water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

NCWABENI: OFF-CHANNEL STORAGE DAM

PRE-CONSTRUCTION
ENVIRONMENTAL MANAGEMENT PROGRAMME

DRAFT

April 2013

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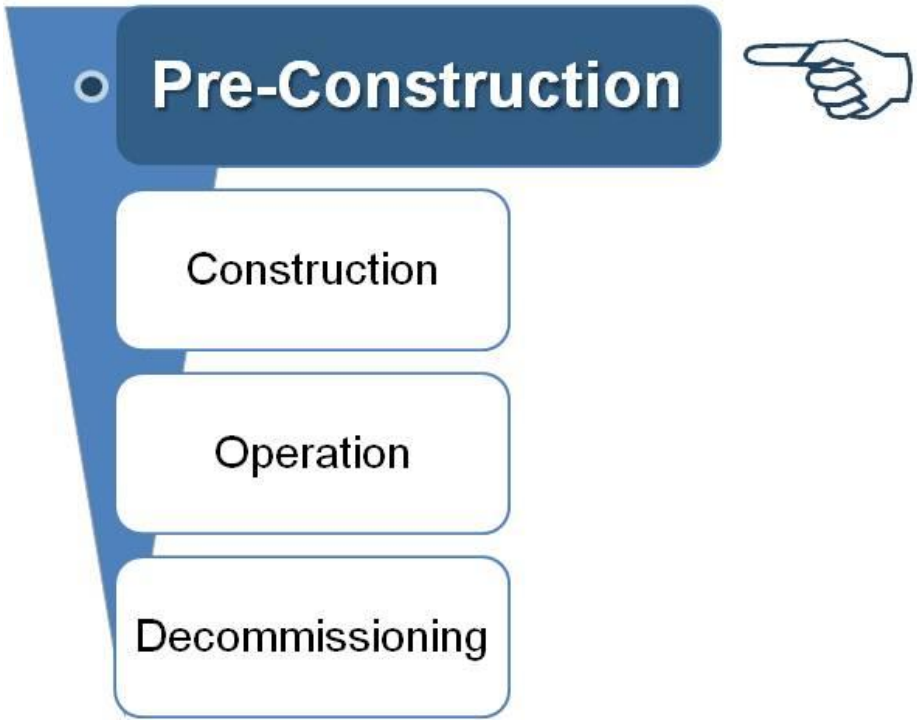

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LIST OF ACRONYMS & ABBREVIATIONS

DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMC	Environmental Monitoring Committee
GN	Government Notice
km	Kilometre
KZN	KwaZulu-Natal
PM_{10}	Particulate matter with diameter of 10 µm
m^3/s	Cubic metre per second
OCS	Off-Channel Storage
SANS	South African National Standards

DEFINITIONS OF KEY TERMS

Auditing	*A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.*
Competent	*Combination of knowledge, qualifications and experience specific to the work or task being performed.*
Dam	*Any barrier dam and any other form of impoundment used for the storage of water.*
Environment	*The surroundings in which humans exist and which comprise:* • *The land, water and atmosphere of the earth.* • *Micro-organisms, plant and animal life.* • *Any part or combination of a) and b) and the interrelationships among and between them.* • *The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.*
Environmental Aspect	*Those components of the company's activities, products and services that are likely to interact with the environment.*
Environmental Feature	*Elements and attributes of the biophysical, economic and social environment.*
Environmental Impact	*The change to the environment resulting from an environmental aspect, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.*
Environmental Management Programme (EMPr)	*A detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.*
Environmental Objective	*Overall environmental goal pertaining to the management of environmental features.*
Environmental Target	*Performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.*
Government Waterworks	*A waterwork (e.g. water storage dams, water transfer schemes and flood attenuation works) owned or controlled by the Minister of Water and Environmental Affairs and includes the land on which it is situated.*
Monitoring	*A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.*
Non-overspill crest level (NOCL)	*General top level of the dam, which is not designed to be overtopped.*
Reserve	*In terms of the National Water Act (Act No. 36 of 1998), the Reserve is the quantity and quality of water required -* *(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from, or being supplied from, the relevant water resource; and* *(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.*

Sensitive environmental features	*Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA as sensitive through specialists' findings and input received from Interested and Affected Parties.*
Watercourse	*A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water.*

DOCUMENT ROADMAP

This document serves as the Draft **Pre-Construction** Environmental Management Programme (EMPr) for the proposed Ncwabeni Off-Channel Storage (OCS) Dam project, where the Department of Water Affairs (DWA) is acting as the project proponent. Note that this EMPr is to be updated to incorporate any conditions stipulated in the Environmental Authorisation issued in terms of the National Environmental Management Act (No. 107 of 1998) (should it be granted) and it should also take cognisance of further discussions with stakeholders affected by the proposed project.

As a minimum, the EMPr aims to satisfy the requirements stipulated in section 24N of NEMA, and the associated regulation 33 of Government Notice (GN) No. R. 543 (18 June 2010). **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: EMPr Report Roadmap

Chapter	Title	Correlation with G.N. No. R543	
1	**Introduction**	–	
2	**Overview of the EMPr**	–	
3	**Environmental Governance Framework**	–	
4	**Environmental Assessment Practitioners**	R33(a)	Details of – (i) the person who prepared the EMPr; and (ii) the expertise of that person to prepare an EMPr.
5	**Roles & Responsibilities**	R33(d)	An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b).
6	**Monitoring**	R33(e)	Proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon
7	**Environmental Training & Awareness Creation**	R33(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.
8	**EMPr Review**	–	–
9	**Environmental Activities, Aspects and Impacts**	R33(c)	A detailed description of the aspects of the activity that are covered by the draft environmental management plan.
10	**Implementation Programme**	R33(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 the EIA Regulations, including environmental impacts or objectives in respect of –

Chapter	Title	Correlation with G.N. No. R543	
			(i) planning and design; (ii) pre-construction and construction activities; (iii) operation or undertaking of the activity; (iv) rehabilitation of the environment; and (iv) closure, where relevant.
		R33(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.
		R33(g)	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.
		R33(h)	Where appropriate, time periods within which the measures contemplated in the draft environmental management plan must be implemented.
		R33(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.
11	References	–	–

1. INTRODUCTION

1.1 Project Background

The Mzimkhulu Water Supply System (MWSS), which forms part of the KwaZulu Natal (KZN) Lower South Coast System, supplies water to all urban coastal towns from Hibberdene to Ramsgate, as well as to many rural inland settlements such as Fairview, Kwa-Madlala, Louisiana, Bhoboyi, Murchison, KwaNdwalane, Izontsha, Kwa Mavundla, Gamalakhe, etc, with a total estimated present rural population size of about 152 450. A significant growth in the water requirements for the system has been predicted through various previous studies, and a substantial portion of that growth can be associated with the increase of the level of service for the rural population as well as the planned extension of the system to cover additional rural areas, which are not presently supplied with water from the scheme.

DWA conducted various studies to determine the best options for providing the water requirements of all user sectors, including the Reserve. It was found that the construction of an off-channel storage (OCS) dam in one of the tributaries to the Mzimkhulu River should be considered. The reservoir can be filled from its incremental catchment, supplemented by pumping from the Mzimkhulu River during times of high river flows. During times of low flows water can be released back into the Mzimkhulu River for abstraction downstream at the existing St. Helen's Rock abstraction works. From the various options investigated it was established that the D3A site on the Gugamela River and the D2 site on the Ncwabeni River were more favourable in terms of the location of the OCS Dam (see map contained in **Figure 1**). The salient parameters for the two OCS dam options (including the abstraction works) are summarised in **Table 2**.

The project required authorisation from the Department of Environmental Affairs (DEA) in terms of the National Environmental Management Act (Act No. 107 of 1998), and the Environmental Impact Assessment (EIA) was undertaken in accordance the EIA Regulations (18 June 2010) contained in Government Notice (GN) No. R. 543, R. 544, R. 545 and R. 546. Based on the comparative analysis of the two alternative sites, as conducted as part of the EIA, site D2 was identified as the preferred option.

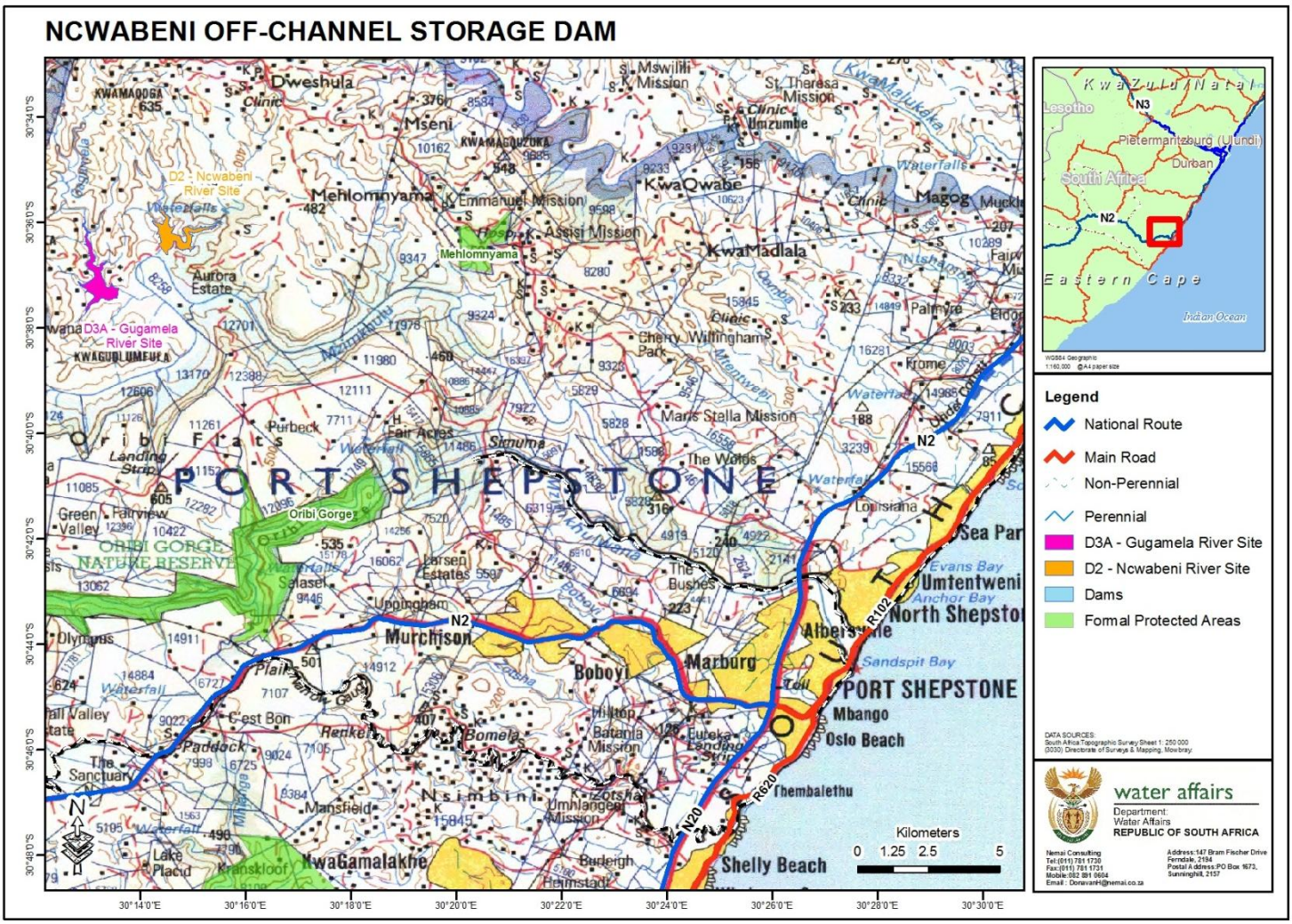


Figure 1: Regional Locality Map (site D2 – preferred site)

Table 2: Approximate Parameters of dam options

Parameter	Development Option	
	D2	D3A
River	Ncwabeni	Gugamela
Coordinates of centreline (approximate)	30°36'27.1"S 30°14'22.2"E	30°37'19.2"S 30°13'35.1"E
Catchment area	39.8 km^2	34.6 km^2
Inundation area	0.95 km^2	0.98 km^2
Gross storage	15 million m^3	17 million m^3
Dam wall height from NOCL to river bed	45 m	46 m
Total length of pipeline (rising plus gravity main)	600 m	1 600 m
Rising main nominal diameter	900 mm	900 mm
Flow rate	1 m^3/s	1 m^3/s

1.2 Overall Project Components

The proposed Ncwabeni OCS Dam project will consist of the following components (refer to layout map contained in **Appendix A**):

1. An OCS dam on the Ncwabeni River (site D2 – preferred site);
2. An abstraction / gauging weir on the Mzimkhulu River;
3. An abstraction works with a mechanism to remove silt;
4. A pump station and pipeline to deliver water to the dam; and
5. An outlet infrastructure to make measured releases back to the Mzimkhulu River.

1.3 EMPr Framework

Due to the extent of the overall project, the following suite of EMPrs was developed to deal with the various key components of the project:

1. Pre-Construction EMPr;
2. Construction EMPrs -
   a. **OCS Dam** (this document);
   b. Re-alignment of D859; and
   c. Abstraction weir, abstraction works, pipeline and access road.

The following EMPrs will be developed as further information becomes available during the implementation of the project:

1. Search, Rescue and Relocation Management Plan for red data, protected and endangered species, medicinal plants, heritage resources and graves;
2. Ncwabeni OCS Dam Impoundment EMPr;
3. Rehabilitation Management Plan for disturbed areas outside of the dam inundation area; and
4. Operational EMPr.

2. OVERVIEW OF THE EMPr

The Pre-construction EMPr provides performance criteria required to address potential environmental impacts during the pre-construction phase of the Ncwabeni OCS Dam project. This Report must be read in conjunction with the Ncwabeni Off-Channel Storage Dam EIA Report.

The scope of the Pre-construction EMPr is as follows:

- Establish management objectives during the pre-construction phase in order to enhance benefits and minimise adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;
- Outline institutional structures and roles required to implement the Pre-construction EMPr; and
- Provide legislative framework.

3. ENVIRONMENTAL GOVERNANCE FRAMEWORK

3.1 Legal Framework

Pre-construction will be undertaken according to recognised best industry practices and will include measures prescribed within this EMPr. This EMPr shall form part of the contract documents, and informs the Contractor about his duties in the fulfilment of the project objectives, with particular reference to the mitigation of environmental impacts caused by pre-construction activities associated with the project. The Contractor will note that obligations imposed by the EMPr are legally binding in terms of environmental legislation.

All project activities must comply with all relevant South African legislation and regulations. All environmental statutory requirements should be included in the Contractors' conditions. Specific legislation that must be complied with includes, but is not necessarily limited to:

- Constitution of the Republic of South Africa, (No. 108 of 1996);
- National Environmental Management Act (No. 107 of 1998);
- National Water Act (No. 36 of 1998);
- Mineral and Petroleum Resources Development Act (No. 28 of 2002);
- National Environmental Management: Biodiversity Act (No. 10 of 2004);
- National Environmental Management: Waste Act (No. 59 of 2008);
- National Heritage Resources Act (No. 25 of 1999);
- KZN Heritage Act (Act No. 04 of 2008)
- National Veld and Forest Fire Act (No. 101 of 1998);
- National Environmental Management Protected Areas Act (No. 57 of 2003);
- National Environmental Management Air Quality Act (Act No. 39 of 2004);
- Kwazulu-Natal Planning and Development Act (Act No. 06 of 2008);
- KwaZulu-Natal Nature Conservation Management Act (Act No. 09 of 1997);
- Natal Nature Conservation Ordinance 15 of 1974;
- Integrated Coastal Management Act (Act No. 24 of 2008);
- Animal Protection Act (No. 71 of 1962);
- Conservation of Agricultural Resources Act (No. 43 of 1983);
- Hazardous Substances Act (Act No. 15 of 1973);
- Occupational Health and Safety Act (No. 85 of 1993); and
- Explosives Act (No. 15 of 2003).

The various forms of authorisations that will be required for the Ncwabeni OCS Dam project are listed in the table to follow.

Table 3: Authorisations required for the implementation of the project

Description	Legal Reference	Regulatory Authority
Approval required for listed activities in terms of the EIA Regulations (18 June 20102) associated with the project. Scoping and EIA process conducted.	• National Environmental Management Act (No. 107 of 1998) • EIA Regulations (GN No. R. 543, R. 544, R. 545 and R. 546 of 18 June 2010)	DEA
Permit to be obtained if protected trees are to be cut, disturbed, damaged, destroyed or removed.	• National Forests Act (No. 84 of 1998)	Department of Agriculture, Forestry and Fisheries (DAFF)
Permits to be obtained if heritage resources are to be impacted on and for the removal of graves.	• KZN Heritage Act (Act No. 04 of 2008)	Amafa aKwaZulu-Natali
Although exempted, DWA must still submit Environmental Management Plans for all	• Minerals and Petroleum Resources	Department of Mineral Resources

Description	Legal Reference	Regulatory Authority
borrow areas situated outside of the Government Waterworks for approval.	Development Act (No. 28 of 2002)	(DMR),
Permit to be obtained for the removal and transportation of endangered fauna and flora.	• Natal Nature Conservation Ordinance 15 of 1974	Ezemvelo KZN Wildlife
Permits required for blasting.	• Explosives Regulations (GN R109 of 17 January 2003)	SAPS Explosives

Additional legal requirements include the following:

- All waste (general and hazardous) generated during the construction may only be disposed of at appropriately licensed sites in terms of National Environmental Management: Waste Act (No. 59 of 2008);
- Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which may include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SABS and international standards;
- Depending on who will act as the developer (DWA, Umgeni Water or the Ugu District Municipality) of the dam and its associated components, an application will need to be made to the DWA KZN Regional Office for a water use licence in terms of Section 21 of the National Water Act (NWA) (Act No. 36 of 1998);
- Construction Regulations (2003) published under the Occupational Health and Safety Act (No. 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 identified, and includes safe work procedures to mitigate, reduce or control the hazards identified, is required under this Act; and
- DWA will need to conform to all its legal obligations as part of the acquisition of land for the construction and operation of the project.

3.2 Project Specifications

The EMPrs focus more on performance criteria for environmental compliance, whereas the detail on how the project is to meet these performance criteria is provided in the project specification in the form of minimum standards and measures to be implemented by the Contractor. The Contractor shall provide detailed method statements on how the

performance criteria will be met, through the application of the specification. These methods are to be reviewed and approved by the Project Manager to ensure that they are adequate.

The Method Statements must be project- and site specific and should explain in detail the following:

1. The manner in which the work is to be undertaken;
2. The estimated schedule for the works (timing);
3. The area where the works will be executed (location);
4. The materials and plant / equipment needed for the works;
5. The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable);
6. Training of employees;
7. Roles and responsibilities;
8. Monitoring and reporting requirements;

The list of method statements required to assist in the implementation of this EMPr includes at least the following (where applicable):

- Method Statement for site clearing;
- Method Statement for establishing the construction camp; and
- Method Statement with regard to waste and wastewater management.

4. ENVIRONMENTAL ASSESSMENT PRACTITIONERS

Nemai Consulting was appointed by DWA as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed Ncwabeni OCS Dam.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company

has offices in Randburg (Gauteng), Durban (KZN) and Rustenburg (North West Province).

The core members of Nemai Consulting that are involved with preparing the EMPrs for the Ncwabeni OCS Dam are captured in **Table 4** below, and their respective Curricula Vitae are contained in the body of the EIA Report.

Table 4: EMPr Core Team Members

Name	Qualifications	Experience
Mr D. Henning	MSc (Aquatic Science)	11 years experience. Prepared EMPrs and acted as the Environmental Control Officer (ECO) on various projects, including: • 80km bulk water pipeline from Randfontein to Rustenburg; • Fish barrier on the Mooi River upstream of Spring Grove Dam; • Construction of the Spring Grove Dam, as part of the Mooi-Mgeni Transfer Scheme Phase 2; • Johannesburg Water sanitation and water supply projects for 2003/2004 and 2004/2005 financial years.
Mr C. Chidley	• B.Sc Eng (Civil); • BA (Economics, Philosophy) • MBA	20 years experience. Prepared EMPrs and acted as the ECO on various projects, including:: • Raising of Hazelmere Dam; • Upgrade of the Sunderland Ridge Waste Water Treatment Works and bulk sewer line situated on the Hennops River; • Empangeni Bulk Outfall Sewer, 40km pipeline.

5. ROLES & RESPONSIBILITIES

A high-level outline of the institutional arrangements for the implementation of the EMPrs during the pre-construction and construction phases of the project, as well as the conditions of the Environmental Authorisation, is provided in **Figure 2**.

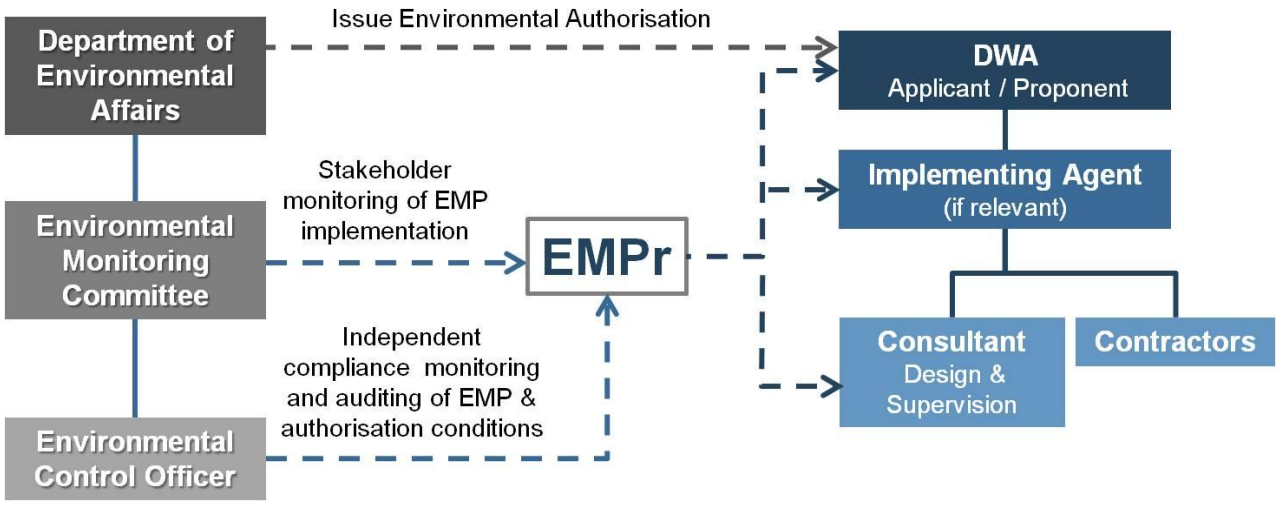


Figure 2: Institutional Arrangements: Roles & Responsibility

5.1 DEA

DEA is the mandated authority in terms of the National Environmental Management Act (No. 107 of 1998) that determines whether authorisation can be issued for the project, following a decision-making process conducted as part of the EIA. Conditions are included in the Environmental Authorisation, which need to be complied with by the project applicant.

DEA also fulfils a compliance and enforcement role with regards to the authorisation. The Department may perform random inspections to checks compliance. DEA will also serve as an active member of the Environmental Monitoring Committee (EMC) and will review the monitoring and auditing reports compiled by the ECO.

Amendments may be required to the Ncwabeni OCS Dam suite of EMPrs or the Environmental Authorisation, based on adaptive management to the site conditions and the technical requirements of the project. These amendments will need to be approved by DEA.

5.2 DWA

DWA is the applicant in terms of National Environmental Management Act (No. 107 of 1998). DWA is also referred to as the project proponent and is ultimately responsible for the development and implementation of the EMPrs and ensuring that the conditions in the Environmental Authorisation are satisfied. The liability for non-compliance thus rests with DWA.

DWA may appoint an implementing agent for the project and arrangements for compliance need to be formalised between these parties.

5.3 Ugu District Municipality / Umgeni Water

The operation of the OCS scheme may be transferred to the Ugu District Municipality or Umgeni Water. The legal requirements of the Environmental Authorisation and Operational EMPr will then also be transferred to one of these legal entities, and the record of this transfer will be clearly communicated to all stakeholders and DEA will be formally notified in this regard.

5.4 Environmental Monitoring Committee

An EMC will be established before commencement of any construction activities, and will serve as an additional mechanism for monitoring the implementation of the EMPr and compliance with the Environmental Authorisation as well as for improving communication amongst key stakeholders. The committee will have an advisory, monitoring and “watch-dog” role for the duration of the construction phase of the project. This committee will report to the Director-General of DEA.

Appropriate Terms of Reference for the EMC will need to be prepared, which will include roles and responsibilities, membership and functionality (amongst others).

5.5 Project Manager

The Project Manager has over-all responsibility for managing the Contractors and for ensuring that the environmental management requirements are met. During the construction phase, the Project Manager will be the proponent's (or implementing agent's) construction manager. During the operations phase it is expected that this role will be fulfilled by the operations manager.

The Project Manager will be on site and the responsibilities of this party will include the following (amongst others):

- Overseeing of all environmental matters and compliance with all environmental requirements and authorisations; and
- Act as the interface between the ECO, EMC and the other project role players.

5.6 Environmental Control Officer

The Environmental Control Officer (ECO) is a competent (minimum of 3 years experience) and independent representative, who acts as the EMC monitoring representative for the conducting of independent audits and performing a secretariat function for the EMC.

The ECO will undertake weekly inspections of the site and at least 6 monthly full compliance auditing against the EMPr and Environmental Authorisation. The aforementioned reports will be submitted to the Project Manager, EMC and DEA for their records.

The ECO will also check the following:

- The record of environmental incidents (spills, impacts, legal transgressions, etc.) as well as corrective and preventive actions taken;
- The public complaints register in which all complaints are recorded, as well as actions taken; and
- Results from the environmental monitoring programme (air, noise, water quality).

5.7 Contractor's Environmental Officer

The primary role of the competent Environmental Officer (minimum of 3 years experience) is to coordinate the environmental management activities of the Contractor on site.

Specific responsibilities of the Environmental Officer, who will be on site, will include the following:

- Aiding the Contractor to comply with all the project's environmental management requirements;
- Assisting the Contractor in compiling Method Statements;
- Facilitating environmental activities and environmental awareness training of all persons on site;
- Exercise an internal compliance management system on behalf of the Contractor;
- Inspect the site as required to ensure adherence to the management actions of the EMPr and the Method Statements;
- Ensuring that environmental monitoring (dust, noise, water) is being undertaken;
- Complete Site Inspection Forms on a regular basis;
- Provide inputs to the regular environment report to be prepared by the ECO (as required);
- Liaise with the construction team on issues related to implementation of, and compliance with, the EMPr;
- Maintain a record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken; and
- Maintain a public complaints register in which all complaints are recorded, as well as action taken.

6. MONITORING

Monitoring is required to ensure that the receiving environment at the Ncwabeni OCS Dam is suitably safeguarded against the identified potential impacts, and to ensure that

the environmental management requirements are adequately implemented and adhered to during the execution of the project.

6.1 Baseline Monitoring

Baseline monitoring aims to determine to the pre-construction state of the receiving environment, and serves as a reference to measure the residual impacts of the project by evaluating the deviation from the baseline conditions and the associated significance of the adverse effects.

The environmental parameters to be included in the baseline monitoring, which is to be undertaken by DWA, are shown in **Table 5**.

Table 5: Baseline Monitoring Requirements

Environmental Parameter	Monitoring Locations	Requirements
Water Quality	• All major watercourses to be affected by the project, including the Mzimkhulu and Ncwabeni Rivers. Sites to be located at suitable spots up- and downstream of the construction site and in-stream works, to be determined in consultation with the ECO. • *In situ* water quality monitoring to be conducted.	• Comply with relevant standards - SANS 5667. • Water Quality variables to be tested include: ○ Chemical oxygen demand ○ Total ammonia ○ Copper ○ Iron ○ Lead ○ Nitrite/Nitrate ○ Orthophosphate ○ Zinc ○ Faecal coliform bacteria ○ Sodium (Na) ○ Soap, oil and grease ○ Manganese ○ Fluoride
Air Quality	• Dust fallout units to be located taking into consideration significant sources of air pollution, sensitive receptors, and dominant wind direction. Dust fallout to be measured at / around the following sites (as a minimum) – ○ Batching plant; ○ Aggregate stockpiles; ○ Crusher area; ○ Key points along the D859 (including the intersection of the D859 and the D922); ○ Dam wall construction area; ○ Borrow areas and quarries; • Particulate matter (PM_{10}) – strategic monitoring point(s) to be selected.	• Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69. • Particulate matter (PM_{10}) – comply with the National Ambient Air Quality Standards.
Noise	Noise monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors, and dominant wind direction. Sites to coincide with dust fallout sites	• Comply with SANS 10103:2008.

Environmental Parameter	Monitoring Locations	Requirements
	(where relevant).	

6.2 Environmental Monitoring

Environmental monitoring entails checking, at pre-determined frequencies, whether thresholds and baseline values for certain environmental parameters are being exceeded. The parameters and sampling localities used during the baseline monitoring will form the basis of the environmental monitoring programme.

The following requirements need to be incorporated into the programme:

- Monitoring during normal operations, abnormal situations and emergency situations (e.g. unexpected spillage of hazardous substance);
- Measuring equipment must be accurately calibrated;
- Adequate quality control of the sampling must be ensured;
- Analysis is to be undertaken at a SANS 17025 certified laboratory;
- Certified methods of testing must be employed;
- Where legal specifications exist for testing and sampling methods, these must be taken into account; and
- Establish a process for identifying and implementing corrective measures.

Note that the specifications will include more detailed requirements in terms of environmental monitoring.

6.3 Compliance Monitoring and Auditing

The ECO will undertake weekly inspections of the site and at least 6 monthly full compliance auditing against the EMPr and Environmental Authorisation. The aforementioned reports will be submitted to the Project Manager, EMC and DEA for their records.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr. Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

7. ENVIRONMENTAL TRAINING & AWARENESS CREATION

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project.

Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices. The various means of creating environmental awareness may include:

- Induction course for all workers before commencing work on site;
- Refresher courses (as and when required);
- Daily toolbox talks, focusing on particular environmental issues (task– and area specific);
- Courses must be provided by suitably qualified persons and in a language and medium understood by the workers. It is noted that Zulu is the dominant language in the area;

- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

Training and awareness creation will be tailored to the audience, based on their designated roles and responsibilities. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

8. EMPr REVIEW

Due to its dynamic nature, the Pre-construction EMPr will be reviewed and revised when necessary to ensure continued environmental improvement. Changes to the EMPr shall be required where the existing system:

- Does not make adequate provision for protecting the environment against the pre-construction activities;
- Needs to be modified to meet conditions of statutory approval;
- It is not achieving acceptable environmental performance;
- Requires changes due to the outcome of a monitoring or auditing event or management review; and
- Provides redundant, impracticable or ineffective management measures.

Depending on the substantive nature of the amendment to the EMPr, regulation 46 of Government Notice No. R. 543 may need to be complied with. This will need to be ascertained in consultation with DEA.

9. ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

9.1 Project Activities and Environmental Aspects

The activities associated with the pre-construction phase are tabulated below.

Table 6: Activities associated with the Ncwabeni OCS Dam Pre-Construction Phase

PRE-CONSTRUCTION PHASE
Project Activities
• *Detailed engineering design*
• *Negotiations and agreements with the landowners (Cele K Tribal Authority, Camro Estates)*
• *Land acquisition*
• *Additional detailed geotechnical investigations*
• *Geophysical investigations*
• *Fencing off of construction domain*
• *Survey and map topography for post-construction landscape, rehabilitation and shaping*
• *Procurement process for Contractors*
• *Selective improvements of access road D859, to facilitate delivery of construction plant and materials*
• *Arrangements for accommodation of construction workers*
• *The building of a site office and ablution facilities*
• *Barricading of sensitive environmental features (e.g. graves)*
• *Development of resettlement plans (if required)*
• *Relocation of affected inhabitants of basin*
• *The harvesting of timber that will be inundated*
• *Obtain permits if protected trees are to be cut, disturbed, damaged, destroyed or removed*
• *Search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves*
• *Obtain permits and relocate heritage resources and graves*

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the environment and cause an impact. The following environmental aspects have been identified for the proposed Ncwabeni OCS Dam pre-construction phase, which are linked to the project activities (note that only high-level aspects are provided):

Table 7: Environmental Aspects associated with the Ncwabeni OCS Dam Pre-Construction Phase

PRE-CONSTRUCTION PHASE
Environmental Aspects
• *Poor construction site planning and layout*
• *Land occupancy by temporary buildings, provisional on-site facilities and storage areas*
• *Inaccurate pre-construction environmental survey (including search and rescue)*
• *Absence of relevant permits (e.g. for protected trees, heritage resources)*
• *Inadequate consultation with landowners*
• *Lack of barricading of sensitive environmental features*
• *Poor waste management*
• *Absence of ablution facilities*

9.2 Potential Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to **Table 8** for the potential significant impacts associated with the pre-construction phase of the project.

Table 8: Potential Significant Environmental Impacts associated with the Pre-Construction Phase

PRE-CONSTRUCTION PHASE	
Feature	**Potential Impact**
Surface Water	• *Impacts to watercourses from poor waste management and absence of ablution facilities*
Flora	• *Loss of vegetation of conservation significance that has not been identified during search and rescue* • *Legal liability if permits are not obtained for impacts to protected species* • *Illegal fires*
Fauna	• *Loss of fauna of conservation significance that has not been identified during search and rescue.* • *Legal liability if permits are not obtained for impacts to protected species.*
Socio-economic	• *Lack of collaboration from Tribal Authority and Camro Estates, if poorly consulted* • *Dissatisfaction with appointment process for local labourers* • *Lack of suitable accommodation for workforce* • *Nuisance from increase in dust and noise* • *Influx of people seeking employment and associated impacts* • *Relocation of occupied dwellings at site D3A* • *Damage to property, including structures, livestock, etc.* • *Job opportunities** • *Use of local goods and services** • *Stimulus to local economy**

Feature	Potential Impact
Archaeological and Cultural Features	• *Damage to heritage resources* • *Legal liability if permits are not obtained for impacts to heritage resources*
Infrastructure	• *Damage to infrastructure*
Transportation	• *Increasing use of D859* • *Interference with use of D859 during selective upgrading*
Aesthetics	• *Impacts to visual quality of area*

**: Positive impacts*

9.3 Sensitive Environmental Features

Cognisance must be taken of the following sensitive environmental features that should be afforded additional care and protection:

- Steep slopes are encountered in the project area (e.g. section of the D859, along the pipeline route). Measures to prevent erosion would need to be adopted for these areas.
- All watercourses, including the Mzimkhulu River and the tributary earmarked for the location of the OCS Dam (i.e. Ncwabeni Rivers), as well as natural drainage lines, are regarded as sensitive and require suitable protection from the pre-construction activities. All pre-construction activities to comply with the National Water Act (Act No. 36 of 1998);
- Protected fauna and flora species occur in the area, which need to be safeguarded against the project's potential adverse impacts. All pre-construction activities to comply with the National Environmental Management: Biodiversity Act (No. 10 of 2004), National Forests Act (No. 84 of 1998) and Natal Nature Conservation Ordinance 15 of 1974;
- A number of grave sites were identified within the project area that may not be disturbed without following legal protocol - refer to the extract from the Heritage Impact Assessment for the Ncwabeni OCS Dam (Beater, 2012) contained in **Appendix B**, which indicates the homesteads and grave sites in the project area. All pre-construction activities to comply with the KZN Heritage Act (Act No. 04 of 2008);
- Existing communication channels need to be duly respected and adhered to when engaging with the Cele K Tribe; and
- Safety risks to existing road users and pedestrians using the D859 (e.g. blind rises, sharp bends).

10. IMPLEMENTATION PROGRAMME

The framework for the subsequent management measures consists of the following:

- **Management objectives** – i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- **Targets** – i.e. level of performance to accomplish management objectives; and
- **Management actions** – i.e. practical actions aimed at achieving management objectives and targets;
- **Responsibilities**; and
- **Monitoring requirements**.

10.1 General Requirements

General requirements during the pre-construction phase include the following:

- Design to consider and incorporate environmental requirements;
- Define and communicate roles and responsibilities for the implementation of the EMPrs;
- Conduct appropriate environmental baseline studies;
- All test pits created as part of geotechnical investigations outside of the dam basin to be filled and rehabilitated;
- Undertake negotiations and confirm arrangements with landowners and/or land users regarding:
  - Use of the D859 and traffic arrangements;
  - Land occupancy (construction facilities);
  - Existing structures and infrastructure;
  - Domestic animals;
  - Security;
  - Protocol for lodging complaints;
- Ensure that all structures within the construction area are identified and recorded;
- Determine and document the road conditions of the D859 (improvements to be made, where necessary); and

- Develop and implement an environmental awareness programme.

Specific management measures related to the identified environmental aspects follow.

10.2 Specialist Environmental Investigations

Management Objective:

Identify sensitive and protected environmental features that have not been identified as part of the EIA process.

Target:

1. All sensitive and protected environmental features to be identified in the construction domain (all the components of the project) and inundation area.
2. All relevant approvals to be obtained prior to relocation of red data, protected and endangered flora and fauna species, medicinal plants, heritage resources and graves.

Management Actions:

- Phase 2 Heritage Impact Assessment to be conducted for the area to be affected where the abstraction weir structure ties into the right bank of the Mzimkhulu River.
- Search, rescue and relocation plan to be developed for sensitive flora and fauna species and graves within the construction domain and dam basin. Plan to be implemented in accordance with the project programme to ensure that these sensitive environmental features are rescued prior to potential impact occurrence. Ezemvelo KZN Wildlife and Amafa aKwaZulu-Natali to be consulted to ensure that the plan incorporates all these authorities' requirements. For fauna and flora species, the following factors need to be considered (amongst others) as part of this plan:
  1. Detailed plan of action (including timeframes, methodology and costs);
  2. Site investigations;
  3. Consultation with authorities, stakeholders and the Cele K Tribe;
  4. Marking of species to be relocated;
  5. Seeking of permits;
  6. Identification of suitable areas for relocation;

7. Aftercare; and
8. Monitoring (including targets and indicators to measure success).

Responsibilities:

- DWA / implementing agent to appoint suitably qualified specialists.
- Specialists to execute the management actions.

Monitoring Requirements:

Approval by relevant environmental authorities.

10.3 Approvals, Permits and Licensing Requirements

Management Objective:

Prevent impact to protected environmental features.

Target:

Obtain requisite approvals for the relevant protected environmental features.

Management Actions:

- Seek permit from DAFF in terms of the National Forests Act (No. 84 of 1998) for protected trees that are to be cut, disturbed, damaged, destroyed or removed.
- Seek permit from Ezemvelo KZN Wildlife in terms of the Natal Nature Conservation Ordinance (15 of 1974) for the removal and transportation of endangered fauna and flora (if relevant).
- Seek permit from Amafa aKwaZulu-Natali in terms of the KZN Heritage Act (Act No. 04 of 2008) if heritage resources are to be impacted on and for the removal of graves.
- Seek all other approvals, permits and licenses required for the project, in accordance with the protocols prescribed by the governing bodies.
- Approvals to be in place prior to the potential impacts to the protected environmental features.

Responsibilities:

- DWA / implementing agent to appoint suitably qualified specialists.
- Specialists to seek relevant approvals.

Monitoring Requirements:

Approvals, permits and licenses to be in place with due consideration to the project programme.

10.4 Construction Site Planning and Layout

Management Objective:

Planning and layout of construction site to ensure protection of sensitive environmental features.

Target:

1. No impacts to sensitive environmental features as a result of construction site planning and layout.
2. 100% of construction footprint to be included in pre-construction survey.

Management Actions:

- Conduct pre-construction survey of sites to be affected by the construction activities.
- Suitable specialist(s) to identify sensitive environmental features (including fauna, flora and heritage sites) where special care needs to be taken and implement suitable mitigation measures to safeguard these features (e.g. barricading, signage and awareness creation). Refer to findings of the following EIA specialist studies in this regard:
  - Heritage Impact Assessment (Beater, 2012); and
  - Terrestrial Ecology Assessment (Nemai Consulting, 2012).
- Suitable specialist to identify protected plants and trees. Any protected plants or trees in proximity to the construction servitude that will remain, should be marked clearly and must not be disturbed, defaced, destroyed or removed, unless otherwise

specified by the Project Manager. Acquire the necessary permits under the National Forests Act (No. 84 of 1998) if avoidance of protected trees is not possible.

- Undertake negotiations and confirm arrangements with Cele K Tribe regarding land occupancy (construction facilities).
- Contractor to produce a site plan for the approval of the Project Manager prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features. The plan must show the following (as relevant):
  - Buildings and structures;
  - Contractors' accommodation;
  - Contractors' camp and lay down areas;
  - Site offices;
  - Site laboratories;
  - Batching plants;
  - Crusher plants;
  - Roads and access routes;
  - Gates and fences;
  - Essential services (permanent and temporary water, electricity and sewage);
  - Rubble and waste rock storage and disposal sites;
  - Solid waste storage and disposal sites;
  - Site toilets and ablutions;
  - Hazardous waste storage and disposal sites;
  - Firebreaks;
  - Borrow areas;
  - Excavations and trenches;
  - Cut and fill areas;
  - Topsoil stockpiles;
  - Spoil areas;
  - Construction materials stores;
  - Vehicle and equipment stores;
  - Workshops;

- Wash bays;
- Fuel stores;
- Hazardous substance stores;
- Sensitive environmental features; and
- Any other activities, facilities and structures deemed relevant.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Photographic record of pre-construction survey.
- Approved site plan.
- Barricading and signage.
- Records of awareness creation.

10.5 Managing Geotechnical Investigations

Management Objective:

Manage environmental impacts associated with detailed geotechnical investigations.

Target:

1. No deviations from agreements made with the landowners (Cele K Tribe and Camro Estates).
2. No damage to sensitive environmental features (e.g. marked and barricaded heritage resources, protected trees, watercourses, structures and infrastructure).
3. Rehabilitation of test pits.

Management Actions:

- Submit Environmental Management Plans in accordance with the Minerals and Petroleum Resources Development Act (No. 28 of 2002) for all borrow areas situated

outside of the Government Waterworks for approval by the Department of Mineral Resources (DMR).

- Suitable access arrangements to be made in accordance with agreements.
- Safe operation of plant and equipment required for geotechnical investigations.
- Adequate management of domestic and construction waste.
- Implement measures to mitigate soil erosion, loss of vegetation and pollution.
- Prevent damage to sensitive environmental features.
- Landscape and rehabilitate test pits, if located outside of dam basin.

Responsibilities:

- Project Manager and ECO - checking.
- Geotechnical team to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Approval from DMR for borrow areas situated outside of the dam basin.

10.6 Environmental Awareness Creation

Management Objective:

Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the EMPr, sensitive environmental features and agreements made with the affected landowners.

Target:

1. All construction workers and employees to have completed appropriate environmental training.
2. A record of environmental training undertaken to be kept on site.

Management Actions:

- The Contractor must arrange that all of his employees and those of his sub-contractor go through the project specific environmental awareness training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site.
- The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as well as the Environmental Specification as they apply to the works and site.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Records of environmental training and awareness creation.

10.7 On-going Consultation with Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the project and ensure that these are timeously and effectively verified and responded to.
- Adhere to agreements made with individual landowners regarding communication.

Target:

1. All complaints and claims to be acknowledged within 5 working days and to be responded to within 10 working days of receipt, unless additional information and / or clarification are required.
2. No deviations from agreements made with individual landowners.

Management Actions:

- Existing communication channels need to be duly respected and adhered to when engaging with the Cele K Tribe.
- Establish processes and procedures to effectively verify and address complaints and claims received.
- Complaints or liaisons with landowners with regard to environmental aspects, compensation or disturbance to activities or animals, must be recorded, reported to the correct person and a record of the response is to be entered in the complaints register.
- Establish lines of communications with landowners. Provide relevant contact details to landowners for queries / raising of issues or complaints.
- Advise landowners on duration of construction period on their properties. Notify landowners of any deviations from these periods.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.

10.8 Site Clearing

Management Objective:

- Manage environmental impacts associated with site clearing associated with pre-construction activities (e.g. fencing).
- Ensure that only areas that are specifically required for construction are cleared.

Target:

No damage to sensitive environmental features outside of construction servitude, including marked and barricaded heritage resources, protected trees, watercourses, structures and infrastructure.

Management Actions:

- Restrict site clearing activities to construction servitude.
- Method Statement to be developed, which will provide the details of how site clearing will be executed. Where possible, clearing by hand is recommended in order to create employment opportunities.
- Maintain barricading around sensitive environmental features.
- Avoid any disturbance to demarcated sensitive environmental features.
- Suitably experienced personnel to monitor the clearing activities, with particular focus on heritage resources and graves, as well as protected fauna and flora species.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- No clearing outside of construction domain.
- Intact barricading.
- Public complaints register.
- Contractor's method statement.

10.9 Site Establishment

Management Objective:

Minimise environmental impacts associated with site establishment.

Target:

1. No deviations from agreements made with individual landowners.
2. No damage to sensitive environmental features outside construction footprint during site establishment.
3. No damage to sensitive environmental features during establishment of construction camp.
4. Site layout endorsed by Project Manager.
5. No access or encroachment into no-go areas.
6. No justifiable complaints regarding general disturbance and nuisance received from the affected landowners.

Management Actions:

- Locate construction camp in area where sensitive environmental features will not be impacted on.
- Positioning of the construction camp and lay-down area should aim to minimise visual impacts.
- Maintain barricading around sensitive environmental features until the cessation of construction works.
- Construction camp and construction servitude should be fenced and access control should be exercised.
- Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.
- Ensure noise levels are within their lawfully acceptable limits as per SANS 10103.
- Minimise disturbance from lighting of the construction camp and site. For example, limit the height from which floodlights are fixed, identifying zones and directions of high and low lighting requirements with the focus of the lights being inward, rather than outward, avoid directing the light towards the direction from where it would be most visible, without compromising safety.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Intact barricading.
- Public complaints register.

10.10 Management of Access

Management Objective:

- Ensure that all construction vehicles use only dedicated access routes to construction sites, with the D859 as the main road.
- Ensure that the community have reasonable access to the land during construction.
- Ensure proper access control.
- Adhere to agreements made with individual landowners regarding access.

Target:

1. No reports of construction vehicles using other unauthorised routes.
2. No complaints regarding blocking of access to dwellings in tribal area.

Management Actions:

- Site plan to detail all access/haul roads.
- Undertake negotiations and confirm arrangements with the Cele K Tribe regarding the use of the D859 and traffic arrangements.
- Determine and document the road conditions of the D859.
- Selective upgrade of the D859 to ensure that it is capable of accommodating the type of vehicles and/or mechanical plant using the road.
- Any clearing for access or haul roads outside the demarcated works area shall only be undertaken after approval from the Project Manager.
- Make provision for community members to access their homesteads.
- Speed limit of 40km/h on public and other roads within the project area to be adhered to.
- Safety risks to existing road users and pedestrians using the D859 (e.g. blind rises, sharp bends);

- Ensure appropriate traffic safety measures are implemented to make provision for blind rises and sharp bends on the D859.
- Permission required from the Project Manager for the movement of any vehicles and/or personnel outside of designated working areas.
- Access roads to be maintained in a suitable condition.
- Suitable erosion protective measures to be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) to be implemented.
- Clearly demarcate all access roads.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Signage displayed.
- Contractor's method statement.

10.11 Management of Labour Force

Management Objective:

- Ensure suitable management of labour force to prevent security-related issues or disturbance to landowners.
- Optimise use of local labourers.
- Adequate provisions to accommodate large labour force.

Target:

1. No complaints from landowners regarding trespassing or misconduct by construction workers.
2. All unskilled labour to be sourced from local communities.

3. Labour force to be accommodated.

Management Actions:

- Prevent trespassing of construction workers on private property (Camro Estates).
- Construction workers to clearly identifiable.
- Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.
- Designated smoking areas should be provided, with special bins for discarding of cigarette butts.
- Establish a 'labour and employment desk', which is not to be situated at the site.
- Create opportunities for the employment of women.
- Where possible use labour-intensive methods of construction.
- Use local labour as far as possible.
- Develop a community labour agreement with targets for employment and for progression.
- Training of labour to benefit individuals beyond completion of the project.
- Go beyond the minimum wage rate and invest in local staff.

Responsibilities:

- Proponent – employment targets.
- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Labour-related targets.

10.12 Management of Ablution Facilities

Management Objective:

- Minimise environmental impacts associated with ablution facilities.

Target:

1. No environmental contamination associated with ablution facilities.
2. Minimise visual impact associated with ablution facilities.

Management Actions:

- Provide sufficient ablution facilities (e.g. mobile / portable / VIP toilets), at the Construction Camps and along construction sites, which conform to all relevant health and safety standards and codes.
- Toilets may not be situated within 100 meters of any water body or within the 1:100 year flood line.
- A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100m from any working area. Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers.
- All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.
- Ensure utilisation, maintenance and management of toilet, wash and waste facilities.
- The entrances to the toilets will be adequately screened from public view.
- Toilet facilities to be maintained in a hygienic state and serviced regularly.
- Toilet paper to be provided.
- The Contractor will ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site. Disposal of such waste is only acceptable at a licensed waste disposal facility.
- Should shower facilities be provided for use by staff staying on site, the following controls must be imposed:
    - Positioning of the shower, and specifically its discharge point, will be carried out to ensure that erosion and build up of detergents does not occur.
    - All discharge from the shower and other washing facilities must be managed to prevent environmental contamination.
    - Use of the shower facilities must be limited to staff or authorised persons only.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Maintenance register for ablution facilities.
- Disposal certificates.
- Contractor's method statement.

10.13 Management of Waste

Management Objective:

- Minimise environmental impacts associated with waste.
- Apply waste management principles of prevent, minimise, recycle or re-use, with disposal as a last option.

Target:

- No littering on construction site.
- Maintain a clean and tidy construction site.
- 100% record of all waste generated and disposed at waste disposal facilities.
- Valid disposal certificates for all waste disposed.
- Provision of adequate waste containers that are easily accessible and maintained.
- Waste bins to be removed and cleaned weekly.

Management Actions:

- Waste management activities must comply with the National Environmental Management: Waste Act (No. 59 of 2008).
- Vermin / weatherproof bins will be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.

- Where possible, waste must be separated at source (e.g. containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Provide waste skips on site. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs.
- Ensure suitable housekeeping. .
- The Contractor will ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- Ensure that solid waste is transported so as to avoid waste spills en-route.

Responsibilities:

- Project Manager and ECO - checking.
- Contractor to implement management actions.

Monitoring Requirements:

- Public complaints register.
- Waste disposal certificates.
- Recycling targets.
- Contractor's method statement.

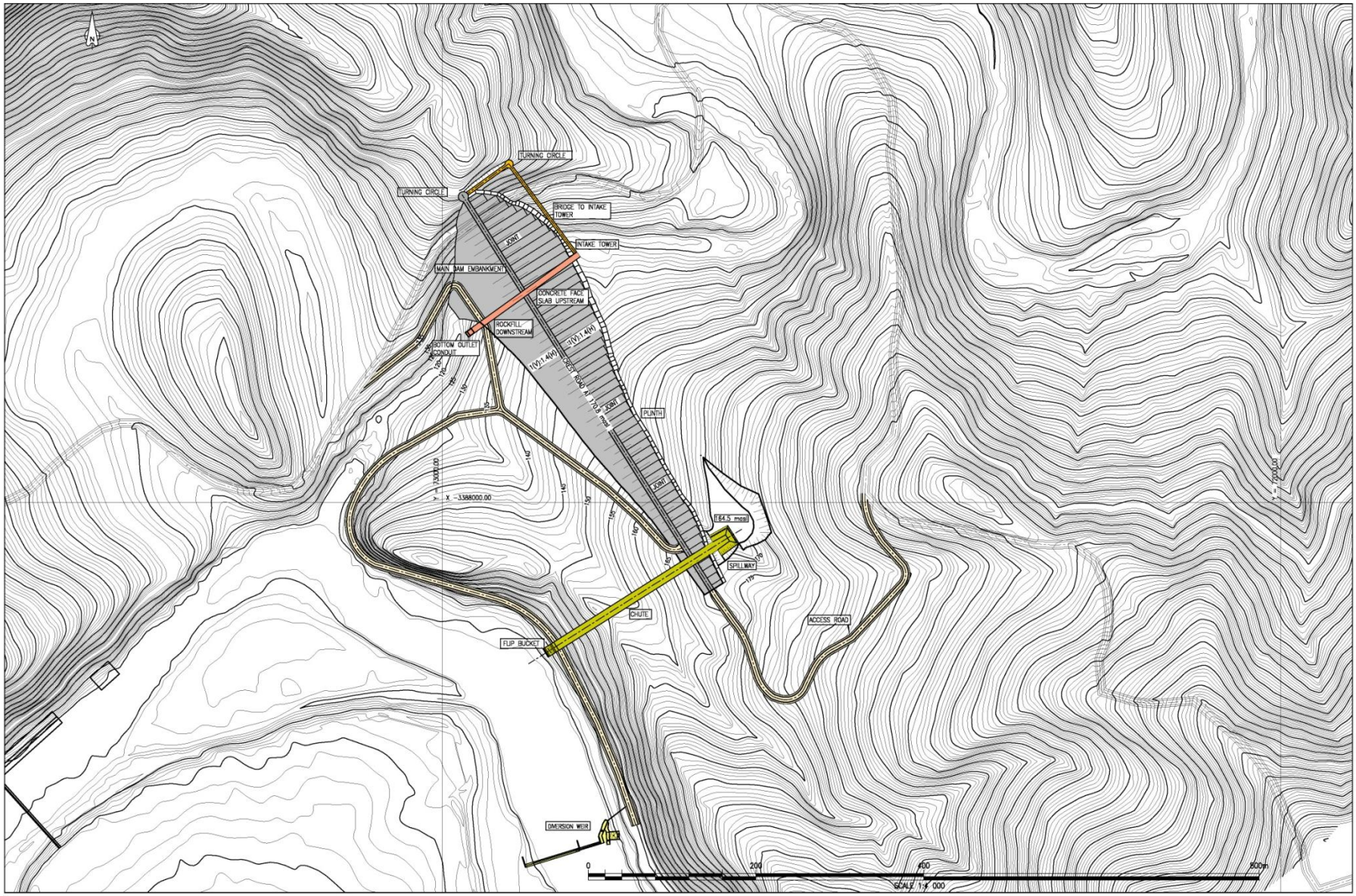
11. REFERENCES

Beater J., 2012. Heritage Impact Assessment for the Proposed Ncwabeni Off-Channel Storage Dam - Mzimkhulu River. EIA Specialist Report.

Nemai Consulting, 2012. Ncwabeni: Off-Channel Storage Dam. Terrestrial Ecology Assessment. EIA Specialist Report.

APPENDIX A

LAYOUT MAP



BKS | NCWABENI FEASIBILITY STUDY | GENERAL LAYOUT | FIG. K.1

GENERAL LAYOUT – MAIN DAM EMBANKMENT

APPENDIX B

EXTRACT FROM HERITAGE IMPACT ASSESSMENT

EXTRACT FROM HERITAGE IMPACT ASSESSMENT

Beater J., 2012. Heritage Impact Assessment for the Proposed Ncwabeni Off-Channel Storage Dam - Mzimkhulu River. EIA Specialist Report.

The homesteads (occupied and abandoned) and associated graves that were identified during the level 1 Heritage Impact Assessment that could be affected by the Full Supply Level for the proposed Ncwabeni OCS Dam are tabulated below and shown in **Figure B1**.

Table B1: Affected homesteads and graves – Sites D2 and D3A

No.	Description/Oral information provided	Coordinates (Approximate)
SITE D2		
1	Remains of homestead, less than 10 graves; oldest grave± 1971	30°36´19.43˚S 30°14´35.50˚E
2	Three homesteads, possible graves	30°36´.345˚S 30°14´516˚E
3	Homestead & graves of Mhlabashana Cele - father of Induna Cele; >2 graves	30°36´22.66˚S 30°14´27.98˚E
4	Three graves below road; not confirmed as access not possible	30°36´24.70˚S 30°14´26.56˚E
5	Cele family graves, no remains of homestead; more than 1 grave	30°36´36.24˚S 30°14´18.11˚E
6	Abandoned homestead & graves?	30°36´19.85˚S 30°14´22.46˚E
SITE D3A		
1	Homestead & possible grave/s: Gitsho or Potsoli Ngwase	30°36´54.28˚S 30°13´2.56˚E
2	Homestead & possible grave/s: Gitsho or Potsoli Ngwase	30°36´56.28˚S 30°13´0.74˚E
3	Homestead & 3 graves: Ndukuzezwe Msomi	30°37´2.28˚S 30°13´8.19˚E
4	Unidentified homestead & possible graves	30°37´6.51˚S 30°13´11.41˚E
5	Unidentified homestead; according to Alson Khwela no graves	30°37´10.36˚S 30°13´11.02˚E
6	Homestead & possible graves: Sokesimboni Msomi	30°37´7.96˚S 30°12´59.67˚E
7	Homestead & possible graves: Mthethiswa Msomi	30°37´8.80˚S 30°12´56.31˚E
8	Unidentified homestead with possible graves	30°37´15.26˚S 30°12´52.17˚E
9	Homestead & possible graves: Khumalo / Msomi/Khwela (1)	30°37´16.63˚S 30°13´2.63˚E
10	Homestead & possible graves: Khumalo / Msomi/Khwela (2)	30°37´21.41˚S 30°13´7.60˚E
11	Homestead & possible graves: Khumalo / Msomi/Khwela (3)	30°37´23.32˚S 30°13´16.93˚E
12	Unidentified homestead/building & possible graves	30°37´14.60˚S 30°13´20.28˚E

No.	Description/Oral information provided	Coordinates (Approximate)
13	Unidentified homestead & possible graves	30°37´26.64˚S 30°13´21.06˚E
14	Unidentified homestead, possibly occupied, possible graves	30°36´49.29˚S 30°13´17.67˚E
15	Unidentified homestead & possible graves	30°36´29.02˚S 30°13´1.42˚E
16	Unidentified homestead & possible graves	30°36´23.54˚S 30°12´57.47˚E
17	Unidentified homestead & possible graves	30°36´17.14˚S 30°13´1.02˚E
18	Unidentified homestead & possible graves	30°36´40.94˚S 30°13´1.39˚E
19	Occupied homestead of Calu Ngwase; 1 grave; cultivated fields	30°36´48.34˚S 30°13´6.59˚E

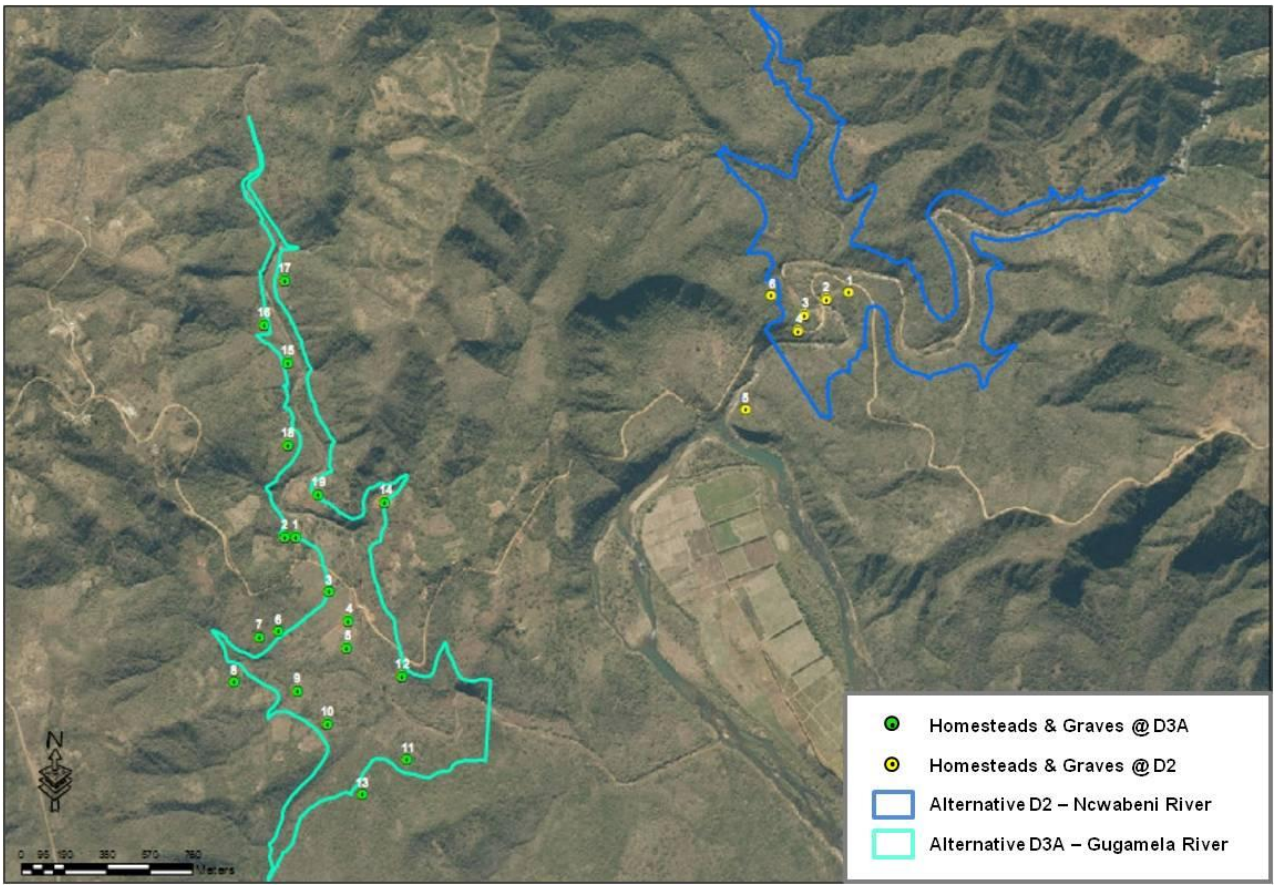


Figure B1: Map indicating Homesteads and Graves in relation to Proposed Dam Sites (site D2 – preferred site)