water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

DWS REPORT NO:
P WMA 19/G10/00/2516/12



Environmental Impact Assessment for the Proposed Surface Water Developments for Augmentation of the Western Cape Water Supply System

ENVIRONMENTAL MANAGEMENT PROGRAMME

Amended as per requirements of the Environmental Authorisation

June 2019

Authority Reference: 14/12/16/3/3/2/973

Title and Approval

Project Name:	***EIA for the Proposed Surface Water Developments for Augmentation of the Western Cape Water Supply System***
Report Title:	***Environmental Management Programme (EMPr)***
Authors:	***S Gerber, V Stippel, D Henning and N Naidoo***
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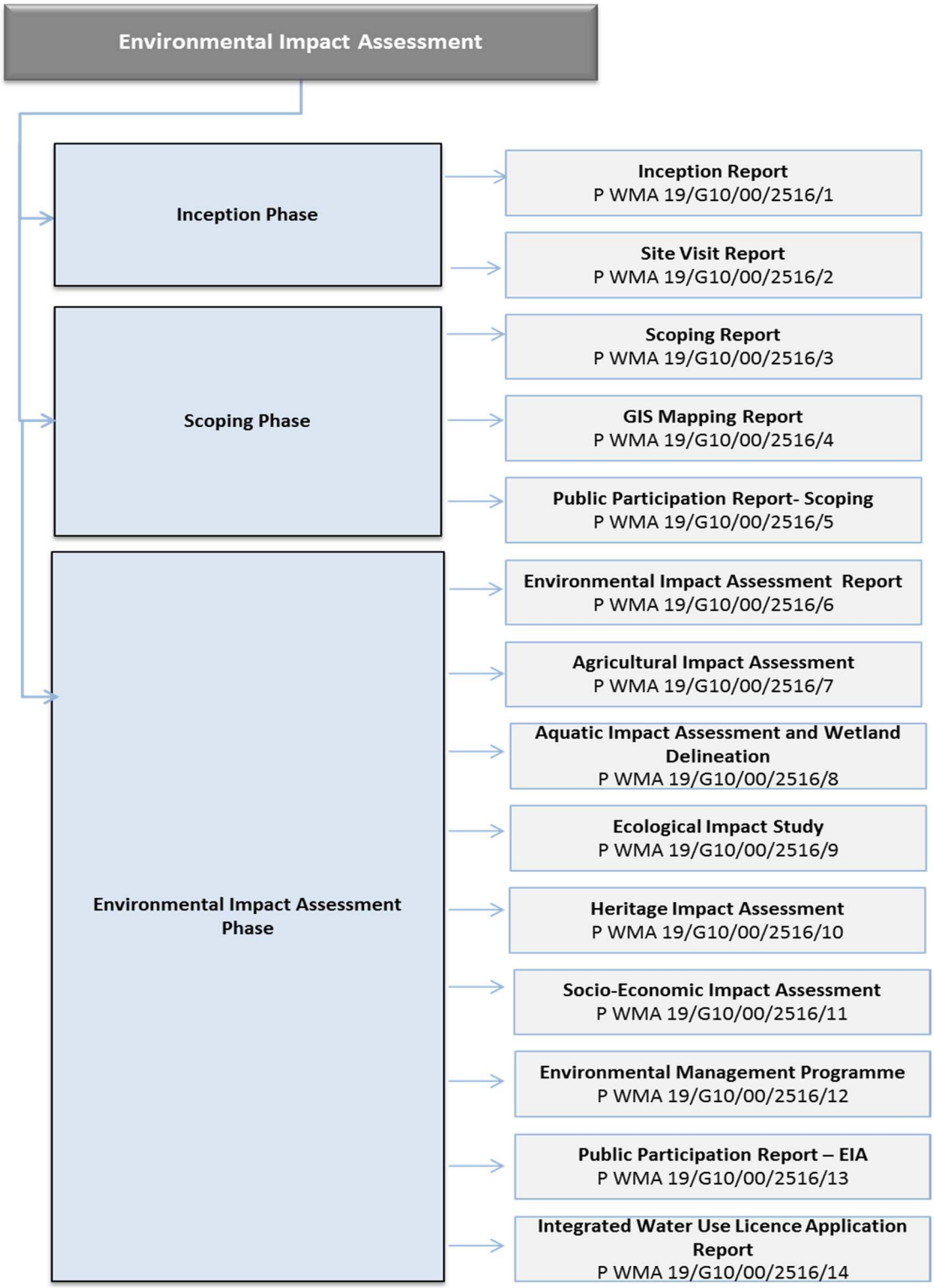
List of Study Reports



Report Reference

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Prepared for:	DWS - Directorate: Options Analysis

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Amendments Page

Date:	Nature of Amendment	Amendment Number:
15/02/2017	Draft Report for Public and Authority Review	01
13/04/2017	Final for Competent Authority decision-making	02
10/09/2018	EMPr amended as per requirements of the Environmental Authorisation	03
14/11/2018	EMPr amended further as per requirements of the Environmental Authorisation	04
07/01/2019	EMPr amended as per requirements of the amendments of the Environmental Authorisation	05
12/06/2019	EMPr amended as per requirements of the amendments of the Environmental Authorisation	06

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List of Abbreviations

BRVAS	Berg River Voëlvlei Augmentation Scheme
CBA	Critical Biodiversity Areas
CCT	City of Cape Town
CCTMM	City of Cape Town Metropolitan Municipality
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
EM	Environmental Monitor
EWR	Environmental Water Requirements
HIA	Heritage Impact Assessment
IAPs	Interested and Affected Parties
MRPDA	Mineral Resources and Petroleum Development Act (No 28 of 2002)
NEMA	National Environmental Management Act (No 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:PA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management Waste Act (Act No. 56 of 2008)
NWA	National Water Act (No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SM	Social Monitor
ToR	Terms of Reference
TCTA	Trans-Caledon Tunnel Authority
WCDM	West Coast District Municipality
WCH	Western Cape Heritage
WCRSS	Western Cape Reconciliation Strategy Study
WCWSS	Western Cape Water Supply System
WMA	Water Management Area
WTW	Water Treatment Works

WULA	Water Use Licence Application
WWTW	Waste Water Treatment Works

1 PURPOSE OF THIS DOCUMENT

Nemai Consulting was appointed by the Department of Water and Sanitation (DWS) as the Independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the proposed surface water developments to augment the Western Cape Water Supply System (WCWSS).

All the infrastructure and activities for the developments that required environmental authorisation were assessed as part of the EIA. In this regard, the Berg River Voëlvlei Augmentation Scheme (BRVAS) was preferred and the development has the following main components that were authorised:

- Low level weir on the Berg River;
- Abstraction works on the Berg River;
- Pump station;
- Rising main pipeline from the Berg River to Voëlvlei Dam, including off-takes and outlet works;
- Permanent access roads for operation and maintenance; and
- Temporary construction site establishment i.e. offices, construction roads, workshops, etc.

This document serves as the Environmental Management Programme (EMPr) for the pre-construction, construction and operational phase, as contemplated in Regulation 23 of Government Notice (GN) No. R. 982 (04 December 2014), for the above-mentioned development. The original EMPr that was developed in support of the EIA is amended as per the EA issued in June 2017

In May 2017, the Minister of Water and Sanitation issued a directive to the Trans-Caledon Tunnel Authority (TCTA) to fund and implement BRVAS. Whilst the Department of Water Sanitation will remain the applicant for the development, TCTA through the transfer of responsibility via the directive will be the accountable authority for the implementation of the conditions of the EA and the requirements of this EMPr.

2 DOCUMENT ROADMAP

As a minimum, the EMPr must satisfy the requirements stipulated in Appendix 4 of GN No. R. 982 (04 December 2014) and was submitted as part of the application for the Environmental Authorisation (EA). Condition 13 of the EA requires that the EMPr (previously submitted) must be amended and submitted to the Department of Environmental Affairs (DEA) for written approval prior to the commencement of the activity. Once approved the EMPr must be implemented and adhered to.

The amendments include the following:

- A Maintenance Management Plan, to ensure that the operation and maintenance activities associated with the development are assessed and taken into consideration – A standard requirement for projects implemented by TCTA is the preparation of a detailed operation and maintenance manual, which includes all aspects of operation and

maintenance activities to enable for the efficient and effective management of the government waterworks post construction. Included in the manual are all the environmental requirements that must be adhered to. Some of the requirements can only be determined during implementation, as it may be specific to the detailed design and construction of the infrastructure as well as the outcome of risk assessments relating to potential impacts on the environment. For the requirements of this EMPr, the minimum environmental requirements are provided (*Section 10.14. Operation and Maintenance*). A site-specific plan/manual will be submitted to DEA for approval prior to the operation phase.

- A Search, Rescue and Relocation Plan (*Section 10.9. Fauna and Flora Management*) developed in consultation with the terrestrial ecologist and CapeNature Scientific Services, which takes into consideration red data, protected and endangered fauna and flora species. General requirements are included in this EMPr, but a detailed site-specific plan will be submitted to DEA for approval prior to the commencement of construction activities.
- An Access Control Plan (*Section 10.2. Access Control)* for access to farmer's private land during construction and operation and maintenance – the requirements for access control are documented in this EMPr, however, it must be noted that all land and land rights that are required for the development will be acquired through expropriation either temporarily (for the duration of construction to the end of rehabilitation) or permanently, and fenced off during construction. The farmers/landowners will be afforded the opportunity to comment further through the Promotion of Administrative Justice Act (Act No. 3 of 2000), which is the legal administrative process that must be adhered to during the acquisition of the required land and land rights for the development.
- If the fishway is constructed, an Aquatic Monitoring Programme for implementation after construction activities will be submitted to DEA for approval prior to the operation phase. An aquatic assessment will be undertaken prior to construction to determine whether a fishway is required for the development.
- Storm Water Management Plan (*Section 10.5. Water Management)* - general mitigation measures against soil erosion on the construction site, as well as requirements for effective storm water control are included in this EMPr. A site-specific plan will be submitted to DEA for approval prior to the commencement of construction activities.

3 PROJECT BACKGROUND

The project background and motivation is detailed in a number of reports and therefore not repeated here. The list of reports include *inter alia:*

- Berg River Voëlvlei Augmentation Scheme – Pre-feasibility and Feasibility Studies for Augmentation of the Western Cape Water Supply System by means of further surface water developments: Prepared by Western Cape Water Consultants for the Department of Water Affairs in 2012. Report No. P WMA 19/G10/00/2413/5.
- Environmental Impact Assessment for the Proposed Surface Water Developments for Augmentation of the Western Cape Water Supply System: Prepared by Nemai Consulting for the Department of Water and Sanitation (DWS). Report No. P WMA 19/G10/00/2516/6.
- Environmental Authorisation issued by the Department of Environmental Affairs.

- Record of Implementing Decisions – DWS Report No: P WMA 19/G10/002/2413/7.

3.1 EXISTING GOVERNMENT WATER WORKS

Voëlvlei Dam was commissioned in 1952 and was the first large water supply scheme in the Berg River Catchment. The main purpose of the dam is to supply water for domestic use to the West Coast District Municipality (WCDM) including Riebeek-Kasteel, Riebeek-Wes, Malmesbury, Darling, Moorreesburg and the CCT Metropolitan Municipality. The dam also supplies water for irrigation purposes along the Lower Berg River.

Voëlvlei Dam is owned by DWS and has an estimated yield of 105 million m^3/annum which supplies the City of Cape Town, the Lower Berg River irrigators and the WCDM. The dam is currently over-allocated. It has a very small incremented catchment over and above the transfers (31 km^2) and thus relies on existing diversion schemes from the Klein Berg River, as well as the Leeu River and the Twenty Four River whereby water from these rivers is diverted into the dam via two canal systems (DWA, 2012b). The Klein Berg canal is 8 km long and has a capacity of 20 m^3/s whilst the canal from the Leeu River and Twenty Four River is 29 km long with a capacity of 34 m^3/s (DWA, 2012a).

Both the WCDM and the CCT own and operate Water Treatment Works (WTW) which are supplied from the Voëlvlei Dam. From the CCT WTW, a 1.5 m diameter pipeline of 80 km long conveys treated water the City's Plattekloof Reservoir. This pipeline only has spare capacity in winter and this places a major constraint on the future water supply from the proposed scheme. In addition, treated water is supplied to users in the WCDM (Malmesbury to St Helena Bay) from the WCDM WTW that is downstream of the Voëlvlei Dam. Water is also released from the Voëlvlei Dam via the existing canal to the Berg River from whence abstraction takes place at Misverstand Dam into the Withoogte WTW (also owned and operated by the WCDM) (DWA, 2012a).

As the dam is located within a winter rainfall area, characterised by wet winters and dry summers, it is filled during the wet winter months, from May to October, when about 90% of the annual runoff occurs. During this period the water requirement comprises only about 30% of the annual requirement. During the dry summer months, from November to April, inflows to the dam in the Western Cape are small and irrigation and garden watering requirements in the urban areas are large. Approximately 50% of the dams' storage is required for storage during the winter so that the high water requirement during the summer can be met. The remaining 50% of the dams' storage is required to provide long-term carry-over storage for periods of drought (DWA, 2012a).

The closest town to the proposed scheme is Gouda and it is located approximately 5 km away from BRVAS. The development is mostly located on privately-owned properties that are primarily used for agricultural practices, except for one property located north of the proposed pipeline which is owned by the Drakenstein Local Municipality. The properties that are directly affected by the authorised development are shown in **Figure 1**.

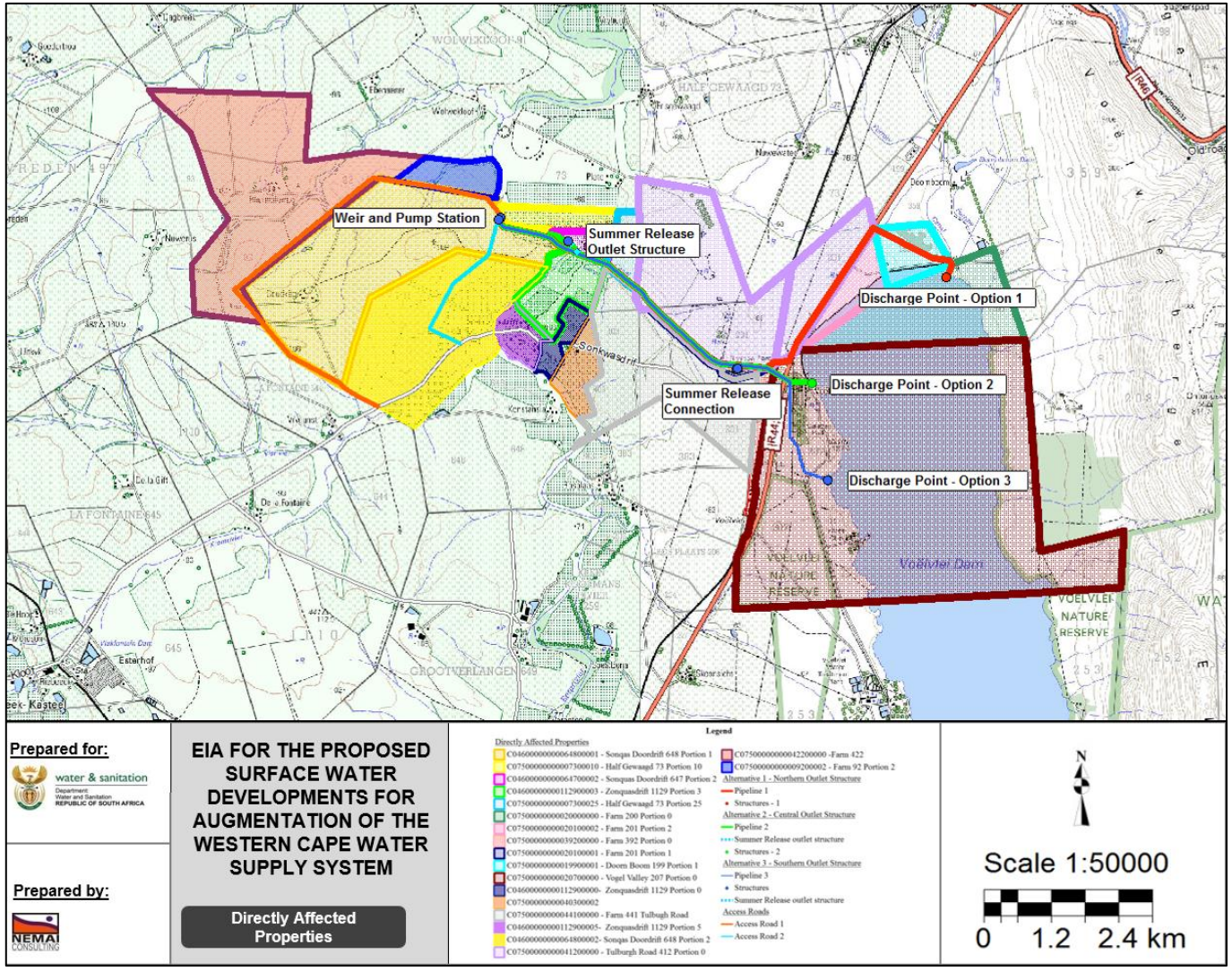

Figure 1: Directly affected properties

3.2 PROJECT COMPONENTS

The main components of the preferred development are discussed in detail in the Final EIR, as well as the Feasibility Reports, therefore only a brief overview is provided in this EMPr. The main components are illustrated in **Figure 2** and discussed below.

3.2.1 Weir and Abstraction Works

A low level weir will be located across the Berg River, including the following:

- Abstraction works;
- Protected embankment on the right bank or a cut-off wall or diaphragm;
- Sediment trap i.e. sand and gravel;
- Scouring canals and with a radial gate to flush sediment;
- Intake chamber for the pump station;
- Canoe chute or portaging facilities for the purpose of the annual Berg River Canoe Marathon; and
- Fishway or fish ladder to facilitate the movement of Berg-Breede River Whitefish, if required.

In addition, the weir will be a low structure with a series of notches in it to minimise the impact of inundation. The upstream damming caused will be very limited, for example, for the 100 year design flood, the upstream water level will be approximately 0.6 m higher with the weir in place, than would be the case if the weir was not there.

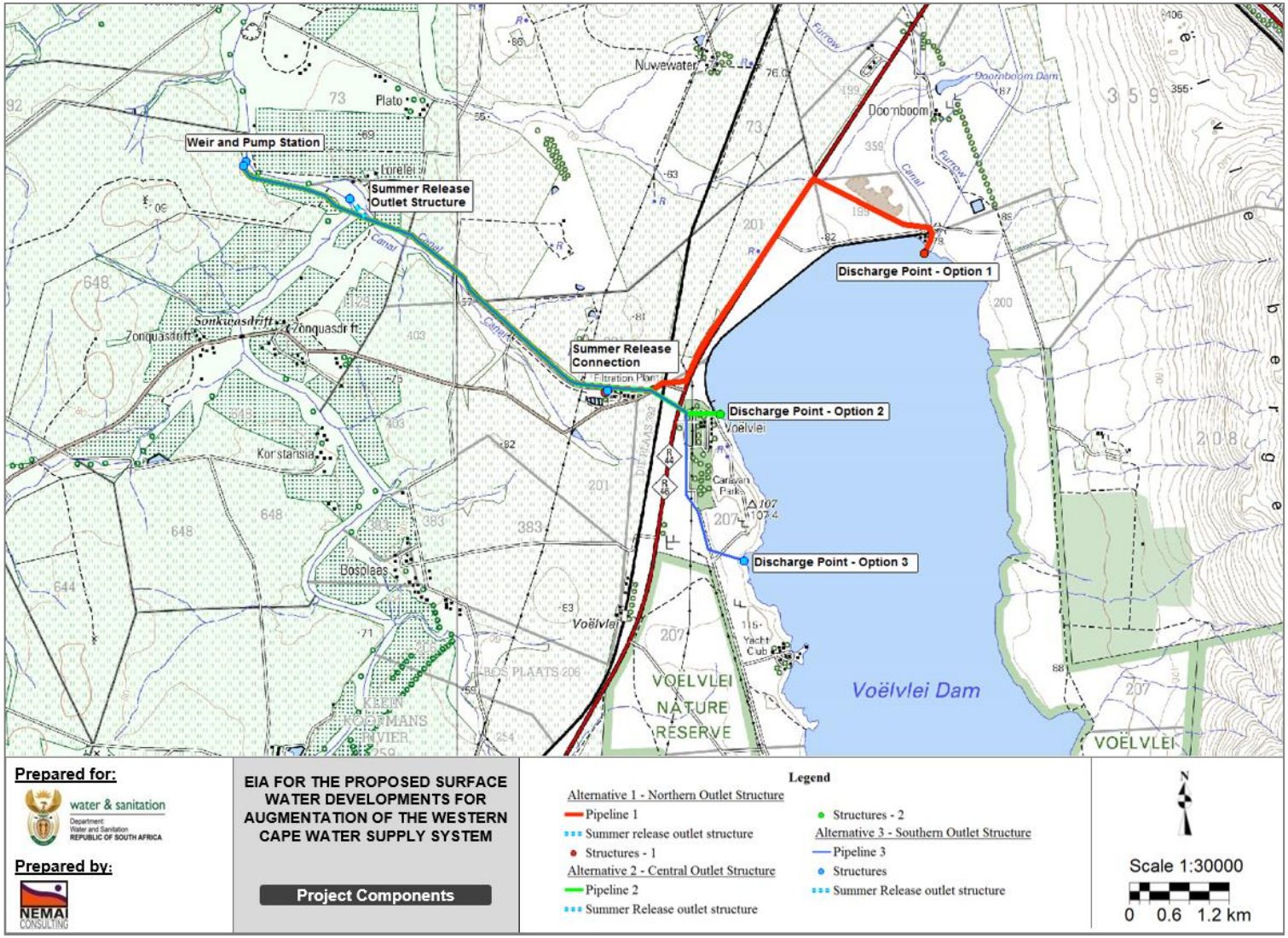

Figure 2: Project components (Note: Only Discharge Point – Option 3 was preferred over options 1 and 2, and authorised)

3.2.2 Rising Main (Pipeline)

As shown in **Figure 1**, three pipeline routes were investigated during the Technical Feasibility Study and were assessed as part of the EIA. These routes are related to three potential discharge options into the dam from the diversion weir site. The Discharge Point Alternative 3, i.e. the route to the Southern Discharge Point was the preferred option and authorised in the EA.

The authorised corridor for the pipeline is 35-75 m wide, while the pipeline itself is 6.3 km long and 1.6-1.7 m in diameter. The proposed flow rates were 4-6 m^3/s and the actual flow rates will be measured and recorded.

To mitigate against the potential loss of an orchard, negative impacts and disruption of farming activities on Portion 25 of Half Gewaagd 684, the pipeline will be placed in the existing canal servitude, where feasible.

3.2.3 Pump Station

During the winter abstraction period, surplus water from the Berg River will flow into the intake chamber. A level transmitter on the weir will provide an input value for the flow calculation to determine the amount of water to be pumped to the Voëlvlei Dam (DWA, 2012a).

The pumping rates will be based on a step-pumping operating rule, however, will not exceed the authorised flow rates i.e. 4-6 m^3/s. Similar to the pipeline, the flow rates will be measured and recorded.

The pump station will have portable water and sanitation facilities for the operation and maintenance of the development. The sanitation facility would either be a septic tank (with a French drain), as is the case for all farm homesteads or a conservancy tank which would then require a service provider to routinely collect and dispose at the closest WWTW.

3.2.4 Access Roads

The EIA proposed an existing farm road (unnamed road), which was authorised as the main access to the site for the weir, abstraction works and pump station (Access Road 1) (**Figure 2**). The servitude for the road will be approximately 12 m wide with the road being approximately 6 m wide.

Where additional access roads are required for the construction or operation and maintenance or the rising main, and this triggers listed activity, TCTA (the implanting agent for the authorised development – refer to Section 6: Roles and Responsibilities) will obtain an EA for such access roads, including the preparation of an EMPr.

Figure 3: Proposed access roads to weir and pump station (Note: Access Road 1 was authorised)

To reduce the negative impacts and disruption of farming activities on Portion 1 of Sonquas Doordrift 684, the existing public roads (upgraded as part of the development, where required) in the area, will be used in conjunction with a section of the authorised access road where feasible.

3.2.5 Electricity Supply

TCTA will apply to Eskom for the electricity supply and Eskom will be responsible for the installations. The electricity supply will be located at the pump station site and along the pipeline. During the EIA, Eskom confirmed that the electricity supplies will be via the Gouda substation.

Eskom will be required to obtain an EA for the installations if it triggers listed activity, including the preparation of an EMPr.

4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed as the independent EAP to undertake the environmental assessment for the proposed surface water developments for the augmentation of WCWSS. In accordance with Section 2(a) of Appendix 2 of GN 921 of 04 December 2014, this section provides an overview of Nemai Consulting and the company's experience with EIAs, as well as the details and experience of the EAPs that form part of the Scoping and EIA team.

Nemai Consulting is an independent, specialist environmental, social development, and occupational health and safety 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 (KwaZulu-Natal), and Cape Town (Western Cape).

The core members of Nemai Consulting that are involved with the Scoping and EIA process for the proposed development are provided in **Table 1**, and their respective Curricula Vitae are in Appendix C of the EIA Report, and in Section 12, attachments.

Table 1: Scoping and EIA Core Team Members

Name	Qualifications	Duties
Ms D. Naidoo	BSc – Eng (Chem)	Project Manager and Environmental Engineering
Mr D. Henning	MSc – Aquatic Health Ecology	Environmental Assessment Practitioner/Study Leader
Mr C. Chidley	BSc – Eng (Civil) BA – Economics, Philosophy MBA	Project Leader: Specialists and WULA
Mrs V. Stippel	BSc (Hons) – Zoology MSc – Ecology, Environment and Conservation	Public Participation and Quality Control
Ms. S. Gerber	BSc (Hons) – Ecology, Environment and Conservation	Public Participation and Report Writing

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 OVERVIEW OF THE LEGISLATION

Some of the pertinent environmental legislation that has bearing on the preferred development is captured below (**Table 2**).

Construction will be undertaken according to recognised best industry practices and will include measures prescribed in this EMPr. This EMPr will form part of the construction contract(s) and informs the contractors and other service providers about their duties and responsibilities in the fulfilment of the objectives, with particular reference to the mitigation of environmental impacts that may potentially be caused by construction activities associated with the development. It is noted note that the obligations imposed by the EMPr are legally binding in terms of environmental legislation, as well as the construction contract(s) with TCTA.

Table 2: Environmental Statutory Framework

Legislation	Relevance
Constitution of the Republic of South Africa (Act No. 108 of 1996)	Chapter 2 – Bill of Rights. Section 24 – environmental rights.
National Environmental Management Act (Act No. 107 of 1998)	Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). Section 28 – Duty of care and remediation of environmental damage. Environmental management principles. Authority – DEA.
Government Notice No. R. 982 of 04 December 2014	Purpose – regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
Government Notice No. R. 983 of 04 December 2014 (Listing Notice 1)	Process for undertaking Basic Assessment / Scoping and EIA process.
Government Notice No. R. 984 of 04 December 2014 (Listing Notice 2)	Activities that need to be assessed through a Basic Assessment process.
Government Notice No. R. 985 of 04 December 2014 (Listing Notice 3)	Activities that need to be assessed through a Scoping and EIA process.
National Water Act (Act No. 36 of 1998)	Chapter 3 – Protection of water resources. Section 19 – Prevention and remedying effects of pollution. Section 20 – Control of emergency incidents. Chapter 4 – Water use. Chapter 12 – Safety of dams Authority – DWS.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes. Authority –DEA.
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Air quality management. Section 32 – dust control. Section 34 – noise control. Authority – DEA.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Management and conservation of the country's biodiversity. Protection of species and ecosystems. Authority – DEA.
National Environmental Management: Waste Act (Act No. 59 of 2008)	Chapter 5 – licensing requirements for listed waste activities (Schedule 1). Authority – Minister (DEA) or MEC (provincial authority)
Occupational Health and Safety Act (Act No. 85 of 1993) and the Construction Regulations	Provisions for Occupational Health and Safety. Authority – Department of Labour.

Legislation	Relevance
National Heritage Resources Act (Act No. 25 of 1999)	Section 34 – protection of structure older than 60 years. Section 35 – protection of heritage resources. Section 36 – protection of graves and burial grounds. Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m^2 in extent. Authority – Western Cape Heritage (WCH).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Control measures for erosion. Control measures for alien and invasive plant species. Authority – Department of Forestry and Fisheries (DAFF).
National Forestry Act (Act No. 84 of 1998)	Section 15 – authorisation required for impacts to protected trees. Authority – DAFF.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Permit required for borrow pits. Authority – Department of Mineral Resources (DMR).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Control measures for erosion. Control measures for alien and invasive plant species. Authority – Department of Agriculture.
National Road Traffic Act (Act No. 93 of 1996)	Authority – Western Cape Department of Roads and Public Works.
Tourism Act of 1993	Authority – South African Tourism Board.
Promotion of Administrative Justice Act (Act No. 3 of 2000)	To give effect to the right to administrative action that is lawful, reasonable and procedurally fair and to the right to written reasons for administrative action as contemplated in section 33 of the Constitution of the Republic of South Africa, 1996.
Expropriation Act (Act 63 of 1973)	To provide for the expropriation of land and other property for public and certain other purposes.

5.2 SPECIFIC REQUIREMENTS

The construction of the development will be in accordance with the Conditions of Contract for Plant and Design-Build (FIDIC, 1999), which under the usual arrangements for this type of contract, the main contractor designs and constructs the infrastructure i.e. civil, mechanical and electrical works, in accordance with the employer's (TCTA) requirements. The Employer's Requirements is a document that is included in the construction contract that specifies the purpose, scope and/or design and/or other technical criteria.

In accordance with the FIDIC contract, the contractors must take all reasonable steps to protect the environment (both on and off site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations. The contractors must ensure that emissions, surface discharges and effluent from the contractors' activities shall not exceed the values indicated in this EMPr, and shall not exceed the values prescribed by applicable laws. The Employer Requirement's also require specific details on *inter alia* the following:

- The estimated schedule for the works (timing);
- The areas where the works will be executed (locations);
- Environmental aspects that must be managed;
- Recommend mitigation measures that should be implemented to adequately safeguard the environment, labour and staff, and the public (where applicable);

- Training of labour and staff;
- Roles and responsibilities; and
- Monitoring and reporting requirements.

The contractors will prepare and submit method statements detailing how the works will be undertaken for the review and/or approval. The method statements will be in accordance with the Employer's Requirements and the conditions above. This EMPr will also form part of the construction contract (i.e. supplement the Employer's Requirements) and is therefore binding on the contractors and other service providers.

6 ROLES AND RESPONSIBILITIES

A high-level outline of the institutional arrangements for the implementation of the EMPr, as well as the conditions of the EA, is provided in **Figure 4**.

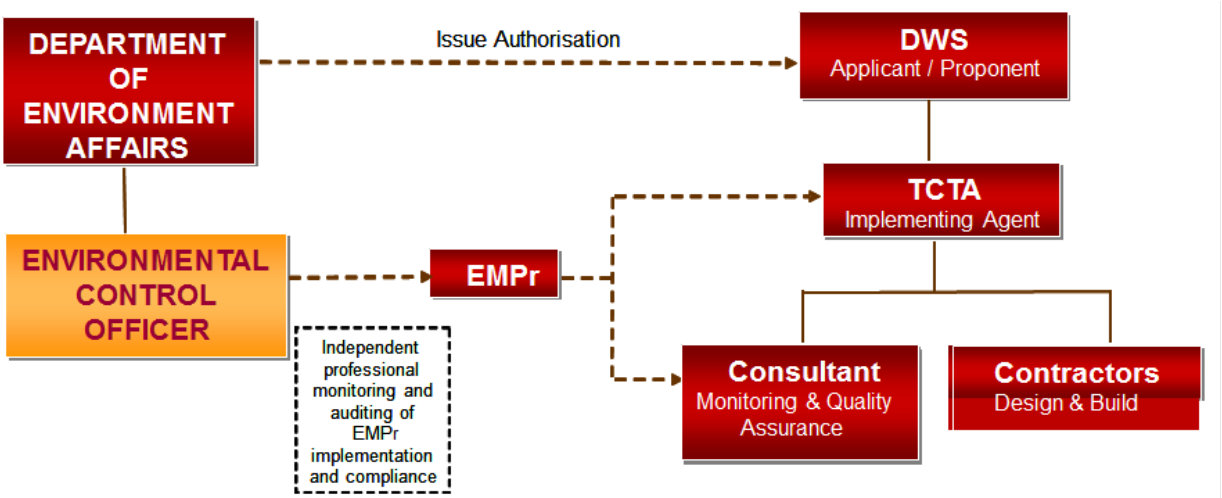

Figure 4: Institutional Arrangements: Roles and Responsibility

6.1 DEPARTMENT OF ENVIRONMENTAL AFFAIRS

The Department of Environmental Affairs (DEA) is the mandated authority in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA) 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 EA and EMPr, which need to be complied with by the project applicant.

DEA also fulfils a compliance and enforcement role with regards to the EA and EMPr. The Department may perform random inspections to check compliance. DEA will review the monitoring and auditing reports compiled by the Environmental Control Officer (ECO).

Amendments may be required to the EMPr and/or the EA, based on adaptive management to the site conditions and the technical requirements of the project. These amendments will need to be approved by DEA.

6.2 DWS

The Department of Water and Sanitation (DWS) is the applicant in terms of NEMA. DWS is also referred to as the project proponent. DWS has transferred the accountability of meeting the requirements of the EMPr and EA to TCTA, who is the implementing agent. This relationship was formalised in May 2017 when the Minister of Water and Sanitation issued a directive to TCTA fund and implement BRVAS. TCTA is therefore responsible for the implementation of the EMPr and ensuring that the conditions in the EA are satisfied. DWS is accountable for the implementation of all environmental management requirements during the operation and maintenance of the infrastructure.

6.3 TCTA

The Trans-Caledon Tunnel Authority (TCTA) is the state-owned entity, established by Government Notice No 2631 of 12 December 1986 for "the implementation, operation and maintenance of the project works within South Africa" according to the Treaty that governs the Lesotho Highlands Water Project (LHWP). Today TCTA has grown to become a specialised liability management body set up to finance and oversee the creation of bulk raw water infrastructure for the National Government on behalf of the people of South Africa.

TCTA is the implementing agent for the development, as directed by the Minister of Water and Sanitation. The responsibility for environmental compliance rests with the TCTA and includes the following:

- Implementation of the approved EMPr.
- Submission of any substantial changes, updates or amendments to the EMPr and/or EA to DEA for approval.
- Ensuring that the provisions of the EMPr are binding on all contractors and service providers operating on the site during construction.
- Ensuring that environmental monitoring and auditing are conducted during construction to confirm that the project complies with all conditions of the EA and the EMPr and that all reports submitted to DEA.
- Ensuring that compliance and non-compliance records are kept up to date and are made available to the ECO and DEA.
- Ensuring that a copy of the EA, approved EMPr and relevant permits and agreements are available at the construction site at all times, and that the contractors, service providers and all staff and labour are familiar with or made aware of the contents thereof.
- Complying with all applicable environmental laws, regulations, standards and guidelines, and ensuring that the contractors accepts responsibility to do likewise.
- Being committed to the principles contained within NEMA, including sustainable development and the prevention of pollution and environmental degradation.

6.4 ENVIRONMENTAL CONTROL OFFICER

The Environmental Control Officer (ECO) is a competent (minimum of 3 years' experience) and independent representative, who monitors and audits the project and reports to DEA.

The ECO will be appointed before commencement of construction activities and will remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation. The ECO will monitor, inspect and audit the project against the EMPr and the EA.

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).

6.5 CONSULTANT

The Environmental Monitor (EM) and Social Monitor (SM) are part of the consultant's staff (i.e. professional service provider appointed by TCTA) and are responsible for the day to day monitoring of construction activities in relation to the compliance with the EMPr, EA and the Employer Requirements (as per the FIDIC contract). It should be noted that as this is a Plant Design and Build Contract, this role may be fulfilled by a single individual who will be on site (hereafter referred to as the Environmental Monitor).

The EM must ensure that any complaints related to the physical and social environmental received from the public are properly recorded and dealt with. The EM is required to:

- Be well versed in environmental management matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of environmental compliance reporting and the implications of non-compliance.
- Know the background of the project and understand the construction activities.
- Be able to identify issues and make recommendations in terms of the environmental management requirements.
- Continually gauge compliance with, and maintain records related to, the environmental legislation, the conditions of the EA, the EMPr and the specifications.
- Submit the findings of internal audits/inspection reports to the engineer (i.e. consultant's staff appointed to act as the engineer for the purpose of the construction contact) and contractors.
- Keep accurate and detailed records of all EMPr-related activities on the construction site.
- Check that the main contractor keeps all the permits and certificates on site as required by this EMPr.
- Advise on the rectification of any pollution, contamination or damage to the project site, rights of way or adjacent land.
- Ensure that the engineer is made aware of all applicable DEA-approved changes to the EMPr

More specifically the EM should maintain the following on site:

- A non-conformance register.
- Copies of method statements, including risk assessments.
- Monitoring reports of the contractors, including a public complaint and issues register.
- Compliance and audit reports.
- Copies of the EA and EMPr, including revisions thereof.
- Copies of all permits required during the construction phase.

6.6 CONTRACTORS

The role of the Environmental Officer is to coordinate the environmental management activities on the construction site, as part of the contractor's staff. The main contractor, including sub-contractors and various specialists will be responsible for the design and construction of the development.

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

- Compliance with all the project's environmental management requirements, including implementation of, and compliance with, the EMPr;
- Facilitate environmental awareness to all staff and labour on site;
- Exercise an internal compliance management system and ensure environmental matters are included in the quality management system;
- To carry out inspection and monitoring on the site as required to ensure adherence to the management actions of the EMPr and other environmental requirements;
- To identify and implement corrective measures, and addressing the findings raised by the ECO (as required);
- Maintain records and documents in accordance with the ISO 9001, particularly relating to environmental incidents (spills, impacts, legal transgressions etc.) and public complaints as well as corrective and preventive actions taken.

7 MONITORING AND AUDITING

Monitoring is required to ensure that the receiving environment is safeguarded against the negative impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the development.

A document control system will all documents required for the effective functioning of the EMPr, as follows:

- EMPr and EA (latest or updated documents).
- Method statements.

- Record of environmental incidents, non-conformances, training, audits, public complaints, etc.
- Reports e.g. monitoring, pre-construction surveys, etc.

7.1 ENVIRONMENTAL MONITORING

Environmental monitoring entails checking, at pre-determined frequencies, whether thresholds and/or baseline values (where appropriate) 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 environmental parameters to be included as part of the environmental monitoring programme, which is to be undertaken by the contractors, includes water quality, air quality i.e. dust fallout, and noise.

The following requirements will be incorporated into the programme:

- Monitoring during normal construction activities, 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;
- Certified/legal methods of sampling/testing must be employed or the use of SANS 17025 certified laboratories;

7.2 COMPLIANCE MONITORING AND AUDITING

Compliance monitoring will commence in the pre-construction phase, where those conditions in the EA that need to be adhered to prior to project implementation will need to be checked and recorded, as well as to check compliance with the provisions in the EMPr. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

The ECO will undertake monthly inspections of the site and undertake an audit within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and a final audit within 30 days of completion of rehabilitation activities against the EMPr and EA. The aforementioned reports will be submitted to TCTA, the consultant/engineer, the main contractor and DEA.

Auditing of compliance with the EA and EMPr must be conducted in accordance with Regulation 34 of GN No. R 982 (4 December 2014) in terms of the following:

- The holder of an EA must, for the period during which the EA and EMPr remain valid, ensure that the compliance with the conditions of the EA and EMPr is audited and submit an environmental audit report to DEA.
- The environmental audit report must:
  - i) Contain the information set out in Appendix 7 of GN No. R 982 (4 December 2014).
  - ii) Be conducted and submitted to DEA at intervals as indicated in the EA.
  - iii) Be prepared by an independent person with the relevant environmental auditing expertise.

iv) Provide verifiable findings, in a structured and systematic manner, on the following:
- The level of performance against and compliance of an organization or project with the provisions of the requisite EA or EMPr; and
- The ability of the measures contained in the EMPr, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

v) Determine the ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and

vi) Determine the level of compliance with the provisions of EA and EMPr.

8 ACTIVITIES, ENVIRONMENTAL ASPECTS AND IMPACTS RELATED TO THE PROJECT

In order to establish best management practices and prescribe mitigation measures for the receiving environment, the following project-related information needs to be adequately understood:

- **Activities** associated with the proposed project;
- **Environmental aspects** associated with the project activities; and
- **Environmental impacts** resulting from the environmental aspects.

8.1 ACTIVITIES

This section identifies any potential impact, either positive or negative that has/may occur as a result of any construction associated with the proposed surface water developments for augmentation of the WCWSS. All impacts identified must be then prevented, mitigated against or managed. The EMPr strives to provide a comprehensive list of mitigation measures associated with the overall project-related negative aspects and impacts for the entire project lifecycle (pre-construction, construction, and operational).

In order to understand the impacts related to the project it is necessary to unpack the activities associated with the project lifecycle.

Table 3: Activities associated with the proposed surface water developments for augmentation of the WCWSS

PRE-CONSTRUCTION PHASE	
1.	Technical investigations/surveys and design
2.	Construction site planning, access and layout
3.	Servitude determinations and expropriation, and survey and mark construction servitude considering sensitive areas
4.	Search, Rescue and Relocation

5. Pre-construction site survey, including Determining and documenting the road conditions for all identified access roads
6. Development method statement, including Stormwater Management and employment of personnel/staff
7. Ongoing consultation with landowners and affected parties
8. Improvements of access roads where required to facilitate the delivery of construction plant and materials
9. Diligent assessment against the EMPr, environmental authorisation and other relevant environmental legislation
10. Undertake a walk through survey of the project footprint by the relevant environmental specialists to identify sensitive environmental features
11. Ongoing consultation with landowners, affected parties, stakeholders and authorities
CONSTRUCTION PHASE
12. Site establishment (including site camp, clearing, roads, electricity, water, access control, security, etc.)
13. Fencing of the construction area
14. Environmental awareness training
15. Stormwater control measures
16. Transportation/delivery of equipment, materials and personnel/staff
17. Storage and handling of materials, including stockpiling (sand, crushed stone, aggregate, etc.)
18. Control of invasive plant species
19. Mechanical and electrical works, including the Eskom electricity supply
20. Waste and wastewater management
21. Earthworks, including blasting and pipe jacking, and management of topsoil and spoil
22. Temporary river diversion for weir and pipeline crossings
23. Construction of weir, pump station, and pipeline
24. Reinstatement, landscaping and rehabilitation
25. Diligent compliance monitoring of the EMPr, EA and other relevant environmental legislation
26. Conduct environmental awareness training
27. Ongoing search, rescue and relocation of red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities) – permits to be in place
28. Ongoing monitoring for red data, protected and endangered species, medicinal plants, heritage resources and graves (based on area of influence of the construction activities)
29. Implement EMPr
30. Reinstatement, landscaping and rehabilitation
31. Ongoing consultation with landowners, affected parties, stakeholders and authorities
OPERATION AND MAINTENANCE PHASE
32. Operation of the scheme in accordance with operation manual
33. Maintenance of the infrastructure and property acquired for the infrastructure
34. Ongoing consultation with landowners, affected parties, stakeholders and authorities
35. Satisfy EWR

8.2 ENVIRONMENTAL ASPECTS

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the receiving environment and cause an impact. The following environmental aspects have been identified for the proposed surface water developments for augmentation of the WCWSS, which are linked to the project activities (note that only high level aspects are provided):

Table 4: Environmental aspects associated with the proposed surface water developments for augmentation of the WCWSS

PRE-CONSTRUCTION PHASE
1. Consultation with landowners, affected parties, stakeholders and authorities
2. Site-specific environmental issues and opportunities not fully understood
3. Environmental monitoring and non-compliance to environmental requirements
4. Relevant permits and/or approvals
5. Waste management
6. Availability of ablution facilities
CONSTRUCTION PHASE
7. Consultation with landowners, affected parties, stakeholders and authorities
8. Environmental monitoring and non-compliance to environmental requirements
9. Environmental awareness creation
10. Search and rescue
11. Site clearing
12. Management of access and use of access roads
13. Disturbance of topsoil
14. Disruptions to existing services
15. Storage and handling of materials, particularly hazardous materials
16. Erosion and drainage management
17. Operation and maintenance of equipment and plant
18. Management of staff and labour
19. Use of ablution facilities
20. Management of the construction site
21. Waste management practices – hazardous and general solid, liquid
22. Management of pollution generation potential
23. Management of water – quantity and quality
24. Disturbance of sensitive areas, fauna and flora
25. Disruption of archaeological and culturally significant features (if encountered)
26. Dust and emissions
27. Noise due to construction activities
28. Management of the affected natural resources – rivers and wetlands
29. Reinstatement, landscaping and rehabilitation
OPERATION AND MAINTENANCE PHASE
30. Consultation with landowners, affected parties, stakeholders and authorities
31. Management i.e. operation and maintenance manual
32. Implementation of EWR and operating rule

8.3 ENVIRONMENTAL IMPACTS

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Refer to **Tables 6** and **7** for the potential significant impacts associated with the preceding activities and environmental aspects for the construction and operational phases.

Table 5: Environmental impacts associated with the Pre-construction and Construction Phases of the proposed surface water developments for augmentation of the WCWSS

Feature	Impact
Geology and Soil	• Unsuitable geological conditions • Blasting • Soil erosion • Sourcing of earthfill • Improper disposal of spoil material • Erosion of removed and stockpiled soils • Soil contamination from incorrect storage/handling/disposal of hazardous waste • Soil contamination through spillages and leakages • Soil contamination due to mismanagement and/or incorrect storage of hazardous substances • Poor stormwater management
Surface Water	• Disturbance of ecological quality and ecosystems, resulting in a vulnerability to alien species • Surface contamination through spillages and leakages, and/or incorrect disposal of hazardous and non-hazardous materials or waste • Surface water contamination through runoff containing suspended solids, sediments and fuel residue • Poor stormwater management
Geohydrology	• Contamination of groundwater resulting from incorrect storage/handling and disposal of hazardous waste materials • Contamination of groundwater through spillages from equipment, machinery and vehicle storage or from a leakage caused by a fracture/crack or rupture in the fuel storage tanks • Contamination of surface water resources through runoff containing suspended solids, sediments and fuel residue
Hydrology	• Alteration of flow regimes
Water Users	• Water quality deterioration and disturbance to flow caused by construction activities may adversely affect downstream water users • Reduction of water due to excessive water abstracted from watercourses
Water Quality	• Sedimentation from instream works • Water quality impacts due to spillages and poor construction practices
Aquatic Ecology	• Disruptions to aquatic biota community due to water contamination, alteration of flow, loss of habitat and disturbance to habitat • Spread of noxious / declared weeds
Riparian Habitat	• Loss of riparian and instream vegetation • Destabilisation of channel morphology at river
Flora	• Loss of sensitive vegetation and habitat • Disturbance of natural ecosystems, making them vulnerable to invasion of alien species • Soil contamination and compaction, vegetation loss and vegetation disturbance due to fuel and chemical spills • Vegetation and habitat disturbance due to accidental introduction of alien species • Destruction of potential red list plants during site clearing and construction • Disturbance of sensitive plant species if relocated • Illegal harvesting of medicinal plants during construction phase • Damage to plant life outside the proposed site

Feature	Impact
Fauna	• Loss of habitat through site clearing and construction • Harming, killing or illegal hunting of fauna due to poor environmental education/training • Potential illness and/or death of fauna due to pollution and/or littering • Noise disturbance to sensitive and endangered species • Potential impacts on fauna due to the potential reduction of artificial wetland on Bonaire Farm
Agricultural Potential	• Loss of fertile soil through land clearance and/or poor rehabilitation • Loss of farming/grazing land due to the development
Air Quality	• Increased dust generation • Greenhouse gas emissions from construction vehicles
Roads	• Increase due to construction-related traffic • Access and access control in and around the farmer's private land
Noise	• Localised noise increase/nuisance
Waste Management	• Waste generation (e.g. plant material, domestic and hazardous waste) • Disposal of excess spoil or unused materials (soil and rock) generated as part of the bulk earthworks • Land, air and water pollution through poor waste management practices
Social Management	• Increased employment opportunities (positive) • Increased potential for increased land invasions i.e. safety and security
Heritage Resources	• Disturbance and/or possible destruction of heritage resources

Table 6: Environmental impacts associated with the Operation and Maintenance Phase of the proposed surface water developments for augmentation of the WCWSS

Feature	Impact
Hydrology	• Alteration of flow regimes • Changes to seasonal flow patterns and sediment deposition
Water Users	• Potential flooding of existing structures e.g. pumps • Potential loss of wetlands
Water Quality	• Impact to sediment balance/deposition • Quality of water releases
Aquatic Ecology	• Impacts to migration of aquatic biota • Fragmentation of affected river - interruptions to river continuum
Riparian Habitat	• Destabilisation of channel morphology at river
Agricultural Potential	• Permanent loss of potential agricultural land and natural areas

9 SENSITIVE ENVIRONMENTAL FEATURES

Within the context of the project area, cognisance must be taken of the following sensitive environmental features, attributes and aspects, for which mitigation measures are included in the EIA Report and this EMPr, as follows:

- The EWR of the Berg Estuary.
- The existing agricultural activities and vineyards in the area.
- The affected landowners and the existing water users in the area.
- The existing pumps located on the Berg River.
- All existing infrastructure and structures, including the powerlines and roads in the area, are regarded as sensitive and need to be protected, reinstated or relocated.
- All traffic and pedestrians on the private and public roads are regarded as sensitive and measures need to be implemented to safeguard these road users.
- A collection of ESA artefacts, including a single hand axe were identified on the edge of a field and close to the Berg River and the location of the pump station and weir.
- A number of watercourses are affected, which include the Berg River (1:100 year floodplain), wetlands, hillslope seeps, depressions and numerous drainage channels.
- The development fall within Critical Biodiversity Area 1 and Critical Biodiversity Area 2 (Degraded), and Ecological Support Area 2 (Restore). The following fauna and flora were observed:
    - One breeding pair of Blue Crane (*Anthropoides paradiseus* – red data species*)* on Gouklip Farm, which is near the proposed Pump station and Laydown Area 3.
    - The Great White Pelican (*Pelecanus onocrotalus*) – vulnerable.
    - Jackal Buzzard (*Buteo rufofuscus*) – endemic.
    - Swartland Alluvium Fynbos and Swartland Shale Renosterveld – critically endangered.
    - Atlantis Sand Fynbos – threatened.
    - Geometric Tortoise *(Psammobates Geometricus)* at the Voëlvlei Nature Reserve, which is adjacent to the Discharge Point of the pipeline - critically endangered and therefore protected under the Nature Conservation Ordinance of the Western Cape Province and Schedule 1 on the International Trade Endangered Species of Wild Fauna and Flora (CITES).
    - Two Red Data frog species (Cape Rain Frog (*Breviceps gibbosus*) and Cape Caco (*Cacosternum capense*)) are known to occur in the region of the proposed development, both listed as vulnerable.

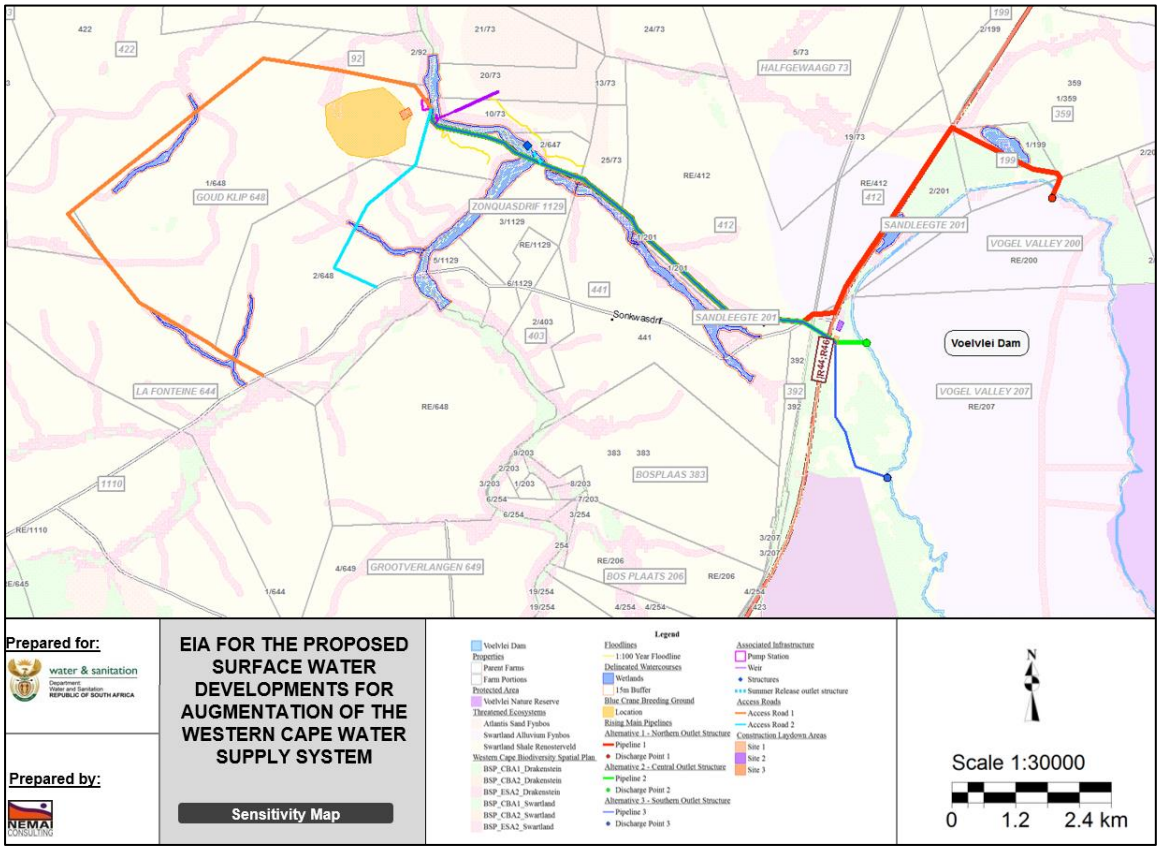

Figure 5: Sensitivity Map (Note: Only Discharge Point – Option 3 was preferred over options 1 and 2, and authorised. In addition, only Access Road 1 was authorised)

A sensitivity map indicating the proposed activities which were authorised, associated structures, infrastructure, and environmental sensitivities is contained in Section 12, Attachments.

10 ENVIRONMENTAL MANAGEMENT PLANS FOR THE PROJECT

The following principles should be considered at all times during the activities under the pre-construction, construction, and operation and maintenance phases.

The receiving environment is considered to be composed of both biophysical and social components.

- Construction is a disruptive activity and management and mitigation measures must be considered with regards to the environment, including the social environment.
- 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 basis for the management measures which follow below comprise 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);
- **Indicators and Targets** – i.e. what should be monitored and the level of performance to accomplish management objectives;
- **Management Actions** – i.e. practical actions aimed at achieving management objectives and targets;
- **Responsibilities**; and
- **Monitoring Requirements**.

These sub-sections describe the Environmental Management Plans for different environmental and social attributes relating to the project:

- Site Layout, Establishment and Management;
- Access Control;
- Air Quality Management;
- Noise Management;
- Water Management;
- Fire Management;
- Waste Management;
- Hazardous Substances Management;
- Fauna and Flora Management;
- Heritage Management;
- Social Management;
- Environmental Awareness and Training;
- Rehabilitation Management; and
- Operation and Maintenance.

10.1 SITE LAYOUT, ESTABLISHMENT AND MANAGEMENT

Two laydown areas/sites were proposed in the EIA at the discharge point of the pipeline site, both approximately 0.4 hectares. The sites will be accessible from the main road, R44/45 and are adjacent to the Voëlvlei Dam.

The main laydown area/site is proposed at the pump station and weir site. The site is approximately 0.85 hectares and it is adjacent to the Berg River. The site will be accessible using public roads and the authorised access road.

The construction site will also include land and land rights that are required for the development, which will be acquired through expropriation either temporarily (for the duration of construction and until the completion of rehabilitation) or permanently, and fenced off during construction.

Construction site establishment largely entails conducting the necessary specialist studies, and carrying out the requisite environmental processes in preparation for construction and may include obtaining relevant authorisations/approvals and permits, etc. Construction management entails how the site is managed for the duration of construction. At no time during construction will construction personnel be allowed access on private land unless a prior arrangement is made with a particular landowner and there is explicit permission to do so. Similarly, landowners will not be allowed access onto the construction sites.

Management Objective:

- The layout of the construction site will be in accordance with the EA.
- The construction site shall specifically exclude the nature reserve that is located to the south of the Voëlvlei Dam.
- Manage environmental impacts associated with site clearing and establishment.
- Ensure that only areas that are specifically required for the construction purposes are cleared.
- Minimise environmental impacts associated with the construction site and related facilities.
- Ensure suitable management of labour and staff to prevent security-related issues.
- Optimise the use of local labour and provide a work environment that is conducive to effective labour relations.
- Provide a safe and healthy working environment to labour and staff, and the public by complying with the Construction Regulations and the OSH Act.

Indicators and Targets:

Indicators	Targets
Compliance notices or other forms of sanction by the authorities	None
Access or encroachment into the no-go areas	None
Damage to sensitive environmental features outside of the demarcated construction areas, including marked and barricaded heritage resources, protected trees, watercourses, agricultural area, structures and infrastructure	None
General housekeeping as a function of visual inspections	Full compliance

General waste management, including contamination as a result of ablution facilities as a function of visual inspections	Full compliance
All temporary fencing in position and maintained until such time it is replaced by permanent fencing or removed at completion of construction activities	Full compliance
Number of health and safety major incidents	None
Compliance with the Occupational Health and Safety Act and the construction regulations	100%

Management Actions:

Pre-construction surveys:

- An ecologist and/or group of specialists (with wetland and rehabilitation experience) will produce an ecological report, which will provide a pre-construction baseline description of the habitats and vegetation types on the construction site. The report must include maps and photographic records per directly affected property and describe the vegetation types as well as:
  - Mitigation for threatened/protected species of conservation importance.
  - The alien invasive plant species and weeds that will need to be controlled and the methods of control.
  - Detailed and specific rehabilitation requirements – fertilisers, seed mixes, timing, maintenance, type of applications, etc.
- Baseline studies/monitoring where required should be undertaken prior construction in order to provide a benchmark against which impacts resulting from the development.
- Determine the depth of the topsoil.

Existing services and structures:

- Identify (as part of the pre-construction survey), relocate and/or demolish all affected services and structures in consultation with the owners of the services and structures.
- Conform to requirements of the relevant owners of the services and/or structures. Agreements or permits to be in place.
- Ensure access to services and/or structures is available to the relevant owners.

Fencing and barricading:

- The whole construction site will be fenced and maintained until construction is completed, including fencing/barricading of sensitive environmental features.
- On areas where there is livestock and/or wild animals, erect fencing will be according to appropriate specifications.
- Comply with the provisions of the Fencing Act (Act No. 31 of 1963).
- No-go areas will be clearly marked and fenced/gated accordingly.

Construction site clearing:

- Clearing of vegetation and removal of topsoil will be done in a phased matter, with due consideration of the search and rescue activities.

- Monitor the clearing activities, with particular focus on heritage resources and vegetative cover for sensitive areas, as well as protected fauna and flora species.
- Remove **all** the topsoil and stockpile it for the duration of construction. The stockpiles will be at suitable areas and protected against wind and water/rain erosion, contamination, pollution and compaction of any kind.
- Topsoil to be adequately protected from contamination from construction activities and by aggregate, cement, concrete, fuels, litter, oils, domestic and industrial waste.
- Following the construction phase, the topsoil will be reinstated to the same level that it was removed and used in rehabilitation of affected areas and landscaping around the infrastructure.
- Prohibit the felling of trees for firewood.

Construction camps/offices:

- Temporary facilities and structures (fuel storage, toilets, parking areas, offices, etc.) shall be located with due cognisance of the terrain and geographical features and within the authorised footprint of the development.
- Minimise public disturbance from lighting through suitable placement (zones), height, type, direction (inward rather than outward) and intensity of floodlights, without compromising safety.
- Provide designated safe smoking areas, with special bins for discarding of cigarette butts.
- Ensure that essential services and facilities (ablution, drinking water, eating areas) are provided and maintained.
- A recruitment/employment office will not be permitted or established at the construction site. Furthermore, job-seekers will not be permitted access the construction sites/offices.

Eating areas:

- Provide designated and demarcated eating areas and fully equipped kitchen and/or enclosed braai facilities for all labour and staff. Eating areas be cleaned on a daily basis and shall provide adequate temporary shade.
- Provide safe potable water and washing facilities. Disposal of waste shall be in accordance with the requirements below.
- Sufficient vermin/weatherproof refuse bins must be placed at all eating areas and maintained.

Ablution facilities:

- Provide sufficient and suitable ablution facilities (e.g. washing basins, showers, mobile / portable / VIP toilets) for labour and staff, in accordance with the relevant construction regulations of the Occupational Health and Safety Act and other standards. For example, 1 toilet per 15 workers.
- No pit latrines will be allowed. Install and maintain conservancy tanks, particularly at the main construction camp or site offices.
- Toilets may not be situated within 100 m of any water body or within the 1:100 year flood line, exceptions should, however, be allowed when the works are in the water body or in close proximity of the water body – in this instance mobile toilets may be situated at least 50 m away from the water body.

- All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause and doors are to be kept closed at all times.
- All windows and other ventilation openings of the toilets should be fitted with suitable screens to prevent flied and other unwanted flying insects from entering the neighbouring properties. This is particularly important given that the surrounding land use is orchards and vineyards.
- Some form of screened off changing facility must be provided separately for each sex.
- The entrances to the toilets will be adequately screened from public view.
- Sanitary hygiene bins will be provided for female staff.
- Toilet paper shall be provided.
- All ablutions facilities are to be cleaned/emptied on a regular basis, before they are full and contaminate the environment, and the disposal of waste is only at a licensed waste disposal facility.

Management of workshop and equipment:

- Maintenance and washing of construction equipment (which includes apparatus, machinery, and off-road construction vehicles) will be performed in such a manner so as to avoid any environmental contamination.
  - Use of drip trays, oil traps or other suitable measures.
  - Washing will be at dedicated washing areas.
  - Refuelling (using dripless methods/equipment) or servicing within or close proximity of the natural water resources will not be permitted.
- Workshops, refuelling depots and washing areas must be bunded and equipped with oil traps or other suitable measures.
- Ensure storage and disposal of hydrocarbons in accordance with Hazardous Substances Management.

Management of staff and labour:

- Prevent trespassing of construction workers, vehicles and equipment onto private property.
- Use designated and demarcated smoking areas.
- Employ local people, including women and disabled persons as far as possible and provide transportation, where necessary (e.g. unskilled labour).
- Training of labour and staff to benefit individuals beyond completion of the project.
- Undergo environmental awareness training.

Health and safety:

- The requirements of the Occupational Health and Safety Act and the construction regulations shall be adhered to, including the project-specific health and safety specification and plan.
- All labour and staff must be clearly identifiable and issued with identification cards.
- Speed limits shall be enforced on the construction sites.
- Applicable notice boards, warning signs or contact details will be put in place and secured.

Traffic Management:

- Ensure that all construction vehicles use only designated accesses and construction roads.
- Ensure minimum disruption to other road users. Where construction will obstruct existing roads, temporary road deviations must be provided.
- Road signs and traffic calming measures such as flag-person must be provided where construction activities interfere with general traffic or pedestrians. Such measures must be implemented in consultation with the provincial traffic authorities.
- Comply with traffic rules and requirements of the provincial roads authority, including the contractor's set speed limit on the designated construction roads.
- Maintain construction roads – repair rutting, potholes and maintain stormwater control mechanisms.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- An independent health and safety agent (a service provider that will be appointed by TCTA) will monitor and audit the development against the Occupational Health and Safety Act and construction regulations.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives and acquire the land and servitude rights for the development.

Monitoring Requirements:

- Documentation i.e. Occupational Health and Safety Act and construction regulations
- Public complaints and issues, and responses.
- Specialist reports – pre-construction surveys and baseline studies/monitoring.
- Intact fencing and/or barricading, and no clearing outside the construction area.
- No evidence of recruitment office at the construction site.
- All facilities in place and maintained.
- Signs erected and maintained.

10.2 ACCESS CONTROL

The right of access on or around the farmer's private land that are required to access the construction sites for the development will be acquired through expropriation i.e. servitude of aqueduct, road servitudes, and/or right of ways.

There will be several stages of access and access control:

- Initial stage, prior to construction activities:

  Permission will be sort from farmers/landowners to use their existing private access roads for site establishment (e.g. demarcation of construction footprint/layout by a surveyor, and erection of temporary fences/pegs, ablution facilities and offices), further studies (e.g. aquatic assessment, geological and geotechnical) and pre-construction surveys only. This will be used by small teams/specialists, because the requirements will be temporary and for a limited period. There will be no construction-related environmental impacts, because no construction activities will be undertaken prior to the building of the construction access roads below.

- During construction activities:

  At no time during construction will construction workers be allowed access on existing private access roads. Similarly, landowners will not be allowed access onto the new temporary and permanent construction access roads. Temporary construction access roads will be confined and constructed within the temporary and permanent construction sites/footprint (refer to Section 10.1 above) and will be rehabilitated as per the Rehabilitation Management Plan. The main access routes to and from the construction sites will be as follows:
  - Proclaimed public road network by the Department of Transport and Public Works in the area i.e. R311; R44; R46; MR226; MR227; DR1154; OP5403; OP5404 and OP5405.
  - Authorised Access Road 1 on Portion 1 of farm Zonquasdrift 648 along its Northern boundary and situated between OP5403 and the Berg River, which will be constructed as part of the development. The farmer has been consulted and the parties have agreed to undertake further consultation during the design phase of the project (refer to the correspondence in Section 12, Attachments).
  - Existing access road on the state land i.e. Voëlvlei Dam. The Applicant (DWS) is the owner of the property and operator of the dam, and has reviewed and agreed to this EMPr.

- Final stage, operation phase:
  - The operator (DWS) will use the new permanent access road, which will be registered as state land after expropriation, as well as the existing access road on the above-mentioned state land for the overall operation of the development i.e. pump station, substation, outlet at Voëlvlei Dam, weir and abstraction works.
  - Should access to the pipeline and associated infrastructure be required during operation on the farmer's private land, albeit very infrequently, the operator will make specific arrangements with the landowner(s) to access the servitude of aqueduct on the private property. Such requirements will be specified in the operation and maintenance manual as per Section 10.14 below.

Management Objective:

- The access and access control will be in accordance with the EA and this EMPr.
- No access roads will be constructed in or around the nature reserve that is located to the south of the Voëlvlei Dam.
- Ensure that only construction access roads are used during construction.

Indicators and Targets:

Indicators	Targets
Illegal access to farmer's private land and use of private access roads	None
Consider comments and/or recommendations by farmers/landowners in accordance with PAJA	Full compliance
Access control measures	Full compliance
Rehabilitation of temporary construction access roads	Full compliance

Management Actions:

- The construction sites will be fenced off and the newly-constructed access roads to and from, and around, the construction sites will be locked and/or manned (gates with security personnel, where necessary) throughout the construction period.
- At no given time will the construction workers, vehicles and equipment be allowed access onto farmer's/landowner's private land or use private roads/access. All construction vehicles will use only construction access roads.
- The farmers, landowners, public or non-construction people will not be permitted access to the construction sites and roads, unless permission is given by the contractor and is undertaken in accordance with the Occupational Health and Safety Act and construction regulations. In general, visitors will be not be allowed on site unaccompanied by the contractor or consultant and/or will undergo health and safety inductions.
- Construction labour should be bussed to and from the construction sites as far as possible to minimise traffic. Only construction access and public roads shall be used at all times.
- Speed limits shall be enforced on the construction access roads through road signs and traffic calming measures such as flag-persons.
- Ensure minimum disruption to other road users – where construction will obstruct existing public and private roads, temporary road deviations must be provided.
- Comply with traffic rules and other requirements of the provincial roads authority, including the contractor's set speed limit on the designated construction roads.
- Maintain construction access roads during construction – repair rutting, potholes and maintain stormwater control mechanisms and access control measures above.

Responsibilities:

- The main contractor will implement the Management Actions.

- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives and acquire the land and servitude rights for the development.

Monitoring Requirements:

- Farmer's/landowner's complaints and issues, and responses.
- Construction access roads and controls in place and maintained.
- Signs erected and maintained.

10.3 AIR QUALITY MANAGEMENT

Dust is a common occurrence on construction sites and is typically mechanically generated during earthworks and use of gravel roads, especially in dry and windy conditions. Construction-related dust is typically more of a nuisance issue rather than a health issue, but nevertheless requires effective management.

The use of plant, machinery and vehicles also results in atmospheric emissions from exhausts, albeit of relatively low intensity. All these sources of emissions must be managed effectively during the development.

Management Objective:

Minimise pollution, albeit the air emissions/dust associated with the development does not result in adverse human health effects and environmental damage.

Indicators and Targets:

Indicators	Units	Targets
Dust fallout	mg/m^2/day averaged over 30 days	<600 in the pipeline servitude <1 200 for the weir and abstraction works *
Visible vehicle emissions		None

Management Actions:

- Appropriate dust suppression measures must be implemented on dry weather days and periods of high wind velocities or during construction activities.
- All construction equipment will be kept in good working order and serviced regularly to minimise emissions.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Air quality monitoring measurements.
- Inspections or identification of incidents that generate dust.
- Public complaints and issues, and responses.

10.4 NOISE MANAGEMENT

Noise can be generated from a variety of activities across the construction site. Given the nature of the area, noise can result in a nuisance or disturbance, and actions need to be taken to control or minimise disturbance to surrounding residents and landowners.

Management Objective:

Minimise noise-related disturbance to surrounding residents and landowners.

Indicators and Targets:

Indicators	Targets
1 hour L_{Aeq} noise levels at selected key receptors	Threshold levels determined from baseline monitoring, including the relevant South African National Standards
Number of complaints related to noise	<10/month

Management Actions:

- Undertake baseline monitoring prior to construction – to be undertaken by a suitably-qualified specialist.
- Construction equipment must be kept in good working order and operated within specifications and capacity – no overloading and speeding. Immediate attention being paid to defective silencers, slipping fan-belts, worn bearings and other sources of noise.
- Sufficient notice must be provided to the surrounding residents and landowners should there be a need for blasting to occur.
- No amplified music is to be allowed from the use of radios, tape recorders, compact disc players, television sets, etc.
- Limit construction activities to mainly daylight hours as far as possible.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Specialist baseline and regular monitoring reports.
- Public complaints and issues, and responses.

10.5 WATER MANAGEMENT

Working in close proximity to, or in, surface water means that discharges of waste water or releases of contaminated storm water pose a risk to the ecological integrity of these resources, potentially to the detriment of the users of water in the resources. It is therefore necessary to ensure that activities that could negatively impact on water resources and water users are effectively managed and controlled to minimise or prevent the same. In addition, storm water runoff should not result in erosion in and around the construction area and should not be contaminated by oil or other hazardous material spills.

Management Objective:

The present quality of surface water resources, which includes the physical, chemical quality and biological characteristics of the water, the quantitative flow regime, as well as the quality of the instream and riparian habitats[1], is not adversely affected by the development.

Indicators and Targets:

Indicators	Targets
Dewatering of sediment-laden or cement laden water into natural water resources	None
Downstream water quality of natural water resources	<10% variation from the (instantaneous) upstream water quality
Presence of parameters that are toxic to aquatic life by the development	None
Visible oil and grease contamination	No oils and grease contamination in the river

Management Actions:

Waste/contaminated water management:

- Identify sources of process wastewater and general quality characteristics, and specify what will be done to treat and/or dispose of such process water.
- Cement-laden and silt-laden water must not be directly discharged over land or directly into watercourses. It must be contained in settlement ponds or filtered (e.g. geotextile sock) before release.
- Install adequate sediment control measures to prevent erosion at areas that are susceptible to erosion, such as embankments, excavations, roads and stockpiles. Suitable methods will include sandbags, coarse rock (rip-rap), fabric liners, etc.

Working in rivers and wetlands:

- Ensure that adequate measures are in place to prevent contamination of natural water resources. Suitable measures will include diversions, fluming, coffer dams or pumping water from the point of source to be treated before release back into the system.

[1] "Resource quality" is defined thus in s1(i)(xix) of the National Water Act, 36 of 1998.

- No impediment to natural water resources other than the planned erosion control measures, and river and wetland crossings shall be permitted. The designs and/or construction methods for these crossings will be performed only after the approval of the consultant.

Stormwater management and prevention of contamination:

- All sensitive material storage areas shall be designed to reduce the risk of spillages and contain any spills should they occur.
- Contaminated stormwater and other run-off from the construction activities/sites shall be contained.
- In the event of a spill which may contaminate stormwater, the spill management procedures shall be implemented immediately.
- Adequate stormwater drainage lines shall be constructed to divert run-off around the construction sites to prevent contamination of the water and collection of water in excavations.
- All stormwater drainage lines shall contain water flow discharge dissipaters to prevent erosive action on the sides of the drainage lines.
- Damage to existing drainage lines, levees, and dams shall not be permitted, and where this cannot be avoided due care will be taken during construction and measures as per the Rehabilitation Management Plan will be implemented.
- Alteration or modification to a course or channel of water courses shall be in accordance with the requirements/licences of the Department of Water and Sanitation.

Water conservation:

- Include observations of unnecessary or wasteful water use during site inspections e.g. leaking taps, hosepipes, etc. Repair identified leaks and address water wastage.
- No water may be abstracted from natural water resources without authorisation from the Department of Water and Sanitation.
- Avoid over-wetting, saturation and unnecessary run-off during dust control activities and irrigation. Due to the severe drought in Western Cape, water will be used very sparingly during construction.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Public complaints and issues, and responses.
- Water monitoring – discharges.
- Construction method statements.

10.6 FIRE MANAGEMENT

Uncontrollable fires pose risks to health, safety and the environment. It is therefore necessary to ensure that suitable fire management measures and the necessary precautions are in place.

Management Objective:

No damage to adjacent properties, sensitive environmental features as a result of uncontrolled fires. Where uncontrolled fires are started inadvertently, they are quickly brought under control.

Indicators and Targets:

Indicator	Target
Number of fires on the construction site for the duration of the development	0
Maximum extent of fires started inadvertently	<1 hectare
Value of adjacent property damage	0
Number of fire-related injuries	0
Loss of sensitive environmental features as a result of fires started inadvertently	None

Management Actions:

- Membership of the local fire protection association and compliance with the regulations of the association e.g. burning of fire breaks.
- Take all necessary precautions i.e. suitable fire-fighting equipment, in accordance with the Occupational Health and Safety Act and construction regulations.
- Open and uncontrolled fires shall not be permitted.
- Smoking will not be permitted at areas with fire hazard. Such areas include workshops and fuel storage areas and any areas where the vegetation or other material is such as to support the rapid spread of an initial flame.
- Take immediate steps to extinguish any fire, which may break out on the construction site, and/or report it to the relevant authority.
- Comply with the requirements under Hazardous Substances Management.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Membership of, and compliance with, the local fire protection association (if applicable).
- Public complaints and issues, and responses.

10.7 WASTE MANAGEMENT

The general solid and liquid waste materials generated during construction must be segregated, stored, transported and ultimately safely disposed of. Efforts must be made to minimise the volumes of waste generated, and to minimise the volumes of waste to be disposed of.

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.

Indicators and Targets:

Indicator	Target
Littering on the construction site	None
Records of waste disposed at waste disposal facilities, recycled or reused	100% records and valid waste disposal certificates, reused or recycled
Adequate waste containers that are easy accessible and maintained	100%
Removal and cleaning of waste bins	Weekly / monthly (as required)

Management Actions:

- Waste management activities must comply with the National Environmental Management: Waste Act (Act No. 59 of 2008). All waste (refuse, wires, metal and other foreign objects) will be cleaned/collected and disposed of regularly at suitable disposal sites/facilities, based on the waste type (general versus hazardous). In general, burying, dumping or burning of waste materials will not be permitted.
- Ensure that waste is transported without spillages.
- Vermin / weatherproof bins (kept closed) and/or skips will be provided in sufficient numbers and capacity to store general/domestic and construction waste, respectively. The bins and skips should be emptied regularly to avoid overfilling or spillage and other associated nuisances.
- Where possible, waste must be separated at source (e.g. glass, paper, metals, plastics, organic waste and hazardous wastes) and have a dedicated storage area. Allow collection by recycling contractors, where feasible.
- The maximum retention time for temporary storage of waste generated must not exceed a month, provided the waste does not present a health hazard or odour build-up.
- Littering is prohibited.
- Excess concrete, building rubble or other material must be disposed of in areas designated specifically for this purpose and not indiscriminately over the construction site.
- Contaminated soil must be treated and disposed of at a permitted waste disposal site, or be removed and the area rehabilitated immediately.
- All chemical spills must be contained and cleaned up by the supplier or professional pollution control personnel. Run-off from wash bays must be intercepted.

- Hazardous and flammable substances such as used oil and contaminated hydrocarbons must be stored separately and dealt with in accordance with Hazardous Substances Management.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Public complaints and issues, and responses.
- Housekeeping activities.
- Records of recycling, reuse or disposal certificates.

10.8 HAZARDOUS SUBSTANCES MANAGEMENT

Hazardous and flammable substances pose risks to health, safety and the environment. These substances are typically limited to fuels, oils and greases, hydraulic fluids and paint. It is necessary to ensure that these substances are transported, stored, handled and disposed of in a safe manner that poses no risk to the environment.

It must however, be recognised that spillages can occur as a result of accidents, negligence or other upset circumstances. In the event of a spill, quick and effective remedial action can ensure little or no significant impact occurs, especially if there is also effective rehabilitation.

Management Objective:

- Hazardous and flammable substances are stored, transported, used and disposed of in accordance with safe practice and regulatory requirements.
- Spillages of hazardous and flammable substances are prevented, and should they occur accidentally or for any other reason, rapid clean-up is implemented to prevent water, soil and/or groundwater contamination.

Indicators and Targets:

Indicators	Targets
Fires as a result of poor management of hazardous substances	0
Health complaints or injuries as a result of poor management of hazardous substances	0
Audits on safe handling, storage, transport, use and disposal	100% compliance
Complaints in respect of poor management of hazardous substances	0
Major spillages are cleaned and hazardous substances disposed of in accordance with the legal requirements	Within 24 hours
Complaints related to spillage of hazardous materials	0

Management Actions:

- Comply with the Occupational Health and Safety Act and the construction regulations, and this includes:
  - Emergency preparedness and response, and emergency equipment.
  - Fire prevention and protection (Construction Regulation 29).
  - Electrical Installations (Construction Regulation 24).
  - Use and storage of flammables (Construction Regulation 25).
  - Hazardous Chemical Substances.
  - Incident reporting and investigation.
  - Blasting and the use of explosives.
- Ensure that labour and staff that use hazardous and flammable substances are adequately trained and wear personal protective equipment.

- Obtain Material Safety Data Sheets for all hazardous chemical formulations before use and the substances must be handled according to the instructions.
- Record the details and quantities of hazardous and flammable substances on the construction site.
- Implement systems and measures that prevent uncontrolled or accidental releases/spills onto the environment. Should a spill occur, clean it up immediately using absorbent spill clean-up materials or suitable materials/equipment and remedy the cause. Furthermore, the recovery of spills should be treated as hazardous waste.
- Flammable substances will be handled, stored, used and transported in a safe manner that does result in a fire or explosions.
- Use clear sign – no smoking and other precautions.
- Ensure secured and clear labelling on containers with the details of the hazardous and flammable contents.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- An independent health and safety agent will monitor and audit the development against the Occupational Health and Safety Act and the construction regulations.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Documentation i.e. Occupational Health and Safety Act and construction regulations.
- Public complaints and issues, and responses.
- Disposal certificates.
- Recorded evidence of spillages.

10.9 FAUNA AND FLORA MANAGEMENT (TERRESTRIAL AND AQUATIC)

The development is largely on transformed through farming activities and existing government water works in the area. No threatened fauna (animals) or flora (plants) species of conservation importance were noted i.e. EIA.

There are some critically endangered grasslands and functioning wetlands, and other sensitive environmental features (refer Section 9) such as the geometric tortoise. There may be the presence of red data (such as the Blue Crane), endangered species, or medicinal plants within the construction footprint and these must be rescued and dealt with.

In addition to the above, the development will have both direct and indirect impacts on the river with the most significant risks associated with the construction of the weir, abstraction works and the fishway structures.

Management Objectives:

- To identify, relocate and/ reinstate flora after the completion of construction activities.
- To prevent harm to faunal species by preventing access during construction and relocating to a safe environment if encountered.
- To minimise the impact on the Berg River during construction of the weir, abstraction works and fishway.
- To ensure that fishway results in movement of fish (both fast and slow-moving) during both high and low flows.

Indicators and Targets:

Indicator	Target
Documentation available for all pre-construction surveys, period to construction clearing	100%
Percentage area of search and rescue on the construction area, including licences/permits where required	100% (conservation-worthy fauna and flora identified and removed prior to construction clearing)
Alien invasive vegetation control on the construction area	100%

Management Actions:

Translocation and protection of flora:

- Suitably-qualified specialists to identify, locate, mark (for protection during construction) and/or remove/relocate protected plants prior to construction site clearing. The specialist must also acquire permits or licences required for the removal or pruning of protected plants/tree species as in accordance with Government Gazette Notice 1012 of 27 August 2004 and the National Forests Act (Act No 84 of 1998).
- Do not disturb, deface, destroy or clear plants that are specifically marked for ‘protection’, particularly plants or trees of value that are not affected by construction activities.

Control of weeds and alien invasive plants:

- The identification and control of invasive and other noxious plants must be undertaken according to the 2014 Alien and Invasive Species Regulations of the National Environmental Management: Biodiversity Act (10 of 2004).
- With the disturbance of soils, weed growth is expected and should be controlled before seed formation.
- Ensure that the control of exotic or invasive plants is undertaken by suitable contractors using appropriate methods such hoeing, hand pulling, digging, mowing or herbicide applications.
- The use of any pesticides or herbicides shall not have negative impacts on the surrounding environment.
- Dispose of the eradicated plant material at an approved solid waste disposal site. If no toxic sprays or persistent poisons were used during eradication, then woody material may be sold or donated as fuel, building or craft material.

Search, relocation and protection of fauna:

- A suitably qualified faunal specialist to identify animal species, populations and nests of conservation worthy species (including the geometric tortoise) and to undertake the relocation prior to construction, in consultation with CapeNature Scientific Services.
- No wild animals may under any circumstance be fed, hunted, poached, snared, captured, injured or killed (unless posing a direct threat to labour and staff). This includes animals perceived to be vermin.
- Undertake regular inspections of the surrounding natural vegetation, excavations, fences and along game paths to ensure that no trapped animals or traps/snares. Remove and dispose of any snares or traps, and animals must be safely removed and released. Any animal found dead or injured as a result of traps or snares on site must be reported to CapeNature Scientific Services or the SPCA.
- Only existing roads must be used for all vehicles, there must be no driving in vegetation whatsoever.
- Ensure that domesticated and wild animals are kept out of the construction site as far as possible.
- Comply with Nature and Environmental Conservation Ordinance (Act No. 19 of 1974) with regards to the accommodation of relevant large mammal species.
- Fishway: if the fishway is to be constructed, an aquatic biomonitoring programme will be conducted after the construction phase has been completed to determine the effect, if any, on the local biota and migration of the fish species. A number of sensitive aquatic biota should be specifically monitored as part of assessing the performance of the new fishway.

Dealing with the geometric tortoise:

- Where required during the construction phase, and in consultation with CapeNature Scientific Services, install a feral animal exclusion fencing.
- Undertake regular inspections of the construction site. When a geometric tortoise is found, CapeNature Scientific Services must be contacted immediately and informed of the GPS coordinates where found and where it was safely released.
- There must be minimal handling of the tortoise. As such, the tortoise should be carried/transported in a box with vegetation to the appropriate release site.
- All the requirements above were established in consultation with CapeNature – refer to the correspondence in Section 12, Attachments.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Public complaints and issues, and responses.
- Exotic or invasive plants – growth/re-growth.
- Records of flora and fauna search, relocation and/or protection.
- Specialist reports.
- Aquatic monitoring programme.

10.10 HERITAGE MANAGEMENT

A Heritage Impact Assessment was undertaken for the EIA by the specialist under Section 38(8) of the National Heritage Resources Act (25 of 1999). Only some early stone artefacts were found in a pile of rocks on the edges of a wheat field on the farm Goudklip 648/1, but these were of low significance.

Management Objective:

To avoid damage to, or destruction of, any archaeological artefacts.

Indicators and Targets:

Indicators	Targets
Damage to, or destruction of, archaeological and cultural resources or graves	None
Compliance with permit conditions, where applicable	100%

Management Actions:

- For any chance finds, the construction activities will be stopped at the affected area (to be demarcated and protected). A registered heritage specialist will to carry out the inspection and inform the heritage resource agency (i.e. Heritage Western Cape) about the finding.
- Permits to be obtained in terms of the National Heritage Resources Act (No. 25 of 1999) if heritage resources are to be impacted on and for the removal thereof.
- Should any (human) remains be found, the South African Police Service and archaeologist should also be contacted.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

Permits and/or approvals and compliance thereto (if applicable).

10.11 SOCIAL MANAGEMENT

Relocation and resettlement:

The studies conducted during the EIA indicate that there will be no relocation of homesteads or graves, therefore should there be any chance finding, the requirements under Heritage Management must be followed.

Stakeholder management:

The development will affect landowners and other interested and affected in the area. All interested and affected parties will need to be (i) kept updated on status of construction and (ii) given the opportunity to raise issues or request information.

A stakeholder engagement process will be implemented to ensure that stakeholders and communities are kept informed about the project and its impacts, and effective resolution of issues and grievances.

Socio-economic opportunities:

The development will provide employment and various commercial opportunities, and training and skills development where possible.

Management Objective:

- Establish and maintain good relationship with, and promote participation of, all key interested and affected parties.
- Monitor and record of all impacts, complaints and issues and ensure that these are timeously and effectively verified and responded to.

Indicators and Targets:

Indicators	Targets
Acknowledgement of complaints and issues	Within five (5) working days
Address and respond to complaints and issues	Within thirty (30) working days, unless additional information or clarification is required.
Log and formalise all communication received and track complaints to determine trends and issues that may require future interventions.	100% of communication received is recorded.

Management Actions:

- Establish and maintain communication with interested and affected parties.
- Continued liaison with authorities with regards to compliance with the EA and this EMPr.

- Establish and maintain protocol to record and address complaints and issues, and provide a single point of contact (suitably qualified person) through whom the interested and affected parties may register queries, issues or complaints.
- TCTA is to consult with landowners regarding the acquisition of the land and servitudes rights and related financial loss claims, if any.
- Development and implement a socio-economic programme/plan or method statement, considering the Management Actions under the Site Layout, Establishment and Management.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives and consultations relating to the acquisition of the land and servitudes rights.

Monitoring Requirements:

- Public complaints and issues, and responses.
- Socio-economic opportunities, in line with the construction contract.

10.12 ENVIRONMENTAL AWARENESS AND TRAINING

Environmental awareness is the understanding of environmental management obligations as well as the prescriptive measures governing the development. All staff and labour should have general attentiveness to sensitive environmental features and higher-level of understanding environmental management obligations.

The methods of creating environmental awareness and methods or training may include:

- Courses/presentations prior to construction activities;
- Refresher courses/presentations (as and when required);
- Toolbox talks (task- and area specific);
- Signage/posters containing environmental information at appropriate locations e.g. no destroying of protected fauna, grave sites - no-entry, etc.

Courses and toolbox talks must be provided by suitably qualified persons such as the environmental officer, and in a language and medium understood by labour and staff.

Management Objective:

Ensure that all labour and staff on the construction site are aware of the relevant provisions of the, EA and EMPr as well as their specific roles and responsibilities.

Indicators and Targets:

Indicators	Targets
Labour and staff completed/attended the appropriate environmental awareness and/or training	All and 100% aligned with the specific roles and responsibilities
Records of environmental awareness and/or training undertaken	100%, kept on site

Management Actions:

- The Contractor must arrange that all of his employees and those of his sub-contractors 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.
- Training may include:
  - Water conservation – highlight simple water savings tips such as keeping taps properly closed, fixing leaks on hosepipes and others.
  - Fauna and flora – provide training pursuant to the requirements under Fauna and Flora Management. Particular emphasis should be placed on talks regarding snakes.
  - Spillages – ensure awareness on prevention, containment and reporting of spills that do occur.
- Photographs of sensitive animals (Greater White pelican, Jackal Buzzard, Geometric Tortoise, and Blue Crane) must be displayed on the construction site to raise awareness about the specific species.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Records of training and awareness.
- Signage/photographs displayed and maintained.

10.13 REHABILITATION MANAGEMENT

Rehabilitation refers to a phase of the project that will be carried out after the construction of the infrastructure, as follows:

- Clean-up and removal of construction roads, equipment and facilities around the disturbed areas as soon as practically possible. Fencing will remain intact.
- Landscaping, reinstatement of topsoil and vegetation using species and methods specified by a suitable specialist.
- Rehabilitation of existing services and decommissioning of temporary services where applicable.
- Control of exotic or invasive plants
- Completion and acceptance of the rehabilitation per affected property, and removal of fencing (where applicable)

The site specific (property by property) package must be prepared prior to the commencement of construction activities. Rehabilitation must ensure that any existing natural drainage to wetlands, farm dams etc. are restored after construction of the infrastructure. Any disturbed areas must be restored to their former state, including planting of vegetation (grasses and other) on existing and new servitudes to blend in with the surrounding environment. The pre-construction survey specialist will used.

Management Objective:

All areas disturbed by construction activities must be rehabilitated as soon as is practically possible, utilising appropriate methods and the species specified by the rehabilitation specialist.

Indicators and Targets:

Indicator	Target
Recovered topsoil from disturbed areas stored for re-use	100%
Evidence of erosion	None
Survival rate of translocated plants	Not less than 40%*****
Vegetation cover for grass using methods recommended in the specialist reports	80% of pre-construction state
Exotic or invasive plants on the construction area	<10%
* Achieving high survival rates of grassland plants is very challenging, as the plants are difficult to move and maintain. The target has been set in the spirit of doing the best that can be done to maximise the survival rate.	

Management Actions:

Landscaping:

- All imported materials used for the construction of temporary roads must be removed and backfilled with suitable material i.e. subsoils prior to construction.
- Backfilling of excavations must ensure placement of soil in the order it was removed, i.e. subsoil is deposited first, followed by the topsoil. Compact in suitable layer thickness to avoid subsistence or depressions.
- The landscape profile should be restored, matching as closely as possible to the original land form prior to the distribution of the topsoil. Where possible, slopes steeper than 1(V):3(H) should be avoided, unless there are no other solutions.
- Ensure that there is no ponding or localised/collection of stormwater run-off that will cause soil erosion.
- Ensure that no excavated material or stockpiles of construction materials (surplus and spoil materials) are left on the rehabilitation areas. Surplus and spoil materials are to be transported to another location for re-use or spoiling, disposed at licensed facility, or offered to the landowners.

Topsoil replacement and soil amelioration:

- Execute topsoil placement after scarifying the areas.
- Replace topsoil to the original depth.

Planting/grassing:

- Indigenous vegetation will be used considering the EA and pre-construction specialist report (refer to Fauna and Flora Management).
- All planting and grassing is to be undertaken by suitably experienced contractors using appropriate equipment at designate areas.
- Where required, an on-site nursery may be established or a suitable commercial nursery used.
- Deep rooting plants and trees will not be planted in the pipeline servitude, even if these may have been present pre-construction.
- The land surrounding the pump station and abstraction works will be vegetated with indigenous vegetation as far as possible to ensure minimal maintenance over the long term, including the monitoring and control of exotic or invasive plants.

Maintenance:

- Control the exotic or invasive plants in accordance with Fauna and Flora Management
- Monitor the re-growth of invasive vegetative material.
- Apply the above on failed areas or alternative applications recommended by the ecologist or suitably-qualified specialist.
- The rehabilitation should be completed at the end of the defects notification period of the construction contract, approximately 12-months.
- Only when the rehabilitation has been completed and signed off by the ECO, the project will be closed-out.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review/approve, monitor and inspect the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr, and sign-off on the completed rehabilitation.
- TCTA will be accountable for the Management Objectives.

Monitoring Requirements:

- Rehabilitation activities.
- Public complaints and issues, and responses.
- Record of signed rehabilitation sheets.

10.14 OPERATION AND MAINTENANCE

An operation and maintenance manual will be prepared prior to the operation and maintenance and will include *inter alia* the following*:*

- Operating rules that include the consideration of Ecological Water Requirements and downstream users.
- The land use on the servitude of aqueduct (pipeline) will ultimately return to the landowners for grazing purposes or for the cultivation of crops with a weak root system.
- Environmental requirements and obligations, including the Aquatic Monitoring Programme if the fishway is constructed as part of the development.
- Main access roads and procedures on how to access the actual pipeline and associated infrastructure in the servitude of aqueduct.

Management Objective:

The operation and maintenance activities associated with the development to adhere to environmental requirement and not result in environmental damage.

Indicators and Targets:

Indicator	Target
Issue manual that has clear environmental obligations	100%

Management Actions:

Draft the operation and maintenance manual:

- Maintenance of firebreaks where required.
- Maintenance surface water management systems.
- Management of ablution/conservancy tank system.
- Assess and include details of other monitoring requirements and obligations.
- Access roads and access control requirements.

Responsibilities:

- The main contractor will implement the Management Actions.
- The consultant will review and approve the Management Actions by the contractors.
- The ECO to check compliance with the EA and this EMPr.
- TCTA will be accountable for the Management Objectives in so far as to issue the manual to the owner and operator of the new government water works, being the Department of Water and Sanitation (DWS).
- DWS will be accountable for the operation and maintenance in accordance with the manual.

Monitoring Requirements:

Operation and maintenance manual.

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12 ATTACHMENTS

12.1 ENGAGEMENT WITH CAPENATURE