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AMENDED ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

for

Strengthening and Raising of the Clanwilliam Dam and Associated Re-alignment of certain Secondary Roads, Clanwilliam

Report No : 23011-46-Rep-002

Submitted to:

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Development Planning
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DOCUMENT APPROVAL

ACTION	DESIGNATION	NAME	DATE	SIGNATURE
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Reviewed/ Approved	Project Manager	Dr. Mathys Vosloo	03.12.2025	

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Acronym	Description
BPEO	Best Practicable Environmental Option
CA	Competent Authority
DMRE	Department of Mineral Resources and Energy
DFFE	Department of Fisheries, Forestry and the Environment
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (73 of 1989)
ECO	Environmental Control Officer
ECF	Environmental Consultative Forum
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme (in terms of the NEMA)
EMP	Environmental Management Plan (in terms of the MPRDA)
EO	Environmental Officer
EWR	Ecological Water Requirement
HIA	Heritage Impact Assessment
I&AP	Interested and Affect Party
MPRDA	Mineral Petroleum Resources Development Act (28 of 2002), as amended
NEMA	National Environmental Management Act (107 of 1998), as amended
NWA	National Water Act (36 of 1998)
OHS	Occupational Health and Safety
PM	Project Manager
PSP	Professional Service Providers
RE	Resident Engineer
RoD	Record of Decision
S&EIR	Scoping and Environmental Impact Reporting
SEF	Safety Evaluation Flood
SHE	Safety, Health and Environment
WCDEADP	Western Cape Department of Environmental Affairs and Development Planning

GLOSSARY OF TERMS

Term	Description
Best Practicable Environmental Option	Best Practicable Environmental Option means the option that provides the most benefit or causes the least damage to the environment as a whole at a cost acceptable to society in the long term as well as in the short term.
Environment	Environment means the surroundings within which humans exist and that are made up of – (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Pollution	Pollution means any change in the environment caused by - (i) substances; (ii) radioactive or other waves; or (iii) noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
Environmental Aspect	Element of an organization's activities or products or services that can interact with the environment.
Environmental Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
Interested and Affected Party	Interested and Affected Party for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v) of the NEMA and which includes - a) Any person, group of persons or organisation interested in or affected by such operation or activity; and b) Any organ of stale that may have jurisdiction over any aspect of the operation or activity.
Environmental Assessment Practitioner	Individual responsible for the planning, management, coordination or review of Environmental Impact Assessments, Strategic Environmental Assessments, Environmental Management Programmes or any other appropriate environmental instruments introduced through regulations.

1 INTRODUCTION

The Department of Water and Sanitation (DWS) (previous Department of Water Affairs) ~~intend to proceed with~~ commenced with the implementation of the Strengthening and Raising of the existing Clanwilliam Dam Project (hereafter referred to as the ~~proposed~~ project) in June 2014. The mandatory Environmental Authorisation Process for the ~~proposed~~ project was concluded with the granting of Environmental Authorisation (EA) (previously termed as a Record of Decision) by the Western Cape Department of Environmental Affairs and Development Planning (WCDEADP). The ~~proposed~~ project was prompted by the opportunity to increase the water-yield of the existing Clanwilliam Dam brought by the necessity to conform with the dam safety requirements stipulated in Chapter 12, Section 123 of the National Water Act (36 of 1998) (NWA) and regulations thereunder. The projected marginal cost of raising over and above the cost of strengthening the dam wall, is such that the raising is considered as economically viable, socially desirable and environmentally acceptable. The Clanwilliam Dam is an existing impoundment structure (see Figure 1) and was constructed in 1935 prior to the coming into effect of the National Environmental Management Act (107 of 1998) (NEMA), the NWA as well as Specific Environmental Management Acts such as the National Environmental Management: Waste Act (59 of 2008) (NEMWA). Structural changes made to the Clanwilliam Dam to date include raising the dam wall with the addition of 13 crest gates and through the use of pre-stressed cables. The Clanwilliam Dam Wall is 43 meters high and the dam has a storage capacity of 124 million m^3 which will be increased to 364 million m^3 with the ~~proposed~~ raising of the dam wall.

The activities required for the Strengthening and Raising of the existing Clanwilliam Dam fall within the ambit of the National Environmental Management Act (107 of 1998) and as such require EA before the activities can proceed. The Environmental Impact Assessment carried out for the ~~proposed~~ project was initiated during November 2004, prior to promulgation of the NEMA Environmental Impact Assessment Regulations 2010, as such the EIA Process for the ~~proposed~~ project was carried out in accordance with the EIA regulations (R.1183[1]) promulgated in in terms of the Environment Conservation Act (73 of 1989) (ECA). EA for the ~~proposed~~ project was granted by the WCDEADP on 12 May 2009, allowing the ~~proposed~~ project to be implemented. In correspondence dated 22 February 2010 sent by the Western Cape Minister of Local Government to the DWS, it was indicated that the aforementioned appeal had been dismissed by the Western Cape Minister of Local Government based on the grounds that the Minister was satisfied that the Competent Authority took an informed decision when granting the EA, and therefore upheld the initial EA granted. All conditions provided in the initial EA, except for the amendment of Section J (Duration and Date of Expiry) are therefore still binding.

Prior to the implementation of the Construction Phase a number of conditions provided in the EA must be met including revising the DWS' generic Environmental Management Programme (EMPr) to ensure that the document is project specific and all EA Conditions are incorporated. The DWS generic EMPr was amended in 2015 by inclusion of specific information required in terms of Condition 23 of the RoD. The site-specific EMPr was approved and implemented since the start of construction.

[1] Environment Conservation Act (73 of 1989) Regulations regarding activities identified under Section 21(1). 1997. (Notice 1183). *Government gazette.* 8261:1, 5 Sept.

1.1 Purpose of the Environmental Management Programme

The application of the EIA Process, for the ~~proposed~~ project, served as a pre-decision making Environmental Management Tool for determining and evaluating the significance of the environmental consequences that the implementation of the project activities will have. The environmental consequences (i.e. environmental impacts) and mitigation measures formulated to manage these impacts informed the conditions provided in the EA and consideration of the Application by the WCDEADP. Managing the environmental consequences through preventing or reducing the significance thereof lies in the implementation of the mitigation measures.

The mitigation measures provided in the Environmental Impact Report (titled "Proposed raising of Clanwilliam Dam and associated realignment of affected roads Final Environmental Impact Report") dated September 2007, have been translated into enforceable EA Conditions and have been incorporated into this EMPr. This document serves as the Revised EMPr for the ~~proposed~~ Strengthening and Raising of the existing Clanwilliam Dam Project. Furthermore the EMPr is intended to achieve the following primary objectives:

- Conform to the information requirements stipulated in Regulation 33 of the NEMA EIA Regulations 2010 (Government Notice R.543)
- Ensure that environmental management practices are tailored to the site specific conditions and are implemented throughout the project lifecycle;
- Ensure that the conditions provided in the EA are translated into management actions, and to report on the measures that have been taken to comply with the EA Conditions;
- Conform to Condition 23 of the EA issued by the WCDEADP for the ~~proposed~~ project;
- Ensure that all reasonable measures are taken to prevent the realisation of adverse environmental impacts; and
- Ensure that all mitigation and management measures provided in this EMPr are implemented.

1.2 Amendment of the Environmental Management Programme

Since commencement of construction in 2014, a number of recurring non-compliances in terms of the existing RoD and site-specific EMPr were raised by the Environmental Control Officer (ECO) appointed to monitor the compliance of DWS and its contractors during the construction phase of the Clanwilliam Dam raising project. During this time, DWS reassessed it's ability to comply with the conditions resulting in the recurring non-compliances. It was concluded that some of the conditions were too onerous and went beyond the scope of the construction impacts. DWS initiated engagements with the WCDEADP to resolve these issues, and it was concluded that some of the conditions should be amended in order to make compliance with these conditions achievable.

DWS commissioned Zitholele Consulting to undertake an application for amendment of the existing Record of Decision (RoD) issued under the Environmental Conservation Act or 1989 to the Competent Authority to amend some conditions of the RoD. The application further included amendment of the existing EMPr to align the EMPr with the amended Environmental Authorisation and to bring the EMPr in line with the 2014 EIA Regulations (GN R.983), as amended, which is the current legislative regime enforced in South Africa.

1.3 Particulars of the Environmental Assessment Practitioner

In keeping with the requirements of Condition 23 of the EA granted by the WCDEADP for the ~~proposed~~ project, Tlou Integrated Tech (referred to as "Tlou") were appointed by the DWS to update and refine the DWS' Generic Environmental Management Plan which was submitted with the initial EIA Application. In its team of professionals, Tlou has included members from Zitholele Consulting to look at the specialist component of the project. The overall details and competencies of the project team members who contributed towards and were instrumental in preparing this EMPr is provided in Table 1-1.

Table 1-1: Details of Project Team Members

Team Member	General responsibilities	Qualifications	Core competencies under this framework appointment
Ms. Isabel Radebe	Professional Staff – Project Management	Registered Pr Tech Eng. and Post Grad. Dipl in Business Management from University of Johannesburg and University of Natal.	EIA Project Manager, Review of deliverables, EIA Project and financial management, Client Liaison, EIA reporting, Management of specialists.
Dr Mathys Vosloo	Professional Staff - Environmental Assessment Practitioner	Ph.D. - Zoology (Nelson Mandela Metropolitan University, 2012). SACNASP, Pr Sci.Nat registered	EIA Project Manager, Review of deliverables, EIA Project and financial management, Management of GIS, Client Liaison, Technical reporting, Management of statutory processes and risk assessment.
Mrs Shandré Laven	Professional Staff - Environmental Assessment Practitioner	BSc Homs. – Environmental Science (North West University, 2009). SACNASP, Cand.Sci.Nat. registered	Technical reporting, Management of statutory processes and risk assessment.

All existing feasibility, preliminary design, Ecological Water Requirements (EWR), and EIA documents were used to prepare this EMPr. These documents were provided by the project proponent upon the appointment of Tlou Integrated Tech. The conditions provided in the EA called for the development of mitigation measures aimed at protecting groundwater resources and the appointment of a Heritage Expert to assist with the recording of heritage resources and implementation of mitigation measures.

1.4 Particulars of the Environmental Assessment Practitioner

Details of the Zitholele Consulting team that undertook the amendment of the EMPr is provided in Table 1-2.

Table 1-2: Environmental Assessment Practitioner team that undertook the amendment

Team Member	General responsibilities	Qualifications
Ms. Natasha Lalie	Environmental Assessment Practitioner	MSc. Environment and Society Registered Environmental Assessment Practitioner (EAP) with Environmental Assessment Association of South Africa (EAPASA) Reg No. 2021/3611, *Pr.Sci.Nat*: 124589)
Mr. Tshepo Masuoane	Environmental Control Officer and Assessment Practitioner	BSc. (Hons) Energy, 2023, University of Johannesburg BA. (Hons) Environmental Management and Geography, 2017, University of Free State - Bloemfontein BA. Geography), 2015 University of Lesotho
Dr Mathys Vosloo	Project Manager and Environmental Scientist	Ph.D. - Zoology (Nelson Mandela Metropolitan University, 2012). SACNASP, *Pr Sci.Nat*: 400136/12

1.5 Document Roadmap – Rationale for Document Structure

The regulations promulgated under the ECA which related to EIA did not make any provision for the inclusion or contents of an Environmental Management Plan in the submissions made to the Competent Authority (CA). However, upon request from the WCDEADP a generic EMPr was included in the EIA documentation. Although the Environmental Impact Assessment (EIA) process for the ~~proposed~~ project was carried out in accordance with the EIA regulations (R.1183) promulgated in in terms of the ECA this EMPr has been structured to conform to the requirements provided in Regulation 33 of the NEMA EIA Regulations 2010. Furthermore Condition 23 provided in the EA included the requirement to submit a revised EMPr which has been amended to incorporate the final detailed designs and to update and refine DWS' Generic EMP that was submitted to the WCDEADP as part of the final EIR submission.

1.5.1 Content of EMPr – Regulation 33 of NEMA EIA Regulations 2010

Specific provisions which are included in Regulation 33 of the Environmental Impact Assessment (EIA) Regulations 2010 (R.543[2]) relating to the contents of an EMPr is provided in Table 1-3. It should be noted that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. Non-compliance to environmental law is a criminal offence and if prosecuted DWS will be liable for any environmental damage incurred.

[2] South Africa. 2010. National Environmental Management Act, 1998 (Act No. 107 of 1998) Environmental Impact Assessment Regulations, 2010. (Notice 543). *Government gazette* 33306:3, 18 June

Table 1-3: Document Roadmap

DOCUMENT ROADMAP		
Regulation 33 of the EIA Regulations (2010)	**Description of Regulation**	**Relevant chapter of document**
Regulation 33(a)	details of – (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Part 1.2
Regulation 33(b)	information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of— (i) planning and design; (ii) pre-construction and construction activities; (iii) operation or undertaking of the activity; (iv) rehabilitation of the environment; and (v) closure, where relevant.	Part 6
Regulation 33(c)	a detailed description of the aspects of the activity that are covered by the draft environmental management programme;	Part 6
Regulation 33(d)	an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	Part 4
Regulation 33(e)	proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;	Part 7 Part 8
Regulation 33(f)	as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;	Part 6.17
Regulation 33g)	a description of the manner in which it intends to— (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; (iii) comply with any prescribed environmental management standards or practices; (iv) comply with any applicable provisions of the Act regarding closure, where applicable; (v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Part 8
Regulation 33(h)	time periods within which the measures contemplated in the Environmental Management Programme must be implemented;	Part 6 Part 7 Part 8
Regulation 33(i)	the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;	Part 8.5

DOCUMENT ROADMAP		
Regulation 33 of the EIA Regulations (2010)	**Description of Regulation**	**Relevant chapter of document**
Regulation 33(j)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;	Part 8.1
Regulation 33(k)	Where appropriate, closure plans, including closure objectives.	Not Applicable

1.5.2 Amendment of the EMPr and ROD

DWS has identified a number of proposed amendments to the exiting RoD (EA) and EMPr based on the review of the Department's ability to comply with recurring non-conformances raised during construction, careful consideration of the scope of certain conditions of the exiting RoD (EA) and engagements between DWS and the WCDEADP.

1.5.3 Methodology

Zitholele reviewed and updated the existing EMPr in line with the following:

- To comply with the latest EIA regulations (2014, as amended) and other applicable environmental legislation and regulations;
- Amend specific clauses in the existing EMPr in relation to the conditions of the RoD that will be amended; and
- Propose and include additional impact management actions and mitigation measures in order to improve protection of specific environmental aspects, e.g. wetlands downstream of the Clanwilliam Dam wall.

The amended EMPr will comply with the requirements of Appendix 4 of the EIA regulations, 2014 and will be subjected to public participation and review.

1.5.4 Incorporation of EA Conditions

Where the management and mitigation measures provided in this EMPr serves to conform and respond to a specific condition provided in the EA, it will be indicated as such.

2 PROJECT DESCRIPTION

2.1 Project Background and Description

The Clanwilliam Dam was built in 1935 and is situated on the Olifants River adjacent to the N7 in close proximity to the town of Clanwilliam in the Western Cape Province of the Republic of South Africa. Dam safety investigations concluded that the Clanwilliam Dam requires remedial work for dam safety reasons. Specific concerns were related to the effectiveness of the pre-stressed cables (possibly) having lost their shear resistance ability and the problem with alkali-aggregate reaction on the surface of the existing structure. As a result, the hazard and risk levels for the dam fall within an unacceptable range according to DWS dam safety standards.

The Department of Water Affairs has received a conditional EA for the raising of the existing Clanwilliam Dam by 13 m from 43 m to 56 m on 12 May 2009.

The EA for the dam raising requires that a comprehensive and detailed Environmental Management Programme (EMPr) for minimising and mitigating impacts be compiled and approved prior to the start of construction. The ~~proposed~~ strengthening and raising of the Clanwilliam Dam Wall will entail the following overarching project activities:

- The strengthening of the dam wall by the addition of a concrete apron on the downstream face of the wall and adding additional concrete on the crest and downstream face;
- Raising the dam wall height from 43 meters to 58 meters, thereby increasing of the net storage volume of the Clanwilliam Dam with 240 million m^3/a;
- Upgrading the dam to accommodate the reserve release requirements, which will include the construction of a multi-level intake structure on the upstream face of the dam wall, which will include drilling and cutting through the existing dam wall, accommodating the existing mini-hydropower station, and the construction of a new stilling basin for the outlets on the downstream side of the dam.

The raising of the Clanwilliam Dam Wall will necessitate roadworks relating to the realignment of the existing gravel access road on the eastern side of the dam as well as portions of the divisional and minor roads. The following roadworks associated with the ~~proposed~~ project will be carried out:

- To allow access to the raised Clanwilliam Dam Wall crest and outlet works, existing gravel access road located on the eastern side of the dam will be realigned;
- Realignment and raising, and possible closure, of portions of the gravel road between Clanwilliam and Citrusdal (Divisional Road DR2183) including the construction of a large culvert and bridge. The roadworks associated with the realignment, raising, and possible closure of portions of the gravel road between Clanwilliam and Citrusdal (Divisional Road DR2183) as well as the construction of a large culvert and bridge will be carried out by the Western Cape Department of Transport and Public Works;
- Raising portions of the road between the N7 and Algeria (Divisional Road DR1487 / Minor Road MR539) including the construction of a bridge to replace the existing causeway over the Olifants River. The raising of portions of the road between the N7 and Algeria (Divisional Road DR1487 / Minor Road MR539) as well as the construction of the bridge will be carried out by the Western Cape Department of Transport and Public Works;
- Raising portions of the Citrusdal Road (Minor Road MR539) including the construction of a culvert to lift portions of the road; and

- Raising and realignment as well as the possible closure, of portions of the Renbaan Road (Minor Road MR16/2) including the construction of a large culvert.

Lastly, the ~~proposed~~ remedial work and possible raising of the dam would require numerous construction related activities which include, inter alia:

- The establishment of a construction camp (basic infrastructural services, sewerage and wastewater treatment, roads and storm water drainage).
- The establishment of a construction site (basic infrastructural services such as water and electrical reticulation, sewerage and wastewater treatment, roads and storm water drainage, administration offices, workshops, material storage areas).
- The construction of a permanent gravel road on the eastern side of the dam to provide access.
- The extension of the existing quarry to source and stockpile construction materials.

The maintenance and management of South Africa's National Road Network falls within the ambit of the SANRAL[3]. A separate EA Process for the realignment and raising of portions of the N7 to accommodate the raised Clanwilliam Dam Wall was undertaken. EA was granted by the WCDEADP allowing the following project activities to proceed:

- Realignment of the portion of the N7 National Road between km 89.32 and km 95.92; and
- Raising of the portion of the N7 National Road between km 68.77 and km 70.22.

2.2 Project Activities and Phasing

Due to the long nature of the ~~proposed~~ construction activities associated with the raising of the Clanwilliam Dam, it is proposed to consider construction activities in a phased approach, thus allowing sufficient time for compliance with pre-construction conditions stipulated in the EA dated 12 May 2009, and upheld by the Western Cape Minister of Local Government (refer to Part 2.1 of this EMPr). The phased approach including ~~proposed~~ construction timeframes and pre-construction conditions stipulated in the EA are presented in the Table 2-1 below.

[3] SANRAL: South African National Roads Agency Limited

Table 2-1: Phased approach to construction activities for the Clanwilliam Dam raising project.

Phase No	Phase	Construction activities	Impact area	Phase timing	Pre-construction conditions from EA to comply with	Pre-construction conditions deadline
1	Construction Site Establishment	The activities associated with the establishment of the Construction Site for the ~~proposed~~ project commenced on 02 June 2014. Therefore at the time of preparing this EMPr, the Construction Site Camp had already been established in line with the mitigation and management measures provided in the EMPr titled "*National Road N7 Realignment and N7/ Clanwilliam Intersection Upgrade, Western Cape Construction Environmental Management Programme*" dated October 2013. The management and mitigation measures provided in Part 6.5.5 of this document have been taken from the "*National Road N7 Realignment and N7/ Clanwilliam Intersection Upgrade, Western Cape Construction Environmental Management Programme*". Written notification of the commencement of the establishment of the Construction Site was made to the WCDEADP Directorate: Integrated Environmental Management (Region B) on 19 May 2014 (*refer to Appendix D of this EMPr*).	Area west of the existing quarry and N7 road Immediately downstream of dam wall Eastern side of dam Existing quarry location	June 2014 to December 2014 (6 Months)	Conditions 3, 4, 11, 14, 22, 23, 23.13, 24	12 December 2014
2	Rehabilitation and raising of dam wall	Construction of temporary access roads	West of dam from construction camp to dam wall	February 2015 to December 2017 (35 months)	Conditions 6, 8, 16, 19, 20, 21, 27	30 January 2015
		Clearing of the foundation footprint in the river and on the valley flanks Demolition of various components of the existing dam Excavations Infilling and cut-off grouting below the new foundation Drilling and blasting of drainage addits into the valley flanks below the raised dam Cutting of openings through the existing dam Erection of form work and casting of concrete	Within 100m radius from dam wall			
3	Raising, realignment and/or decommissioning of existing provincial and minor roads	Portions of the gravel road between Clanwilliam and Citrusdal (Divisional Road DR 2183) including construction of a large culvert and bridge Raising of portions of the road between the N7 and Algeria (Divisional Road DR 1487 / Minor Road MR 539) including constructing a bridge to replace the causeway over the Oliphants River Raising of portions of the Citrusdal Road (Minor Road MR 539) including constructing a culvert to lift portions of the road Raising and re-alignment, and possible closure, of portions of the Renbaan Road (Minor Road MR 16/2) including constructing a large culvert	Existing road alignments, area between existing dam level to new dam purchase line	January 2018 - October 2018 (10 months)	Conditions 9, 15	01 November 2017
4	Raising of the water level in the dam and inundation of new area	Dam level rises causing inundation of the area below the purchase line.		Post October 2018	Conditions 10	30 September 2018

2.3 Design Considerations

2.3.1 Existing structure

Clanwilliam Dam is a concrete gravity dam with a non-overspill crest (NOC) length of approximately 250 m. The spillway section is 117.5 m long and has an approximated ogee shape. Spillway discharge is controlled with 13 vertical spillway gates. The gates are used to provide additional storage above the spillway invert level. Piers support the gates and deck over the spillway, resulting in an effective spillway length of 101 m. The full supply level (FSL) of the dam is at RL 105.25 m (top of the crest gate) and the crest of the ogee at RL 102.15 m. Two outlet pipes of nominal diameter (φ) 1 219 mm discharges into the river. Their inlets are at RL 80.51 m. Discharge is controlled with sleeve valves. The maximum discharge capacity is approximately 10 m^3/s. An additional outlet pipe delivers water to the hydropower plant, which is currently dysfunctional, and the irrigation canal on the downstream right flank.

The existing outlet works comprise of two 1219 mm pipes (RL 79,55) and two 914 mm pipes (RL 81,99). Both 1219 mm pipes are located within the spillway section, with one being just left of the existing outlet chamber and the other towards the middle of the spillway. Releases to the river are undertaken through these pipes.

2.3.2 Design Philosophy

The design philosophy for the Clanwilliam Dam raising project centres on achieving the following aspects:

- Long-term structural reliability;
- Minimal operational requirements / predictable operation; and
- Minimal maintenance requirements.

2.3.3 Availability of Material

Results from geotechnical investigations indicate that adequate aggregate is available for the ~~proposed~~ raising by roller compacted concrete (RCC). RCC is the preferred material mainly due to the rapid tempo at which it can be placed, resulting in shorter construction periods and its relatively low heat of hydration. For the purposes of this report the design was based on the use of RCC. The eventual choice of spillway type and construction programme may dictate the use of mass concrete.

2.3.4 Dam Wall Structure Considerations

The ~~proposed~~ dam wall structure is recommended to have the following characteristics:

- Construction of a concrete apron on the downstream face of the existing structure;
- Additional concrete on the crest and downstream face of the existing structure;
- Raising the dam wall height from 43 meters to 58 meters;
- Construction of a multi-level intake structure on the upstream face of the dam wall;
- Drilling and cutting through the existing dam wall; and
- Construction of a new stilling basin for the outlets on the downstream side of the dam.

2.3.5 Non-Overspill Crests (NOC's)

It is recommended that NOC's are raised vertically including the addition of waterproof concrete balustrades or parapet walls. This will add to the storage height of the structure. Both the left and right NOC's are assumed to be 4,5 m wide. The crest levels of the NOC's are assumed to be at the maximum water levels. This means that a 0 m freeboard is accepted during the Safety Evaluation Flood (SEF).

2.3.6 New Outlet Works

The new outlet works will comprise of a combination of 1200 mm pipes and 900 mm pipes. The 900 mm pipes will be used to extend the existing 914 mm pipes. All other pipes will have a diameter of 1200 mm. Discharging shall be done by means of 900 mm sleeve valves for the 1200 mm pipes, and 600 mm sleeve valves for the 900 mm pipes. The combination and quantity of valves shall depend on the required discharge capacity of the outlet works.

2.4 Potential Impacts Resulting from the Raising of the Dam

The following impacts may affect the bio-physical and social environments within the study area.

2.4.1 Operational Phase Impacts

- Impact on flora;
- Impact on terrestrial fauna;
- Impact of reservoir-induced seismicity;
- Impact on ability to achieve recommended scenario for EWRs;
- Impact on riverine fish;
- Impact on groundwater resources;
- Visual impacts;
- Impact on heritage resources;
- Impact of inundation of roads on access;
- Impact of inundation of existing infrastructure, other than roads;
- Impact of loss of agricultural land on livelihood security;
- Impact on assurance of supply to farmers;
- Impact of increased water yield on Resource Poor Farmers;
- Impact on the local economy; and
- Macro-economic impacts.

2.4.2 Construction Phase Impacts

- Disturbance of flora;
- Disturbance of fauna;
- Sedimentation and erosion;
- Deterioration of water quality;
- Traffic impacts;
- Interruption of water releases;
- Storage and utilisation of hazardous substances on site;
- Risk of fire;

- Creation of employment opportunities;
- Influx of workers to the area (health and safety risks);
- Influx of job seekers;
- Creation of business opportunities for local businesses;
- Disturbance to sense of place, visual aesthetics;
- Windblown dust;
- Litter/ waste pollution;
- Noise and light pollution; and
- Impact of sourcing construction material.

3 ENVIRONMENTAL LEGISLATIVE REQUIREMENTS

3.1 Framework Legislation

All environmental and applicable legislation, as well as other requirements will be complied with during the course of implementation of this project. Any changes in legislation, or other requirements, will be updated as and when required and communicated to all role players involved in the project. A list of applicable legislation is provided in Table 3-1 below.

Table 3-1: List of applicable legislation for the raising of the Clanwilliam Dam Wall

No	Legislation
1	Advertising on Roads and Ribbon Developments Act (21 of 1940)
2	Conservation and Agricultural Resources Act (43 of 1983)
3	Constitution of the Republic of South Africa Act (108 of 1996)
4	Development Facilitation Act (67 of 1995)
5	Environment Conservation Act (73 of 1989)
6	Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (36 of 1947)
7	Hazardous Substances Act (15 of 1973)
8	Intergovernmental Relations Framework Act (13 of 2005)
9	Mineral and Petroleum Resources Development Act (28 of 2002)
10	Mountain Catchment Area Act (63 of 1970)
11	Municipal Structures Act (117 of 1998)
12	Municipal Systems Act (32 of 2000)
13	National Building Regulations and Building Standards Act (103 of 1977)
14	National Building Regulations and Building Standards Amendment Act (30 of 1982)
15	National Building Regulations and Building Standards Amendment Act (36 of 1984)
16	National Environmental Management Act (107 of 1998)
17	National Environmental Management: Air Quality Act (39 of 2004)
18	National Environmental Management: Biodiversity Act (10 of 2004)
19	National Environmental Management: Protected Areas Act (57 of 2003)
20	National Environmental Management: Waste Act (59 of 2008)
21	National Forest Act (84 of 1998)
22	National Forest and Fire Laws Amendment Act (12 of 2001)
23	National Heritage Resources Act (25 of 1999)
24	National Road Traffic Act (93 of 1996)

No	Legislation
25	National Veld and Forest Fire Act (101 of 1998)
26	National Water Act (36 of 1998)
27	Occupational Health and Safety Amendment Act (181 of 1993) and the regulations thereunder
28	Promotion of Access to Information Act (2 of 2000)
29	Promotion of Administrative Justice Act (3 of 2000)
30	Protected Disclosure Act (26 of 2000)
31	Provincial Nature Conservation Ordinances
32	Public Finance Management Act (1 of 1999)
33	Traditional Leadership and Governance Framework Amendment Act (41 of 2003)
34	White Paper on Environmental Management
35	White Paper on Integrated Pollution and Waste Management for South Africa
36	White Paper on Land
37	White Paper on the Conservation and Sustainable use of South Africa's Biodiversity
38	Cederberg Municipality: By-law relating to Outdoor Advertising and Signage (10865)
39	Cederberg Municipality: By-law relating to the Control of Boats ad Boating on the Clanwilliam Dam (10868)
40	Cederberg Municipality: By-law relating to Fire Safety (10871)
41	Cederberg Municipality: By-law relating to Camping Areas (10874)
42	Cederberg Municipality: By-law for the Prevention of Public Nuisances and the Keeping of Animals, Poultry, pigeons and Bees (10877)
43	Cederberg Municipality: By-law relating to Refuse Removal (10882)
44	National Environmental Management: Air Quality Act (39 of 2004) National Dust Control Regulations 2013
45	Occupational Health and Safety Act (85 of 1993) Construction Regulations 2014
46	Mine Health and Safety Act (29 of 1996)

3.2 Environmental principles

The following principles should be considered at all times during all phases of the ~~proposed~~ dam raising activities.

- The environment is considered to be composed of both biophysical and social components.
- Construction is a disruptive activity and all due consideration must be given to the environment, during the execution of a project to minimise the impact on affected parties.
- Minimisation of areas disturbed by construction activities (i.e. the footprint of the construction area) should minimise many of the construction related environmental impacts of the project and reduce rehabilitation requirements and costs.
- As minimum requirements, all relevant standards relating to international, national, provincial and local legislation, as applicable, shall be adhered to. This includes requirements relating to waste emissions (e.g. hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinances, etc.
- Every effort should be made to minimise, reclaim and/or recycle "waste" material.
- The proponent shall exercise the "Duty of Care" principle at all times during the life of the dam raising project.
- The proponent shall also prescribe to the "Polluter Pays" principle and shall manage the project in a pro-active manner to avoid any incidents of pollution.

3.3 Licenses and Permits Requirements

A number of permits and licences are generally required for projects of this nature before construction can commence. A list of such permits or licences is provided in Table 3-2 below.

Table 3-2: List of possible permits or licences that may be applicable

Permit / License	Relevant legislation / Regulating authority
Blasting	Blasting permits are required from the Department of Mineral Resources in accordance with the Explosives Act (Act No 26 of 1956).
Waste disposal	All wastes (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites. Government Notice (GN) 921, promulgated in terms of the National Environmental Management: Waste Act (59 of 2008) (NEMWA), lists Waste Management Activities in respect of which a waste management license is required; these include various activities associated with the storage of waste, reuse, recycling and recovery of waste, treatment of waste (which includes the remediation of contaminated land) and disposal of waste. NEMWA GN 926 presents the norms and standards for the storage of waste. The Department of Environmental Affairs is the regulating authority for waste management activities. The National Waste Management Strategy must be incorporated into the waste disposal strategy proposed and followed.
Storage of hazardous substances	Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous Substances Act, the Occupational Health and Safety Act, and relevant associated Regulations.
Health and safety of work teams	Construction Regulations (2014) published under the Occupational Health and Safety Act (85 of 1993) apply to construction activities including “the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work”. A “health and safety plan” which addresses hazards, and includes safe working procedures to mitigate, reduce or control the hazards identified, is required under this Act. A risk assessment must also be undertaken by a competent person(s) and the Contractor shall ensure that all employees under his or her control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences
Heritage resources	Before any heritage resources are demolished or damaged a permit should be obtained prior to any actions been taken. Permit applications must be submitted to South African Heritage Resources Agency (SAHRA).
Removal of trees	The removal of trees (excluding alien invasive trees) from the dam basin requires a permit in terms of the National Forest Act (No 84 of 1998).
Control and eradication of alien invasive species	All reasonable measures must be taken to control and eradicate any alien invasive species that has been listed in terms of Section 70(1) of the National Environmental Management Biodiversity Act (10 of 2004).
Removal and transportation of endangered fauna and flora	A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous protected and endangered plant and animal species. Copies of permits required must be submitted to the WCDEADP for record keeping purposes.
Water abstractions	Water abstracted from any sources for construction purposes requires authorisation in terms of the National Water Act, No 36 of 1998.
Removal of graves	Permits are required for the removal of graves in terms of the National Heritage Resources Act (No 25 of 1999) section 36.

Permit / License	Relevant legislation / Regulating authority
~~Asphalt Plants~~	~~GN 893 of 2013 in GG 37054 dated 22 November 2013 provides a list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Activities include Macadam preparation (the mixing of aggregate and tar or bitumen to produce road surfacing in permanent facilities and mobile plants). These activities require an Atmospheric Emission License in terms of Section 37 of the Act.~~
Borrow areas and Quarries	Government Gazette No 26501 dated July 2004 states that the Minister of the Mineral Resources, acting in terms of section 106 (1) of the Mineral and Petroleum Resources Development Act (No 28 of 2002) (MPRDA) exempts the Department of Water Affairs, amongst other institutions, from the provisions of sections 16, 20, 22 and 27 of said Act in respect of any activity to remove any mineral for the construction and maintenance of dams, harbours, roads and railway lines and for purposes incidental thereto. Section 106 (2) of the MPRDA says that in such cases the DWS must still compile an Environmental Management Programme (EMP) for approval in terms of Section 39 (4) of the Act.

4 STRUCTURE AND RESPONSIBILITY FOR ENVIRONMENTAL MANAGEMENT

4.1 Implementation of Environmental Management Programme

The implementation of the mitigation, environmental management and EA conditions documented in this EMPr requires the commitment of various stakeholders and role players. Although the onus of ensuring that all project activities associated with the ~~proposed~~ project comply with mitigation, environmental management and EA conditions rest with the holder of the EA, DWS and various parties will play a role in the implementation of this EMPr. Taking the aforementioned into account, this section of the EMPr is intended to clearly define the responsibilities for management actions contained in this document and to explain arrangements for coordination among the role players involved in the implementation of the ~~proposed~~ project lifecycle.

4.2 Regulating / Commenting Authority

In accordance with Section 31 of the National Environmental Management Amendment Act (No 62 of 2009), the Competent Authority (WCDEADP) is responsible for the application and enforcement of the NEMA as amended and Specific Environmental Management Acts. Concerning the implementation of this EMPr the specific role of the Competent Authority will entail the following:

- Review the revised EMPr submission and based on the review, approve the EMPr (with or without conditions) or request amendments to be made to the document as well as the resubmission thereof;
- Review all monitoring and audit reports submitted by the ECO and advise of any additional corrective measures to be implemented;
- Conduct routine inspections at any reasonable time with the intend to determine compliance with the EMPr, EA Conditions and Method Statements; and
- In instances where required assist the Project Proponent in understanding and meeting the specified conditions provided in the EA.

4.3 Roles of Key Stakeholders

4.3.1 Project Proponent

The project proponent (holder of the EA) namely the DWS is required to ensure that all conditions provided in the EA, as well as any other reasonable condition that the Competent Authority (WCDEADP) considers necessary for the protection of the environment, are met. In keeping with the requirements of Section 28 of the NEMA as amended, the holder of the EA is also required to take all reasonable measures and to implement mitigation / management measures to prevent adverse environmental consequences, associated with the implementation of the project activities, from happening.

The project proponent is responsible for ensuring that the mitigation measures provided in this EMPr are implemented and that the mitigation measures are clearly understood by all relevant parties. Where the implementation of Construction and / or Operational activities associated with the ~~proposed~~ project are contracted out (e.g. to Contractors and / or Sub-contractors),

the legal responsibility associated with non-compliance still rests with the Project Proponent (*unless otherwise agreed upon by the Competent Authority*).

Additional responsibilities of the Project Proponent also include the following:

- Ensure compliance with the EA Conditions by any person acting on their behalf, including but not limited to, an agent, sub-contractor, employee or any person rendering a service to the holder of the EA;
- Notify the WCDEADP, ECO any other relevant authority, in writing, within 24 hours thereof if any condition of the EA is not adhered to;
- Ensure that a copy of the EA is kept on site at all times. The EA must be provided to an authorised official of the WCDEADP who requests to see it and must be made available for inspection to any employee or agent of the holder of the EA who works or undertakes work within the development footprint;
- Notify the WCDEADP, within 30 days, of any changes of the ownership and / or project developer. It must be explained to the new owner / developer that the conditions provided in the EA are legally binding and must be adhered to;
- Notify the WCDEADP of any change of the contact details including the name of the responsible person, the physical or postal address and / or telephonic details and provide the Department with the new details; and
- Allow Departmental Officials access to the development site for the purpose of assessing and / or monitoring compliance with the EA Conditions.

The project proponent will also be required (as requested by the Competent Authority) to:

- Provide a report which provides details regarding the following:
  - Extent to which the EA conditions are / are not being complied with;
  - The nature of, and reasons for, any non-compliance with a condition provided in the EA; and
  - Any action taken, or to be taken, to mitigate the effects of any non-compliance or to prevent any recurrence of the non-compliance;
- Provide Environmental Audit Reports on the impacts of the authorised activity on the environment, at specified times or intervals or whenever requested by the competent authority; and
- Provide the Competent Authority with proof of compliance with the requirements regarding financial provision for the implementation of the management measures provided in this EMPr.

4.3.2 Professional Service Provider (PSP)

The Project Proponent will appoint a team of supervising and consulting engineers who will function to ensure that all construction activities are carried out in accordance with the approved detail design for the raising and strengthening of the Clanwilliam Dam and supervision of the contract. In addition the role and responsibility of the Engineer will include:

- Providing assistance to the ECO in the monitoring and execution of the Contractors or Sub-contractors' Method Statements;
- Review and approve the Method Statements developed by the Contractor;
- Maintaining a photographic record of the construction activities;

- Verifying that the EMPr have been included in the contract documents. In the event the EMPr is not included in the tender documents, it shall be issued officially to the Contractor once approved;
- Ensuring that Environmental Compliance matters are addressed during all Site Meetings;
- Provide technical guidance and assistance to onsite teams regarding the implementation and compliance with the EMPr;
- Consults and co-operates with the ECO concerning environmental matters;
- The Engineer may appoint an Engineer's Environmental Representative (EER) to plan and direct the implementation of the EMP and provide advice on environmental matters;
- Designate or appoint a staff member to review weekly site inspections undertaken by the Contractor to determine whether construction activities are carried out as per the detailed design and management measures provided in the EMPr and Method Statements; and
- Provide inputs, as and when required, to the monthly Environmental Compliance Report prepared by the ECO.

4.3.3 Project Manager

The Project Manager, appointed by the DWS will function to coordinate and manage the Construction and Operational Phases of the ~~proposed~~ project. Separate Project Managers for the Construction Phase and Operation Phase may be appointed. Any project activity, which may result in adverse environmental consequences and for which mitigation and management measures are not provided in this EMPr must be approved by the Project Manager. The Project Manager must instruct the Contractor / Sub-contractor to cease any construction activity which is in contravention of this EMPr and the EA.

4.3.4 Contractor and Sub-contractor/s

Where specific EMPr responsibilities are assigned to Contractors or Sub-contractors, these must be clearly stipulated and included in the contract documentation. Any construction activities or actions of onsite personnel which results in environmental damage, non-compliance with the EA and EMPr, must be reported to the project proponent by the Contractor. The roles and responsibilities of the Contractor will also include the following:

- To prepare Method Statements which sets out the manner in which the management actions contained in the EMPr will be implemented;
- Ensure that all sub-contractors and onsite personnel understand and are familiar with the management measures provided in the EMPr;
- Ensure that all mitigation and management measures relating to construction activities are implemented;
- Report any non-compliance with the EMPr and / or EA Conditions to the project proponent and ECO;
- Rehabilitate the construction footprint as well as any sensitive environment damage resulting from negligence on the part of the Contractor, to the satisfaction of the ECO; and
- All personnel shall be required to familiarise themselves with the content of this EMPr.

4.3.5 Environmental Control Officer

The Environmental Control Officer (ECO) will be appointed by the project proponent for the duration of the Construction Phase up to the completion of rehabilitation. In accordance with

Condition 24 of the EA, the ECO must be appointed prior to the commencement of any site preparation, land clearing or construction activities. The ECO's primary role will be to monitor compliance with the conditions provided in the EA and the implementation of the EMPr, and to report the compliance / non-compliance to the Competent Authority. The appointed ECO must meet the following requirements:

- Have an appropriate Environmental Management / Science qualification / degree and be registered with a recognised professional affiliation (e.g. International Association of Impact Assessment and the South African Council for Natural Scientific Profession;
- Appropriate training and experience in the implementation of environmental management specifications; and
- Have no vested interest in the ~~proposed~~ project.

The responsibilities of the ECO will include the following:

- Review and approval of Method Statements prepared by the Contractor for activities on the construction site;
- Conduct weekly site inspections / audits and record compliance / non-compliance with the management and mitigation measures provided in the EMPr and EA Conditions observed during the inspection;
- Based on the observations made during weekly site inspections issue site instructions to the contractor for any corrective actions which may be required;
- Document the findings of the site inspection / audits;
- Monthly Environmental Compliance Audit Reports should be submitted to the Competent Authority. The Environmental Compliance Report should provide an overview of any trends in non-compliance recorded;
- Develop and maintain an I&APs Complaints Register in which all complaints are recorded, as well as remedial action taken and the response provided to the I&APs;
- Verify that the management and mitigation measures provided in the EMPr as well as the EA Conditions have been communicated to, and are understood by all personnel on site including the Contractors and Sub-contractors;
- Report incidents which have lead / may lead to substantial danger to the surrounding communities /public or significant environmental damage, to the Competent Authority. Any remediation or corrective measures which have been / proposed to be implemented to prevent danger to the surrounding communities /public or significant environmental damage from occurring must also be reported to the Competent Authority (WCDEADP Appeals Management Unit);
- Ensure that a copy of the approved revised EMPr and EA is kept onsite and is accessible to all personnel on site; and
- ~~Provide Environmental Awareness Training to all personnel on site, Contractor and Sub-contractor. Documented proof of the Environmental Awareness Training as well as the content of the training must be kept onsite and should be made available to the Competent Authority upon request. All visitors to the site (including project team members which are not based onsite), must undergo Environmental Induction before being permitted to the construction and associated area. The Environmental Induction should be structured so as to provide a condensed version of the comprehensive Environmental Awareness Training that will be provided to the workforce / onsite staff.~~

4.3.6 Interested and Affected Parties

The role of I&APs will include the following:

- The DWS will establish an Environmental Consultative Forum (ECF) for the duration of the construction period.
- ~~The frequency and the proposed agenda for meetings will be discussed as part of the meetings.~~
- The established Forum will operate as per the Consultative Forum Strategy appended to this EMPr (see **Appendix F)**
- Members of the ECF should include, but not limited to, the I&AP who were registered during the EIA process; the ECO as well as representatives of Clanwilliam community; ward councillors and the applicable Catchment Management Agency.

Once the ECF has been formed the role of I&APs will include the following:

- Request updates on the progress of the Construction Phase and the effectives of the EMPr implementation;
- Provide input into corrective actions where appropriate and to the revisions of the EMPr;
- Report any non-conformance with the EA Conditions and EMPr observed to the Competent Authority and ECO; and
- Ensure that the communication platform provided, is utilised to communicate any queries or concerns relating to the Construction Phase Activities.

4.3.7 Environmental Assessment Practitioner

Within the context of this EMPr and in keeping with the requirements of Condition 23 of the EA the role of the EAP is focussed on updating and refining the DWS' generic EMPr that was submitted to the Competent Authority as an appendix of the final Environmental Impact Report. Although due diligence has been exercised to ensure that the EMPr meets the requirements of the relevant national and provincial standards and guidelines for EIA processes and specialist studies, the EAP is also required to ensure that the EMPr includes the following:

- Submit the revised EMPr, following review of the document by the DWS, to the WCDEADP for review and approval;
- Take into account and be based on the WCDEADP Guideline for Environmental Management Plans (2005);
- Address the mitigation measures provided in the Environmental Impact Assessment Report and the aspects highlighted in the EA;
- Describe the level and type of competency required of the ECO;
- Determine the frequency of site visits to be carried out by the ECO;
- Make provision and call for the inclusion of the revised EMPr in all contract documentation for the Construction Phase of the ~~proposed~~ project;
- Define and allocated roles and responsibilities for all aspects of the EMPr;
- Define the code of conduct for engineers, contractors and sub-contractors, including all other parties operating on the site during construction and include penalties for non-conformance with the EA Conditions. A comprehensive account of the penalties that will be levied for non-compliance with the management measures provided in this EMPr

together with the process that will be followed in administering the penalty structure is provided in Section 8.5 of this document;
- Include Environmental Awareness and Training Programmes for all contactors, sub-contractors and labourers.

4.3.8 Contractor's SHE Officer, Fire Officer and Environmental Officer

The name and letter of appointment of the Contractors SHE Officer, Fire Officer and Environmental Officer (EO) must be given to the ECO and the terms of reference for the work to be undertaken must be detailed including time on site, roles and responsibility, interaction with the Contractor and environmental offices, etc.

5 PRE-CONSTRUCTION SPECIFICATIONS

5.1 Additional Submissions to Competent Authority

5.1.1 Clanwilliam Dam and Bulshoek Weir Operating Procedures

The DWS Chief Directorate: Integrated Water Resource Planning will maintain the existing level of development as operating rules for Clanwilliam Dam and Bulshoek Weir. DWS documentation related to the Clanwilliam Dam and Bulshoek Weir operating procedures are listed below:
- Water Resources Situation Assessment (Report number: P WMA 17/000/00/0101), March 2002
- Overview of Water Resources and Utilization (Report number: P WMA 17/000/00/0203), September 2003
- Olifants / Doorn Water Management Area: ISP (Report number: P WMA 17/000/00/0305), February 2005

5.1.2 Riverine Monitoring Programme

A Riverine Monitoring Programme is to be developed and implemented before construction on the Clanwilliam Dam wall structure commences. To determine the potential effect the construction may have on water sources the Department of Water and Sanitation (DWS) appointed an independent specialist to provide monitoring reports for surface water.

The purpose of the monthly water quality assessment is to:
- Monitor and assess biological and chemical parameters in the surface water quality
- Compare the current status of the water quality with the baseline assessment
- Determine the impact and downstream from the Project site during the construction phase

Samples should be tested at a laboratory that is accredited by South African National Accreditation System ISO 17025.
The samples should be tested for the following parameters:
- Bacteriological: Faecal Coliform
- Chemical characteristics: pH, Suspended Solids, Colour, Odour, Chemical Oxygen Demand and Fats, oil and grease

- Chemical elements; Fluoride, Nitrate, Ortho Phosphate, Ammonia, Sodium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Phosphorous (total) and Zinc

5.1.3 Olifants- Doorn Water Management Area Catchment Management Plan

A Water Management Plan for the Olifants / Doorn Water Management Area has been developed by the Department of Water and Sanitation. The aim of the water demand management investigation was to highlight options available for improved demand management in use and to make recommendations to improve efficiency and save water. This report has been included as **Appendix C** to this EMPr.

Within 12 months from the date of completion of the construction phase the relevant Directorate of the applicant must submit to this Directorate for approval an updated catchment management plan for the Olifants/Doring Water Management Area which must, inter alia, include:

- a water demand and conservation plan;
- an urban, industrial and agricultural water use efficiency plan;
- a water loss investigation and repairs plan for the canal system of the Lower Olifants River Government Water Scheme;
- catchment management, mitigation and improvement measures; and
- the establishment of management entity to co-ordinate and monitor implementation of the plan.

5.1.4 Environmental Rehabilitation and Restoration Plan

The rehabilitation work described in this document is concerned with the rehabilitation work to be undertaken as soon as practically possible after the post construction of the raising of the Clanwilliam Dam.

The Chief Directorate: Construction Management (CD: CM) Construction South is dedicated towards implementing sound environmental practices, and also expanding on the existing environmental practices that are in place on site. These practices include the minimisation of the impact left by the dam construction work, by returning the environment to its former state (or as close as possible).

With the increased requirement for rehabilitation there is also an increased requirement for this rehabilitation work to be undertaken in a responsible manner, taking into consideration the specific rehabilitation requirements for any given type of project, the location of the project and the environmental aspects affected by the project such as soils, slopes, fauna and flora and the climate (temperature and rainfall) of the area. As such, this section aims to provide guidance to the construction team at Clanwilliam to determine the adequacy of rehabilitation planning and implementation on this project.

As such a rehabilitation plan has been developed and is provided in **Appendix B** to the EMPr for consideration. If required more detailed explanations can then be given in Method Statements.

6 CONSTRUCTION PHASE ENVIRONMENTAL MANAGEMENT AND MITIGATION

6.1 Management of Flora

6.1.1 Aspect

Site preparation activities carried out to accommodate the required supporting infrastructure (e.g. concrete batching plants and offices etc.) will necessitate the clearing of vegetation within the footprint of the site camp. All sensitive environmental features where construction activities will not be undertaken must be cordoned off (e.g. fencing off the area) and must be clearly indicated as a no go area.

6.1.2 Impact

Vegetation clearing within the development footprint carried out as part of site preparation will result in the loss of indigenous, Red Data Listed species and endangered vegetation types. Areas disturbed by vegetation clearing will create conditions conducive to the establishment of alien / invasive plant species.

6.1.3 Objective

Through the implementation of the management and mitigation measures, the loss of vegetation beyond the demarcated construction area must be prevented.

6.1.4 Target

Eradication of, and prevention of the establishment of alien plants and invasive species. No disturbance to or loss of protected flora species outside of construction footprint.

6.1.5 Management and Mitigation Measures

The implementation of the following management and mitigation measures are intended to prevent or reduce the significance of the anticipated impacts on the flora within the development area:

- Endangered and protected plant species within the inundation area which are representative of the local species composition of the area (including bulbs and succulents) should be transplanted into similar soil conditions within the areas disturbed by construction activities. Where no suitable location for transplanting can be identified the removed plants must be used to enrich parts of the Ramskop Nature Reserve at Clanwilliam. Removing the plants, selected for transplantation, from the soil and re-planting it within the identified areas, will be carried out once prior to the establishment of the site. The mitigation measure will therefore not be carried out repeatedly during the Construction Phase. Maintenance and Monitoring of the growth of the transplanted plants will be required for a minimum of one growing season. A botanist who is familiar with the development area should be appointed to assist with determining which plant species are representative of the local species composition of the area also taking into consideration the findings of the Specialist

Botanical Study[4] that was conducted for the ~~proposed~~ project by Dr C. Boucher titled "*Clanwilliam Dam Raising Dam: Botanical Study*" dated 20 March 2006;

- ~~A plant nursery should be established during the construction phase, for the temporary storage of rescued plants that will be used during the Rehabilitation Phase to restore vegetation cover. Maintenance of all rescued plants kept in the nursery will continue for the duration of the Construction Phase up to completion of rehabilitation activities to the satisfaction of the ECO and WCDEADP;~~
- Vegetation cover should be retained for as long as possible, and vegetation clearance should occur in a phased manner from one side if the site to the other;
- The Contractor shall not clear areas of indigenous vegetation outside of the direct project footprint.
- The Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- The movement of construction vehicles and the use of equipment should only be permitted on predetermined access routes and predetermined area, respectively, thereby limiting the area disturbance and necessity for the removal of vegetation;
- The removal of vegetation, in particular protected and endangered species outside the construction footprint will not be permitted;
- All reasonable measures must be taken to control and eradicate any alien invasive species that has been listed in terms of Section 70(1) of the National Environmental Management Biodiversity Act (10 of 2004). The relevant Competent Authority must be notified of the occurrence of any listed invasive species occurring and be provided with an Alien Invasive Control and Management Plan;
- The reseeding (indigenous vegetation) of disturbed areas should be carried out at the end of the dry season to ensure optimum conditions for germination and rapid vegetation establishment.
- Due to the change in conservation status of many of the plant species since authorisation in 2009, an SCC and protected species walkdown is recommended prior to the commencement of construction activities. This walkdown must cover the areas between the old FSL and the proposed FSL. Any protected or threatened plant species recorded from this area must be relocated to nearby, suitable habitats as recommended by a botanical specialist, upon the receipt of the appropriate permits to do so. In addition, the walkdown must cover a 200 m buffer around the New FSL and HFL (Walkdown Area) and all plant SCC must be clearly marked and left undisturbed during the construction phase.
- Small portions of the site are composed of the Critically Endangered (CR) Citrusdal Shale Renosterveld, which also coincide with Critical Biodiversity Area (CBA) 1 areas according to the Western Cape Biodiversity Sector Plan (2023). Particular care must be taken in these areas, and they should be avoided for all laydown and site activities where possible.
- If required, vegetation clearing commences only after the necessary permits for SCCs or protected plants have been obtained. Any individual of the protected plants that were observed needs a relocation or destruction permit for any individual to be removed or destroyed due to the development. High visibility flags must be placed near any protected plants to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.

[4] Given that a significant time period has lapsed since the initial Flora Study was carried out, up to the commencement of the Construction Phase, it is advised that a Botanist be appointed to also assist with determining whether the initial specialist findings correlate with the current vegetation in the development area.

- A Plant Search and Rescue Plan must be compiled and implemented following the walkdown. It is recommended that as many of the threatened plant species as possible are relocated to similar habitats that are not to be impacted by project activities following the procurement of the relevant relocation permits.
- It is recommended that seeds are collected from the indigenous plant community prior to clearing or inundation, and these seeds are used for rehabilitation purposes at a later stage. It is recommended that geophytic and succulent species are relocated to similar habitats nearby or used for rehabilitation purposes where possible and feasible.
- Conduct follow-up rehabilitation and re-vegetation of any bare areas, and areas denuded during construction, with local indigenous grasses, shrubs, and trees, taking into account the following:
    - Areas between the current dam level and the old FSL may be left unvegetated provided they are controlled for alien and invasive plant species.
    - Construction camps and areas earmarked for other site activities must be revegetated using species indigenous to the area to prevent the establishment of alien and invasive plant species, and to assist with erosion control. Where revegetation is not feasible, such as in parking lots, it is recommended that the area is covered in an environmentally friendly, porous material, such as sustainable sourced, untreated wood chips, to help control erosion, dustfall and alien and invasive plant species.
    - Steep banks that are at risk of erosion may be reinforced with erosion control blankets (biodegradable geotextiles) such as jute or sisal.
    - Rehabilitation must be followed by monitoring of the vegetation communities, to be informed by the rehabilitation plan.

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed. All management measures which relate to information being provided to the Competent Authority and the preparation of any additional management plans will be done by the ECO in consultation with the project proponent.

6.1.6 Corresponding Environmental Authorisation Condition

As per Condition 23.13.1, the Environmental Rehabilitation and Restoration Plan must provide details of the approach that will be adopted for the search for, harvesting of and storage of bulbs, succulents and other suitable horticultural material from areas to be inundated and disturbed that can be used to re-vegetate disturbed areas. The requirement for ongoing alien plant species eradication and management is provided in Condition 23.12.17 of the EA.

6.2 Management of Fauna

6.2.1 Aspect

The increased human presence, movement of workers onsite, operation of equipment and nature of the construction activities (e.g. Blasting and to a lesser extent drilling and grouting) will constitute an intrusion in the natural habitat of the fauna found within the development footprint and adjacent areas.

6.2.2 Impact

The movement of workers onsite, operation of equipment and nature of the construction activities (e.g. Blasting and to a lesser extent drilling and grouting) may give rise to the following:

- Disturbance to fauna resulting in mobile animals leaving their natural habitat for the duration of the Construction Phase;
- Injury and harm;
- Obstruction of movement; and
- Preventing access to watering points.

6.2.3 Objective

Through the implementation of the management and mitigation measures, prevent any harm that may be caused to the animal life by the execution of any construction and / or related activity.

6.2.4 Target

No harm to any animal life resulting from the construction activities.

6.2.5 Management and Mitigation Measures

The implementation of the following management and mitigation measures are intended to prevent or reduce the significance of the anticipated impacts on the animal life within the development area:

- Information provided in the Environmental Awareness Training must lay emphasis on the fact that no intentional harm inflicted on animals will be permitted;
- Any fauna that is found within the construction footprint shall be carefully and safely removed from site to an equivalent environment;
- Snakes or dangerous wildlife that are found within the construction footprint may only be removed from site and relocated by a suitably qualified expert;
- The feeding of wild animals will not be permitted;
- The capturing and hunting of any animal as well as the placing of snares will under no circumstances be permitted; and
- No domestic animals or livestock will be permitted on site.

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed.

6.2.6 Corresponding Environmental Authorization Condition

Condition 23.12.6 of the EA explicitly calls for the revised EMPr (this document) to include provisions relating to the implementation of environmental controls and procedures aimed the management and protection of fauna.

6.3 Public Relations and Socio-Economic Environment

6.3.1 Aspect

The increase in areas of inundation is likely to result in the loss of land, built structures and infrastructure. The social dynamic of the nearby town of Clanwilliam may be altered by the influx of speculative job seekers employment during the Construction Phase.

6.3.2 Impact

The influx of job seekers from surrounding areas may give rise to the following:

- Limited available land and resources as well as the additional pressure placed on basic service delivery may aggravate social unrest;
- Sexual exploitation of women and the rate of HIV infections may increase.

6.3.3 Objective

Ensure that the Environmental Consultative Forum (ECF) is established and a communications system is put in place to provide a platform for Interested and Affected Parties (I&APs) to raise any concerns and queries relating to the Construction and associated activities is developed and put in place. The implementation of the communication system will facilitate maintaining clear lines of communication between I&APs and the role players that are defined in Section 4 of this EMPr.

6.3.4 Target

The following targets will be indicative of whether the set environmental objective has been reached:

- Provide I&APs with regular formal updates on the milestones reached with regards to the construction activities. The aforementioned updates should be provided in the form of a newsletter or be conveyed in formal written correspondence to the Consultative Forum. The members of the Consultative Forum should include I&APs who were registered during the EIA Process, the ECO and representatives of the Clanwilliam community, Ward Councillors, and applicable Catchment Management Agency;
- Acknowledge and respond to all complaints recorded in the Complaints Register within 7 working days; and
- Timeously inform I&APs of any disruptive activities which may result from the construction activities.

6.3.5 Management and Mitigation Measures

- The existing Consultative Forum will be mandated to address any public concerns, issues and queries. The members of the Consultative Forum should include I&APs who were registered during the EIA Process, the ECO and representatives of the Clanwilliam community, Ward Councillors, and the Olifants-Doorn Catchment Management Agency;

- The DWS in consultation with the Clanwilliam Municipality and Clanwilliam Aquatic Club must identify alternative sites to locate the facilities (i.e. Clanwilliam Municipal Resort) lost due the raising of the dam wall. The identification and selection of alternative sites which will be lost as result of the raising of the dam wall should form of a Land Use Management Plan;
- A Complaints and Comments Register must be kept onsite at all times and should be provided to any I&AP who wishes to report a complaint relating to the ~~proposed~~ project. The following information must be recorded in the Complaints and Comments Register:
  - Name and contact detail of the complainant;
  - Date, time and nature of the complaint;
  - Corrective measures that were implemented / in a way the complaint or comment was addressed;
  - Summary and evidence of formal response provided to the I&AP by the Contractor in consultation with the ECO.
- A Workforce Recruitment Policy aimed at controlling the influx of speculative job seekers and ensuring that the local community benefit from employment opportunities that are generated during the Construction Phase, should be developed. The Workforce Recruitment Policy should be developed by the Contractor in consultation with the Consultative Forum and project proponent. The Workforce Recruitment Policy must strictly adhere to the principles of the Public Finance Management Act (No.1 of 1999).

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed.

6.3.6 Corresponding Environmental Authorization Condition

Condition 23.10 and Condition 23.11 of the EA explicitly calls for the revised EMPr (this document) to include a strategy to ensure ongoing communication between I&APs and the Project Team throughout the Construction Phase as well as provisions to address social impacts associated with the influx of workers to the area.

6.4 Storm Water and Erosion Control

6.4.1 Aspect

All bare and exposed areas will be vulnerable to erosion. The construction of culvert inlets and outlets, side drains, and coffer dams are likely to leave these areas susceptible to soil erosion in the vicinity of the construction site, and lead to elevated turbidity levels in the river. Contaminated storm water from the batching plant may adversely impact on water resources in the area.

6.4.2 Impact

Sediment laden runoff from construction areas will result in elevated levels suspended solids in the watercourse. The increased volume of suspended solids in the watercourse will reduce the clarity of the water and sunlight penetration. This will in turn adversely impact on the biota of a river, smothering and abrading plants and animals, blocking out light, and reducing the

overall productivity of the system. Inadequate control of storm water runoff from the batching plant will result in the release of contaminated water into the receiving environment.

6.4.3 Objective

It must be ensured that all reasonable measures are put in place to prevent erosion and the release of contaminated storm water and sediment laden into the receiving environment.

6.4.4 Target

The following targets will be indicative of whether the set environmental objective has been reached:

- No formation of erosion channels caused by construction activities; and
- No release of contaminated storm water into the receiving environment.

6.4.5 Management and Mitigation Measures

The following management and mitigation measures relating to storm water runoff and erosion prevention must be implemented:

- The volume of water required for the operation of the batching plant must be regulated to maintain the required moisture content and wastage of water and additional runoff from these areas;
- The implementation of dust-control activities which entails dampening the surface through wetting may not result in run-off volumes that are large enough to result in erosion;
- All reasonable measures must be taken to avoid the surface water or storm water to be concentrated (i.e. avoid ponding of water);
- Erosion control measures including the use of berms to direct runoff to settling ponds as well as the construction and maintenance of coffer dams to settle sediments must be employed. Settling ponds with accumulated sediments need to be cleared before the onset of winter rains, and the construction of roads and causeways should be confined to the period October to May, where possible. Where the above activities are planned outside the recommended periods, management of the construction activities must take cognisance of weather patterns and secure the construction site during extreme weather events;
- Monitoring of the sediment load within the watercourse should take place both upstream and downstream of the construction site and in accordance with the approved Riverine Monitoring Programme. ~~**The maximum turbidity must be determined by an aquatic ecosystem specialist prior to the commencement of construction activities**~~
  The maximum turbidity must be determined by a suitable qualified specialist prior to the commencement of construction activities. This specialist may be a suitably qualified internal DWS specialist.;
- Vegetation cover must be retained for as long as possible and only clear areas of the site where it is necessary for construction; and
- Any erosion channels caused by construction activities must be suitably stabilised and rehabilitated to an acceptable condition.

Management measures relating specifically to the operation of the batching plant include:

- The release / discharge of contaminated water to the environment will not be permitted;

- Unused cement bags will be stored in a sealed container;
- Contaminated and wastewater generated by the cleaning of equipment and flushing of mixers will not be released into the environment;
- Wastewater management must be undertaken in line with current and relevant legislation governing the release, storage or removal of wastewater; and
- All visible remains of excess concrete will be physically removed from the batching plant area following the completion of the construction activities.

The mitigation and management measures listed above must be implemented for the duration of the Construction Phase. The Contractor will assume responsibility for ensuring that the mitigation and management measures are executed, unless otherwise indicated.

6.4.6 Corresponding Environmental Authorisation Condition

Condition 20 and Condition 23.12.3 of the EA explicitly calls for the revised EMPr (this document) to include storm water control measures as well as for the development of a Riverine Monitoring Programme, respectively.

6.5 Construction Site Preparation

At the time of preparing this EMPr, as agreed with by the WCDEADP Directorate: Integrated Environmental Management (Region B) of, the construction Site Camp had already been established in line with the mitigation and management measures provided in the EMPr titled "*National Road N7 Realignment and N7/ Clanwilliam Intersection Upgrade, Western Cape Construction Environmental Management Programme*" dated October 2013. The management and mitigation measures provided in Part 6.5.5 of this document have been taken from the "*National Road N7 Realignment and N7/ Clanwilliam Intersection Upgrade, Western Cape Construction Environmental Management Programme*"

6.5.1 Aspect

The establishment of the site will entail demarcating, preparation and clearing of the site as per the approved site plan, erecting site offices, and concrete aggregate stockpiles as well as material storage areas.

6.5.2 Impact

The establishment of the site will necessitate site preparation and clearing, which will result in a loss of vegetation within the demarcated site camp area.

6.5.3 Objective

Minimise environmental impacts associated with site establishment.

6.5.4 Target

Establishment of the site in accordance with the approved Site Plan, thereby confining the associated environmental impacts to the predetermined area.

6.5.5 Management and Mitigation Measures

Accommodation

- No living accommodation shall be available on site for any of the Contractor's employees and no employees will be aloe to sleep overnight on site; and
- A night watchman shall be available on site for any of the Contractor's employees and no employees will be allowed to sleep overnight on site.

General Aesthetics and Lighting

- All construction areas shall be kept neat and tidy at all times. Different materials and equipment shall be kept in designated areas and storing / stockpiling shall be kept orderly; and
- The Contractor shall take reasonable measures to ensure that the construction camp does not have an unreasonable impact on the aesthetics of the area or cause a reasonably avoidable disturbance to the surrounding users.

Water Provision

- The Contractor shall be responsible for ensuring that there is access to clean drinking water for all employees on site; and
- If water is stored on site, drinking water and multi-purpose water storage facilities shall be clearly distinguished and demarcated.

Eating Areas

- The Contractor shall establish eating areas, as agreed with the Resident Engineer (RE) and Environmental Control Officer. These areas shall provide adequate temporary shade to ensure that employees do not move off site to eat;
- The Contractor shall provide adequate refuse bins at all eating areas to the satisfaction of the RE and shall ensure that all eating areas are cleaned up on a daily basis;
- Collected waste shall be stored in a central waste area within the construction camp that has been approved by the RE and ECO;
- Any cooking of food onsite shall be done in only designated areas; and
- No watercourse shall be used for washing of pots, plates and clothing, etc.

Toilet Facilities

- The Contractor shall provide suitable arrangements (e.g. chemical toilets) as per building guidelines (SABS 0400). There should be one toilet for every 15 workers on site (Occupational Health and Safety Act (85 of 1993);
- Toilets must be easily accessible and shall be secured in order to prevent them from blowing over;
- Toilets shall be located within the construction camp and in construction areas there will be concentration of labour. The siting of toilets shall be done in consultation with the RE and ECO to ensure that they are easily accessible for employees;
- ~~Toilets shall not be more than 50 meters away from where construction activities are being undertaken;~~ Toilets shall not be more than 100 meters away from where construction activities are being undertaken.
- Toilets shall not be placed within 32 meters of a watercourse or drainage channel;

- The Contractor shall be responsible for ensuring that all ablution facilities are maintained in a clean and sanitary condition to the satisfaction of the RE or ECO;
- The Contractor shall provide toilet paper;
- Where toilets are connected to conservancy tanks the Contractor shall service these tanks when full and dispose of the sewage at an approved and licenced wastewater treatment plant;
- All sewage disposal slips shall be recorded and submitted to the ECO
- The Contractor shall appoint a suitable Sub-Contractor to empty chemical toilets on a regular basis;
- The Sub-contractor shall ensure that there is no spillage when the chemical toilets are cleaned and that the contents are properly removed from site;
- The Contractor shall be responsible for enforcing the use of these facilities; and
- Performing ablutions outside of established toilet facilities is strictly prohibited.

Location of Construction Camp

The Construction Camp refers to all storage stockpile sites, site offices, container sites, other areas required to undertake construction and rest areas for employees.

- Identify and demarcate the extent of the site camp as per the approved location described in Section I of the EA; and
- The Contractor must provide a Site Plan for the approval of the ECO and the Engineer prior to the establishment of the site. The Site Plan must show the following:
  - Buildings and structures;
  - Location and layout of waste storage facilities;
  - Stockpiling and spoil areas;
  - Hazardous material storage area;
  - Contractors' camp and lay down areas;
  - Site offices;
  - Access Route;
  - Ablution facilities;
  - Eating Areas;
  - Water Provision;
  - Site laboratories; and
  - Batching plants.

6.5.6 Corresponding Environmental Authorization Condition

Condition 23 of the EA calls for the revision and amendment of the EMPR to incorporate the final detailed designs, to update and refine DWS' Generic EMP that was submitted to the WCDEADP as part of the final EIR submission.

6.6 Solid Waste Management

6.6.1 Environmental Aspect

The inherent nature of construction activities will generate domestic and solid waste.

6.6.2 Environmental Impact

The inappropriate storage and disposal of solid waste will result in environmental pollution.

6.6.3 Environmental Objective

In keeping with the principles of the National Environmental Management Waste Act (59 of 2008) all waste management measures which are implemented during the Construction Phase must conform to the Act and all applicable regulations thereunder. Furthermore all waste management measures must be aligned with the objectives of the National Waste Management Strategy (2012) which include the protection of the health, well-being and the environment through sound waste management. The National Waste Management Strategy (2012) serves as a tool to give effect to / implement the Waste Act, and as such it seeks to ensure that responsibility for waste management is properly apportioned. The waste management hierarchy, which advocates that the disposal of waste as a last resort and only implemented in the event where the generation of waste cannot be avoided, nor reduced, will be applied to all construction activities.

6.6.4 Environmental Target

The adoption of the waste management hierarchy will result in continual reduced volumes of waste being generated and disposed of at an appropriate, registered landfill site.

6.6.5 Management and Mitigation Measures

The following waste management measures relating specifically to solid waste must be implemented:

- All domestic waste must be placed in litter bins located as required on the Work Site and within the Contractors camp;
- Waste minimisation, the re-use, recycling and recovery of waste must be promoted;
- Where possible, waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes);
- Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out, and must be animal proof to prevent animals from toppling the litter bins and accessing it's content;
- Ensure that personnel make use of the litter bins provided. Keep all Work Sites and at the Contractors camp tidy and litter free at all times;
- A sufficient number of litter bins which area animal-proof (i.e. scavenger proof) and weatherproof, with lids shall be provided to temporarily store the solid waste produced on a daily basis;
- All litter bins shall be emptied weekly (or as required before they reach capacity);
- A dedicated temporary waste storage area must be identified within the construction footprint. A sufficient number of waste skips, to cater for the anticipated volumes of waste, must be placed in the waste storage area. The temporary waste storage area should be kept clean (e.g. all waste to be placed in the skips) at all times. In the event where the temporary storage of waste is stored for periods longer than 90 days, and where the capacity of the waste storage area exceeds 100m^3, the National Norms and Standards for the Storage of Waste (Government Notice No. 926) made under the NEMWA (2013) must be conformed to;
- A Safe Disposal Slip Register must be maintained by the Contractor;

- Ensure suitable housekeeping;
- The Contractor will ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs;
- All solid waste will be disposed of at suitable licensed disposal sites; and
- As far as reasonably possible wastes should be removed during off-peak periods to reduce the impact on the movement of local traffic.

6.6.6 Corresponding Environmental Authorization Condition

Condition 23 of the EA calls for the revision and amendment of the EMPr to incorporate the final detailed designs, to update and refine DWS' Generic EMP that was submitted to the WCDEADP as part of the final EIR submission. The EA also refers to the adoption of the Waste Management Hierarchy.

6.7 Hazardous waste management

6.7.1 Aspect

Hazardous substances will be used and stored on site and will include diesel, curing compounds, shutter oil and cement.

The inappropriate handling or storage of any hazardous substance which is released into the receiving environment (i.e. through spillage) will result in the contamination of soil and immediate watercourses. A significant hazardous substance spills which enters the watercourse will adversely impact on the aquatic ecosystem and reduce the quality of water used by downstream farmers for irrigation.

6.7.2 Objective

Ensure the protection of the receiving and sensitive environments through the correct management and handling of hazardous substances.

6.7.3 Target

No environmental pollution caused by the handling and storage of hazardous substances.

6.7.4 Management and Mitigation Measures

The following management and mitigation measures relating to the storage and handling of hazardous substances must be implemented:

- All hazardous substances (including paint and fuel) must be stored in secure, safe and weatherproof facilities, underlain by a bunded concrete slab to protect against soil and water pollution. The bunded area must be able to contain 110% of the total volume of the stored hazardous substance;
- In the event of a significant hazardous substance spillage or leakage, the ECO must investigate the incident and prepare a report which documents the following information:
  - Environmental Aspect associated with the incident;
  - The manner in which the incident happened;
  - Indicate whether any preventative measures were not implemented;
  - Determine the reason why the incident occurred;
  - Required and appropriate rehabilitation and remediation measures;

- Indicate whether the actions which resulted in the incident were aligned with the applicable Method Statements;
- The type of work, process or equipment involved; and
- Recommendations to avoid future such incidents and/or occurrences.

A copy of the Incident Report should be submitted to the WCDEADP.

- Any accidental spills must be cleaned immediately, treating the spilled material using absorbent material. Spill kits must be kept on site to use in the event of a hazardous substance spillage;
- All cleaning of equipment, batching plants, trucks and flushing of mixers will not result in pollution, with all contaminated wash water (including water from the batching plants) entering the waste water collection system (e.g. be diverted to sedimentation / settling ponds). Contaminated water may therefore not be discharged to the environment;
- Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement;
- Used cement bags will be stored so as to prevent windblown dust and potential water contamination and will be appropriately disposed of;
- Controlled loading / unloading areas must be underlain by impervious paving or PVC sheet to protect against soil and water pollution;
- Environmental Awareness Training must include the correct handling, use and disposal of any spilled hazardous substance;
- Material Safety Data Sheets which provides all information relating to the specific hazardous substances stored on site must be prepared and be readily accessible;
- Empty containers in which hazardous substances were kept are to be treated as hazardous waste and disposed of at a licenced hazardous waste disposal facility;
- All storage tanks containing hazardous materials must be placed in bunded areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material.
- Hydrocarbon leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair
- No servicing of equipment on site unless approved by the ECO and EO.
- All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.
- A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The hydrocarbon spill management plan must include the following:
  - The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.
  - Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when no in use.
  - All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.
  - Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.
  - Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.
  - All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the PAOI.

The following management and mitigation relate specifically to the temporary storage of fuel onsite:

- The fuel tanks must be designated and installed in accordance with the relevant Oil Industry Standards and SANS codes where applicable for above ground storage tanks;
- Fuel storage tanks must be located within bund (110% of the tank's storage capacity);
- During fuel tanker delivery, the tanker driver must be present at all times during product offloading. Should an incident occur, and emergency cut-off switch must be used to immediately stop fuel delivery. Flexible hoses with beak couplings and emergency isolation must be used;
- The Contractor must ensure that effective stock inventory monitoring, recording and regular auditing takes place for early identification of possible leaks and maintain a leak history for the site;
- The requirements of the Occupational Health and Safety Act (85 of 1993) must be adhered to;
- Crash barriers must be installed around the fuel tanks;
- An onsite emergency plan must be developed and implemented and must be drafted in consultation with the relevant Municipality's Emergency Services; and
- Within six months of the tanks ceasing to be functional for the purpose of temporary fuel storage, the tanks and associated infrastructure must be removed from site at the expense of the project proponent. The area associated with the fuel storage tanks and associated infrastructure must be rehabilitated to the satisfaction of the ECO and relevant local municipality.

6.7.5 Corresponding Environmental Authorization Condition

Condition 17 of the EA provides management, and mitigation measures specific to the temporary storage of fuel to be implemented. As per Condition 23.12.8 of the EA, the revised EMPr must include management and mitigation measures relating to the storage and management of hazardous materials and other construction materials such as cement, detergents and paints.

6.8 Aquatic ecosystems management

6.8.1 Aspect

Water quality, especially turbidity and pH, in the Olifants River immediately downstream of the construction site may deteriorate due to construction related activities. Furthermore, pollutants may find their way into the river system. Typical sources of pollution include oils and fuels from construction vehicles and construction material such as cement, detergents, paints and other chemicals.

6.8.2 Impact

Any pollutants which find their way into the river system could cause damage to the riparian habitat, lead to increased siltation (water quality deterioration) and adversely affecting aquatic biota (e.g. Clogging of gills, influence movement).

6.8.3 Objective

Ensure that all reasonable measures are taken to prevent any impacts on the characteristics of the watercourses associated with the development area.

6.8.4 Target

- The downstream flow regime must remain unchanged,
- The downstream water quality to remain within acceptable ranges, as prescribed by Resource Water Quality Objectives.

6.8.5 Management and Mitigation Measures

The following management and mitigation measures aimed at preventing any adverse impacts on the aquatic biota must be implemented:

- Silt traps within the watercourse channel and along the riparian habitat should be installed and maintained.
- If silt traps are not deemed feasible, other suitable measures need to be taken to limit the suspension of unnaturally high sediment volumes in the stream;
- Implement site specific and suitable storm water measures during construction to prevent the ingress of runoff into watercourses; and
- Ensure proper storage and safe handling of hazardous substances.

6.8.6 Corresponding Environmental Authorization Condition

Condition 23.12.11 of the EA stipulates that the revised EMPr must make provision for the management and rehabilitation of sedimentation of the riverine systems caused by construction activities.

6.9 Material Sourcing, Earthworks and Stockpiles

6.9.1 Environmental Objective

Ensure that materials are sourced from authorised operations and that stockpiled material potential impacts the environment is limited.

6.9.2 Environmental Target

A comprehensive record providing the source of all sourced material will be maintained. Stockpiled material must not exceed a height of 3 meters. Stockpiled aggregates must not exceed a height of 3 meters and stockpiled topsoil must not exceed a height of 2 meters.

6.9.3 Management and Mitigation Measures

The following management and mitigation measures should be implemented to achieve the set environmental target relating to material sourcing, earthworks and stockpiles:

- The Contractor will be required to prepare a source statement to indicate the sources of all construction materials and submit these to the Engineer for approval. The Source Statement must include sources from commercial suppliers;

- Stockpiles will not be allowed underneath trees or against the trunks of trees;
- Stockpiles will be constructed and maintained to avoid erosion of the material and contamination of the surrounding environment;
- Stockpiles will be kept free of all alien vegetation;
- The heights of stockpiles should not exceed 1.5 meters to reduce wind entrainment and stockpiles should be located as far away from sensitive receptors as possible; and
- Windbreaks should be erected around stockpiles where possible in order to reduce wind entrainment of dust emissions (also refer to the mitigation measures provided in Part 6.12.5 of this EMPr).

6.10 Topsoil Management

6.10.1 Aspect

Prior to the commencement of the construction activities, the topsoil from the areas where construction activities will be undertaken, excluding the batching plant and construction site camp.

6.10.2 Impact

The incorrect handling and storage of topsoil will reduce the re-growth potential of the topsoil to be used for rehabilitation of the construction footprint.

6.10.3 Objective

Ensure that all reasonable management measures are implemented to maintain the re-growth potential of the topsoil to be used for rehabilitation of the construction footprint.

6.10.4 Target

To retain the usefulness of topsoil for the rehabilitation of the site.

6.10.5 Management and Mitigation Measures

Management and mitigation measures relating to the removal, storage and maintenance of topsoil includes the following:

- Prior to the commencement of the construction activities the topsoil layer must be removed and be stockpiled separately from overburden (subsoil and rocky material). In the absence of a recognizable topsoil layer, strip the upper most 300mm of soil;
- Co-ordinate works to limit unnecessarily prolonged exposure of stripped areas and stockpiles. Vegetation cover must be retained for as long as possible;
- Stripping of the topsoil must not be carries out when wet;
- Topsoil must be stored in a demarcated area;
- Stripping of the topsoil may not be carried out during wet / high rainfall periods;
- Stockpile topsoil stripped from different sites separately, as reapplication during rehabilitation must preferably be site specific. If necessary keep a stockpile register.
- Do not mix topsoil obtained from different sites.
- Topsoil is to be handled twice only – once to strip and stockpile, and once to replace and level.

- Position topsoil stockpiles on the higher side of a disturbed area, and above a 1:50 year flood line wherever possible.
- Ensure that all topsoil is stored in such a way and in such a place that it will not cause the damming up of water, erosion gullies, or wash away itself.
- Stockpiled material may not exceed a height of 1.5 meters;
- Protect topsoil stockpiles from erosion;
- Exotic / invasive plants and broad leaf weeds that emerge on topsoil stockpiles removed by hand;
- If topsoil is to be stockpiled for extended periods, especially during the wet season, stockpiles may be re-vegetated with indigenous grasses and covered with a protective material such as hessian mats;
- Ensure that topsoil is at no time buried, mixed with spoil (excavated subsoil), rubble or building material, or subjected to compaction or contamination by vehicles or machinery. This will render the topsoil unsuitable for use during rehabilitation; and
- The Contractor will be held liable for the replacement of any topsoil rendered unsuitable for use during rehabilitation, for reasons due to his negligence or mismanagement on site.

6.11 Visual and Aesthetics Management

6.11.1 Aspect

The establishment of the construction site, construction activities, establishment of site infrastructure and security lighting the construction area during the evening will alter the visual aesthetics of the immediate area.

6.11.2 Impact

Safety and security lighting of the site camp area, batching plant and specific construction areas where such activities are carried out during the evening will create a visual intrusion on residences in close proximity to the site and by-passers. Dust generated by the construction activities can also result in a visual intrusion. The establishment of the construction site, construction activities and the visibility of the site infrastructure will constitute a visual intrusion.

6.11.3 Objective

Ensure that all reasonable management measures are implemented to reduce the significance of the impact on the aesthetic character of the area.

6.11.4 Target

No complaints raised by I&APs relating specifically to the impacts to visual quality associated with the ~~proposed~~ project.

6.11.5 Management and Mitigation Measures

- The visual impact of raising the dam wall by 13 m, by adding concrete on the downstream face of the overspill, cannot be significantly mitigated due to its scale in the landscape. Viewer related mitigation measures could however be implemented, including for example, the planting of trees at receptor sites (e.g. Cederview) to screen

the raised wall and accordingly minimise the visual impact. In this regard, indigenous vegetation ~~will~~ may be planted in strategic locations to function as a vegetative screen;
- All reasonable measures must be taken to avoid the generation of dust as provided in Part 6.14 of this EMPr;
- The stockpiles may not exceed a height of 1.5 meters, thereby reducing the visibility of the stockpiles beyond the demarcated stock area. Where practical stockpiles should also be located in areas which are not in the line of sight of surrounding land users;
- The movement of construction vehicles and workers must as far as reasonably possible be restricted to the immediate site and access roads;
- As far as reasonably possible construction activities should be confined to daylight hours. In the event where construction activities cannot be confined to daylight hours all Interested and Affected Parties should be notified of the extended working hours, which will be approved by the ECO and project manager, and provided with the reason for the extended working hours, at least 24 hours beforehand;
- It must be ensured that rubble, litter and construction rubble are collected and appropriately stored until the collection and disposal thereof at an appropriate registered landfill site;
- Appropriately site the construction camp as well as other storage areas and consider screening through the erection of shade cloth; and
- The visual intrusion associated with lighting of the construction site must be managed through the implementation of the following (but not limited to):
    - The light fixtures must be mounted to face downwards and only be erected where lighting is necessary; and
    - Making use of motion detectors on security lighting, to ensure that area remains dark until lighting is required for security purposes.

6.11.6 Corresponding Environmental Authorization Condition

Condition 23.12.10 of the EA specifies that the revised EMPr must make provision for management measures aimed at mitigating the visual impacts associated with the proposed project, with specific reference to light pollution during the evening.

6.12 Air Quality Management

6.12.1 Aspect

The movement of construction vehicles across bare soil surfaces and the exhaust fumes gaseous pollutants (e.g. sulphur dioxide) released from vehicle exhausts will alter the ambient air quality of the immediate area. High wind speeds is likely to generate dust particles from topsoil and spoil stockpiles.

6.12.2 Impact

The release of pollutants generated by gaseous emissions and the release of particulate matter into the air, will reduce the quality of air in the immediate areas surrounding the construction footprint.

6.12.3 Objective

It must be ensured that the volumes of dust generated by the construction and associated activities, do not exceed the National Ambient Air Quality Standards and Minimum Emissions Standards and may not result in any adverse impacts on human health.

6.12.4 Target

The following will serve as indicators of the extent to which the environmental objectives relating to the management of air quality, have been reached:

- No complaints recorded by I&APs relating specifically to dust pollution and health concerns;

6.12.5 Management and Mitigation Measures

- Appropriate dust suppression measures or temporary stabilising mechanisms must be used in instances where dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather;
- Dust suppression to be undertaken for all bare areas, including construction servitude, access roads, borrow pits, site yard, etc.;
- A dust management plan must be implemented for crusher plant operations;
- Any dust control system (i.e. sprinkler or vacuum) that is installed must be maintained and controlled to prevent impacts associated with excessive runoff (e.g. soil erosion);
- Within the construction area, construction / heavy vehicles and light vehicles will not be permitted to travel at speeds exceeding 20 km/h and 40 km/h, respectively; and
- The Contractor will take preventative measures to minimise complaints regarding dust nuisances (e.g. screening, dust control, timing, pre-notification of I&APs);
- The deposition of dust (i.e. dustfall) within the development footprint and the immediate adjacent area must remain within the Acceptable Dustfall Rates (refer to Table 6-1) provided in the National Environmental Management: Air Quality Act (39 of 2004) (NEMAQA) National Dust Control Regulations 2013 (R.8275). The method (including the selection of sampling points) to be employed applied for measuring the dustfall must be aligned with the technique provided in the ASTM D1739:19706. The data generated by the recorded dustfall rates must be used to prepare a Dustfall Monitoring Report which conforms to Regulation 5 of NEMAQA National Dust Control Regulations 2013 (R.827). In the event where quantities of dust exceeding the dustfall standard provided in Regulation 3 NEMAQA National Dust Control Regulations 2013 (R.827), must upon receipt of a notice form an Air Quality Officer, implement a dustfall monitoring programme.

[5] South Africa. 2004. National Environmental Management: Air Quality Act (39 of 2004) National Dust Control Regulations, 2013. (Notice 827). *Government gazette*, 3697:4, 1 Nov.

6 ASTM D1739: American Standard for Testing and Materials method D1739, which is the standard test method for the collection and measurement of dustfall.

Table 6-1: Acceptable Dustfall Rates

Restriction Areas	Dustfall rate (D) (mg/m^2/day, 30 –days average)	Permitted frequency of exceeding dustfall rate
Residential area	D<600	Two within a year, not sequential months.
Non-residential area	600<D<1200	Two within a year, not sequential months.

6.12.6 Corresponding Environmental Authorization Condition

Condition 23.12.7 of the EA stipulates that the revised EMPr must include management measures relating to dust control.

6.13 Noise Control

6.13.1 Aspect

The movement of construction activities, construction vehicles and heavy machinery as well as construction personnel will alter the ambient noise levels in the area. The construction site would operate 24-hours per day, for a portion of the construction period, if not for the full duration.

6.13.2 Impact

The increased noise levels caused by the movement of construction activities, construction vehicles and heavy machinery as well as construction personnel, and which is audible by the surrounding receptors may cause a nuisance and disturbance.

6.13.3 Objective

Increased noise levels must be maintained below levels which will be audible by the surrounding receptors.

6.13.4 Target

Noise levels at the boundary of the development footprint will not exceed 7 dB above ambient levels.

6.13.5 Management and Mitigation Measures

The following management and mitigation measures relating to the control of noise generated during the Construction Phase must be implemented:

- Noise mufflers and/or soft explosives must be used during blasting to minimise the impact on humans and animals;
- No amplified music will be permitted on site and in construction camps;
- All noise levels must be controlled at the source;
- If the noise levels at the boundaries of the site exceed 7 dB above ambient levels, the local health authorities must be informed;
- All onsite workers must be provided with the necessary ear protection gear;

- I&APs must be informed of the excessive noise factors and responding promptly to noise complaints;
- Ensure construction activities are restricted to daytime hours (07:00 – 17:00) to avoid night-time disturbance;
- ~~Local municipal by-laws specific to noise must be adhered to;~~
- Blasting operations must be strictly controlled with regard to the size of explosive charge in order to minimise noise and air blast, and timings of explosions. The number of blasts per day should be limited, blasting should be undertaken at the same times each day and no blasting should be allowed at night. All I&APs must be notified least 24 hours prior to the blasting;
- The SANS10103 (2008) should be applied to provides a guidance for determining the community's response to the increase in the general ambient noise level caused by the Construction Phase;
- Blasting, use of pneumatic tools and other noise intensive operations must be restricted to normal working hours (07:00 – 17:00);
- Amplified noise such as sirens and announcements limited to restricted hours other than cases of emergency;
- Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours; and
- Respond to community complaints with regard to noise generation, taking reasonable action to ameliorate the impact. Where complaints cannot be addressed to the satisfaction of all parties, the Contractor will, upon instruction by the Project Manager, provide an independent and registered Noise Monitor to undertake a survey of the noise output levels.
- When noise levels increase to above 7dB above ambient noise levels, the contractor shall implement all mitigation measures in accordance with applicable standards and to recommendations made by the specialist report and the ECO.

6.13.6 Corresponding Environmental Authorization Condition

Condition 23.12.7 of the EA stipulates that noise control measures must be provided in the updated EMPr.

6.14 Traffic and Roads Management

6.14.1 Aspect

Construction vehicles would make use of the existing roads in the area, including the N7 to transport material to the dam site. In addition the construction site would operate on a 24-hour basis. A high volume of traffic currently travels on the N7 between Clanwilliam and Citrusdal, and the road is poor, in parts with no shoulders or passing lanes. The current road works associated with the Realignment of the National Road N7 and the N7 / Clanwilliam Intersection Upgrade will also increase the number of construction vehicles which travels on the existing roads in the area.

6.14.2 Impact

The increased traffic volumes caused by the travelling of construction vehicles to and from the construction area will impact negatively on the traffic flow, the structural integrity of the N7 and may exacerbate the risk of vehicular accidents, especially at night.

6.14.3 Objective

It must be ensured that the number of construction vehicles and trips undertaken by the construction vehicles to and from the construction area

6.14.4 Target

- No road accidents involving or caused by the construction vehicles travelling on public roads; and
- No complaints reported by I&APs relating to the traffic impacts associated with the travelling of construction vehicles on public roads.

6.14.5 Management and Mitigation Measures

The following management and mitigation measures relating to the management of the traffic impacts resulting from the movement of construction vehicles to and from site during the Construction Phase must be implemented:

- The phasing of the construction of the dam should be considered as a means of ensuring that access for traffic on the N7 is maintained, and conflicts between construction traffic hauling material between the quarry and the dam wall and the traffic on the N7 are reduced;
- The method of transporting concrete from the batching facility (west of the N7 and dam wall) to the dam wall, would need to be carefully considered to reduce the impact on traffic using the N7, i.e. a conveyor system across the existing N7 to the wall would not be desirable, as the risk of spillage over the N7 would pose a significant safety risk to road users. It would accordingly be preferable for concrete pipe/s to be jacked under the road fill to accommodate the conveyor system, thereby reducing the safety risk and traffic impacts; and
- Ensuring that all regulations relating to traffic management are observed and by notifying the local traffic officials of programmed construction activities. As far as possible, attempts should be made to ensure that high construction-related road usage coincides with low traffic flow periods.

6.14.6 Corresponding Environmental Authorization Condition

Condition 23 of the EA calls for the revision and amendment of the EMPR to incorporate the final detailed designs, to update and refine DWS' Generic EMP that was submitted to the WCDEADP as part of the final EIR submission.

6.15 Heritage Resource Management

6.15.1 Aspect

The Clanwilliam Dam is located in an area where numerous sites containing rock art, Stone Age tool deposits and other culturally significant artefacts are found.

6.15.2 Impact

The raising of the dam could result in the inundation of inter alia significant artefacts and rock paintings from the Early, Middle and Later Stone Ages, as well as historical structures, road infrastructure, industrial infrastructure, quarries and graves.

6.15.3 Objective

Ensure that a documented record all heritage and paleontological artefacts within the development area is established. Prevent disturbance and damage of unmarked graves (e.g. Khoisan Graves).

6.15.4 Target

No disturbance to sites of heritage importance and burial sites which fall outside the extent of the new Full Supply Level of the Clanwilliam Dam.

6.15.5 Management and Mitigation Measures

The following management and mitigation measures relating to reduce the significance and / or damage to heritage and paleontological artefacts during the Construction Phase must be implemented:

- Any heritage or paleontological artefact (e.g. Early Stone Artefacts) uncovered / found during the Construction Phase should be fenced off for protection. The provincial Heritage Resource Agency must be notified of any found heritage or paleontological artefact. Furthermore a professional archaeologist must monitor such operations at a schedule agreed upon by the provincial Heritage Resource Agency;
- In the event where any remains be found on site that is potentially human remains, the South African Police Service must be informed thereof and all works surrounding the area should be halted. Following public consultation, the graves must be exhumed and re-interred either in a new cemetery or relocated to the Municipal Cemetery in Clanwilliam;
- The photographic record of the development footprint as specified in Condition 22 of the EA must be verified by a professional archaeologist prior to the onset of the construction activities; and
- No heritage material may be destroyed or removed from site without a relevant permit issued by the Provincial Heritage Resources Authority.

6.15.6 Corresponding Environmental Authorization Condition

Condition 22 of the EA stipulates mitigation measures that must be implemented to reduce the significance / prevent impacts on heritage resources as well as management measures to be implemented in the event of any heritage remains being uncovered.

The proponent has appointed a heritage resources specialist that has commenced with the relocation of rock art within the inundation zone between the current water level and anticipated purchase line. The specialist expects to complete mitigation actions and relocations by end of 2015.

6.16 Health and Safety

6.16.1 Aspect

The nature of the construction activities and magnitude of the ~~proposed~~ project activities inherently have the potential to impact on the health and safety of the construction workers and the community.

6.16.2 Impact

Unsafe working conditions and the absence of a Health and Safety Plan may result in injury to workers and loss of life.

6.16.3 Objective

Provision of a safe working environment to construction workers and the public.

6.16.4 Target

Ensuring that health and safe working environment is provided will be dependent on the following:

- Implementation of an approved Health and Safety Plan
- No incidents, injury or loss of human life; and
- Compliance with the Occupational Health and Safety Act.

6.16.5 Management and Mitigation Measures

The following mitigation and management measure aimed at ensuring the health and safety of working and preventing injury or loss of human life must be implemented:

- The safety of all construction and operational personnel, as well as any member of the public on the site is the responsibility of the Contractor. The Contractor shall also ensure the site is managed to ensure the unauthorised persons does not come to harm;
- Control access onto and off the site by means of a register system;
- Ensure that first aid / emergency facilities / procedures are in place;
- Ensure that all personnel are trained in basic site safety procedures;
- A register with contact numbers of all people employed and one emergency contact person for each employee;
- Keep a list of all relevant emergency numbers in an easily accessible location on site;
- Maintain a record of all incidents and illnesses on site and make the information available at meetings;
- Ensure that proper footwear is worn by employees at all times;
- Ensure that employees are issued with and make use of the necessary safety equipment when working in dusty, noisy and / or dangerous situations. Personal Protective Equipment (PPE), including, but not limited to hardhats, goggles, masks, earplugs, gloves, safety footwear and safety ropes as required;
- Ensure that adequate drinking water, wash water and sanitary facilities are available at all times and on all work sites;
- <u>A designated and adequate resting and eating area must be provided on site</u>

- Ensure that adequate ablution facilities are provided on site and appropriately labelled for different genders.
- ~~A designated area for food storage, preparation and consumption must be provided on site;~~
- Ensure that all vehicle and machine operators are qualified and licensed to operate their vehicles / machines;
- The Contractor will prepare and submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval by a Health and Safety Officer prior to the commencement of the construction activities. The Health and Safety Plan must be prepared in accordance with Regulation 7(1)(a) of the Occupational Health and Safety Act (85 of 1993) Construction Regulations 2014 (Government Notice No. R.84);
- Fencing and barriers must be put in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993);
- Applicable notice boards and hazard warning notices will be put in place and secured;
- All construction personal must be clearly identifiable and provided with employee cards for identification purposes;
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993); and
- Cordon off dangerous excavations or Works that may pose a hazard to humans and animals.

6.17 Site rehabilitation

6.17.1 Aspect

The rehabilitation works carried out following the completion of all construction activities will include the following:

- Removal of structures and infrastructure;
- Inert waste and rubble;
- Hazardous waste and pollution control;
- Final shaping and landscaping;
- Topsoil replacement and soil amelioration;
- Ripping and scarifying;
- Planting;
- Grassing; and
- Maintenance of the rehabilitated areas.

6.17.2 Objective

Reinstatement and rehabilitation of construction site to the satisfaction of the ECO and WCDEADP.

6.17.3 Target

The rehabilitation and remediation activities will ensure that a complete site clean-up is carried out and that the entire construction site is reinstated and rehabilitated.

6.17.4 Management and Mitigation Measures

Removal of structures and infrastructure

During and following the completion of the construction activities, the area must be rehabilitated by appropriate landscaping, levelling, topsoil dressing, land preparation, alien plant eradication and vegetation establishment. All construction plant, equipment, storage containers and temporary fencing must be removed from site.

Waste and pollution control

- Waste minimisation, the re-use, recycling and recovery of waste must be promoted;
- Rubble, including surplus rock, foundations and batching plant aggregates will be removed from the construction site and firstly recycled and re-used, where possible, before disposed of at a registered landfill site; and
- All waste storage containers will be removed from site.
- All portable sanitation facilities will be removed by a certified contractor. It must be ensured that no leaks or spillage from sanitation facilities occurs during the removal thereof; and
- All hazardous waste which is temporary stored on site, including the storage containers must be removed from site and disposed of at a registered hazardous landfill site.

Final Shaping and landscaping

- Where possible all disturbed areas must be shaped so as to blend in with the surrounding landscape;
- Where possible, programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil;
- Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material; and
- Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfill is smoothed over to blend in with the surrounding landscape.

Grassing

- Grassing must be undertaken by a suitably qualified Contractor;
- Grass areas using the method specified on the plant plans;
- Sodding may be done at any time of the year, but seeding must be done during the summer when the germination rate is higher; and
- Hydro-seeding with a winter mix will only be specified where re-grassing is urgent, and cannot be postponed until summer.

Ripping and Scarifying

- Rip and / or scarify all areas following the application of topsoil to facilitate re-growth of vegetation. The ECO will specify whether ripping and / or scarifying is necessary, based on the site conditions immediately before these works begin;
- Rip and / or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the works;
- Rip and / or scarify along the contour to prevent the creation of down-slope channels;
- Rip and / or scarify all areas at 300mm intervals (but not more than 400mm intervals), ensuring that the lines overlap; and
- Areas may not be ripped / scarified under wet conditions, as the soil will not break up.

Topsoil replacement and soil amelioration

- The principle of Progressive Reinstatement must be followed wherever possible. This includes the reinstatement of disturbed areas on an ongoing basis, immediately after the specified construction activities for that area are concluded;
- Execute top soiling activity prior to the rainy season or any expected wet weather conditions;
- Execute topsoil placement concurrently with construction where possible, or as soon as construction in an area has ceased;
- Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes and roads. Replace topsoil to the original depth. These areas will be quantified by the ECO;
- Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality;
- The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage, and approved by the ECO; and
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation.

Introduction of alien and invasive species, especially plants

- Before dam levels are raised, all alien and invasive plant species must be cleared from the inundation zone. Failure to do so may result in the spread of alien and invasive reproductive plant material to sensitive habitats.
- Conduct regular checks for alien invasive plant (AIP) encroachment during the operational phase to prevent alien invasion issues due to disturbances. Monitoring should occur every three months for the first two years and every six months thereafter for the project's duration.
- Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage.
- All activities must make use of existing roads and tracks as far as practically and feasibly possible. No new roads or servitudes should be constructed where existing infrastructure can be used.

Maintenance of rehabilitated areas

- Allow for a maintenance period of one year following practical completion;
- Landscape maintenance must be undertaken by a suitably qualified professional landscape architect;
- Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access.
- Re-vegetation must match the vegetation type which previously existed, unless otherwise indicated in the Contract or specified by the EO / ECO.
- Water all transplanted, planted and grassed areas;
- For planted areas that have failed to establish, replace plants with the same species as originally specified. The same species as originally specified must be used unless otherwise specified by the EO / ECO; and

- A minimum grass cover of 80% is required, and individual plants must be strong and healthy growers at the end of the Maintenance Period.

Quarry rehabilitation

- The rehabilitation plan of the Quarry has been developed and approved by the Department of Mineral Resources and Energy. The Rehabilitation plan is provided in **Appendix E** to this EMPr for consideration. If required more detailed explanations can then be given in Method Statements.

Habitat rehabilitation

- A habitat rehabilitation plan must be compiled and implemented for all areas denuded during the construction phase, or those areas already impacted by construction activities.

7 RESOURCE IMPACT MONITORING

This section deals with monitoring of local resources as specified during the Environmental Impact Assessment (EIA) phase and specialist studies. No specific monitoring measures were provided and the following were extracted from specialist studies:

7.1 Ecological

In order to ensure that the Reserve, Ecological Flow and riverine health requirements are met, a detailed riverine monitoring programme must be developed and submitted together with the Clanwilliam Dam and Bulshoek Weir operating rules.

7.2 Heritage

Early Stone Age artifacts and/or fossilized bones might be exposed during earth moving operations. A professional archaeologist must monitor any such operations at a schedule agreed upon by Heritage Western Cape and the applicant.

7.3 Groundwater

7.3.1 Justifiable claims to unforeseen groundwater impacts

Possible Impacts on groundwater relating to the increase of the dam supply level and inundated zone was identified in the original Environmental Impact Assessment for the ~~proposed~~ Clanwilliam Dam raising project. Impact relating to any decreased downstream subsurface flows will be mitigated by way of reserve releases from the Clanwilliam Dam. However, if any justifiable claim regarding an impact on the groundwater resources is made a suitable qualified and experienced groundwater specialist must be appointed to investigate and mitigate such impacts.

7.3.2 Development of a monitoring framework

~~A suitably qualified and experienced groundwater specialist should be appointed by the DWS to carry out extensive groundwater monitoring to inform the groundwater management measures. A suitably qualified and experience groundwater specialist should be appointed by the DWS to carry out groundwater monitoring to inform the groundwater management measures. This specialist may be a suitably qualified internal DWS specialist.~~

Short-term monitoring plan

Short-term monitoring will be implemented for areas associated with active work areas, specifically site quantity and quality impact.

Objectives:

Catch and manage construction-related water-quality risks (hydrocarbons, cement wash water, sediment) and alluvial/shallow GW responses around the works, N7 tie-ins, and material sources. These are the impacts the EIA highlights for construction (water quality deterioration, sedimentation/erosion, hazardous substances).

Establishment of the monitoring system/network (construction phase – short term):

- Springs/seeps within ~2 km of the wall footprint and road works (map & tag each spring/weep line; use simple V-notch plates where feasible for repeatable readings).
- Alluvial contact points (riverbanks, dewatering sumps/outfalls) immediately upstream and downstream of works to track turbidity and any cement/hydrocarbon signatures.
- Existing lawful boreholes/wells within ~2–3 km (opportunistic only, no new drilling) for quarterly spot checks to corroborate spring/seeps trends.

Construction can drive sedimentation/erosion, deterioration of water quality, and risks from stored hazardous substances; these are best detected at seeps, shallow alluvium, and discharge points tied to the site works and N7 realignment.

Parameters & frequency:

- Field (weekly during active works; after >10 mm rainfall; monthly otherwise): EC, pH, temperature, turbidity/NTU.
- Lab (monthly during active works; quarterly otherwise): TSS, alkalinity, major ions (Ca, Mg, Na, K, Cl, SO_4, HCO_3), nitrate-N, TPH (if any hydrocarbon handling in the sub-area), and dissolved metals only if visual/field flags arise.
- Visual/operational checks (weekly): bund integrity, spill kits, cement wash-water containment, and silt control efficacy (SED fences, traps) logged in the EMP site diary.

Triggers & responses**:**

- Hydrocarbons: any TPH detection → isolate source, replace absorbents, sample daily until non-detect.
- Cement influence: pH > 9.0 or spike in alkalinity at a discharge point → stop wash-water release, pump to lined containment for haul-off; resample within 24 h.
- Sediment: NTU/TSS at downstream points > upstream by >50% during dry weather → review erosion controls, install additional traps, reseed/cover disturbed areas; re-check in 48 h.
- Springs/seeps: step-change (>25%) in EC or sustained turbidity during dry spells → targeted site audit for leaks/stockpiles/runoff path; add straw bales/geo-fabric as interim control, then re-sample.

Reporting:

- Establish project EMP with weekly checklists and a monthly one-pager (map, table of results, exceedances & actions).

Long-term - Operation monitoring plan

Objectives:

Track regional TMG aquifer behaviour (quantity first, quality pragmatic) under raised full storage water level (FSL) and any conjunctive-use development. It is proposed that a dedicated study be undertaken to ensure that the monitoring program ties in with DWS Environmental Management Frameworks (EMFs) for the greater project area, as well as existing monitoring networks such as the Water Management System (WMS) and Resource Quality Objectives (RQS).

Borehole monitoring (6-10 sites)

- Identify NW–SE megafault trends (e.g., Klawer-linked structures) and within the Peninsula and Nardouw/Skurweberg units up- and downstream of the dam (synclinal axis and limbs).
- Drill boreholes to the required effective depths that best represent the full aquifer thickness, or zone associated with inflow from the predicted groundwater mound. This should be determined by dedicated geophysical investigations
- Equip 2–3 boreholes with loggers for continuous water level monitoring; the rest quarterly manual dips (or as determined by the existing DWS monitoring program for the region).

Spring-flow stations (8–12 priority springs):

- Gauge perennial springs that reflect TMG pressure response (classify by unit if possible).
- The springs should be identified via dedicated hydrocensus and spring survey studies, and regulated by DWS

Recharge & climate sentinels

- It is proposed that dedicated rain gauges in the high-MAP recharge belt (Krakadouwberge/southern Cederberg) be installed, as well as 1 in the lowland area.
- If possible, simple soil-moisture probes at two mountain-front sites can be considered to evaluate recharge pulses (if required and for drought predictions).

Parameters & frequency:

- Water levels: continuous (loggers) at index holes; monthly elsewhere; weekly spring discharges in Year 1, taper to monthly in Years 2–3 once seasonal envelopes are established
- Chemistry (quarterly, taper to biannual or annual depending on trends): EC, pH, T, alkalinity, major ions; nitrate-N, chloride/sulphate (mixing/salinity flags).
- Isotopes (every 2 years at 3–4 sites): $\delta^{18}O/\delta^{2}H$ to fingerprint recharge elevation/seasonality if resources allow (optional but very informative for TMG).
- Rainfall: daily totals; compute rolling recharge indices aligned to the report's recharge-centric approach.

Triggers & management:

- Drawdown: >1.0 m below the seasonal 10th percentile in any index hole for >60 days → investigate pumping patterns; if linked to abstractions, step down rates regionally per license conditions.
- Quality: >20% step-change in Cl^- or SO_4^{2-} season-adjusted median → targeted source check (salinity ingress, irrigation return), add a monthly chem cycle until stabilised.
- Springs: 30% flow reduction outside seasonal band → diagnose (rainfall deficit vs pressure decline); consider conjunctive-use balancing (e.g., surface releases vs pumping curtailments).

- Aerial photo interpretation (1:50 000 to 1:10 000 orthophoto scale) and field mapping of boundaries in Nardouw Subgroup (bottom and top of Skurweberg Aquifer, possible aquitard zone between Skurweberg and Rietvlei hydrostratigraphicunits) around Clanwilliam Dam site and town must be undertaken;
- Conceptual formulation, spatial planning of monitoring sites and technical design of a groundwater monitoring network appropriate in location and scale to the anticipated problem of aquifer-related impacts must be considered;
- Incorporation of local seismographic monitoring for the detection and hyocentral location of micro-earthquakes possibly related to groundwater movement along major and/or minor hydrotect structures.

7.4 Description of the Monitoring Programme

When developing a monitoring programme, the following should be addressed. The monitoring programme should consist of three main aspects:

- **Baseline assessment**. This must occur prior to the start of the project or activity in order to determine the level and status of the environmental parameters prior to any impacts associated with the project or activity (excluding[7] the Site Camp area).
- **Impact (or performance) monitoring.** This monitoring should be ongoing throughout the project life-cycle and must be implemented to ensure that environmental impacts are within the predicted levels; and
- **Compliance monitoring.** This monitoring must be implemented to ensure that the prescribed mitigation measures are having the predicted and desired effect. This monitoring would be conducted periodically, the timing of which will vary from project to project. It must be used to check that the levels of specific environmental parameters are compliant with laws, regulations, standards or guidelines, as applicable. The programme must make provision for remedial measures to be effectively implemented in the event of non-compliance, i.e. when mitigation measures are inadequate or when impacts have been underestimated in the impact assessment study.

8 MONITORING COMPLIANCE WITH EMPR

8.1 Environmental Awareness Plan

In keeping with Regulation 33(j) of the NEMA EIA Regulations 2010 (Government Notice R.543) this part of the EMPr provides an account of the approach that will be adopted for Environmental Awareness Plan during the Construction Phase of the ~~proposed~~ project. The Environmental Awareness Plan is intended to describe the method that will be adopted by the DWS to inform any person acting on their behalf, including an agent, sub-contractor, employee or any person rendering a service, of any environmental risk which may result from the implementation of the project activities and the manner in which risks must be managed in order to avoid adverse environmental consequences. Providing Environmental Awareness

[7] At the time of preparing this EMPr, the construction Site Camp had already been established in line with the mitigation and management measures provided in the EMPr titled "*National Road N7 Realignment and N7/ Clanwilliam Intersection Upgrade, Western Cape Construction Environmental Management Programme*" dated October 2013.

Training is fundamental for ensuring that the onsite personnel understand how they can play a role in achieving the objectives specified in the EMPr.

The Environmental Officer, in conjunction with the employer, should develop an environmental awareness plan in order to address the following:

- Training needs of site and project personnel;
- Training material to be used;
- Language of training;
- General environmental awareness i.e. posters, toolbox talks etc.;
- Include site-specific findings as per the EIA;
- Health and Safety aspects;
- HIV/Aids Awareness;
- Environmental Reports; and
- Environmental Terminology.

Once the awareness plan and training material are available, the entire workforce and project management team should undergo an environmental awareness training course. Environmental awareness training is critical for the workforce to understand how they can play a role in achieving the objectives specified in the EMP. All visitors to the site (including project team members which are not based onsite), must undergo Environmental Induction before being permitted to the construction and associated area. The Environmental Induction should be structured so as to provide a condensed version of the comprehensive Environmental Awareness Training that will be provided to the workforce / onsite staff.

8.2 Method Statements

A Method Statement (MS) must be compiled for every activity undertaken by the Contractor which poses a risk to the environment (natural, biophysical and social) and should include all aspects as per the EMPr, and includes the following:

- The MS should be submitted at least 7 working days prior to the commencement of work to the ECO;
- A MS describes the scope of the intended work in a step by step description to ensure that the ECO / EO understands the Contractors intentions. This will enable them to assist in devising any mitigation measures which would minimise environmental impact during these tasks;
- The ECO may require changes to a MS if it does not comply with the specification or if, in the reasonable opinion of the ECO, the proposal may result in, or carries a greater than reasonable risk of damage to the environment in excess of that permitted by the EMPr or any legislation;
- The Contractor shall carry out the activities in accordance with the approved MS;
- Approved MS shall be readily available on the site and shall be communicated to all relevant personnel;
- Approval of the MS shall not absolve the Contractor from any of his obligations or responsibilities in terms of the contract;
- No claim for delay or additional cost incurred by the Contractor shall be entertained due to inadequacy of a MS;
- For each instance where it is requested that the Contractor submit a MS to the satisfaction of the ECO, the format should clearly indicate as a minimum the following:
    - Responsible person (name and ID number) and an alternative (name and ID number);

  - The applicable requirements provided in all legislation and policies which have a bearing on the ~~proposed~~ activities (refer to Table 3-1);
  - Training Requirements;
  - Timing of activities as per the Project / Construction Schedule;
  - Materials, plant and equipment to be used;
  - Proposed construction procedure, including the order in which the activities making up the procedure will be carried out, designed to implement the relevant environmental specifications;
  - The system to be implemented to ensure compliance with the above;
  - PPE required;
  - A detailed description of the process of work, methods and materials;
  - Emergency Procedures;
  - Response in the case of a non-compliance; and
  - Other information deemed necessary by the ECO.
- All Method Statements must be signed by the Engineer; and
- Work may not commence until the method statement has been approved by the ECO. All method statements will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr main document.

The following Method Statements shall be prepared by the Contractor for approval:

- **Site layout**. The Contractor must compile for DWS and ECO approval an updated site-specific Master Plan for the development site should any new construction areas, not included in the Master Layout Plan approved as part of the EA and EMPr amendment process, be proposed or established. The graphical representation with detailed notes of the location, layout and method of establishment of the construction camp must be provided and must including the following:
  - All Contractor's buildings, and/or offices;
  - Lay down areas;
  - Vehicle and plant storage areas, including wash areas;
  - Workshops, if required and approved by ECO;
  - Fuel storage and dispensing areas, if required and approved by ECO;
  - Cement/concrete batching areas, if required and approved by ECO (including the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete);
  - Other infrastructure required for the running of the project.
- **Access Routes.** Details, including a drawing, showing where and how the access points and routes will be located and managed must be provided in a Method Statement. Final locations of planned new access roads will be subject to successful negotiations with landowners. Details of fences and gates affected or used during the construction activities, including a drawing showing the location of fences and access gates must be provided.
- **Pollution control**. Expected solid waste types, quantities, methods and frequency of collection and disposal as well as location of disposal sites must be identified and stated in a Method Statement. The Method Statement shall further include methods of minimising, controlling, collecting and disposing of contaminated water, and details of any hazardous substances/materials to be used, together with the transport, storage, handling and disposal procedures for the substances.
- **Safety considerations**. The Contractor shall provide details identifying what safety precautions will be implemented to ensure the safety of all staff, and the general public at large, on site during the life of the project. This will include protective clothing requirements

for all types of construction activities on site, including protection against dust, noise, falling objects, work associated with electricity and work at heights.

- **Emergency procedures.** The Contractor shall provide details regarding all relevant emergency procedures that will be implemented for fire control and accidental leaks and spillages of hazardous substances (including fuel and oil). The Contractor shall further include details of risk reduction measures to be implemented including firefighting equipment, fire prevention procedures and spill kits.
- **Fire Management:** A fire expert should compile and implement a fire management plan to minimise the risk of veld fires around the project site.
- **Waste management control.** The Contractor shall provide details regarding how solid and liquid waste generated on the construction site and site camp will be collected, stored, transported and disposed of. Details of any service provider(s) appointed to manage this task must also be provided.
- **Storm water and erosion control**. The Contractor shall provide details of how storm water emanating within or adjacent to the construction site may impact on construction activities. Details on how the Contractor will deal with storm water runoff and potential erosion within the construction footprint and servitude must be provided. Details of any service provider(s) appointed to manage this task must also be provided.

8.3 Compliance Auditing and Reporting

The independent Environmental Control Officer will be responsible for compliance monitoring, auditing and reporting throughout the life of the ~~proposed~~ development. The required compliance monitoring for the Clanwilliam Dam raising project should include the following:

The ECO and EO shall be responsible for the day-to-day management and implementation of the EMPr. They should ensure that day-to-day activities are captured in a site diary and a photographic record is kept as evidence.

The EO shall be responsible to report any non-conformities to the ECO within 24 hours of the incident and an investigation report within 5 days. Bi-weekly reports to the ECO should be submitted and should include all activities and aspects of the last two weeks.

The EO and ECO shall schedule compliance audits at least once a month to check full compliance to the EMPr and the audit report to be made available to the Department and management.

After the compliance audit, the ECO will make available the draft audit report to the EO, for comments and development of a Corrective Action Plan with clear time frames before submission to the responsible authority

8.4 Implementation of Corrective Measures

Checking and corrective action forms part of the environmental management function and is aimed at ensuring that the necessary environmental management activities are being implemented and that the desired outcomes are achieved. When non-conformities do occur that have a negative impact on the environment, these should be rectified by the implementation of corrective actions issued by the ECO and Project Manager within a reasonable or agreed period of time. All corrective actions need to be documented and the outcome photographed and included in the next ECO report.

8.5 Penalties Structure

Section 30 of Chapter five of NEMA proposes penalties for non-compliance with the provisions of Chapter five. Any person who contravenes the regulations set out here or commits an offence as described in this section is liable for a fine or jail term. The responsible person or even the minister within the DWS who is undertaking an activity that contravenes these regulations, will be liable for these penalties. Fines and penalties shall be managed in accordance with the Public Management Finance Act.

A penalties and fines system shall be developed for this project and shall take the following in consideration:

- Penalties will be issued for the transgressions and non-compliances where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental specifications. The Contractor shall be liable to pay a penalty over and above any other contractual consequence.
- Penalties may be issued per incident at the discretion of the PM and ECO. The exact value of the penalty imposed shall be at the discretion of the PM and ECO and enforcement shall be at the discretion of the DWS Infrastructure Development Division. The Contractor will also be responsible for remediation costs.
- Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the EMPr. The PM will inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.
- The PM and ECO shall be the judge as to what constitutes a transgression in terms of this clause subject to the provisions of the General Conditions of Contract.
- For each subsequent similar offence, the penalty may, at the discretion of the PM and ECO be doubled in value to a maximum value to be determined.
- Payment of any penalty in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

A guideline of minimum fine values is provided for minor, moderate and serious offences in Table 8-1 below.

Table 8-1: Guideline to fines for minor, moderate and serious offences

Offences	Fine
Minor offences • Littering • Possession of intoxication substances on site. • Failure to use ablutions. • Moving on areas recently landscaped. • Disturbing grassed areas. • Not parking in demarcated areas. • Not using safety equipment • Wasting of water and electricity. • Not removing domestic waste off site. • Not stockpiling topsoil adequately.	R 1500 - 00
Moderate offences • Oil spills • Persistent oil leeks on vehicles. • Generation of excessive dust and noise. • Transgression of the speed limit.	R 5000-00

Offences	Fine
• Illegal fires. • Burying of waste. • Use of intoxicate substances on site. • Lack of erosion control. • Entering non-demarcated areas. • Hunting and snaring. • Damaging of pre- identified trees.	
Serious offences • Large oil/ hazardous waste spill. • Removal of pre-identified trees. • Damage of pre- identified heritage sites or objects. • Continually exceed noise limits. • Transgression of legal requirements. • Sanitation facilities not adequate. • Pollution of groundwater. • Removal of any protected plant or other species. • Damage or pollution of wetlands.	R15 000.00

8.6 Documentation and Record Keeping

All records related to the implementation of this EMPr (e.g. method statements, audit inspection protocols, incident reports, etc.) must be filed together by the ECO in a safe place where it can be easily retrieved. These records should be kept for two years, following the completion of the Construction Phase and should, at any time, be available for scrutiny by relevant authorities. It is also recommended that photographs be taken of the site prior to, during and immediately after construction/ installation, as a visual reference. These photographs should be stored with other records related to this EMPr.

9 MANAGEMENT REVIEW AND REVISION OF THE EMPR

This EMPr should not be considered as a stagnant document, but rather as a tool to manage project activities which may result in adverse environmental impacts and to prevent such impacts from happening. In the event where any of the mitigation and management measures provided in this revised EMPr have proven to be less effective due to unforeseen significant changes in the conditions of the receiving environment, the amendment of the EMPr should be initiated by the project proponent in consultation with the WCDEADP.

This EMPr must be revised and amended in any instance where the following provisions are applicable:

- To prevent deterioration or further deterioration of the environment;
- To achieve prescribed environmental standards;
- Where deemed necessary to accommodate demands brought about by impacts on socio-economic circumstances and it is in the public interest to meet those demands;
- To ensure compliance with the conditions of the EA;
- Ensure the continued suitability and adequacy of the EMPr; or

- When this EMPr is in conflict with the principles set out in the NEMA or any act governing the activities associated with the ~~proposed~~ project.

Furthermore this EMPr must be revised in the case where amendments to the current environmental legislation governing the project activities necessitate a revision of the document in order to conform to environmental legislative requirements. The site specific circumstances which warrant an amendment and revision of this EMPr should be led by the findings of the site inspection / audits against documented Monthly Environmental Compliance Audit Reports. Although the EIA Process for the ~~proposed~~ project was initiated in terms of the now repealed ECA, any amendments which are made to this EMPr should be done in accordance with the prescribe process provided in Regulation 46 of the NEMA EIA Regulations (Government Notice R.543).

10 CONCLUSION

This EMPr has been revised to include not only the conditions provided in the EMPr, specialist recommendations and EIR, but also conform to the environmental legislative requirements and environmental best practice principles. It is the opinion of the EAP that the implementation of the management and mitigation measures provided in the EMPr is sufficient to prevent the environmental impacts associated with the ~~proposed~~ project, thereby facilitating conformance with Condition 23.12.18 of the EA. This EMPr will furthermore contribute the realising the following over-arching objectives set out to be reached by the use of the document as an environmental management tool:

- Ensure that sufficient monetary provision, aligned with the significance of the environmental impact and scale of the project, is made to remediate and rehabilitate the environment impacted on by the construction activities;
- Verifying environmental performance through information on impacts as they occur;
- Responding to changes in project implementation not considered in the EIA;
- Responding to unforeseen events and environmental incidents; and
- Providing feedback to drive continual improvement in environmental performance.

The effectiveness of this EMPr will to a large degree rest on adherence to and fulfilling the roles and responsibilities of each role player and stakeholder provided in Part 4, which clearly defines the responsibilities for management actions contained in the EMPr and arrangements for coordination among the role players.

11 REFERENCES

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APPENDIX A: Copy of Environmental Authorisation

APPENDIX B: Clanwilliam Dam Rehabilitation Plan

APPENDIX C: Water Management Plan

APPENDIX D: Written notification of commencement of the establishment of the Construction Site made to the WCDEADP Directorate: Integrated Environmental Management (Region B)

Appendix E – Small-scale Mining EMP

Appendix F – Consultative Forum Strategy