of 2003 as amended by Act 46 of 2013
- Treasury Regulations for departments, constitutional institutions and public entities issued in terms of the PFMA 1999, April 2001 (Treasury Regulations)
- Engineering Professions Act, Act 46 of 2000, Board Notice 41 of 2017 (ECSA BN 41 of 2017)
- Engineering Professions Act, Act 46 of 2000, Board Notice 138 of 2015 (ECSA BN 138 of 2015)
- Technical Advisory Note: Specialist reports on civil design in support of water use, waste management and/or mining license applications, February 2019
- Technical Advisory Note: Capping closure of waste management facilities and pollution point sources, January 2019

3. Cost containment through competitive practices

The intention is to note the development of recent practices in containment barrier design and construction projects which are believed to be anti-competitive and have an element of corruption which has a negative impact on both the environment and business practices. It is in response to these practices that legal guidance is sought with intent to rectify such practices, albeit through criminal prosecution and/or approaches to the relevant ombudsman. There is however a duty on the State and its officials in respect of developments by Organs of State.

The competent authorities for waste management and water use licensing are the Department of Environment Affairs and the Department of Water and Sanitation respectively. Both State departments are bound to cooperation, (the Constitution of the Republic of South Africa, Act 36 of 1996, sections 41 (g) and (h) and the National Environmental Management Waste Act, Act 59 of 2008, sections 44 and 49) and they employ the National Environmental Management Waste Act Regulations of 2013 for assessing waste or pollutant source and the commensurate pollution control barrier standards.

These regulations known as NEMWA Regulations 2013 R636 national norms and standards for waste disposal by landfill prescribe the use of geomembranes and allow the use of other geosynthetic materials as replacements for natural materials provided equivalent performance has been demonstrated. (Please see NEMWA R636 regulation 3(2)(d)). This regulation also requires license applicants to submit signed design reports and drawings (by an ECSA registered person) in support of a license application, and include a Construction Quality Assurance (CQA) plan for implementation during construction.

The alternative materials include possible use of different geomembranes, geotextiles, geosynthetic clay liners (GCLs), geodrains and geocells. Alternative materials are not necessarily required, nor the cheapest option, if suitable natural materials occur on site. License applications often exclude geotechnical evaluations of available materials which meet prescribed performance specifications in favour of geosynthetic products. License applicants should insist the engineer demonstrate cost effectiveness of the design, or have an external audit to identify such oversight, accidental or intentional, by the designer.

For years the industry has attempted to specify performance; however, where products brands have been specified, professional engineers have included words such as “or equal”, “or equivalent”, “or similar”. The Geosynthetic Interest Group of South Africa published a newsletter article to this effect in November 1999 on its front page (GIGSA newsletter, November 1999 *Fairness Associated with Specifications*).

This approach for fair and competitive behaviour in the engineering industry is carried through in more recent legislation. The purpose of modern legislation is to promote and maintain competition in the Republic of South Africa, for efficiency adaptability and development of a country, to provide consumers with competitive prices and product choices, and to promote employment and advance the social and economic welfare of South Africans.

There is a growing perception, if not reality, of alignment between players in the industry. This may be through the over specification or exclusionary specifications of the consulting engineer targeting a particular product or product supplier. The practice has further developed in which product suppliers have preferential or exclusive supply relationships to installation contractors. The implications are that an applicant's ability to get a fair competitive price for a waste management facility is placed in the hands of the consultant who through specification is actually specifying the contractor and controlling the price rather than the facility performance.

Restrictive horizontal practices and restrictive vertical practices address agreements between firms or associations of firms and are prohibited if competition is lessened unless it can be shown that competition is improved and/or technical advantage outweighs restriction. Similarly it is prohibited to directly or indirectly fix a trading condition; divide markets; and collude in tendering. (Competitions Act, Act 89 of 1998).

The abuse of dominance by a firm is prohibited, such as to charge an excessive price to the detriment of consumers, to refuse a competitor access to an essential facility when it is economically feasible to do so, to engage in an exclusionary act unless the technical advantage or pro-competitive benefit can be shown to outweigh the anticompetitive effect. (Competition Act, Act 89 of 1998, section 8). Such outlawed acts include requiring or inducing a customer or supplier to not deal with a competitor; refusing to supply scarce goods to a competitor; and/or selling goods or services on condition that the buyer purchases separate goods or services unrelated to the object of a contract. This applies to all business in South Africa, public and private.

It is understood that all state owned entities and government departments are also required to comply with the Public Finance Management Act, Act 1 of 1999, Treasury Regulations, and the Treasury Guidelines in respect of those regulations.

The guidelines state on page 27 clause 3.4.2:

“Specifications should be based on relevant characteristics and/or performance requirements. References to brand names, catalogue numbers, or similar classification should be avoided. If it is necessary to quote a brand name or catalogue number of a particular manufacturer to clarify an otherwise incomplete specification, the words ‘or equivalent’ should be added after such reference. The specification should permit the acceptance of offers for goods which have similar characteristics and which provide performance at least equivalent to those specified. The quality of the goods/services required should, however, not be over-specified to the extent that it will be impossible or others to offer such a product.”

Furthermore on page 36 thereof a table addressing the use of brand names is explicit in repeating the previously quoted clause 3.4.2.

Hence it is clear that the over specification to preclude other competitive product suppliers is unacceptable, as is the use of brand names without allowing alternative products of equivalent performance for organs of state.

In tender documents for both public and private entities, some engineers specify materials such as geomembranes and GCLs and geosynthetic drainage layers to the extent that only a single producer can supply such materials. Consideration of local natural materials and local construction and manufacturing is not addressed in design reports.

There is a duty upon all officials in a department, trading entity, or institutional institution to take effective or appropriated steps to prevent any unauthorised expenditure, irregular expenditure and fruitless or wasteful expenditure. (PFMA section 45).

Thus, for all organs of State, it is appropriate for CFOs to instil a practice of auditing specifications in waste containment facilities, where product specifications deviate from regulatory norms and standards. Similarly, it is good practice for the private sector waste management facility(WMF) license holder to have design reports, drawings and tender documents audited or reviewed by a party independent of the design engineer and without vested interests of any sort to review such, specifically for the purpose of cost effectiveness.

It is noted that the definition of corrupt activities provided in the prevention and combating of corrupt activities act includes, *to act or not act*, in a variety of ways. (PCCAA sections 2, 3 and 4).

The over specification of physical attributes of a textured geomembrane within the past 10 years with intent to exclude a particular form of texturing has led to failures of the geomembrane supplied by both an alternative and the intended manufacturer as shown in Figure 1. Such failures could have been avoided by identifying the interface shear strength requirements for the projects. Similar failures have occurred in chemical resistance parameters when deviating from international standards in pursuance of a particular product not readily available on the domestic or world market, and at higher cost than materials compliant with standard specification.



Figure 1: Geomembranes manufactured to ISO 9001 but shipped and revealed deviations from performance during construction (a) Separation in plane adjacent to wedge welds and (b) Discontinuities in texturing and thickness to the extent of manufactured holes.

An over specification of geotextile cushion layers by way of physical parameters when included in a design (be it the product specification or CQA component addressing construction quality control or similar) has similarly led to substandard performance in strain limitation. Such incidents can be avoided by specifying the performance requirement of the product such as to limit the total geomembrane strain to less than 3% for the project particular loading conditions listed in the design criteria at concept stage (see ECSA BN 138 of December 2015 section 3(2)).

The unnecessary deviation from standard specifications for manufactured materials may also lead to higher cost imported products to the detriment of South African manufacturing and objectives of broad based black economic empowerment.

4. Recommendations

Client review of design: The review of a design report, drawings and associated documentation on behalf of the project owner by a registered person independent of the design engineer, potential contractors and specialist geosynthetic installers as well as product suppliers, for the specific purpose of identifying cost saving practices and illuminating anti-competitive practices is advisable.

Performance specifications: Construction materials should comply with standard specifications and performance specifications, rather than rely on the over specification of attributes of a particular brand of product.

Deviation from standard specifications: All deviations from standard specifications should be declared in the design report, and their performance should be justified quantitatively following a technical evaluation. Furthermore, such deviations from standard specification should be signed-off as essential by the design engineer with the concurrence of the owner or in the case of organs of State the Chief Finance Officer for that institution.

Construction Quality Assurance (CQA) plan details: The CQA plan should be explicit on independence of the CQA officer for the project who should declare all interests in the industry and demonstrate independence from the designer, construction and geosynthetic suppliers and installers. Furthermore, the design drawings shall overrule any constraining brand or over specification not identified in the design drawings.

Provisional sum for performance assessment at the owners discretion: It is often good practice for the owner to include a provisional sum within the design and procurement documentation to make provision for evaluation of materials and oversight performance entirely independent of the engineer, contractor, specialist contractors and material suppliers. (Such tests may include differential scanning calorimeter (DSC) evaluation of a geomembrane specimen; an evaluation or separation in plane (SIP) of a geomembrane, an assessment of bentonite modification in a GCL; an assessment of geotextile joint residual strength, an electric leak location survey of part of a facility, or similar.)

Record keeping: Design and construction records, including topographical surveys and methodical materials test results (on all materials used) including representative samples, shall be maintained and archived and accessible for the life of the facilities (including decommissioning).