



TECHNICAL ADVISORY NOTE: SPECIALIST REPORTS ON CIVIL DESIGN IN SUPPORT OF WATER USE, WASTE MANAGEMENT AND/OR MINING LICENSE APPLICATIONS

1. Introduction

This document is made available to persons seeking guidance on the compilation of technical design reports in the field of engineering as contemplated in water use, waste management, and/or mining license application legislation. It is intended to aid persons who seek improved knowledge or experience in the field of technical design report requirements without detracting from specialist skills; however, it is not intended to be an all embracing definitive guide, as each development may have its own unique attributes. This guide is provided without prejudice and neither the Department nor its employees can be held accountable for the neither use thereof, nor consequences therefrom.

2. Legislation

It is recommended that the applicant and his/her agents are familiar with all pertinent legislation for the particular license application with particular attention given to inter alia the following:

(a) The Constitution of the Republic of South Africa, Act 36 of 1996

- Chapter 2 – the Bill of Human Rights
- Section 42 on cooperative governance

(b) National Environmental Management Act, Act 107 of 1998

- Section 2 addressing principles to be applied by decision making authorities throughout the RSA, and section 30 addressing emergencies
- NEMA Regulations 2014 R983, R984, and R985 on Impact Assessment Regulations and associated listing notices

(c) The National Water Act, Act 36 of 1998

- Preamble, section 1, 2 and 3 addressing definitions, purpose of act and public trusteeship of the nation's water; section 19 addressing pollution control; section 21 on water uses and section 27 addressing factors to be taken into consideration of a general authorisation or license application

- Regulation R. 267 of 24 March 2017 Regulations regarding the procedural requirements for water use licence applications and appeals, noting Appendix D
- Regulation GN 704 of 4 June 1999, Regulations on use of water for mining and related activities aimed at the protection of water resources
- Regulation 665 of 6 September 2013 Revision of general authorisations in terms of section 39 of the Act
- Regulation 139 of 24 February 2012, National Water Act (36/1998): Regulations: Safety of dams
- DWS Integrated Water Resource Planning for South Africa, A synopsis of the situation for key systems: 2010
- DWS Legal Services Circular No. 1 of 2017, the application of the NWA section 25

(d) The National Environmental Management Waste Act, Act 59 of 2008

- NEMWA sections 44 on cooperation, 48 on factors to be taken into consideration, 59 on criteria for fit and proper persons, 65 on compliance powers of the Minister of Water Affairs and 74 on exemption requirements
- NEMWA Regulations 2013, R634, R635, R636 Norms and Standards
- NEMWA Regulation R632 of 24 July 2015, Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation
- NEMWA Regulations 990 of 21 September 2018, Amendments to the regulations regarding the planning and management residue deposits and residue stockpiles, 2015

(e) Other Legislation

- Engineering Professions Act, Act 46 of 2000 and Rule 41 of 2017 addressing the Code of Conduct for registered persons
- The Competitions Act, Act 89 of 1998, sections 4, 5, 7 and 8
- The Prevention and Combating of Corrupt Activities Act, Act 12 of 2013 sections 2, 3 and 4
- Harassment Legislation

3. Technical Design Report Considerations

When considering technical design reports, it is the responsibility of the applicant to demonstrate compliance with at least the above legislation and principles.

The following guidance in respect of standards is provided to assist with efficient technical design report compilation and review of civil designs and associated drawings. It is noted that the DWS responsibilities are primarily in service of the principles of equity and sustainability of water resources management, and is consistent for the lead authorities of water licensing, waste management licensing, and mining licensing. It is thus recognised that while water uses are diverse, there is a commonality between organs of state in respect of pollution control.

(a) Water abstraction

The beneficial and efficient use of water is taken into consideration during license application reviews. Although the infrastructure associated with abstraction is occasionally related to run of river in which case the NWA 21 *c & i* water uses would be integrated into the consideration of the pump station/weir/abstraction works or similar design, the infrastructure associated with boreholes is not usually subject to civil design review and should not be confused with mine open pit dewatering. Nevertheless the volume and rate of abstraction from a source is to be noted along with the volume and rate of return to same or other source, with water accounting of inputs and outputs.

(b) Water Storage

Dams not required to comply with the dam safety legislation shall demonstrate compliance with the principles of dam engineering as described in the “design of small dams” USBR as amended, with particular attention to filters at points of intersection between soil and outlet works etc. Such filters should comply with the Sherard Criteria for critical filters to cohesive clays as published in 1989. The technical design report and drawings shall reflect the outlet works detail and mechanisms for Reserve releases.

(c) Instream Use (altering the beds, banks, or characteristics of a river, or impeding or diverting flow)

In the case of bridges crossing over a water course: the approach taken by CD: Engineering Services in respect of reviewing technical design reports and drawings submitted under the signature of a registered person is to ascertain compliance with norms and standards of the profession. In the case of a public road or private road used by the public, the license application/holder is expected to submit a signed technical design report and drawings by a registered professional Engineer (Civil) demonstrating the design and construction compliance with the SANRAL Drainage Manual and conditions of environmental authorisation. In particular, your attention and that of the Engineer is drawn to Chapter 8 thereof.

Before the technical design report and drawings are reviewed, please forward the road classification in accordance with TRH 26 “South African Road Classification and Access Management Manual”. A copy of the written classification by the applicable road authority (Northern Cape) should be forwarded as that sets the standard for design, warnings, cautions and monitoring, let alone erosion protection upstream and downstream

In the case of pipelines crossing a water course other than by road bridge as above: the approach taken by Engineering Services is to consider the material within the pipeline and limit the water resource exposure to that risk. Hence, all pipeline designs shall be checked for buoyancy, and pipelines conveying substances which are a potential pollutant such as sewage or fuel shall also have designs that demonstrate resistance to erosion or other damage when exposed to floods up to 1:100 year recurrence interval, and shall not have valves, inspection eyes, manholes

or similar below the 1:100 year flood level. Such pipeline specifications shall demonstrate durability for the license period, embedding or doweling to rock foundations or equivalent performance and have operational phase sensors for shut down in the event of a rupture or spill.

(d) Engaging in a stream flow reduction activity

There are usually no civil works associated with this water use.

(e) Engaging in a controlled activity

Such activities are rare and unique, hence site specific guidance will be provided by the DWS through the Case Officer on standards other than those listed in this document.

(f) Over and above the standards referenced for other uses, the water quality standards of the water to be discharged shall comply with the DWS general discharge standards, or special standards as per regulations, or as prescribed by the water use license authorisation advisory committee. In all cases the discharge infrastructure shall mitigate erosion effects to at least the standard set by the SANRAL Drainage Manual 2015 as amended, and the infrastructure shall be stable against floods for up to the 1:100 year event.

(g) Disposing of waste in a manner which may have a detrimental effect on a water resource

This water use as well as the NWA section 19 pollution control standard is considered to be the same performance standard as referenced in waste and mining legislation, with the understanding that the means by which the containment performance is achieved for water conservation and/or pollution control may vary according to the nature of the liquid contained and water resource strategy applicable to the development under consideration.

It is noted that the use of the Minimum Requirements 1998 Volume 1 for site classification was inappropriate, as the NEMWA Regulations 2013 supersede waste classification, and similarly the Minimum Requirements Volume 2 has been supersede in part by NEMWA R636 overriding the Appendix 8 of Volume 2.

The historic Minimum Requirements developed from a philosophy in the 1980s which believed that in water deficit areas no leachate would be produced, and that in water surplus areas we could rely on attenuation largely as the mitigation measure, as written up by JM Ball, 2002. From the outset it was recognised that attenuation as mitigation of pollution dilution and dispersion was not a very reliable measure, which has become evident with many general waste (be they municipal, ash, or mining) sites in both water balance deficit and water balance surplus areas.

The 1998 change in legislation requires pollution to be avoided and the polluter to pay through principles in the National Environmental Management Act Section 2 and the National Water Act section 19.

After several years of public consultation the NEMWA Regulations 2013 came into effect, with a transitional period of 3 years which has now lapsed. Thus all waste sites are now required to comply with these norms and standards. The reader's attention is drawn to NEMWA R636 regulation 3(2) as the requirements of a technical design report. Alternative materials may be used to partially or totally replace elements within the barrier system provided performance is not compromised, and some guidance can be extracted from pertinent literature.

If the applicant is an Organ of State, the designer should also be aware of the Treasury Regulations in respect of avoiding over specifying products and the use of brand names. Irrespective of client, the Competitions Act controls on alignment and anti-competitive practices should be noted and implemented in the design. Thus several SANS and GRI standards are listed for your convenience. Please note that the SANS 1200 series is most commonly used for civil engineering construction of small earthworks and concrete works and includes guidance on Bills of Quantities. Accepted standard specifications include:

- SANS 1526 (2015) for geomembranes which reference the latest amendments to GRI GM13 for HDPE and GM17 for LLDPE geomembranes, as well as GM14 and GM20 on frequency of welding conformance testing.
- SANS 10409 as amended for geosynthetic material installation
- GRI GM19 for geomembrane seams
- GRI GCL3 for geosynthetic clay liners
- GRI GT12(b) for geomembrane protection or as cushion geotextiles
- GRI GN2 and GC3 for geonet or geocomposite drainage layer overlaps

In respect of the particular waste site, please note the National Waste Management Strategy 2012 goals in section 2.6 and standards referenced in section 3, as well as the NEMA principles – thus for cost effective use of resources (financial and human) and compliance with NEMA Principles of impact avoidance or where an impact is unavoidable it should be minimised and mitigated.

The design of a new Cell of a WDF needs to take into consideration both the geology, geohydrology and geotechnical characteristics of the foundations as well as the proximity of surface water resources defined by the 1:100 year floodline and wetlands with a 500m buffer zone.

The WDF capping would be defined by the pollution potential of the waste, and the probable or measured impact on the groundwater at site taking the baseliner performance into consideration. A technical advisory note to this effect can be found on the Department of Environment Affairs website: <http://sawic.environment.gov.za/documents/9707.pdf>

Please note the technical design report requires particular aspects to be addressed amongst others which include quantification of service life, determination of expected and action leakage rates, address of drainage systems showing their function at atmospheric pressure throughout the operational life, demonstration of equivalent performance of alternative materials and inclusion of materials compatibility with waste assessment, as well as the construction quality assurance (CQA) that is to be used to achieve the above performance, including stability. There are several references in this regard and training courses available, including on-line.

An applicant may also wish to consider the use of ASTM standards in some cases such as ASTM D7007 for assessing durability if unique or peculiar waste and leachate is anticipated, or ASTM standards for electric leak location surveys such as the Dipole method (bearing in mind that the design should incorporate construction specifications to accommodate this efficient assessment).

It is advisable for the applicant to acquire an internal review from a person with skills and experience in this field of geo-environmental technology application so as to avoid waste disposal facility design pursuing an excessive use of geosynthetic alternatives without substantiation.

While the department can give technical assistance it would be improper or unethical for the regulator to become over involved in the design as there needs to be a clear separation of roles and responsibilities. (Please see the ECSA Board Notice 41 of 2017 Rules 3.2 (b) and (f), and Rule 3.5 (e) amongst others.)

(h) Disposing of elevated temperature water

The effect of elevated temperature on biodiversity and containment barrier service life assessment, as applicable, should be recorded.

(j) Removing or discharging of underground water

This use is addressed under section 21a, with particular focus on the water quality and water use accounting.

(k) Recreational Use of Water

The DWS guidelines on sustainable utilisation planning for recreation should be fulfilled, with a primary consideration for public safety. The public safety aspect should take into consideration water quality and variation in water quantity, such as water surface elevation in reservoirs and flood events or sunny day releases into water courses.

4. Recommended references to address technology

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